OFFICIAL OCTOBER 2011 UPDATE SUBMISSION TO THE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION UNDER THE STATE BROADBAND INITIATIVE GRANT PROGRAM FOR THE STATE OF ALASKA

CONNECT ALASKA®

October 1, 2011

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ALASKA COVER LETTER

October 1, 2011

Ms. Anne W. Neville
SBI Grant Program Director
National Telecommunications and Information Administration
U.S. Department of Commerce
1401 Constitution Avenue, NW Room 4716
Washington, DC 20230

Dear Ms. Neville:

As the State Broadband Designated Entity, in partnership with the Alaska Department of Commerce, Community, and Economic Development, please accept this submission from Connected Nation on behalf of the state of Alaska's State Broadband Initiative (SBI) Grant Program, known as Connect Alaska.

These artifacts should be found to be compliant with the October 1, 2011, deadline for the semi-annual data update and in accordance with the terms of the July 1, 2009, Notice of Funds Availability (NOFA) and all subsequent clarifications pertaining to delivery of state-level mapping of broadband service availability. This packet includes:

Inventory of Deliverables, Connect Alaska: October 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing
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n/a	DataPackage.xlsx	Worksheets of Contact Information, Record Count, and Provider Summary Table
n/a	n/a	List of Changes and Corrections to the Dataset
n/a	n/a	Non-Participating Provider Narratives
n/a	n/a	Broadband Provider Roster and Participation Status

In addition, this data update submission should be found to be compliant with the additional program requirements instituted by the National Telecommunications and Information Administration since the time of the April 2011 SBI data submission for the Connect Alaska program. Specifically, these new requirements are:

SBI Data Transfer Model
The submission of the broadband dataset for October 1, 2011, is contained within the SBI Data Transfer Model as released on the Grantee Workspace on June 30, 2011. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information on each provider as possible.

Additional Submission Guidance
This submission also includes a list of changes and corrections made to the dataset between the April 2011 submission and the October 2011 submission. This represents a summary of why data displays and/or supplied speeds, etc. are different from the previous submission. Changes can include upgrades to infrastructure to allow for higher throughput speeds for customers, an expansion of the service area (e.g. additional fixed wireless towers, recently activated DSLAMs, etc.), or a new provider in the marketplace. Corrections can include revisions to speed tier information that was previously reported incorrectly or the addition of a previously existing provider that has not yet been submitted in a semi-annual dataset.

This October 2011 semi-annual data update under the State Broadband Initiative Grant Program continues to demonstrate our dedication to implementing the joint purposes of the Recovery Act and the Broadband Data Improvement Act (BDIA) by gathering comprehensive and accurate state-level broadband mapping data, developing state-level broadband maps, aiding in the development and maintenance of the National Broadband Map, and undertaking statewide initiatives for broadband planning.

Broadband Service Availability — Provider Outreach and Verification

This data update submission under the SBI program includes datasets for 100 percent of the Alaska provider community, which is 22 total providers. Of the 22 participating providers, 10 supplied an update to their network or coverage area(s), while 12 have reported no change. A complete roster by provider depicting participation status and contact record is contained herein.

As the aforementioned roster and attached methodology documentation will attest, it is the collective opinion of the Connect Alaska principals that all commercially reasonable efforts were made to account for 100 percent of the known Alaska broadband provider community, pursuant to this semi-annual data update submission.

Connect Alaska has also continued to perform broadband verification activities through several means. In addition to confirmation of service area(s) by each provider, Connect Alaska conducts field validation efforts. To date, 15 (68.18 percent) providers have been validated through field verification activities. Additional details on verification activities are contained within the Field Validation Methodology.

The Connect Alaska website, www.connectak.org, continues to serve a prominent role in the outreach and data collection effort. This program asset provides a way for the general public to participate in the process by offering interactive tools for users to test their connection speed, submit broadband inquiries, or contact a program representative.

As an indicator of stakeholder penetration, the Connect Alaska website encountered 4,370 unique visits during this reporting period (7,767 total to date for the life of the grant awarded on June 1, 2010). Additionally, this pronounced Web activity netted 8 broadband inquiries over this same reporting period (39 grant inception to date). The website also provides the BroadbandStat application, which allows the consumer to confirm or dispute the coverage represented on the broadband inventory map. These consumer-initiated actions are facilitated through the Connect Alaska website and the Connect Alaska interactive mapping tool (BroadbandStat) that offer the citizens the vehicles to provide information regarding availability in their respective service area, either in affirmation or contest of the reported data represented in the Connect Alaska mapping artifacts. Since the initial data collection and release of corresponding maps, feedback in the form of broadband inquiries has allowed Connected Nation to identify additional areas that are in need of field validation, which is scheduled as soon as possible.

Community Anchor Institutions

Connect Alaska has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBI NOFA Technical Appendix.

Outreach was conducted during this data update reporting period by Connect Alaska to continue identification of existing, centralized sources for CAI connectivity data. Additionally, outreach was coordinated to distribute a CAI survey to institutions throughout the state focusing on the education and higher education sectors through multiple methods including a customized online survey available on the Connect Alaska website. During this reporting period Connect Alaska has developed a number of new relationships with statewide associations such as the Alaska Department of Education & Early Development and Alaska's Vocational and Technical Education System to promote the importance of broadband connectivity at anchor institutions and participation in this data collection process. Connect Alaska will continue to build upon these new relationships over the coming months and utilize its contacts throughout the state to collect data and raise awareness of this project.

Connect Alaska continues to work with the Alaska Broadband Task Force and utilize the inaugural issue of the Connect Alaska CAI newsletter to further outreach opportunities within the state. From our work in Alaska, as well as other states, we recognize the great value of this data to future collaboration efforts within the state as well as its value to the National Broadband Map. We plan to continue to bring best practices to the Connect Alaska efforts, along with an investment of both human and technical resources required to reach our goal of increasing the data that is secured and reported as part of this process.

The Connect Alaska program exists to improve data on the deployment and adoption of broadband services and to assist in the extension of broadband technology across all regions of the great state of Alaska, as well as the United States through contribution to the National Broadband Map. We look forward to the continuing work ahead.

Respectfully submitted,

Thomas W. Ferree
Chief Operating Officer
Connected Nation, Inc.

Data Acquisition: Alaska Community Anchor Institutions Methodology

In this fourth reporting period of the SBI, Connect Alaska, working in close coordination with the state of Alaska, has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBI NOFA Technical Appendix. During this reporting period Connect Alaska has continued to focus efforts on conducting outreach and raising awareness of this important project.

Connect Alaska has continued to identify and process CAI data obtained through an ongoing statewide outreach campaign. Physical address information continues to be augmented through manual sourcing and geocoded by Connect Alaska through ESRI ArcGIS software.

Connect Alaska continues to utilize a customized online survey hosted through SurveyMonkey, with a landing page on the Connect Alaska website that was developed during the first reporting period. This survey, in combination with a customized data-gathering spreadsheet, was distributed to a targeted list of CAI throughout the state. Connect Alaska will continue to use these data-gathering tools for future targeted outreach efforts throughout the coming months leading up to the next reporting period. These materials are customized to fit the CAI categories as defined in the SBI NOFA.

The survey can be accessed at this link using the following password:
http://connectak.org/mapping/Community_Anchor_Institution_Data_Collection.php
Password: CAI_AK_5852

During this reporting period Connect Alaska conducted research, specifically within the education sector, to identify existing, centralized sources for CAI connectivity data. Connect Alaska was unable to locate any additional centralized sources but established a new contact within the Alaska Department of Education & Early Development to distribute our CAI survey in conjunction with a yearly survey conducted by the Department during September and October 2011 to all public schools across the state. These results will be reported during the April 2012 submission.

In tandem with these efforts to identify existing data, Connect Alaska continues to identify key CAI contacts in an effort to distribute and promote the online survey and raise awareness of the importance of CAI broadband connectivity. Connect Alaska has formed a number of new relationships this reporting period with key CAI associations including the Alaska eHealth Network, Alaska's Vocational Technical Education Providers (VTEP), Alaska Pacific University, and the University of Alaska. Connect Alaska has requested participation by these groups to assist with gathering data within the state. Additionally Connect Alaska is working closely with members of the Alaska Broadband Task Force who represent key CAI sectors to assist with outreach and data-gathering efforts on behalf of the project. A key indicator of success from a recent meeting was attendance from a representative of the Division of Alaska State Troopers. They are interested in assisting us with collecting data from the public safety sector and we are now engaged in conducting a joint survey within the state.

Connect Alaska has an ongoing mission to educate CAI throughout the state on the importance of participating in the project. Participation by these institutions will raise awareness about the importance of broadband connectivity and the need to report the requested data for inclusion on the National Broadband Map. Connect Alaska continues to utilize a CAI newsletter which was distributed in March 2011 and is available on the CAI page of the Connect Alaska website. The newsletter is currently being updated with plans to distribute an updated version in Q42011.

The greatest challenge with collecting this data continues to be the difficulty in securing CAI broadband connectivity data. Connect Alaska is overcoming this challenge through new relationships that are being formed, our work with the Connect Alaska Broadband Task Force and the upcoming release of an updated CAI newsletter. Connect Alaska expects noted progress to occur over the coming months leading up to the April 2012 submission and will continue to work in close coordination with the state of Alaska to raise awareness of this important project.

A CAI summary of all processed and submitted data is provided below:

CAI Type	Total	Physical Address	Lat/Long	Technology of Transmission	Download Speed	Upload Speed
K-12	654	654	654	91	84	84
Libraries	131	131	131	46	44	44
Healthcare	89	89	89	5	3	3
Public Safety	323	312	323	3	3	3
Higher Ed Institutions	14	14	14	8	8	8
Other Government	565	565	565	22	18	18
Other Non-Government	440	440	440	3	3	3
Total	**2,216**	**2,205**	**2,216**	**178**	**163**	**163**

SBI DATA SUBMISSION METHODOLOGY

The submission of the broadband dataset for October 1, 2011, is contained within the SBI Data Transfer Model and additional components as released on the Grantee Workspace on June 30, 2011. Connected Nation has reviewed all literature that relates to the release and use of this data transfer model and recognizes that it does not replace or dictate how data is stored, processed, or displayed for the state, as it is meant primarily as a means to transfer the broadband data from all states and territories and populate the National Broadband Map in a seamless fashion. Guidance from the Technical Mapping Guide, as released on the Grantee Workspace on March 24, 2011, was also followed to ensure the completeness and validity of the submission through completion steps and checklists, completing the DataPackage spreadsheet, uploading broadband datasets into the Data Transfer Model, and checking the dataset using the SBDD_CheckSubmission receipt process.

As part of the ongoing review and analysis process, NTIA has requested further information in the submission of the DataPackage spreadsheet. In addition to the information on providers whose coverage and accompanying attributes are submitted in the SBI Data Transfer Model, information on other providers that are considered to be non-viable is also included in the DataPackage. Providers deemed non-viable that have been excluded from continued outreach may have been eliminated for reasons such as (i) the company offers Internet service but at speeds below the current definition of broadband; (ii) the company was listed in advertisements as a broadband provider, but is actually a network solution or consulting firm, etc.; (iii) the company may build or install network infrastructure, but does not actually provide the broadband service to consumers; and (iv) the company has gone out of business. The submitted DataPackage includes any relevant information that has been obtained through the course of due diligence and/or direct provider outreach, such as a Federal Registration Number (if applicable), the company's URL, the existence of an executed Nondisclosure Agreement, and brief notations regarding the status of the company.

In addition to the methodologies contained herein, as well as the DataPackage.xls containing contact information, the data dictionary, and a provider summary table, the following feature classes are submitted within the SBI Data Transfer Model for the state of Alaska.

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Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing.

The provider data collected by Connected Nation on behalf of the state of Alaska have been formatted per the given specifications and uploaded into the appropriate feature classes of the SBI Data Transfer Model. Wireline availability is contained within census blocks and road segments, wireless availability is contained as polygons of coverage areas, and middle-mile connections and Community Anchor Institutions are contained as point data. All speed data is contained at the census block, road segment, or wireless polygon level of availability. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information as possible.

Connected Nation has continued outreach to satellite providers on their availability, technology, and speed information, but granular coverage is not yet available. Submitted within the wireless feature class are the satellite companies providing service to Alaska as a polygon of the state boundary.

Efforts will continue to collect, process, or otherwise create more granular satellite data based on availability analyses and guidance received from NTIA.

Provider Changes and Corrections for October 2011

As requested by the SBI Program Office, a listing of the changes and/or corrections to the datasets between the April 2011 and October 2011 submissions is included in this narrative. This information is presented in this section as well as in the Broadband Provider Log. Changes to the data include expansion of service area(s), activation of new wireless towers, and upgrades to the network to provide higher download speeds to consumers. Corrections to the dataset include the addition of previously existing providers whose coverage has never been submitted, revision of coverage or speed information that was incorrect, and any other items that were misrepresented in the April 2011 dataset.

Changes

- Alaska Power & Telephone, Inc. (DSL): Provider upgraded infrastructure to higher speeds.
- AT&T Corp, Inc. (mobile wireless): Provider expanded mobile territory in old and new regions.
- Copper Valley Telephone Cooperative (DSL): Previously underserved area now meets speed requirements. The provider's entire infrastructure can now reach the top advertised speeds.
- Cooper Valley Telephone Cooperative (mobile wireless): Provider added three additional transmission points and removed one.
- Matanuska Telephone Association, Inc. (DSL): Provider upgraded speed capabilities.
- SPITwSPOTS LLC (fixed wireless): Provider added additional transmission points and upgraded infrastructure to higher speeds.
- Yukon Tech Inc. (cable): Provider upgraded some infrastructure to max download speed tier 3. Previously all cable was underserved.

Corrections

- Alaska Communications Systems Holding, Inc. (ACS) (DSL, mobile wireless): New provider for October 2011 submission that previously refused to participate.
- Alaska Power & Telephone, Inc. (fixed wireless): Provider indicated it does not meet broadband requirements in its five WiFi towns. Were previously stated as download speed tier 3, but in actuality are speed tier 2.
- Clearwire Corporation (fixed wireless): Provider service area is now a real-world propagation unlike prior submissions.
- Hughes Network Systems (satellite): Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.

- Ketchikan Public Utilities (fiber): Provider indicated it was incorrectly reporting its max download/upload business speed tier for the past submissions. Corrected this to speed tier 5 download and 3 upload.

ALASKA FIELD VALIDATION METHODOLOGY

Connected Nation focused a portion of its time on specific validation processes such as:

- conducting random spectrum analysis studies throughout the state using an Avcom PSA-37-XP spectrum analyzer;
- conducting mobile speed tests throughout the state using an iPhone, Android (or other smart phone) as well as provider-specific aircards (Sprint 3G/4G, Clearwire et al);
- identifying pre-selected, provider-submitted wireless transmit tower sites and cross-referencing data about that tower against the Federal Communications Commission (FCC) databases such as Antenna Structure Registration and/or the Universal Licensing System;
- cross-referencing Federal Registration Number data against available FCC Form 477 data as well as the FCC **CO**mmission **RE**gistration **S**ystem (CORES);
- validating provider submitted data (for example: latitude/longitude) using a handheld Garmin eTrex Summit GPS unit or GPS enabled software such as Microsoft Streets and Trips;
- locating physical wire-line attributes (such as remote terminals, CATV plant, etc.) and comparing them against provider submitted data; and
- conducting on-net and off-net speed tests using the FCC portal at http://www.broadband.gov/qualitytest/about/ or using the Ookla Net Metrics enabled speed test utility located on each of Connected Nation's state specific websites.

Additionally, Connected Nation cross-referenced numerous public documents in order to ensure that all known broadband providers were located and contacted. This included searching membership logs from the trade associations (WISPA, WCAI, PCIA, etc.), the Cable Television Fact Book, Public Utility Commission records, Public Service Commission records, Chamber of Commerce, etc.

To date, Connected Nation's staff conducted on-site validation tests in Alaska on the following providers:

Ace Tekk Wireless Internet; AlasConnect, Inc.; AT&T, Inc.; Borealis Broadband; Clearwire Corporation; Copper Valley Telephone Cooperative, Inc.; Cordova Telephone Cooperative, Inc.; GCI Internet; Ketchikan Public Utilities; Matanuska Telephone Association, Inc.; SPITwSPOTS LLC; TelAlaska Long Distance, Inc.; Verizon; and Yukon Telephone Company.

From program initiation through this reporting period, Connected Nation has completed in-the-field validation testing against 15 companies (out of a universe of 22 viable providers) totaling 68.18 percent within the state of Alaska.

Connected Nation has also continued to review provider datasets for accurate speed information, platform listings, and other intricacies that may fall outside of the standard SBI Data Transfer Model parameters. Any providers whose submitted coverage and attributes are anticipated to come into question have been further reviewed and confirmed; details on a case-by-case basis are presented below.

SPITwSPOTS LLC
Issue: Fixed wireless platform with maximum advertised download speed in tier 7, higher than expected value range for the technology.
Resolution: Provider website advertises 12 Mbps service, screenshot available below.

Internet Subscription Rates:

- 400k Service $20 monthly
- 2Mb Service $59 monthly
- 3Mb Service $90 monthly
- 4Mb Service $107 monthly
- 5Mb Service $128 monthly
- 6Mb Service $146 monthly
- 7Mb Service $162 monthly
- 8Mb Service $176 monthly
- 9Mb Service $189 monthly
- 10Mb Service $200 monthly
- 11Mb Service $210 monthly
- 12Mb Service $218 monthly

ACCURACY AND VERIFICATION: PROVIDER VALIDATION METHODOLOGY

Broadband providers maintain their service area data in many different formats, all in varying levels of complexity and granularity. In order to ensure that the data required by the NTIA is standardized across all providers and that it is as accurate as possible, Connected Nation translates and formats the data that providers are able to supply into a GIS shapefile and produces maps for the provider to review. The resulting map(s) and review process allow for providers to see their service area in a geographic format – for some providers, this is the first time they have seen maps of their broadband service area. Having the mapped service area allows providers to quickly identify any issues that appear in the data representation, whether the issue is in the data translation into a GIS format or from the original data collection and submission. Often data is provided from various sources and through the review and revision process, local engineers who operate the networks and work in the field are able to ensure that the tabular data that has been submitted is accurate and represents the real-world network extent. Any issues in how the service area is represented on the map(s) are remedied by Connected Nation, whether they are additions, removal of service, or any other revisions. Revised maps of service area representations are sent to the provider for review and approval; Connected Nation will revise data and return maps as many times as necessary until the provider is in agreement that the map represents their service area as accurately as possible. Once the review process has been completed and final approval of the data is provided, the data is deemed ready for NTIA submission.

Once the data collection has been aggregated at a statewide level, static maps of statewide and county-level availability are produced and made publicly available. In addition, consumers can visit the interactive online tool, BroadbandStat, to create customized views of broadband service areas and analyze corresponding demographic information. Leveraging broadband service data on various platforms allows for public users, providers, and other stakeholders to review, scrutinize, and provide feedback on the represented data. This feedback becomes a validation method in itself as consumers submit inquiries to Connected Nation either affirming where service is not available or identifying areas where broadband service is shown on the map, but in actuality is not available. This allows for a follow-up to providers regarding revisions to the data as it is represented; it also allows for Connected Nation to identify locations where on-site visits may be necessary to complete field validation of available services. Public feedback on all forms of mapping products serves as a localized validation method for provider-supplied information and allows Connected Nation to resolve inaccuracies as they are identified to ensure that only the highest quality information is provided to stakeholders.

Estimates derived from provider-validated data indicate that approximately 9.31 percent of Alaska households do not have terrestrial fixed broadband service available, and approximately 7.52 percent[1] of Alaska households have neither mobile nor fixed broadband service available.[2]

Within rural areas of the state, results derived from provider-validated data indicate that approximately 19.51 percent of rural Alaska households do not have terrestrial fixed broadband service available, and approximately 16.14 percent[3] of rural Alaska households have neither mobile nor fixed broadband service available.[4] Please note that the availability estimates presented are based on Census 2000 household information; these figures will be updating in the near future with Census 2010 household information.

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[1] In accordance with NTIA's definition of available broadband service as specified in the SBI NOFA, this estimate includes both terrestrial fixed *and* mobile broadband service, if the service offers download speeds of at least 768 Kbps and upload speeds greater than 200 Kbps.

[2] Due to the nature of the SBI data collection methodology as defined by the NTIA and based on both census block geographic units and street segment data, the estimates of broadband availability derived from provider-validated data may include an overstatement of the actual number of households with broadband availability. Under the census block-based data collection method, a provider will typically report broadband availability for an entire census block whether its network is present across the whole or only a subset of that census block. This potential overestimation at the census block level can be amplified as the data is aggregated across the entire state.

[3] See footnote 1.

[4] See footnote 2.

WIRELESS METHODOLOGY

Broadband Service Availability in Provider's Service Area
Wireless Services Not Provided to a Specific Address

Data solicited from a fixed wireless provider to create propagation models include, but are not limited to:

1. The name of the structure
2. Whether the transmitting device is operational or proposed
3. The maximum advertised downstream speed, the maximum advertised upstream speed
4. The typical downstream speed, the typical upstream speed (peak periods for both)
5. The frequency range of spectrum being used (as prescribed by NTIA)
6. The primary population center(s) being served (for geopolitical boundary reference)
7. The physical address of the transmit site (in the event latitude/longitude is unavailable from the provider this allows a quick reference point for geocoding)
8. Latitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
9. Longitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
10. Antenna pattern (e.g. omni-directional, 180°, 120°, 90°, etc.)
11. Azimuth of antenna (e.g. 360° with magnetic declination if known)
12. Approximate transmit radius (in feet, miles, or kilometers)
13. Polarity of transmit antenna (Vertical or Horizontal)
14. Transmit antenna gain (in dBi)
15. Line loss (applicable only to providers using coax, heliax, waveguide or other forms of cabling – excludes power-over-Ethernet devices)
16. Mechanical and/or Electrical beam tilt (if applicable)
17. Equipment Manufacturer (allows easy cross-reference against manufacturer's specification sheet)
18. Power output of the transmitting device (if unknown, FCC standards or manufacturer specifications are applied)
19. AMSL at base of tower site
20. Antenna centerline AGL (height of antenna above ground level measured at the centerline of the actual antenna)
21. Foliage factors (Evergreens/Deciduous and percent of ground cover)
22. Ground Clutter (primarily used in rural areas to account for foliage and in metropolitan areas to account for types and heights of buildings if known)
23. Average gain of receive antenna
24. Receive antenna is estimated at height above average terrain (HAAT) of 6.2 meters/20 feet
25. Federal Registration Numbers (if applicable) which may allow opportunities to cross-reference and/or obtain additional data from the Federal Communications Commission Universal Licensing System and the **CO**mmission **RE**gistration **S**ystem

Propagation modeling is an empirical mathematical formulation for the characterization of radio wave propagation as a function of frequency, distance, and other conditions. Propagation software(s) typically use the Irregular Terrain Model (also known as Longley-Rice) of radio propagation for frequencies between 20 MHz and 20 GHz. This model is based on electromagnetic theory and statistical analyses of the combination of terrain features and radio measurements, then predicting the median attenuation of a radio signal as a function of distance and the variability of the signal in time and in space. For metropolitan areas, the software can typically be adjusted to use the Okumura-Hata model which accounts for predicting the behavior of cellular transmissions in areas where buildings are the primary obstructions. The resulting product from either model depicts a graphical illustration of the theoretical propagation characteristics of a selected frequency range based on defined variables (receiver sensitivity of the home/mobile device, foliage factor, and digital elevation terrain input).

After converting propagation models into a geospatial format, additional processing is completed to remove the small pixels representing service present in the resulting dataset. These areas are initially created based on the parameters entered in the software from the provider equipment information, the underlying data parameters of elevation, hillshade, etc., and the limitations of the software itself to display a broadband service area as accurately as possible. Generally, these random pixel striations appear as a result of signal levels reaching the highest elevated points within the prescribed radius. Typically, while this pixilation anomaly shows legitimate areas where signals can be received, these highly elevated points may have exceedingly sparse populations or are entirely void of population. As a result, and congruent to the *Wireless Technology Methodologies and Business Logic* white paper submitted to NTIA on January 20, 2011, all independent pixels representing service that are less than 0.125 square miles in area have been removed from the geospatial representation of each wireless provider.

Broadband Inquiries Methodology

Connected Nation collects consumer feedback in the form of broadband inquiries (BBIs). These inquiries represent any type of communication received from the public regarding broadband service. Once BBIs are received across the state, this information is overlaid with the broadband availability information which was collected through the SBI program. This allows for a real-world comparison of the broadband landscape to the information received from broadband inquiries. Consumers submitting these inbound comments and/or inquiries are able to provide information regarding three categories: 1) residents who do not have broadband but want it; 2) residents who have broadband but want a different provider; and 3) residents who do not have broadband, but the broadband inventory maps indicate that they do.

BBIs are submitted frequently by consumers via the Connect Alaska website. Inquiries often seek help to identify local broadband provider options, or to learn when a specific provider may be able to provide service to that consumer. Consumer comments also provide information which may help modify maps with actual service area information. The primary objectives of Connected Nation regarding these inquiries are 1) to improve the accuracy of the state maps with submitted consumer information and follow-up field research; 2) to provide broadband options to consumers through cooperation with mapped providers and by facilitating new broadband service options; and

3) to map and analyze information from consumers about areas of unmet broadband demand and alternatives to currently mapped services.

New BBIs are assigned to either the GIS department or the Engineering & Technical Services (ETS) team depending on the category entered by the consumer on the website submission form. The GIS or ETS team members respond to each inquiry according to the information requested by the consumer. Many BBIs can be resolved through desktop research; however, if a BBI requires research in the field, the assigned ETS team member conducts such research when performing field validations in the area of the inquiry, or at other such time as is practical and appropriate. GIS and ETS team members respond to and conclude BBIs via telephone contact and/or e-mail communication.

The broadband inquiry process has been implemented in each of the Connected Nation state programs with successful results. Altogether Connected Nation has received over 17,000 broadband inquiries since 2007, allowing the state programs to evaluate each inquiry for broadband demand and data verification. These inquiries are continuously examined against current broadband availability, updated every six months, to determine if previously unserved households have been expanded to and can now receive broadband at their residence. This database of broadband inquiries has also allowed the Connected Nation state programs to aggregate demand in concentrated areas to show providers the exact locations where the population has made it clear that they would purchase broadband if it was made available to them. Providers in the states have responded to this process and have expanded to areas knowing that their investment will be worthwhile. Data verification methods have also proven successful, as the state programs have been able to show those inquiries that indicate the broadband service areas are misrepresented on the map to providers, who then verify where service cannot reach in regard to that residence(s). The broadband coverage in these states has been altered to create a more accurate map based on the inquiries submitted by the public.

During this reporting period, the Connect Alaska project has received a total of 8 inquiries (39 grant inception to date). As more inquiries are submitted to Connect Alaska, a more thorough validation of the broadband landscape can be performed, while also allowing providers to see which areas have a high demand for broadband adoption.

BroadbandStat Methodology

BroadbandStat is an online, interactive mapping tool for viewing, analyzing, and validating broadband data. Developed through a partnership with ESRI, the market leader in geographic information system (GIS) software, BroadbandStat is a multi-functional, user-friendly way for local leaders, policymakers, consumers, and technology providers to devise a plan for the expansion and adoption of broadband.

First and foremost, BroadbandStat allows consumers to locate their residence and identify providers that offer broadband Internet service to that location. The interactive platform allows for users to build and evaluate broadband expansion scenarios using a wealth of data, including education and population demographics, broadband availability, and research about the barriers to adoption.

New functionality in BroadbandStat allows the consumer to provide feedback on the broadband data displayed on the interactive map. Through the collection of this feedback, a visual demand for broadband is presented. This visualization allows the Connected Nation state programs the ability to validate the broadband availability for accuracy. If residents within a region state they are without broadband, but the interactive map shows otherwise, this allows Connected Nation to approach the providers within that area in an effort to trim down their coverage to more accurately represent real-world availability on the ground.

The Connect Alaska project launched BroadbandStat on September 1, 2010, and has received a total of 1,113 visits to date, of which 303 occurred this reporting period.

Speed Test Methodology

The 460 speed tests that are represented in the Connect Alaska Speed Test Report during this reporting period (1,269 grant inception to date) are the result of a partnership between Connected Nation and Ookla Net Metrics. Utilizing this relationship increases the level of confidence in the data being collected and provides for a far greater sample size than could be collected by a single testing site.

Ookla owns and operates Speedtest.net, as well as develops and deploys speed tests, such as the Connect Alaska speed test website, for partners around the world. This network of sites that is developed and run on its testing technology provides Ookla with a vast dataset that, due to the variability of geographic information collected across the varying speed test sites, is geocoded utilizing Geo-IP technology. This technology allows for tests to be geocoded to points of aggregation, typically larger nodes across provider networks. While there are hundreds of thousands of tests that have been conducted, the level of aggregation is only sufficient for county-level detail due to the test results being located at these larger nodes and not at an absolute location for each speed test.

In an effort to validate broadband data from the Connect Alaska project, speed test information is collected throughout the state. Speed tests provide speed information on the path taken through all networks (a provider's network as well as additional networks) a local machine must connect to in order to reach the host test. The benefit of this collection of speed information is two-tiered. First, it allows for a comprehensive dataset of speeds, while also providing Connect Alaska with the information on where broadband services are available. Second, unlike theoretical speed information which was received through the data collection process, the use of speed tests provide real-world information on the speeds that currently exist within the state of Alaska.

Broadband Provider Log

Complete	31
Non-Responsive/Refused	0
In Progress	0
Count of Datasets by Status	**31**
Total Unique Providers Represented	**23**

Provider Name	Platform	Status	NDA Execution Date	Notes
Alaska Communications Systems Holding, Inc. (A	DSL	Data Added to Statewide Inventory	6/2/2011	[SEP-1-11 Brian Dudek] Correction: New provider for October 2011 submission that previously refused to participate.
Alaska Communications Systems Holding, Inc. (A	Mobile Wireless	Data Added to Statewide Inventory	6/2/2011	[AUG-15-11 Brian Dudek] Correction: New provider for October 2011 submission that previously refused to participate.
Alaska Power & Telephone, Inc.	Fixed Wireless	Data Added to Statewide Inventory	2/26/2010	[AUG-17-11 Brian Dudek] Correction: Provider indicated they do not meet broadband requirements in their five WiFi towns. Were previously stated as download speed tier 3, but in actuality are speed tier 2.
Alaska Power & Telephone, Inc.	DSL	Data Added to Statewide Inventory	2/26/2010	[AUG-18-11 Brian Dudek]Change: Provider upgraded infrastructure to higher speeds.
AT&T Corp, Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/16/2009	[AUG-30-11 Brian Dudek] Change: Provider expanded mobile territory in old and new regions.
Copper Valley Telephone Cooperative, Inc.	DSL	Data Added to Statewide Inventory	1/11/2010	[AUG-30-11 Brian Dudek] Change: Previously underserved area now meets speed requirements. The provider's entire infrastructure can now reach the top advertised speeds.
Copper Valley Telephone Cooperative, Inc.	Mobile Wireless	Data Added to Statewide Inventory	1/11/2010	[AUG-30-11 Brian Dudek] Change: Provider added three additional transmission points and removed one.
Ketchikan Public Utilities	Fiber	Data Added to Statewide Inventory	1/8/2010	[AUG-31-11 Brian Dudek] Correction: Provider indicated they were incorrectly reporting their max download/upload business speed tier for the past submissions. Corrected this speed tier 5 download and 3 upload.
Matanuska Telephone Association, Inc.	DSL	Data Added to Statewide Inventory	6/15/2010	[AUG-31-11 Brian Dudek] Change: Provider upgraded speed capabilities.
SPITwSPOTS LLC	Fixed Wireless	Data Added to Statewide Inventory		[AUG-18-11 Brian Dudek] Change: Provider added additional transmission points and upgraded infrastructure to higher speeds.
Yukon Tech Inc	Cable	Data Added to Statewide Inventory	6/23/2010	[AUG-16-11 Brian Dudek] Change: Provider upgraded some infrastructure to max download speed tier 3. Previously all cable was underserved.
Alaska Communications Systems Holding, Inc. (A	Backhaul	Backhaul Provider Only Processing Complete	6/2/2011	
ATCONTACT COMMUNICATIONS	Backhaul	Backhaul Provider Only Processing Complete		
GCI Internet	Backhaul	Backhaul Provider Only Processing Complete	2/25/2010	
Ace Tekk Wireless Internet	Fixed Wireless	No Update to Provide		
Adak Eagle Enterprises, LLC	DSL	No Update to Provide	12/22/2009	
AlasConnect, Inc.	Fixed Wireless	No Update to Provide		[SEP-7-11 Brian Dudek] Although generalized, according to provider representative, service area is derived from a real-world wireless propagation and real work combined.
American Broadband Communications	DSL	No Update to Provide	6/7/2010	
Borealis Broadband Inc.	Fixed Wireless	No Update to Provide	2/1/2010	
Borealis Broadband Inc.	Backhaul	No Update to Provide	2/1/2010	
Clearwire Corporation	Fixed Wireless	No Update to Provide	3/3/2010	[SEP-7-11 Brian Dudek] Correction: Provider service area is now a real-world propagation unlike prior submissions.
Cordova Telephone Cooperative, Inc.	DSL	No Update to Provide		
Craig Cable TV, Inc.	Cable	No Update to Provide	7/27/2010	
GCI Internet	Cable	No Update to Provide	2/25/2010	
GCI Internet	Mobile Wireless	No Update to Provide	2/25/2010	[SEP-6-11 Brian Dudek] Connected Nation was unable to acquire real-world wireless propagations or the needed data to develop them for this submission.
Hughes Network Systems, LLC	Satellite	No Update to Provide	2/5/2010	[SEP-16-11 Brian Dudek] Correction: Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.

Ketchikan Public Utilities	DSL	No Update to Provide	1/8/2010	
Kodiak Kenai Cable Company	Backhaul	No Update to Provide	2/7/2011	
MCI Communications Services, Inc.	Backhaul	No Update to Provide	12/14/2009	
OTZ Telephone Cooperative, Inc.	DSL	No Update to Provide		
Yukon Tech, Inc.	Fixed Wireless	No Update to Provide	6/23/2010	

State Broadband Initiative Mapping Methodology

For the States of Alabama, Idaho, Wisconsin and Wyoming
Revised September 30, 2011

CostQuest Associates

LinkAMERICA Alliance

Contents

Overview

The following documentation provides an overview of how the fourth required data set was collected and processed for the State Broadband Initiative (SBI) in the states of Alabama, Idaho, Wisconsin, and Wyoming.

Although we could separate this draft into state-specific deliverables, the majority of methodology remains intentionally consistent among the states. As one important validation test is comparability across states, we find value in this cross-state approach. This cross-state approach also helps the LinkAMERICA team focus on comparable outcomes across the four states, where appropriate. Our intent is not to make the states look and be the same, rather it is to leverage economies of scope and scale among the business processes.

As expected, this document rests heavily on the prior drafts, but has also been updated and expanded.

Significant changes include additions covering:

1. Trends in provider inputs
2. Expansion in retrieval of WISP coverage
3. Requested changes based upon NTIA guidance
    a. Modification of Satellite providers as a Type 1 Broadband provider;
    b. Discontinuation of estimating Community Anchor Institution coverage and speed;
    c. Review of submitted speed with respect to NTIA supplied frequency table
4. Transition planning with respect to capacity building within the State for Broadband map development
5. Development and posting of a provider Type classification rubric

Treatment of the following subjects has been expanded:

1. Community anchor institutions and survey methodology
2. Verification and validation
3. Data production methods
4. Conversion to Census 2010

As anticipated, the SBI program continues to mature and evolve. Technical leadership and strong program office guidance has been appreciated. We continue to focus resources on establishing stable business processes to track submissions, verify received and processed data, test for temporal stability and provide reporting deliverables consistent with NTIA expectations.

In our view, the mapping deliverable reflects (1) a good faith effort, which results in a reasoned response to the NOFA, Technical Appendix A, as well as supplementary program office guidance and modifications offered in phone calls, emails, and webinars, (2) a stable foundation for improvement and prioritization of both NTIA and state needs and interests , (3) a valid data processing model to support

online mapping, consumer feedback, provider verification and reporting, and finally, (4) a valid use of the evolving data transfer model and its intrinsic validation methods. More importantly, the resulting data and online coverage maps that follow from this work are providing good input and context for the Broadband planning teams working across the states we have the pleasure to serve.

We close this methodology document with two Appendices. Appendix One describes Data Collection Challenges. This section describes some of the open issues, challenges and questions we are exploring. Our hope is to receive clarification and counsel from NTIA in how best to confront some of these issues, which are likely common across states. Appendix Two describes the confidentiality framework explained by NTIA.

Purpose of This Manual

This technical document was developed to provide transparency in our data production process.

Our goal is to illustrate a thoughtful process designed to meet the intent of the submission. Our hope is that we have developed a process that is reasonable, with respect to the data it deals with, as well as flexible enough to change with evolving NTIA requirements and lessons learned from the Broadband mapping community.

Data Sources

Developing the Provider List

Provider lists for all states were developed at project inception from the following sources:

- State lists of regulated telecommunications, cable and wireless service providers
- State and national industry organizations (i.e. cable associations, wireless service provider organizations, telecommunications associations)
- FCC Form 477 respondents
- Independent web searches
- Prior comparable mapping/research efforts
- Interviews with key state staff members and important community influencers

After the April 1, 2011 “Round 3” submission, we continued our research and added new providers to the program as discovered. As one would expect in a dynamic marketplace, provider identification is an ongoing and important component of our work. Mergers and acquisitions, the use of multiple regional DBAs, the lack of any universal identity management attribute, and the generally complex parent-subsidiary structure of many telecommunications companies, make provider identification and tracking very challenging.

In early July 2011, we once again initiated an email and telephone outreach campaign to contact all known providers. This is an extremely time consuming process, but it is necessary to ensure that the list of contact persons remains current, and that providers are aware of data request changes and deadlines

associated with each round. Where necessary, we execute new NDAs with providers. In “Round 4”, this effort continued on a daily basis until we reached our final data submission deadline on August 19, 2011.   After August 19, we continued to work with providers who were not able to meet the deadline. In most cases were able to “crash” our process to accommodate this extra data, but late submissions continue to create inefficiencies and add costs to the overall program. In Round 4 providers that responded too late to be included in the final dataset will be included in our Round 5 submission. Once again, as contact is made in each round, we verbally qualify each provider by asking a series of questions regarding the type of service and speeds offered. If the provider does not meet the minimum specifications for a Broadband provider (as defined in the NOFA) we make a note of their status and remove them from the data submitted to NTIA.[1] We continue to reach out to them in future rounds in the event that their service is upgraded or expanded.

Provider Outreach

To meet the program’s aggressive deadlines and participation goals, LinkAMERICA believes it is critical to maintain rapport with providers. To do this, we continued to reach out to providers with regular project communications, including a program newsletter and links to the various state mapping websites. As described above, individual e-mails and/or telephone calls were made to all providers explaining the status of the program and requesting their continued support in Round Four. We’ve also had the opportunity to support providers in their BTOP / BIP applications in certain cases. Through these collective outreach initiatives, and our engagement with various industry associations, we continue to enjoy a healthy and appropriate relationship with Broadband service providers.

NDA

To provide protection for all parties involved, LinkAMERICA continues to honor the terms of our NDA. If providers did not execute the NDA in previous rounds they were offered the opportunity to do so in this collection round.   New providers were of course also supplied with a copy of the NDA.

To facilitate the execution of NDA’s, LinkAMERICA continues to use the DocuSign online document management solution. This system allows providers to review and digitally sign the NDA in a legally binding manner, and has been instrumental in achieving rapid approval and execution of NDAs with the majority of providers. In some cases, NDA’s were individually negotiated to address specific provider concerns. In all cases, minimum standards established by the NOFA are honored. In other cases, providers chose to submit data without executing an NDA.

Provider Survey

Since three prior rounds of data collection had been completed, the LinkAMERICA team had a solid base of coverage and speed information with which to begin Round 4. This allowed us to provide two response options to providers. The first was for them to review check maps of their coverage and speed data – submitting only corrections and additions to the existing dataset. (For provider convenience the

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[1] As with other Grantees, we struggle with appropriate and consistent classification for service providers who opportunistically provision Broadband services. In this submission we continue to bring them into the analysis as a provider type “other”. As the inclusion of this category isn’t our primary goal, we are working to process data as we can. We are similarly categorizing and retaining reseller information. Our datapackage.xls illustrates the categorization of non Broadband providers within our provider tracking and verification systems.

check maps were created in both PDF and Google Earth (.KMZ) formats.) The second was to allow submittal of completely new datasets, either in tabular form or in multiple other digital formats. For those without sophisticated CAD or GIS systems, we continued to allow the submittal of printed/scanned maps and other written materials.

Survey Methods

Once again, we used a secure digital survey process (via our provider portal websites) to collect and display information for providers. The Round 4 survey process was designed to accommodate both new and returning providers, and the different types of information they would be submitting. The following is a summary of the process encountered by each group:

New providers: New providers were routed directly to our standard survey where they were provided with templates for uploading data in tabular NTIA-compliant formats. As in previous rounds, if providers could not supply information in the requested format, alternatives were offered. These alternatives included uploading service-area boundary maps, exchange area maps, CAD drawings or customer address lists. From that information, the LinkAMERICA team developed a geographic representation of coverage and was able to build coverage features for each provider.

Returning providers: For Round 4 we continued to work with participating providers to improve their datasets. The change in Census Data vintage was explained to providers and links to appropriate files were provided to assist with the transition to the new vintage data.

Check maps continue to be a useful tool to show providers how their area would be displayed on the resulting interactive state map and to get constructive feedback regarding corrections and changes that need to be made to their coverage and speed data. Generating these customized documents in each round is an extremely time consuming verification process, but it allows us to close many of the gaps that might have otherwise persisted.

Follow Up

After the release of the Round 4 survey in early July 2011, LinkAMERICA launched an extensive effort to encourage responses. Every known provider was contacted at least twice during the months of July and August. The initial data submission deadline was set for August 19, but, as previously noted, we continued to accept “straggler” submissions into September.

No Response Policy

As mentioned above, every effort was made to contact each provider who appeared on our initial list. However, if no current information could be found on the company (i.e. no website, no valid phone number, no contact person identified) they were removed from the list of “known providers”. We believe the vast majority of those we were unable to reach were providers who have simply ceased to exist[2].

[2]The list of known providers and important submission statistics are contained in the datapackage.xls file.

Summary

In summary, an intensive 45-60 day provider outreach and data collection process is initiated at the beginning of each round. In Round 4, given the data vintage of June 30, 2011, we began this process in July and the last submissions were accepted in September, 2011.

While we continue to successfully engage the majority of providers in each round, the amount of manpower required to solicit complete and timely responses should not be underestimated. This process is one of the most costly and complex within the entire SBI program.

Third Party Data Used

Beyond the data obtained from providers, we acquired the following commercial data products:

- American Roamer, Coverage Right Advanced Services. This data served two purposes. The first was to verify the provider list and help find Broadband service providers not on other lists. The second was to verify the reasonableness of the Broadband service provider's submission.
- MapInfo ExchangeInfo, Professional. This data was used in the verification of telephone Broadband provider data. Where a public domain exchange boundary wasn't available, the MapInfo boundary was used for coverage containment tests.
- Media Prints Cable boundaries. This data was used in the verification of Cable/HFC Broadband provider data. It was used to research valid providers and discover if that provider was offering Internet service. In very rough terms the contained boundaries were used to test the location of some provider data.
- FCC 477 restricted use data were analyzed to find valid providers within a given area.

We have included third party data sources, which touch on each of the three major technologies analyzed within the SBI program. Each of these data sources tie back to a public domain data source, which provides a cross-verification mechanism for the commercial data product.

Although there are a large number of third party licensed data sources available, we remain conservative in our acquisition plans. From our limited analysis we are concerned about the ability to cross-verify additional third party licensed sources against public domain data. Further, we are unsure of how we may be able to integrate another data provider's view of valid Broadband providers within the definitions used by the NOFA (eg. Are they using an FRN/DBA identity view or a marketing view? Can the provider supply in a 7-10 day window? Are they facilities based or not?). This leads us back to a statement we made in a 'lessons learned' Webinar (April 2010) about exploring a consortia to lower the cost of data acquisition and allow multiple entities to peer review the quality and methodologies behind licensed data products.[3]

Beyond these commercial data sources, we used a number of public domain sources. These included:

a. Geographic Data Files

[3] We also suggested forming a technical standards committee and a consistent system for confidence reporting.

    i. US Census TIGER data[4]

b. Sources that helped isolate providers, identity management or provider service areas
    i. NECA Tariff 4
    ii. State produced exchange boundaries
    iii. Carrier produced wirecenter boundaries
    iv. FCC Coals reports (321/325)
    v. FCC FRN API lookup tool
    vi. FCC/FAA Antenna Registration System
    vii. FCC FRN Lookup Tool (plain text search)
    viii. USAC High Cost FCC Filing Appendices
c. Sources that helped isolate anchor institutions
    i. USAC Grant lookup tool
    ii. USAC High-Cost FCC Filing Appendices
    iii. HRSA data warehouse
    iv. NCES data lookup
    v. State managed lists of schools (K-12), post-secondary institutions and libraries
    vi. List of museums, conventions, and visitors bureaus from www.onlineatlas.us

Finally, challenges exist when dealing with the inevitable conflicts between provider-submitted data and third party sources (public or commercial). There is no guarantee third party sources are more accurate or timely than the providers' own reports. Indeed, some third party sources are based upon different standards than those specified in the NOFA, perhaps making them less reliable than information collected directly from providers. At the very minimum, provider data has a lineage and temporal status that we can identify. A concern we have with increasing use of third party data is that we have no way to verify its quality or development methodology. In other words, we may hit a wall in which we can't determine how the commercial source derived its coverage conclusion. To us this means that third party data sources are beneficial, but represent a supplementary view, not an authoritative one, of the NOFA defined Broadband market.

In short, we have chosen to use provider data as the baseline. We will challenge provider reports when third party data shows major anomalies, when submitted data conflict with prior submissions or when a consistent volume of consumer feedback points to a potential error.

As the program evolves it is also our intention to provide tools that allow end users to evaluate the accuracy of the data in their own way. A confidence score or the presentation of multiple (and potentially competing) reports for the same location may be made available. This notion is discussed further in the "Validation" section.

[4] Census data were derived from < http://www.census.gov/cgi-bin/geo/shapefiles2010/main>, Census 2010 files. Roads were derived from the county faces and edges file downloaded at the same location and tiled for a full state.

Confidentiality and the Use of Licensed Materials

As a mapping vendor, we are reliant upon the cooperation of Broadband service providers. In large part, what underlies this cooperation is trust that we will not violate the proprietary and confidential nature of the data provided to us.

We are thankful for the confidentiality clarification that NTIA shared with us (included as Appendix Two). We intend to use this as a guiding document to help us communicate with providers about what information NTIA considers to be confidential. Our suggestion is that NTIA publish this, or something comparable, to ensure a consistent interpretation of the NOFA and how it guides NDAs.

As some providers are non-responsive to requests for information, or lack resources necessary to put data into NTIA compliant formats, we have fallen back to the use of commercial data sources in several places.

For instance, some mobile wireless providers were unable to submit coverage information to us. In these circumstances we have generalized the American Roamer coverage. For incumbent telephone providers we have used commercial wirecenter boundary products to filter Census Blocks that are clearly out of their exchange areas.

Public Engagement: Crowd Sourcing, Surveys and Social Media

Crowd sourcing (i.e., an intentional and carefully designed effort to tap into the collective intelligence of the public at large to expand our knowledge base) continues to be an important element of our data collection and validation process. In addition to the various opportunities the public has to provide input via the online service coverage maps and the related 'Broadband story' process, our crowd sourcing efforts are grounded in a time tested telephone survey approach focused on the consumer market. In addition, we continue to advance our process to include certain initiatives centered in two social media outlets – Facebook and Twitter. These initiatives are discussed below.

Consumer Surveys

Working under contract for the state of Alabama in 2009, our initial consumer survey was performed before the NTIA SBI grant was in place. Subsequent consumer surveys funded by the SBI grant were hosted in 2010 for the states of Idaho, Wisconsin and Wyoming and then again in 2011 for Alabama (as noted below). These surveys will be repeated after two years to establish and evaluate trends. To this end, in August/September 2011 we are wrapping up a second-round survey in Alabama designed to expand our understanding of important adoption issues and to establish important local trends from the initial 2009 survey. Survey results from this effort are currently under evaluation. These primarily telephone based surveys include two distinct and carefully scripted tracks: one for Internet users and one for non-users. The telephone survey approach allows us to reach the non-Internet user group as well as the current Internet user. A secondary online approach is also used to augment input from current Internet users. In the most recent Alabama survey we added a third tier to our approach as we equipped local field survey teams with an iPad-based survey tool and targeted their time to reaching the younger market. For non-users, the surveys help determine why they don't have or don't use

Broadband. For current Broadband users, the survey helps determine the nature of their Broadband access and how they use that connectivity in their daily lives. In addition to our state-specific surveys a nation-wide survey was also hosted to provide a broader view of consumer views for comparison purposes. State-specific surveys are, where possible, framed to match the state's regional Broadband planning structure (e.g., the updated consumer survey in Alabama was designed to produce results relevant to the state's twelve Broadband planning regions).

The resulting data is helpful on a number of fronts in the SBI's mission to advance the access and adoption to Broadband. Survey data provides an important, albeit broad, gauge for assessing coverage information obtained by providers. For example, areas with widely available coverage (according to provider information), but lower consumer subscription levels (according to survey results), or perhaps where survey results suggest Broadband is not available, can be examined in more detail. Survey results are also very important to the Broadband planning (and capacity building) components of the SBI program in that they help inform and formulate Broadband advancement priorities. Survey results also help inform Broadband policy discussions on both the local and state levels. Finally, survey results provide important information to the service provider community regarding market demand and specific Internet use in specific communities (i.e., regions).

Our ongoing consumer survey process adheres to a consistent process. For example, consistent with prior practice the 2011 Alabama survey was launched in June 2011 with a test number of survey calls to confirm (and adjust as needed) the structure of the survey and the underlying survey process. Our surveys typically run for three to four months. All telephone surveys are completely random beginning with the acquisition of a list of state-specific, randomly selected landline telephone numbers. Mobile phones are not typically included in the surveys. Upon evaluation of the survey statistics, auxiliary surveys are executed to ensure appropriate representation is achieved on both demographic and geographic fronts. For example and as noted above, the recent Alabama survey was augmented with a field effort to ensure the younger demographic (i.e., age 18 – 25) was adequately represented. This secondary step is required because of the continued migration (by younger markets) to non-landline based communications. This younger market is also surveyed by reaching out through social media outlets to encourage their participation in an online survey process.

Survey statistics from the Alabama update survey are currently being developed and evaluated. Survey statistics from our initial surveys in Idaho, Wisconsin and Wyoming were summarized in our last filing. Survey volumes are designed to achieve statistical validity.

As noted above, our telephone survey process is augmented by providing online access to the survey. Participation in the online survey is promoted on all of our state-specific public web sites and selected social media.

As a final relevant point with respect to the consumer survey process the length of the survey is noteworthy. By survey standards, these tend to be long surveys. The surveys typically average just over fifteen minutes. While this clearly contributes to the number of survey call attempts that were required to reach the level of statistical validity, it is not insurmountable.

Social Media

The phenomenon of social media is widely documented and yet still emerging as an effective access point for public engagement. We continue to explore appropriate ways to use a variety of social media venues in our SBI efforts. All of our efforts are informed by and consistent with relevant state statues and guidelines. Different states have different perspectives on if and how the state will participate in the use of social media. Some state requirements are well defined and some are still being formed. Where appropriate, we use LinkedIn, Facebook and Twitter to support our work. A central focus is on promoting awareness. As noted above, we are able to promote additional input on the consumer surveys through a social media outreach program aimed at our younger market segments.

In addition, we continue to evaluate how Facebook and Twitter can be used to drive public input on two important crowd sourced issues: online speed tests and input on map accuracy. Based on data obtained through our web site traffic monitoring process and readily available social media tracking processes, our most recent results are promising.

Capacity Building and Transitioning to State Partners

A foundational goal of LinkAMERICA has always been to transfer knowledge and capacity to our State partners. As we move into program year 3, distinct tasks are migrating to the responsibility of our State partners.

Within each State, transition planning and responsibility for specific activities is on a slightly different timeline. Much of this is driven by resource availability and partner identification within the State. For example in round 3, the State of Alabama used interns to validate Community Anchor Institution (CAI) data. In this submission Alabama took on greater responsibility for the CAI submission. To support this LinkAMERICA developed a detailed transition document describing the current CAI efforts.

Other States are looking more towards program year 3 and the in-State hire of a Broadband Coordinator as the initiation point to support their transition efforts.

Data Production Process

To support our objective of transitioning the data development process to our State partners, we continue to model and document our data production process. We find this to be a very beneficial step for two purposes.

First, it helps us understand why (and if) a task is being done, and if it is being done efficiently. Much of this program started so quickly that it was difficult to plan logical integration and hand off points among the various workgroups. Further, we are currently in the process of consolidating much of the process data (check-ins, check-outs, metadata) and we can use this process model to efficiently plan a cohesive information architecture.

Second, our process documentation and modeling helps explain why resources are being consumed in a particular way. This helps our State partners plan for in-sourcing specific tasks as their time and

budgetary constraints allow.   It also helps our LinkAMERICA team better plan and cross-train members to deal with the work surge that occurs 30-45 days prior to submission.

Finally, documenting and modeling our process helps us to take advantage of increasing specialization and proficiency with certain types of data and management responsibilities.   In submission 3, we had identified data “czars” responsible for check-in and check-out of data. That data czar helped to bridge the gap among receipt functions, provider feedback, production and DBA.

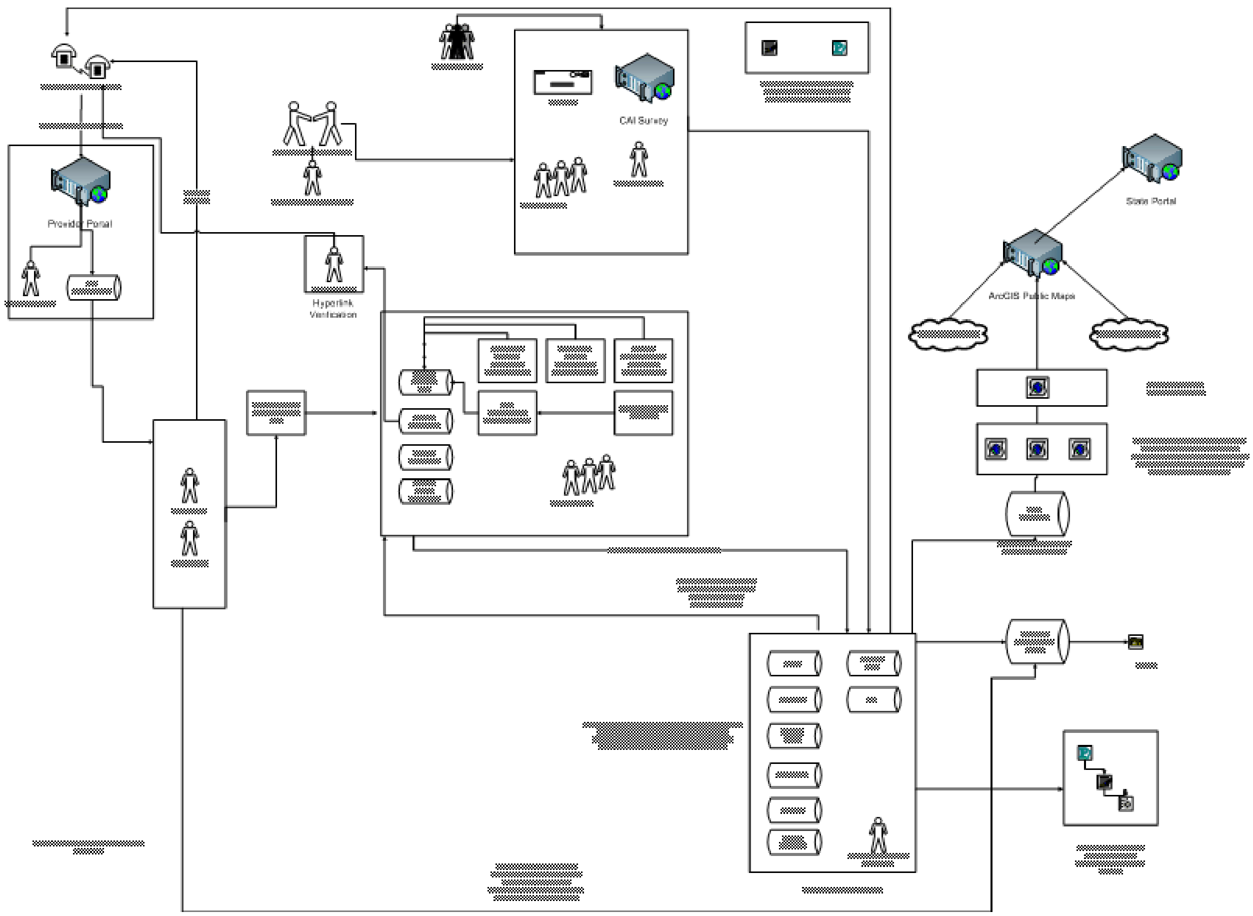

Figure 1—SBI Data Development Business Process Diagram

Data Production Methods

As raw data were received from the provider community, attention turned to normalizing the disparate submission formats[5]. The team considered each submission with respect to the following criteria. These criteria are important because they perform the basis for our verification and quality assurance

[5] In line with NTIA Best Practices we continue to request and receive a large number of data input formats. This ranges from tabular Block lists to hand drawn maps.

process. In other words, we have to appropriately scale our data verification efforts to match the scale or ambiguity of the following:

- Locational certainty
- Speed certainty
- Temporal certainty
- provider and network ownership certainty

The team's goal was NOT to quantify a particular degree of precision with respect to any of these criteria. Rather, we are working to attribute the above "certainty attributes" to each submission, and will continue to implement quality assurance and verification mechanisms that are resource-appropriate for each.

Deriving Broadband Coverage Information

Broadband Coverage[6] was normalized into four formats:

1. Coverage in Census Blocks (2010) of 2.00 or less square miles
2. Covered Street Segments (2010) in Census Blocks greater than 2 square miles[7]
3. Address Level Coverage (point data)
4. Wireless Service Areas (SHP file format)

With each submission, the team went through a series of steps to normalize and categorize the data. Since data arrived in many different formats, and at many levels of granularity, the following normalization procedures were used:

1. Determining the nature of service being provisioned (who is providing service and what technologies are in use)
2. Planning an attack strategy for the submission –understanding the data and assigning team members to various tasks
3. Geo-referencing the data; QA the geo-referenced data
4. Geoprocessing the geo-referenced response
5. Segregating the submission into the correct NOFA-compliant submission formats.
6. Apply appropriate source metadata[8]

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[6] Speed, Anchor institutions and Middle Mile facilities are discussed in later sections.

[7] To help clarify issues relating to Census block area and vintages in use, our team published a technical paper to the Grantee workspace. Because we were unsure if this standard should be implemented uniformly, this document was never distributed to the provider community.

[8] When our team logs a submission into the staging database we record at least two attributes. One records the method used to derive the coverage, the other records the method by which speed was attributed to that object. Other attributes carried to NTIA carry source meta values as well.

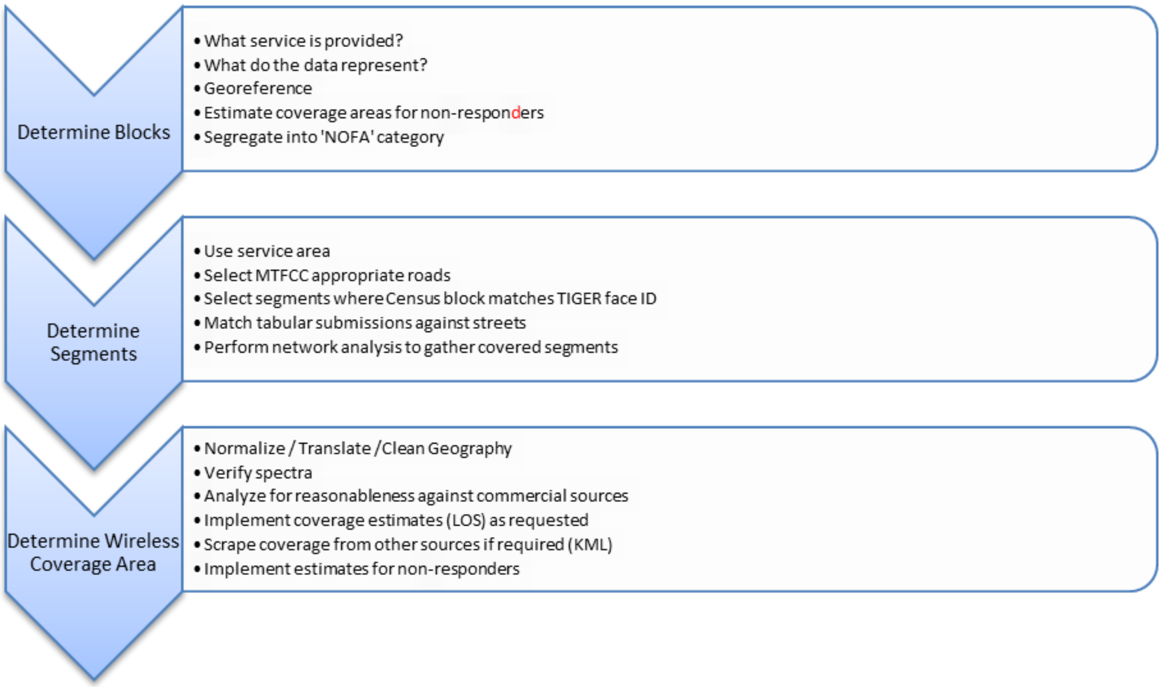

Figure 2-Broadband Coverage Process

Impact of Program Change

There were several important program changes that impacted how Broadband coverage was developed and submitted to NTIA in Round 4.

Census Conversion

The first and most obvious change in submission 4 was the conversion to a Census 2010 coverage baseline. This impacted all wireline providers, the data submitted, the appearance of the mapped information and the baseline coverage metric comparisons against prior submissions.

Release of the June 30 Grantee guidance document, allowed LinkAMERICA to communicate this change with providers. LinkAMERICA provided by FTP access appropriately formatted and sized[9] TIGER 2010 Census blocks and Tiger Road Segments. Given the relatively late release date, we received a mix of responses from Broadband providers. Some easily produced Census 2010 information. Others requested that we do the translation from their supplied blocks and segments. Others requested that we translate their engineering data into appropriate formats. A small number of providers committed to producing Census 2010 data but struggled internally with the conversion in this rapid time frame.

Census 2010 has significantly more Blocks than Census 2000. For the most part there are far more small Census 2010 blocks (less than 2.0 sq mi) than Census 2000. As our team worked through the QA process, this presented a significant challenge in comparing our converted results to prior submissions. We use a block count metric as our first test of consistency across submissions. Since the block count

[9] In Submission 3 we released a technical note describing how we measure Census block area. Although there remains no consensus on this, we used the same process as outlined in the paper.

increased it was hard to distinguish coverage area changes from coverage chances resulting only from a change in Census shapes.

The converse side of this challenge was even more precarious to work through. Because many road segments dropped out due to the covered area now being in a small block area it was difficult to determine how effective our covered segment process was given the fact that many segments naturally dropped out due to changes in Census shapes.

The tendency for large blocks becoming small was not universal. We note in some of our very rural areas of Wyoming and Idaho, small block covered areas become large. This created a contrary situation where small blocks become road segment areas. The image below shows a coverage area change between submission 3 and 4. The covered number of blocks is comparable but the appearance of the coverage is different as a manifestation of the Census change.

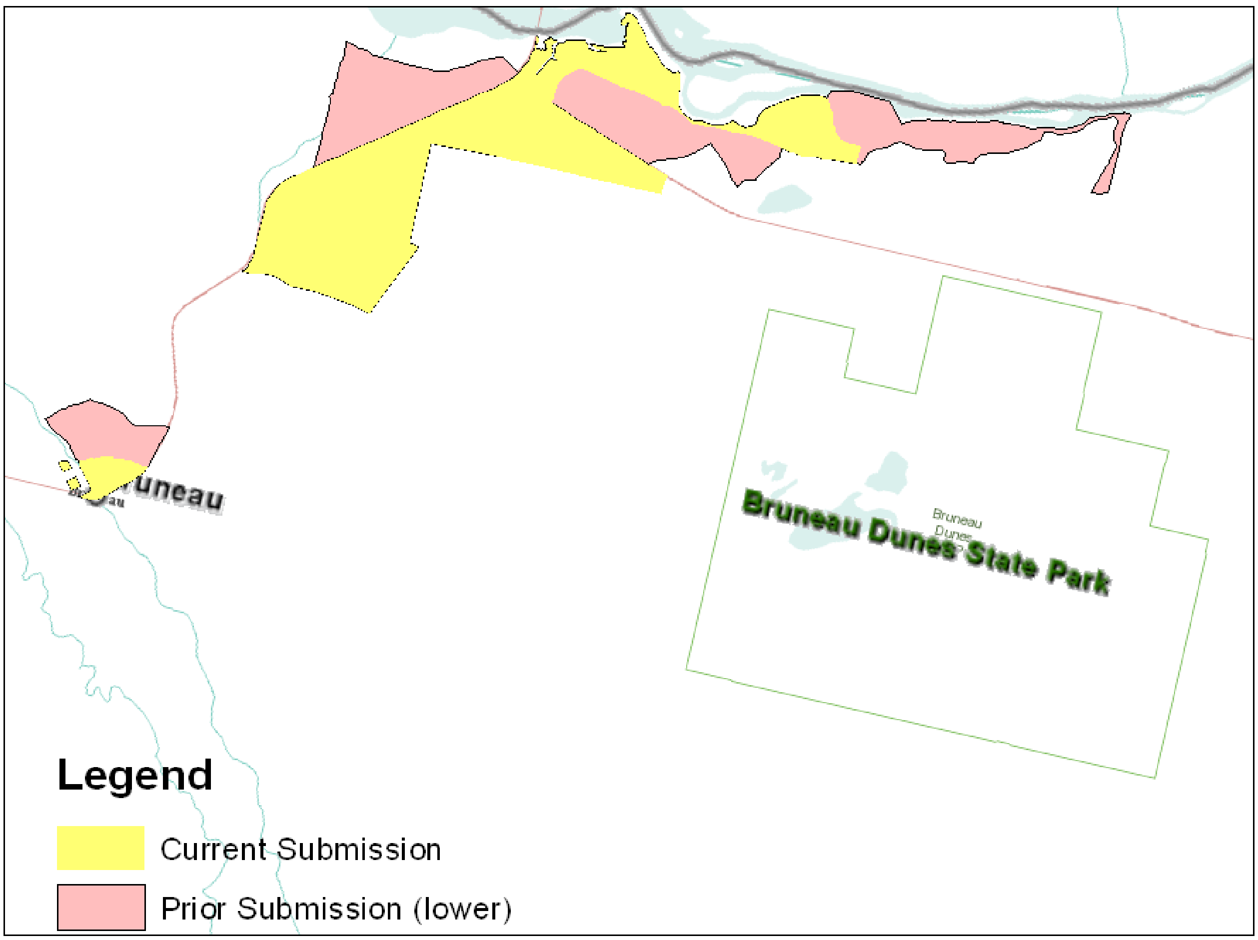

Figure 3--Coverage Change across submissions

This somewhat indeterminate process required our QA analysts to examine a number of submissions in detail. The conclusion was that although the appearance of coverage was significantly different, the underlying engineering data was the same (or very similar) but how the coverage was manifested was a product of the Census conversion.

Census Conversion Practices

Although we had hoped there would be a single process we could follow for all Census conversions our experience has been that it is necessary to be flexible and base the Census conversion process upon the data received.

On a subjective level, we felt the most comfortable converting into Census 2010 where we had facility or demand data to guide the block and segment selection process. In these circumstances we used geoprocessing methods like intersections or network analysis Analyst to make an objective determination. The geoprocessing methods mirrored those discussed in the next section. This was probably the majority of our submitted data.

In circumstances where we were provided Tiger 2010 blocks or segments, we used those as given and performed our standard validation process. Some providers used the TIGER blocks and segments which we supplied them and made their own selections.

Finally, in circumstances where we had either a Census 2000 block list or a geographic file containing Census 2000 geographies and were told there was no coverage change for this submission, we used the Census crosswalk tables[10] to derive a list of candidate blocks. The output of a conversion process is shown below.

[10] See http://www.census.gov/geo/www/2010census/rel_blk.html

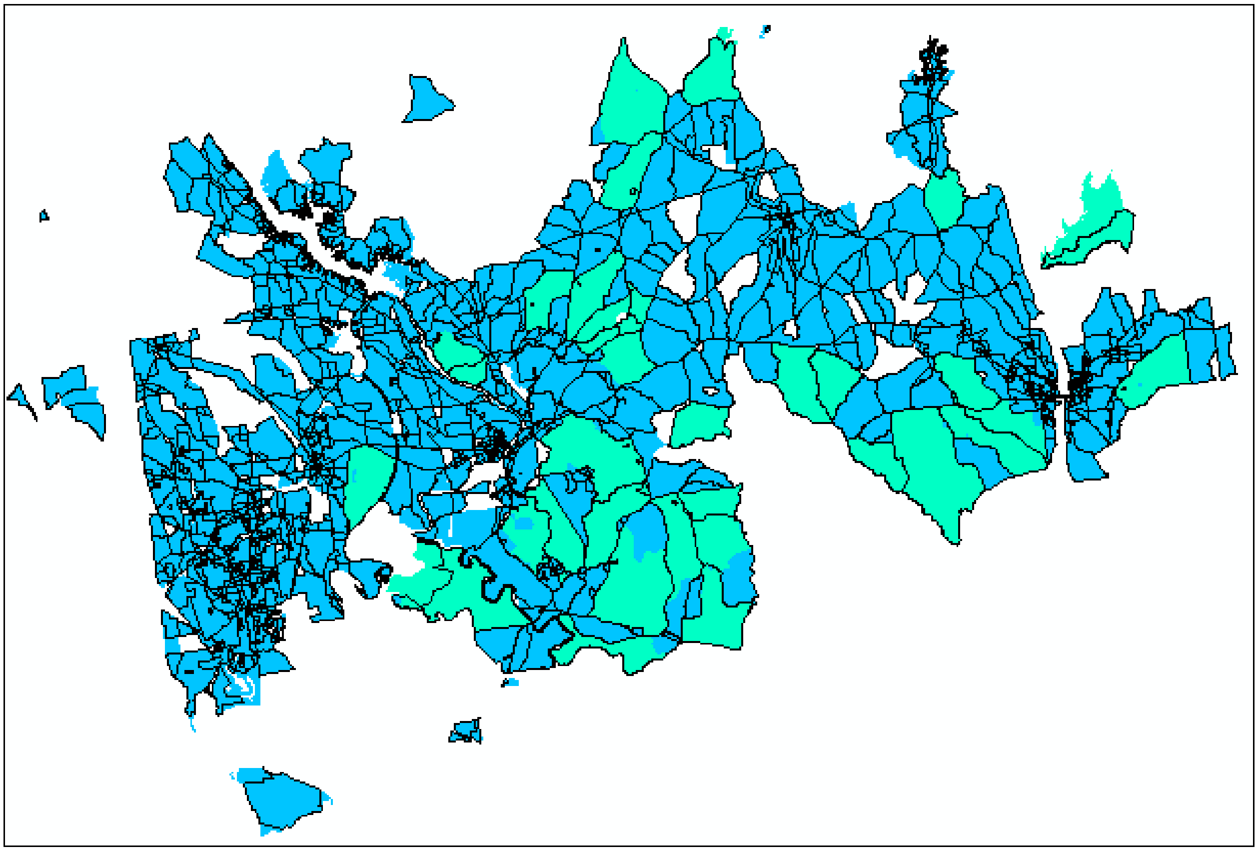

Figure 4—Block Conversion Process, Census 2000 black outline, no fill. Green is 2010 large blocks, so any shading without an outline is 2010 block area not covered in 2000

For the most part it is difficult to discern the impact of a conversion into Census 2010. We don't see vast changes in areas covered. Nonetheless because the block shapes do change the overall coverage area will look different.

As the 2010 data gets pushed into public deliverables, our sense is we will receive questions about the appearance of the new data.

Speed Examination

Given recent concerns about the depiction of speed and what that mapped speed represents, LinkAMERICA invested considerable time requesting detailed information on speed which appeared to be beyond normal speeds for a given Technology of Transmission given the NTIA supplied frequency tables.

Based upon these conversations we learned

A) For a large incumbent telephone provider; the speeds beyond the normal DSL range represent significantly shortened copper loops.

B) For a large national cable provider the intermixing of Docsis 3.0 and non 3.0 systems in a market area is typical and sometimes reflects a circumstance where segments of plant cannot

be upgraded to Docsis 3.0. This variance can be at a level below the Census block. In these cases the maximum advertised speeds remain to represent the market area but the plant variance is typical. This same provider expressed concern with moving reported advertised speeds below the market level.

C) We have a minority of providers who submit a theoretical speed that is unmatched by their web advertising. In these cases we request clarification from the provider on the inconsistency. Our experience has been that providers will modify the speed to be consistent with their web coverage.

Provider Definitions

Within our provider verification process we work to derive a state level provider match against third party data sources. As discussed in the early pages of this manual, there is no guarantee that a third party data source is any more accurate than submitted data, nor does it necessarily reflect the provider ecosystem specified in the NOFA, Technical Appendix A. We devote significant resources to matching our submitted data against three, third party data sources. In many cases this becomes a judgment call trying to match provider names across systems. It is a difficult and somewhat arbitrary process. Nonetheless we do believe it has value because it forces a re-examination of who we believe is an appropriate provider within a non-NOFA context[11].

The use of a provider match system, as well as the webinar comments (3/17/11) directing grantees to estimate, wherever possible, non-participating providers have made us back away from one of our fundamental assumptions in data collection. As discussed in the prior draft of this manual, we had developed a certain "hold-out" class of data when a provider's data wasn't of sufficient quality to verify, or we were unable to put it into the data model (eg. address points submitted for a wireless). In this submission, much of this hold-out data has been included[12]. In some cases this means we are using simple polygons to capture a wireless ISPs serving area. Other times, if we are confident in the coverage, but can get little clarification on the submitted speeds or frequencies, we release the coverage and note in our internal metadata the source issues with the other attributes.

Finally, we have used the new provider type classification of 'other' to bring some aspect of the provider's data into our submission. There still seems to be confusion on how to handle provider types where a provider offers multiple paths to provision Broadband for typically business customers. Rather than waiting for certainty on the answer, we bring the provider in and list them as provider Type "other". Our sense is provider Type "other" will continue to expand in subsequent submissions.

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[11] We have requested from NTIA information on how provider matching is done within their QA process; beyond the relatively short whitepaper posted with the national map <http://www.broadbandmap.gov/blog/wp-content/uploads/2011/02/DataComparison_Methodology2.pdf>, we have not received any more detailed information on how providers are cross verified between submitted and third party sources at the national level. Our understanding is licensing concerns are holding the release of this information.

[12] We continue to process older submission data looking for information and methods by which we can estimate coverage information. This will be an ongoing process.

Clearly one challenge is the data, but an equally significant challenge is appropriate messaging around this “other” provider type category. We do not want to leave consumers with the impression that they can get a high capacity fiber or microwave link despite the fact that the hospital next to them in the same Census block can get this service.

After the Grantee conference, LinkAMERICA submitted a paper describing our provider classification system[13]. It is our feeling that understanding the type of provider is essential to appropriate verification methods.

Coverage Geoprocessing Methods

The next section discusses how data were georeferenced and geoprocessed given a particular submission format. We have yet to find a particular method that works across all submissions. Rather we tend to tailor our geoprocessing to meet the specifics of the service provider and data submitted.

In most cases, in Round 4 we were still not provided with street segment level information for Blocks greater than two square miles (large Blocks). This necessitated subsidiary geoprocessing. As stated before, our first goal was to derive block level coverage. Then, for Blocks greater than 2.00 square miles, we moved to a segment gathering processing. The segment process will be described in the last section.[14]

Block Level Coverage Derivation Using Service Point Data

A number of providers submitted point level customer data.

In some cases the submissions themselves were not internally consistent. For example, in the image below, unprojected points are shown, while the Census block polygon to which the points are supposed to “belong” is highlighted. In this case, one of the following scenarios has occurred: block attribution is wrong, the points are not in the location to which they are attributed, or different block shapes were used than what is assumed.

[13] https://sbdd-granteeworkspace.pbworks.com/w/file/42309493/provider%20ClassificationFINAL.docx

[14] As has been discussed previously, we note inconsistency in how providers are supplying information at the block and segment level. Beyond the temporal differences, we see that providers are computing area differently, as well as including or excluding water areas. This provides an inconsistent measure across providers for the 2.00 sq mile cut off. Our preference would be to provide guidance to service providers within our states, but our concern is that we will inconsistently message this with grantees in other states. We would appreciate consistent guidance from FCC/NTIA on this topic.

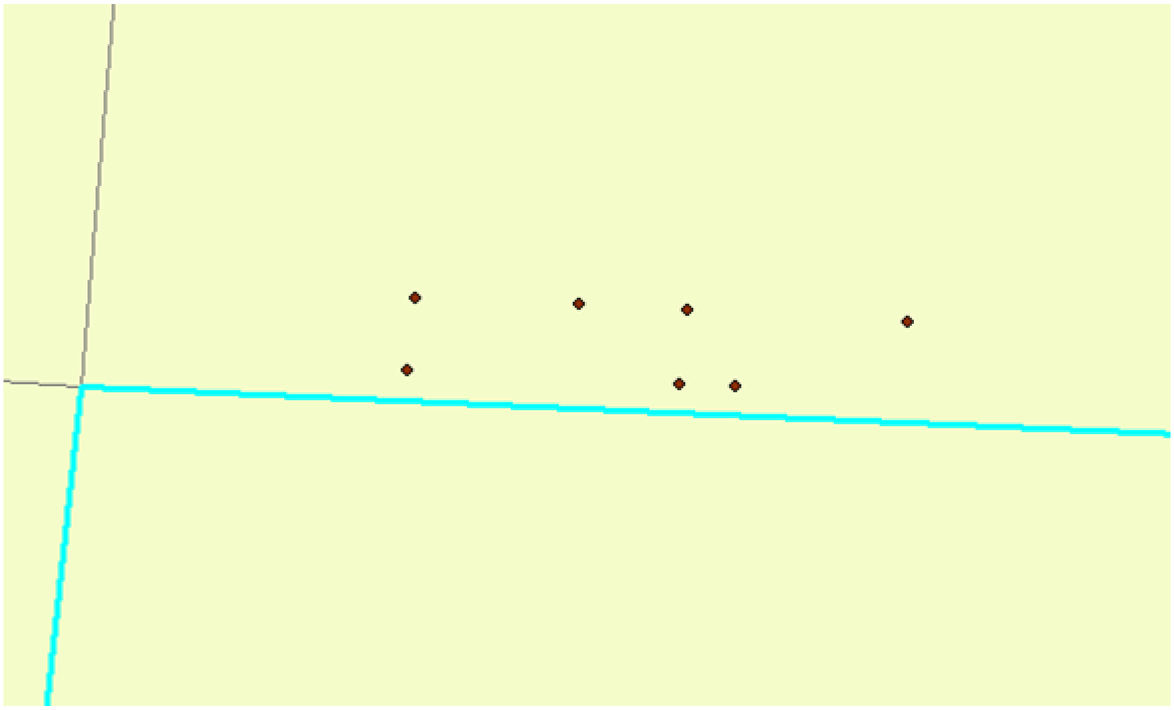


Figure 5-Internal inconsistency in submitted data

In other circumstances, we found that inconsistent geocoding standards may produce misleading results. The next image shows point level data, and the Blocks are colored based upon the counts of points intersecting Blocks. The challenge this presents is that if geocoding was performed on a different dataset than the block boundaries (the road traces are not coincident with block boundaries) and/or geocoding was done without an offset, it becomes problematic to assign coverage to a Census block based upon only the point locations.

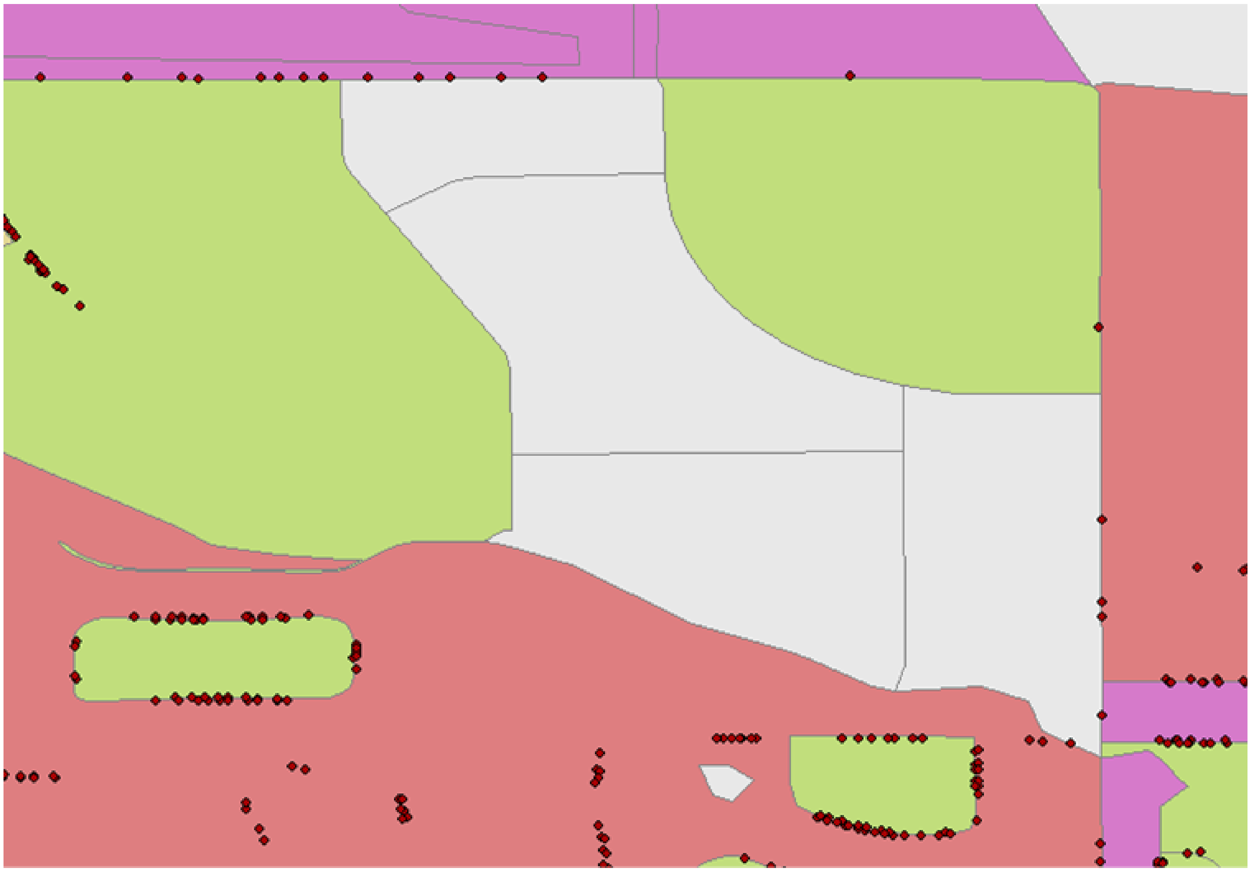


Figure 6-Block Coverage

For this reason, where we were provided address point data and asked to generate covered Census blocks, we elected to use a 200-foot buffer to select Census Blocks that intersect our points.

We are also starting to see a number of providers submit customer data and facility data. Their intent is to allow us to have two primary sources from which to derive the most accurate coverage. In these cases we tend to look for clusters of customers in areas where we see no facility based coverage.

With respect to deriving Block level speed from sub-Block data, we have instituted a business rule where the predominant speed in a Block is the speed we attribute to the Block.

Block Level Coverage Derivation Using Customer Facing Plant Level Point Data

In other circumstances, providers submitted point level plant data. From what we could gather, these points tended to be customer-dedicated terminals. Typically, these providers were high speed Broadband producers—which may somewhat strain the definition of Broadband as other providers supplying comparable services specifically disclaimed the ability to provide high-capacity Broadband services in the required 7-10 day interval. In these plant point data submissions, we had similar concerns to the point level customer data, but two factors tended to make us use a more conservative intersection buffer. First, we tended to have far fewer points to work from, so our concern was grabbing too many covered Blocks as the Blocks tended to be much smaller in these urban areas.

Second, these plant points tended to be dedicated to distinct customers, but it was difficult to know which element of the customer's campus to attach coverage to.

In the case of the image below, given a small shift to the left, it would be easily possible to gather 1 to 3 Census Blocks from this point. Although orthoimagery is helpful in a circumstance such as this, it is still indeterminate.

Thus, in the circumstance of plant level point data, we used a 100-foot intersection buffer.

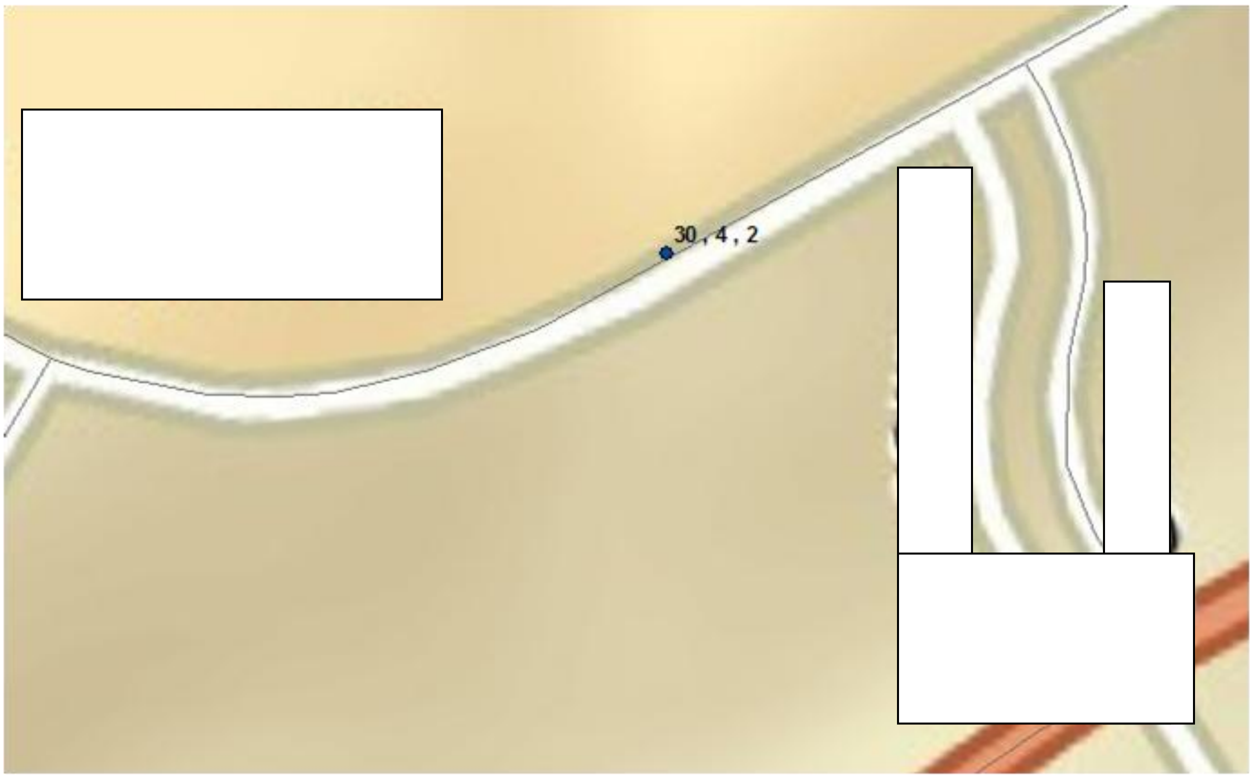


Figure 7-Plant Point level data

Coverage Derivation Using Linear Facilities Data

A number of providers submitted facilities data. We handled this data in different ways depending upon what we believed the facility data represented.

Most telecommunications networks are divided into two components. Feeder supplies higher capacity nodes (eg. DSLAMs, Fiber Nodes). Distribution usually supplies customer premises (NIDs, Pedestals, Taps, ONTs). Where we could discern what strand we were provided, we used different methods.

The next image demonstrates a geo-referenced CAD image as given to us by a Broadband service provider. Note the light and dark green shading. We would infer that the lighter segments represent distribution and the dark green represents the feeder network.

In the case of a combined strand map, we used a relatively tight buffer of 200 feet to gather covered Census Blocks. Our intersection tolerance is based upon an assumption that our data likely represent a

situation comparable to customer point level submission in that we have most of the network footprint captured.

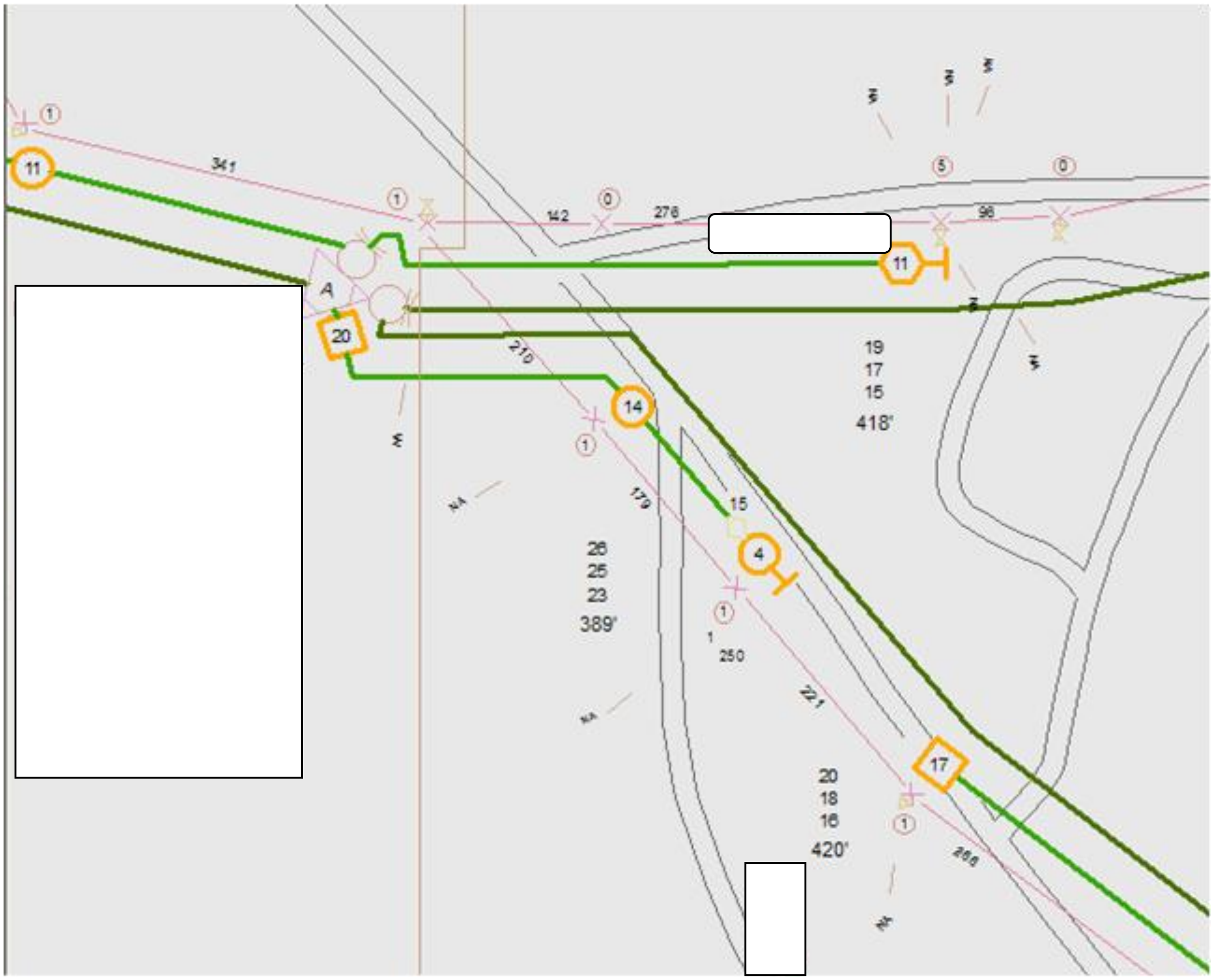


Figure 8-Georeferenced CAD information supplied by Broadband provider

In other circumstances, we were provided engineering information that we inferred to be feeder only. This inference was typically based upon the presence of fiber optic equipment only. In these cases, we used a more generous 2,000 meter Census block intersection. The 2,000 meter criteria was based upon an informal survey of population in proximity to the geo-referenced strand data, but it could be varied based upon a more complete survey.

Coverage Derivation Using Covered Street Segment Data

In some cases we were provided with covered street segment data. Covered segments tended to come from two sources.

In some circumstances, providers gave us CAD data, which was not drawn in a projected manner. This is relatively common for older engineering data derived from hand drawn records. This meant that our

team geo-registered the image into an approximate position. In this case, the boundary streets were selected, and an enclosing polygon was derived. The intersection of this polygon and the Blocks within became the geoprocessing method to derive Blocks.

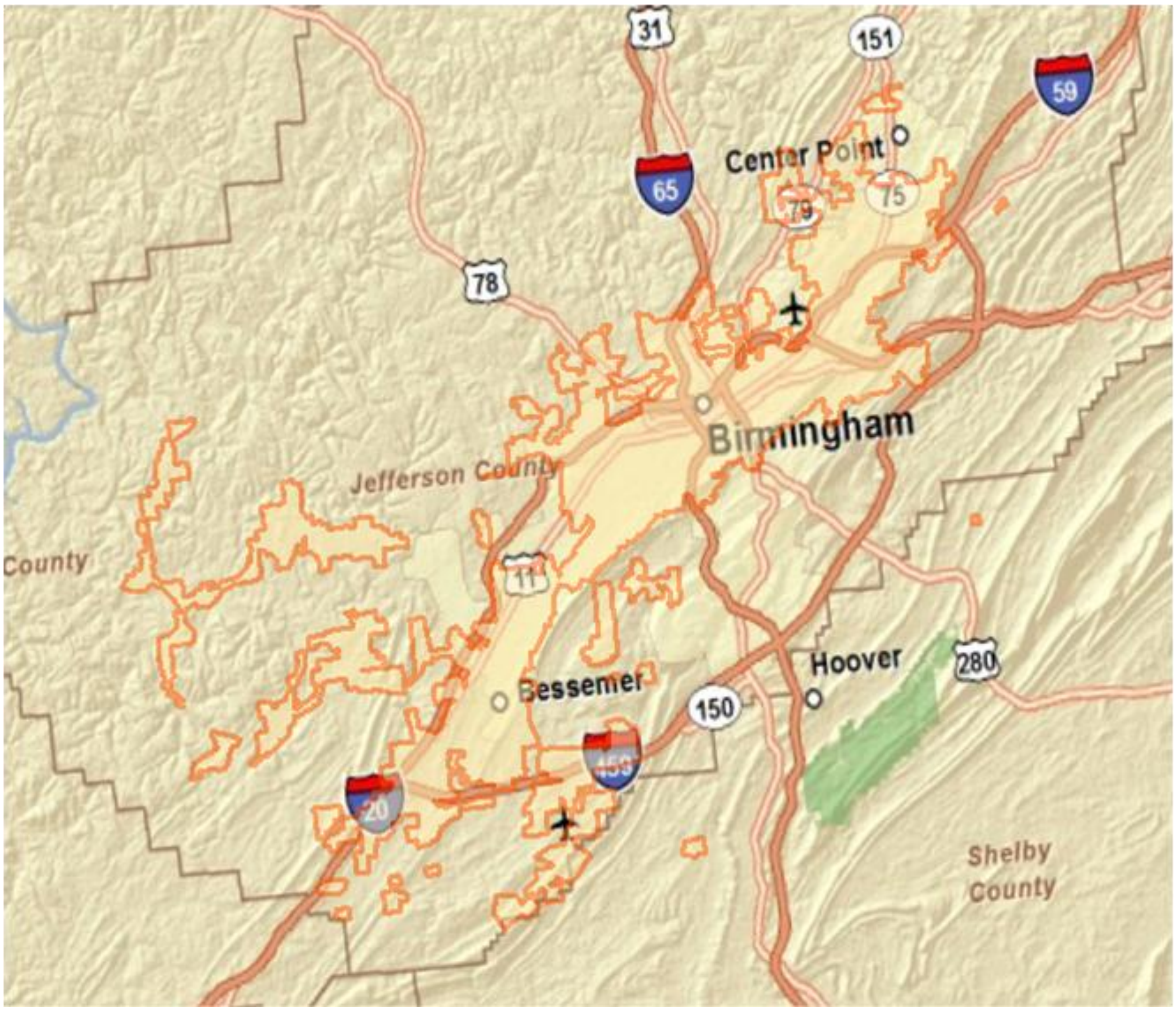


Figure 9-Coverage derived from street segments

In a second circumstance, street segment data was developed during coverage estimation. Handling the estimated data is discussed below.

Coverage Derivation Using Serving Area Point Submission Data

In other cases we worked with providers to derive service areas based upon point plant data. In these cases we were given a serving node and an appropriate road length service boundary. There is an important distinction from the plant data discussed above. In this specific case, the data submitted was a node that served many locations--such as a Central Office or DSLAM. This is contrasted with the earlier example in which the point represents a node serving only a few customers.

When trying to derive coverage from Central Office or DSLAM nodes, the team used ESRI Network Analyst to derive covered road segments honoring these road engineering parameters.

The figure below shows street level coverage derived from Central Office and remote DSLAM point data.

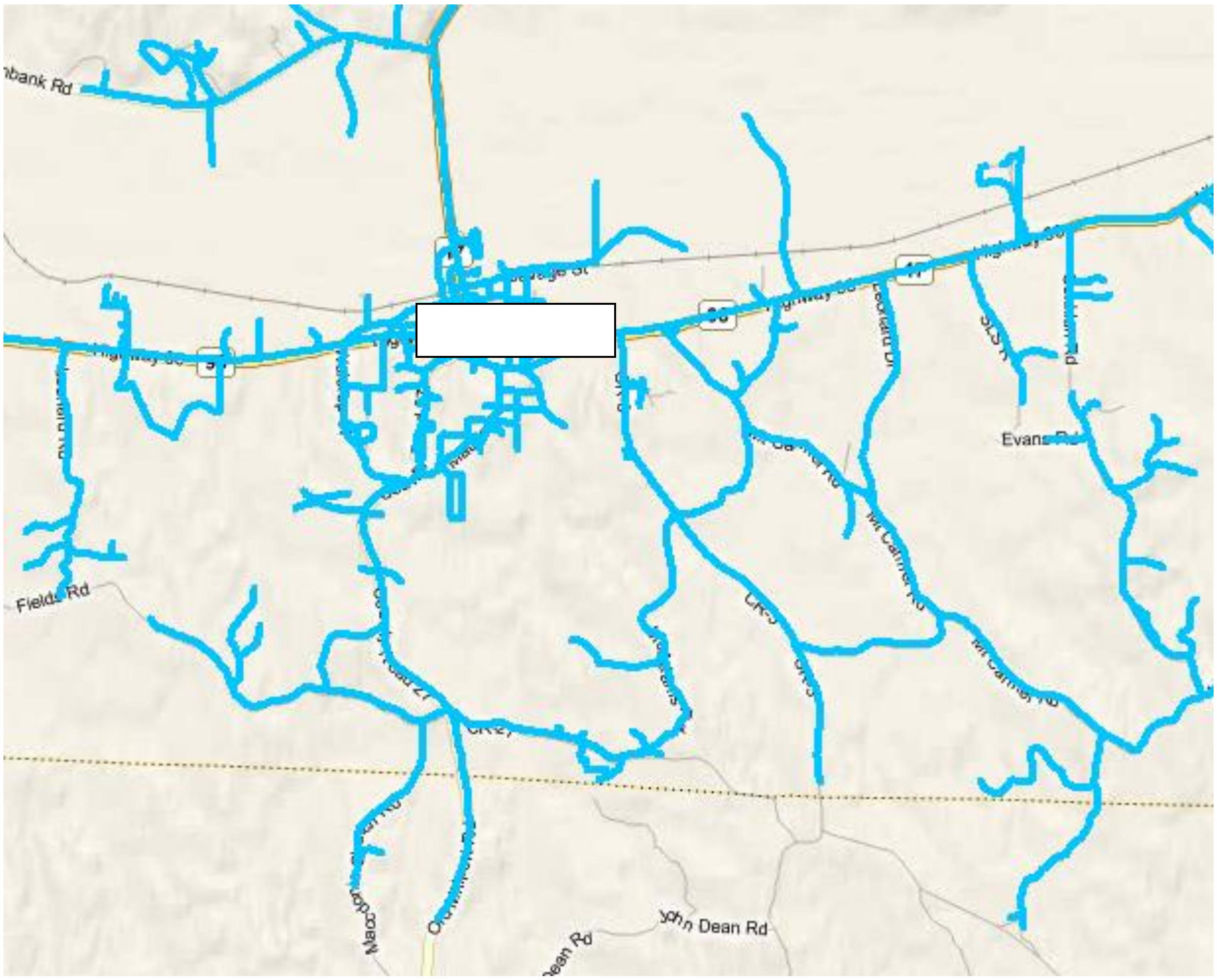


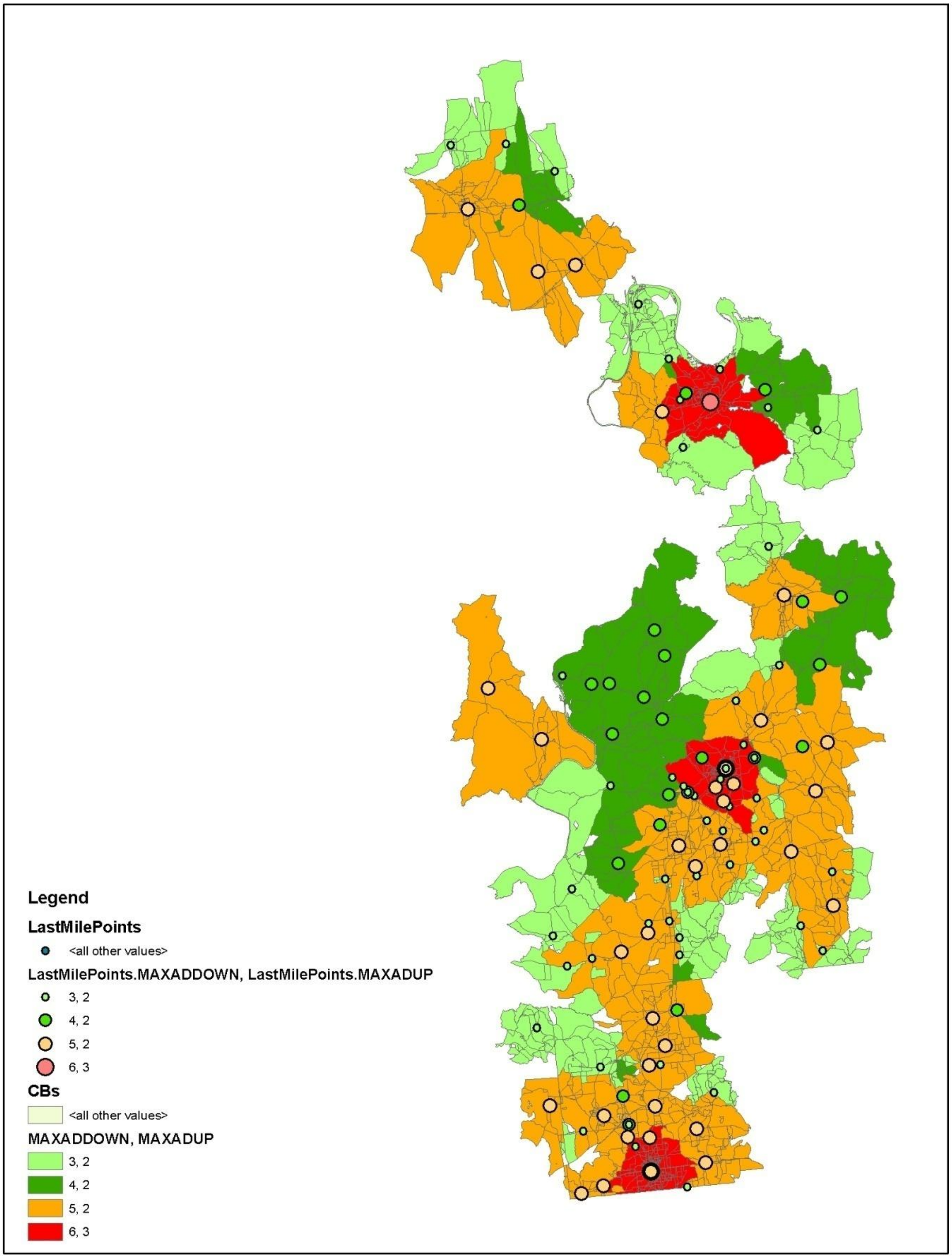
Figure 10-Coverage derived through road paths

In response to Provider feedback we revised this process to include a larger variety of TIGER road types. In Round 1, unimproved roads were not used. In the current submission -- particularly to improve estimates in areas bordering parks and public lands -- a wider class of TIGER roads was used.[15]

The segment level coverage is easily extendable to derivations of Census block level speed. The figure below shows the attributions of block level speed based upon the Maximum Advertised Speed available from a DSLAM. Although the methodology isn't perfect, it does provide insight into the value of granular infrastructure data.

[15]Only TIGER features of MTFCC type S1100 and S1200 were excluded from use.

Over time we have seen an increase in the number of providers submitting this type of data for our use. Our sense is some providers find plant level data easier to generate and are satisfied with the results of derived coverage.


Legend
LastMilePoints
<all other values>
LastMilePoints.MAXADDOWN, LastMilePoints.MAXADUP
3, 2
4, 2
5, 2
6, 3
CBs
<all other values>
MAXADDOWN, MAXADUP
3, 2
4, 2
5, 2
6, 3

Coverage Derivation Using Polygon/Polyline Serving Areas

Broadband service providers sometimes submitted coverage in terms of served areas. This was either in direct geospatial formats, CAD files, or paper maps. The image below reflects a carrier's service area. Within that service area, there are variations in technology of transmission and served speeds. When polygons with speed data and technology of transmission were available, we used a spatial intersection to gather covered Census Blocks. In many cases, using covered Census Blocks resulted in a loss of the speed variation (sometimes the speed variation was at a level smaller than a Block and did not get picked up within a spatial query).

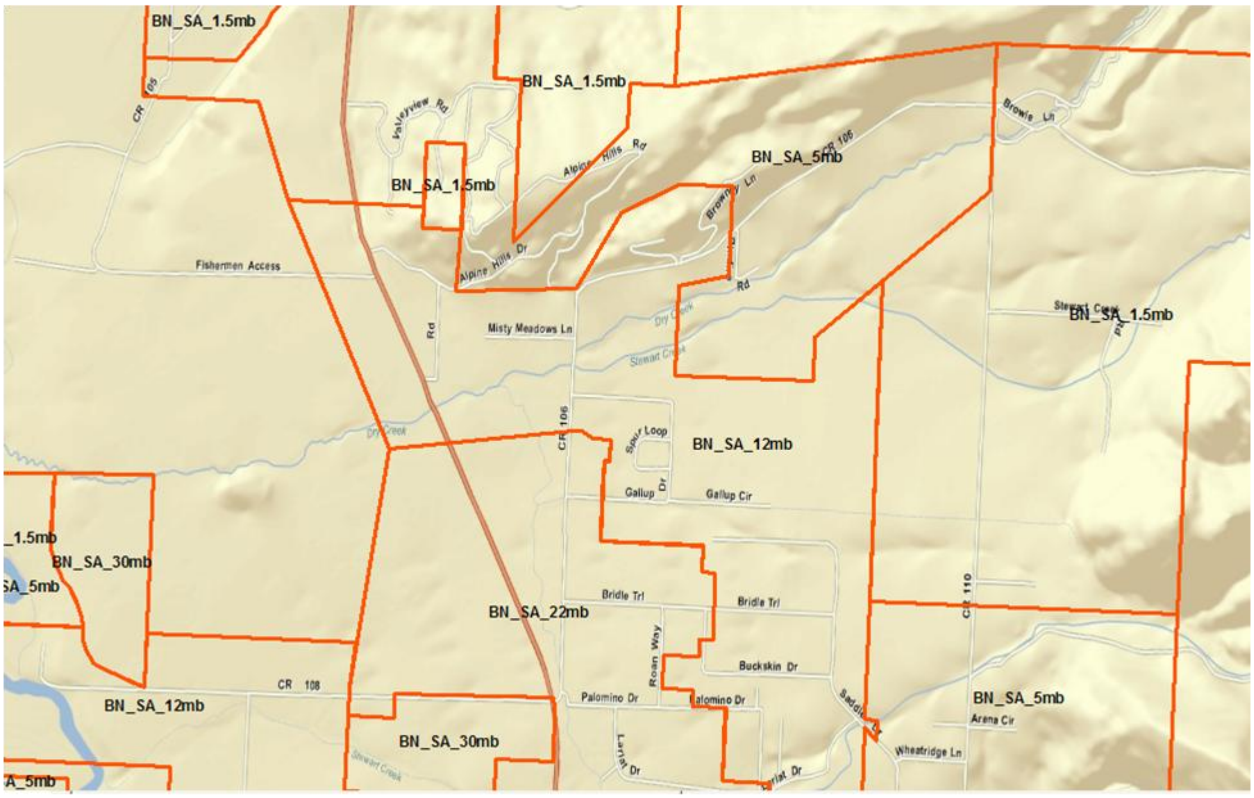


Figure 11-Coverage derived through serving area polygons

Although we cannot directly solve the loss of speed granularity due to Block shapes, we honor a business rule wherein we always select Blocks from the highest speed areas first, and then allow the lower speeds to select from the remaining Blocks. This is an arbitrary rule, but our feeling was that it should be a consistent selection, rather than an unordered selection.

Street Segment Derivation, Large Blocks

For those calculated Blocks greater than 2.00 square miles (large Blocks), we provided coverage in terms of covered street segments and corresponding geography.

With respect to segments we had four sources of data:

1. Covered large Blocks
2. Tabular street segments and address ranges for large Blocks

3. Geographic segments either with street attributes or without
4. Service area boundaries

A number of providers only provided a list of covered large Blocks without corresponding segment information beneath the block. This provided the dichotomy of either selecting all segments in the block, or none. Because we had little information from which to make the selection, we elected to be conservative and did NOT pass any covered segments to NTIA from this submission format. Some Broadband providers submitted covered street names and street ranges. In these cases we performed a manual analysis trying to link to specific segment names and address ranges within covered Blocks. Sometimes this was a simple process because a provider used a TIGER derived street database. In other cases we could not determine the source of the provider's street data. Street and Address matching tended to yield a relatively good result (typically between 30% and 100% of possible segments in the Block), but was very time consuming. Where yield rates were low, our result was a shredded segment coverage pattern, like the image shown

below.[16]

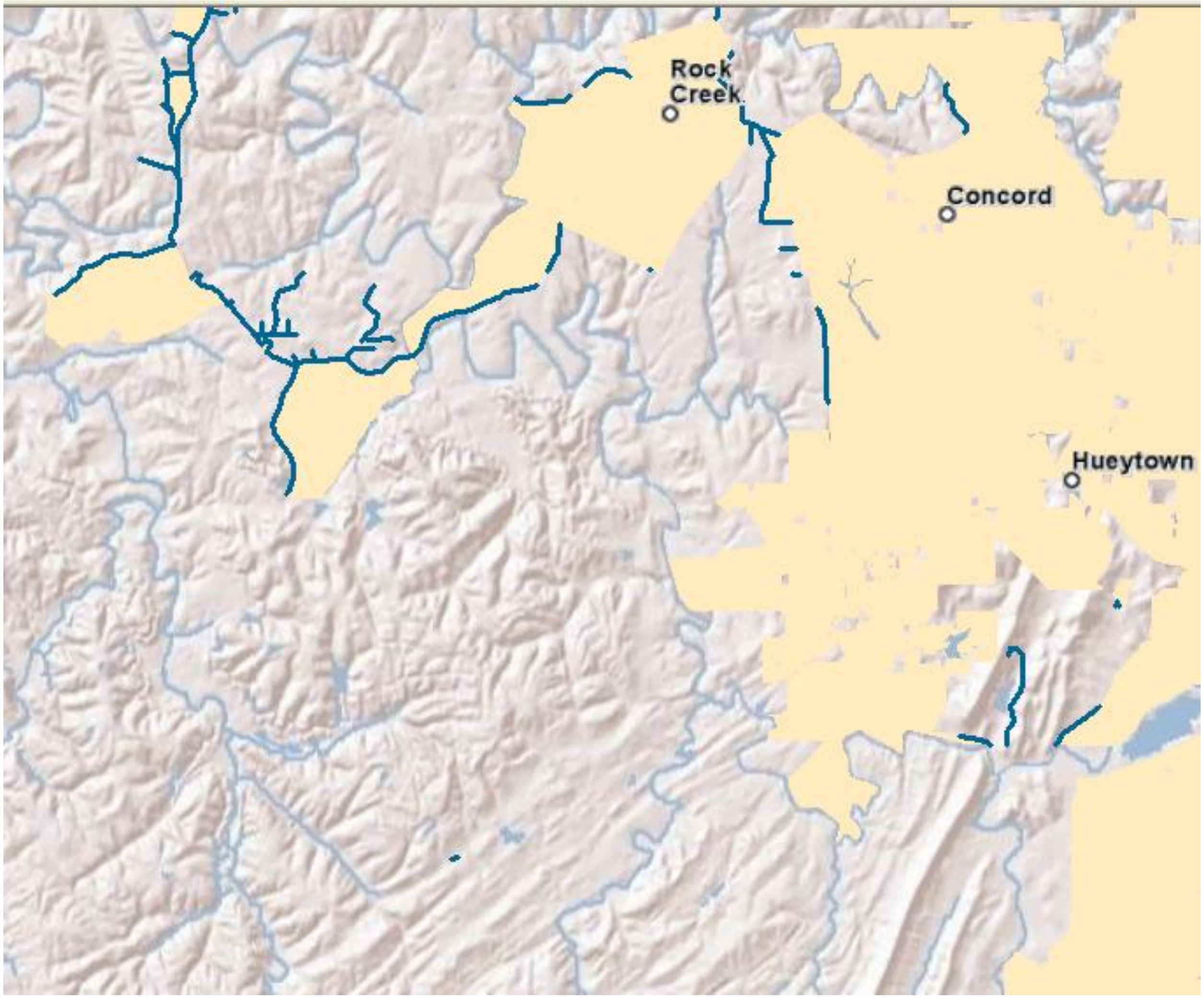


Figure 12-Blue road segments adjacent to peach covered small Blocks

A number of providers submitted geographic objects. In this case, our manual process was directed toward a conflation of data sources. The goal was to take provider submitted segments and put these segments in terms of our TIGER 2010 basemap. Although there is a trade-off in the accuracy using non-provider submitted segments, we felt it was more important to have a road set that would edgematch our Block features and remain consistent with the Block size standards we used for other providers. This is important for the appearance of the online maps, as well as potential verification work where we are attempting to judge a feature based upon its attachment to a covered small Census block. The figure below shows street segment input data.

[16] We continue to hear providers expressing concern that our request for either a geographic object or TIGER Line ID is beyond the scope of the NOFA clarification. Therefore, they cannot supply additional information to us.

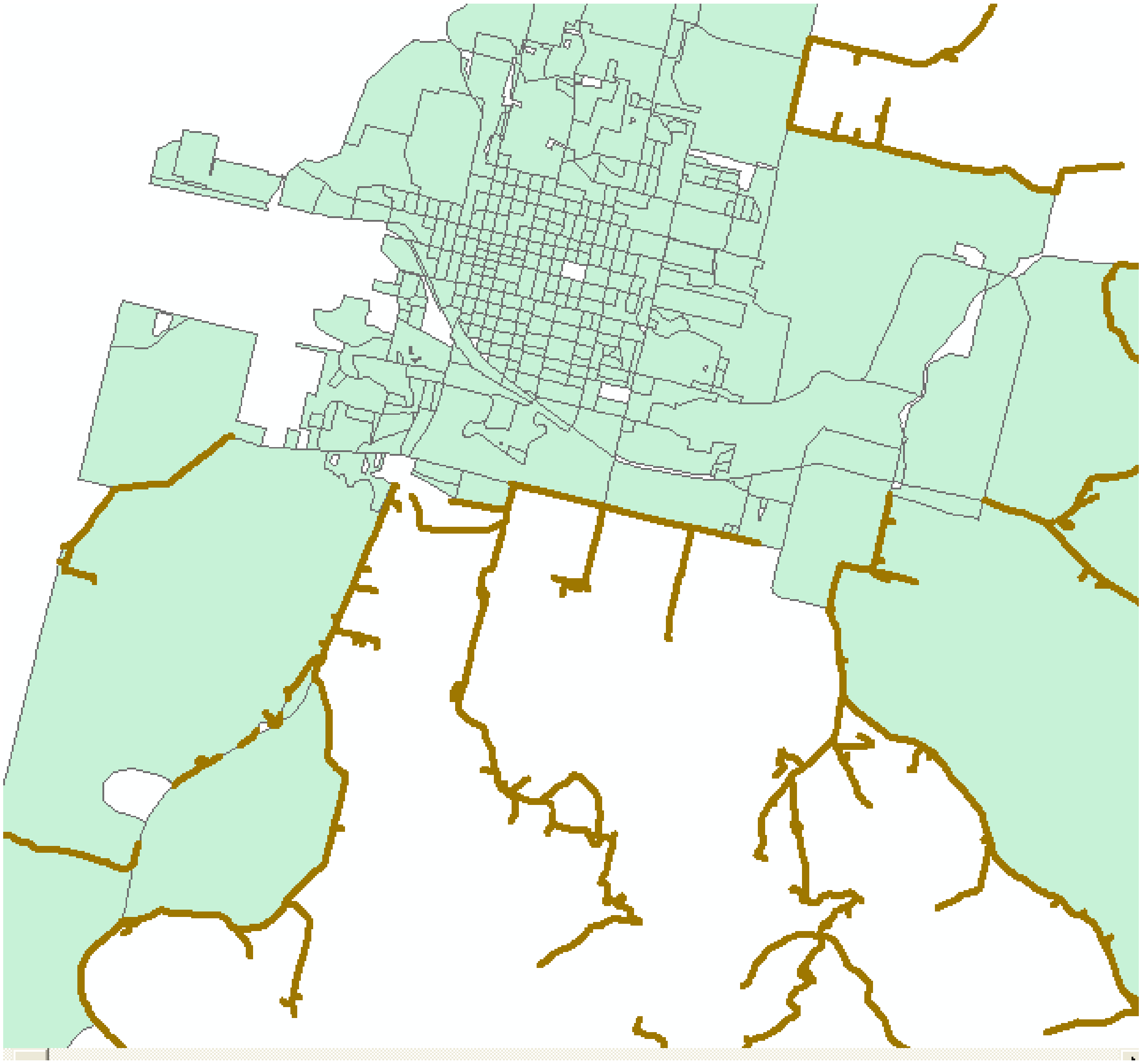


Figure 13-provider Submitted Street Segment Objects. The segments don't edge match the Blocks nor are they continuous.

The figure following demonstrates the same area after the conflation process. Blue segments are the conflated TIGER roads which will be passed to NTIA.

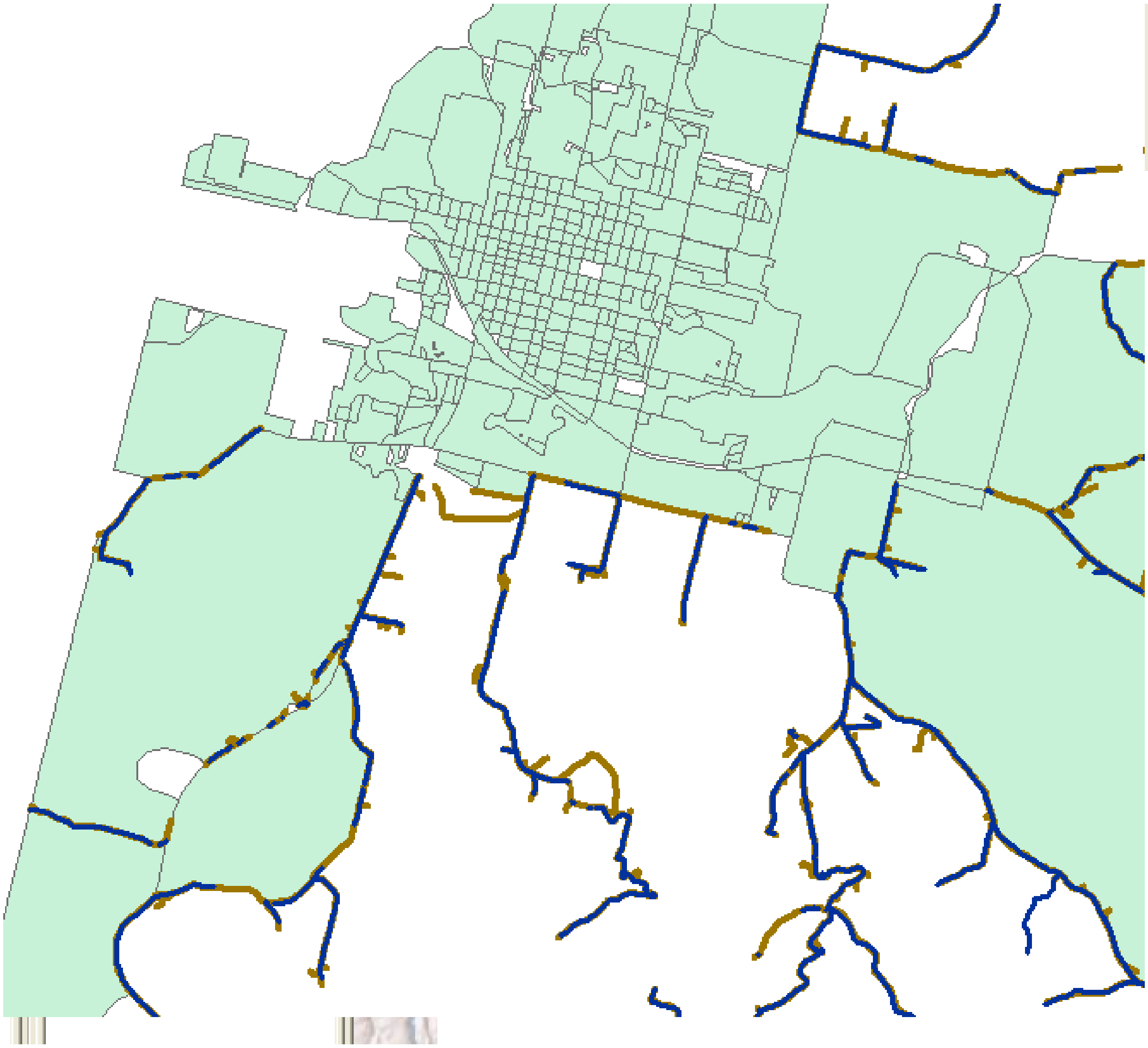


Figure 14-provider submitted segments in gold, selected TIGER in blue—Conflation result; in many cases what was a continuous segment is made discontinuous because even with a distance buffer the TIGER segment doesn't always intersect the provider segment

The final segment process was used when we were supplied with a Broadband covered area polygon. In this case, we found the segments within covered areas and eliminated those segments inside of Blocks less than or equal to 2.00 square miles.

Because there was more control over the format of the inputs (we knew we had a boundary and were working with TIGER segments), this was an automated process that followed this general format:

1. Select large covered Blocks by provider ID (from updated Large Block table)
2. Select TIGER 2010 road segments (MTFCC like 'S%') that face (CB = CBLeft2010 or CB = CBRight2010) covered large Blocks for provider

4. Select segments as distinct records, max speed with corresponding technology, join in feature names, export selected records to temporary DBMS table
5. Join TIGER roads feature class to temporary table on TLID
6. Select covered segments (Python script)
7. Select service area polygons for provider
8. Clip selected facing segments with selected service area
9. Export clipped segments to staging feature class, keyed by providerID

In this figure, orange represents covered small Blocks; black lines are covered segments in large Census Blocks (light blue). The service area boundary is shown in grey. Based upon feedback from providers, we have elected to clip segments at the end of a coverage boundary.[17]

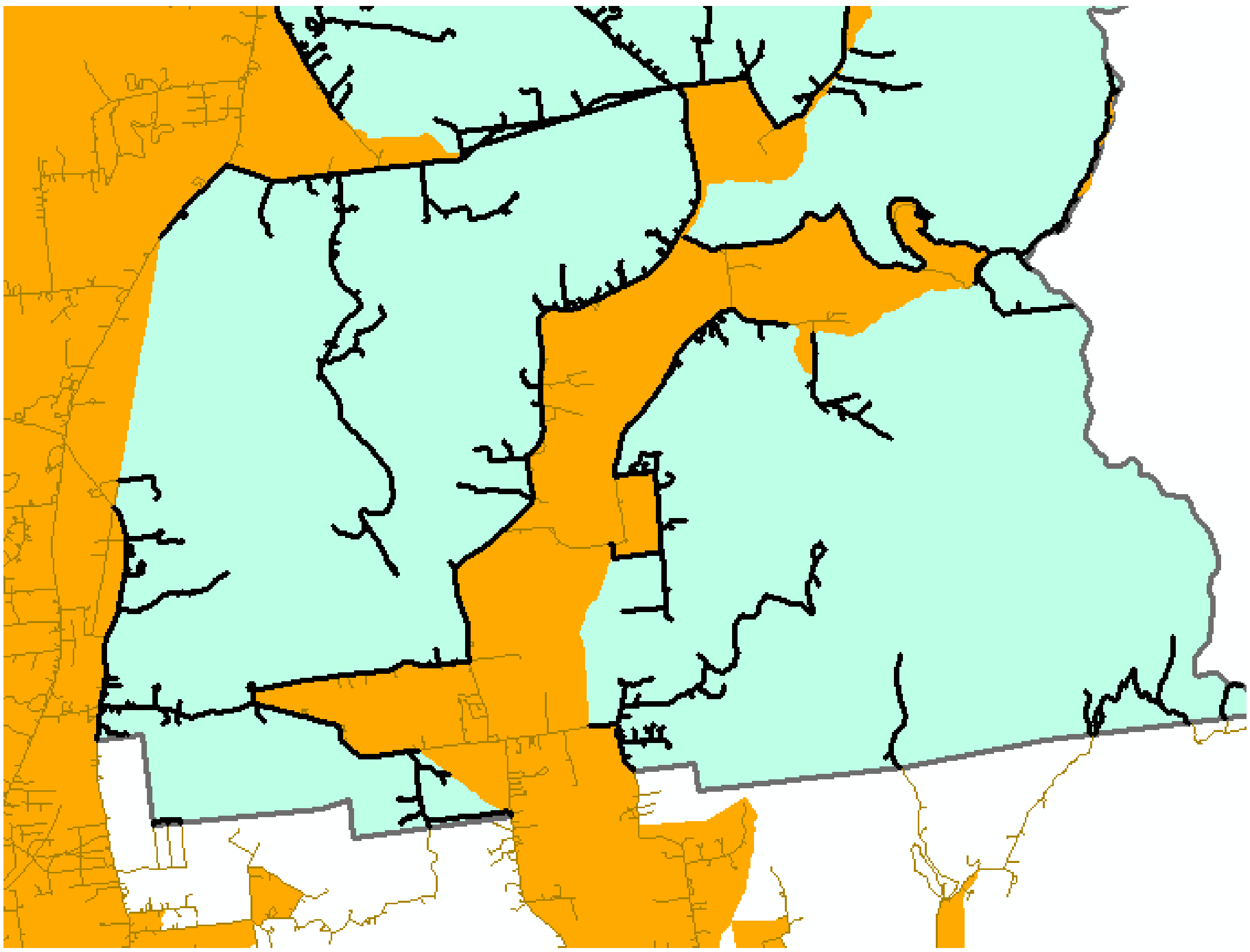


Figure 15-Output of the Segment Process

Wireless Coverage Process

In general, most providers of mobile Broadband submitted coverage information in a NOFA-compliant format. Other than attributions for spectrum and speed, little was done to this coverage.[18]

[17] An outcome not discussed here is how to handle address ranges on segments. As NTIA is asking for a Min and Max on the segment, deriving theses values for clipped segments is very problematic. Also the prevalence of alphabetic characters in addresses makes the min/max selections very arbitrary. We are grateful that addresses are nullable data elements.

LinkAMERICA continues to make aggressive efforts to bring additional WISP coverage into the NTIA dataset. For the most part, our outreach was with providers who were unable to supply sufficiently granular data in the past or those that could only submit wireless address points which is no longer a valid submission format.

In Round 4 fixed wireless providers generally either supplied coverage information or infrastructure from which coverage estimates could be derived. Many allowed us to use their tower locations, antenna heights and direction/spread of coverage to derive a line of sight coverage estimate. In our experience, this is a conservative and reasonable derivation of coverage.

Some wireless providers submitted RF studies. When this was done, there was a request that the signal strength be removed from coverage data. The request was honored.

Other fixed providers were able to supply us with hand drawn maps or polygons/polylines drawn in Google Earth format. In these cases we did our best to georeference and verify the coverage areas with the WISP.

When we received coverage information in KML format, like the image below, we accepted the data as it was presented to us.

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[18] Some polygon data did exceed the node count threshold. In these cases, data was rasterized to 100m cells and then converted back to polygons. The polygons were dissolved to multi-part geometry. This addressed the node count concern.

As the image above shows, in some cases we were provided hand-drawn coverage, as well as infrastructure. Instead of estimating their coverage using a line of sight or RF study, we elected to stick with the provider's supplied information. Our decision was guided by two primary factors:

- If the provider is advertising using this coverage they must have specific confidence in its accuracy.
- If the provider can supply coverage, as well as infrastructure that reasonably supports the coverage, there is a very high likelihood in the accuracy of the information.

The downside, of course, is the polygon shown on the map may not represent our notion of how wireless coverage should appear.

In general we note several interesting trends in the wireless data. First, we can be successful in increasing the amount of WISP coverage when we aggressively pursue WISPs. This means we have to be willing to accept data on their terms and convey it into SBI formats. Some of our WISP submissions have taken over 12 hours to normalize into SBI formats. Second, we have to accept that some WISPs will not be able to supply FRNs. There remains a minority of WISP providers who are not aware of the FCC FRN. Third, there appears to be some variation on how the NOFA coverage definition is met. In other words, there seems to be a disparity on the necessary strength (e.g. -80 dB, -98 db, -120 dB, etc) to provide the appropriate quality of service for data services. Fourth, it was very difficult getting providers to identify spectra used for Broadband data services[19]. We are unsure if this is a competitive concern, or if the same coverage pattern is yielded for multiple frequencies. Typically, the spectra returned were those that a provider was licensed for. At this point, we have no reliable way to locally determine what set of frequencies are used to provide Broadband data services in a local area.

Service Address Point Process

A handful of providers have requested that customer level, service address point data be submitted to NTIA. In these circumstances we have done minimal processing to preserve the provider's intent with this deliverable and not bias downstream NTIA use.

Our verification included checks against commercial or Public Utility/Public Service Commission exchange boundary maps. Points not contained within one mile of a boundary are not submitted to NTIA. The percentage of excluded data variesacross providers.

We retain from the provider the provided latitude and longitude, as well as Census block. For some coverage data, if a provider is unable to supply a longitude, latitude or Census block, we fill in these attributes. In those circumstances where we do not have a Census block, but we do have a longitude

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[19] One provider responded by email, "This mapping program is to provide the coverage area for Broadband provided by a company. Not to keep a detailed account of every aspect of a companies (sic) network."

and latitude, we accept the given longitude and latitude and use that as the basis for our Census block assignment.

With point data we have tested for comparable geocoding success rates but do not overwrite provider information.[20] From this type of analysis we note the amount (usually little more than 10%) of addresses that seem to locate with less than street segment certainty. Deriving a thematic representation of the points on speed also illustrates some of the locational certainty issues in this point level data.

Coverage Estimation Process

Although the derivation of Broadband coverage into Census Blocks, street segments, or wireless coverage files is, in itself, a bit of an estimation process, there was an explicit estimation process required in cases where a Broadband provider either refused to participate in our survey, or provided such a threadbare submission that no carrier-based coverage information could be gleaned[21].

We typically resorted to three possible estimation paths.

For Cable (HFC) providers who did not provide any coverage information, we fell back to Media Prints data. Rather than using the entire Census Block Group gathered by Media Prints, we used only those Census Designated Places carrying the same or similar names to the Media Prints p_com field. Our reasoning was that Cable systems tend to be franchised on a municipal or at least administrative basis so the coverage will likely follow a governmental boundary. As a general rule, cable infrastructure is not available in the public domain[22] and what could be found was poor in quality and difficult to ascertain for validity.

For DSL providers who did not provide any coverage information, we estimated road-based coverage from their Central Offices[23]. We only used Central Offices that showed evidence of DSL or fiber-based services in the NECA 4 tariff. Road-based engineering areas were derived via ESRI Network Analyst to 18kft. These segments/boundaries were clipped to commercial wirecenter boundary edges.

For mobile Broadband providers who were non-responsive to our requests, we fell back to American Roamer coverage patterns. We generalized the American Roamer coverage to ½ km in order to protect the licensed information.

For fixed wireless providers who provided no coverage information, we relied on their public websites to derive coverage maps. When these maps were available, we georeferenced them and tried to use the

[20] We will make a second geocoding pass on locations with no longitude or latitude from provider. We typically pick up ~5% from our second geocoding pass. Typically the issue is address quality but also difficulties in geocoding in very rural areas.
[21] We report estimated submissions to NTIA as a non-responsive provider but we have data in the submission for them. This is the reason for datapackage.xls entries which are non responsive but contain submitted data.
[22] The team tried to use data from the FCC Coals system and 321/325 fillings but this seemed to be a bit non-uniform in quality.
[23] Central Office location was derived from MapInfo ExchangeInfo Professional. Wirecenter boundaries also came from this commercial product.

outer polygon boundary to represent their serving area. In other cases, when only a tower could be provided, we used a view shed analysis and estimated coverage at 10mi per tower[24]. Because much wireless propagation is driven far below the Census Block and much engineering information isn't known (frequency in use, polarization of the signal, coverage pattern of antenna(s), local terrain/land cover) this was the most complicated group to estimate.

Speed

Speed attributes are reported both at the block (typical) and higher levels (maximum advertised and subscriber weighted). We note that in many cases, providers did not supply typical or subscriber-weighted speeds. In some cases, it appears--although we cannot verify--that their maximum advertised speeds were used to populate typical speed columns.

We do have limited testing data on reported speeds, but we have been careful to not use our typical reported values with carrier-provided information. If we do not have a speed value from a provider, we report an empty value.

Several service providers claim they do not have data on typical speeds available, but estimate a 20% overhead factor between the advertised speed and what may be experienced by an end user.

We continue to request advertised speed at the block level. Nevertheless we appear to be getting speeds that do not vary over a large geographic area – leading us to believe that providers may still be submitting the maximum speed advertised in local media for the entire market. For the most part, we have been unsuccessful in messaging that advertised speed should not correspond to a market area, but instead, the maximum speed, which can be provided to a household—what some may describe as a 'qualified speed.'[25]

As a general rule, in circumstances where a provider supplies a range of speed attributes, we assign NTIA categories based upon the midpoint of the range. We follow this rule unless we can determine other grantees are handling the same submitted information differently.

To support NTIA program office requests, we have also modified the structure of the Service Overview table. Even if Maximum Advertised Speed is supplied at the market or county level, we push that speed down to the contained Blocks. The only records that remain in this table, will be those wireline records with either a non NULL nominal weighted speed or ARPU value.

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[24] In some cases we had an approximate radius of coverage but no height. In this case we used a 50' height estimate and then clipped the coverage to the provided coverage range. We also clipped wireless coverage to honor state boundaries but did not look for providers serving coverage with out of study state facilities.

[25] As an example of a response to our request for Block level advertised speeds, we received the following comment from one anonymous provider, "This is and of itself does not require anything new of us – just states the NTIA supports efforts focused on getting that information on the CB level." It would be helpful to have broader messaging so that providers understand this new direction.

Community Anchor Institutions

In the first submission, the Community Anchor Institution (CAI) process was referred to in terms of a learning curve. This continues to be an appropriate metaphor. The mapping team continues to focus on data that will support and help inform policy makers and the SBI planning process.

In the first submission, the team gathered information on what data was available and what resources will be required to engage these categories of important institutions. In the second submission we continued to obtain additional connectivity information. For the Spring 2011 collection, the team began a survey process to directly engage these important organizations. As the October 2011 submission represents a transitional phase, much of the CAI effort encompassed getting this dataset stabilized for work outside the LinkAMERICA team.[26]

In the current submission we worked to achieve four goals

1) Modify the source data so as to no longer pass NTIA any connectivity estimates

2) Propagate administrative capabilities in our Community Anchor Verification System (CAVS) systems to the Regional Planning Teams

3) Verify the available connectivity information based upon new survey information

4) Update the Federal record identifiers (NCES codes, etc).

CAI Philosophy

Our work with CAIs is guided by three principles.

First, CAIs are important stakeholders within the planning process. Our goal is to engage participants in regional planning that have strong ties into the CAI categories identified by NTIA. This has a direct benefit of engaging an established stakeholder community. It also allows Broadband planning to tie into existing organizational and planning networks. In each of our states, key relationships with education, public safety, libraries, and economic development sectors are being identified and developed.

Second, we believe that CAIs will likely be one of the primary beneficiaries of targeted Broadband funding. Our belief stems from the sense that many of the benefits of Broadband will extend from these community 'anchor points'. In other words, it isn't solely the existence of Broadband at a library that provides a benefit. It is people using applications that work only on a Broadband network to upgrade their skills (e.g., online training) and gain access to online content (e.g., job postings, goods and services), etc. The targeted use of a specific application--that can only take place with Broadband networks-- is what produces the priority benefit. Put another way, there seems to be a realization that

[26] LinkAMERICA began transitioning the CAI data collection effort in the state of Alabama to ConnectingALABAMA in Round 3. For Round 4 ConnectingALABAMA assumed full responsibility for the CAI data collection effort in Alabama. To facilitate the reporting process, the ConnectingALABAMA team continued to use the Community Anchor Verification System (CAVS) to store CAI data collected or modified. CostQuest maintained responsibility for the CAI data submission for Alabama for round 4.

things are less about pure connectivity (for the sake of connectivity) than about connectivity in terms of an application (for the sake of the benefit obtained through the application).

Third, we continue to use a rational and targeted approach to derive information. This means we will utilize our planning teams for as much ground work as possible. This also means that a goal of our CAI process is not an exhaustive Census of anything that could be a CAI; rather, it is the discovery, inventory and integration of Broadband planning activities into those CAIs that stand to produce the greatest synergies with the SBI planning process.

The above implies two significant points. First, the team's goal is to document community anchor institution connectivity within a broader context of regional and statewide planning objectives. Second, if a particular category of CAI has an independent Broadband planning effort underway, we will encourage that organization to take the lead, and we will provide relevant expertise and support as warranted. For example, in one of our states, the public safety community is already engaged in a mobile Broadband survey effort. We have aligned our CAI data collection process with that effort and are sharing information and expertise (e.g., hosting a survey) to support their mission. In another state we are attempting to glean connectivity information from a municipal government survey. There may be some downside to this collaborative approach in that we may have to work with data spanning different times or we may not have all of the location-specific information we need, but this does prevent the same user from receiving multiple inquiries.

Anchor Institution Survey

During the third submission period we designed and developed a simple on-line survey system called CAVS (Community Anchor Verification Survey). The intent of the survey was to both verify received connectivity information and garner additional connectivity information from CAIs. For round 4 we continued the use of the on-line survey process. Although we have found that reaching out to central contacts, for specific institution groups, is the most fruitful way of collecting connectivity data we find value in inviting individual anchor institutions to participate through means of a survey. From our perspective this approach gives the individual institutions an opportunity to become engaged in the broadband planning process. The link for the survey is housed on the Home Page of the website developed for each state, thus providing the added opportunity for responding institutions to learn more about activities in their state.

The survey remains open between collection periods to provide opportunity for the Regional Planning Teams to update information as they engage with the community and to allow responding institutions to update their data as necessary.

Anchor Institution Trends

At this point we have focused our CAI attention on schools and libraries, with respect to connectivity. We benefit from strong relationships throughout the education sector (K-12 and Post-Secondary). We have also found excellent resources within State librarians in all States.

To supplement the education and library information we have formed organizational relationships with the major hospital associations within each state. Our goal with this relationship is to cull information from their planning process. We continue to formalize/advance this relationship.

As in the prior submissions, we rely on public domain sources of information for the public safety-category . Collecting connectivity data for this group continues to be one of our most significant challenges. Our hope is that in subsequent submissions, we will reduce the size of this category and connectivity information specific to root nodes of the public safety network--such as County Emergency Operation Centers.[27] At this point we have had minimal success gaining this information.

Because we have a wide ranging population of CAIs in our data set we have a variety of Broadband services that don't always fit NOFA parameters. Services like PRI or T1 are classified into "other copper," We also had difficulty obtaining both the upstream and downstream channel capacities. In most instances, when it was logical to do so, we made the speeds symmetrical, but this is an assumption on our part. If a site records bandwidth across several services (eg. video and data), we record the total bandwidth to give a picture of available site bandwidth. We are also working to standardize our response to NTIA in circumstances where an entity shares a Broadband connection among a campus which is fiber fed. In this case we use the total campus bandwidth and use the primary campus Internet connection.

As a final verification step, we attempt to screen the CAI data for duplicate values. Because many CAI are closely clustered together we perform the de-duplication based upon the ANCHORNAME within the ZIP5.

Middle Mile

Middle Mile information was collected directly from providers via survey or interview. Middle Mile is a "chicken or egg" type of challenge in that it is possible to verify that the infrastructure exists, but extremely difficult to know what is the site is doing without engineering level assistance. Although most providers submitted "something," there was a significant variance in what that "something" represented.

The purpose of this section is to record some of the comments and questions we have received about Middle Mile. We hope this provides better context for our data submission.

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[27] Within the public safety category, it is also very difficult to derive precise locations as many CAI are addressed to PO boxes.

Within the NOFA, Middle Mile was defined as (a) a service provider's network elements (or segments) or (b) between a service provider's network and another provider's network, including the Internet backbone. (Collectively, (a) and (b) are "middle-mile and backbone interconnection points.")[28]

Given the existence of the "or" in this definition, providers submitted a variety of information. Based upon the NOFA example, several fixed wireless providers interpreted Middle Mile in terms of the connection points from their towers to their own serving backhaul location. The topology was commonly Microwave from their distribution towers to their NOC. The NOC and towers were listed as the Middle Mile points. This seems to be consistent with the first definition clause (a).

Telephone, Mobile Wireless, and Cable providers tended to remain either silent on the question, or would provide a single location in which Internet peering occurred (clause b). A number of participants explained that the NOFA was quite ambiguous with data traffic moving back and forth over both TDM and IP networks--it was unclear where the distinction should be drawn. As a general rule it seemed like many providers listed a single location where Internet Peering occurred.

A number of providers refused to answer the question on grounds of confidentiality[29]. Others would not disclose as their Middle Mile points are not owned--another company provides the physical and electronic connection to their network. In other words, the entity providing Broadband is not the entity providing Middle Mile.

Additionally, based upon the new Provider Type classification of "other," we have started to integrate points provided by Broadband service providers not meeting the NOFA definition. This includes POP locations and aggregation points for public / private networks.[30] Within a given submission there were two final attributes that tended to concern respondents. First, speed should be measured in terms of only data capacity and what exactly is "data" (e.g., can/should you segregate out voice or video), and is the relevant capacity of the physical connection, channelized to a specific virtual circuit on their network.

Finally, a number of other providers were unsure of the height above grade measure (is this their floor, the street outside, etc). We seem to have a combination of height above or below grade, as well as heights above mean sea level (AMSL).

To the extent possible in our timeframe, we verified the location of a sample of Middle Mile points. Where we could see infrastructure that appeared to be consistent in location with other provider

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[28] From http://broadbandusa.gov/files/BroadbandMappingNOFA(FederalRegisterVersion).pdf at 54, visited March 28, 2010

[29] As received in email 9/30/10, "Due to security concerns and the risk of public disclosure of highly sensitive data, whether inadvertent or otherwise, ***REDACT***response to the Middle Mile and backbone interconnection request is limited to publicly available information available on {remainder not included}"

[30] As discussed in our readme.txt file, a number of middle mile points were lost in validation due to their location in adjacent state. This will cause a decrease in some providers relative to prior submission.

infrastructure, we felt that the location was accurate. In some cases, the point provided seems sensible (is on a road, near other equipment), but using imagery, we couldn't find a place where this type of connection could occur. This wouldn't be unforeseen, in that Middle Mile connectivity likely takes place in a protected environment much smaller than a standard Central Office installation.

Mobile Wireless Coverage

We have received mobile wireless coverage from most mobile Broadband providers in each state. At this point we have cleaned the geometry of the data and attributed it with spectra and FRN as required.

Provider derived coverage has been reviewed against the commercial licensed product for consistency. To a limited extent we also use licensing locations and tower infrastructure to spot-check supplied coverage. This mode of verification remains complex, given the lack of facility-based information with mobile wireless.

Finally with respect to mobile Broadband services, we note several trends.

First LinkAMERICA used the NTIA supplied frequency tables to report speeds consistent with other grantees. In circumstances where a provider supplied a range of experienced speeds, we used the portion of the range consistent with the most frequently reported Grantee value.

Second where a provider reports multiple frequency bands in use but doesn't distinguish these bands by submitted SHP file, we submit identical geometries but attribute one geometry to each submitted spectrum value.

Third we are seeing a trend toward increasing Broadband speed. As of this writing, there is not consistency across providers in how they attribute the advertised 4G speed values. In other words, for some providers 4G means advertised speed categories increase. For other providers, the speed value did not change.

Verification

Almost by definition, data verification is an ongoing and evolving process. Clearly, with each new data submission there will be a validation process at hand and at the same time, our team continues to expand and improve the efficiency and effectiveness our data verification routines. Consistent with the movement toward an fGDB export database and use of a data receipt script, much of our validation effort was spent in supporting the ETL processes into the required formats. In future data submissions we will continue our work to stabilize and improve the business process that normalizes provider submissions into NOFA formats and expands in more depth on the confidence analysis within the data.

Verification Standard

Our overall verification standard is focused on the level at which we supply processed data to NTIA. This means that the vast majority of our verification process will be focused on ascertaining coverage for Census block's less than 2 square miles and covered road segments.

We are learning that Verification has multiple dimensions.

Provider verification is finding providers who supply Broadband and discriminate out providers not meeting Technical Appendix A's definition of Broadband.

Identity verification is taking the provider's categorized in the first step and ensuring that the provider either has a valid FRN or is assigned a default FRN. Identity verification is very complicated because of the Technical Appendix A's mandate to record data at the FRN, provider Name and DBA level. Each of these attributes could be unique for a single provider going to market under different or the same names. As a result, rolling up each provider into an identity collection that matches either the FCC data integration team or a third party Broadband provider's data view, is very, very time intensive. Identity verification is discussed in the earlier section-- Developing the provider List.

Coverage verification is a broad term, but in our definition it boils down to determining if Broadband coverage is in the right place. For a given provider, the question is whether the coverage is assigned to appropriate Census Blocks, road segments or area features. Coverage verification can be further broken out into two distinct classes:

- Technology verification, which is determining if the provider is listed with a technology consistent with their marketing information.
- Speed verification, which is determining if the speed supplied for that block, road segment, point area file or market area is consistent with the technology and the marketing information received.

The final verification dimension is consumer feedback and crowd-source verification. This is a dynamic set of steps we are beginning to implement. One side of this is responding to consumer concerns. The second is using the crowd sourced data to validate provider claims and, if appropriate, update the map and the underlying data.

At this stage, our working hypothesis (confirmed by our experience) is that there will not be a single dispositive measure to indicate Broadband coverage availability in a Census block or along a segment. From prior work, and examining our current provider submissions, we believe that there is too much variation below the submitted record to make a single binary yes/no indication. Rather, there will be a series of measures that combine to provide qualitative confidence (a classification scheme) in our indication of Broadband availability at the block, segment, or wireless polygon level. We believe such a qualitative confidence scheme is both relevant to and supportive of NTIA interests, as well as the interests of our end-user community – that is, the states and citizens we serve through this program.

The intent of this section is to illustrate why we are moving toward a particular verification methodology. Our team is learning as we go along, and will adjust and improve this thinking. But given our experience to date, this is where we are heading. As stated above:

- First, coverage verification is at the level of data submitted to NTIA.
- Second, coverage verification is enhanced when there is a secondary measure of availability (such as infrastructure presence or serving area boundaries)
- Third, given the limited resources of this effort, the most important coverage verification process to implement is the erroneous dispersion of coverage. These are the “islands” of coverage isolated by significant distance from other covered areas. . In other words, Broadband Internet likely doesn’t exist far away from other areas with Broadband Internet access.

Before explaining our overall verification thought process, we have several examples, which illustrate the complexity of coverage verification.

The first example is taken from a gentleman who requested a map change in Alabama. His home is near the yellow dot. The darker grey Blocks are covered Census Blocks. The black lines are covered road segments. He cannot receive DSL from his incumbent provider, although his neighbors can. The incumbent carrier does have at least one structure in that block from which Broadband services can be provided; unfortunately his home is not served.

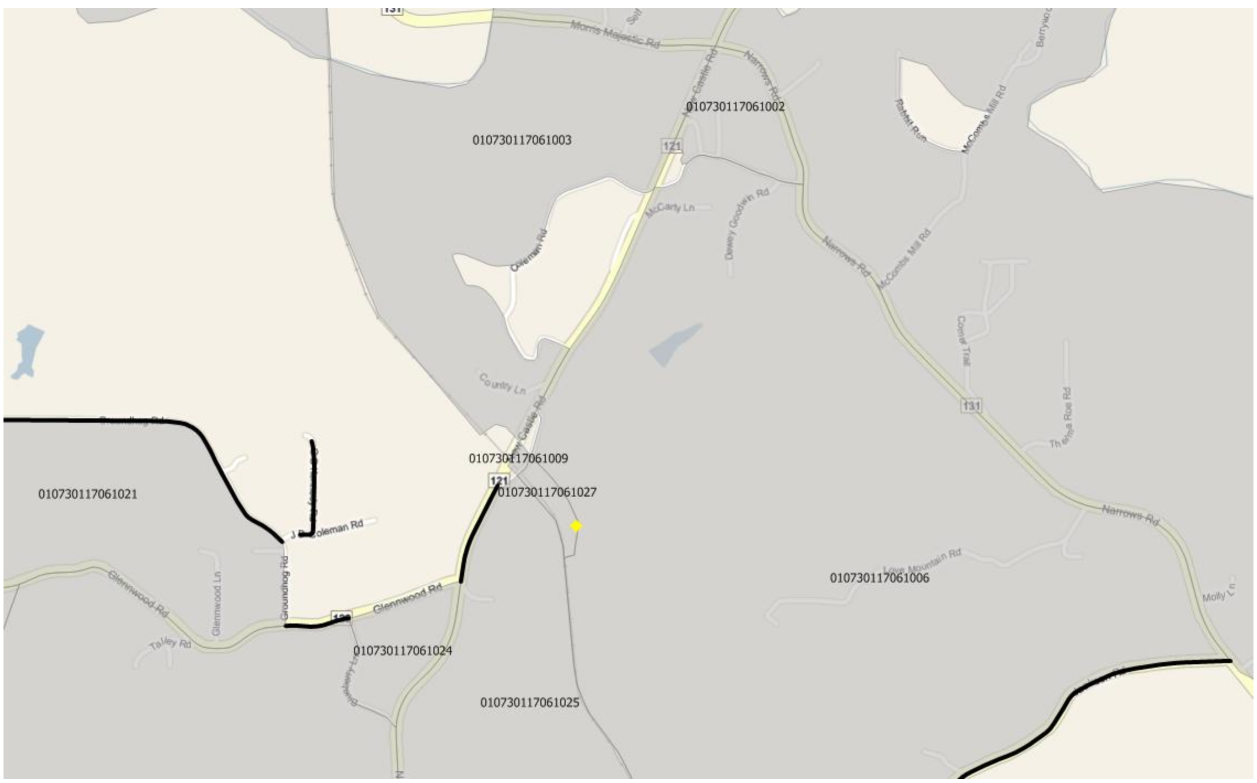


Figure 16--Sub block variation

Because the SBI program requires the depiction of coverage at the block level, the above map has been correctly generated. However, from the customer's point of view, the map is inaccurate. This requires us to explain that the maps are not intended to be a structure-level qualification, at which point some consumers question the value of the maps when seeking service information. Of course, we also share this information with the incumbent carrier in the area so they are aware of a potential customer market.

Beyond this type of one-off structure-level qualification, sometimes, as shown below, we have even larger gaps in provided coverage. The image here shows an "outlier" block that could be an error, or it could indicate missing Blocks along a major road that should have been filled in. In this figure, the outlier block is highlighted in turquoise.

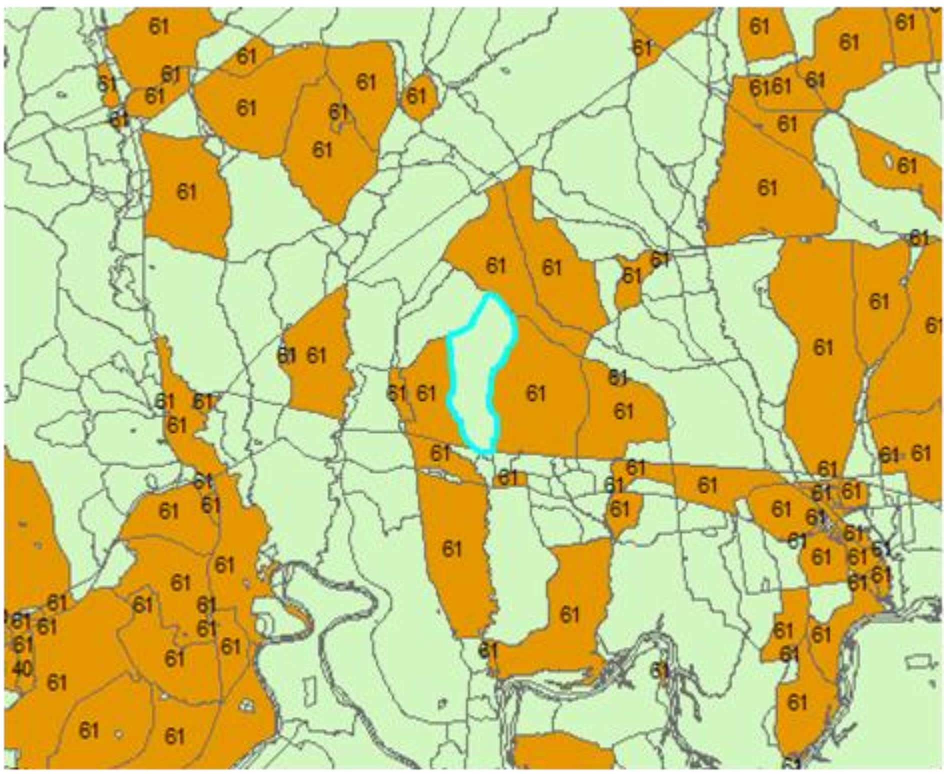


Figure 17--Dispersion in Submitted Data

In this particular case, we are faced with a different verification question. Based upon the properties of the neighbors, we believe this block should likely be covered (coverage interpolation,) but supplied data from the incumbent says otherwise.

The next example shows where an interpolation process could require some adjustment. The figure below shows a town level. There are some smaller Blocks that are likely covered by interpolation logic, but we also do not want to extend coverage beyond a franchise boundary as in the areas shown in a box on the bottom of the map.

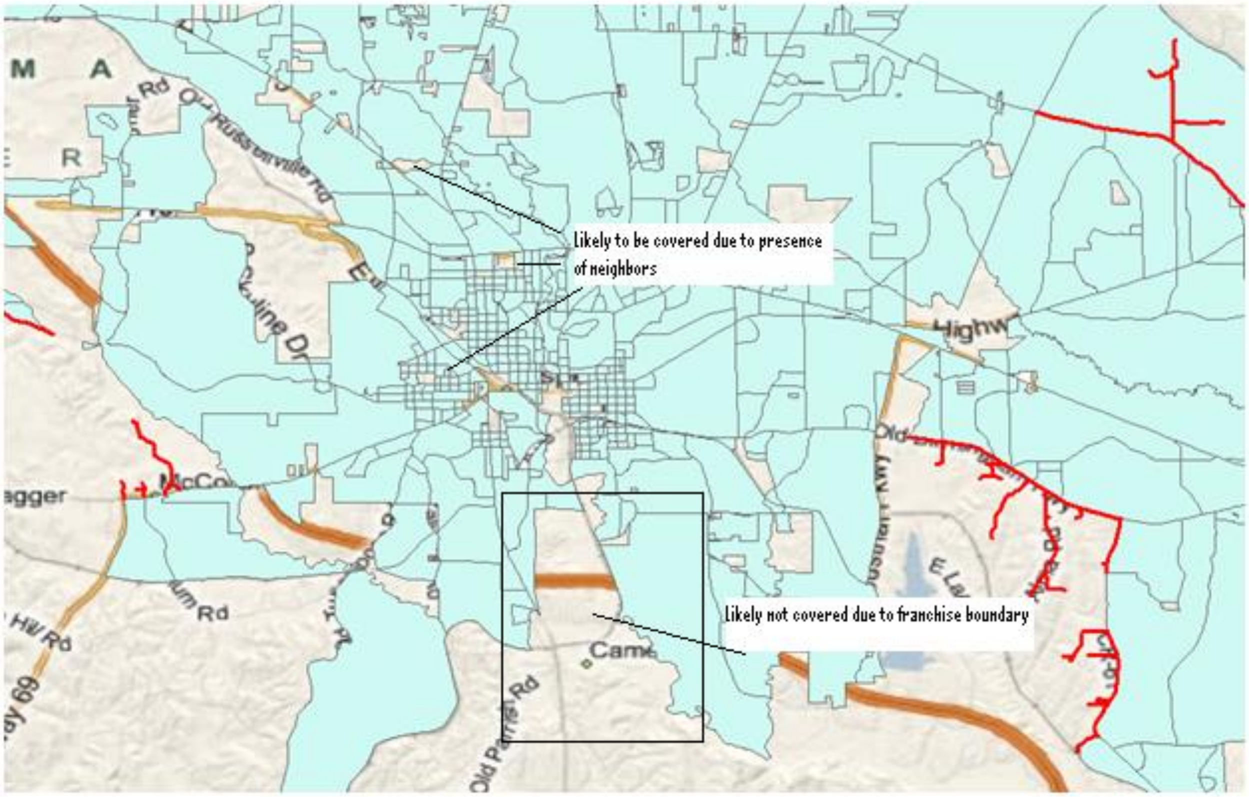


Figure 18-Where do you stop interpolating?

From what we can gather from some providers, the submitted data—data with consistently high degrees of dispersion or coverage holes—tends to come from geocoded billing records. In this paradigm, this means where there are no customers; service is not identified on a map. The interpolation verification question then takes on two dimensions.

> First, if a provider has no customers in an area, how can we know if they would be able to provide service in a 7-10 day interval?
>
> Second, if we use the properties of neighboring Blocks to interpolate coverage, when should we stop (e.g., at a franchise boundary, at a certain distance, etc.)?

We continue to work with providers to get additional information to help us better understand and contend with this type of circumstance. However, we have not been entirely successful at getting franchise boundaries that would address much of the issue.

The final map shows this dispersion problem, but to an even larger degree. This solitary large block is likely the result of a bad geocode, but we don't know, given the data that has been submitted by the provider and the "single customer in a block standard" set by the NOFA clarification.

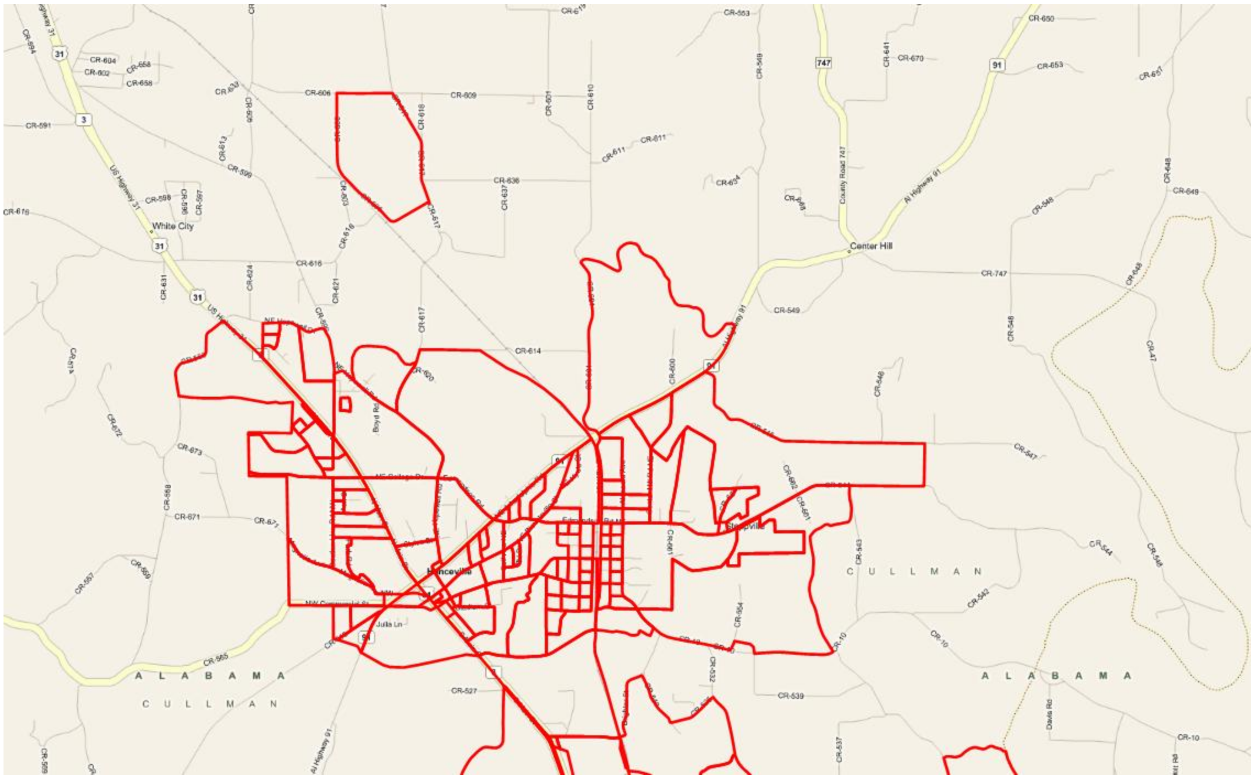


Figure 19-Dispersion in covered Blocks

Due to the fact that this situation is quite obvious in display, this type of problem is one that we are more aggressively trying to resolve. Where a single block has no neighbor offering comparable coverage and is a specified distance beyond an exchange boundary, our approach has been to filter these Blocks out. As of now, this filter is limited to incumbent DSL providers because we have a good source of exchange boundaries.

The exchange boundary dispersion verification method breaks down when examining smaller providers who are more likely to CLEC into neighboring territory. In the figure below, the black line represents the exchange boundary, while the continuity in the DSLAMs likely points to coverage extending along a road into another provider's territory.

Figure 20--DSL Coverage outside of exchange boundary

In sum, the variability in our source data continues to suggest that our dynamic verification process is relevant, appropriate and evolving in a manner consistent with the overall program. And, as noted above, we believe the more meaningful outcome of our verification processes will likely be a series of qualitative indicators or expressed confidence levels. Our concern, as with the development of any sort of classification process, is how rigid we should make this classification given the variation in our input data and the varied perceptions of service providers, map viewers and down-stream data consumers.

Verification Work Process

To support our dynamic multi-factor verification process, we have implemented the following steps.

First, when data is received, an analyst reviews the submission and any immediate questions or concerns are sent back to the provider as quickly as possible. We have found this gatekeeping step very helpful in making sure we understand the intent of the submission.

Second, for all providers who submitted data to us in the third round, they received both a tabular data summary and mapped output[31]. Prior to releasing the "check maps" to providers, we had a team of analysts visually inspect each provider's coverage area. The focus on this QC effort has been to identify and flag suspect Blocks. After this in-house review, we solicited a second level of feedback from providers and received a number of requested changes and corrections used in the development of the October, 2011 round 4 dataset.

For those providers who submit only block or segment level coverage (i.e., in those cases where we have no infrastructure to test with) we test for coverage containment within known service boundaries. The intent of this validation step is to remove Blocks that are obviously erroneous. We also verify the submitted speeds against the typical speed ranges in the NTIA frequency tables. If we note a value outside of typical range, we ask the provider for clarification.

As mentioned in the sections above, we have implemented a check on dispersed Blocks, but we have implemented less with respect to coverage interpolation (holes in coverage). We continue to work on a series of mechanical tools to assist with the inspection process but have run into challenges related to geographic basemap and timing.

As our submissions have moved online, we have also begun to benefit from crowd source feedback. In some cases this has helped us identify and fix errors in our underlying data. In other cases, as we have shared with NTIA, we have encountered some perceptual issues rooted in how the data are developed and modeled to comply with the NOFA. Depiction of uniform coverage in small Census Blocks continues to be a challenge. Despite our best efforts to explain the full block coverage requirement, we continue to receive complaints that the coverage shown on the map is not accurate for a particular location within that block.

[31] For the verification of round 3 data, we submitted both PDF and KMZ (Google Earth) format check maps. Some providers prefer to work with the Google format as it supports easier modification. Others continue to submit marked up PDFs.

Consumer and Provider Responses to Deliverables

Here, we segue from internal verification to external verification. We view responses to our work product as a form of validation and verification. On the one hand, this gives us the opportunity to fix mistakes and then generate QA steps to make sure that the problem does not reoccur. We also learn how to improve what we are doing or better explain what we are doing to a community not always familiar with the NOFA and program office framework. On the other hand, listening and learning from this feedback helps us better target our mapping deliverable to meet the needs of our external customers. In this second case, external feedback not only provides feedback on perceived qualities (or lack of quality) in the data, it helps us to learn if we are developing data that is truly helpful to downstream users.

At this point, our external deliverables take three forms: State Broadband Maps, data transfer to NTIA used for the National Broadband Map, and text format data requested by outside parties.

Online Map Experiences

With our State maps are online, we continue to harvest viewer feedback and comments. Because an online map allows someone to zoom in far below the scale of the data, a large number of comments reflect sub-Census block concerns. While important to the citizens reporting these issues and to our Broadband planning teams, this level of data is outside the scope of our core validation process, which as noted above, is focused on the level of data submitted to NTIA.

There are several other themes that our team believes are important to share. These comments are actually quite helpful because they also improve our data processes to better meet the needs of map viewers. For example, we have invested significant time in harvesting more segments from provider data. Because the appearance of segments is so important, we are putting time into ensuring a visually appropriate edge match between the roads we harvest and the Blocks/roads we will show online. On a technical level, we also believe that a good segment process will help us understand more about dispersion in the data, and what is valid versus what is not valid.

Online Display of Consumer Feedback

We have completed development of a consumer feedback layer for our online maps.

The intent of the new layer is to show viewers the feedback of other map viewers. We anticipate the feedback layer will go live when the Round 4 data is posted on our state maps. We expect this to be prior to the end of October, 2011.

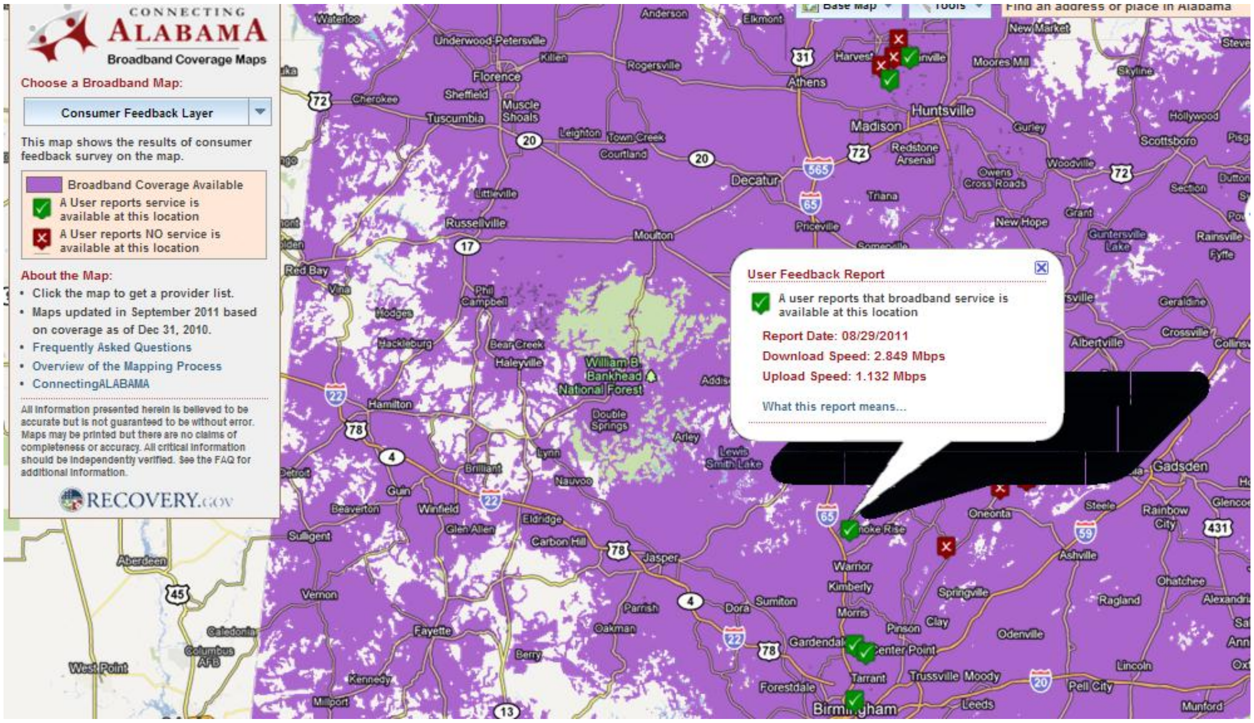
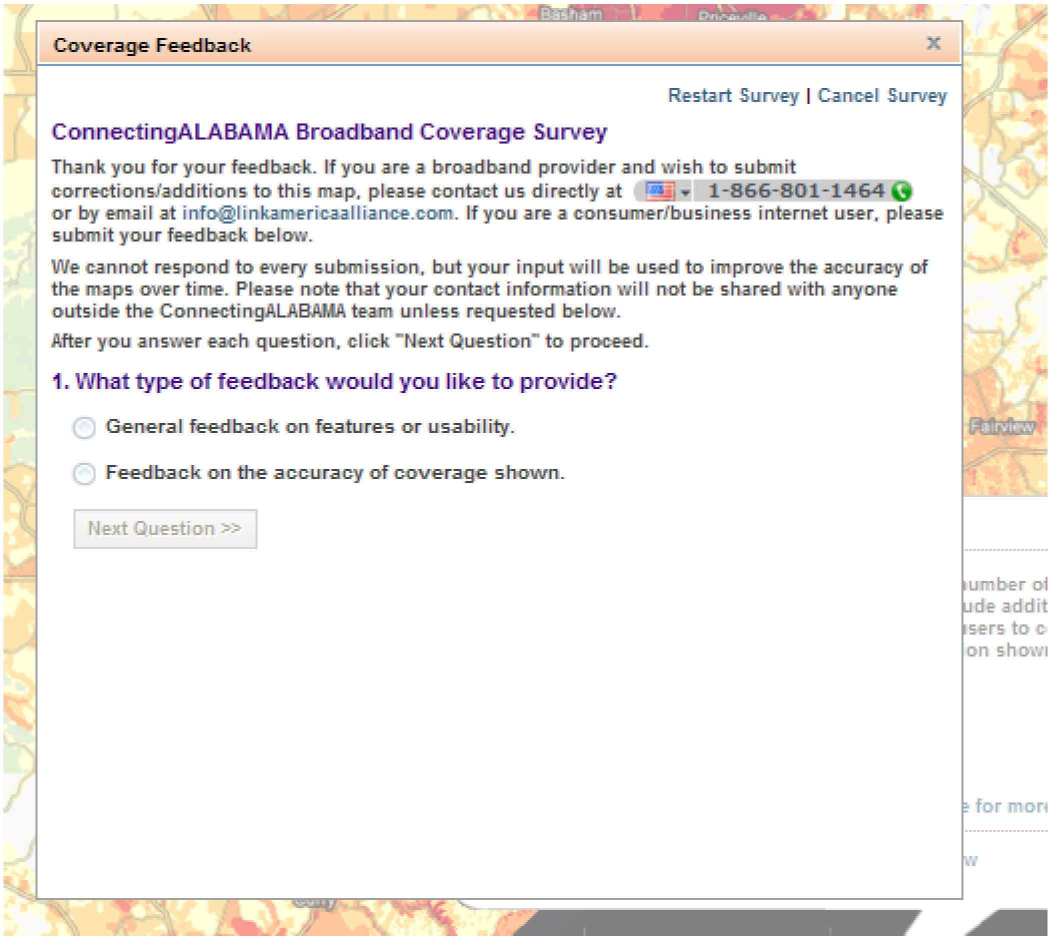


Figure 21--Consumer Feedback Layer

To gather feedback, we use a survey wizard which asks the end users to categorize their concerns. The survey went through several iterations of design and usability testing. Our experience has been unless we get a way to constrain the user feedback into manageable categories, it becomes very difficult to act upon.



As mentioned by other Grantees we struggle with how to use all of the feedback we receive. The qualified data points seem to fall below a volume in which we can infer significant modifications to the map data. Nevertheless, we believe it is important to gather structure and display the feedback to support project transparency.

Perception of Unfair Treatment Across Technologies

Several Broadband service providers have expressed strong concerns regarding how wireline services are displayed, as contrasted to how wireless coverage is displayed. This is an artifact of the SBI data model. As an example, consider the figure below.

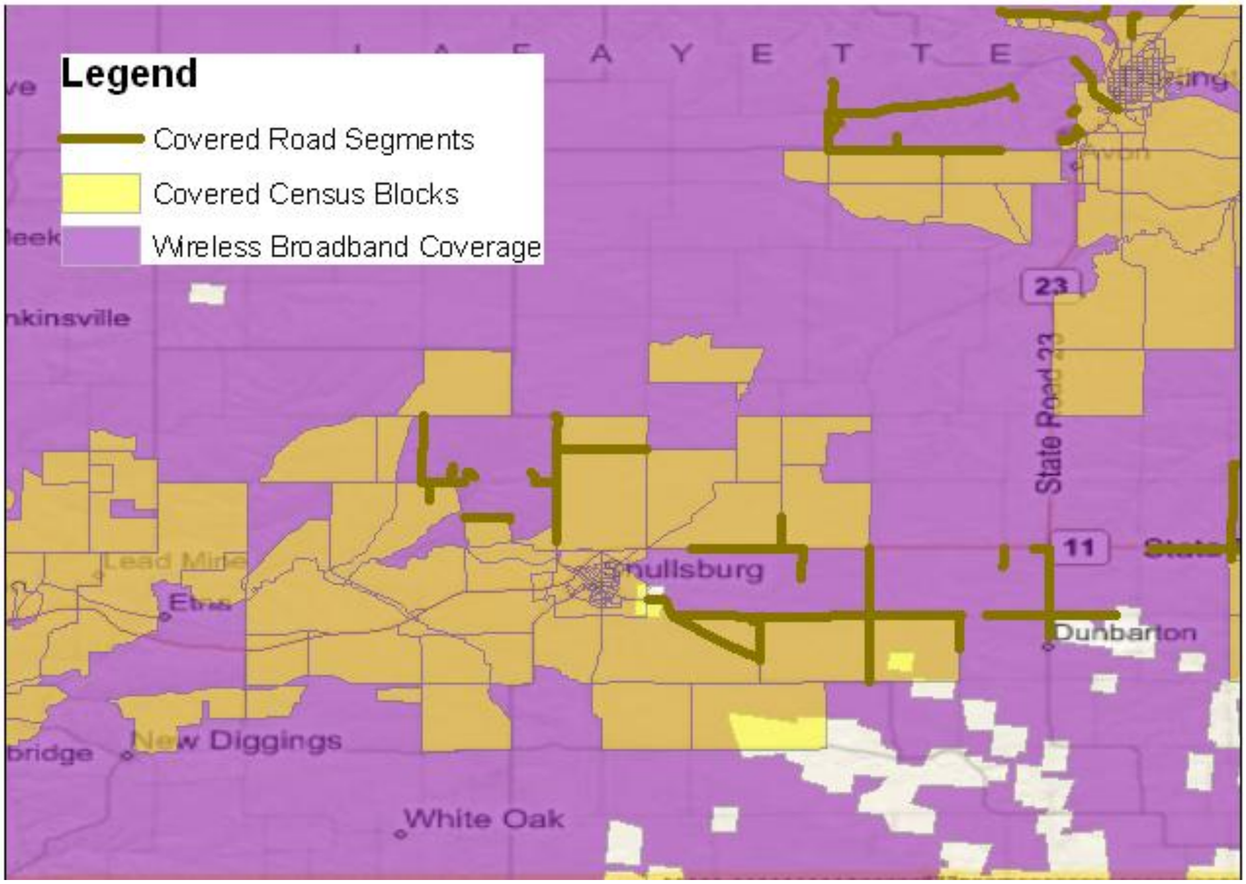


Figure 22--Multi Network Coverage portrayal

In this image, covered Census Blocks are light gold. Covered road segments are a darker gold and wireless coverage is purple. The concern seems to come down to how a wireline provider's coverage is shown in the large Census Blocks (greater than 2.0 sq mi). Some wireline providers have expressed dissatisfaction because their coverage is only tied to road geography, which leads to a visual "hole" in their coverage map. At the same time, they feel that it is unfair that the wireless provider's coverage is shown to be uniform in the same area. Put another way, if our maps show wireline in terms of Blocks and segments, why don't our maps show wireless the same way?

Perceptions of Carrier of Last Resort (COLR) Obligations

Some wireline providers have also expressed dissatisfaction because online maps limit the distance of coverage from a road segment. In our current online maps we buffer a wireline carrier's service 300' from road centerline. A number of providers have expressed that they are mandated to provide voice coverage (which Broadband will accompany) anywhere in the Exchange. There seem to be many dimensions to this argument, but the basic concern comes down to not being able to accurately reflect the scope of their COLR obligation within the mixed block/segment view. Their ability (or lack thereof) to actually provision such services for new users within a 7-10 day period adds yet another level of complexity when attempting to fairly portray their coverage capabilities.

Intentions of Coverage Mapping

When a viewer of an online map clicks on the map (or zooms to an address), they are provided with a pop-up of service provider coverage in the area. The critical question is this: what is the area to which that pop-up window responds to? In the past, we reported back to the specific Census block, or buffered road segment intersected by the user click. As far as the map was concerned, once we move off of that road, or out of that segment, we have a new area to examine.

Our sense, given feedback received, is that our provider view should be a bit more tilted toward finding providers in a general area, rather than finding providers at a single-click location. If the goal of the map is to get someone to call a provider for service, our bias should be to include all of the potential providers in the general area, rather than giving potential customers a method to self-disqualify. That is, we want to cast a wider coverage net, rather than one too narrow. The problem with this approach is that it will create a number of false positive Broadband reports. As of this date we cannot determine if the claims of inaccurate coverage in online maps are due to the looser provider view standard or not. We keep this looser standard in place to minimize the likelihood of self-disqualifications.

CAI Survey Fatigue

We are beginning to note an increase in survey fatigue among CAIs. Sometimes, as part of a direct survey process an end user will tell us how unhappy they are with the repeated Broadband survey efforts. Within several states BTOP grants are in effect that also survey Community Anchor Institutions.. As stated earlier we will defer to other Grantees when there are overlapping survey efforts.

Appendix One

Data Collection Challenges

This section summarizes some of the challenges we have experienced with data collection and processing. The team believes it is important to categorize these challenges as they help inform the geoprocessing and verification methods used. It is also our hope that some of the more global issues can be discussed and decided within the Grantee community.

We begin with several global issues and then continue toward more granular challenges.

Global Data Collection Issues

Census Block and Road Standards are not clear

We receive a variety of Census data. Some were able to supply 2010 Census blocks. Others continued to provide Census 2000. Managing this set of heterogeneous inputs has proved to be a challenge.

There seem to be several methods by which providers are calculating the Census block area. So the distinction between at 2.00 square miles can be uniform, it would be ideal to articulate an operational area calculation definition as early as possible.

Providers Not Wishing for Block Level Aggregation of Their Data

Both ***REDACT*** have supplied address point level data. Both carriers want NTIA to have the point level information, and they have asked CostQuest/LinkAMERICA not to aggregate their coverage to Blocks. Other than a verification to make sure that point data were contained within, or fell within 1 mile of exchange boundaries, the only other processing was normalization into NTIA formats.

Broadband providers not Meeting the NOFA "provider" Definition

PBWorks appears to reflect a concern among a number of grantees about what a Broadband provider is--and how that definition impacts mapping.

If the 7-10 day provisioning rule is to be strictly enforced, it would seem to eliminate a number of prominent Broadband providers[32]. Further, the need for clarification around a facilities-based provider, versus the reseller, has injected even more ambiguity into the mix. Right now we are unclear on how strictly to interpret either of these important distinctions, but we are concerned that we are beginning to create an NTIA exclusion criteria that is going to confuse downstream consumers of the data.

---

[32] By email ***REDACT*** informed us they could not provision in 7-10 days, but they also supply information on qualified locations to the address point level. Therefore, we draw a distinction between an incumbent provider owning the facility--which terminates at a customer premise--who cannot turn up service at a qualified location, versus a provider not reporting any specific qualified locations in which they cannot turnup service in the 7-10 day window. In the first case we have a sense of where service can be offered and verified. In the second, we have no evidence that a service could exist there until a specific location becomes a customer.

Again, we do not want to exclude a service provider, but we believe there needs to be further clarification around the 7-10 day ”rule,” the definition of a “reseller,” and better interpretation of facility-based providers, versus equipping UNEs, SpA or leased lines.

We have used the provider Type of ”Other” to classify a number of providers who offer Broadband services, but we do not offer them in a manner consistent with Technical Appendix A definitions.

To What Extent Should We Begin “Classifying” the Data and Maps?

The question immediately preceding gets to the intent of a Broadband provider. This question gets to the intent of the Data and Maps.

Earlier in this document we discussed the question of what type of bias we should introduce to our online map messaging. In an online environment, do we want to more likely create an overstatement of coverage for a provider than an understatement? In other words, is the larger problem allowing a consumer to self-disqualify, versus calling a number of neighboring providers? There is a related issue to this. Clearly in our maps there is a lot of scatter in data that we believe should be more continuous. These are the islands of coverage from an incumbent provider[33]. There are a number of processes that could be put in place to deal with this type of scatter, but without more information from the service provider-- essentially the last mile facilities-- it will be difficult to perform this clean up in an informed manner. On the one hand, we can aesthetically clean the maps up and reduce the scatter, but we have little sub-block engineering information upon which to make this decision. Right now our preference is to put out a somewhat aesthetically messier deliverable and work with providers to get better information to clean their submission. If that isn't forthcoming, we are limited in what can be done given the lack of facility level information. In summary this yields two questions

1. In our online maps should we error on overstating coverage to prevent consumer self-disqualification?
2. In our online maps should we work to clean up a lot of the scatter that we see without having facility-based evidence from which to remove it?

Granular Data Collection Issus

Non-Uniform Submission Standards

It is clear among providers that there isn't a consistent method used to derive Broadband coverage. Some providers appear to be use a geocoding approach and then point in polygon or point on segment process. Others may be using GPS locations. In some cases, it is difficult to infer what reference data was used to georeference plant (is it the carrier's roadbase?). This leads to uncertainty regarding the input data scale or accuracy relative to other base layers. Although we may be trading off absolute

[33] For a provider who sells opportunistically (not within a franchise area) it becomes even more problematic to classify their coverage because the points are more related to the type of consumer purchasing the service than a bounded offering. In a matter of speaking, the ProviderType is more determined by the technology and/or location than a type of business. The core intent of the NOFA and our grant application was centered around the 7-10 day providers but we believe maintaining information on provider Type “Other” and “Reseller” is important to assist in validation and market segment analysis as resources are available.

accuracy, our standard has been to conflate submitted data to TIGER 2010 Blocks and TIGER 2010 roads. We perform our verification against this conflated data product.

Temporal

We are unsure of how well the data are temporally consistent. Some providers gave us their best effort to control to June 30, 2011. We note that some providers were clear that the submission was as of extract date without any way to move back in time. They have no means to control for time and cannot provide any audit support beyond when the data are released to us. Some data-especially loop qualification data-may change from day to day. It will be very difficult to clarify why something was changed from a given point in time.

Perceived Inaccuracy with Respect to Internal Standards

The NOFA is clear on submitting a list of Blocks in which a provider delivers Broadband service. This is a different objective than perfectly reflecting service territories. If a firm's accuracy standard is a reflection of their service area, then the data created under the NOFA will not meet their perception of accuracy. This leads to two other issues: First, using Census Blocks rather than serving area may overstate or understate a particular provider's Broadband serving area. This was a significant concern of ***REDACT*** who specifically required us to submit only address-level qualification data. The second issue this brings up is how or if, there should be some standard on how much of a Census Block needs to be covered to call it covered.

Confidentiality

Several providers have noted concerns with CPNI-related issues and have stated this as a reason for non-participation. We have also heard expressions of comparable concern regarding identifiable responses to Anchor Institution information.

Unclear on Definitions

As discussed earlier, several providers claimed confusion on several key terms involved in Middle Mile. We note a consistent stream of questions around the interpretation of Maximum Advertised Speed. Some providers understand this to be the most common speed package bought within the mass market, while others view this as a speed that can be purchased for an additional cost above a mass market offering (eg. a Turbo option for an additional fee per month). Others interpret this as the fastest speed that is available for that particular location--in terms of xDSL, a structure qualified speed, for example.

Perception of Data Use

There seems to be some hesitancy releasing speed information because no one is sure of how the information will be used, or what the speed is intended to reflect. A number of providers have verbally indicated that typical speed will be about (on average) 80% of purchased speed due to overhead. But there are many other factors (such as a user's home network) that influence speeds measures. Providers are concerned about introducing statistics without a clear understanding of how those statistics are derived and will then be used. Also, as advertised speed is pushed down to a block level, we sense more trepidation to report speed values. This quickly begins to touch on parity across network types (why is wireline down at the block when wireless is half the state, etc.). Finally we note a

significant increase in speed reported to us. This may be due to network upgrades or competitive concerns to match the theoretical network speed.

Location Uncertainty In Source Data

Within this document we have noted concerns about the impact of source data accuracy. Our geoprocessing methodology provided what we believe is a relatively conservative tolerance to account for the scale issue in the source data, but we are unsure of how this may impact downstream users. Clearly, it also impacts the verification process because we can't attempt to verify received data beyond a scale at which it was developed.

Covered Segment Process

Deriving those Broadband covered segments in Census Blocks greater than 2 square miles has proved to be a challenge. Moving from a NOFA specified tabular deliverable to a requested geographic deliverable also increases the complexity of the effort.

Record Level Metadata

It would be helpful to have one or two additional fields in each feature class transmitted to NTIA. One User Defined field could be helpful as an expression of record level confidence. The second field could be used as a Key between the transfer geodatabase and our systems. Ideally, both fields could be large text fields (50 char) so the Grantee can use them to express a variety of attributes.

Miscellaneous Data Collection Notes

We note the following important observations regarding our data submission:

1. There are Middle Mile plant records for providers who are not present in the Census block, segment or wireless area feature classes. This is due to classification as non-NOFA Broadband providers.
2. In some cases, we have trimmed wireless coverage estimates to honor state boundaries.
3. We believe some providers are trimming their coverage to honor license area boundaries.
4. As a departure from past practice, where a provider submitted Middle Mile points out of state, we are no longer passing those points to NTIA as they fail the validation script. We experienced validation errors for BroadbandServed=N records in the CAI table. These records were attributed a Technology of Transfer=0. This cleared validation.
5. In tables with mandatory Street and Zip5 attributes(Service Address), if the value is unavailable it is filled with N/A. was not available, we have inserted 'N/A
6. As with submission three, there remains a tension between the Data Model, Data Model Default Values and the Python Validation Script. As an example the data model allows a NULL for the Maximum Advertised speeds in a Census block record. A default 'zz' is available for this condition as well but zz will fail the validation script. In the case where we have data which is missing Maximum Advertised Speeds, we are holding that data back to prevent downstream validation problems.
7. We have a significant amount of VDSL, ADSL 2 and ADSL 2+ coverage categorized into the xADSL category. This introduces a variance in speed availability as some providers are using VDSL, shortened loops and/or pair bonding to increase speed over 10 Mbps.

8. We have left in the data Middle Mile locations with above grade elevations that appear to be unreasonable, given review of orthoimagery. This seems to be confusion between above grade request and above sea level readings.
9. All fGDB have passed validation except in cases where attributed speeds did not agree with domains associated with technology of transmission (eg Upstream Speed of 2 with ADSL). We have modified the Python script to allow for conditions in the CAI table in which default data model values are disallowed in the Python submission script.
10. We note a few providers who have speeds seemingly inconsistent with their technology of transmission. This is either very low speeds with optical fiber, or very high speeds with non DOCSIS 3.0 systems. We have verified on provider websites that the reported speeds are available in the area but these speeds will fall out of the NTIA frequency table analysis.
11. We have a small number of providers who serve an area with both a residential and business speed tier. In cases where we cannot distinguish which speed tier offering to use, we use the lower of the speed tiers.
12. Per NTIA request we have modified the manner in which we handle Wireless coverage polygons. If a Provider submits a single geometry but specifies multiple spectrum codes in use in that polygon, we duplicate the polygon for each spectrum code. In other words the geographic object is identical but the attribute data for the object is unique.
13. In point level data submissions (Service Address and CAI) we note points that are spatially coincident. With respect to Service Address points our thought is these represent multi-unit dwellings or businesses but we don't have enough address detail to determine if these are multi-unit structures or duplicated customers. Because we cannot determine the reason for the duplication we leave spatially coincident records in our submission. We also leave in our CAI submission points which may be the same physical structure but have slight variations in addressing.
14. In point level middle mile data, we are finding a variance in the quality of the geocoded longitude and latitude returned. Given the data received we are unsure if this is an issue where the plant address is difficult to geocode or if the longitude and latitude provided to us is different than what would be returned in geocoding.
15. We note two important issues in our datapackage.xls. First the number of records in the provider tab will not sum up to the total record count. This is due to the requested grouping within the Excel table.. Second for estimated broadband coverage, we internally mark that coverage as an estimate but the provider is described as non-responsive within the datapackage.xls.
16. We made one modification to the NTIA supplied verification script. For the CAI layer we The query to check the TRANSTECH field now includes: "AND TRANSTECH <> -9999"

Appendix Two

This appendix contains the confidentiality clarification supplied in a series of emails between CostQuest and NTIA.

Feature Class	*Metadata*	*NOFA Confidential?*	*Online Map*	*Public Disclosure*	*Exemption*
Last Mile	Constraints on accessing and using the data	Yes	No	No	None
	Access constraints: None				
	Use constraints:				
	This data is confidential as defined in the NOFA.				
Middle Mile	Constraints on accessing and using the data	Yes	No	No	None
	Access constraints: None				
	Use constraints:				
	This data is confidential as defined in the NOFA.				
Service Address	Constraints on accessing and using the data	No	No	Yes	
	Access constraints: None				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
CAI	Constraints on accessing and using the data	No	Yes	Yes	NO attributes on any record in this feature class are considered confidential

	Access constraints: None				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
Census Block	Constraints on accessing and using the data	No	Yes	Yes	NO attributes on any record in this feature class are considered confidential
	Access constraints: None				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
Service Overview	Constraints on accessing and using the data	No	Yes	Yes	The only provider who may not show up this table is a provider who has provided only confidential data (last mile, Middle Mile,

					address point with provider name)
	Access constraints: None				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
Road Segment	Constraints on accessing and using the data	No	Yes	Yes	NO attributes on any record in this feature class are considered confidential
	Access constraints: None.				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
Wireless	Constraints on accessing and using the data	No	Yes	Yes	NO attributes on any record in this feature class are considered confidential
	Access constraints: None				
	Use constraints:				

	There are no restrictions on distribution of the data by users

Technical Whitepaper
Arkansas Broadband Data Submitted for October 1, 2011 to NTIA

Submitted By Connect Arkansas

Connect Arkansas

Connect Arkansas, a private, non-profit, is implementing a community-based initiative to promote internet access and education. The Connect Arkansas Broadband Act was signed into law by Governor Beebe on March 28, 2007, to ensure the creation of a competitive broadband, or high speed internet, infrastructure that will not only improve personal lives, but also the economic capabilities and of all Arkansans.

To facilitate statewide broadband access, Connect Arkansas, a "delivery platform neutral" entity focuses on three major components: Determination of existing broadband infrastructure in Arkansas, Education, and Accessibility to computer devices. The first of these components, determining existing infrastructure, facilitates the requirements of the SBDD Program adequately.

Identification of Broadband Providers

As of September 1st, 2011, Connect Arkansas has identified by Holding Company name Eighty-Two (82) Broadband Providers in the state of Arkansas. These providers are identified as having infrastructure in the state and are not identified as being resellers. Of these providers, Seventy-Four (74) submitted to Connect Arkansas at least partial data to map coverage. Of the remaining eight (8) Broadband Providers, three (5) have agreed to provide data in the future. HortonTv and Batesville Computing are two (2) fixed wireless providers discovered following the Spring 2011 Data Submission.

Data Collection and Processing

For the Fall 2011 data set all providers were contacted first via mail, then email, and finally with telephone calls to the point of contact for each company. Thirty (30) companies updated coverage information as far as speed or coverage area. The other Forty-Four (44) participating Broadband providers chose to display data as unchanged from the Spring 2011 NTIA Data Submission.

The format of data collected has been in various formats as listed below:

ArcGIS Shape files
Tab delimited files of Address Ranges
Tab delimited files of Addresses
Physical maps of coverage
Tower information for propagation

Shape files were easily formatted to conform with standards in the SBDD Data Model.

All census blocks and tigerlines (used for address range and address points) are based on the 2010 U.S. Census.

All tab delimited address files were geocoded using the ESRI geocoding engine in ArcGIS. These geocoding passes were used against the standard ESRI database, as well as U.S. Census Tigerline data, and Arkansas Geographic Information Office's Street Centerline and Address Points. In the rural areas of Arkansas the accuracy of geocoding is much lower than in urban areas. To help remedy this, Connect Arkansas reviewed the geocoding results with each provider, giving each the opportunity to correct any issues. Note: any geocoding results that fell outside of a providers existing telephone exchange or know service areas were discarded. From these results, nearest road centerlines or census blocks (less than 2 square miles) containing the geocoded points, were selected to represent the Broadband Providers Coverage. Note: only two (2) Broadband Providers provided data at the address level.

Any physical maps of coverage (including those submitted in pdf format) were used as a basis to manually select line segments from existing road centerlines in the state (based on U.S. Census Tigerline data). From these results census blocks (less than 2 square miles) that contained the digitized road centerlines were selected along with the road centerlines in areas of larger census blocks, to represent the Broadband Providers Coverage.

Beginning with this submission, in census blocks greater than 2 square miles, that also have had address points have been completed by Arkansas Geographic Information Office, Connect extracted and submitted the address points that corresponded to the adjacent street segments as produced based on the Broadband Provider's submitted data.

Fixed Wireless tower information (including Latitude, Longitude, Frequency, Power, Height) were gather and entered in to EDX Signal software to model signal propagation. This software also took into consideration terrain elevation as well as ground clutter to accurately model the Broadband signal, in most cases to a twenty (20) meter degree of accuracy. These raw propagation models were processed in ArcGIS into more organically smooth shapes to conform with standards in the SBDD Data Model.

The results of the processes above were loaded into the SBDD Data Model and the latest CheckSubmission script was run. All resulting failed processes were analyzed and addressed to result in No Fails in Census Blocks, Road Segments, Addresses, or Wireless Coverage data sets.

Middle Mile information that was received (most Broadband Providers view Middle Mile as proprietary information and elected not to submit) as tab delimited text files or as a spread sheet in Microsoft Excel. This information was brought into ArcGIS, processed, then formatted to conform with standards in the SBDD Data Model and uploaded.

Community Anchor Institution data is information received from 3rd party sources in regards to institutions as outlined in the NOFA. Most of the data collected is from phone surveys to each location. In some cases difficulties were presented in finding a suitable technical point of contact to collect information. Arkansas Department of Information Systems has agreed to help provide information for public schools as well as HITArkansas for Health Systems, in future submissions. Only Community Anchor Institutions that could be geolocated were included. Arkansas Department of Information Systems has also informed Connect Arkansas that every K-12 school in Arkansas is connected with at least a T1 ADSL connection. In cases where phone surveys found additional connections or higher speeds this was submitted. Connect Arkansas is also including commercial locations with publically available broadband (typically via WiFi).

Verification Processes

Connect is currently using several methods to verify data collected. The format of data collected has been in various formats as listed below:

Telephone surveys
FCC released Form 477 data
Telephone Exchange Boundaries
Data collected from feedback on maps.connect-arkansas.org
Data collected from speed tests on www.connect-arkansas.org
Speed test data released from Broadband.gov
Spot field validation of Wireless technology

General Notes

All Census Block data is 2010 vintage, and all Road Segments are based on Tigerline 2010.

Connect continues to identify small providers, in particular fixed wireless providers that do not advertise or have a web presence. It is possible that several more of these providers will be identified in future data submissions.

It should be noted that in some cases relating to Cable Companies in Arkansas several of these described their Broadband Coverage area as "all streets within XX city limits".

Several Cable companies in Arkansas currently report technology of DOCSIS 3.0, although the max speeds offered are well below the capabilities of the technology. The reason for this is the lack of demand for higher speed tiers in their locations. The providers that fall in this category are Clinton Cable Inc., Conway Corporation, Fusion Media, Ritter Communications, and Suddenlink.

The majority of Broadband Providers Submitted Maximum Advertised Speeds at the MSA/RSA level, or overall coverage areas which in some cases represent a large portion of land, in some cases several counties. At the direction of Andrew MacRae with NTIA, Connect Arkansas has pushed these speeds down to the census block and road segment level. Some inaccuracies can be seen in the data as actual Maximum Advertised Speeds in some cases vary from zipcode to zipcode in some cases. Also at the direction of Andrew MacRae, in the case of large providers, Connect Arkansas attempted to obtain the max advertised speeds from the Broadband Providers' websites; the results of which follows:

CenturyLink
CenturyLink provide a system to check availability and speeds at address level. CenturyLink’s system allows users to select city, street, and address in sequence via drop down lists. After making these selections the user is brought to page that display Max Available Download speeds for that address. Upload speeds are not mentioned. The download speed is then recorded in the spreadsheet that has been provided for this purpose.
This process captured roughly half the cells. The remaining cells were then checked to see if there were duplicates in the spreadsheet and then filled in by researching the city associated with the ZIP code and checking it against the list of cities CenturyLink provides and filled accordingly. This process still leaves some ZIP codes with the appearance of being unserved. The speeds for these remaining areas were then based on speeds submitted on the MSA/RSA level.

AT&T

AT&T has a way to enter your ZIP code on their website while looking at the services they offer. However, changing the ZIP code doesn’t actually change the displayed services resulting in the premium U-Verse package being displayed for all areas including those that outside AT&T’s wireline service. As such, any data extracted from AT&T’s website is far less accurate than the speeds submitted on the MSA/RSA level. At the direction of Andrew MacRae, Connect also approached the mapping contact with ATT about more granular data, which the response was that all states received the same format of data and no additional data would be provided.

Windstream

Windstream’s method for changing geographic location while browsing service packages on their website is quite easy to use, but it doesn’t change any plan offerings. That is to say, the exact same 3, 6, and 12 Mbps packages are listed for every city chosen from their provided drop down menu. The data provided to Connect Arkansas by Windstream is considerably more accurate than that of the website. The speeds for these areas were then based on speeds submitted on the MSA/RSA level for Spring 2011, as Windstream declined to send new data at this time.

Cox

The location mechanism on the Cox website would not respond in any attempts to change it. That being said, the only download speed shown was done so in a general overview of all plans offered. No actual location dependant information was shared. The speeds for these areas were then based on speeds submitted on the MSA/RSA level.

Allegiance

Allegiance provides a list of all the cities they serve on their website, which then shows you the offered services for those areas. Download/Upload speeds were recorded for the areas that had internet services available.

American Samoa
Broadband Mapping Project:
Product Release White Paper

Contact Name Manager:	Andrew Berquist
Contact Phone Number:	684-633-3648
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Submitted By:	Kristin Rousseau
Contact E-mail:	**kristin.rousseau@broadmap.com**
Product Specification:	Fall 2011 NTIA Data Model
Product/Process:	NTIA—October 1, 2011 Data Deliverable
Dataset Submission QC:	NTIA—SBDD_CheckSubmission.py

Table of Contents

OVERVIEW

This white paper highlights the **Submission Summary** for this deliverable, as well as describes the **Data Gathering**, **Data Integration**, **Data Validation and Verification** and **Quality Control** processes used to create the Broadband Mapping Project's October 1, 2011 data submission. To support varying levels of technical and program knowledge, both a **high-level summary** and a **detailed process review** are supplied.

SUBMISSION SUMMARY

PROVIDER DETAILS

PROVIDER PARTICIPATION

- Providers Included
    - ASTCA
    - Blue Sky

- New Providers Since Last Data Submission
    - None

- Non-Responsive/Non-Cooperative Providers
    - None

COVERAGE AREA CHANGES

- Provider Expansion
    - Blue Sky Communications: Expanded their TT-41 coverage
    - ASTCA: Expanded coverage into the Manu'a islands

- Coverage Footprint Reductions/Map Refinement -
    - None

DATA CORRECTIONS

- There were no data corrections required for this data submission

COMMUNITY ANCHOR INSTITUION (CAI) DETIALS

OVERALL STATISTICS

Community Anchor Institution - Categories	Overall Count	Transmission Technology	Advertised Speed Down	Advertised Speed Up
Category 1 - School K through 12	49	0	0	0
Category 2 - Library	1	1	1	1
Category 3 - Medical/Healthcare	2	0	0	0
Category 4 - Public Safety	4	0	0	0
Category 5 - Universities/Colleges	1	1	1	1
Category 6 - Other: Government	26	7	7	7
Category 7 - Other: Non-Government	33	0	0	0
Total	**116**	**9**	**9**	**9**

CAI CHANGES

- The only change for this data submission was the inclusion of the CAIID extracted from the three databases communicated by NTIA. They are as follows:

  - For K-12 institutions (CAI type 1) please add the NCES ID CCD ID value found here: **http://nces.ed.gov/ccd/bat/**

  - For Higher Education (CAI type 5) please add the NCES IPEDS ID value found here: **http://nces.ed.gov/ipeds/datacenter/**

  - For Libraries (CAI type 2) please. Combine (do not add) "FSCSKey" and "FSCs_SEQ" from the "puout08av2000" file and place them here: **http://harvester.census.gov/imls/data/pls/index.asp** (FYI the LIBID is your state's unique ID for libraries)

SUBMISSION RECEIPT

SUBMISSION RECEIPT RESULTS

- Attached are the results from the NTIA data submission receipt quality script.

AS_2011_9_23.txt

- Error Report
    - No errors were reported

HIGH-LEVEL SUMMARY

DATA GATHERING

BROADBAND SERVICE AREAS, MIDDLE MILE AGGREGATION POINTS AND BROADBAND SERVICE OVERVIEW

The collection of Broadband Service Areas, Middle Mile Aggregation Points and Broadband Service Overview information is handled through the following Provider Outreach Process:

- Build and maintain an inventory of Broadband providers through research and State inputs.
- Update provider material that describes the data requirements and logistics for data transfer.
- Update Non-Disclosure Agreement (NDA) for use in project, where applicable.
- Maintain multiple protocols for the provider to submit data, including Secure File Transfer Protocol (SFTP) technology when desired.
- Conduct one-on-one informational discussions with each provider to communicate the following:
  - Requirements of this project;
  - Broadband data required to support the product data model;
  - Submission protocols available;
  - Capability to validate how the supplied data is aggregated.
- Download/receive provider data.
- Establish a repeatable process with provider. Maintain provider communication, transaction and data handling records throughout the project (dates contacted, data received, etc.).

COMMUNITY ANCHOR INSTITUTION (CAI)

The collection of CAI information is handled through the following CAI Collection Process:

- Collect and maintain inventory of CAIs through data mining, research and State inputs.
- Maintain web-based CAI portal for institutions to add or confirm attribution, location and enter broadband-specific information.
- Upload web-based data to Core Database for standardization.
- Perform internal cleansing, such as removing duplicate records, identifying gaps in broadband attribution and verifying category.
- Geocode CAI locations.
- Translate Core Database data to deliverable-ready format.
- Continue engagement with non-responsive institutions.

DATA INTEGRATION PROCESS

The data integration and processing mechanisms currently used allow for multiple types of inputs and result in a standardized output that meets the NTIA deliverable requirements. This flexible process supports data model changes and project-requested enhancements.

- Receive inputs from providers via submission protocols; upload into Sourcing Database and catalog with provider information.
- Review provider-supplied data for completeness and for potential discrepancies that require resolution prior to processing and flag as necessary.
- Categorize input into data-type category (addresses, block lists, paper maps, etc.).
- Standardize input based on data type within Staging Database.
- Create Compact Polygons (CP)—(internal methodology for generating area-based feature for coverage in Staging Database).
- Apply broadband attribution to CP; apply metadata to CP.
- Perform quality analysis of the CP against the source supplied to identify any completeness or accuracy issues.
- Request additional information from the provider if elements of coverage are missing or contain discrepancies. This is a second manual quality check to ensure data is complete.
    - Process coverage area to build the required NTIA data model layers.
- Process CAI data input into internal standardized format, as discussed above in the **Community Anchor Institution (CAI) subsection**, based on NTIA and State-level requirements.

DATA VALIDATION AND VERIFICATION

Following the creation of the product, process steps within Data Validation and Verification occur. To ensure the data collected and processed is as accurate and comprehensive as possible, provider validation and internal verification activities are employed. After the initial mapping of providers' coverage areas and serviceability claims, additional reviews are performed using the methods described in the subsections below (**Third-Party Data Verification**, **Broadband Provider Validation**, **Confidence Values**).

THIRD-PARTY DATA VERIFICATION

The coverage is visually and programmatically compared against third-party data. Pitney Bowes and American Roamer data are used in cases where a coverage area is questionable. All anomalies identified during this analysis are reviewed with the providers.

BROADBAND PROVIDER VALIDATION—PROVIDER PORTAL APPLICATION

Providers are trained on and requested to use a secure interactive web application to review their current coverage area(s) and supporting broadband attribution and validate their data or submit change requests to update their data. All provider change requests go through the **Data Integration Process** and are reviewed with the provider to complete validation.

CONFIDENCE VALUES

All verification, validation and manual quality review results are tracked by provider/technology type and stored and maintained within a **Validation table**. A confidence value is assigned, based on internal assessments of the collected information, to highlight the provider coverage areas and/or attributions that would benefit from further investigation and/or enhancements.

QUALITY CONTROL

Following collection, processing and analysis of the provider and CAI data, the product is checked manually and algorithmically against the NTIA data model. Some of the items included within these checks are:

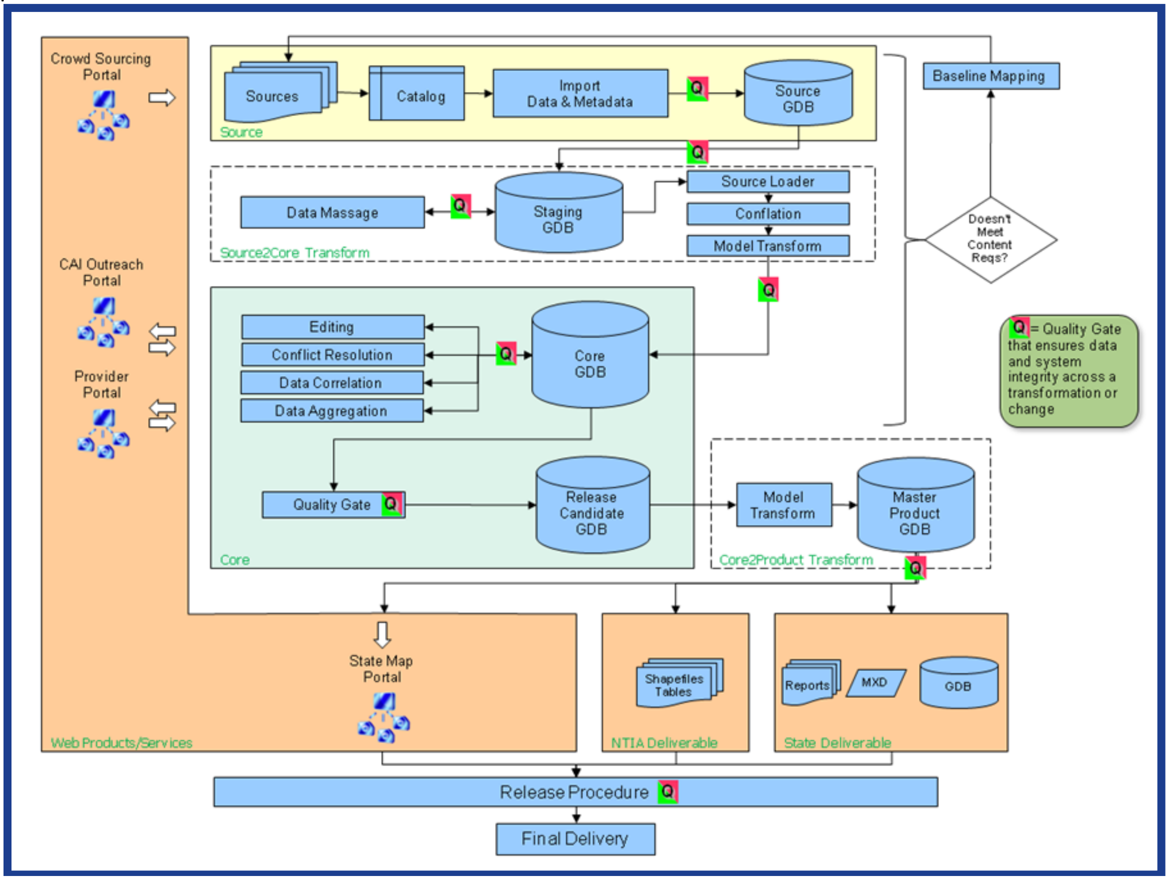
- Format correctness;
- Table and field structure;
- Valid values, including default values, where applicable;
- Geographic extent and topology errors.

Prior to data submission, another quality control script supplied by NTIA is run. This script, SBDD_CheckSubmission.py, creates an output in text form that is required to be submitted along with the final deliverable. All errors must come up clean, unless otherwise specified by NTIA. Exceptions to the script as noted by NTIA on the SBDD Workspace on 03/25/11 can be found at the following link: **https://sbdd-granteeworkspace.pbworks.com/w/page/38218329/CheckSubmissionExceptions**

- Longitude values for States outside the lower 48 (any table);
- CAI results for Transtech, MaxAdUp, MaxAdDown if BBService is “No” or “Unknown”;
- Overview MaxAdDown, MaxAdUp if 100% of record-level data has MaxAdDown or MaxAdUp populated.

DETAILED PROCESS REVIEW

A detailed review of the data collection, integration and quality control points within the broadband data gathering and mapping process are discussed in the subsections that follow. In addition, a diagram showing the overall process can be seen below.



PROVIDER OUTREACH

For the October 2011 data submission, an e-mail notification was sent to all providers with supporting deliverable dates. The providers mainly used the Provider Portal web application to submit changes to and/or validate their current coverage area(s).

In support of the data collection effort, providers that did not timely respond to the outreach were contacted by phone.

OUTREACH MATERIALS

The original provider packet sent via e-mail to the providers included the following documents and files:

- Letter from the State inviting them to participate in the program;
- Copy of the Non-Disclosure Agreement (NDA);
- Copy of the Mapping NOFA from the NTIA;
- Copy of the NOFA Clarification from the NTIA;
- Broadband service address example file in CSV format;
- Word document describing service address example file;
- Broadband service block example file in CSV format;
- Word document describing service block example file;
- Broadband service street example file in CSV format;
- Word document describing service street example file;
- Broadband subscriber example file in CSV format;
- Word document describing subscriber example file;
- Broadband wireless coverage area sample shapefile;
- Word document describing wireless coverage area sample shapefile;
- Instructions for downloading, installing and using the WinSCP SFTP application.

OUTREACH PROCESS

The provider outreach process is comprised of the following general steps:

- Send the provider package and introduction letter to the main point of contact for the provider.
- Follow up with e-mail and telephone to verify that the main point of contact is correct.
- If necessary, discuss the NDA further and resolve any redlines.
- Once the correct primary contact is established, set up a telephone call, if necessary, to learn more about the provider's offerings and direct them to the appropriate outreach materials.
- If providers are unable to be contacted (non-responsive) or indicate that they are not interested in participating (non-cooperative), mark them as such on the provider tracking sheet. These providers will be escalated to the State for further action.
- As the providers are collecting the required data, provide instructions on downloading, installing and using the WinSCP SFTP application, if required.
- Arrange with the providers to transfer the data in whatever way they are comfortable: some providers will find regular email acceptable; others will want to use the SFTP application.
- After data is received and reviewed, it may be necessary to contact a provider for clarification or to address incomplete datasets. In the interest of building and maintaining relationships, care is given not to push the provider but to work with it to obtain accurate data in the best possible format.

DATA COLLECTION

DATA TRANSFER PROCEDURES

There are three primary ways data is collected from providers. These are:

- Secure FTP (SFTP) using the WinSCP application;
- Regular e-mail;
- Mail.

INITIAL DATA REVIEW AND QUALITY ASSURANCE

The initial data review and quality assurance process consists of the following general steps:

1) Access the data from the SFTP site or e-mail.
   a. If e-mailed, place copy of original dataset in the appropriate provider folder on the SFTP site.
2) Place copy of raw data on local computer in a working directory.
3) Review data and determine course of action based on type of data received.
4) Ensure data is complete and contact provider to address any gaps.

NOTE:
The goal is to get as many providers as possible to provide subscriber address data in the correct format. Obviously, this will not be possible with all providers so we will continue to have to process various types of provider-supplied data.

DATA INGESTION

DATA INGESTION OVERVIEW

The following subsections outline the process steps taken based on the type of input supplied by the data provider:

- **Point Data**:
  - Subscriber location;
  - DSLAM location;
  - Central Office location;
  - Broadcast Tower location.
- **Linear Data**:
  - TIGER® street segments.
- **Polygonal Data**:
  - Census Blocks;
  - Coverage Area.

Overall, the process is geared toward taking the provider data supplied and creating polygon shapes to append to the bb_cov feature class. The bb_cov feature class is the interim dataset that is then processed using the makeDeliverable.py Python script to create the MapConnect™ data layers that will be delivered to the State and, ultimately, to the NTIA. Detailed instructions used in this process can be found in the subsections below.

POINT DATA

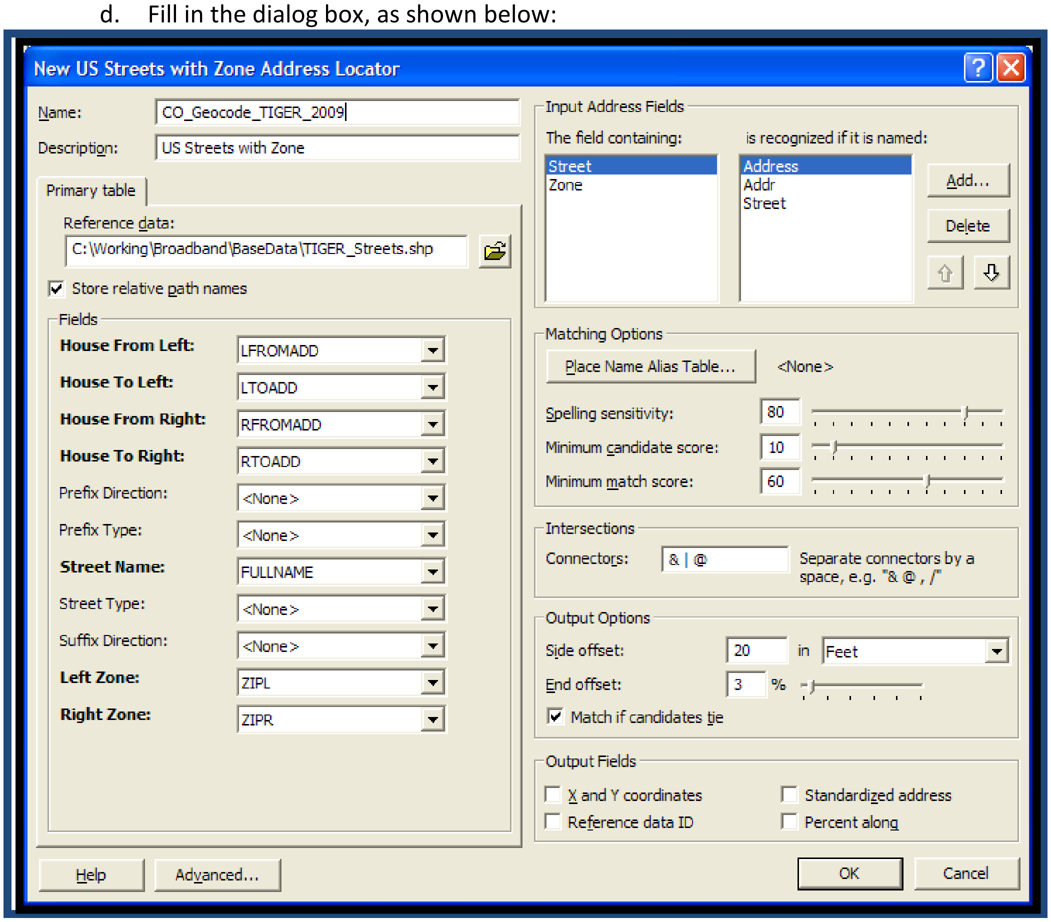
SUBSCRIBER LOCATION—ADDRESS DATA

In the event that the data provider supplies subscriber address data, the steps are as follows:

1) First, convert the address data to a clean Excel spreadsheet in an appropriate address data format.
   a. Usually, this has the following columns: street address (number, pre-directional, pre-modifier, street name, street type, post-directional and post-modifier concatenated), city, state, ZIP.
2) Configure the ArcGIS® geocoding tool to use the TIGER® 2009 streets dataset.
   a. In ArcCatalog®, create a new Address Locater by right-clicking in the white space of the appropriate directory and selecting **New>Address Locater** from the dropdown menu.
   b. Select **US Streets with Zone** and click **OK**.

NOTE:
It is likely that multiple Address Locators will have to be set up to handle the variety of provider address data received.

   c. Navigate to the **TIGER Streets 2009 file** and click **OK**.
   d. Fill in the dialog box, as shown below:

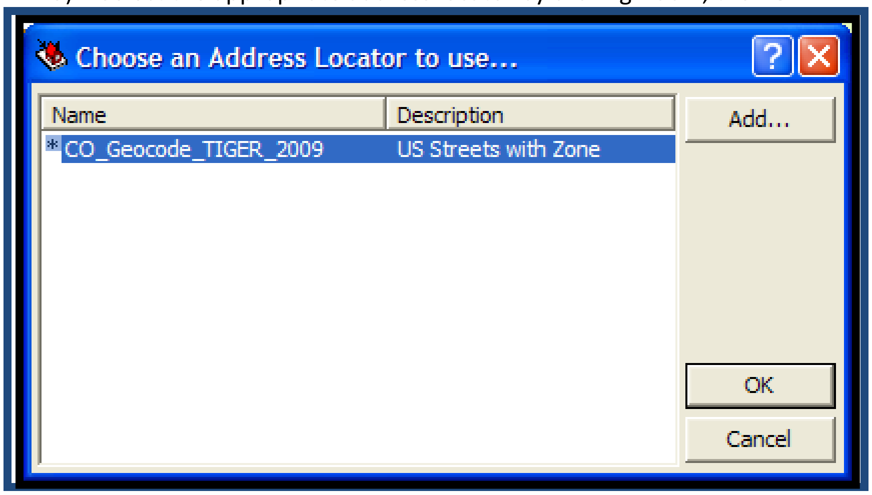


e. Click OK.

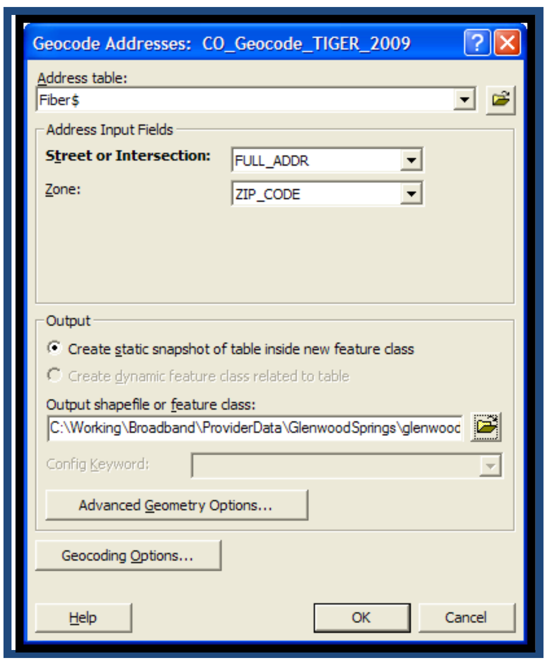
3) Open ArcMap® and add the Excel spreadsheet with the address information.

4) Right-click on the Excel spreadsheet and select Geocode Addresses from the dropdown menu.

5) Select the appropriate address locator by clicking Add..., then OK.

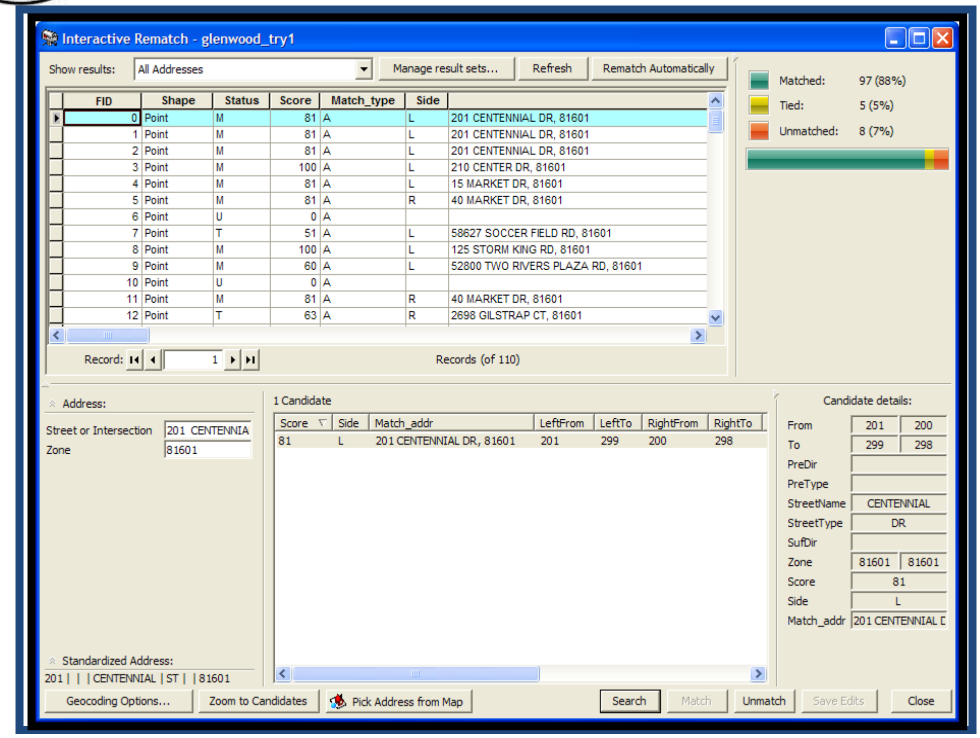


6) Fill out the Geocode Addresses dialog box, as shown below:

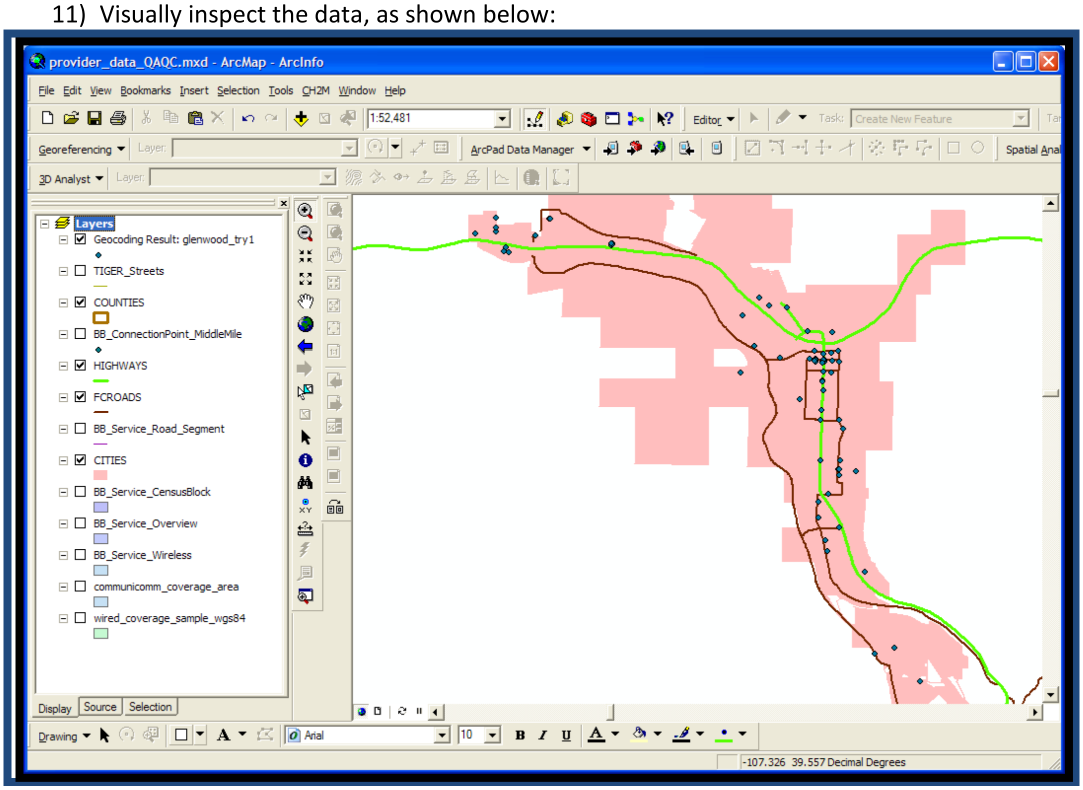


7) Geocode the list in batch mode using the geocode service set up in **Step 2** above, accepting all the default parameters.

8) Review results. See example below.



9) Adjust geocoding parameters accordingly and repeat batch to resolve issues.
10) Manually geocode unmatched addresses until target hit rate achieved, generally 90%.
11) Visually inspect the data, as shown below:



12) Follow the steps detailed in **Subscriber Location—GIS Data** below.

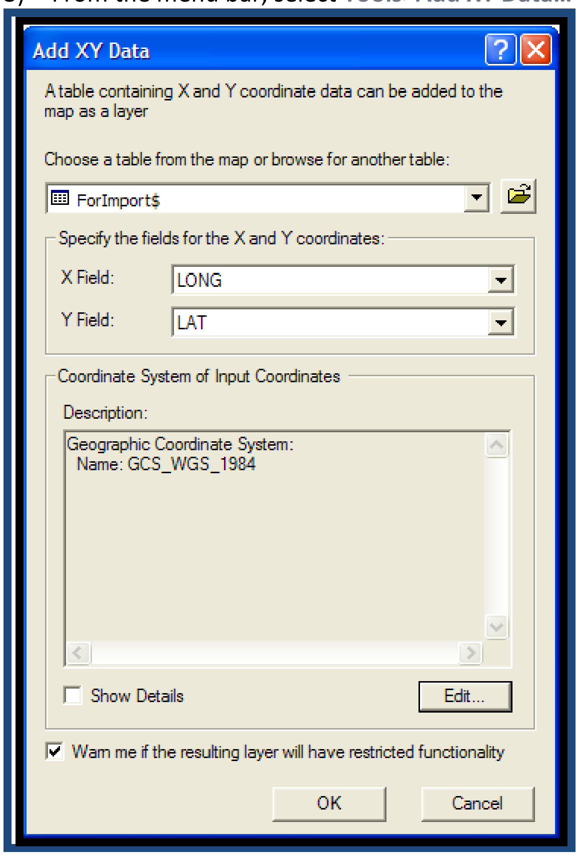
SUBSCRIBER LOCATION—XY DATA

If the provider supplies a list of subscriber data with accompanying XY data such as latitude and longitude, the steps are as follows:

1) Refine the format in Excel so that the data can be opened easily using ArcMap®.
    a. Remove all font color, highlighting, cell colors and borders, clean up column headers and make certain there are no merged cells.
    b. Make certain that XY locations are in decimal degrees.
        (i.) To convert from degrees, minutes, seconds (39º 26’ 45.67”) to decimal degrees, use the following formula: DD + (MM/60) + (SS.SSS/3600).

> **NOTE:**
> If XY locations from some other coordinate system are provided, you can use those in the process below but you must know what the coordinate system is.

2) Open the Excel worksheet in ArcMap®.
3) From the menu bar, select **Tools>Add XY Data…**

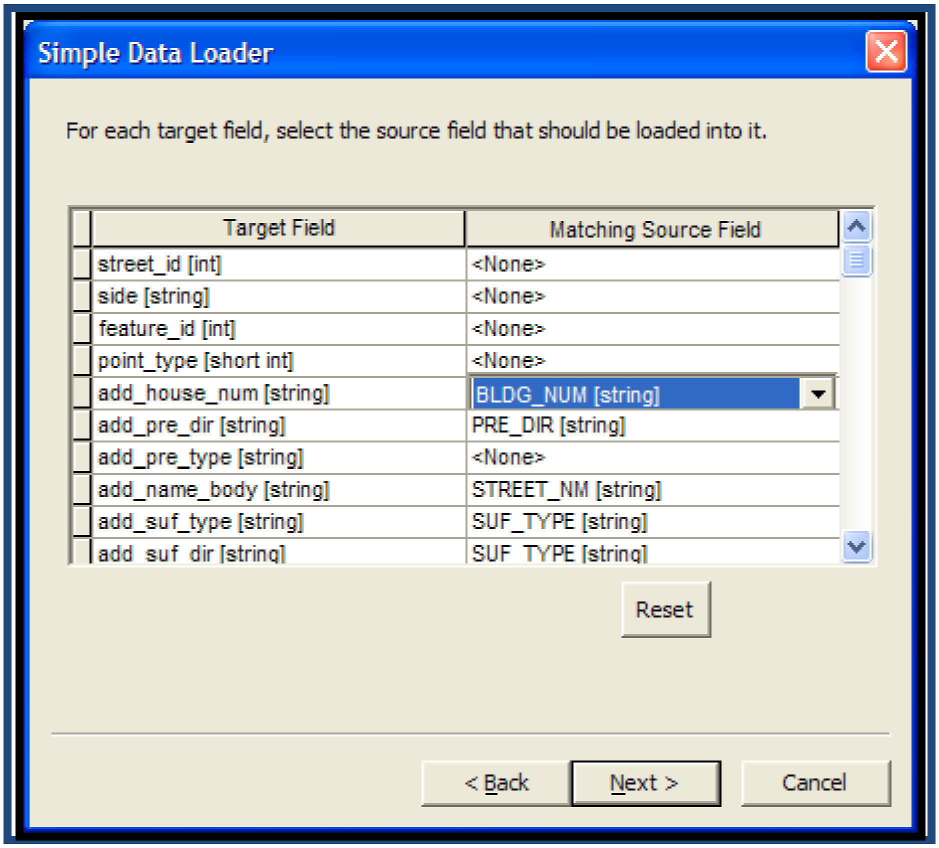


4) Supply the appropriate fields for the X and Y coordinates, choose the appropriate coordinate system and click **OK**.
5) Results are an event layer, not a true spatial layer. Export the data by right-clicking the event layer and selecting **Data>Export Data…** from the dropdown menu.
6) Follow the steps detailed in **Subscriber Location—GIS Data below**.

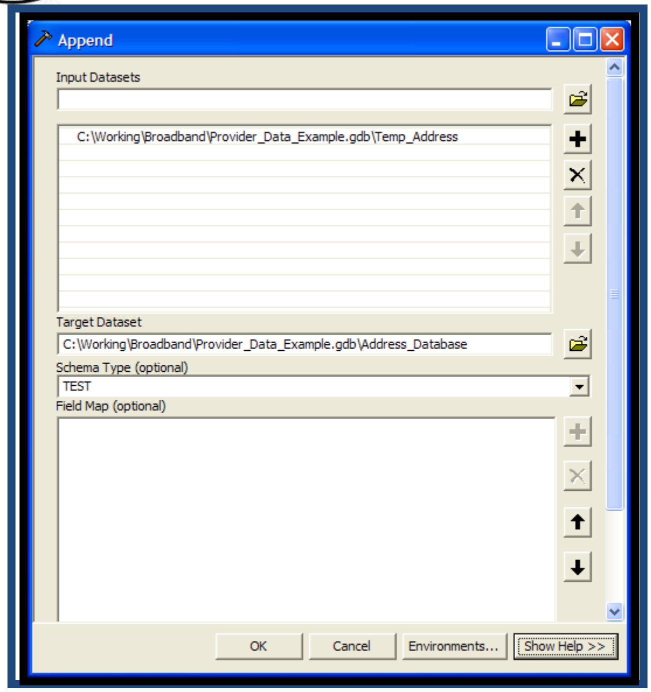
SUBSCRIBER LOCATION—GIS DATA

If the provider supplies subscriber location in GIS format, the only process step is to load that data into the appropriate data schema and it will be ready for processing.

1) First, load the data into the Point Address database schema using an empty feature class in that schema.
2) In ArcCatalog®, right-click on the empty feature class and select **Load** from the dropdown menu.
3) Navigate to the provider address GIS dataset and then map the attribute fields accordingly, as shown below:



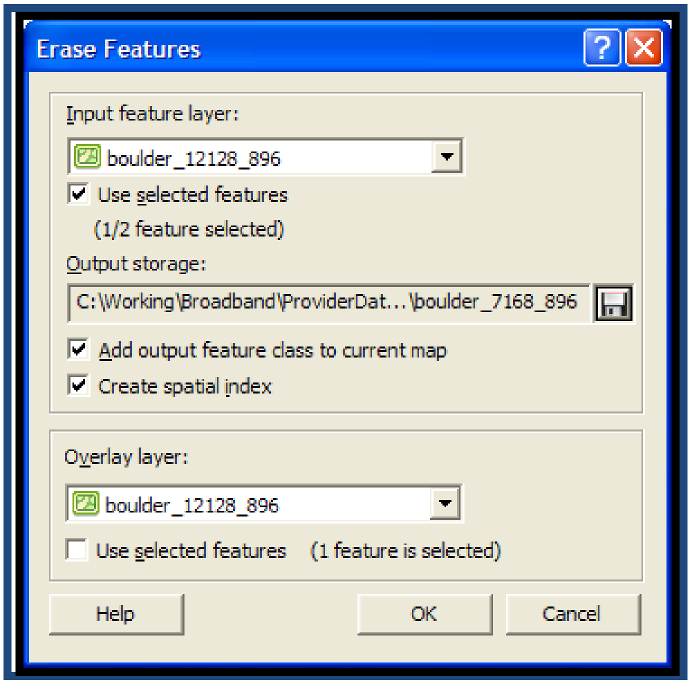
4) Once you have successfully loaded the provider address data into the temporary database with the correct schema, you now will append that data to the overall Point Address database.
5) In ArcToolbox®, use the **Append** command (**Data Management Tools>General> Append***)* to add the features into the overall Point Address database, as shown below:



6) Since the data is already in the Point Address database schema, there is no need to alter the Field Map in the Append tool.
7) After appending, calculate metadata reflecting geometry source and representation values.
8) Break provider-specific points into separate county feature classes and perform the following steps per county feature class:
    a. Within ArcGIS®:
        (i.) Summarize download and upload speeds [first,last] to determine all speeds available for county.
            (1) This will save as a DBF table. Keep track of location for future reference.
        (ii.) Buffer county address point featureclass to 150'.
            (1) During buffer command, dissolve on ad_down; ad_up; provider; dba; frn; tt; all metadata fields; stctyfips. Save as…. county_fastestdown_fastestup.
            (2) Example using Qwest data: boulder_40128_20128, where boulder=county; 40128=ad_down; 20128=ad_up.

NOTE:
These attribute fields are specific to the Point Address database.

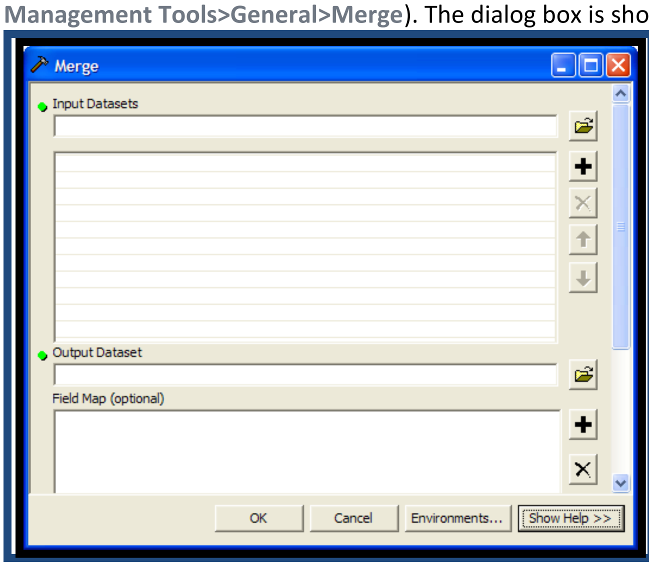
        (iii.) Select the features that represent the lowest speeds.
    b. Using XtoolsPro (***http://www.xtoolspro.com/***):
        (i.) In the XTools Pro toolbar, select **XTools Pro>Layer Operations>Erase Features.**
        (ii.) Use the same feature class for Input and Overlay.
        (iii.) Check **Use selected features** on the **Input** feature, as shown below.
        (iv.) Repeat and erase slowest speeds one speed at a time. Save each new feature class as the next slowest speed, using the same naming convention as shown in **a.(ii.)(1)** above. A general example is shown below:



c. <u>Return to ArcGIS®</u>:

(i.) Edit/delete speeds from the attribution table of each feature class, so each remaining feature class has only one speed value.

(ii.) Merge individual speed feature classes using the **Merge** command in ArcToolbox® (**Data Management Tools>General>Merge**). The dialog box is shown below:



(iii.) Merge individual county feature classes using the **Merge** command in ArcToolbox (**Data Management Tools>General>Merge**).

(iv.) Since the county files are all in the same schema, DO NOT alter the Field Map portion of the command interface.

(v.) When all the county files are merged into one dataset, use the **Append** command in ArcToolbox® (**Data Management Tools>General>Append**) to add the features to the bb_cov interim dataset. Use the **Field Map** portion of the **Append** tool to map the appropriate field values to their corresponding fields in the bb_cov feature class.

DSLAM OR CENTRAL OFFICE LOCATION—ADDRESS DATA

In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office address data, the steps are as follows:

1) Follow the process for geocoding points in **Subscriber Location—Address Data** above.
2) Follow the steps detailed in **DSLAM or Central Office Location—GIS Data** below.

DSLAM OR CENTRAL OFFICE LOCATION—XY DATA

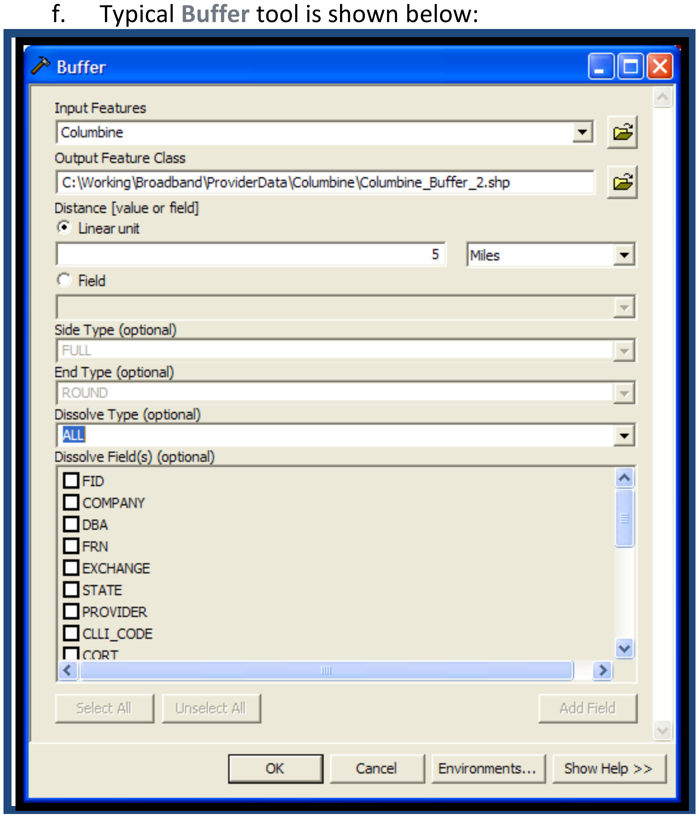
In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office XY data, the steps are as follows:

1) Follow the process for creating points from XY data in **Subscriber Location—XY Data** above.
2) Follow the steps detailed in **DSLAM or Central Office Location—GIS Data** below.

DSLAM OR CENTRAL OFFICE LOCATION—GIS DATA

In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office GIS data, the steps are as follows:

1) Buffer the DSLAM/Central Office points feature class.
   a. Add the point feature class to ArcMap®.
   b. Open the ArcToolbox® and go to **Analysis Tools>Proximity>Buffer**.
   c. Set the buffer distance to 5 miles.
   d. Set the dissolve type to **ALL**.
   e. Name the output feature class.
   f. Typical **Buffer** tool is shown below:



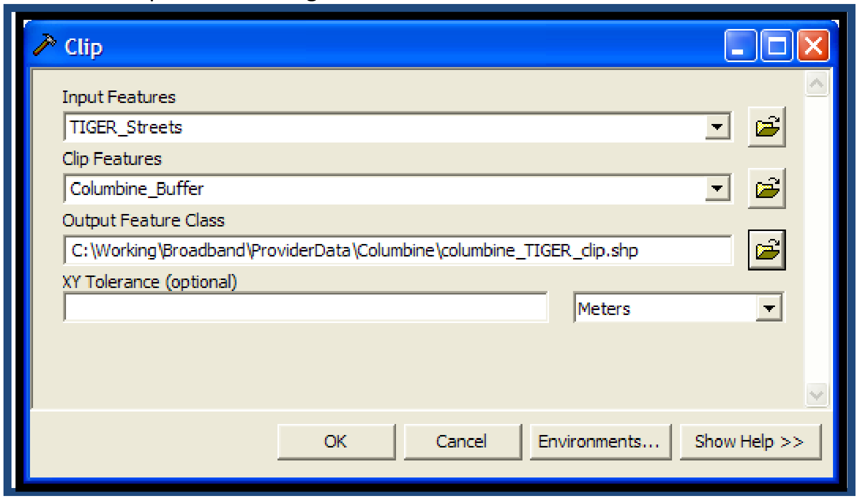
g. Click **OK**.

2) Use the resulting buffer feature class to clip the TIGER® street layer:

a. Add TIGER® street layer to ArcMap®.

b. Open the ArcToolbox® and go to **Analysis Tools>Extract>Clip**.

c. Complete the dialog box as shown below:



d. Click **OK**.

3) Using ArcCatalog® and within the file geodatabase:

a. Right-click and create a new Feature Dataset.

(i.) For the Feature Dataset settings:

(1) Name the feature dataset accordingly.

(2) Select horizontal coordinate system by importing the coordinate system associated with the clipped TIGER® street layer by selecting **Import** and navigating to the location of that feature class.

(3) No vertical coordinate system needed.

(4) Leave all x,y,z,m values at default.

(5) Click **Finish**.

4) Import previously created street feature class into new **Feature Dataset**.

5) Right-click **Feature Dataset** and create new Network Dataset—accept all default setting for the Network Dataset.

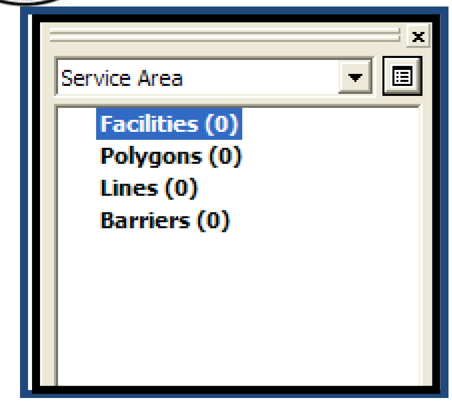
NOTE:
The Network Analyst extension must be turned on.

6) In ArcMap® turn on the **Network Analyst Toolbar** by going to **View>Toolbars>Network Analyst**.

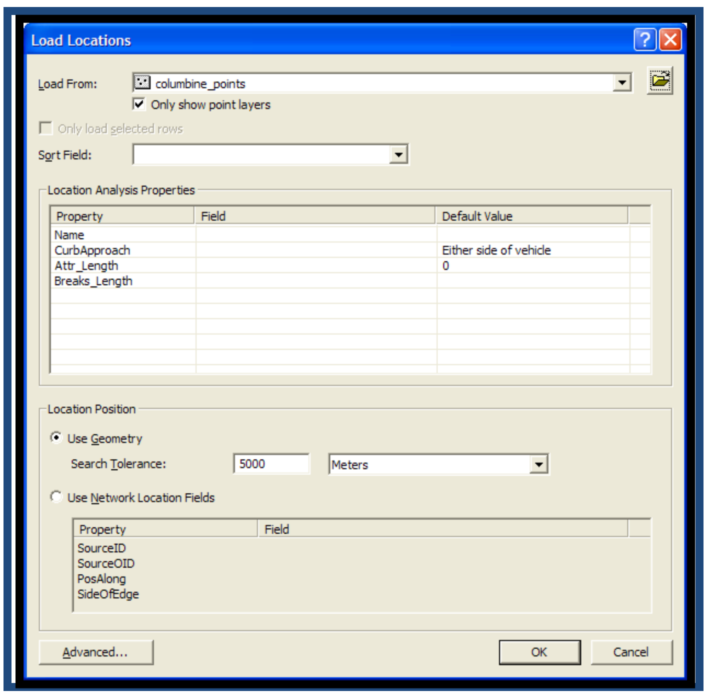
7) Add the Network Dataset created in **Step 5** to ArcMap.

8) Using the **Network Analyst Toolbar** dropdown, create **New Service Area**.

9) Open the **Network Analyst Window** by selecting the button. See below.



10) Right-click **Facilities** layer, select **Load Locations** and navigate to the DSLAM/Central Office facilities feature class.



11) Click **OK**.

12) Click the **Service Area Properties** button .

13) For the following tabs, change the following properties:

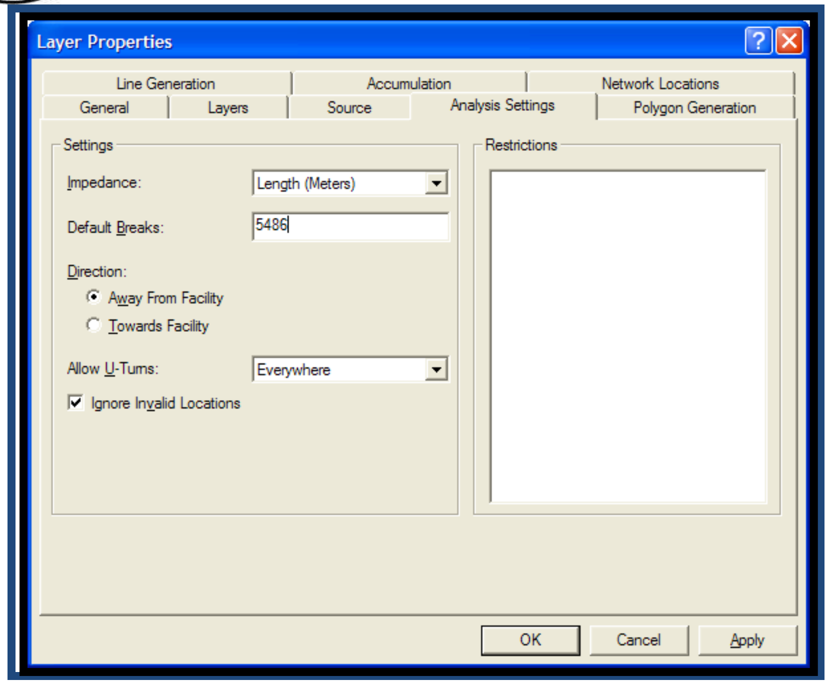
a. **Polygon Generation** tab:

(i.) Select **Merge by break value**.

(ii.) Also disable the **Trim Polygons** option.

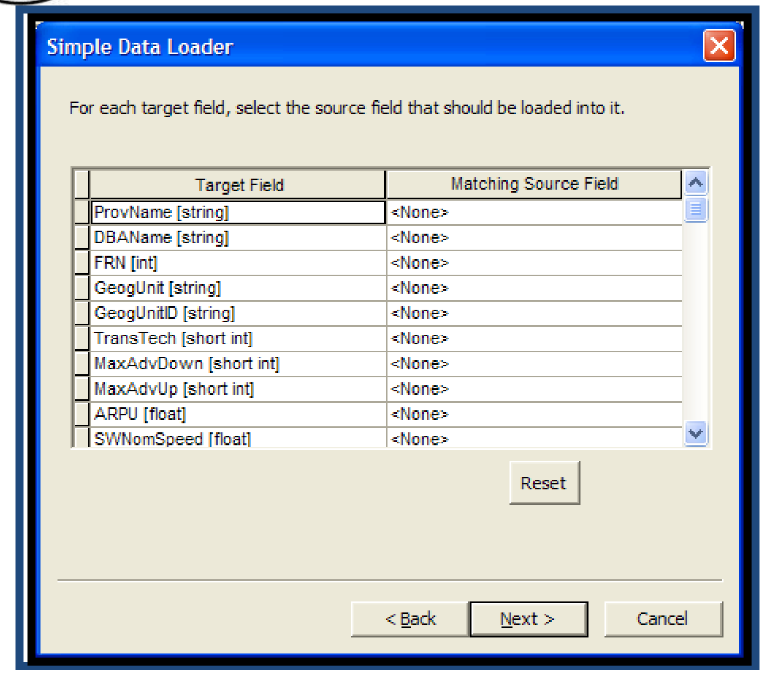
b. **Analysis Settings** tab—using and converting the specified DSLAM buffer distance from feet to meters—input buffer distance value in meters into the **Default Breaks** location.

(i.) Generally, 18,000 feet (5486 meters) from DSLAM or Central Office location is used as the buffer distance. See below.



   c. Click **OK**.

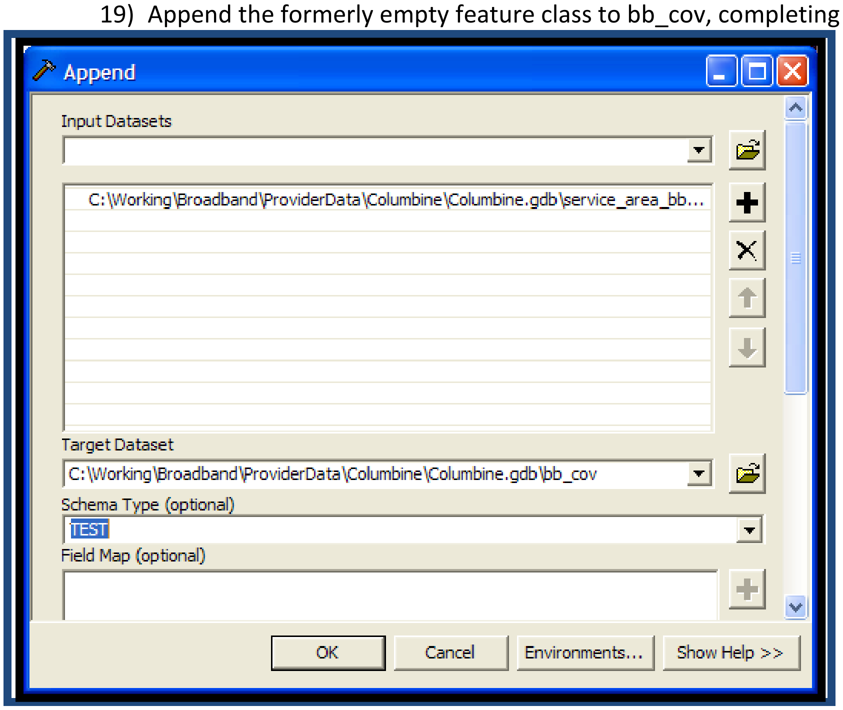
14) On the **Network Analyst Toolbar**, click the **Solve** button to create service area polygons.
15) Right-click on the created service area polygon in the layer list, and select **Data>Export Data** from the dropdown list.
16) Export to a feature class in the file geodatabase you created earlier.
17) In ArcCatalog®, create an empty feature class with the schema of the bb_cov feature class and load the feature class created in **Step 16** into it.
   a. Right-click on the empty feature class, select **Load>Load Data** from the dropdown menu and navigate to the location of the service area feature class.
   b. Click the **Add** button, then click **Next**.
   c. Accept the defaults and click **Next**.
   d. DO NOT attempt to map any fields, as shown below:



e. Click **Next**, then **Next** again, then **Finish**.

18) In ArcToolbox®, go to **Data Management Tools>General>Append**.

19) Append the formerly empty feature class to bb_cov, completing the dialog box, as shown below:



20) Leave the **Schema Type** as TEST.

21) Click **OK**.

22) In ArcMap®, open bb_cov for editing and manually input associated attribution.

BROADCAST TOWER LOCATION—ADDRESS DATA

In the event that the provider supplies wireless broadcast tower location address data, the steps are as follows:

1) Follow the process for geocoding points in **Subscriber Location—Address Data** above.
2) Follow the steps detailed in **Broadcast Tower Location—GIS Data** below.

BROADCAST TOWER LOCATION—XY DATA

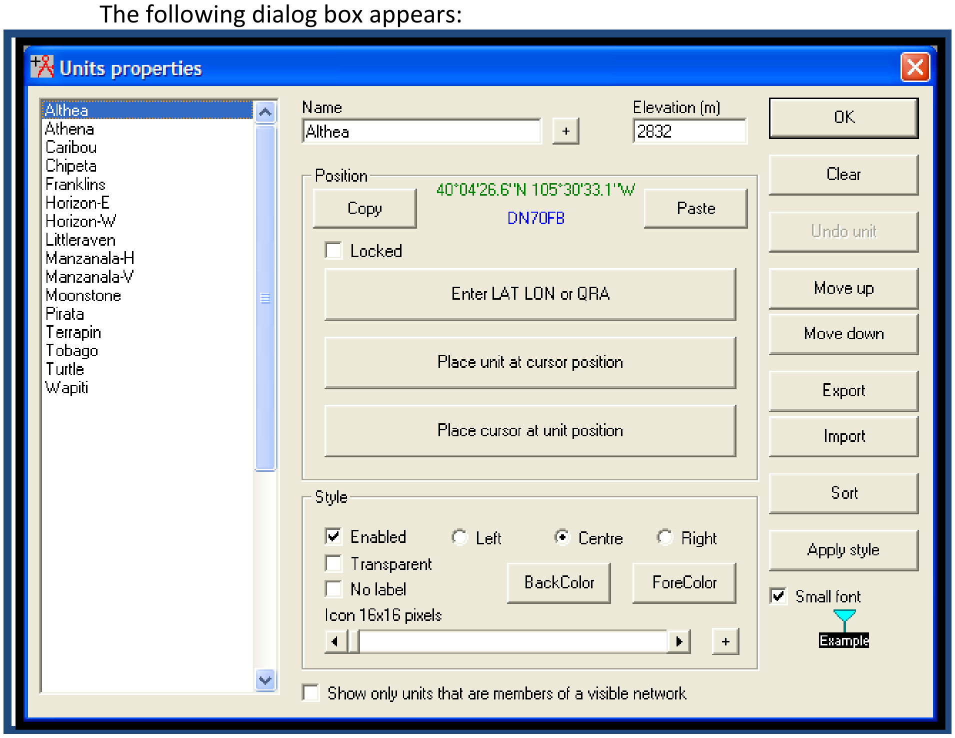
In the event that the provider supplies wireless broadcast tower location XY data, the steps are as follows:

1) Follow the process for creating points from XY data in **Subscriber Location—XY Data** above.
2) Follow the steps detailed in **Broadcast Tower Location—GIS Data** below.

BROADCAST TOWER LOCATION—GIS DATA

In the event that the provider supplies wireless broadcast tower location GIS data, the steps are as follows:

1) Download the required software (Radio Mobile) from the website: **http://www.cplus.org/rmw/english1.html**
2) Install the software according to the standard directions, found here: **http://www.cplus.org/rmw/download/download.php?S=1**
3) Open the application.
4) Load the broadcast tower location and elevation information by selecting **File>Unit properties**. The following dialog box appears:

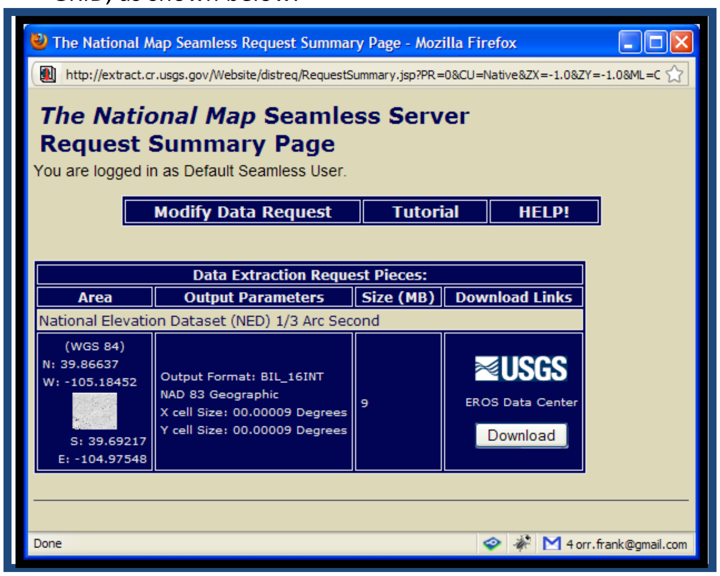


5) Add the information for all the towers supplied by the WISP data provider, including the elevation. If provider does not supply elevation, this information can be obtained from Google Earth.
   a. If available, use the **Import** button to import a Google Earth KML of the tower locations.
6) Go to the National Map Seamless Server (**http://seamless.usgs.gov/**) and download elevation data sufficient to contain the tower locations.

a. At least the 1/3" NED data is needed. Select this by clicking the **Download** button in the upper right of the website and checking the box next to **1/3" NED**.

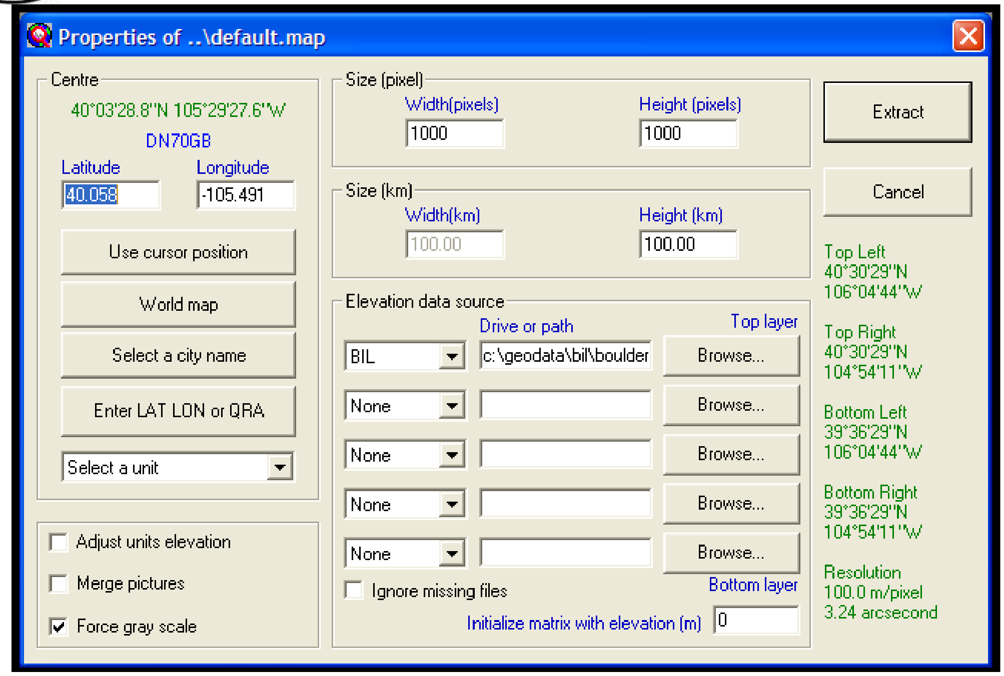
b. Zoom to the area of interest and use the **Download** tools to define the area to download:

c. Click the **Modify Data Request** button to request the data in BIL_16INT format, not ESRI GRID, as shown below:

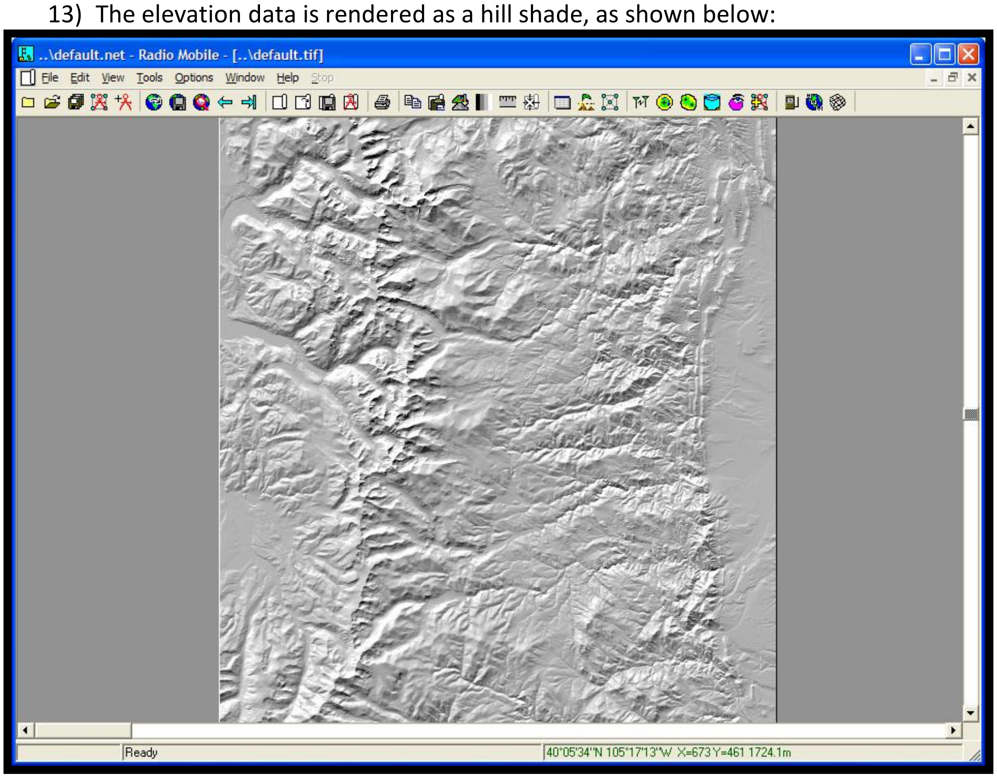


d. Download the data and unzip it.

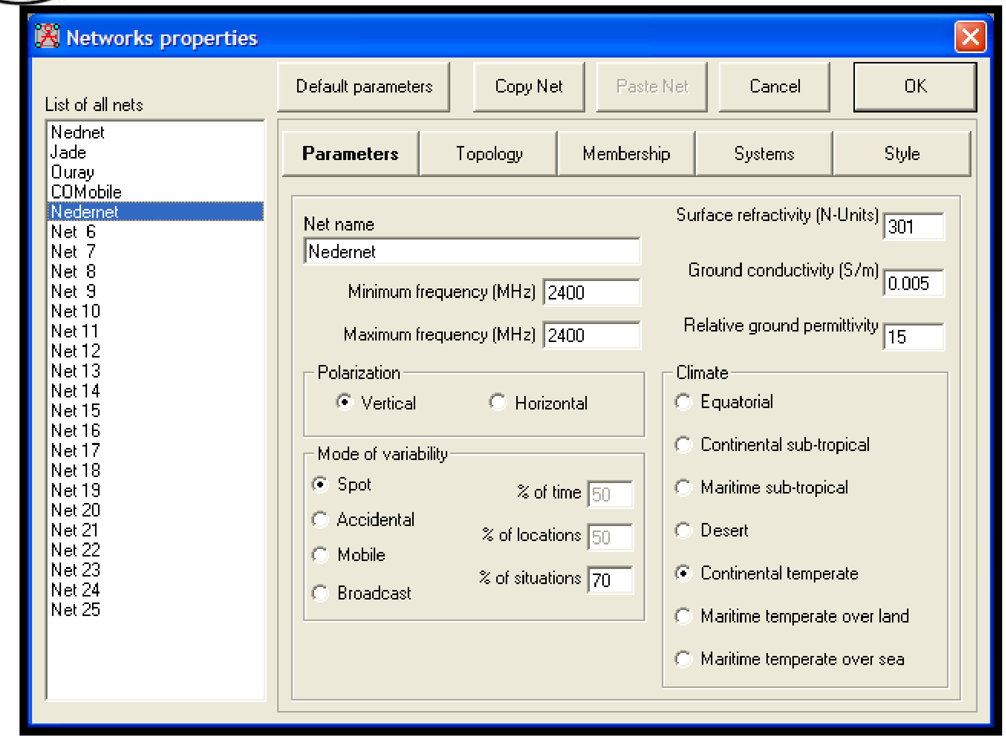
7) Select **File>Map Properties** to define the map.
8) Enter a latitude and longitude in the center of the tower locations.
9) Set the size (in pixels) and the size (in kilometers) of the map.
10) Set the directory path leading to the BIL elevation data just downloaded.
11) The dialog box is shown below:



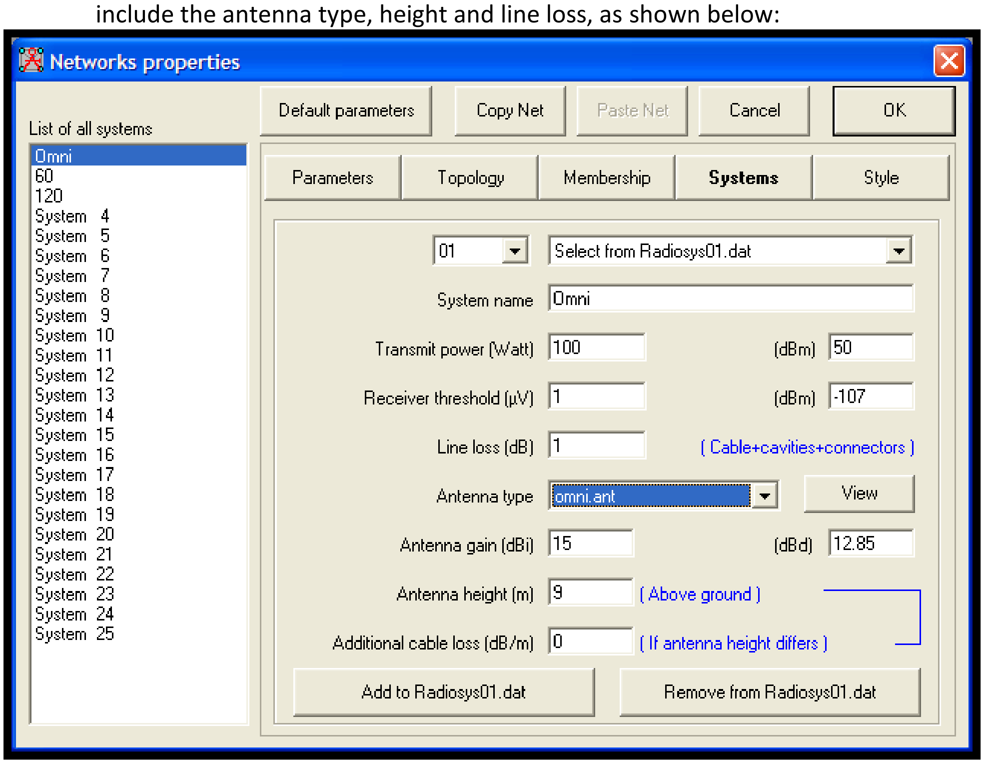
12) Click **Extract**.
13) The elevation data is rendered as a hill shade, as shown below:



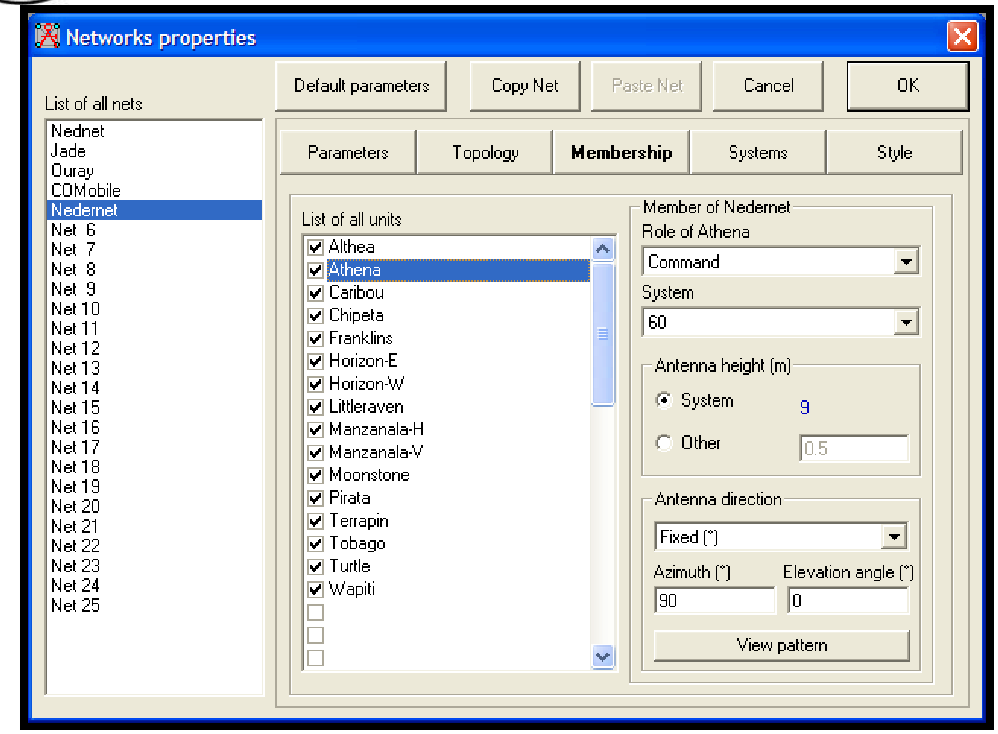
14) Select **File>Network properties** from the main menu.
15) Create a new network and enter in the frequency range under the **Parameters** tab, as shown below:



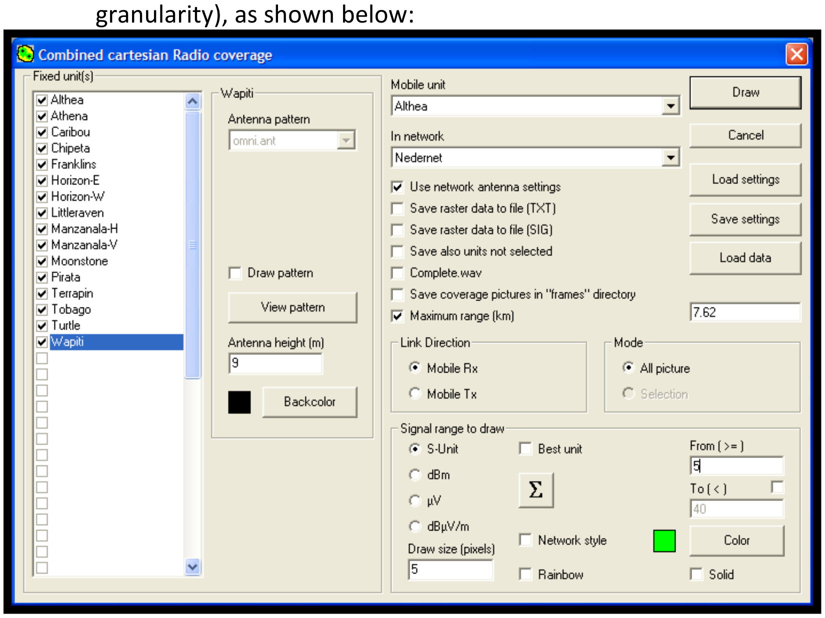
16) Leave all the other values as they appear, and select the **Systems** tab.
17) Create enough systems to cover all the varieties of equipment in the provider network. This will include the antenna type, height and line loss, as shown below:



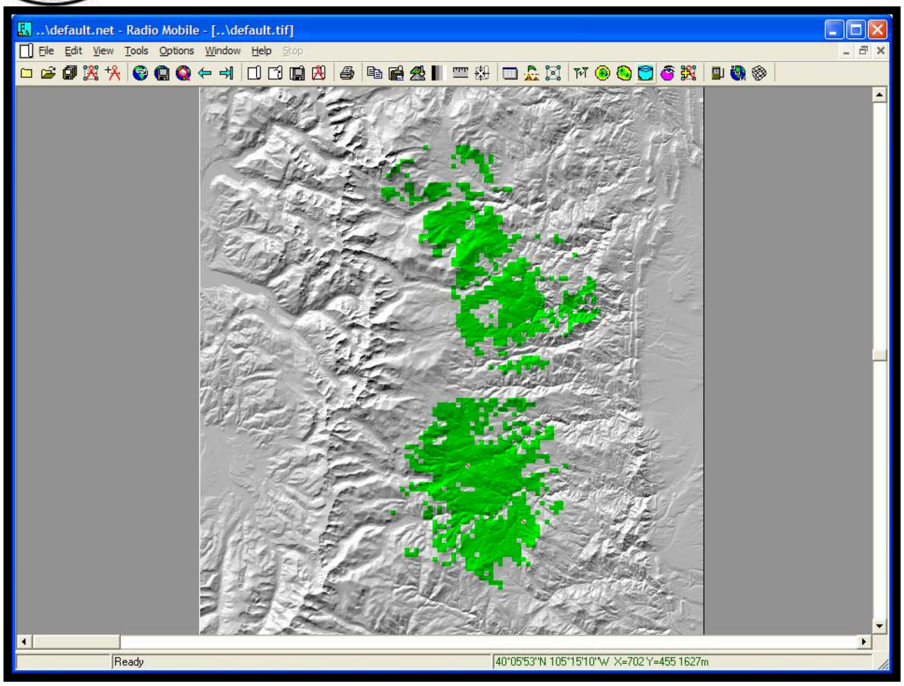
18) Now click on the **Membership** tab, and assign the individual towers to their respective systems, providing the azimuth for non-omnidirectional antennas, as shown below:



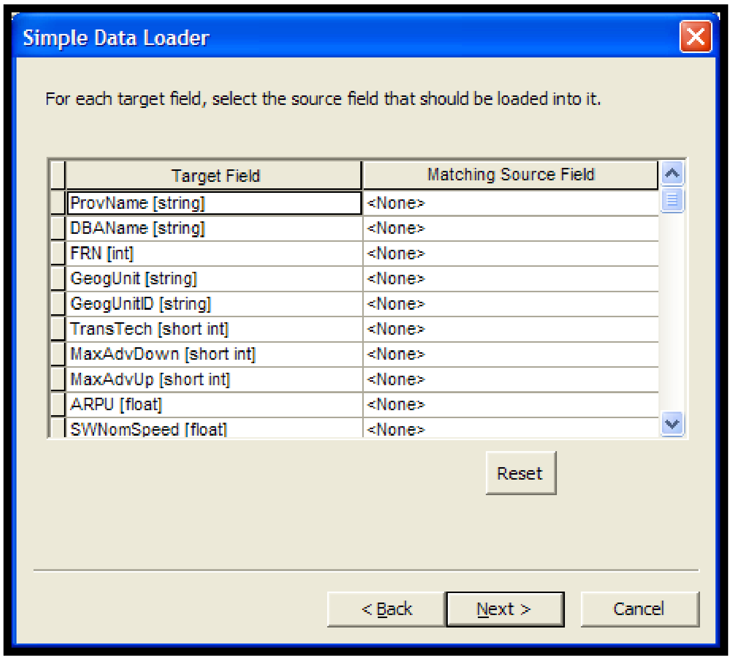
19) Click **OK**.
20) Select **Tools>Radio Coverage>Combined Cartesian** from the main menu.
21) Complete the dialog box as shown below, providing the **Maximum Range** from the highest tower beam radius supplied by the provider.
22) Set the **Pixel Size** at 5 (experiment depending on the area covered to get the right level of granularity), as shown below:



23) Set the **Signal range to draw** to S-Unit and type 5 in the **From (>=)** box.
24) Click on **Draw**. See below.



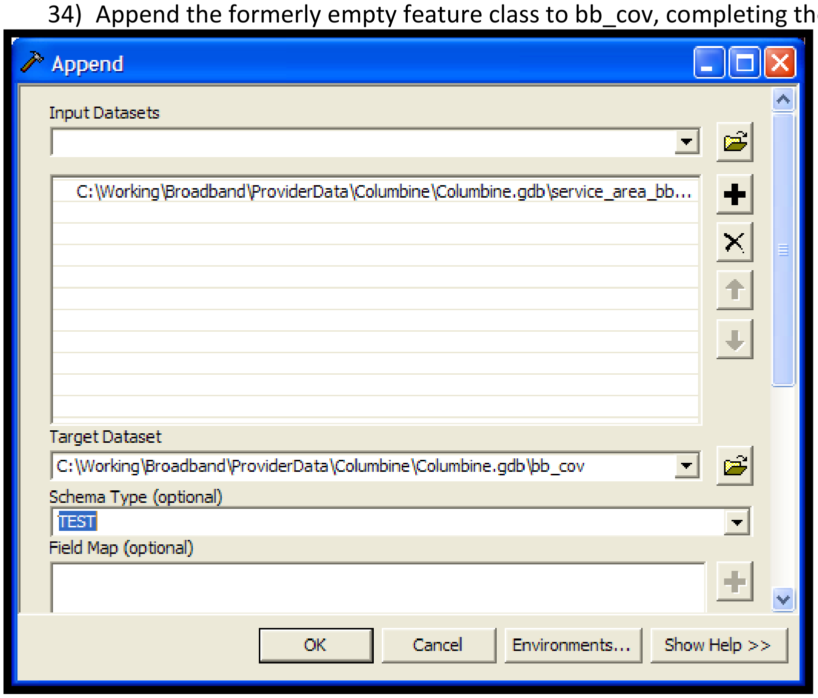
25) Save the resulting image as a TIF by selecting **File>Save Picture as**.
26) Open ArcMap® and load the BIL elevation data you used in Radio Mobile.
27) Load the TIF image you created and georeference it using the corners of the BIL data.
    a. The corners of the data can be seen in the TIF image.
28) Follow the georeferencing directions from the **Coverage Area—PDF/JPG/Other Image Format** section below.
29) Use the **Georeferencing Toolbar** to **Update the Georeferencing** for the TIF dataset.
30) In ArcToolbox®, select **Data Transformations>From Raster>Raster to Polygon** and input the georeferenced TIF you just created, as shown below:
31) Open the resulting polygon feature class for editing using the **Editing** toolbar in ArcMap® and clean up as necessary.
32) In ArcCatalog®, create an empty feature class with the schema of the bb_cov feature class and load the feature class created above into it.
    a. Right-click on the empty feature class, select **Load>Load Data** from the dropdown menu and navigate to the location of the service area feature class.
    b. Click the **Add** button, then click **Next**.
    c. Accept the defaults and click **Next**.
    d. DO NOT attempt to map any fields, as shown below:



e. Click **Next**, then **Next** again, then **Finish**.

33) In ArcToolbox®, go to **Data Management Tools>General>Append**.

34) Append the formerly empty feature class to bb_cov, completing the dialog box, as shown below:



35) Leave the **Schema Type** as TEST.

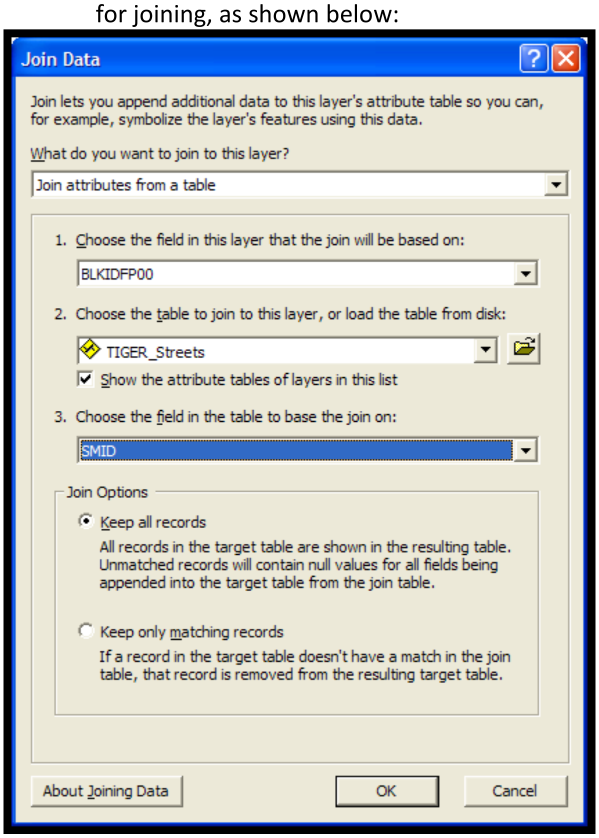
36) Click **OK**.

37) In ArcMap®, open bb_cov for editing and manually input associated attribution.

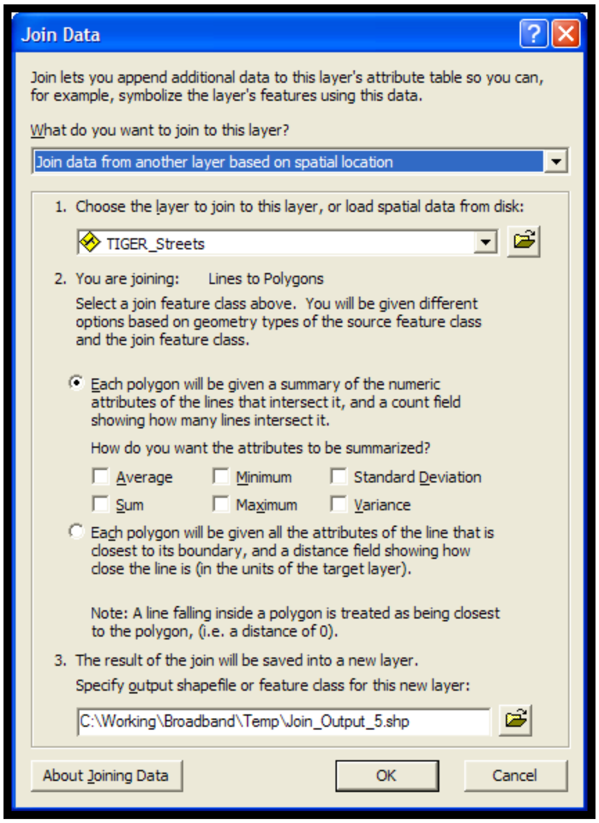
TIGER® STREET SEGMENTS—LIST, SPREADSHEET OR GIS DATA

In the event that the provider supplies TIGER® street segments in list or spreadsheet format, the steps are as follows:

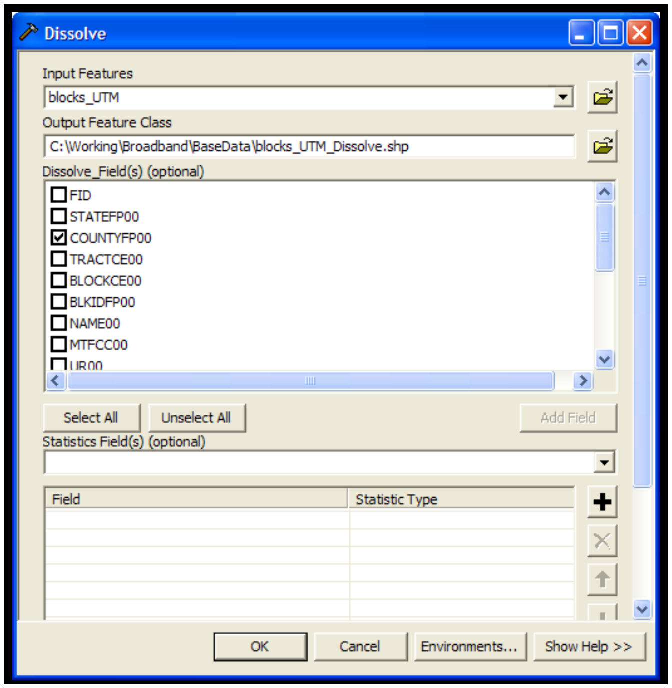
1) Join TIGER® road segments to 2000 census blocks feature class using one of two methods based on how the data is provided:
   a. If the TIGER® data is provided with a Census Block ID, then join the segments to the Census Block geometry based on that ID:
      (i.) Load both datasets into ArcMap®;
      (ii.) In the layer list, right-click on the 2000 census block feature class and select **Joins and Relates>Join**;
      (iii.) In the dialog box, select the TIGER® road segments data and the proper attribute fields for joining, as shown below:



      (iv.) Click **OK**.
   b. If the data provided is a list containing TLIDs, then join to the TIGER®/Line data using the TLID, and use a spatial join to associate the TIGER® segment with the coterminous block based on the block ID:
      (i.) Load both datasets into ArcMap®;
      (ii.) In the layer list, right-click on the 2000 census block feature class and select **Joins and Relates>Join**;
      (iii.) Select **Join data from another layer based on spatial location** from the dropdown menu;
      (iv.) Complete the dialog box, as shown below and click **OK**.



2) Export joined records into a temporary feature class.
3) If joined Census Block geometry is confined to one specific area, then dissolve blocks into one record. If joined Census Block geometry is distributed throughout a particular State, then dissolve sub-selections of census blocks for each county.
    a. Use the County FIPS code to dissolve by county.
    b. In ArcToolbox®, select **Data Management Tools>Generalization>Dissolve**.
    c. Complete the **Dissolve** dialog box, as shown below:

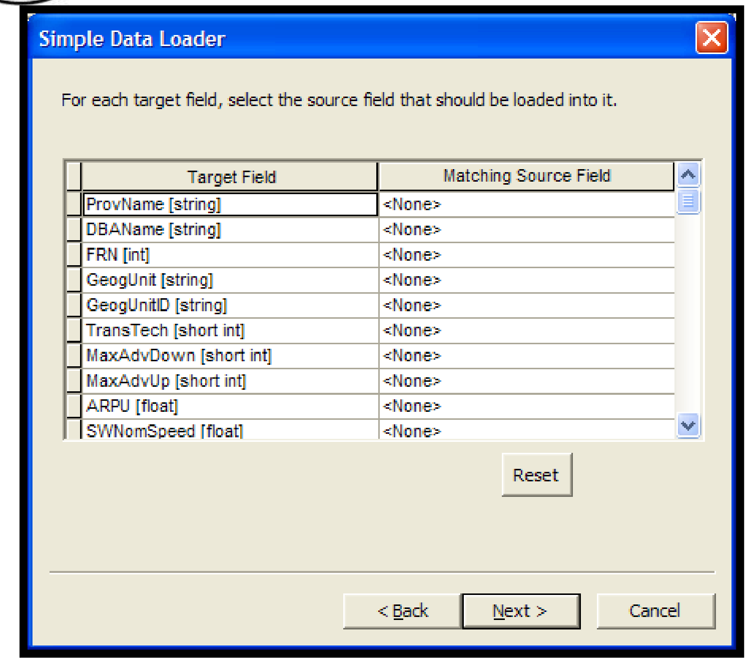


d. Click **OK**.

4) For each dissolved region, open the feature class for editing using the **Editing** tool in ArcMap® and remove unnecessary slivers and other small holes. For general guidance on editing features in ArcMap®, see **http://webhelp.esri.com/arcgisdesktop/9.3/pdf/Editing_Tutorial.pdf**

5) In ArcCatalog®, create an empty feature class with the schema of the bb_cov feature class and load the feature class created above into it.

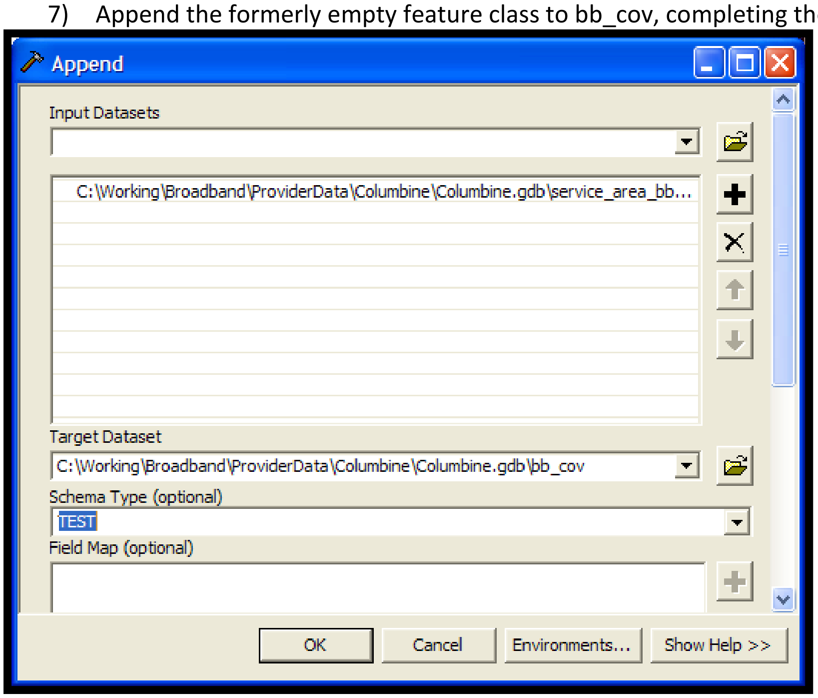
   a. Right-click on the empty feature class, select **Load>Load Data** from the dropdown menu and navigate to the location of the service area feature class.
   b. Click on the **Add** button, then click **Next**.
   c. Accept the defaults and click **Next**.
   d. DO NOT attempt to map any fields, as shown below:



e. Click **Next**, then **Next** again, then **Finish**.

6) In ArcToolbox®, go to **Data Management Tools>General>Append**.

7) Append the formerly empty feature class to bb_cov, completing the dialog box, as shown below:



8) Leave the **Schema Type** as TEST.

9) Click **OK**.

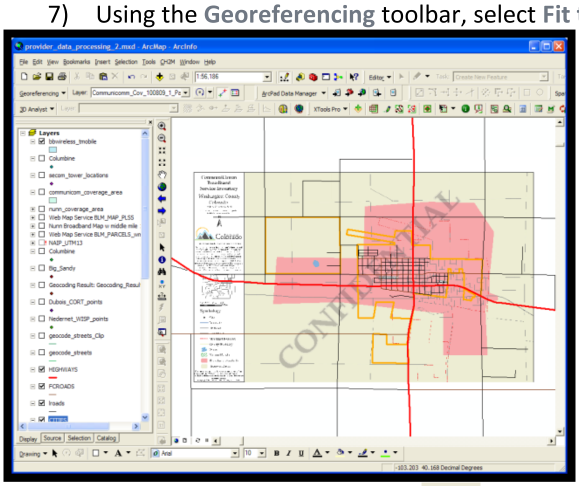
10) In ArcMap®, open bb_cov for editing and manually input associated attribution if necessary.

POLYGONAL DATA

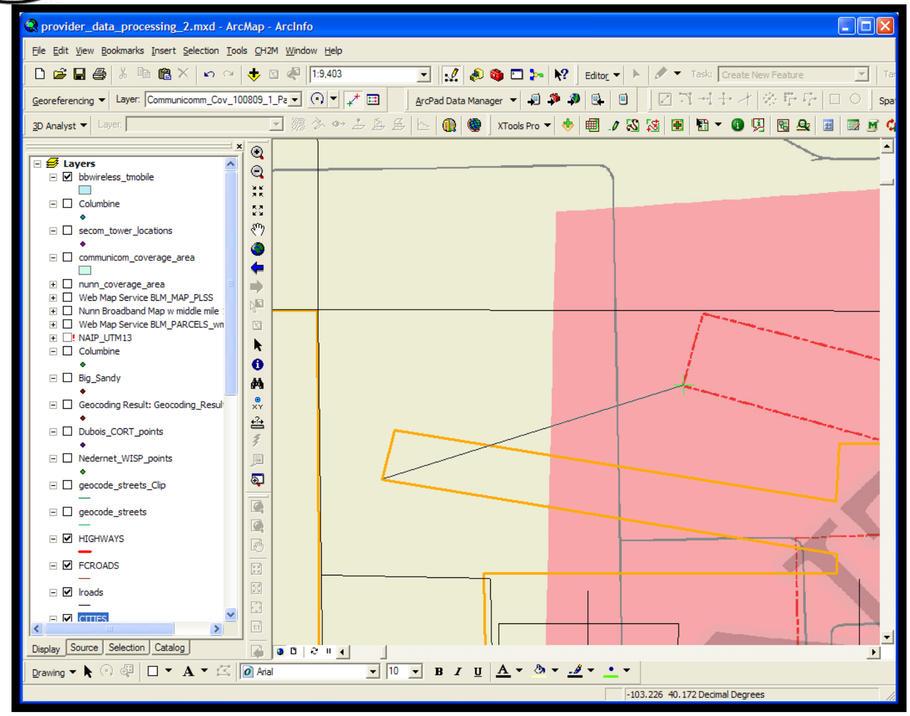
COVERAGE AREA—PDF/JPG/OTHER IMAGE FORMAT

In the event that the provider supplies coverage area data in some image format such as PDF or JPG format, the steps are as follows:

1) If in PDF format, open in Adobe Acrobat and **Save As…** JPG format.
2) Open the JPG image in ArcMap®.
3) Add the required base map vector data for georeferencing.
   a. This generally will be either the CDOT data or TIGER® data.
4) Change the coordinate system of the data frame to the desired end coordinate system.
5) Zoom to the general location of the JPG map image.
   a. This is the location based on the vector data, not the JPG image itself. For example, if you know that the JPG image represents an area around the town of Limon, zoom to the town of Limon in your vector data.
6) Open the **Georeferencing** toolbar by selecting **View>Toolbars>Georeferencing** from the main menu bar.
7) Using the **Georeferencing** toolbar, select **Fit to Display**; results are shown below:



8) Use the **Control Point** button to add control points to the map.
9) Use common points in the base dataset and the JPG image.
   a. For example, find major street intersections, county/city boundaries, etc.
   b. Try to distribute the points more or less in the four corners on the image for the best transformation.
10) Click on the location on the image first, then click on the corresponding location on the vector database map, as shown in the image below:



11) After placing each control point, the image transformation will update automatically.
12) Repeat until satisfied with the transformation.

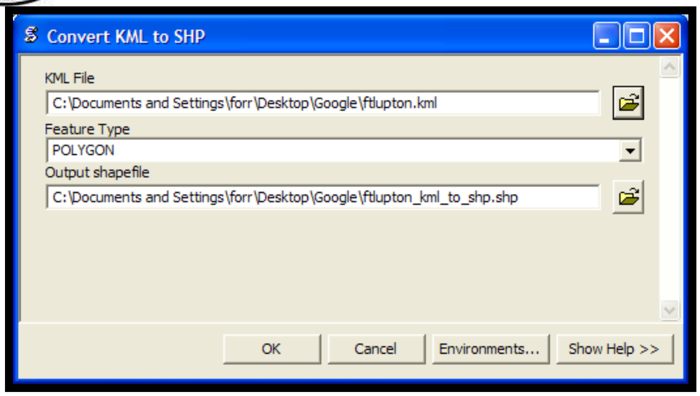
NOTE:
The transformation may take up to four points, although sometimes only two are necessary.

13) When satisfied with the transformation, select **Update Georeferencing** from the **Georeferencing** toolbar dropdown.
    a. This will create a "world" file (.jgw in the case of JPGs) in the same directory as the image file.
14) In ArcCatalog®, create a new polygon shapefile with the appropriate data schema for a provider coverage area, which can be found in Appendix D.
15) Add the shapefile to ArcMap®.
16) Using the **Editor** toolbar, select **Start Editing**. Set the **Task** to **Create New Feature**.
17) Use the **Sketch Tool**  to digitize a new coverage polygon using the coverage area outline from the georeferenced JPG and add the required attributes manually.
18) Repeat the above steps for all subscriber speed coverage areas provided.
19) Follow the steps detailed in **Coverage Area—GIS Data** below.

COVERAGE AREA—KML/KMZ

In the event that the provider supplies coverage area data in Google Earth KML or KMZ format, the steps are as follows:

1) Use a KML to SHP converter to translate file into an Esri® format.
2) **http://arcscripts.esri.com/details.asp?dbid=15603**
3) Download the script and follow the provided instructions for installing it in ArcToolbox®.
4) Double-click on the script in ArcToolbox® and navigate to the location of the KML file, as shown below:



5) Add the new shapefile to ArcMap®. Repeat for all KML files provided.
6) Follow the steps detailed in **Coverage Area—GIS Data** below.

COVERAGE AREA—CAD DATA

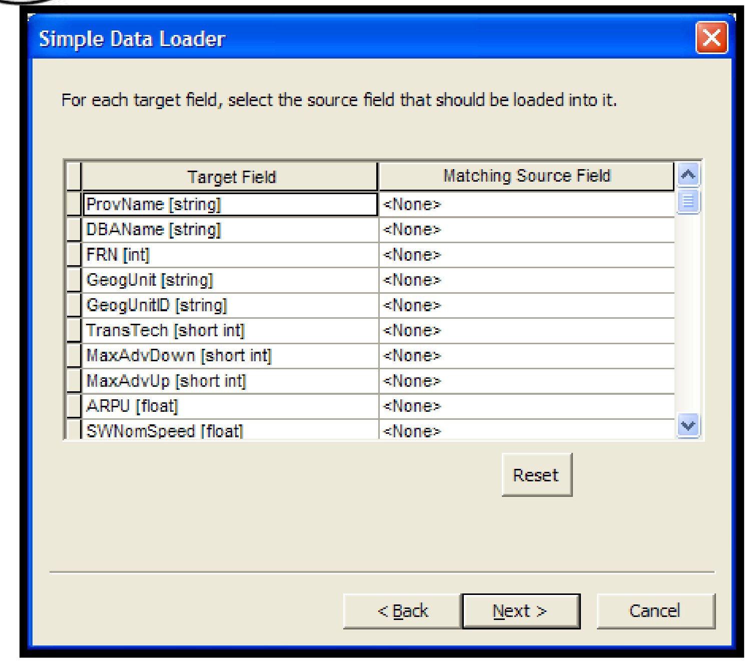
In the event that the provider supplies coverage area data in GIS format, the steps are as follows:

1) Transform the CAD dataset into an Esri® format.
2) **http://webhelp.esri.com/arcgisdesktop/9.2/index.cfm?TopicName=Transforming_CAD_datasets**
3) It may be necessary to contact the provider first to determine the coordinate system of the CAD data.
4) If the CAD data is not in a standard coordinate system, it may be necessary first to use ArcMap® to georeference the CAD data to a known coordinate system.
a) To do so, follow the instructions provided above in **Coverage Area—PDF/JPG/Other Image Format**.
5) In ArcCatalog®, create a new polygon shapefile with the appropriate data schema for a provider coverage area, which can be found in Appendix D.
6) Add the shapefile to ArcMap®.
7) Using the **Editor Toolbar**, select **Start Editing**. Set the **Task** to **Create New Feature**.
8) Use the **Sketch Tool** to digitize a new coverage polygon using the coverage area outline from the georeferenced CAD file and add the required attributes manually.
9) Follow the steps detailed in **Coverage Area—GIS Data** below.

COVERAGE AREA—GIS DATA

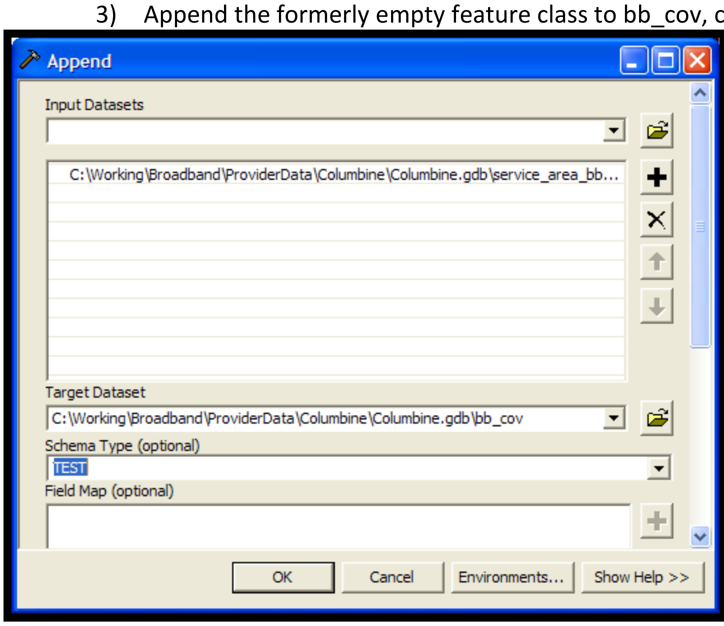
In the event that the provider supplies coverage area data in GIS format, the steps are as follows:

1) In ArcCatalog®, create an empty feature class with the schema of the bb_cov feature class and load the GIS feature class either created above or supplied by the provider into it.
    a. Right-click on the empty feature class, select **Load>Load Data** from the dropdown menu and navigate to the location of the service area feature class.
    b. Click on the **Add** button, then click **Next**.
    c. Accept the defaults and click **Next**.
    d. DO NOT attempt to map any fields, as shown below:



e. Click **Next**, then **Next** again, then **Finish**.

2) In ArcToolbox®, go to **Data Management Tools>General>Append**.
3) Append the formerly empty feature class to bb_cov, completing the dialog box, as shown below:



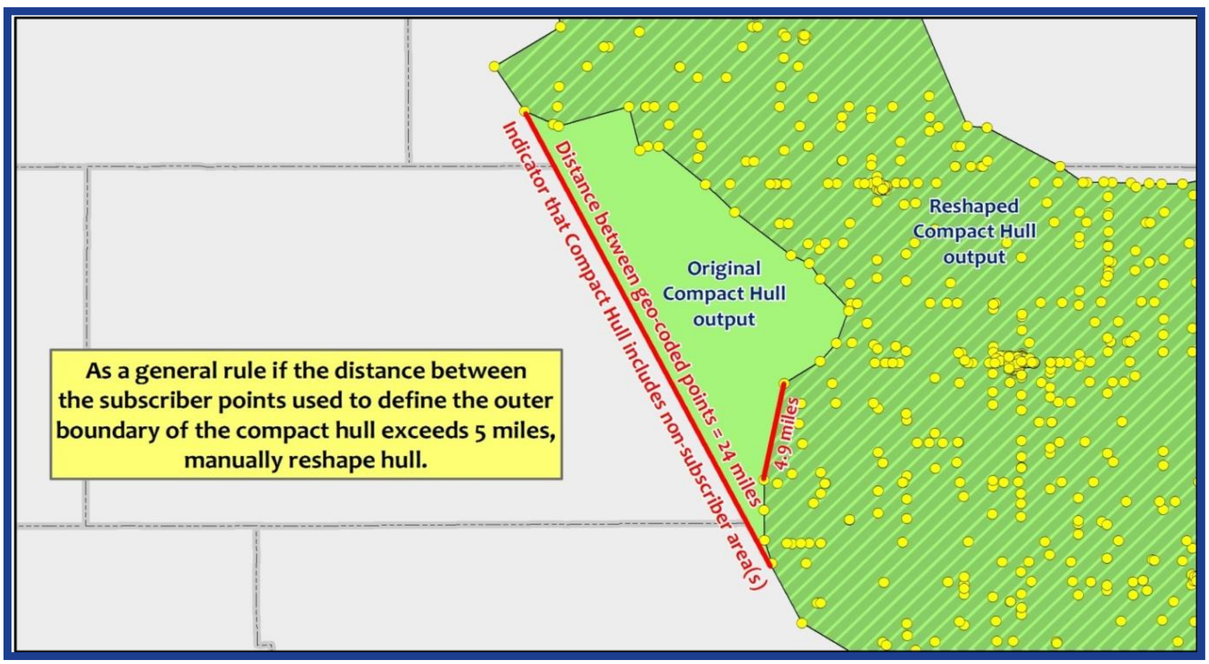
4) Leave the **Schema Type** as TEST.
5) Click **OK**.
6) In ArcMap®, open bb_cov for editing and manually input associated attribution, if necessary.

COMPACT POLYGON FROM SUBSCRIBER POINTS

1) Geocode address list using latest **State Composite Locator**.
2) Verify that your geocoded file has only one TT (Technology Type). If not, export individual geocoded layers for each Technology Type.
3) For each TT, check for differences in speed values or speed tiers and create separate layers for each speed value/tier.

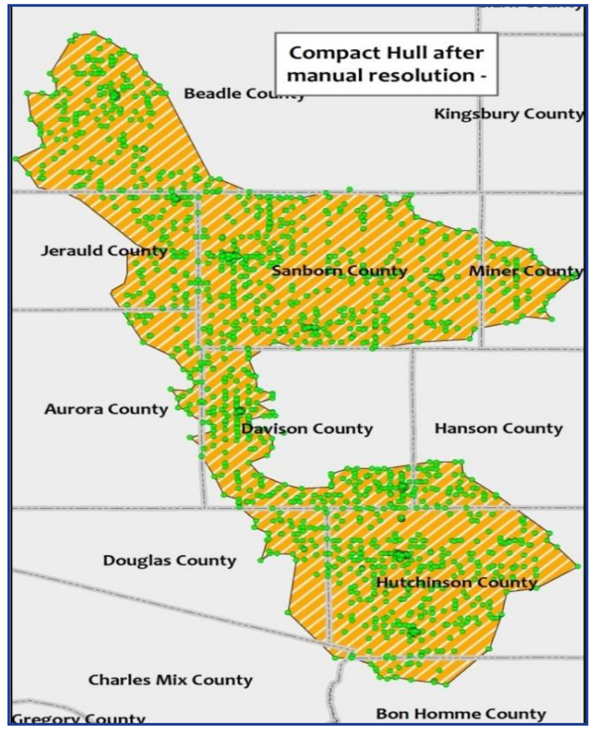
4) Clean your geocoding results: remove any points that geocode to accuracy levels below ZIP+4 (ZIP centroids, carrier route centroids, etc). Also, verify that outliers with acceptable accuracy levels are legitimate, i.e., fall in correct city and Zip.
5) Perform spatial join between county polygons (using stcnyfips field) and the cleaned geocoded subscriber points in order to carry the county name and stcnty fips.
6) Summarize the number of subscribers by county and use the subscriber counts by county to populate the Rate Tier table.
7) Un-join the county data from the geocode subscribers list.
8) Create Compact Polygon using cleaned geocoded layer or sub-selection of XtoolsPro—ConvexHull-DetailedHull option. A sub-selection of geocoded points will be used in areas where more than one polygon will need to be created for one provider's service area.
9) Evaluate output Hull carefully, looking for areas that should not be covered by hull polygon.
    a. If it is determined that an area or areas should not be represented in coverage area, manually reshape hull polygon until coverage area is adequate.
    b. When not obvious and as a general rule, manually resolve compact polygon when the distance between the subscriber points used to define the outer boundary of the compact polygon exceeds 5 miles . When reshaping the hull polygon, snap to the outermost geocoded points. See the three figures below for examples.

Compact Hull: Manual Resolution Required



Compact Hull: Manual Resolution Required

Compact Hull: After Manual Resolution



10) To attribute the compact polygon, perform a spatial join where your Target Feature Class is the compact polygon and the Join Feature Class is your geocoded point layer. Export compact hull with joined attributes and name file appropriately.
11) Append attributed compact polygon to Broadband TT template Feature Class and, if required, manually input any provider attribution that may not have carried over in the append process.
12) Intersect compact polygon with county boundaries to create unique records by county and use the state-county-fips field to populate stcty_fips field. Also use the county name field to populate the BBCov_Name field.
    a. Exception: where a provider's coverage is distributed throughout more than one area of any given county where the BBcov_Name should be populated using an appropriate city or other logical name based on geographical location.
13) Export/load into appropriate BB TT model dataset.

CENSUS BLOCKS—LIST OR SPREADSHEET

In the event that the provider supplies census block data in a list or spreadsheet, the steps are as follows:

1) Ensure block polygons supplied by the provider are 2000 currency.
2) If other currency, convert to 2000 currency before proceeding.
    a. To do this, remove the trailing letter (a, b, etc.) from the block ID.
    b. You will now have two blocks that equate to one block in the 2000 block geometry.
    c. Delete duplicate block IDs, retaining the higher service tier in each case.
3) Prepare the block list in clean Excel format, removing all Excel-only formatting, merged cells, colors, borders, etc.
4) Import the spreadsheet into ArcMap®.
5) Right-click on the 2000 census block feature class in the layer list in ArcMap® and select **Joins and Relates>Join** from the dropdown menu. Join the census block list to the 2000 census blocks feature class using the block ID and export joined records in a new feature class. The **Join** dialog

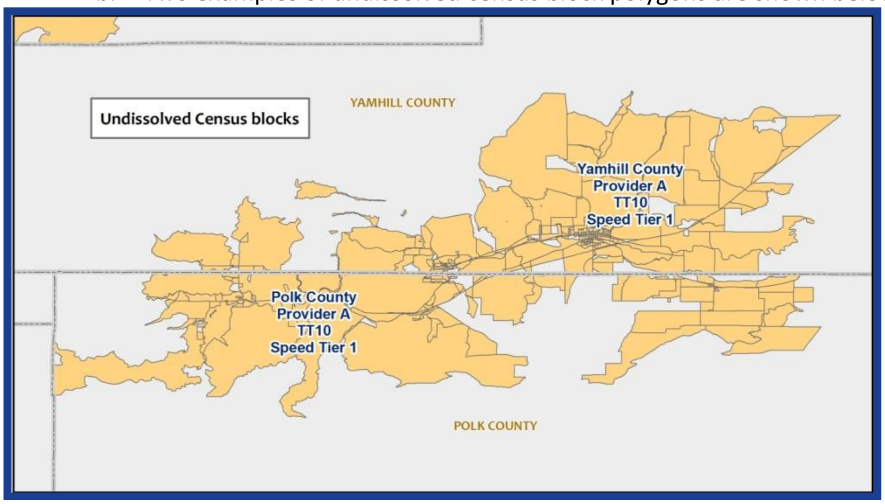
box and process can be seen above in the **TIGER® Street Segments—List, Spreadsheet or GIS Data** subsection.

6) Follow the steps in **Census Blocks—GIS Data** below.

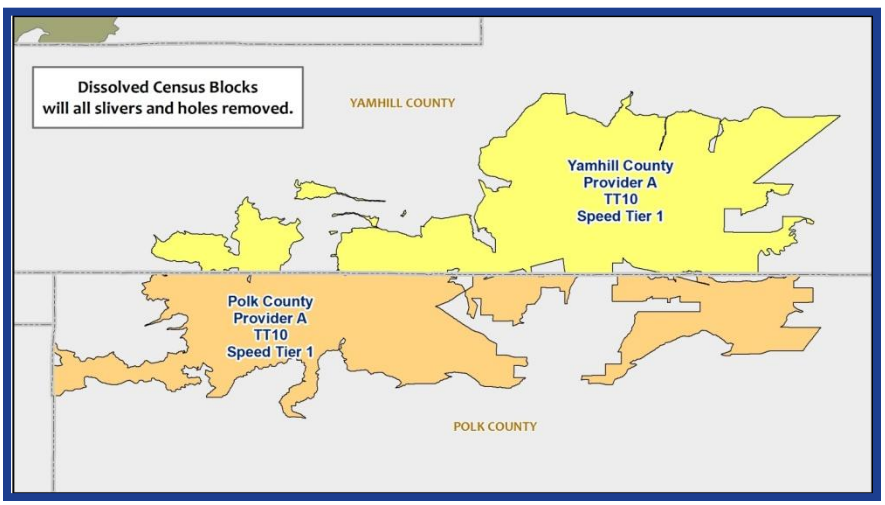
CENSUS BLOCKS—GIS DATA

In the event that the provider supplies census block GIS data, the steps are as follows:

1) Ensure that the blocks supplied by the provider are in the required data schema and are complete as far as required attribution.
   a. If not, manually enter the required attribution or contact the provider to fill gaps.
2) If census block geometry is distributed throughout more than one county, then select **Data Management Tools>Generalization>Dissolve** in ArcToolbox® and dissolve based on County/Provider/TT/Speed Tier so that unique records are created for each unique combination.
   a. The **Dissolve** dialog box is shown above in the **TIGER® Street Segments—List, Spreadsheet or GIS Data** section.
   b. Two examples of undissolved census block polygons are shown below:



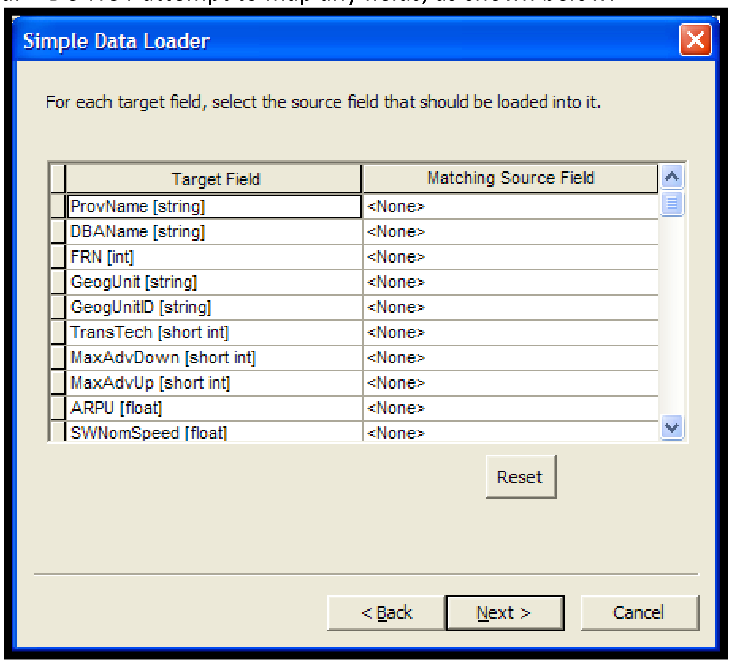
Undissolved census block polygons



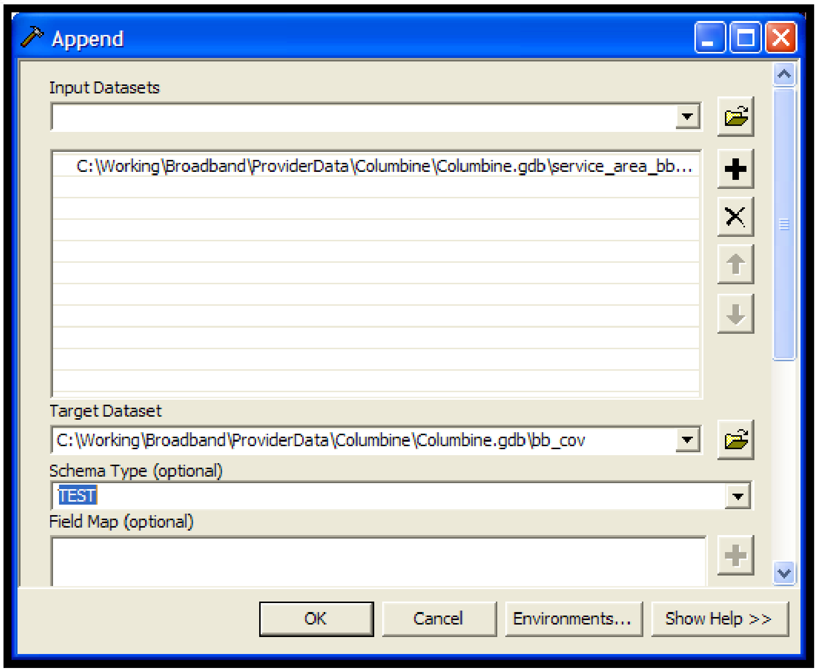
Census block polygons dissolved by county

3) For each dissolved region use the **Editing** toolbar in ArcMap® to remove unnecessary slivers and other small holes.

4) In ArcToolbox®, select **Data Management Tools>General>Merge** and merge the processed polygons into a single layer.
5) The merged census blocks will need to have the subscriber's frn field added and populated.
6) In ArcCatalog®, create an empty feature class with the schema of the bb_cov feature class and load the GIS feature class either created above or supplied by the provider into it.
   a. Right-click on the empty feature class, select **Load>Load Data** from the dropdown menu and navigate to the location of the service area feature class.
   b. Click the **Add** button, the click **Next.**
   c. Accept the defaults and click **Next.**
   d. DO NOT attempt to map any fields, as shown below:



   e. Click **Next**, then **Next** again, then **Finish**.
7) In ArcToolbox®, go to **Data Management Tools>General>Append**.
8) Append the formerly empty feature class to bb_cov, completing the dialog box, as shown below:



9) Leave the **Schema Type** as TEST.
10) Click **OK**.
11) In ArcMap®, open bb_cov for editing and manually input associated attribution, if necessary.

METADATA TRANSACTIONS

Following any updates or changes completed within the file geodatabase (fGDB) stored on the GIS-Analysts staging environment, the GIS-Analyst runs transactions to compare that fGDB with the one stored on the Core server to ensure metadata on all changes is recorded.

The steps taken to run transactions on the updated Core database are outlined below:

1) Open a command line window and run generateTransactions.py:
   a. Usage: **generateTransactions.py [Core fGDB] [Staging Environment fGDB]**
   b. Example of command line:

<path>**generateTransactions.py** <path>**ST_BB_POLY_SRV_AREAS.gdb** <path>**ST_BB_POLY_SRV_AREAS.gdb**

2) Shown below is an example of the output screen that will be displayed:

```
-----------  Collecting Transactions  ----------------

Calculating rec_id field for BBCov_0_BB_POLY_TEMPLATE
value can not be 0 or less
Trouble creating the progress meter

Calculating rec_id field for BBCov_10_CenturyLink

%   10   20   30   40   50   60   70   80   90   100

----|----|----|----|----|----|----|----|----|----|      Goal = 8
```

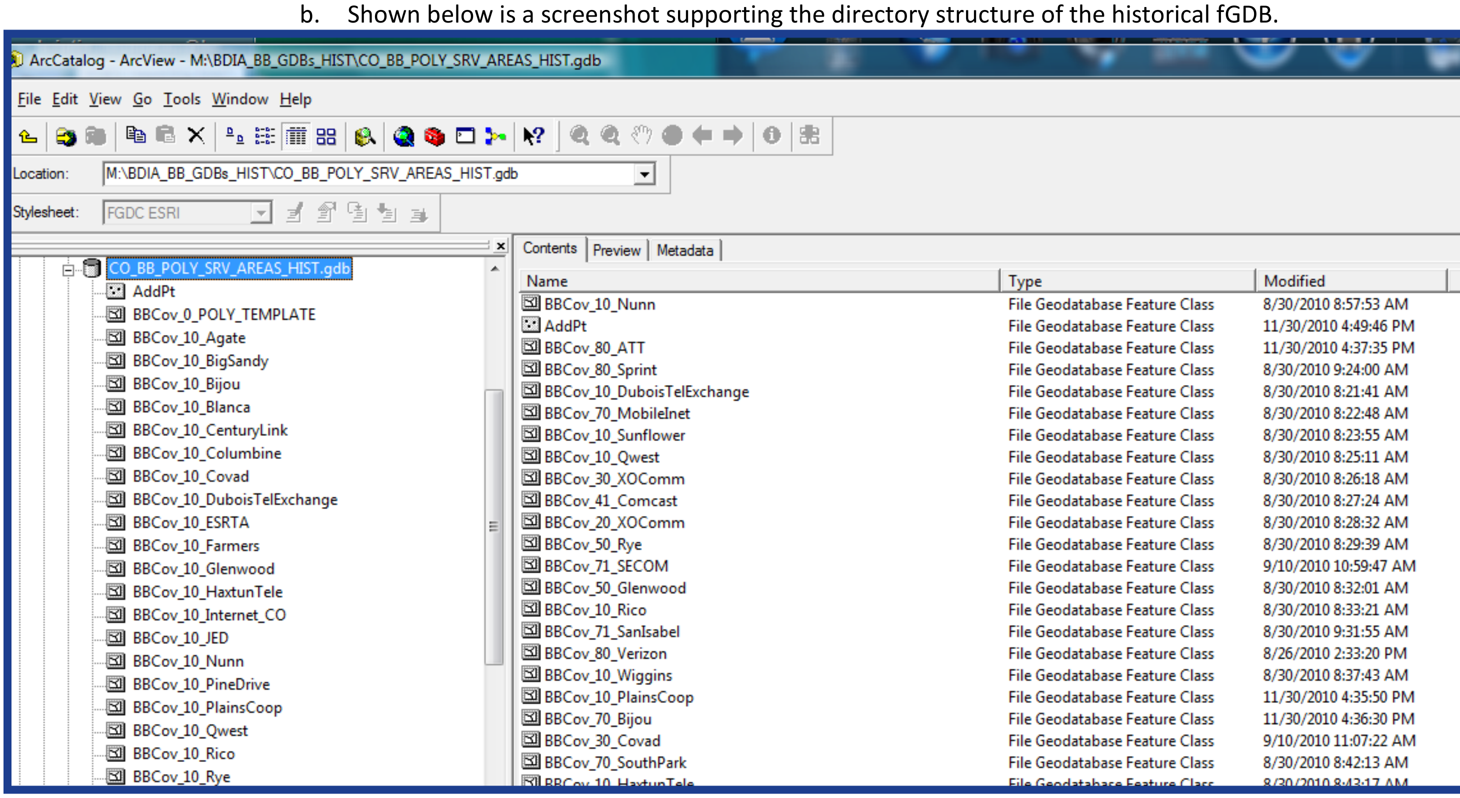
```
Merging change: X:\BDIA_BB_GDBs\MS_BB_POLY_SRV_AREAS.gdb\AddPt
Calculating Transaction fields for AddPt

%   10   20   30   40   50   60   70   80   90   100

----|----|----|----|----|----|----|----|----|----|      Goal = 1
**************************************************
X:\BDIA_BB_GDBs\MS_BB_POLY_SRV_AREAS.gdb\AddPt...changes is complete.

Your transaction FeatureClasses are in:
\\michigan\AllAccess\BDIA_BB_GDBs_HIST\MS_BB_POLY_SRV_AREAS_HIST.gdb
--------------------------------------------------------------------------------
------------
elapsed time = 2994.4 seconds
```

3) After the process has completed, results can be found in the ST_BB_POLY_SRV_AREAS_HIST.gdb:
   a. The transactions scripts records changes at a feature level.
   b. Shown below is a screenshot supporting the directory structure of the historical fGDB.



   c. Attribution associated with each added/removed/changed feature is tracked, including the following additional columns appended to the end of each:
      (i.) Commit_by

(1) Records the GIS-Analyst who committed the changes to the historical fGDB.

(ii.) Commit_date

(1) Records the date and time stamp on which the changes were committed.

(iii.) Trans_type

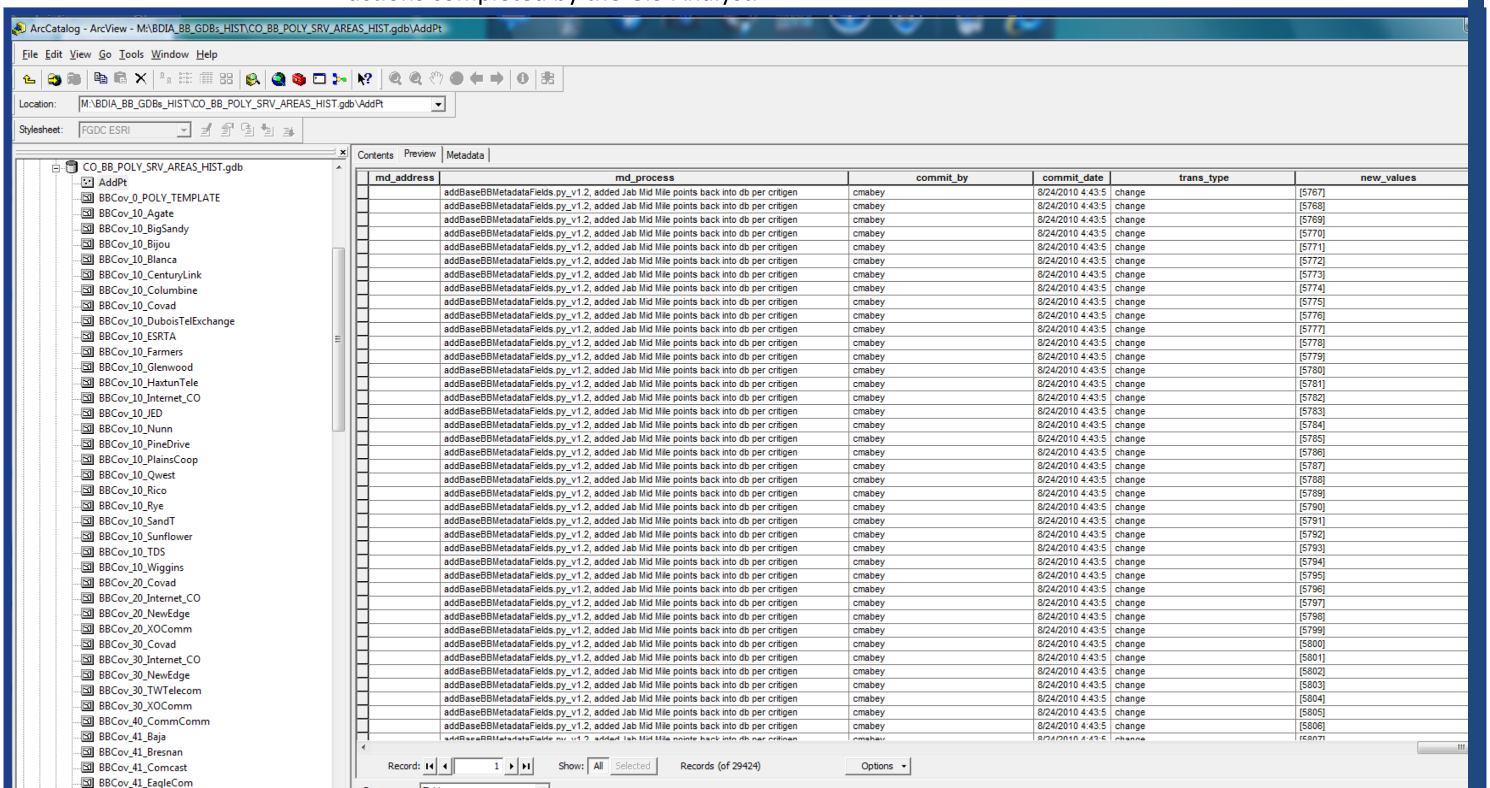
(1) This field reflects the type of change recorded;

(2) Categorized by: Adds/Change/Deletes.

(iv.) New_values

(1) Records the new values when a change was completed on a feature. Example: Name or speed change.

d. MD_Process also is transferred from the edited fGDB to the historical fGDB, which states the actions completed by the GIS-Analyst.



DATA PROCESSING

DATA PROCESSING OVERVIEW

The following subsections detail the steps and layout required to process the service provider data further to meet NTIA requirements:

- **Weighted Nominal Speed**;
- **Middle Mile**;
- **Broadband Coverage Template**.

WEIGHTED NOMINAL SPEED

The weighted nominal speed is populated in one of the following two ways: **subscriber data supplied by provider** or **value supplied by provider**.

SUBSCRIBER DATA SUPPLIED BY PROVIDER

Where the data provider supplies subscriber speed information, the following formula from the NOFA is used:

$$\frac{(\text{speed tier-1 in kbps} \times \text{no. of tier-1 subscribers}) + (\text{speed tier-2 in kbps} \times \text{no. of tier-2 subscribers}) + (\text{etc.})}{\text{Total average monthly subscribers}}$$

Data is initially broken up in the following order:

1) Stcty_fips;
2) Transmission technology type;
3) Subscriber tiers.

VALUE SUPPLIED BY PROVIDER

Some providers will supply their weighted nominal speed. In these cases, the data supplied will be populated instead of using the NOFA formula. These obtained or calculated values are used to update the service overview layer.

This can be done manually or by creating a table with the provider's FRN and average weighted speed and joining it to the service overview table in ArcMap®.

1) To join, right-click on the layer to join to and select **Joins and Relates>Join** from the dropdown menu.
2) Then navigate to the table to join to and select the join fields from the dropdown list.
3) Then open the source table (the table in ArcMap®) and right-click on the header of the **Average Weighted Speed** field and select **Calculate Field** from the dropdown menu.
4) Use the value of the average weighted speed from the joined table.

MIDDLE MILE

Middle mile information generally is provided in spreadsheet or text file format. The process is to take what is supplied by the provider and translate it into the required data schema.

1) If the data is supplied with address information, follow the process outlined above in **Subscriber Location—Address Data**.
2) If the data is supplied with associated XY coordinates, follow the process outlined above in **Subscriber Location—XY Data**.
3) Once the data is in GIS format, use the **Append** (**Data Management Tools>General>Append**) command in ArcToolbox® to append the data to the overall middle mile dataset.
4) Set the schema type to NO_TEST and use the Field Map to map the attribute fields from the source to the target dataset.

BROADBAND COVERAGE TEMPLATE

The table below lists descriptions of the fields within the bb_cov layer, which is the interim dataset used to create the final product deliverable.

NAME	ALIAS	DESCRIPTION
objectid	OBJECTID	Internal Object ID
shape	SHAPE	Internal Shape storage
prov_id	PROVIDER_ID	Unique numeric identifier for each provider
prov_name	PROVIDER_NAME	Unique name for each provider
dba_name	DOING_BUSINESS_AS	An alternative "Doing-Business-As" name for the provider
frn	FCC_REGISTRATION_NUMBER	Provider FCC Registration Number
bbcov_name	BBCOV_NAME	BroadMap Broadband Coverage name
trans_code	TRANSMISSION_CODE	Unique code for the transmission technology type described by this layer
trans_name	TRANSMISSION_NAME	Name for the transmissions technology type
trans_desc	TRANSMISSION_DESC	Description for the transmissions technology type
spect_code	SPECTRUM_CODE	Unique code for the spectrum [WIRELESS ONLY]
spect_name	SPECTRUM_NAME	Name for the spectrum [WIRELESS ONLY]
spect_desc	SPECTRUM_DESC	Description for the spectrum [WIRELESS ONLY]
mad_dwn_t	MAX_AD_DOWN_TIER	Maximum advertised downstream speed available within given area (speed tier)
mad_up_t	MAX_AD_UP_TIER	Maximum advertised upstream speed available within given area (speed tier)
typ_dwn_t	TYPICAL_DOWN_TIER	Typical downstream speed available within given area (speed tier)
typ_up_t	TYPICAL_UP_TIER	Typical upstream speed available within given area (speed tier)
mad_dwn_k	MAX_AD_DOWN_KBPS	Maximum advertised downstream speed available within given area (kbps)
mad_up_k	MAX_AD_UP_KBPS	Maximum advertised upstream speed available within given area (kbps)
typ_dwn_k	TYPICAL_DOWN_KBPS	Typical downstream speed available within given area (kbps)
typ_up_k	TYPICAL_UP_KBPS	Typical upstream speed available within given area (kbps)
subs	SUBSCRIBERS	Total average monthly subscribers for this provider for this technology for this coverage polygon
md_geom	MD_GEOMETRY	Metadata: Comma separated list of source ids from which the polygon extent was produced
md_exists	MD_EXISTS	Metadata: Comma-separated list of source ids used in understanding and editing the provider data for this polygon

NAME	ALIAS	DESCRIPTION
md_who	MD_WHO	Metadata: Name of the editor who last edited this feature at the time in md_when
md_when	MD_WHEN	Metadata: Date/time that this feature was last edited
md_process	MD_PROCESS	Metadata: Comma-separated list of processes used to create and/or modify this layer
stcty_fips	STATE_COUNTY_FIPS	State/County FIPS code
rec_id	RECORD_ID	Compound Key formed from STCTY_FIPS+"|"+Provider_ID+"|"+Trans_Code+"|"+BBCov_Name
st_area	ST_AREA(SHAPE)	Area in square decimal degrees
st_length	ST_LENGTH(SHAPE)	Length in decimal degrees
Provider_Type	Type of Provider	Has Subtype (1:Broadband provider as described in the NOFA,2:Reseller,3:Unknown), default value=1 (New 04/11 Model)

VERIFICATION AND VALIDATION

PROVIDER VALIDATION—PROVIDER PORTAL/PDF MAP REVIEW

Following the collection and aggregation of provider data, the aggregated data is validated by the provider to ensure it is an accurate representation of their coverage area and supporting broadband information.

- This validation is completed through the Provider Portal web application, which is a secure interactive map that displays the provider's coverage areas and allows the provider to validate, submit feedback or request changes.
  - If changes are requested, then the features on the portal are updated and an automatic request is sent to the provider to complete the validation process.
- Providers that did not use the Provider Portal are asked to validate a PDF map displaying their coverage area(s). This is accomplished via e-mail notification.

PROVIDER VERIFICATION—THIRD PARTY SOURCE REVIEW

After the provider has validated its coverage areas, a third-party source comparison and analysis is performed.

- Where anomalies or discrepancies are identified, a "SCAN" point is dropped and descriptive comments are applied to be reviewed later with the provider.
- During the provider review, the map is displayed along with the "SCAN" points and potential refinement is completed based on input from the provider.

The table below shows third-party sources used:

THIRD-PARTY SOURCE NAME	SOURCE TYPE	VERIFICATION TYPE
InfoUSA	Consumer and Business Listings	Community Anchor Institutions; Can also be used for demographic information supporting the State websites.
Pitney Bowes (PBBI)	Exchange Info Plus (Central Office Locations)	Exchange datasets are used to verify the following Transmission Technologies (TT): Asymmetric xDSL (10), Symmetric xDSL (20), Other Copper Wireline (30), and Optical Carrier/Fiber to the End User (50).

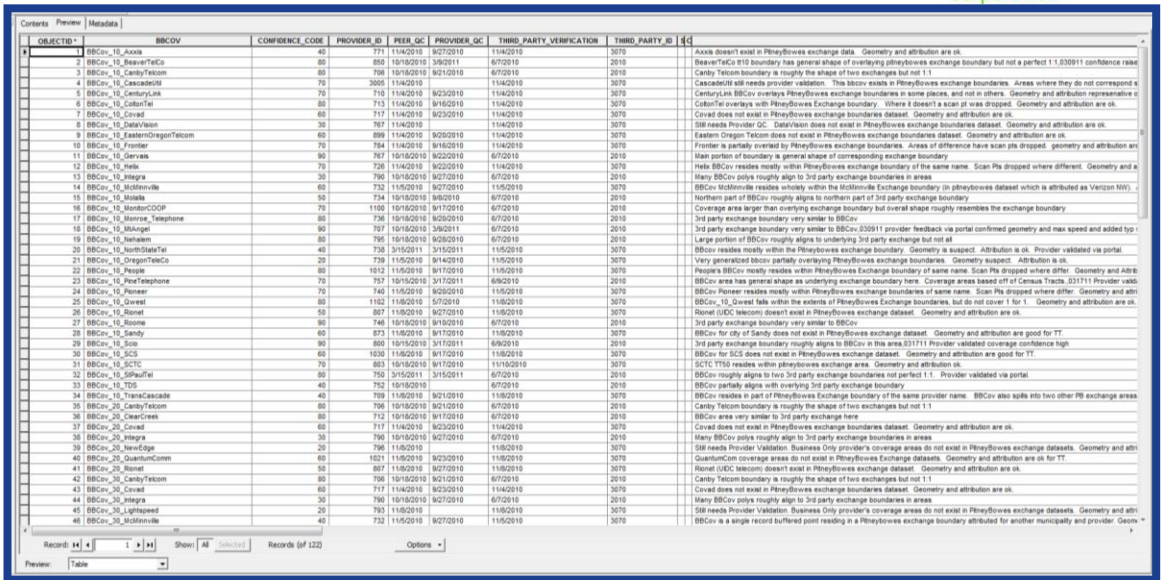
THIRD-PARTY SOURCE NAME	SOURCE TYPE	VERIFICATION TYPE
Media Prints	Cable Boundaries	Used to verify the following TT: Cable Modem—DOCSIS 3.0 (40) and Cable Modem—Other (41).
American Roamer	Wireless Coverage Patterns (EVDO, GPRS, WISP, HSPA)	Used to verify the following TT: Terrestrial Fixed Wireless—Unlicensed (70), Terrestrial Fixed Wireless—Licensed (71) and Terrestrial Mobile Wireless (80).
ComSearch	Wireless Spectrum Holdings and Tower Data	Used to verify the following TT: Terrestrial Fixed Wireless—Unlicensed (70), Terrestrial Fixed Wireless—Licensed (71) and Terrestrial Mobile Wireless (80).

ASSIGNING CONFIDENCE VALUES

All findings and results from the abovementioned **validation and verification activities**, plus internal peer quality reviews, are captured and tracked in a **Validation table** (see example on the following page) and form the basis of the confidence value assigned for each provider and then each technology.

CONFIDENCE VALUE	DESCRIPTION
0	Coverage area has not been reviewed.
10	Extremely Low: Single Source QC.
20	Very Low: Needs additional validation\verification.
30	Low: Even with validation\verification, coverage still is suspect.
40	Acceptable: Confirm with State prior to shipment.
50	Meets requirements to be included in shipment.
60	Moderate: Meets NTIA/State's standards, representative of Technology Type (TT).
70	High: Accurate representation of coverage based upon TT.
80	Very High: Multiple validation\verification with most third-party sources.
90	Extremely High: Multiple validation\verification sources.
100	Perfect: Multiple validation\verification sources, with complete alignment with sources and ground truth verification activities.

The **Validation table** is maintained as updates or changes occur for each provider, down to technology type, with the overall goal to improve the confidence values and overall map representation. An example of the Validation table is shown below:



Contents | Preview | Metadata

OBJECTID *	BBCOV	CONFIDENCE_CODE	PROVIDER_ID	PEER_QC	PROVIDER_QC	THIRD_PARTY_VERIFICATION	THIRD_PARTY_ID	S	C
1	BBCov_10_Axxis	40	771	11/4/2010	9/27/2010	11/4/2010	3070		Axxis doesn't exist in PitneyBowes exchange data. Geometry and attribution are ok.
2	BBCov_10_BeaverTelCo	80	850	10/18/2010	3/9/2011	6/7/2010	2010		BeaverTelCo tt10 boundary has general shape of overlaying pitneybowes exchange boundary but not a perfect 1:1,030911 confidence raise
3	BBCov_10_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010		Canby Telcom boundary is roughly the shape of two exchanges but not 1:1
4	BBCov_10_CascadeUtil	70	3005	11/4/2010		11/4/2010	3070		CascadeUtil still needs provider validation. This bbcov exists in PitneyBowes exchange boundaries. Areas where they do not correspond s
5	BBCov_10_CenturyLink	70	710	11/4/2010	9/23/2010	11/4/2010	3070		CenturyLink BBCov overlays PitneyBowes exchange boundaries in some places, and not in others. Geometry and attribution represenative o
6	BBCov_10_ColtonTel	80	713	11/4/2010	9/16/2010	11/4/2010	3070		ColtonTel overlays with PitneyBowes Exchange boundary. Where it doesn't a scan pt was dropped. Geometry and attribution are ok.
7	BBCov_10_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070		Covad does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
8	BBCov_10_DataVision	30	767	11/4/2010		11/4/2010	3070		Still needs Provider QC. DataVision does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
9	BBCov_10_EasternOregonTelcom	60	899	11/4/2010	9/20/2010	11/4/2010	3070		Eastern Oregon Telcom does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
10	BBCov_10_Frontier	70	784	11/4/2010	9/16/2010	11/4/2010	3070		Frontier is partially overlaid by PitneyBowes exchange boundaries. Areas of difference have scan pts dropped. geometry and attribution are
11	BBCov_10_Gervais	90	767	10/18/2010	9/22/2010	6/7/2010	2010		Main portion of boundary is general shape of corresponding exchange boundary
12	BBCov_10_Helix	70	726	11/4/2010	9/22/2010	11/4/2010	3070		Helix BBCov resides mostly within PitneyBowes exchange boundary of the same name. Scan Pts dropped where different. Geometry and a
13	BBCov_10_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010		Many BBCov polys roughly align to 3rd party exchange boundaries in areas
14	BBCov_10_McMinnville	60	732	11/5/2010	9/27/2010	11/5/2010	3070		BBCov McMinnville resides wholely within the McMinnville Exchange boundary (in pitneybowes dataset which is attributed as Verizon NW).
15	BBCov_10_Molalla	50	734	10/18/2010	9/8/2010	6/7/2010	2010		Northern part of BBCov roughly aligns to northern part of 3rd party exchange boundary
16	BBCov_10_MonitorCOOP	70	1100	10/18/2010	9/17/2010	6/7/2010	2010		Coverage area larger than overlying exchange boundary but overall shape roughly resembles the exchange boundary
17	BBCov_10_Monroe_Telephone	80	736	10/18/2010	9/20/2010	6/7/2010	2010		3rd party exchange boundary very similar to BBCov
18	BBCov_10_MtAngel	90	707	10/18/2010	3/9/2011	6/7/2010	2010		3rd party exchange boundary very similar to BBCov,030911 provider feedback via portal confirmed geometry and max speed and added typ
19	BBCov_10_Nehalem	80	795	10/18/2010	9/28/2010	6/7/2010	2010		Large portion of BBCov roughly aligns to underlying 3rd party exchange but not all
20	BBCov_10_NorthStateTel	40	738	3/15/2011	3/15/2011	11/5/2010	3070		BBcov resides mostly within the Pitneybowes exchange boundary. Geometry is suspect. Attribution is ok. Provider validated via portal.
21	BBCov_10_OregonTeleCo	20	739	11/5/2010	9/14/2010	11/5/2010	3070		Very generalized bbcov partially overlaying PitneyBowes exchange boundaries. Geometry suspect. Attribution is ok.
22	BBCov_10_People	80	1012	11/5/2010	9/17/2010	11/5/2010	3070		People's BBCov mostly resides within PitneyBowes Exchange boundary of same name. Scan Pts dropped where differ. Geometry and Attrib
23	BBCov_10_PineTelephone	70	757	10/15/2010	3/17/2011	6/9/2010	2010		BBCov area has general shape as underlying exchange boundary here. Coverage areas based off of Census Tracts.,031711 Provider valid
24	BBCov_10_Pioneer	70	740	11/5/2010	9/20/2010	11/5/2010	3070		BBCov Pioneer resides mostly within PitneyBowes exchange boundaries of same name. Scan Pts dropped where differ. Geometry and attri
25	BBCov_10_Qwest	80	1102	11/8/2010	5/7/2010	11/8/2010	3070		BBCov_10_Qwest falls within the extents of PitneyBowes Exchange boundaries, but do not cover 1 for 1. Geometry and attribution are ok.
26	BBCov_10_Rionet	50	807	11/8/2010	9/27/2010	11/8/2010	3070		Rionet (UIDC telecom) doesn't exist in PitneyBowes exchange dataset. Geometry and attribution are ok.
27	BBCov_10_Roome	90	746	10/18/2010	9/10/2010	6/7/2010	2010		3rd party exchange boundary very similar to BBCov
28	BBCov_10_Sandy	60	873	11/8/2010	9/17/2010	11/8/2010	3070		BBCov for city of Sandy does not exist in PitneyBowes exchange dataset. Geometry and attribution are good for TT.
29	BBCov_10_Scio	90	800	10/15/2010	3/17/2011	6/9/2010	2010		3rd party exchange boundary roughly aligns to BBCov in this area,031711 Provider validated coverage confidence high
30	BBCov_10_SCS	60	1030	11/8/2010	9/17/2010	11/8/2010	3070		BBCov for SCS does not exist in PitneyBowes exchange dataset. Geometry and attribution are good for TT.
31	BBCov_10_SCTC	70	803	10/18/2010	9/17/2010	11/10/2010	3070		SCTC TT50 resides within pitneybowes exchange area. Geometry and attribution ok.
32	BBCov_10_StPaulTel	80	750	3/15/2011	3/15/2011	6/7/2010	2010		BBCov roughly aligns to two 3rd party exchange boundaries not perfect 1:1. Provider validated via portal.
33	BBCov_10_TDS	40	752	10/18/2010		6/7/2010	2010		BBCov partially aligns with overlying 3rd party exchange boundary
34	BBCov_10_TransCascade	40	709	11/8/2010	9/21/2010	11/8/2010	3070		BBCov resides in part of PitneyBowes Exchange boundary of the same provider name. BBCov also spills into two other PB exchange areas
35	BBCov_20_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010		Canby Telcom boundary is roughly the shape of two exchanges but not 1:1
36	BBCov_20_ClearCreek	80	712	10/18/2010	9/17/2010	6/7/2010	2010		BBCov area very similar to 3rd party exchange here
37	BBCov_20_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070		Covad does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
38	BBCov_20_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010		Many BBCov polys roughly align to 3rd party exchange boundaries in areas
39	BBCov_20_NewEdge	20	796	11/8/2010		11/8/2010	3070		Still needs Provider Validation. Business Only provider's coverage areas do not exist in PitneyBowes exchange datasets. Geometry and attri
40	BBCov_20_QuantumComm	60	1021	11/8/2010	9/23/2010	11/8/2010	3070		QuantumCom coverage areas do not exist in PitneyBowes Exchange datasets. Geometry and attribution are ok for TT.
41	BBCov_20_Rionet	50	807	11/8/2010	9/27/2010	11/8/2010	3070		Rionet (UIDC telecom) doesn't exist in PitneyBowes exchange dataset. Geometry and attribution are ok.
42	BBCov_30_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010		Canby Telcom boundary is roughly the shape of two exchanges but not 1:1
43	BBCov_30_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070		Covad does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
44	BBCov_30_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010		Many BBCov polys roughly align to 3rd party exchange boundaries in areas
45	BBCov_30_Lightspeed	20	793	11/8/2010		11/8/2010	3070		Still needs Provider Validation. Business Only provider's coverage areas do not exist in PitneyBowes exchange datasets. Geometry and attri
46	BBCov_30_McMinnville	40	732	11/5/2010	9/27/2010	11/5/2010	3070		BBCov is a single record buffered point residing in a Pitneybowes exchange boundary attributed for another municipality and provider. Geom

Record: 1 Show: All Selected Records (of 122) Options

Preview: Table

COMMUNITY ANCHOR INSTITUTION (CAI) DATA

DATA COLLECTION

The CAI data was initially collected from the State to create the baseline inventory. All location information and broadband coverage data supplied also was ingested into the data deliverable. Additional collection of CAI information was done via data mining and/or webscraping to build out the inventory further. For example: Collection of additional CAIs and location information.

The State-agency-provided CAI inventory was comprehensive but the challenge is collecting broadband related data: service provider(s), technology and speed data for each CAI. Availability of the CAI portal has not significantly increased submission of this data. Additional promotion to CAIs to use the CAI portal will be needed to increase this data for subsequent deliverables.

INSTITUTION DATA

Institution data is obtained from a variety of sources and almost always provided in Excel spreadsheet format. The general process for incorporating this data is as follows:

1) If the data is provided in Excel or some similar format:
    a. Clean and standardize the Excel spreadsheet, removing any cell formats, merged cells, etc.
    b. Standardize the address format as defined in the staging CAI database.
    c. If the spreadsheet includes X and Y values, such as latitude and longitude, use the **Add XY Data** tool in ArcMap® to create a spatial data layer.
    d. If there are only addresses, then follow the geocoding steps outlined above to create spatial data points for each of the institutions.
        (i.) Institutions that do not geocode based on the TIGER® 2009 dataset will have to be located manually using Google Maps, Google Earth or some other information source.
2) If the CAI source data is in GIS format, add the Latitude and Longitude fields and use the **Calculate Geometry** tool to populate them, using the WGS 84 coordinate system.
3) Using ArcCatalog®, load the new data into the staging CAI database.
4) This database is ready for the makeDeliverable.py script to process the information into the final State and NTIA deliverables.

COMMUNITY ANCHOR INSTITUTION (CAI) PORTAL UPDATES

A web application has been released to allow for further data collection and validation of anchor institution location information, broadband coverage and speed test data. Information collected from the CAI Portal is then ingested into the overall inventory and will be compared later against the provider coverage areas mapped to locate any potential discrepancies.

PRODUCT EXTRACT

PYTHON SCRIPTS

The following subsections make use of Python scripts. In general, to use a Python script you must have Python installed on your computer. To download the latest version of Python, go to **http://www.python.org/download/** and download the latest stable version. As of August 2010, this was version 2.7. Once this is installed, the general way to run a script is to type the following at a command prompt: C:\Python27\python.exe C:\<location of script>. Many of the scripts provided have environment variables that must be set before they can be run.

The Python code for BroadMap's product extract has been incorporated into a Hudson CI System, which is detailed in the **Process Operation and Monitoring** section of this document. This was a process improvement activity so that all processes can be monitored, controlled and will contain historical tracking on each process.

PRODUCT EXTRACT PROCESS

NOTE:
Specific Python scripts are called out in **red** font in the subsections below.

The MapConnect™ product extract process, makeDeliverable.py, uses the BB_Cov and BROADMAP_POINTS interim datasets to create the following layers according to the current specifications:

- BB_Service_Road_Segment
  - This layer contains all broadband services associated with specific street segments for census 2000 blocks larger in area than two square miles.
- BB_ServiceCensusBlock
  - Contains all broadband services associated with census blocks of no greater than two square miles.
- BB_Service_Wireless
  - This layer contains all wireless services not associated with specific addresses.
- BB_ServiceOverview
  - This layer contains subscriber-weighted nominal speed for each provider's service area at a county level and is meant to act as a summarized view.
- BB_ConnectionPoint_MiddleMile
  - This layer contains middle-mile and backbone interconnection points.
- BB_Service_CAInstitutions
  - Broadband Service at Community Anchor Institutions (CAI).
  - Community Anchor Institutions consist of schools, libraries, medical and healthcare providers, public safety entities, community colleges and other institutions of higher education as well as other community support organizations and entities.

Because of a NTIA model change for the October 2010 data deliverable, an addition to this code was created to support both models in case a comparison is later desired or a request is made to revert to the original model. This script name is bdia2ntia.py and creates the following layers in addition to the layers mentioned above, rolled up to NATL_Broadband_Map.

- BB_ConnectionPoint_LastMile
  - This layer contains last mile infrastructure points, which is populated only if data cannot be provided at a more granular level.
- BB_Service_Address
  - Represents broadband availability for service address points. Address Point availability refers to those individual addresses at which each facilities-based provider of broadband service can provide broadband services of minimal characteristics within 7-10 business days.
- State_Boundary
  - State boundary supporting topological validation of point feature classes.
- NATL_Broadband_Topology
  - Supports basic topology quality checking. Example: No CAIs or Middle Mile points outside of the State boundary.

The following process flow provides a view of how the Core fGDB is extrapolated to the NTIA final deliverable via the makeDeliverable.py script. Following that, the bdia2ntia.py script is run, which limits what is placed in the final layers based on the NTIA modeling standards.

The product scripts and supporting extract were originally created separately per request, in case data model comparisons were to be completed.

PRODUCT STATISTICS

Following the completion of a product extract, the product statistics script (BDIA_ReleaseNotesStats.py) extracts the following information supporting that product deliverable.

- Provider Statistics:
  - Collects all provider information, listing by Provider Name.
  - Provides output of FRN.
  - Counts the number of features supported within the following layers:
    - Census Block;
    - Street Segment;
    - Max Upstream;
    - Wireless Services;
    - Infrastructure Points.
  - These updates were made to support the Data Package required to accompany every NTIA product deliverable.
- Community Anchor Institution (CAI) Statistics:
  - Breaks down CAI to the eight categories:
    - 1: School: K through 12;
    - 2: Library;
    - 3: Medical/Healthcare;
    - 4: Public Safety;
    - 5: University/College;
    - 6: Other Government;
    - 7: Other Community non-government;
    - None: Unknown Category. In cases where this occurs, further investigation is completed prior to product shipment to ensure all CAIs are categorized accurately.
  - Reports out the following counts:

- Total CAIs within that category;
- Total CAIs that contain partial BB coverage. Contains any of the following information for a given CAI: BB Subscriber, Transmission Technology, Speed Down Speed Up;
- Total CAIs that contain full BB coverage. Contains all of the abovementioned BB information for a given CAI.

The output of this script is two CSV files: AnchorInstitutions.csv and Providers.csv. These files then can be inspected to ensure that there are the expected number of CAIs and providers for every release.

QUALITY ASSURANCE

Quality assurance is supported manually and algorithmically on the interim data, BB_Cov file geodatabase and on the final product. For scheduled product releases, a test product extract and subsequent manual and algorithmic QC run is completed along with a release review. The product specifications, project status reports and previous product release notes are used as references throughout this review.

The following parameters are tested using the methodology listed below each:

- Product Deliverable Format:
  - Correct names and format of data deliverables.
    - BDIA_QC_SUITES (please see below for details).
  - Correct Projections/Datum.
    - Manual interaction with product.
  - Metadata Present and Correct.
    - Manual interaction with product.
- Table Structure:
  - All required tables included.
    - BDIA_QC_SUITES.
  - Extraneous tables identified.
    - BDIA_QC_SUITES.
- Field Structure:
  - All fields included.
    - BDIA_QC_SUITES.
  - Extraneous fields identified.
    - BDIA_QC_SUITES.
  - Correct field names, types and widths.
    - BDIA_QC_SUITES.
- Field Domains:
  - Values in all tables are constrained to the specified values specified:
    - This action is accomplished via BDIA_QC_SUITES and manual review of the product;
    - This tends to identify project completeness issues as fields with a null value are identified.
- Geometric Representation:
  - Identify if all layers have the correct geometric representation:
    - Manual review of the BB_ServiceOverview layer;
    - Dependent on NTIA and client requirements.
- Geographic Extent:
  - Product includes the necessary Geography associated with Product?
    - Manual Review—ArcGIS®.
  - Is there extraneous geography included in Product?
    - Manual Review—ArcGIS®.
- Completeness:
  - Products contain the expected amount of data?

- Manual review of product statistics relative to weekly State reports and defined expectations.

- Accuracy:
  - Product meets the stated accuracy requirements for the deliverable?
    - Sampling procedure to manually review source material to resulting product;
    - Provider Validation;
    - Verification using Third-Party Data;
    - Verification against reality, where applicable.
- Data Regression:
  - Any unexplainable data loss or change?
    - This action is accomplished by comparing results within product statistics script (BDIA_ReleaseNotesStats.py) from previous releases, as well as manual review of the product.
- Confidentiality:
  - Any unauthorized confidential information included in the delivery?
    - Review of NDAs and delivery expectations.
- Prior Issues Resolved:
  - Have expected internal issues been resolved?
    - Manual review of data against previous product release notes.
  - Have agreed-upon customer issues been resolved?
    - Manual review of data against previous product release notes, status report and client feedback.
- Delivery Medium:
  - Has the product medium been verified?
    - Manual review.
  - All files present.
    - Manual review of SFTP site to ensure all files are copied correctly, including file/directory size.
  - Correct location.
    - Manual review—confirmation of SFTP link, username and password.

QC SUITE

The BDIA_QC_SUITES consists of four main types of scripts supporting the overall QC process. These scripts are all run in concert and are called from the test_runner script and the test_BDIAProductGDB script.

CONFIGURATION

These scripts establish the configuration for the test_BDIAProductGDB script, which is the core of the QC Suite.

update_test_config
active_config
config_PROCESS01_automated
config_PROCESS01_manual
set_active_config

LIBRARIES

These scripts provide additional functionality that is called from with the test_BDIAProductGDB script.

bb_unittest_fixture
bbcov_structure
BC_XmlWriter
file_folder
search_and_replace
unittst_fixture

validate_BB_DB
validate_BB_GDB
xmlrunner_gui

QC SUITE

This is the core script for performing automated QA/QC on the interim and final data deliverables.
test_BDIAProductGDB

OTHER

These scripts perform other functions detailed below:
test_runner—this is the main script that runs all the other QC scripts and imports all the necessary scripts and libraries.
which_build—this determines the current build and passes information to the configuration scripts.

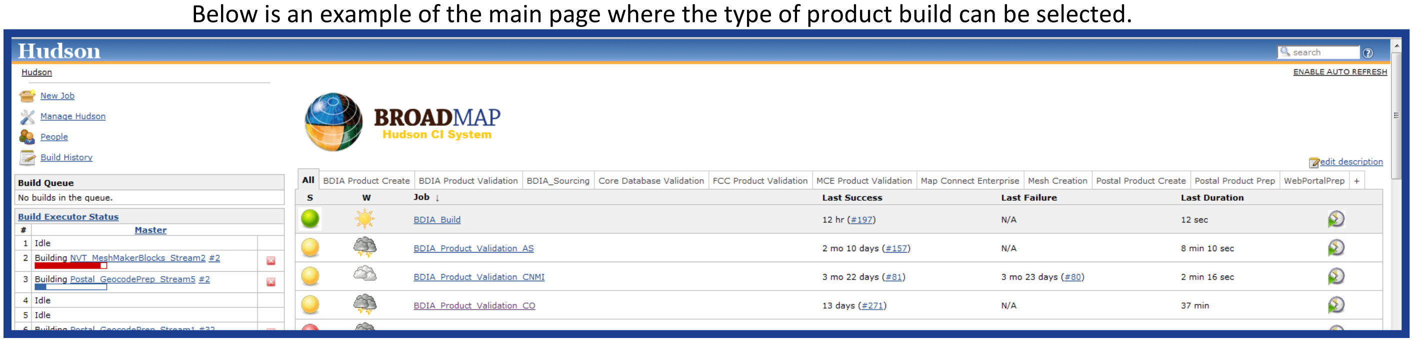
PROCESS OPERATION AND MONITORING

Product Extract, makeDeliverable.py and bdia2ntia.py, is run within BroadMap using a platform called Hudson that has been enhanced to support BDIA product extraction, process monitoring, as well as product validation. The same platform can be planned for implementation for the State, if desired.

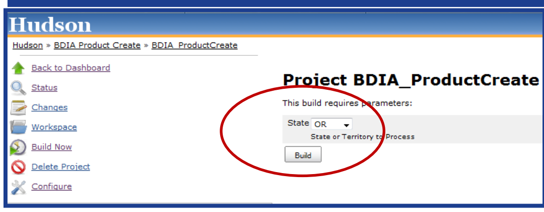
Below are examples of the product create, product validation, product statistics and monitoring processes that are managed within the BroadMap Hudson CI-System. All of the **abovementioned Python scripts**, with the exception of metadata transactions script, are run via this system.

BDIA PRODUCT CREATE

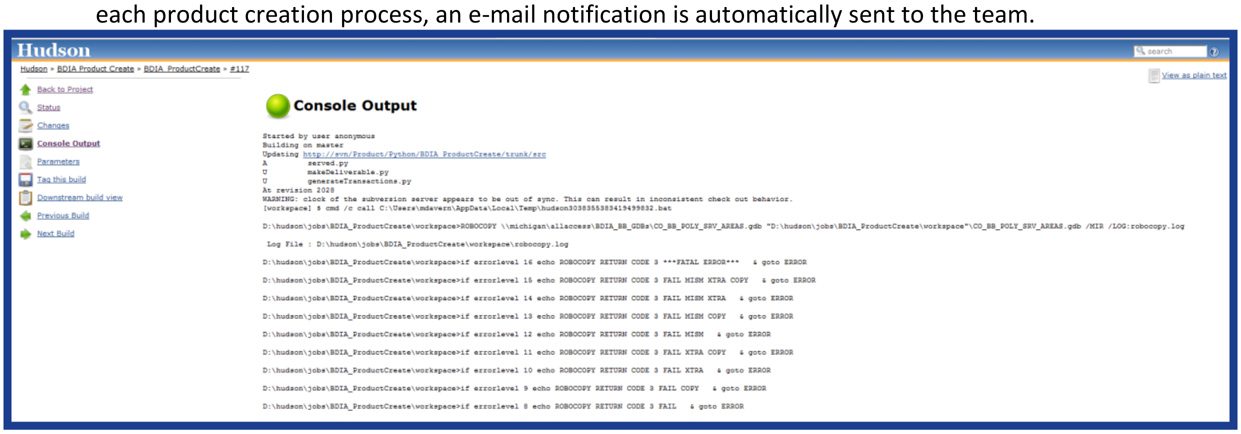
Below is an example of the main page where the type of product build can be selected.



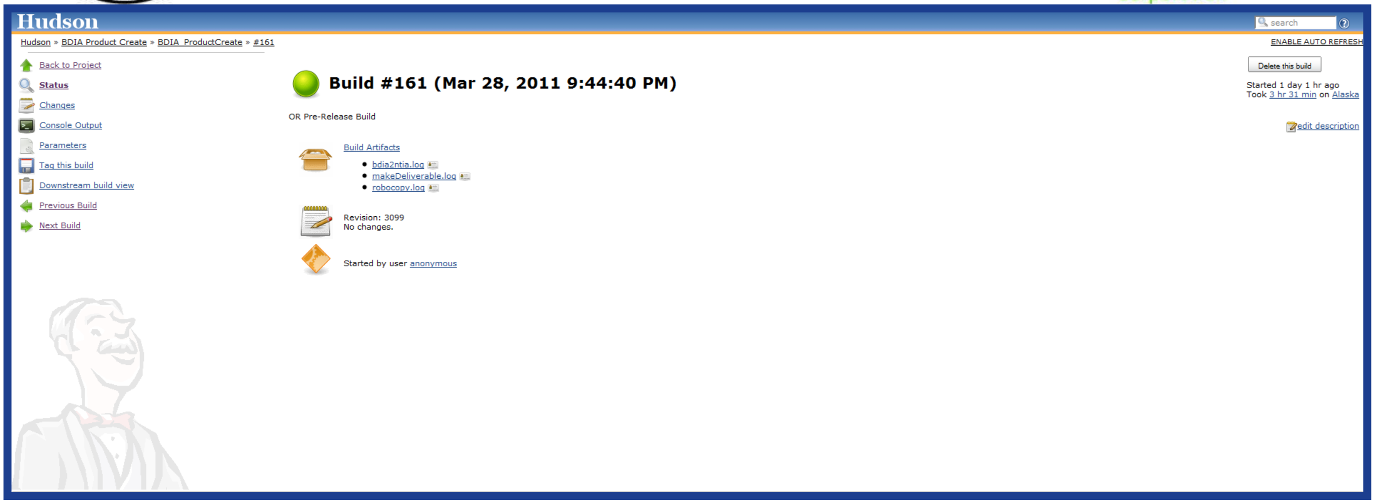
Selecting based on the type of process that will be initiated is shown below:



The Console Output can be reviewed to see the progress of product create. Following the completion of each product creation process, an e-mail notification is automatically sent to the team.



All processes run via the BroadMap Hudson CI-System are stored for historical reporting. Each process can be reviewed, including the Console Output and Build Artifacts from that run.

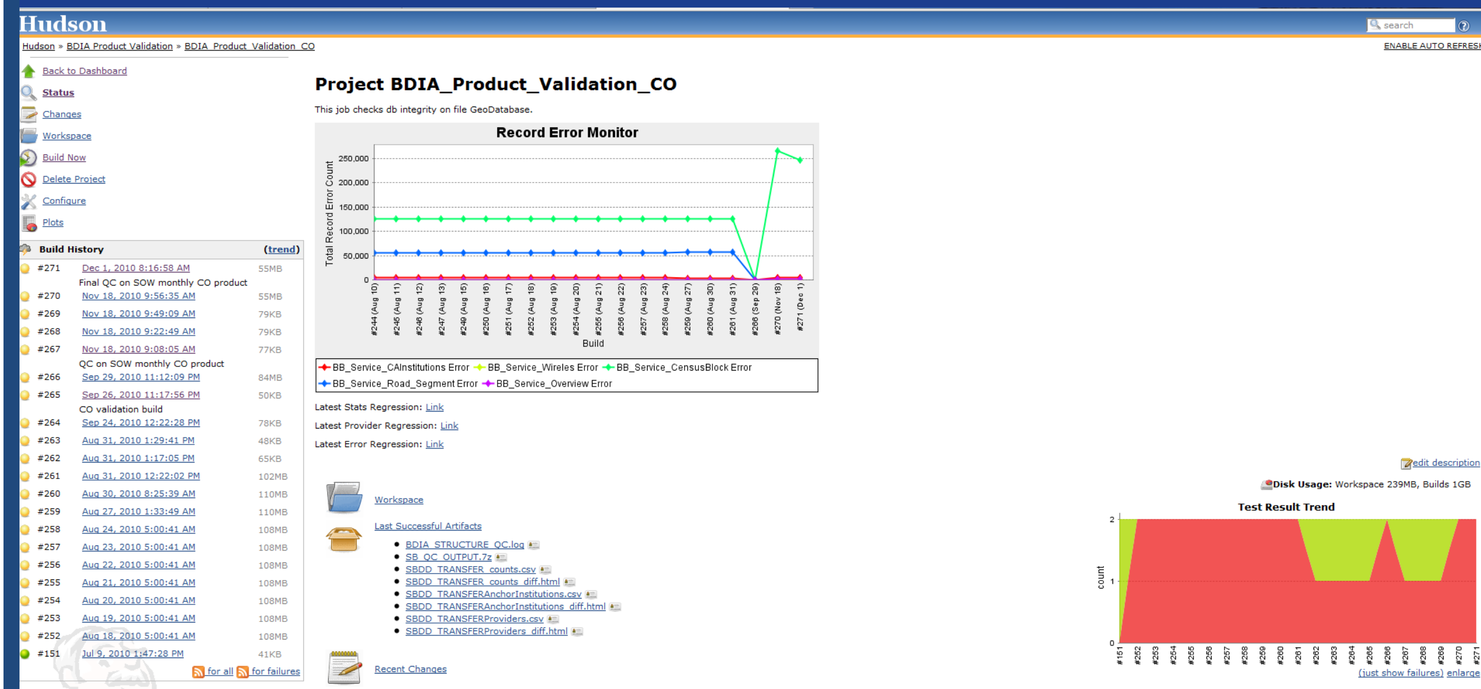

Hudson
Hudson » BDIA Product Create » BDIA_ProductCreate » #161
ENABLE AUTO REFRESH
Back to Project
Status
Changes
Console Output
Parameters
Tag this build
Downstream build view
Previous Build
Next Build
Build #161 (Mar 28, 2011 9:44:40 PM)
OR Pre-Release Build
Delete this build
Started 1 day 1 hr ago
Took 3 hr 31 min on Alaska
edit description
Build Artifacts
bdia2ntia.log
makeDeliverable.log
robocopy.log
Revision: 3099
No changes.
Started by user anonymous

PRODUCT VALIDATION AND STATISTICS

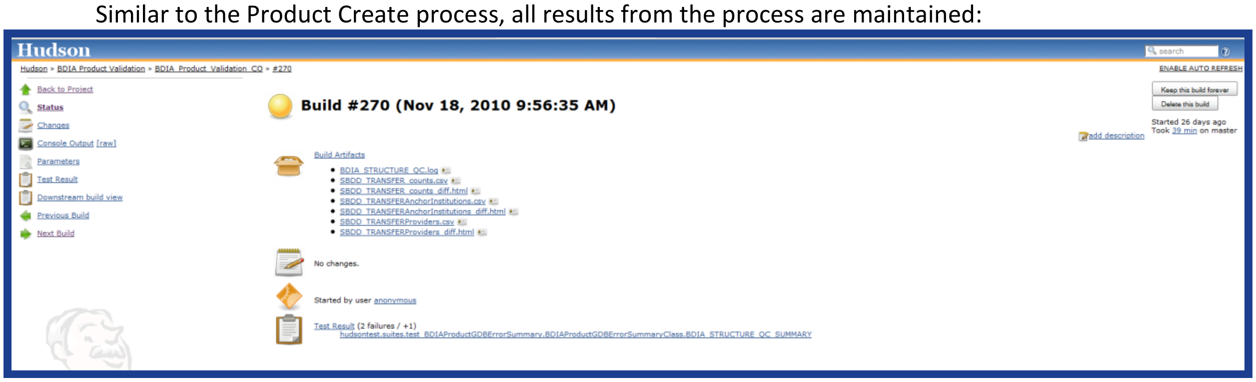
Once the product creation process is complete, Product Validation and Statistics are then initiated. These support the BDIA_ReleaseNotesStats.py script and the BDIA_QC_SUITES scripts detailed above.

All statistics and reports are stored for historical review with the capability to place violation criticality on each quality control check, allowing the identification of errors because of project status/completeness verses project correctness. Example: Typical Speeds populated.

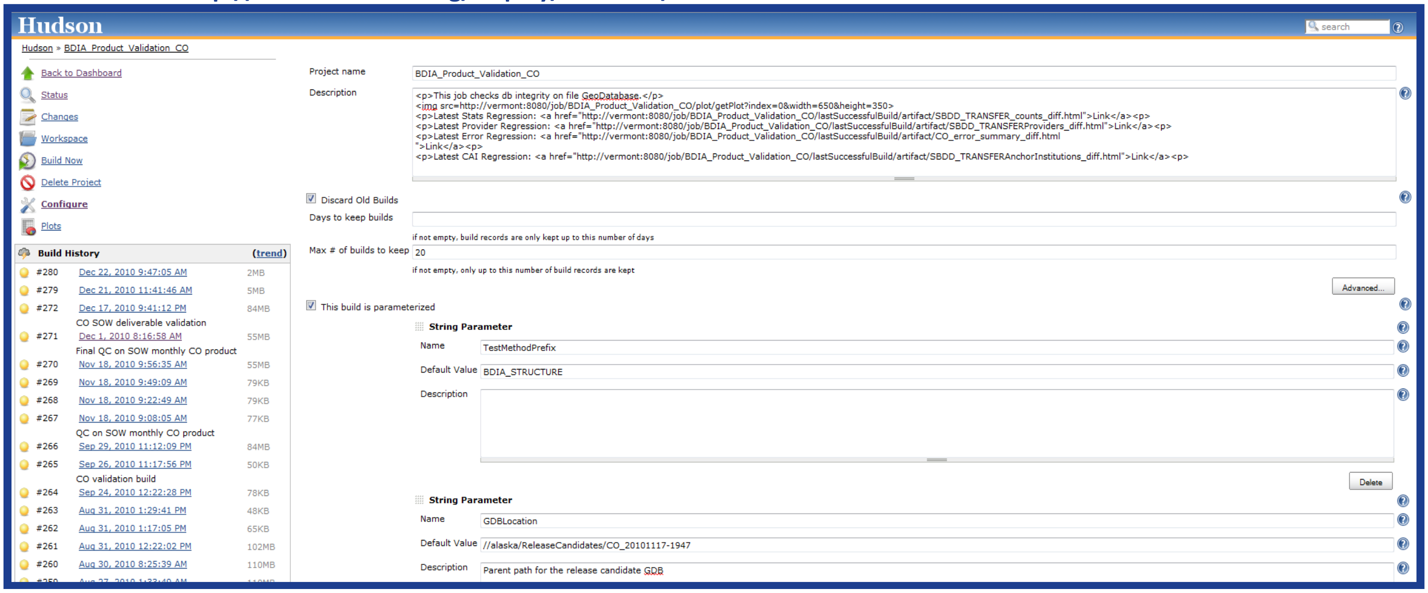
Below is an example of the report provided based on various control points running over a specified period:



Similar to the Product Create process, all results from the process are maintained:



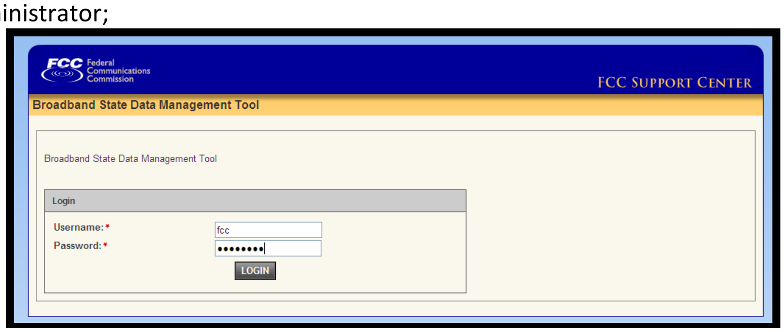
Results are then reviewed manually to ensure no errors reported are critical or in violation of the NTIA data model or project completion statements. Any errors of concern are communicated ahead of product delivery and included within the product release notes. Further detail on the Hudson-CI System environment can be found by navigating to the following link:
http://wiki.hudson-ci.org/display/HUDSON/Meet+Hudson



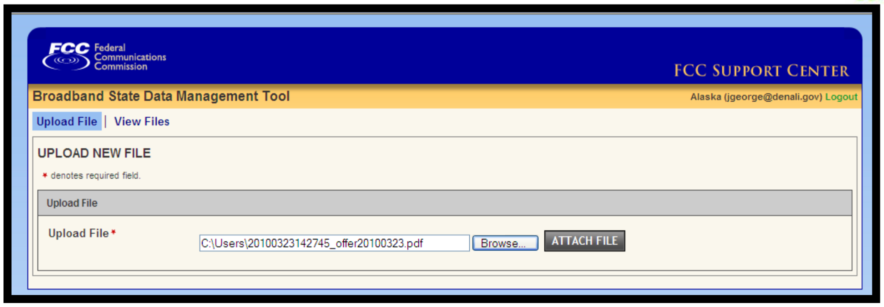
PRODUCT EXTRACT DATA DELIVERY

Product delivery for MapConnect™ Broadband is handled two ways, depending on client requirements:

1) State Submittal:
   a. Data is submitted via SFTP site;
   b. Product Release Notes and QC Test Report accompany the delivery.
2) NTIA Submittal:
   a. Directions for using the NTIA State Broadband Data file submission tool:
      (i.) Go to the following website: **https://esupport.fcc.gov/statedata**;
      (ii.) Enter your **username and password** as provided to you from the NTIA program administrator;



      (iii.) Click in **Upload a file** field;
      (iv.) Browse to local file for submission using the **Browse** button. Select file, then select **ATTACH FILE**. See example below.



(v.) **Logout/Receipt** using the **Logout** button in the top right of the screen;
(vi.) A receipt of submission is e-mailed to username e-mail address.

Data Processing Methods

Primary Data Collection

The California Public Utilities Commission (CPUC) sent out a Data Request to broadband providers to initiate the Round 4 data collection. Potential providers were widely encouraged to submit broadband service availability data to the CPUC. We expressed our preference for providers to use a file geodatabase format when possible while tabular data was also accepted. Data submittal instructions were posted to assist providers with the process, template files, sample shapefiles and record formats on the CPUC Broadband Mapping Website at:

http://www.cpuc.ca.gov/PUC/Telco/Information+for+providing+service/BroadBand+Mapping.htm

The data submittal instructions guide each provider to wireless and/or wireline datasets which are separated into sections for those with GIS data (shapefiles/FGDB) and those without GIS data (text/excel files). For providers with GIS capabilities, statewide census block and TIGER/Line shapefiles were provided on the CPUC website for download and use for their data submission. The square mileage of each block was calculated in advance in the sample census block shapefile. Providers could then easily determine which blocks in their footprint were less than two square miles and which were two square miles or greater and therefore needed to be represented using the road segment shapefile. For providers without GIS capabilities, excel spreadsheets were provided incorporating record field formats adhering to the NOFA data submittal requirements.

Community Anchor Institutions (CAI)

CAI data initially came from the eligible entries of California Teleconnect Fund (CTF) program. The CTF program provides 50% discounts on telecommunications bills for qualifying schools, libraries, government-owned and operated hospitals and health clinics, and other community based organizations, thus providing a good initial list of CAIs. The CAI addresses were geocoded to point locations and loaded into the file geodatabase. Technology of transmission and speeds data were included and identified either through information received from the Institutions themselves (as in the case of libraries) or from those service providers who responded to our request for such information. To provide CAI ID information (as in the case of schools), the California Department of Education search engine website (http://www.cde.ca.gov/re/sd/) was utilized.

Provider Participation

A total of 71 providers participated in Round 4 data collection. These providers comprise over 99.9% of the total broadband connections in California reported to the FCC on form 477, which constitutes a very complete set of data

CPUC Initial Data Verification

After obtaining files submitted by the providers, a data inventory spreadsheet was used to reflect the assigned GIS team member and record count. Each file was reviewed against the GIS data model posted in the SBDD Network website to see if mandatory fields were filled in, and each field was checked for the appropriate range of values. Where possible, team members loaded the submitted data into the corresponding geodatabase table to make certain that appropriate field headers were used and that each field contained the correct data type. When data was found to be missing or incorrect, the provider was contacted and the issue was documented in a separate provider spreadsheet. Some providers submitted nearly perfect data sets while others gave incomplete, unexpected, or incorrect data. New information, correspondence with the providers, and fixes made by the CPUC were also documented in each provider spreadsheet.

Chico GIC Geoprocessing

After the initial CPUC review, data was transferred to the Geographical Information Center (GIC) at CSU Chico for geocoding, geomatching, propagation of wireless service by antenna, and validation of geographic data. In those cases where the CPUC had received street address level data from broadband providers, such addresses were assigned a point location, (geocoded) and then geomatched to census blocks and street segments.

Providers who offer wireless service but could not submit a shapefile or geographic representation of their service area gave tabular antenna information. Wireless antenna parameters were used to model a service area and shapefiles were created for each provider. The wireless propagation model is based on the Longley-Rice, Irregular Terrain propagation model. Individual unit specifications are used to measure performance based on frequency, transmit power, receiver sensitivity, antenna gain, and height. Signal coverage patterns are produced for each individual unit taking into account terrain and vegetation features that may hinder signal dispersion.

CPUC Final Data Verification

The resulting datasets were delivered from Chico to the CPUC in the SBDD transfer model geodatabase for final review and verification. Data sets were checked again and reviewed for unexpected changes resulting from the geocoding /geomatching process. Geoprocessed data was visually reviewed using ArcGIS to verify service area footprints, and the SBDD check submission Python script was run on each dataset to identify unexpected values.

Deliverable Data

The final dataset is delivered to the NTIA/FCC in file geodatabase format with the following feature classes:

BB_ConnectionPoint_LastMile – not required per Clarification to the NOFA.

BB_ConnectionPoint_MiddleMile – Point between the local "last mile" network and the middle mile network which goes on to connect to the internet backbone. This is a confidential dataset.

BB_Service_Address – not included per the CPUC NDA.

BB_Service_CAInstitutions – Community Anchor Institutions: points geocoded from address lists

BB_Service_CensusBlock – Broadband availability polygons for areas less than 2 square miles

BB_Service_Overview – Service overview by County including Subscriber Weighted Nominal Speed

BB_Service_RoadSegment – Broadband availability line segments for areas 2 square miles and greater

BB_Service_Wireless – Wireless service area polygons.

Planned Validation Methods

The following validation methods will be conducted on Round 4 data. Detailed maps showing submitted service area footprints and areas that could not be validated will be distributed to each provider for feedback.

FCC Form 477

FCC Form 477 collects information about broadband connections to end user locations, wired and wireless local telephone services, and interconnected Voice over Internet Protocol (VoIP) services, in individual states, at the Census Tract level. A shape file was created for each provider reflecting the presumed availability of broadband service at each census tract where the provider reported customers to their fixed broadband service. These layers were used to cross reference ISP data submissions to the CPUC.

ID Insight, BroadBand Scout

BroadBand Scout is a third party comprehensive and unbiased data specifically designed to show the carriers, connectivity, speed and usage details of the national broadband landscape. ID Insight's patent-pending process analyzes hundreds of millions of internet transactions that link a consumer's physical address to their internet carrier. BroadBand Scout data is provided as tabular point locations and geomatched to the census block level where less the two square miles in area and to the street segment level where census blocks are greater than two square miles in area. A shape file was created for each provider reflecting the presumed availability of broadband service at each census block or street segment where Broadband Scout reported online customer transactions. These layers were used to cross reference ISP data submissions to the CPUC.

TeleAtlas Wire Center

The Wire Center Premium product is a comprehensive database for mapping and analyzing wire center service areas. It forms the backbone of the Tele Atlas® Telecommunication Products line. This product lists every Local Exchange Carrier (LEC) landline wire center in the United States. The term "wire center" refers to the location where the telephone company terminates the local lines; this is usually the same location as a central office, although a wire center might house one or more central offices. Buffers were created at 12,000 feet and 18,000 feet from provided Wire Center point datasets to cross reference ISP data submissions to the CPUC.

TeleAtlas Wire Center Region

The Wire Center Premium product is a comprehensive database for mapping and analyzing wire center service areas. It forms the backbone of the Tele Atlas® Telecommunication Products line. This product lists every Local Exchange Carrier (LEC) landline wire center in the United States. The wire center boundary is a representation of the area served by all of the switching equipment housed at that physical location. Wire Center Region polygon GIS layers were provided and used for cross referencing ISP data submissions to the CPUC.

FCC Consumer Broadband Test (Non-Mobile App)

The FCC offers an Online Consumer Broadband Test. FCC's Online Consumer Broadband Test collects information regarding the location of the client, the engine used to provide the speed test, download speed, upload speed, latency, jitter, packet loss, minimum round trip time, maximum round trip time, and average round trip time at a specified point location. A shape file was created to represent each location at which speed tests were performed based on geocoded address records. All point locations were then geomatched to the census block level where less the two square miles in area and to street segment level where census blocks are greater than two square miles in area. These layers were used to cross reference ISP data submissions to the CPUC where sub-broadband speeds were reported and/or where there were no tests performed.

FCC Consumer Broadband Test (Mobile App)

The FCC offers a Mobile Consumer Broadband Test for the Apple iPhone and Android mobile platforms. The official name of the App is the **FCC Broadband Test**. This tool can be downloaded to an Apple or Android enabled device by accessing the App Store or App Market on a handheld phone. FCC's Mobile Consumer Broadband Test collects information regarding the location of the client, the client's operating system, the engine used to provide the speed test (always OOKLA for mobile tests), download speed, upload speed, and latency, at a specified point location. A shape file was created to represent each location at which speed tests were performed based on latitude and longitude coordinate pairs. All point locations were then geoprocessed to the census block level where less the two square miles in area and to street segment level where census blocks are greater than two square miles in area. These layers were used to cross reference ISP data submissions to the CPUC where sub-broadband speeds were reported and/or where there were no tests performed.

FCC Broadband Dead Zone Reporting Form

The FCC offers a Broadband Dead Zone Reporting Form for recording address or city level queries against the National Broadband Map, that failed to return any providers at the specified location, or alternately, where a user may know that no service is provided at a specific address. FCC's Broadband Dead Zone Form collects information regarding the location of the client, whether the client has internet access at their home, what type of internet access the client has at their home, and whether or not the client would be interested in purchasing broadband internet if service options were available. A shape file was created to represent each location for which dead zone forms were filled out based on geocoded address records. All point locations were then geomatched to the census block level, where less than two square miles in area, and to street segment level, where census blocks are greater than two square miles in area. These layers were then used to cross reference ISP data submissions to the CPUC where dead zones and/or no services provided were reported.

California State Map Broadband Service Survey Feedback

The CPUC offers the Broadband Service Survey within its interactive map. The survey records user feedback based on address, city, or zip code level queries against the State's Broadband Availability. It collects information regarding the location of the client, whether the client is accessing the internet from their home, place of business, or any other location, whether or not the client purchases broadband service, and if not, why they choose not to purchase broadband service. A shape file based on geocoded address records was created to represent each location for which service surveys were submitted where the respondent indicated non-subscription because of no broadband availability. All such point locations were then geomatched to the census block level, where less than two square miles in area and to the street segment level, where census blocks are greater than two square miles in area. These layers were then used to cross reference ISP data submissions to the CPUC

Chico GIC Data Validation Processes

Each individual provider's submitted and/or created data was validated independently to all applicable validation methods. The following fields were added to each individual provider's data tables, where appropriate; FCC_477 (FCC Form 477), BBSCOUT (ID Insight BroadBand Scout), TA_WC_REG (TeleAtlas Wire Center Region), WC_VAL_12K (TeleAtlas Wire Center 12,000 foot buffer), WC_VAL_18K (TeleAtlas Wire Center 18,000 foot buffer), VAL12k_18k (TeleAtlas Wire Center 12,000 to 18,000 foot buffer ring), DEGRAD_FT (TeleAtlas Wire Center distance), (FCC_TST) FCC Consumer Broadband Test Non-Mobile App, (FCC_MOBL) FCC Consumer Broadband Test Mobile App, (FCC_DZ) FCC Broadband Dead Zone Reporting Form, and (CA_SRVY) State Map Broadband Service Survey Feedback to record validation results and to allow symbology of discrepancies based on validation methods for further interaction with each provider to refine their data submissions. The final step was a summary statistics report of all validation results for all submitted providers. Summary statistics include validity counts and percentages for all validation methods, specific to provider and technology.

Wireline Census Block Validation

A spatial selection was performed on Census Block data, either submitted by provider, or created from submitted address records through a geocoding/spatial selection process, to derive only those blocks which intersect polygons in a given validation layer. Counts are recorded as number of unique blocks which share geographic area with any given validation layer, compared to the total number of unique blocks submitted by, or created for, a given provider. Percentages are recorded as percentage of the total number of unique blocks which share geographic area with any given validation layer, compared to the total number of unique blocks submitted by, or created for, a given provider.

Wireline Street Segment Validation

A spatial selection was performed on Street Segment data, either submitted by provider, or created from submitted address records through a geocoding/spatial selection process, to derive only those segments which intersect polygons in a given validation layer. Counts are recorded as number of unique segments which share geographic area with any given validation layer, compared to the total number of unique segments submitted by, or created for, a given provider. Percentages are recorded as percentage of the total number of unique blocks which share geographic area with any given validation layer, compared to the total number of unique segments submitted by, or created for, a given provider.

Wireless Validation

A spatial selection was performed on Wireless Availability data, either submitted by provider, or created from antenna location and specification information, to select only those polygons which intersect a given validation layer. Results are recorded as a percentage of the total geographic area of wireless coverage sharing geographic area with any given validation layer, compared to the total coverage area submitted by, or created for, a given provider.

Colorado Broadband Data & Development Program
October 1, 2011 Data Delivery Report

For details about the Colorado Broadband Data and Development Program (CBDDP), please see our web site at www.colorado.gov/oit/broadband or visit the National Broadband Map at www.broadbandmap.gov. The Colorado interactive broadband map is available at http://maps.co.gov/ColoradoBroadband.

Purpose of this Report

This report provides details about the data set delivered to the NTIA on October 1, 2011 to support the National Broadband Map and to meet the requirements of the State Broadband Data and Development Program grant to the Governor's Office of Information Technology (OIT). The report describes the various processes used to verify this data set and the results of those processes. It also describes, in general terms, how the CBDDP collects and validates information about broadband availability in the State of Colorado.

Status of Data Collection

The Colorado Broadband Data and Development Program has continued the data collection effort begun with a third party contractor through a data collection contract signed on March 22, 2010. The contractor has collected data from almost all service providers of significant size, but effort will continue to capture data from those not yet reporting.

The following table categorizes all possible broadband service providers in Colorado known to the CBDDP, and indicates the status of their participation in the program. The table also shows progress made over the first four data deliveries to the National Telephone and Information Administration (NTIA). See the Data Delivery Report at the end of this document for more details on the data.

Service Providers	**May 21, 2010**	**October 1, 2010**	**April 1, 2011**	**October 1, 2011**
Identified	102	158	161	161
Duplicates	0	14	14	14
Not a BB Provider	15	24	29	31
Working Universe of SP's	87	120	118	116
Multiple Contact Efforts, Have Chosen Not to Participate So Far, May Not Be a Provider	5	17	50	46
Data Sets Delivered to NTIA	39	59	65*	71**
Broadband Provider Status Not Yet Known	43	44	0	0

* Data Received but Not Included in Data Set: 1 Provider that Missed the Cutoff, and 2 Satellite Providers that Report They Cover the Entire State
** Data Received but Not Included in Data Set: 2 Providers that Missed the Cutoff, and 2 Satellite Providers that Report They Cover the Entire State

The following table describes how many service providers updated their data between the prior and current data delivery. Three dataset were also removed the previous delivery: 1) Alltel Wireless-was acquired by AT & T, 2) Big Sandy Telecom, Inc. speeds did not meet broadband requirements and 3) Town of Timnath stopped providing broadband service.

Service Provider Updates	October 1, 2011
New in Data Set	1
Updated Data	26
Responded "No Data Change"	43
Data Sets Delivered to NTIA	63

The following table shows the number of community anchor institutions that have been identified in the state, and how many CAIs for which some broadband information has been collected and included in this data set. In addition, the "Includes Speed Tests" column shows how much of the data in the "Collected" column are actual speed tests.

The CBDDP is very pleased with the progress that has been made in promoting speed tests among reporting CAIs. As shown below, 44%, or 1,662 of 3,768, of the data collected for CAI's is from speed tests. The CBDDP has not significantly expanded the number of CAIs submitting speed test information between April 2011 and this delivery. However, with the hiring of new GIS staff within OIT, we expect to make a more concerted effort to collect additional CAI information or update the data collected last year.

Community Anchor Institutions	October 1, 2011		
	Identified	Collected	Includes Speed Test
Cat. 1 - School K -12	2109	1987	974
Cat. 2 - Library	252	241	14
Cat. 3 - Medical/Healthcare	709	346	143
Cat. 4 - Public Safety	1779	673	305
Cat. 5 - University/College	55	44	42

Cat. 6 - Other Government	601	315	179
Cat. 7 - Other non-Government	10	7	6
	5515	**3613**	**1663**

Validation and Verification Processes for the April 2011 Data Set

1. **Automated Validation**. The CBDDP has been developing and improving automated validation scripts since its first data delivery in May 2010. The CBDDP runs both the scripts it has developed as well as the script provided by the NTIA on a monthly basis. The data delivery includes proof that the data passed the NTIA validation script as required.

In addition to testing all of the issues covered by the NTIA script, the CBDDP's automated script:

- Verifies that the Geodatabase has metadata, is in the correct projection, and that the feature classes are properly named
- Verifies all columns are properly named and defined
- Verifies all table value domains are adhered to
- Captures the required information to accurately complete the Records Count and Provider Table tabs for the SDBB Data Package
- Cross references and creates statistical tables of technology type and valid speed combinations for both Service Provider and CAI data
- Compares FRNs to provider names to ensure consistency across the data set
- Ensures consistency in provider names
- Identifies possible duplicates among CAIs
- Tests all feature classes to ensure they are within the State's boundaries
- Creates a statistical table for all features classes including records details, service provider information and attribution frequencies
- Ensures the data model, business rules and schema are in compliance

2. **Analysis of Changes**. This data delivery uses the 2010 census block geography which is different from the 2000 geography used for the April 1, 2011 data delivery. As a result it is impossible to perform a straight comparison and enumerate changes in census features for each provider between the April 2011 and October 2011 deliveries. However, to obtain a rough assessment of the providers that may have submitted significant changes to their data, the CBDDP first calculated the increase in the number of census blocks from 2000 to 2010 (29.5%). There was also a decrease in the number of blocks greater than two square miles that had provider provider data in them (-32.7%). If a provider's census block coverage increased by more than 31%, it become a higher priority provider to scrutinize. In these cases, CBDDP staff looked closely at the data, visually inspecting all of the blocks in the provider's data set to

determine if there were any apparently erroneous changes. No significant corrections to the resulting data were necessary as a result of this process.

3. **Visual review**.
The CBDDP also routinely reviews the coverage areas for new service providers and those with changes to their coverage areas as part of preparing data for delivery. We found no unusual coverage areas.

4. **Third Party Data Validation.** For the October 1, 2011 data delivery, OIT has compared 100% of the service provider coverage areas to third party data sets. These data sets include American Roamer, ComSearch, Pitney Bowes, MediaPrints, and SpectrumView. In 21 instances, multiple third party data sets were used to validate a single service provider/technology type combination. The CBDDP records comments about coverage areas, geometry and attribution provided for the technology type and assigns a categorical assessment of the match between the CBDDP data and the third party data. This assessment is necessarily subjective because the third party data sets are sometimes very crude in their spatial resolution so it is difficult to make precise comparisons.

5. **Feedback loop**. The CBDDP provides all service providers the opportunity to review the final geospatial representation of their data as a routine part of the work flow. In addition, when updates to data were solicited, providers were questioned as to the accuracy of the geospatial display of their coverage areas.

6. **Speed Test Analysis**. There are several issues to consider when comparing speed test data to service provider advertized maximum speeds. Many speed tests do not collect the name of the service provider being tested. In areas where more than one service provider offers varying maximum service speeds, it is not possible to know who is providing the service to the CAI. Also, even if a speed test result is directly tied to a certain service provider, it is unknown if the customer has chosen to purchase the maximum available speed offered by the service provider.

The speed test information that the CBDDP collects from CAIs requests the name of the service provider, but of the 1,662 speed tests collected from CAIs only 1048 of those tests specifically identified the service provider. In the past, the CBDDP used only the tests that included provider information, but for this delivery, we used all of the speed tests. We think this gives a more comprehensive perspective of the comparison between the speeds at each institution and the potential advertised service in their area. Service providers report data by speed test tier, and the following table compares how the speed tier for the CAI speed test compares to the maximum advertized speed tier provided by the service provider. A similar test also compared the CAI tests to the minimum advertised speed for among all of the providers that reported service in that area, and the table with those results are below as well.

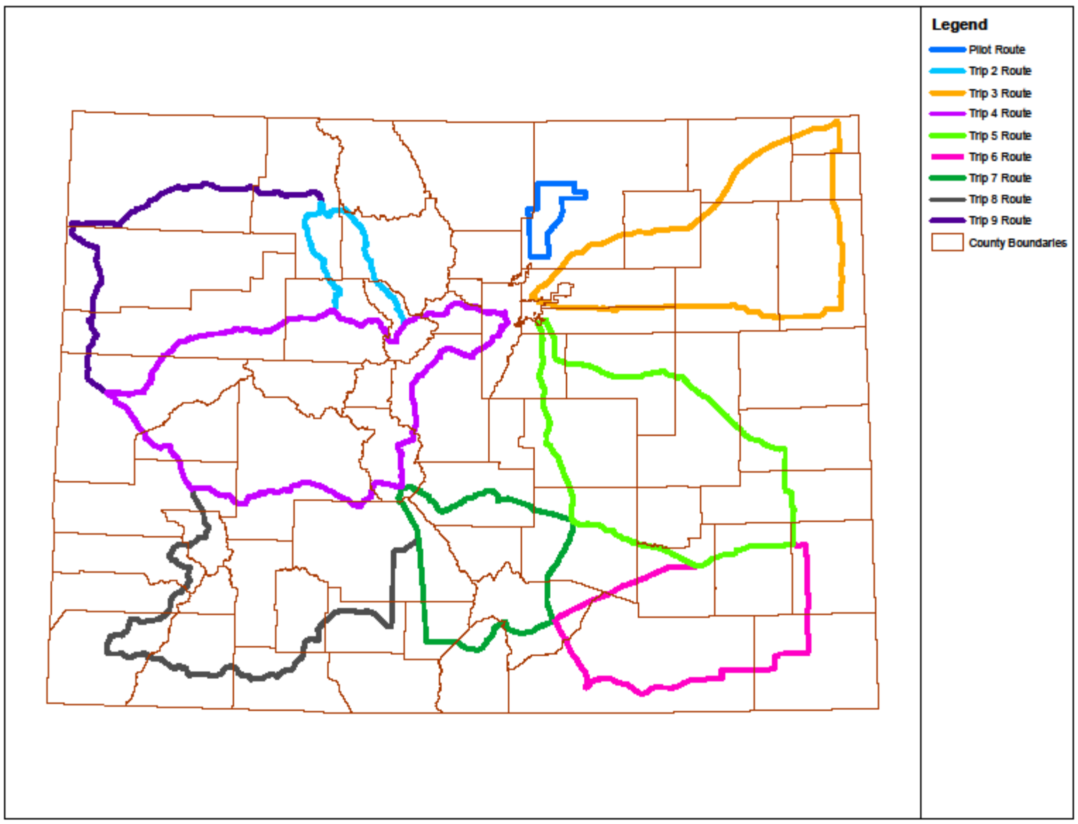
CAI Speed Test Compared to Maximum Download speed by Census Block.																
	Speed Test Slower							Same Tier	Speed Test Faster							Total Tests
Number of Speed Tiers Slower or Faster	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	
School K - 12	2	1	23	51	117	118	277	249	78	35	17	6				974
Library		3	1			3	3	3		1						14
Healthcare		7	7	21	25	19	28	22	9	4						142
Public Safety		1	8	31	64	61	44	79	12	5						305
University, college		1		1	5	1	5	13	6	3	4	3				42
Other Government		1	4	18	25	24	25	47	28	3	4					179
Other Non-Government				1	1	3		1								6
Totals	**2**	**14**	**43**	**123**	**237**	**229**	**382**	**414**	**133**	**51**	**25**	**9**				**1662**
Totals	**1030**							**414**	**218**							**1662**

CAI Speed Test Compared to Minimum Download speed by Census Block.																
	Speed Test Slower							Same Tier	Speed Test Faster							Total Tests
Number of Speed Tiers Slower or Faster	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	
School K - 12			2	14	44	76	104	209	149	185	156	22	9	4		974
Library				1	2	4	2	4				1				14
Healthcare			3	6	18	20	36	24	15	10	5	3	1	1		142
Public Safety			3	10	28	42	47	94	35	22	14	10				305
University, college						1	4	4	4	5	11	4	6	2	1	42
Other Government			1	11	17	19	29	42	32	8	13	7				179
Other Non-Government				1	1	1	2	1								6
Totals			**9**	**43**	**110**	**163**	**224**	**378**	**235**	**230**	**199**	**47**	**16**	**7**	**1**	**1662**
Totals	**549**							**378**	**735**							**1662**

7. Drive Testing Mobile Coverage Areas. The CBDDP tested the mobile wireless coverage areas reported by the service providers. The CBDDP has completed drive testing for over 5,000 miles of roads.

This testing followed a test scheme that started with primary test points along major highways followed by secondary points from one half to one mile away from the primary point to confirm the result of the primary point. Up to four additional secondary points farther from the primary points were then tested or until at least two tests fail with test speeds of less than 768 Kbps. The primary points were generally 10 to 15 miles apart, and the derived points were clustered around the primary points within 2 to 3 miles. The tests all used commercially available wireless air cards, identical laptops, and the same FCC speed test site. The tests checked only the major national mobile providers and were all performed between March and May of 2011.

The following graphic is a general depiction of the routes used for the drive testing.



The following table presents the results of drive testing completed. The number of test results shown for each provider reflect only the test points that fell within the coverage area provided by that service provider to the CBDDP. In addition, some providers had overlapping areas of mobile coverage with differing speed tier information. All of these overlapping areas were included in the comparison for each point that fell in those areas. For example, if at a specific point a provider had four different overlapping regions each with its own speed tier, the test point there was compared to each one, and the results added to the total for the appropriate tier difference and a increased the total number of tests by four for that provider.

MOBILE WIRLESS COVERAGE TESTING									
All Points Tested Including Primary and Secondary									
Combined Result for Three Providers Tested									
	Tiers Slower				Same Tier	Tiers Faster			Total Tests
Number of Speed Tiers Slower or Faster	< 768 Kbps	-3	-2	-1	0	1	2	3	
	302		60	29	111	14	1		517
Totals	391				111	15			517
ATT									
	Tiers Slower				Same Tier		Tiers Faster		Total
Number of Speed Tiers Slower or Faster	< 768 Kbps	-3	-2	-1	0	1	2	3	
	79			**29**	**11**				**119**
Totals	**108**				**11**	**0**			**119**
Sprint									
			Tiers Slower		Same Tier		Tiers Faster		Total
Number of Speed Tiers Slower or Faster	< 768 Kbps	-3	-2	-1	0	1	2	3	
	85		**1**		**100**	**14**	**1**		**201**
Totals	**86**				**100**	**15**			**201**
Verizon									
			Tiers Slower		Same Tier		Tiers Faster		Total
Number of Speed Tiers Slower or Faster	< 768 Kbps	-3	-2	-1	0	1	2	3	
	138		**59**						**197**
Totals	**197**				**0**	**0**			**197**

Planned Data Verification and Analysis

The CBDDP has prepared a survey for residences and businesses querying them about their broadband availability and their use of broadband. The survey process has collected over 150 responses in the southwest portion of the state, which met the sample requirements for that region as defined by the CBDDP Quality Assurance specialist. The survey is also under way in the northeast, southeast and central southern areas of Colorado as well.

The CBDDP is currently analyzing the data from the southwestern region survey responses. Similar to the data verification shown above, these results will provide sense of the actual speeds in use or available to residents and businesses across the state. The CBDDP expects to represent these results to the broadband service providers as a feedback and potential data improvement process for future data deliveries.

Summary of Process

The CBBDP follows a data collection process outlined on the National Broadband Map in the "Technical Overview" of the "About" section at www.broadbandmap.gov. If you would like a more detailed, procedural description of the process, please contact the CBDDP via email at COBroadband@state.co.us.

The data gathering process begins by contacting the potential broadband providers. Although participation is voluntary, many providers choose to support this effort. The success of this program rests, in part, on that support, and we appreciate their efforts to participate in this program. Broadband providers submit data in a variety of formats, and in a number of cases the CBDDP also conducts technical assistance to support the efforts of smaller providers to participate. For census blocks less than two square miles, the entire census block is presumed to have coverage if any service provider reports broadband anywhere in the census block. For census blocks greater than two square miles, the CBDDP reports service along road segments. Before submitting data to the NTIA, the CBDDP integrates the data from each provider into a single dataset using a data model specified by the NTIA. The NTIA and FCC then integrate the CBDDP's dataset along with those from all other states into the single National Broadband Map dataset.

An earlier section in this report titled "Data Verification and Analysis", describes the specific steps that the CBDDP took, and the results of those steps, to verify the data before transmission to the NTIA.

The CBDDP has implemented the following data collection and ingestion processes which may vary from other state programs.

1. The CBDDP implemented the following process to spatially transform broadband service to census or road geography where the service provider has given the CBDDP address specific information. A 150 foot buffer is drawn around each point. Any census block touched by the buffered area is selected. For census blocks greater than two square miles, any road segment touched by the buffer is selected. The CBDDP has met with the largest service provider in the state that provided address specific data, and they agree that the 150 foot buffer process is reasonable and creates an accurate representation of their service area.

2. Based on clarifications from the NTIA, the CBDDP did not provide any features in the BB_Service_Overview feature class since more granular speed information was provided in the BB_Service_CensusBlock, BB_Service_RoadSegment and BB_Service_Address feature classes.

3. The CBDDP is not currently collecting pricing information.

4. Reference layers include the U.S Census Bureau 2010 census blocks and 2010 Tiger data for roads.

5. The CBDDP made a significant adjustment to the data set starting with the October 2010 data delivery. Very few of Colorado's service providers have reported both their maximum advertized speed and the typical speeds a user might encounter. During an in-person meeting, previous to the October 2010 deliver, Qwest stated their advertised speeds are the typical speeds and there is no potential for degraded service during peak periods of use or distance from central office. Based on this information from the service provider, the CBDDP is using Qwest advertised as typical speed.

5. The CBDDP has created an exception table that will record unusual areas or pockets were coverage may or may not exist. The table will be persistent through provider updates, so these exceptions will not have to be rediscovered with each update.

6. The CBDDP reports wireless towers in the middle mile where they are being used for backhaul. When service providers have submitted central office locations, they are included in the middle mile. Qwest and CenturyLink did not provide such information, and have requested the CBDDP not include publicly available central office locations in the data set.

7. The CBDDP is utilizing a data collection contractor during the first two years of the program. Starting in October 2011 (i.e., for the April 1, 2012 delivery), and through the remainder of the program to October 31, 2014, the CBDDP will bring this process in-house. The CBDDP has worked closely with the contractor, and has developed skills and experience in validating the information and working with the data sets. Consequently, this transition should be seamless.

8. For CAIs, multiple data sources are compared where available. However, speed test data is reported in preference to other types of data such as surveys, reports or speeds for which the CAI is paying.

9. Addresses and names that appear to be duplicates are validated. The CBDDP chooses to report multiple CAIs at the same address as distinct entities. For example, a county sheriff's office and a 911 call center at the same address are reported as two distinct entities.

Data Summary and Feature Class Statistical Tables

Data Summary		
File Summary		
File Type	[redacted]	**Number of Records**
Total Records in all Files	[redacted]	**508522**
Census Block < 2 sq. miles	[redacted]	**392973**
Street Segments	[redacted]	**108607**
Wireless Shape File	[redacted]	**40**
Service Address	[redacted]	**466**
BB Service Overview	[redacted]	**0**
Community Anchor Instituions	[redacted]	**5515**
Middle Mile	[redacted]	**921**
Metadata Provided for Geospatial Data	[redacted]	**Yes**
Provider Information		
File Type	[redacted]	**Number of Records**
Number of ISPs Provided	[redacted]	**63**

Data Delivery Report

Census Blocks < 2 sq. miles

Data Type	Code	Data Element	Count	%
Records Details		Total Records	392973	
		Census Blocks < 2 sq. miles with Broadband	134578	
		Census Blocks < 2 sq. miles in State (with & without broadband)	192101	
		Census Blocks > 2 sq. miles in the State (with & without broadband)	8961	
		Total Census Blocks in the State (with & without broadband)	201062	
Services Provider Details		Number of Distinct Providers	36	
		Number of Distinct "Doing Business As"	34	
		Number of Distinct FRN	35	
Technology	10	Asymmetric xDSL	192540	49.0%
	20	Symmetric xDSL	58679	14.9%
	30	Other Copper Wireless	77033	19.6%
	40	Cable Modem-DOCSIS 3.0	0	0.0%
	41	Cable Modem-Other	61690	15.7%
	50	Optical Carrier/Fiber	3031	0.8%
	60	Satellite	0	0.0%
	70	Terrestrial Fixed Wireless-Unlicensed	0	0.0%
	71	Terrestrial Fixed Wireless-Licensed	0	0.0%
	80	Terrestrial Mobile Wireless	0	0.0%
	90	Electrial Power Line	0	0.0%
	0	Other	0	0.0%
Max. Advertised Download Speed	3	> 768 kps, < 1.5 mbps.	3930	1.0%
	4	> 1.5 mbps, < 3 mbps.	47436	12.1%
	5	> 3 mbps, < 6 mbps.	87395	22.2%
	6	> 6 mbps, < 10 mbps.	127856	32.5%
	7	> 10 mbps, < 25 mbps.	51112	13.0%
	8	> 25 mbps, < 50 mbps.	74228	18.9%
	9	> 50 mbps, < 100 mbps.	40	0.0%

Data Type	Code	Data Element	Count	%
Typical Download Speed	3	>= 768 kbps. < 1.5 mbps.	12784	3.3%
	4	>= 1.5 mbps. < 3 mbps.	46716	11.9%
	5	>= 3 mbps. < 6 mbps.	100977	25.7%
	6	>= 6 mbps. < 10 mbps.	55553	14.1%
	7	>= 10 mbps. < 25 mbps.	32373	8.2%
	8	>= 25 mbps. < 50 mbps.	74168	18.9%
	9	> 50 mbps, < 100 mbps.	0	0.0%
	10	> 100 mbps, < 1 gbps.	0	0.0%
	11	> 1 gbps.	0	0.0%
		ZZ "null"	70402	17.9%
Max. Advertised Upload Speed	2	>200 kps, < 768 kps.	19754	5.0%
	3	>= 768 kbps. < 1.5 mbps.	155787	39.6%
	4	> 1.5 mbps, < 3 mbps.	66471	16.9%
	5	> 3 mbps, < 6 mbps.	85076	21.6%
	6	> 6 mbps, < 10 mbps.	39270	10.0%
	7	> 10 mbps, < 25 mbps.	25485	6.5%
	8	> 25 mbps, < 50 mbps.	114	0.0%
	9	> 50 mbps, < 100 mbps.	40	0.0%
	10	> 100 mbps, < 1 gbps.	941	0.2%
	11	> 1 gbps.	35	0.0%
Typical Upload Speed	2	>200 kps, < 768 kps.	38546	9.8%
	3	> 768 kps, < 1.5 mbps.	71240	18.1%
	4	> 1.5 mbps, < 3 mbps.	74031	18.8%
	5	> 3 mbps, < 6 mbps.	75175	19.1%
	6	> 6 mbps, < 10 mbps.	38206	9.7%
	7	> 10 mbps, < 25 mbps.	25319	6.4%
	8	> 25 mbps, < 50 mbps.	54	0.0%
	9	> 50 mbps, < 100 mbps.	0	0.0%

Data Type	Code	Data Element	Count	%
	10	> 100 mbps, < 1 gbps.	941	0.2%
	11	> 1 gbps.	35	0.0%
Provider Type	1	Provider	392005	99.8%
	2	Reseller	968	0.2%
End User Name	1	Residential	390893	99.5%
	2	Governmental	2080	0.5%

Data Type	Code	Data Element	Count	%
	10	> 100 mbps, < 1 gbps.	0	0.0%
	11	> 1 gbps.	0	0.0%
		ZZ "null"	70402	17.9%

Street Segment

Data Type	Code	Data Element	Count	%
Record Details		Total Records	108607	
Services Provider Details		Number of Distinct Providers	35	
		Number of Distinct "Doing Business As"	33	
		Number of Distinct FRN	34	
Technology	10	Asymmetric xDSL	68760	63.3%
	20	Symmetric xDSL	15188	14.0%
	30	Other Copper Wireless	4592	4.2%
	40	Cable Modem-DOCSIS 3.0	0	0.0%
	41	Cable Modem-Other	16317	15.0%
	50	Optical Carrier/Fiber	3750	3.5%
	60	Satellite	0	0.0%
	70	Terrestrial Fixed Wireless-Unlicensed	0	0.0%
	71	Terrestrial Fixed Wireless-Licensed	0	0.0%
	80	Terrestrial Mobile Wireless	0	0.0%
	90	Electrial Power Line	0	0.0%
	0	Other	0	0.0%
Max. Advertised Download Speed	3	> 768 kps, < 1.5 mbps.	6553	6.0%
	4	> 1.5 mbps, < 3 mbps.	27471	25.3%
	5	> 3 mbps, < 6 mbps.	8480	7.8%
	6	> 6 mbps, < 10 mbps.	20847	19.2%
	7	> 10 mbps, < 25 mbps.	39384	36.3%
	8	> 25 mbps, < 50 mbps.	5870	5.4%

Data Type	Code	Data Element	Count	%
Typical Download Speed	3	> 768 kps, < 1.5 mbps.	7730	7.1%
	4	> 1.5 mbps, < 3 mbps.	26360	24.3%
	5	> 3 mbps, < 6 mbps.	5653	5.2%
	6	> 6 mbps, < 10 mbps.	17685	16.3%
	7	> 10 mbps, < 25 mbps.	13820	12.7%
	8	> 25 mbps, < 50 mbps.	5870	5.4%
	9	> 50 mbps, < 100 mbps.	0	0.0%
	10	> 100 mbps, < 1 gbps.	0	0.0%
	11	> 1 gbps.	0	0.0%
		ZZ "null"	31486	29.0%
Max. Advertised Upload Speed	2	>200 kps, < 768 kps.	21838	20.1%
	3	> 768 kps, < 1.5 mbps.	45409	41.8%
	4	> 1.5 mbps, < 3 mbps.	19812	18.2%
	5	> 3 mbps, < 6 mbps.	6024	5.5%
	6	> 6 mbps, < 10 mbps.	15326	14.1%
	7	> 10 mbps, < 25 mbps.	196	0.2%
	8	> 25 mbps, < 50 mbps.	0	0.0%
	9	> 50 mbps, < 100 mbps.	0	0.0%
	10	> 100 mbps, < 1 gbps.	2	0.0%
	11	> 1 gbps.	0	0.0%
Typical Upload Speed	2	>200 kps, < 768 kps.	22185	20.4%
	3	> 768 kps, < 1.5 mbps.	16702	15.4%
	4	> 1.5 mbps, < 3 mbps.	19612	18.1%

Data Type	Code	Data Element	Count	%
	9	> 50 mbps, < 100 mbps.	0	0.0%
	10	> 100 mbps, < 1 gbps.	2	0.0%
	11	> 1 gbps.	0	0.0%
Provider Type	1	Provider	108584	100.0 %
	2	Reseller	23	0.0%
End User Name	1	Residential	108551	99.9%
	2	Governmental	56	0.1%

Data Type	Code	Data Element	Count	%
	5	> 3 mbps, < 6 mbps.	3235	3.0%
	6	> 6 mbps, < 10 mbps.	15188	14.0%
	7	> 10 mbps, < 25 mbps.	196	0.2%
	8	> 25 mbps, < 50 mbps.	0	0.0%
	9	> 50 mbps, < 100 mbps.	0	0.0%
	10	> 100 mbps, < 1 gbps.	0	0.0%
	11	> 1 gbps.	0	0.0%
		ZZ "null"	31486	29.0%

Wireless

Data Type	Code	Data Element	Count	%
Record Details		Total Records	40	
Services Provider Details		Number of Distinct Providers	31	
		Number of Distinct "Doing Business As"	30	
		Number of Distinct FRN	28	
Technology	10	Asymmetric xDSL	0	0.0%
	20	Symmetric xDSL	0	0.0%
	30	Other Copper Wireless	0	0.0%
	40	Cable Modem-DOCSIS 3.0	0	0.0%
	41	Cable Modem-Other	0	0.0%
	50	Optical Carrier/Fiber	0	0.0%
	60	Satellite	0	0.0%
	70	Terrestrial Fixed Wireless-Unlicensed	13	32.5%
	71	Terrestrial Fixed Wireless-Licensed	13	32.5%
	80	Terrestrial Mobile Wireless	14	35.0%
	90	Electrial Power Line	0	0.0%
	0	Other	0	0.0%
Max. Advertised Download Speed	3	> 768 kps, < 1.5 mbps.	8	20.0%
	4	> 1.5 mbps, < 3 mbps.	9	22.5%
	5	> 3 mbps, < 6 mbps.	16	40.0%
	6	> 6 mbps, < 10 mbps.	7	17.5%

Data Type	Code	Data Element	Count	%
Typical Download Speed	2	>200 kps, < 768 kps.	0	0.0%
	3	> 768 kps, < 1.5 mbps.	8	20.0%
	4	> 1.5 mbps, < 3 mbps.	6	15.0%
	5	> 3 mbps, < 6 mbps.	7	17.5%
	6	> 6 mbps, < 10 mbps.	3	7.5%
	7	> 10 mbps, < 25 mbps.	0	0.0%
	8	> 25 mbps, < 50 mbps.	0	0.0%
	9	> 50 mbps, < 100 mbps.	0	0.0%
	10	> 100 mbps, < 1 gbps.	0	0.0%
		ZZ "null"	16	40.0%
Max. Advertised Upload Speed	2	>200 kps, < 768 kps.	6	15.0%
	3	> 768 kps, < 1.5 mbps.	17	42.5%
	4	> 1.5 mbps, < 3 mbps.	9	22.5%
	5	> 3 mbps, < 6 mbps.	6	15.0%
	6	> 6 mbps, < 10 mbps.	2	5.0%
	7	> 10 mbps, < 25 mbps.	0	0.0%
	8	> 25 mbps, < 50 mbps.	0	0.0%
	9	> 50 mbps, < 100 mbps.	0	0.0%
	10	> 100 mbps, < 1 gbps.	0	0.0%
	11	> 1 gbps.	0	0.0%
al Upl oa d Sp	2	>200 kps, < 768 kps.	3	7.5%

Data Type	Code	Data Element	Count	%
	7	> 10 mbps, < 25 mbps.	0	0.0%
	8	> 25 mbps, < 50 mbps.	0	0.0%
	9	> 50 mbps, < 100 mbps.	0	0.0%
	10	> 100 mbps, < 1 gbps.	0	0.0%
	11	> 1 gbps.	0	0.0%
Spectrum	1	800 Mhz Spectrum Used	2	5.0%
	2	700 Mhz Spectrum Used	5	12.5%
	3	1900 Mhz Spectrum Used	4	10.0%
	4	1700 Mhz Spectrum Used	5	12.5%
	5	2500 Mhz Spectrum Used	4	10.0%
	6	Unlicensed Spectrum Used	18	45.0%
	7	Specialist Mobile Radio Service	2	5.0%
	8	Wireless Communication Service	0	0.0%
	9	Satilite	0	0.0%

Data Type	Code	Data Element	Count	%
	3	> 768 kps, < 1.5 mbps.	16	40.0%
	4	> 1.5 mbps, < 3 mbps.	2	5.0%
	5	> 3 mbps, < 6 mbps.	2	5.0%
	6	> 6 mbps, < 10 mbps.	1	2.5%
	7	> 10 mbps, < 25 mbps.	0	0.0%
	8	> 25 mbps, < 50 mbps.	0	0.0%
	9	> 50 mbps, < 100 mbps.	0	0.0%
	10	> 100 mbps, < 1 gbps.	0	0.0%
		ZZ "null"	16	40.0%

Community Anchor Insititution

Data Type	Code	Data Element	Count	%
Record Details		Total Records	5515	
Anchor Category	1	School-K through 12	2109	38.2%
	2	Library	252	4.6%
	3	Medical/healthcare	709	12.9%
	4	Public safety	1779	32.3%
	5	University, college, other post-secondary	55	1.0%
	6	Other community support-/gov't	601	10.9%
	7	Other community support-non-/gov't	10	0.2%
Technology	10	Asymmetric xDSL	340	6.2%
	20	Symmetric xDSL	6	0.1%
	30	Other Copper Wireless	1591	28.8%
	40	Cable Modem-DOCSIS 3.0	0	0.0%
	41	Cable Modem-Other	133	2.4%
	50	Optical Carrier/Fiber	1248	22.6%
	60	Satellite	14	0.3%

Data Type	Code	Data Element	Count	%
Max. Advertised Upload Speed	1	< 200 kps.	0	0.0%
	2	>200 kps, < 768 kps.	125	2.3%
	3	> 768 kps, < 1.5 mbps.	195	3.5%
	4	> 1.5 mbps, < 3 mbps.	1297	23.5%
	5	> 3 mbps, < 6 mbps.	516	9.4%
	6	> 6 mbps, < 10 mbps.	391	7.1%
	7	> 10 mbps, < 25 mbps.	660	12.0%
	8	> 25 mbps, < 50 mbps.	90	1.6%
	9	> 50 mbps, < 100 mbps.	8	0.1%
	10	> 100 mbps, < 1 gbps.	54	1.0%
	11	> 1 gbps.	70	1.3%
		ZZ "null"	2109	38.2%
Y/N Broadband Service	Y	Yes-Subscribers to Service	3406	61.8%
	N	No-Does Not Subscribers to Service	2109	38.2%
	U	Unknown	0	0.0%

	70	Terrestrial Fixed Wireless-Unlicensed	27	0.5%	Lat/Long Accuracy	1	Lat/Long thT FIls within the State	5515	
	71	Terrestrial Fixed Wireless-Licensed	77	1.4%		2	Total Lat/Long	5515	100%
	80	Terrestrial Mobile Wireless	0	0.0%					
	90	Electrial Power Line	0	0.0%	Anchor Names		Total Count Anchors Names	5515	
	0	Other	0	0.0%			Disticnt Count of Anchor Names	5368	
		ZZ "null"	2109	38.2%					
								Count	BB Info
Max. Advertised Download Speed	1	< 200 kps.	0	0.0%	Community Anchor Institution Category Count with Broadband Information	1	School-K through 12	2109	1950
	2	>200 kps, < 768 kps.	0	0.0%		2	Library	252	209
	3	> 768 kps, < 1.5 mbps.	209	3.8%		3	Medical/healthcare	709	327
	4	> 1.5 mbps, < 3 mbps.	1292	23.4%		4	Public safety	1779	566
	5	> 3 mbps, < 6 mbps.	421	7.6%		5	University, college, other post-secondary	55	43
	6	> 6 mbps, < 10 mbps.	280	5.1%		6	Other community support-/gov't	601	305
	7	> 10 mbps, < 25 mbps.	913	16.6%		7	Other community support-non-/gov't	10	6
	8	> 25 mbps, < 50 mbps.	157	2.8%			Totals	5515	3406
	9	> 50 mbps, < 100 mbps.	10	0.2%					
	10	> 100 mbps, < 1 gbps.	54	1.0%	Public WI IF	1	Y	0	
	11	> 1 gbps.	70	1.3%		2	N	5515	
		ZZ "null"	2109	38.2%					

Middle Mile

Data Type	Code	Data Element	Count	%	Data Type	Code	Data Element	Count	%
Record Details		Total Records	926		Facility Type	1	Fiber	480	51.8%
						2	Copper	5	0.5%
Services Provider Details		Number of Distinct Providers	37			3	Hybrid Fiber Coax (HFC)	1	0.1%
		Number of Distinct "Doing Business As"	33			4	Wireless	440	47.5%
		Number of Distinct FRN	36				N/A "null"	0	0.0%
Ownership	0	Owned	112	12.1%	Lat / Long		# of Lat/Long in State	926	100%
	1	Leased	814	87.9%			Total Lat/Long	926	
Facility Capacity	1	Multiple T1's and less than 40 mbps.	409	44.2%					
	2	Greater than 40 mbps. and less than 150 mbps.	87	9.4%	Elevation		Number of Data Points	425	

3	**Greater than 150 mbps. and less than 600 mbps.**	43	4.6%	**Lowest Elevation**	5
4	**Greater than 600 mbps. and less than 2.4 gbps.**	15	1.6%	**Highest Elevation**	225
5	**Greater than 2.4 gbps. and less than 10 gbps.**	2	0.2%		
6	**Greater than 10 gbps**	370	40.0%		

Services Providers

#	Broadband Services Providers Submitted			Census	Roads	Wireless	Mid Mile
#	FRN	Company Name	Doing Business As				
1	0004311627	Agate Mutual Telephone Cooperative Association	Prairie Networks, LLC	31	214		
2	0004496774	AT&T Inc.	AT&T Corp, Inc.			2	1
3	0014860522	Baja Broadband Holding Company	Baja Broadband Operating Company, LLC	995	138		
4	0003728292	Beulahland Communications, Inc.,	Beulahland Communications, Inc.,			1	1
5	0003754652	Bijou Telephone Co-op Association, Inc.	Bijou Telephone Cooperative Association, Inc.	424	845	1	3
6	0003766201	Blanca Telephone Company	Blanca Telephone Company	2922	3252		
7	0017108747	Brainstorm Internet	Brainstorm Internet			1	
8	0014778781	BySky, Inc.	BySky, Inc.			1	
9	0018626853	CenturyTel, Inc.	CenturyTel, Inc.	9884	30951		2
10	0001621127	City of Glenwood Springs	City of Glenwood Springs, Community Broadband Network	630	37	1	
11	0019898303	Cogent Communications, Inc.	Cogent Communications, Inc.	91			
12	9999	Colorado Mobile Inet, LLC	Colorado Mobile Inet, LLC			1	
13	0002147098	Columbine Telecom Company	FairPoint Communications	252	695		10
14	0004441663	Comcast Cable Communications, LLC	Comcast	46718	2987		
15	0007001977	CSC Holdings, LLC	Bresnan Communications	12117	12123		
16	0001617281	Delta County Tele-comm, Inc.	TDS Telecom	825	753		1
17	0003753753	DIECA Communications, Inc.	Covad Communications Company	126221	4532		3
18	0001629781	Dubois Telephone Exchange, Inc.,	DTE	62	153		3
19	0013339973	Eagle Communications, Inc.	Eagle Cable TV And Internet	237	29		1
20	0004317731	Eastern Slope Rural Telephone Association, Inc.	Eastern Slope Rural Telephone Association, Inc.	1998	6511		12
21	0003767852	Eschelon Telecom of Colorado, Inc.	Integra Telecom	81507	20724		
22	0004338489	Farmers Telephone Company	Farmers Telephone Company	179	907		1
23	0005059092	Farmers Telephone Company	Farmers Telecommunications			1	
24	0015575285	Front Range Internet, Inc.	Front Range Internet, Inc.	795	2		1
25	0016084683	Grand County Internet Services, Inc.	Grand County Internet Services			1	1
26	0001616200	Haxtun Telephone	Haxtun	1023	1328		
27	0019794643	HighSpeed4U	HighSpeed4U			1	1
28	0002157550	IHateToWait.com, LLC	IHateToWait			1	2
29	0015866460	Internet Colorado	Internet Colorado	364	54	1	10
30	9999	Irish & Reynolds, Inc.	Nednet			1	
31	0014175673	JAB Broadband	Skybeam, Inc.			1	418
32	0003766623	Jade Communications, LLC	Jade Communications, LLC			1	
33	0002748044	James Cable LLC	CommuniComm Services	692	3		1
34	0003728284	J.e.d. Enterprises, Inc.	J.e.d. Enterprises, Inc.	174	1499		

35	0003723822	Level 3 Communications, LLC	Level 3 Communications, LLC				365
36	0002963528	Leap Wireless International, Inc.	Cricket Communications, Inc.,			2	
37	0018769547	Magnolia Road Internet Coop	MRIC			2	3
38	9999	Nedernet, Inc.	Nedernet, Inc.			1	
39	0003720471	New Edge Holding Company	New Edge Networks, Inc.	968	23		
40	0004312187	Nucla-Naturita Telephone Company	Nucla-Naturita Telephone Company	187	190		
41	0004311809	Nunn Telephone Company	Nunn Commuicatio, LLC	199	679		1
42	0015246895	Open Range Communications Inc.	Open Range Communications Inc.			1	
43	9999	OurayNet	OurayNet			1	1
44	0004314316	Phillips County Telephone Company	PCTelecom			1	2
45	0001615889	Plains Cooperative Telephone Association, Inc.,	Plains Cooperative Telephone Association, Inc.,	1171	3726	1	47
46	0011099520	Qwest Corporation	Qwest Corporation	97927	11461		
47	0005059092	Rico Telephone Company	Rico Telephone Company	80	99		1
48	0014705602	Roggen Telephone Cooperative Company	Roggen Telephone Enterprises, Inc.			1	1
49	0001615665	Rye Telephone Company, Inc.	ghValley.net	403	337	2	2
50	0005061775	San Isabel Telecom, Inc.	San Isabel Telecom, Inc.			1	5
51	0004310769	S&T Telephone Coop Association. Inc.	S&T Telephone Coop Assoc Inc	22	29		
52	0016136327	SECOM	SECOM			1	
53	0005070933	South Park Telephone Company, LLC	ghValley.net			1	1
54	0003774593	Sprint Nextel Corporation	Sprint			2	1
55	0001616390	Strasburg Telephone Company	TDS Telecom	114	183		1
56	0003723236	Sunflower Telephone Company	FairPoint Communications	193	357		12
57	0006945950	T-Mobile USA, Inc.	T-Mobile			2	3
58	0013430244	Time Warner Cable	Time Warner Cable	931	1037		
59	0004351086	tw telecom inc.	tw telecom inc.	1050	3		2
60	0003290673	Verizon Wireless	Verizon Wireless			4	
61	0015360456	Viaero Wireless	Viaero Wireless			1	
62	0001616192	Wiggins Telephone Association	Wiggins Telephone	648	2693		1
63	0006275945	XO Communications, LLC	XO Communications Services, Inc. (Affiliated Entity)	839	53		

NOTE

0003723822	Level 3 Communications, LLC	Level 3 Communications, LLC	466 Service Address

Distinct Speed Tiers Provided

	Technology Codes	Allowable Down	Up
10	Asymmetric xDSL	3 to 8	2 to 7
20	Symmetric xDSL	3 to 8	3 to 8
30	Other Copper Wireless	3 to 8	2 to 8
40	Cable Modem-DOCSIS 3.0	3 to 7	2 to 7
41	Cable Modem-Other	3 to 9	2 to 9
50	Optical Carrier/Fiber to End User	3 to 11	2 to 11
60	Satellite	3 to 6	2 to 6
70	Terrestrial Fixed Wireless-Unlicensed	3 to 6	2 to 6
71	Terrestrial Fixed Wireless-Licensed	3 to 6	2 to 6
80	Terrestrial Mobile Wireless	3 to 6	2 to 6
90	Electric Power Lines	3 to 6	2 to 6
0	All Other	3 to 11	2 to 11

	Speed Tier Codes
1	< 200 kps.
2	>200 kps, < 768 kps.
3	> 768 kps, < 1.5 mbps.
4	> 1.5 mbps, < 3 mbps.
5	> 3 mbps, < 6 mbps.
6	> 6 mbps, < 10 mbps.
7	> 10 mbps, < 25 mbps.
8	> 25 mbps, < 50 mbps.
9	> 50 mbps, < 100 mbps.
10	> 100 mbps, < 1 gbps.
11	> 1 gbps.

Distinct Speed Tiers Provided

Maximum Advertised Speed				Typical Speed			
Technology	Download	Upload	Freq.	Technology	Download	Upload	Freq.
10	3	2	1915	10	3	2	11514
10	3	3	7250	10	3	3	7248
10	4	2	25453	10	4	2	19852
10	4	3	29412	10	4	3	25582
10	4	4	80	10	5	2	27237
10	5	2	4431	10	5	3	8250
10	5	3	10617	10	6	2	2128
10	5	4	240	10	6	3	17716
10	5	5	295	10	7	3	26899
10	6	2	9793	10	7	4	18915
10	6	3	36535	10	8	4	8457
10	7	3	37785	10	8	5	8457
10	7	4	18915	10	8	7	23997
10	8	4	46125	10	ZZ	ZZ	17380
10	8	5	8457	20	3	3	1749
10	8	7	23997	20	4	4	62721
20	3	3	851	20	6	6	53358
20	4	4	10646	20	ZZ	ZZ	16
20	5	5	9012	30	3	3	3
20	6	6	53358	30	4	4	8898
30	3	3	452	30	5	5	69953

30	4	4	9312		30	6	6	36
30	5	5	70076		30	7	7	113
30	6	6	90		30	8	7	1405
30	7	7	194		30	8	8	54
30	8	7	1405		30	ZZ	ZZ	1163
30	8	8	96		41	5	4	695
41	5	4	695		41	7	4	266
41	6	3	49705		41	ZZ	ZZ	77046
41	6	6	1133		50	5	3	263
41	7	3	26208		50	11	11	466
41	7	4	266		50	ZZ	ZZ	2768
50	3	3	15		70	4	3	2
50	4	4	4		70	5	2	1
50	5	3	263		70	5	3	2
50	5	5	14		70	5	4	1
50	6	6	15		70	5	5	1
50	7	3	996		70	6	6	1
50	7	5	605		70	ZZ	ZZ	5
50	7	7	85		71	3	3	4
50	8	8	18		71	4	3	2
50	9	9	40		71	5	3	1
50	10	10	941		71	ZZ	ZZ	6
50	11	11	35		80	3	2	1
70	3	3	1		80	3	3	3
70	4	3	2		80	4	2	1
70	5	2	1		80	4	3	1
70	5	3	4		80	5	3	1
70	5	4	1		80	6	4	1
70	5	5	2		80	6	5	1
70	6	2	1		80	ZZ	ZZ	5
70	6	6	1					
71	3	3	4					
71	4	3	1					
71	4	4	2					
71	5	3	2					
71	5	5	2					
71	6	3	1					
71	6	6	1					
80	3	2	1					
80	4	2	1					
80	4	3	1					

80	4	4	2
80	5	3	1
80	5	4	3
80	6	4	1
80	6	5	2

CT Broadband Mapping

Data Processing Report

Supplement

Submission 4

September 30, 2011

CONNECTICUT PROGRAM OVERVIEW

In response to the Notice of Funds Availability published in the Federal Register on July 8, 2009 (NOFA), the State of Connecticut Department of Public Utility Control (CT DPUC) submitted a grant application for consideration under the National Telecommunications and Information Administration's (NTIA) State Broadband Initiative Grant Program (SBI), for broadband mapping. The CT DPUC, pursuant to Executive Order 32-A, was designated as the single Connecticut state entity eligible to apply for funds under this program.

In July of 2011, the CT DPUC was merged with the CT Department of Environmental Protection to form a new agency called the Department of Energy and Environmental Protection (CT DEEP). CT DEEP will now be the lead agency coordinating with NTIA on this program.

The State has long been committed to regarding broadband delivery and enhanced use as a fundamental goal. The State has developed a planning strategy to marshal the State's resources and stakeholders and establish Connecticut as a leader in broadband usage, in addition to being a leader in "e-Government" and other broadband-dependent endeavors.

The State entered its SBI initiative not possessing any data related to broadband service, availability, or infrastructure that could readily support the requirements of the Broadband Data and Development grant program. Due to technical considerations, DEEP has partnered with Applied Geographics Inc., to support the data collection and mapping efforts.

So far CT has been very successful in acquiring the requested information from the broadband service providers, and is utilizing this information on our own http://CT.gov/Broadband website as well as providing the needed information up to NTIA to support the national map.

FALL 2011 SUBMISSION OVERVIEW

For the fall 2011 submission (S4), roughly 75% of our providers submitted either entirely new or significantly revised data sets. This is a change from the last submission where half the providers just told us to reuse their existing data.

In general, the submission 4 processes followed the same basic approach that was used in earlier submissions. This document summarizes the following:

- Submission 4 Processing Assumptions
- Reference Data Creation
- Processing of new provider data
- Conversion from Census 2000 to Census 2010 format
- NTIA Submission Data Model Schema Changes

SUBMISSION 4 PROCESSING ASSUMPTIONS

Based on NTIA feedback and information provided in NTIA webinar sessions, the submission 4 data processing workflow is based on the following assumptions to meet NTIA submission requirements.

1. All census blocks and road segments are mapped based on 2010 census data set. Any data submitted in 2000 or 2009 format was converted to 2010 for submission.
2. Overview was removed completely from this submission data due to the fact that all maximum advertised up/down speeds are being reported in blocks, roads, and wireless features. In addition, none of the providers were willing to submit detailed pricing information.
3. Due to our NDA restrictions, last mile points will not be submitted to NTIA.
4. Due to NDA restrictions and our inability to accurately flag service by “category of end user”, address points were not submitted to NTIA for any commercial provider.
5. Some providers did not submit middle mile elevation. Wherever possible, we went back to providers to obtain their middle mile elevation information, but it is not available for every record.
6. Terrestrial Mobile Wireless and Terrestrial Fixed Wireless (licensed and unlicensed) were treated as wireless coverage and were delivered as a shape. In cases where a provider served the same technology and spectrum with different speeds, overlapping areas were removed and the higher speed was assigned.
7. If a cable based wireline provider can provide both DOCIS 2.0 and DOCIS 3.0 service to the same area, the block or road was listed only once with a technology code of 40.
8. Providers were only willing to indicate on a general level if they severed business, residential or both, so we did not get any providers that broke down the type of service by block. Only if the provider stated they only serve business to business customers did we fill in the “category of end user” with a code of 2, otherwise this field was left blank.
9. The submission 4 Provider data model is currently based on the NTIA data model as of 6/30/11.

SUBMISSION 4: REFERENCE DATA

This section describes the reference data used in submission 4.

BLOCK REFERENCE SETUP

For s4, Census 2010 data was utilized. The data was set up as follows:

- Block size (AREA) is calculated combining the 2000 land area (ALAND) and water area (AWATER)
- AREA is converted from square meters to square miles to calculate square mileage (SMI).
- If the SMI of a block is less than or equal to 2, then the less than or equal to 2 square mile indicator (LE2SMI) is set to true.

ROAD REFERENCE SETUP

2010 Tiger Line IDs (TLID) were used for data processing in s4. The data was set up as follows:

- The GT2SMI (Greater Than 2 Square Mile) indicator is set to True when:
  - The 2010 road segment is completely within a block that is NOT less than 2 square miles
- Only minimum and maximum address ranges and a single zip code for each road segment is maintained.

SUBMISSION 4: PROCESSING OF NEW DATA

For submission 4, AppGeo started data collection on July 6th 2011 by sending out data update requests and technical data specifications to all providers. This incorporated all the NTIA changes released on June 30th, 2011. These were sent to a large list of companies which were compiled from past collection efforts, and the revised FCC 477 list. The technical document highlighted the changes from Submission 3 to Submission 4. Due to the change in census geography all new data was requested whenever possible.

We then actively followed up with the providers. As we had discovered in the past, many of the providers listed on the FCC 477 list are either resellers, or not involved in the actual delivery of broadband. (Many are VOIP or teleconference service providers that utilize existing broadband connections.)

In our solicitation for data updates, we told known past providers that if we didn't hear from them by a certain date, we would default to using their data from Submission 3. We contacted them after the due date a few times but for two providers, we eventually had to just reuse Submission 3 data.

All data received went through the following processing steps:

1. **Triage**: All new data was quickly reviewed to understand what was received, and in what format. We also made sure we had all the required components for NTIA's data model, such as their FRN and advertised speed information. We also screened for any known issues that we might have seen before (such as Excel 2003 spreadsheets that cut off at 32k rows.)
2. **Ingest**: At this time the data is actually brought into our systems. Each provider is set up with a unique file geodatabase to store their information. Record counts of what was received is logged so that we can validate we did not drop anything in processing.
3. **Data Processing**: This is where the data goes through a number of ETL routines to convert the raw proprietary information into a format similar to the NTIA format. The exact routine utilized depends on how the data is received:

   a. When a wireline provider submits a service boundary, we select all the blocks and roads inside that shape.
   b. If a wireline provider submits a customer address list, the points are geocoded, and then the appropriate block or road segment is selected.
   c. If a wireline provider submits block and road information using Census data, we just make sure everything is formatted to the appropriate specifications
   d. If the wireline provider submits any type of road or line data that does not direct correlate to the TIGER data set, we convert the lines to TIGER by selecting the road centroid and spatially selecting the closed segment in our data set. If the road is in a block less than 2sqmi, than the block is selected. Some manual cleanup is also applied to make sure we do not accidentally drop any road segments that should have been processed.
   e. Wireless provider data is formatted to ensure that there are no any overlapping polygons with the technology type. In addition the data is cropped to the state boundary.
   f. After each round of processing, we make sure that we only keep unique records. A unique record is defined as having a one of a kind combination of FRN, Block/Road ID, and technology type. If there are multiple records with different speeds, but all else is equal, than we select the maximum of the advertised speeds.
4. **QC Review**: All data is then sent to a different analyst to perform a through quality control review on the processed data set. Record counts are compared to what was submitted. The QC staff also make sure the ETL scripts and routines populated all of the right fields.
5. **QA Review:** Data is then sent to another team for Quality Assurance Review. In this step the data is not only double checked against what was originally submitted, but it also brought up inside standardized MXD templates that allow us to make sure our results make sense. This often involves comparing the new data set with prior submissions, as well as looking for any possible technology or speed anomalies. At this stage we also start in on our validation process. This includes looking at the provider data in comparison to things such as speed test results, franchise boundaries, siting information, and feedback from the planning surveys.
6. **Provider Review:** Processed data is all posted to a customized web application we refer to as our Provider Portal. All providers were notified once their data was available in the site, and they were always given at least ten business days to review the data and respond. In this site, providers can log on and visually see their processed data in a map format. It also allows them to overlay their raw data to help them validate that we did indeed process things correctly. The provider portal also has a suite of markup tools that will allow the providers to edit their data, including adding or removing service areas, and making changes to the data attributes.
7. **Comment Processing:** All comments and feedback received from the provider portal, is then reviewed and applied to the processed data set. This updated data set goes back through our QA and QC processes, and if time allows, back out to the Provider Portal, for the provider to review and sign off on.
8. **Data Append:** After all of the individual data sets are processed and approved, we run an append process which merges all of the individual provider data sets into one geodatabase. This is also the point where our team will do any final transformations to get our working data model into the latest NTIA publishing format.
9. **Final QA/QC:** A series of quality checks are run on the final appended data sets to ensure it is ready for submission to NTIA. We also run the NTIA receipt tool at this time. Any last issues are corrected, and the data is sent to the state for their review.
10. **Submission to NTIA**

As with the third data submission, we followed the following protocols:

1. We did not collect data from resellers
2. We collected data from satellite providers, only if they were able to provide to us all of the required information we need to pass onto NTIA: including spectrum, FRN, and advertised speeds.

COMMUNITY ANCHOR INSTITUTIONS DATA

The community anchor institutions data was primarily populated through State resources, in particular the CEN database which services many schools, colleges, and libraries. We also were able to get a connection survey results for all the libraries through the state library association. Location information for all other CAI points, notably, police, fire, and town halls, were obtained through the Department of Public Safety. All of this information was then populated into an online data gathering and validation web based application. Each town was contacted and asked to update their respective site information. While the web based responses have not been as high as we would like, we do feel that we are fortunate to have a good base set of data from the state.

SUBMISSION 4: 2000 TO 2010 DATA CONVERSION PROCESS

Due to the changes in census geography, all providers were asked to submit new data. In those instances when a provider A) submitted new data in Census 2000 format, or B) instructed us to reuse their last data submission, we had to convert the blocks and roads into 2010 format.

Basic 2000 to 2010 Conversion Process:

1. For the blocks, take the 2000 block ID, and select all the corresponding 2010 block id's
   a. using census crosswalk table – not an actual spatial process, since this was faster
2. Look at the new 2010 block ids, and filter on greater than or less than 2 sq miles.
   a. If less than or equal to 2 --> bring in the 2010 geometry and add that record to the blocks table
   b. If greater than 2 --> select any roads in that area – spatial select (using roads gt2 table)
3. For the roads, take the 2000 or 2009 TLID and try to match it to the 2010 TLID's
   a. If there is a match, add that record to the roads table
   b. If there is not a match, select centroid of existing 2000/2009 segment, and select closest 2010 road
   c. If the road is now in a block LT2, select the block(s) instead and drop the road
4. Remove any duplicate records in both tables
5. Run some automated checks to catch missed features (i.e. add le2smi blocks surrounded by roads that have not already been added)
6. Manual review (QC) and corrections.
   a. There will be some blocks that are selected inappropriately (especially at town edges for CT providers, where we know their franchise ends at a town line.)
   b. There are some holes in the census crosswalk table
   c. The road conversion process may only select one portion of the road if it has now been broken into multiple segments

Assumptions

1. If a road was in an area greater than 2smi in s3, and due to census re-drawing, is now in an area less than 2smi, we will grab blocks (le2smi) on both sides of that road and add them to the provider data:

2. If a new 2010 block, that is less than 2smi, is completely surrounded by roads and/or blocks served by that provider, than we will add the block to the provider service area.

SUBMISSION 4: NTIA DATA MODEL SCHEMA CHANGES

The data model released on June 30, 2011 contained the following changes to the s3 data model:

- The Category of End user field was added back in to the block and road tables. In addition the domain values were changed. 1 still represents residential, but a 2 now represents all non-residential uses.
    - This field is not required, and for many providers, was left blank since the data was not provided.

CONNECTICUT SPECIFIC INFORMATION

Due to Connecticut's geography and population, 99.75% of the census blocks in the state are less than two square miles. The need for us to break apart coverage based on blocks versus roads leads to a lot of unnecessary confusion as well as creates some distorted pictures when you try to visualize this information on a map. For this reason, all of the maps available on the CT.gov/broadband website are published after we convert all of the data to just use blocks.

In the documentation form NTIA there has been a lot of discussion about making sure that a provider uses the same DBA and FRN consistently across all feature classes. We mentioned this to the providers, but there was some push back. Most providers complied with this request, but a few providers pointed out that while they may share a common name, they actually operate as separate organizations. Also, due to regulatory implications of the different FRN's a few providers did insist that their records not be combined.

The State of Connecticut has built and maintains the Connecticut Educational Network (CEN) which is a mostly fiber backbone connecting educational facilities all across the state to the internet. The way this network is set up, it is difficult to accurately identify who the final provider is and at what speeds. In particular, the CEN network will typically install one fiber uplink in each town, and then it is the town's responsibility to provide connection between facilities. So for example CEN may supply the board of education's office with a 10mb connection, but then the board of education will run lines to each of the schools in the district. So towns are reluctant to report speed information as there may technically be 10mb available to the school, but reporting that speed at each school would grossly overestimate how much connectivity they have in total, when in fact there may be 15 schools sharing that same uplink.

Comcast cable has reported that they market their speed offerings based on MSA areas, which do not necessarily match up with their technology available in the field. So what this means is that there are some areas that may in fact have DOCIS 3.0 technology available, but the market they are in is still offering packages and speeds based on the older technology. This means you will see areas with technology type of 40, and advertised speed tiers of 7 or 8. We did work with the provider to make sure that any area that has technology type of 41 is not using the DOCIS 3.0 speed offerings.

One Communications Corporation has a few locations where they offer what they called stacked DSL service, and they confirmed in writing that these locations can offer aDSL with speeds in tiers 7 or 8.

We have already noted that PAETEC has listed most of their locations with an advertised speed of tier 10, but in many cases are reporting typical speeds in tier 2. We have contacted the provider and they have simply responded that we should use the data as it was submitted.

District of Columbia Fall 2011

State Broadband Availability Data Collection and Verification Technical White Paper

Award #:	**11-50-M09011**
Award Period:	**10/1/2009 - 9/30/2014**
Project Type:	**State Broadband Data Development**
Organization Name:	**District of Columbia Office of Chief Technology Officer**
Project Title:	**ARRA SBDD - District of Columbia OCTO**
Contact:	**Matthew Crossett, Interim Geospatial Technology Manager**
Email:	**matthew.crossett@dc.gov**
Submission Date:	**October 1, 2011**

Introduction

The National Telecommunications and Information Administration (NTIA), a division of the U.S. Department of Commerce, through the Broadband Data Improvement Act (BDIA), has sponsored the State Broadband Data and Development Grant Program. This Program is designed to fund projects that gather comprehensive and accurate state-level broadband mapping data, develop state-level broadband maps, aid in the development and maintenance of a national broadband map, and fund statewide initiatives for broadband planning.

The following white paper describes the data integration and verification processes employed by the District of Columbia in preparation of the Broadband Availability data set submitted to NTIA on October 1, 2011. This data collection is to be conducted on a semi-annual basis over a five-year period. The “Fall 2011 Technical White Paper” will be the fourth of ten semi-annual submissions by the District of Columbia and attempts to reflect conditions in the field as of June 30, 2011 or later.

The paper is divided into seven sections:

Section 1 - Data Description: describes October 1, 2011 deliverables to NTIA.

Section 2 - Provider Participation: summarizes provider cooperation.

Section 3 - Data Collection: describes outreach and collection efforts.

Section 4 - DC geospatial data: describes the role of DC GIS data in broadband data processing.

Section 5 - Data integration and processing: describes data manipulation steps.

Section 6 - Data validation: describes efforts to validate the data received.

Section 7 – Documentation and Submittal: Includes the NTIA final checklist steps.

SECTION 1 - DATA SUBMISSION DESCRIPTION

The District of Columbia's fall 2011 submission consists of the following files:

DC_SBDD_20111001.zip – Consolidates all other files for the purpose of data transfer.

DC_SBDD_2011_10_01.gdb – An ESRI file based geodatabase that conforms to the data model distributed by NTIA. It contains primary data and metadata. The District provides NTIA with five data sets:

- **Community Anchor Institutions** – The location of community serving institutions and information about their broadband connections – if known.
- **Middle Mile Connections** – The locations and attributes of infrastructure that interconnects broadband networks.
- **Wireless Broadband Availability** – The service territories and attributes of wireless broadband providers including terrestrial fixed wireless and satellite.
- **Wireline Broadband Availability –** The territories and attributes of wireline broadband providers with 2010 Census Block geography.
- **Metadata –** Information about the data sets described above.

DC_DataPackage_2011_10_01.xls –A report on broadband providers contacted and the status of their submissions.

DC_2011_10_01.txt – An analysis of DC_SBDD_2011_10_01.gdb known as the "data submission receipt." This file is created by an automated script supplied by NTIA.

DC_Methodology_2011_10_01.pdf – An electronic version of the following document.

DC_Readme_2011_10_01.txt – A reduced file with the same information found in the header and section 1 of this white paper.

SECTION 2 - PROVIDER PARTICIPATION

- The PSC contacted 122 prospective broadband providers.
- Of those, 38 are believed to be providing broadband service in the District and are listed in DC_DataPackage_2011_10_01.xls.
- Of those, 27 meet the NOFA definition of available (either wireline and or wireless).
- Eleven providers do not provide service in District within 10 days or are non-responsive.
- Ten provided middle mile data.

SECTION 3 - DATA COLLECTION

Collection of Broadband Availability Data

The District of Columbia Office of the Chief Technology Officer ("OCTO") was awarded a grant from NTIA to map the availability of broadband services in the District of Columbia ("District"). OCTO has delegated to the District of Columbia Public Service Commission ("PSC") the responsibility for all interaction, including data collection, with the broadband service provider community.

Process Steps

- **Identifying and Contacting Broadband Providers -** The work of identifying providers is conducted by the PSC. The PSC reviewed its own records and those of the FCC. The initial identification of providers took place prior to the spring 2010 data call and has been refined for each NTIA submission. Firms identified as providers were:
  - All firms in PSC records as providing any kind of telecommunications service in the District.
  - All firms identified by the FCC having filed a form 477 for broadband service in the District.
  - Satellite providers were also contacted.
- **Contacting providers -** The PSC requested the assistance and cooperation of all commercial broadband service providers that provide service to any residential, business, institutional, or government entity located within the District, to provide the PSC with broadband service location data. Whenever possible, providers are initially contacted by email. The package of material sent by the PSC to providers:
  - **A letter from the Chairman of the District of Columbia Public Service Commission.** Sample letters can be found in **Appendix 1**. Providers receive one of three letters based upon their previous submission:
    - Providers that submitted Round 3 data, met the NOFA broadband service and availability definitions and were provided a Broadband Provider Portal account.
    - Providers that submitted Round 3 data and but did not meet the NOFA definitions.
    - Providers that did not submit Round 3 data or are new BSPs.
  - **Non-Disclosure Agreement** (NDA) The PSC offers every provider opportunity to enter into a NDA between OCTO and the Provider. The standard OCTO NDA is shown in **Appendix 2**. The NDA explains how OCTO will handle the submitted data; including what portions of the data will be submitted to the NTIA and what derived products will become part of the public website on broadband services available within the District that is maintained by OCTO. Key provisions of the District's standard NDA include:

        - OCTO will give the data to NTIA for the National Broadband Map.
        - The service territories of individual providers will not be made public by OCTO, but OCTO has created a public web site that allows users, including potential broadband service subscribers, to enter any valid address in the District of Columbia and be referred to all the broadband service providers offering service to that location.
        - Form 477 subscriber count data from all companies will be aggregated by OCTO at the Census Tract level. OCTO will use this information to estimate the residential broadband adoption rate by Census Tract. Estimated broadband service adoption rates will be made public, but the market share of individual broadband service providers will not be revealed.
    - **Provider submission form -** For fall 2011, OCTO and PSC revised the data request form. The form is a Microsoft Excel based questionnaire which is accompanied by a glossary. **Appendix 3** contains a copy of the form and glossary. The form collects information on:
        - The Provider (Includes: business name, DBA name, FRN#, URL, etc.)
        - Transmission Technology
        - Business type (facility based or reseller)
        - Service Territory
        - Maximum advertised and typical upload and download speeds
        - Wireless spectrum
        - Middle mile connection points

- **Handling providers –** While we hope that all providers complete our forms, not all do. In practice OCTO will accept a variety of submission types and our policy is to work with providers interactively via email and phone whenever we or they have questions.

SECTION 4 - THE ROLE OF DC GEOSPATIAL DATA

DC GIS maintains several datasets that are integral to processing provider submissions. Each dataset and how it is employed is described below:

DC GIS Data Set (Click link to view and double click and zoom)	**Description**	**How the data is used in broadband processing**
Imagery	6" resolution 2010 ortho corrected imagery	GIS analysts superimpose provider service territory on imagery to ensure that submission fit the ground in a credible way. For example, do we have wireline service over water or parks?
DC Base Map	1" to 100' planimetric map.	Used similarly to imagery.
Master Address Repository	A precisely located point for every address in the District	Used to process address lists submitted by broadband providers. Also used to locate and map Community Anchor Institutions.
Education Libraries Health Public Safety Recreation	A variety of GIS layers that include Community Anchor Institutions locations	Used to identify and survey as many Community Anchor Institutions as possible.
Real Property	Ownership data with use codes	Used to ensure that broadband providers who provide to business are not shown as providing service in residential areas.
InfoUSA ISP Connectivity Database	Connectivity provider and connection type records by IP	Used to verify provider service area.

SECTION 5 - DATA INTEGRATION

- **Broadband Provider Data Submission Check-in**
  - Provider data submissions are received in several ways
    - Providers send email file attachments to the PSC.
    - Providers submit data by means of a USB drive.
    - Providers upload the data to a secure OCTO FTP site.
    - Provider mails the data to PSC or OCTO. If data is received directly by OCTO, a GIS analyst will then check-in the data, make a copy and submit the original to the PSC.
    - Provider notifies the PSC that data has not changed since last submission
  - PSC will then contact OCTO that new data has been received.
  - Scanned for viruses.
  - Entered into a submission tracking database.
  - Give an initial review to ensure that each major component is present.

- **OCTO Data Ingestion –** The District of Columbia implemented new data submission and data processing tracking software developed by Applied Geographics for the fall 2011 data collection. After the submission has been checked in by the PSC and received by OCTO, the provider submission status is entered into a data tracker database to reflect the current status of receipt and contents of the submitted data package.

- **Wireline Data Processing -** The following information was collected.
  - Provider Name
  - Doing Business As
  - FRN (Federal Registration Number)
  - Census Tract and Block number
  - Technology of Transmission (DSL, Cable, etc.)
  - Maximum Download speed (greater than 768 kbps)
  - Maximum Upload Speed (greater than 200 kbps)
  - Typical Download Speed
  - Typical Upload Speed

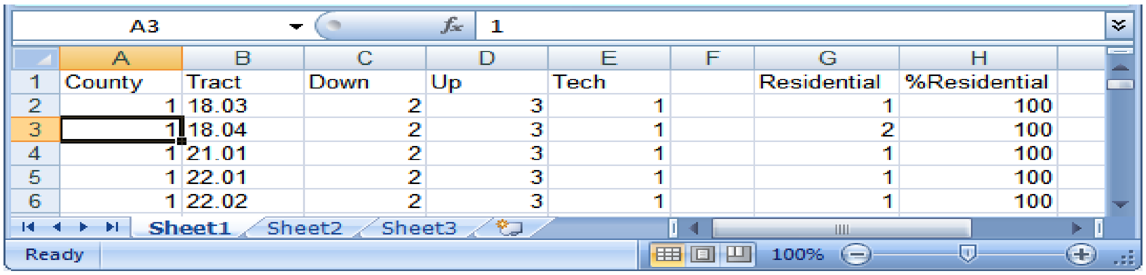
- **Wireline Data Processing - Geographic**
  - **Service territory description -** In order for a provider to be eligible and have their data processed, the Company's service territory must offer broadband service to new

customers within 10 days of a service order without extraordinary effort. Note: A Company can have multiple service territories within the District of Columbia, and those territories need not be contiguous. NTIA requires that the service territory be mapped to the nearest Census Block. Companies have several options for describing their service territory:

- **District-wide broadband service provider.** The Company must offer broadband service to all customers of the entire District of Columbia. If the Company meets the definition, the description of the Company's service territory is complete. This mainly applies to non-residential only providers. The following definitions apply:
  - **"Broadband service"** is the provision to end users of two-way data transmission to and from the Internet with advertised speeds of at least 768 kilobits per second (Kbps) downstream and greater than 200 Kpbs upstream.
  - **"Offer"** means that the Company can provide broadband service to end users (a residential, business, institutional or government entity) within 10 business days of a service order without an extraordinary commitment of additional resources. It also interprets "offer" to be a commercial service. We are not mapping free services such as Wifi hotspots at this time. District of Columbia Government free Wifi hotspots are included in the Community Anchor Data.
  - The **"entire District of Columbia"** means that a wireline company offers service to residential, business, institutional, or government end users in every Census Block in the District. This definition expressly excludes parkland, cemeteries, institutional campuses, bodies of water, and military bases. The definition also excludes real estate complexes where the landlord, condominium association, or similar entity controls the provision of wireline service. Even if the firm doesn't offer service in categories, it can still be a District-wide provider, which simplifies the submission. This caused some problems with OCTO's fall 2010 submission where we now believe some service territories where overstated. Any firm claiming to be a citywide provider received greater scrutiny, in particular, providers that service businesses only were restricted to reporting service to commercial, high density residential, and industrial areas as defined by property use codes.
- **Non District-wide broadband service provider.** Any of the following may be attached to the e-mail to describe the Company's service territory:
  - A **Detailed Map(s)** – Submitted maps should delineate the service area boundaries and label all DC streets within those boundaries. The map may be a

PDF file. Geographic Information System (GIS) or Computer Aided Design files may be submitted in lieu of a map.

- A **List of Census Blocks –** The Company may provide a list of Census Blocks in which they offer service. The list should be provided in a Microsoft Excel File or Text File with each Census Block listed on a separate row.



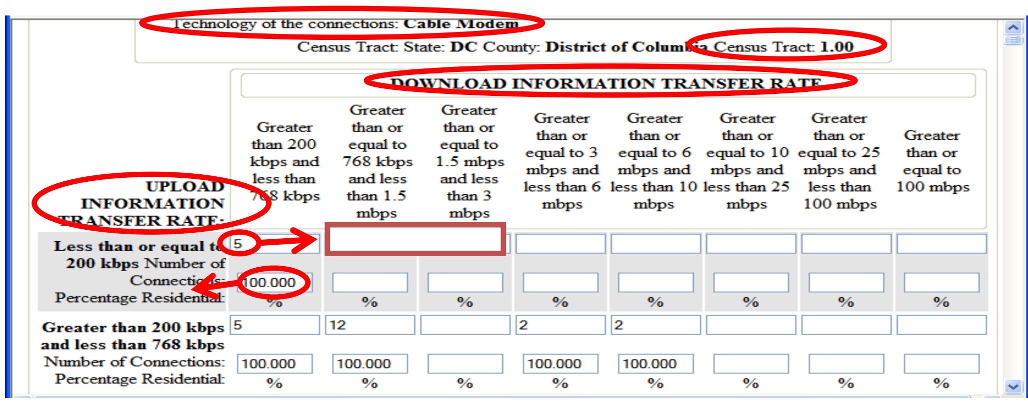
A3 | fx | 1

	A	B	C	D	E	F	G	H
1	County	Tract	Down	Up	Tech		Residential	%Residential
2	1	18.03	2	3	1		1	100
3	1	18.04	2	3	1		2	100
4	1	21.01	2	3	1		1	100
5	1	22.01	2	3	1		1	100
6	1	22.02	2	3	1		1	100

Sheet1 Sheet2 Sheet3

Ready 100%

- A **Written Description –** The Company may describe one or more polygons. For example, a service territory in part of downtown could be described as "East of 23rd Street NW, South of K Street NW, West of 17th Street NW, North of Constitution Ave NW. " Alternatively, the territories can be described by using buffers, for example, "Within 500 feet of 441 4th Street NW Washington DC 20001."
- **Address File** - If service is only offered to certain addresses, a list of those addresses may be submitted.   Address lists (whether for buffering or not) should be submitted in a Microsoft Excel table or text file with each address on a separate row. Address lists are geocoded to the structure using the District's **Master Address Repository.** OCTO encourages providers to submit all addresses where service can be provided within 10 days not just the address of current subscribers.
- **Form 477** – The Form 477 already includes a list of Census Tracts where the firm has existing customers. Census Blocks nest within Census Tracts. Optionally, the Company may indicate that it wishes to use the Census Tracts already listed within its Form 477, minus a list of Census Blocks within those Tracts in which it does not offer service.



Technology of the connections: **Cable Modem**

Census Tract: State: **DC** County: **District of Columbia** Census Tract: **1.00**

UPLOAD INFORMATION TRANSFER RATE:	DOWNLOAD INFORMATION TRANSFER RATE							
	Greater than 200 kbps and less than 768 kbps	Greater than or equal to 768 kbps and less than 1.5 mbps	Greater than or equal to 1.5 mbps and less than 3 mbps	Greater than or equal to 3 mbps and less than 6 mbps	Greater than or equal to 6 mbps and less than 10 mbps	Greater than or equal to 10 mbps and less than 25 mbps	Greater than or equal to 25 mbps and less than 100 mbps	Greater than or equal to 100 mbps
Less than or equal to 200 kbps Number of Connections:	5							
Percentage Residential:	100.000 %	%	%	%	%	%	%	%
Greater than 200 kbps and less than 768 kbps Number of Connections:	5	12		2	2			
Percentage Residential:	100.000 %	100.000 %	%	100.000 %	100.000 %	%	%	%

- **Wireless Data Processing –** Wireless providers often provide a polygon shapefile of their coverage area(s) and if they were an existing provider they communicate if the coverage information has changed. The majority of wireless provider's service areas are District-wide. The following information was collected.
  - Provider Name
  - Doing Business As
  - FRN (Federal Registration Number)
  - Technology of Transmission (DSL, Cable, etc.)
  - Spectrum
  - Maximum Download speed (greater than 768 kbps)
  - Maximum Upload Speed (greater than 200 kbps)
  - Typical Download Speed
  - Typical Upload Speed

- **Middle Mile Data Processing -** Broadband service providers were also asked to list "middle-mile and backbone interconnection points" in the District of Columbia. Interconnection points are facilities that provide connectivity between (a) a service provider's network elements (or segments) or (b) between a service provider's network and another provider's network, including the Internet backbone. Collectively, (a) and (b) are middle-mile and backbone interconnection points. The following information was collected.
  - Provider Name
  - Dosing Business As Name
  - FCC Registration Number
  - Ownership Status
  - Serving Facility Capacity
  - Serving Facility Type
  - Location
  - Elevation

- **Community Anchor Institutions -** As part of the reporting requirements for the grant, OCTO is required to collect a list of Community Anchor Institutions (CAI) and report broadband service available at these institutions. The dataset consists of schools, libraries, medical and healthcare providers, public safety entities, institutions of higher education, and other community support entities. Data is compiled from various district agencies and by contacting institutions directly. Non-government community anchors were contacted individually to complete an online survey. The survey requested the internet service type and service speed at the institution's location(s). **Appendix 4** contains a copy of the Community Anchor Survey online form.

- **Data Review and Consultation with Providers**
  - If a component of the submission is missing, the OCTO GIS analyst will contact PSC for assistance to receive the missing data from the provider.
  - PSC and OCTO will schedule several meetings before final submittal: to review what providers have submitted data and who has not, discuss action points that need to be addressed, and review the process for areas of improvement.
  - As a result of inquiries from NTIA about DC's round 2 data, we are spending more time talking to providers, particularly those who claim to offer citywide service. Most providers respond openly and are willing to make changes to their submissions when questions are raised.
  - The NTIA receipt script is run against each provider submitted dataset separately. Repairs and reruns are iterated until the dataset successfully passes.

SECTION 6 - DATA VALIDATION

During this stage, data from providers are compared with data from other sources. Discrepancies are noted and sent to the contributing provider for comment. Validation techniques vary by the type of data submitted [wireless, wire line, or middle-mile]. The following steps were taken to validate the data submitted:

- **Wireless Validation -** The District completed drive testing of major wireless providers. Drive test were completed in a single vehicle employing multiple laptops and GPS. This was accomplished by installing computer and GPS hardware and software in a vehicle and testing and mapping upstream and downstream transmission speeds. At this time, DC has not shown the drive test data to providers nor discussed our collection techniques with them. This data was collected with public funds and is not covered by NDAs, but DC has not made a decision to release it publically at this time. All providers who claim to be providing citywide wireless service are providing it, and to that end DC will declare all providers who submitted service territories to be "valid". That said, speed of service does drop below the definition of broadband, and does vary across providers, place, and time. The District did not conduct new drive testing for fall 2011. The fall 2010 drive testing results can be found in **Appendix 5.**

- **Wireline Validation**
  - The District, through PSC, has made extensive use of FCC Form 477 data. The Form 477 is used to, verify that we have contacted the correct providers, compare the technology of transmission and speed of transmission between what was reported to the FCC and what was submitted by the provider, compare the geography reported to the FCC by census tracts with the areas submitted to the District by census blocks. When discrepancies are found, the providers are asked for more information.
  - The District purchased a database of broadband subscribers from a commercial mailing list company InfoUSA. The dataset is used to crosscheck data coming from providers. The commercial mailing is not definitive. When discrepancies are found, the providers are asked for more information.

- **Middle Mile Validation –** To date the district has not attempted to validate middle mile data other than checking locations against GIS base data to be sure they are plausible.

- **Final Review -** All data undergoes a standup review conducted jointly by OCTO and PSC staff. Do service territories seem plausible? Do speeds seem realistic? How do speeds compare to other providers using similar technologies? What is the total DSL, Cable, Fiber coverage and does it seem plausible?

- **Amalgamation and documentation** - Unless a provider's submission is conclusively invalidated (which hasn't happened) and the issue cannot be resolved with the contributing provider, it is included in the amalgamation phase. Until this stage, OCTO handles each submission separately. During this stage, all successful submissions are appended to the latest version of the NTIA/NSGIC geodatabase model, and requested transmittal forms are prepared.
    - The data is appended to the NTIA geodatabase model.
    - The amalgamated data is given a final quality review by the GIS Analysts involved in the broadband grant program.
    - FGDC Compliant metadata is prepared and included in the geodatabase.
    - The NTIA provided script is run for the last time on the data set as a whole.

SECTION 7 - DOCUMENTATION AND SUBMITTAL

Once past the quality review, the data sets are submitted to NTIA/FCC via secure FTP. FCC data package documents are included. The checklist provided by NTIA is below:

Number	Question
1	Have you obtained a new clean Transfer Data Model?
2	Have you followed the instructions for loading data into the Transfer Data Model?
3	Have you run the receipt process (SBDD_CheckSubmission) and resolved all data integrity issues?
4	Have you included your receipt text file as part of the package?
5	Have you populated the metadata fields?
6	Have you exported the metadata as .xml files?
7	Have you obtained a new data_package.xls and filled it out appropriately?
8	Have you included methodological description?
9	Have you followed the required naming conventions of all the files?
10	If you are resubmitting any data for the current collection, have you (a) deleted your previous submission (b) informed the Program Office or the FCC of your resubmission and (c) resubmitted your entire data package (e.g., the Program Office is not accepting an partial submissions)?

Appendix 1
Sample Letters
From
DC Public Service Commission
To
Prospective Broadband Providers

PSC Letter to Providers that submitted Round 3 data, meet the NOFA requirements and assigned a Provider Portal account.

Dear (Insert Name of BSP contact):

The District of Columbia ("District") Office of the Chief Technology Officer ("OCTO") and the Public Service Commission ("Commission") would like to thank you for your continued participation in the District's Broadband Service Mapping Program. To meet the objectives under the National Telecommunications and Information Administration ("NTIA") State Broadband Data and Development Grant Program, the Commission requests the assistance and cooperation of all broadband service providers that enable a residential, business, institutional, or government entity located within the District to use broadband Internet services. At this time, the Commission is now requesting broadband service availability data **current as of June 30, 2011** for processing and review before submittal to NTIA for the Fall 2011 National Broadband Map and database update.

As a means to improve data updates and validation, the District is pleased to announce a new online **Broadband Provider Portal** ("Portal") for participating broadband service providers. This new mapping application allows broadband service providers to view the dataset for their company from the last data submission and make edits to reflect current service availability in the District through a secure login account. A user manual and video demonstration are available on the Portal for your review. A secure login account has been created for your use and is provided at the end of this letter. Using the Broadband Provider Portal to provide us with updated service availability data eliminates any need for you to complete a Questionnaire such as what we have sent you in previous data request rounds.

Please note that the NTIA has requested that data should be submitted using the Census 2010 geography. **To allow an adequate time period for OCTO to convert the submitted data to the Census 2010 geography, the Commission requests broadband service providers to submit their data updates on the Portal by Friday, August 19, 2011.**

Due to the new Broadband Provider Portal application and conversion to a new Census geography, a list of data submission options is outlined below.

1. Please help us by using the Portal to provide:

    a. Changes that have occurred in your company's service areas, technologies, speeds, infrastructure, etc. since the last data submission.

        i. The Portal's map application displays the processed data from your last submission. Please note the data is currently being displayed with the Census 2000 geography. After you make the edits to the Portal page for your company, OCTO will process the data to the Census 2010 geography. At that time, we will ask you to help resolve any discrepancies that arise from the conversion as well as to validate the data.
        ii. New full dataset.

1. If you are providing NTIA ready data, please make sure you have converted your data to the Census 2010 geography.
2. If you are providing address points, OCTO will geo-code and process the data to the Census 2010 geography.
3. Use one the data formats below for your company's service area. Each data format should include: technology of transmission; maximum advertised download and upload speed; and typical download and upload speed.
    a. GIS or CAD file(s);
    b. Text file or Excel Spreadsheet listing existing and potential customer addresses; or
    c. Text file or Excel Spreadsheet with a list of Census Blocks with Census Tract numbers

b. For wireless service providers, the change in the Census 2010 geography does not have any impact on your data.

c.

2. If the data has not changed since the last submission, please send an e-mail to Mr. Virgil J. Young, Jr., Senior Telecommunications Analyst, at vyoung@psc.dc.gov and OCTO will use the data from the previous submission. Please note that your data will require validation even if there are no changes in your service to ensure the conversion from the Census 2000 to the Census 2010 geography is correct.

3. If your company is primarily a **non-residential broadband service provider**, please let Mr. Young know that as well – NTIA has requested this specific information for the Fall 2011 data submission.

4. Also, please send an email to Mr. Young if your **company has merged, sold, or bought another broadband service provider in the District** or if your company has ceased operations in the District, as that can have an impact on the data submitted to the NTIA.

5. **If your company does not currently provide broadband Internet access services to a residential, business, institutional, or government entity located within the District**, please send an email confirming your company's non-provider status to Mr. Young.

The District's Broadband Provider Portal login page can be accessed at the following URL:

http://host.appgeo.com/DistrictofColumbiaProviderPortal/

Your secure login account is provided as follows:

Username:

Password:

To help OCTO identify any improvements or changes in the adoption rates for broadband services within the District, I request that you also provide us with a copy of your company's Broadband Service Report for the District of Columbia (Form 477) filed with the Federal Communications Commission ("FCC") on or before September 1. **A PDF copy of the Form 477 for the District should be submitted by email to Mr. Young as soon as possible after the FCC's September 1 filing deadline.** A secure FTP site is available for companies that prefer that method of transmittal.

If your company submitted, in association with a previous broadband data submission, a Non-Disclosure Agreement ("NDA") with OCTO, it is still effective and will be honored. If your company would like to sign a NDA with OCTO please email your request to Mr. Young. (The NDA explains how OCTO will handle the submitted data; including what portions of the data will be submitted to the NTIA and what derived products will become part of OCTO's website on broadband services available in the District.)

Thank you in advance for completing this data request. We have attempted to make the process minimally burdensome, but understand that questions may arise. Should you have any questions regarding this data request, please contact my Policy Advisor, Cary B. Hinton, at chinton@psc.dc.gov or 202-626-9186.

Thank you for your assistance,

Betty Ann Kane

Chairman

District of Columbia Public Service Commission

Attachments:

1. Broadband Data Definitions – Fall 2011
2. Provider Data Validation - Instruction Manual

NTIA Definition of Terms

"Broadband service" is the provision of data transmission technology that provides two-way data communication with the Internet with advertised speeds of at least 768 kilobits per second (kbps) downstream and greater than 200 kbps upstream to end users.
Internet Service Providers (ISPs) are not "end users" for this purpose. An entity is a "facilities-based" provider of broadband service connections to end user locations if any of the following conditions are met: (1) it owns the portion of the physical facility that terminates at the end user location; (2) it obtains unbundled network elements (UNEs), special access lines, or other leased facilities that terminate at the

end user location and provisions/equips them as broadband; or (3) it provisions/equips a broadband wireless channel to the end user location over licensed or unlicensed spectrum.
Service is "available" at an address if the provider currently provides service to a location, or if broadband service could be established, without an extraordinary commitment of resources, in a 7 to 10 business day period.

PSC Letter to Providers that submitted Round 3 data and didn't meet the NOFA requirements

Dear (Insert Name of Group #2 BSP contact):

The District of Columbia ("District") Office of the Chief Technology Officer ("OCTO") and the Public Service Commission ("Commission") would like to thank you for your continued participation in the District's Broadband Service Mapping Program. To meet the objectives under the National Telecommunications and Information Administration ("NTIA") State Broadband Data and Development Grant Program, the Commission requests the assistance and cooperation of all broadband service providers that enable a residential, business, institutional, or government entity located within the District to use broadband Internet services. At this time, the Commission is now requesting broadband service availability data **current as of June 30, 2011** for processing and review before submittal to NTIA for the Fall 2011 National Broadband Map and database update.

The completed broadband service data submission document, see attached "DC Broadband Mapping Questionnaire - Fall 2011" ("Questionnaire"), should be submitted to the Commission as an attachment to an e-mail response to Virgil J. Young, Jr., Senior Telecommunications Analyst, at vyoung@psc.dc.gov. Please note that the NTIA has requested that data should be submitted using the Census 2010 geography. **The Commission requests broadband service providers to submit the questionnaire and data by Friday, August 19, 2011.**

A list of data submission options is outlined below.

1. New full dataset.
    a. If you are providing NTIA ready data, please make sure you have converted your data to the Census 2010 census block geography.
    b. If you are providing address points, OCTO will geo-code and process the data to the Census 2010 geography.
    c. Use one the data formats below for your company's service area. Each data format should include: technology of transmission; maximum advertised download and upload speed; and typical download and upload speed.
        a. GIS or CAD file(s);
        b. Text file or Excel Spreadsheet listing existing and potential customer addresses; or
        c. Text file or Excel Spreadsheet with a list of Census Blocks with Census Tract numbers

2. If the data has not changed since the last submission, please send an e-mail to Mr. Young and OCTO will use the data from the previous submission. Please note: If a service area was provided last submission, your data will require validation to ensure the conversion from the Census 2000 to the Census 2010 geography is correct. Even if there are no changes in your service.

3. Also, please send an email to Mr. Young if your **company has merged, sold, or bought another broadband service provider in the District** or if your company has ceased operations in the District, as that can have an impact on the data submitted to the NTIA.

4. **If your company does not currently provide broadband Internet access services to a residential, business, institutional, or government entity located within the District**, please send an email confirming your company's non-provider status to Mr. Young.

To help OCTO identify any improvements or changes in the adoption rates for broadband services within the District, I request that you also provide us with a copy of your company's Broadband Service Report for the District of Columbia (Form 477) filed with the Federal Communications Commission ("FCC") on or before September 1. **A PDF copy of the Form 477 for the District should be submitted by email to Mr. Young as soon as possible after the FCC's September 1 filing deadline.** A secure FTP site is available for companies that prefer that method of transmittal.

If your company submitted, in association with a previous broadband data submission, a Non-Disclosure Agreement ("NDA") with OCTO, it is still effective and will be honored. If your company would like to sign a NDA with OCTO please email your request to Mr. Young. (The NDA explains how OCTO will handle the submitted data; including what portions of the data will be submitted to the NTIA and what derived products will become part of OCTO's website on broadband services available in the District.)

Thank you in advance for completing this data request. We have attempted to make the process minimally burdensome, but understand that questions may arise. Should you have any questions regarding this data request, please contact my Policy Advisor, Cary B. Hinton, at chinton@psc.dc.gov or 202-626-9186.

Thank you for your assistance,

Betty Ann Kane

Chairman

District of Columbia Public Service Commission

Attachments:

3. DC Broadband Mapping Questionnaire – Fall 2011
4. Broadband Data Definitions – Fall 2011

NTIA Definition of Terms

"Broadband service" is the provision of data transmission technology that provides two-way data communication with the Internet with advertised speeds of at least 768 kilobits per second (kbps) downstream and greater than 200 kbps upstream to end users.

Internet Service Providers (ISPs) are not "end users" for this purpose. An entity is a "facilities-based" provider of broadband service connections to end user locations if any of the following conditions are met: (1) it owns the portion of the physical facility that terminates at the end user location; (2) it obtains unbundled network elements (UNEs), special access lines, or other leased facilities that terminate at the end user location and provisions/equips them as broadband; or (3) it provisions/equips a broadband wireless channel to the end user location over licensed or unlicensed spectrum.
Service is "available" at an address if the provider currently provides service to a location, or if broadband service could be established, without an extraordinary commitment of resources, in a 7 to 10 business day period.

PSC Letter to Providers that did not submit Round 3 data or are new BSPs

Dear (Insert Name of Group #3 BSP contact):

The District of Columbia Office of the Chief Technology Officer ("OCTO") has been awarded a grant from the U. S. Department of Commerce, National Telecommunications and Information Administration ("NTIA") to map the availability of broadband services in the District of Columbia ("District"). Pursuant to a Memorandum of Understanding, OCTO has delegated to the District of Columbia Public Service Commission ("Commission") the responsibility for all interaction, including data collection, with the broadband service provider community. To meet the objectives under the NTIA's State Broadband Data and Development Grant Program, the Commission requests the assistance and cooperation of all broadband service providers that enable a residential, business, institutional, or government entity located within the District to use broadband Internet services. At this time, the Commission is now requesting broadband service availability data **current as of June 30, 2011** for processing and review before submittal to NTIA for the Fall 2011 National Broadband Map and database update.

The completed broadband service data submission document, see attached "DC Broadband Mapping Questionnaire - Fall 2011" ("Questionnaire"), should be submitted to the Commission as an attachment to an e-mail response to Virgil J. Young, Jr., Senior Telecommunications Analyst, at vyoung@psc.dc.gov. Please note that the NTIA has requested that data should be submitted using the Census 2010 geography. **The Commission requests broadband service providers to submit the questionnaire and data by Friday, August 19, 2011.**

A list of data submission options is outlined below.

1. New full dataset.
    a. If you are providing NTIA ready data, please make sure you have converted your data to the Census 2010 block geography.
    b. If you are providing address points, OCTO will geo-code and process the data to the Census 2010 block geography.
    c. Use one the data formats below for your company's service area. Each data format should include: technology of transmission; maximum advertised download and upload speed; and typical download and upload speed.
        a. GIS or CAD file(s);
        b. Text file or Excel Spreadsheet listing existing and potential customer addresses; or
        c. Text file or Excel Spreadsheet with a list of Census Blocks with Census Tract numbers
2. Also, please send an email to Mr. Young if your **company has merged, sold, or bought another broadband service provider in the District** or if your company has ceased operations in the District, as that can have an impact on the data submitted to the NTIA.

3. **If your company does not currently provide broadband Internet access services to a residential, business, institutional, or government entity located within the District**, please send an email confirming your company's non-provider status to Mr. Young.

To help OCTO identify any improvements or changes in the adoption rates for broadband services within the District, I request that you also provide us with a copy of your company's Broadband Service Report for the District of Columbia (Form 477) filed with the Federal Communications Commission ("FCC") on or before September 1. **A PDF copy of the Form 477 for the District should be submitted by email to Mr. Young as soon as possible after the FCC's September 1 filing deadline.** A secure FTP site is available for companies that prefer that method of transmittal.

If your company would like to sign a Non-Disclosure Agreement ("NDA") with OCTO, please email your request to Mr. Young. (The NDA explains how OCTO will handle the submitted data; including what portions of the data will be submitted to the NTIA and what derived products will become part of OCTO's website on broadband services available in the District.)

Thank you in advance for completing this data request. We have attempted to make the process minimally burdensome, but understand that questions may arise. Should you have any questions regarding this data request, please contact my Policy Advisor, Cary B. Hinton, at chinton@psc.dc.gov or 202-626-9186.

Thank you for your assistance,

Betty Ann Kane

Chairman

District of Columbia Public Service Commission

Attachments:

5. DC Broadband Mapping Questionnaire – Fall 2011
6. Broadband Data Definitions – Fall 2011

NTIA Definition of Terms

"Broadband service" is the provision of data transmission technology that provides two-way data communication with the Internet with advertised speeds of at least 768 kilobits per second (kbps) downstream and greater than 200 kbps upstream to end users.
Internet Service Providers (ISPs) are not "end users" for this purpose. An entity is a "facilities-based" provider of broadband service connections to end user locations if any of the following conditions are met: (1) it owns the portion of the physical facility that terminates at the end user location; (2) it obtains unbundled network elements (UNEs), special access lines, or other leased facilities that terminate at the

end user location and provisions/equips them as broadband; or (3) it provisions/equips a broadband wireless channel to the end user location over licensed or unlicensed spectrum.
Service is "available" at an address if the provider currently provides service to a location, or if broadband service could be established, without an extraordinary commitment of resources, in a 7 to 10 business day period.

Appendix 2
Standard Non-Disclosure Agreement

NON-DISCLOSURE AGREEMENT

(District of Columbia Broadband Service Mapping)

This **Non-Disclosure Agreement** ("**Agreement**") is between the Office of the Chief Technology Officer of the District of Columbia ("OCTO") and _________________ ("Company"), a corporation having a business address at ___________________ ____.

RECITALS

A. Company wishes to disclose and OCTO wishes to receive certain information from Company represented by Company to be confidential and commercial / proprietary information (hereinafter collectively, "Information") pertaining to ________________. This exchange includes all communication of Information between the parties in any form whatsoever, including oral, written and machine readable form, pertaining to the above.

B. OCTO wishes to receive and Company wishes to disclose the Information for the sole purpose of participating in national broadband service mapping activities. OCTO will disclose the information only in the following ways:

To The public:

- The service territories of individual providers will not be made public, but OCTO will create a public web site that allows users, including potential broadband service subscribers, to enter any valid address in the District of Columbia and be referred to all the broadband service providers offering service to that location.

- Form 477 subscriber count data from all companies will be aggregated by OCTO at the Census Tract level. OCTO will use this information to estimate the residential broadband adoption rate by Census Tract. Estimated broadband service adoption rates will be made public, but the market share of individual broadband service providers will not be revealed.

To the U.S. Department of Commerce, National Telecommunications and Information Administration (NTIA):

- The broadband service data required by the NTIA in the Notice of Funds Availability; clarification published in the Federal Register; August 7, 2009 (74 FR 40569).

To the Metropolitan Police Department and the District of Columbia Homeland Security and Emergency Management Agency:

- Middle-mile connection points will be added to the District's critical infrastructure data base. This critical infrastructure database is used only for public safety purposes.

These data will not be shared outside law enforcement and homeland security communities.

AGREEMENTS

Therefore, OCTO and Company agree as follows:

1. That the disclosure of Information by Company is in confidence and thus OCTO agrees to:

a. (1) Not disclose the Information to any other person, and (2) use at least the same degree of care to maintain the Information confidential as OCTO uses in maintaining as confidential its own confidential information, but always at least a reasonable degree of care;

b. Use the Information only for the above purpose;

c. Restrict disclosure of the Information solely to those employees or contract staff of OCTO having a need to know such Information in order to accomplish the purposes stated above; The District Government operates an in-house broadband service provider known as DC Net, accordingly, the Information expressly will not be shared by OCTO with DC Net as an organization or its employees.

d. Advise each such individual, before he or she receives access to the Information, of the obligations of OCTO under this Agreement, and require each such individual to maintain those obligations.

2. This Agreement imposes no obligation on OCTO with respect to any portion of the Information received from Company which: (a) was known to OCTO prior to disclosure by Company, (b) is lawfully obtained by OCTO from a third party under no obligation of confidentiality, (c) is or becomes generally known or publicly available other than by unauthorized disclosure, (d) is independently developed by OCTO or (e) is disclosed by Company to a third party without a duty of confidentiality on the third party.

3. This Agreement imposes no obligation on OCTO with respect to any portion of the Information unless such portion is: (a) disclosed in a written document or machine readable media marked as “COMMERCIAL / PROPRIETARY INFORMATION” at the time of disclosure, or (b) disclosed in any other manner and summarized in a memorandum mailed to OCTO within thirty (30) days of the disclosure. Information disclosed by Company in a written document or machine readable media and marked “COMMERCIAL / PROPRIETARY INFORMATION” includes, but is not limited to, the items, if any, set forth in the request for broadband service data from the District of Columbia Public Service Commission (“Commission”); attached hereto. The Commission’s request for broadband service data is incorporated herein by reference. OCTO hereby acknowledges receipt of the items listed in the Commission’s request for broadband service data, if any.

4. The Information shall remain the sole property of Company.

5. In the event of a breach or threatened breach or intended breach of this Agreement by either party, the other party shall be entitled to preliminary and final injunctions, enjoining and restraining such breach or threatened breach or intended breach.

6. OCTO agrees it will not export, directly or indirectly, any technical data acquired from Company or any product utilizing any such data to any country for which the U.S. Government or any agency thereof at the time of export requires an export license or other governmental approval, without first obtaining such license or approval.

7. The validity, construction, and performance of this Agreement are governed by the laws of the District of Columbia, and suit may be brought in the District to enforce the terms of this Agreement.

8. The rights and obligations of the parties under this Agreement may not be sold, assigned or otherwise transferred.

This Agreement is binding upon OCTO and Company and upon the directors, officers, employees and agents of each. This Agreement is effective as of the later date of execution and will continue indefinitely.

Office of the Chief Technology Officer of the District of Columbia

By

Name:________________________________

Title:_________________________________

Date:_________________________________

(Company)

By:

Name:________________________________

Title:_________________________________

Date:___________________________________

Appendix 3
Provider Questionnaire and Glossary
Microsoft Excel

Figure 1. Contact and Broadband Service

District of Columbia - Mapping Questionnaire Fall 2011

This questionnaire is directed to providers that have not qualified for participation in the National Broadband map. Each sheet collects a different type of information. Tabs at the bottom of the workbook allow users to switch among the three sheets.

Date Submitted:<mm/dd/yyyy>	
Company Name:	
Doing Business As:	
FRN #:	
Contact Name:	
Contact Email:	
Contact Address1:	
Contact Address2:	
Contact City, State Zip code:	

1.1 Provide a URL of the Company's website to which the District should refer potential broadband service subscribers.

1.2 Is your Company a facility based provider or a reseller? Please select the cell next to the technology that you provide and choose from the dropdown menu which business type applies.

Technology	Business Type	Technology	Business Type
10 Asymmetric		60 Satellite	
20 Symmetric		70 Terrestrial Fixed Wireless - Unlicensed	
30 Other Wireline		71 Terrestrial Fixed Wireless - Licensed	
40 Cable DOCSIS 3.0		80 Mobile Wireless	
41 Cable-Other		90 Electric Power Line	
50 Optical Carrier		0 Other	

1.3 If your company is a resller, who is the facility based provider(s)?

1.4 Complete the following dropdown table **for each Technology of Transmission that your company provides.**
(One row for each Technology of Transmission - click on the cell to view a list of selections per column).

	Technology Transmission	Districtwide*	Maximum Advertised Speed		Typical Speed	
	Code Description	Yes/No	Download Speed	Upload Speed	Download Speed	Upload Speed
(Ex.1)	*10 Asymmetric*	*Yes*	*768 kbps to 1.49 mbps*	*201 to 767 kbps*	*1.5 to 2.9 mbps*	*768 kbps to 1.49 mbps*
1						
2						
3						
4						
5						

__ Districtwide Definition__ : The Company must be able to "offer broadband service" to the "entire District of Columbia", (residential, business, institutional or government entity **within 10 business days** of a service order without an extraordinary commitment of additional resources.) with advertised speeds of **at least 768 kilobits per second (Kbps) downstream and greater than 200 Kpbs upstream** .*

1.5 For each Technology of Transmission that was selected in 1.2 how long does it take to provide service to a customer after service has been ordered? (Click on the cell next to each Technology you provide and select the length of time from a drop-down list).

Technology	Length of time to provide service	Technology	Length of time to provide service
10 Asymmetric (xDSL)		60 Satellite	
20 Symmetric (xDSL)		70 Terrestrial Fixed Wireless - Unlicensed	
30 Other Wireline		71 Terrestrial Fixed Wireless - Licensed	
40 Cable Modem - DOCSIS 3.0		80 Mobile Wireless	
41 Cable Modem - Other		90 Electric Power Line	
50 Optical Carrier (Fiber to end user)		0 All Other	

1.6 For each Technology of Transmission that was selected in questions 1.2, please provide your service area in any of the following data formats (each data format should include technology of transmission, maximum advertised download and upload speed, typical download and upload speed):

- **GIS or CAD file(s)**
- **Text file or Excel Spreadsheet listing service addresses**
- **Text file or Excel Spreadsheet with a list of Census Blocks with Tract numbers**

See graphics below of sample data formats

1.7 Does your company primarily make your service available to residential or non-residential (i.e. business) customers?

1.8 Can you provide this service within 10 business days of a service order without extraordinary commitment of additional resources?

1.9 If you provide broadband service and can offer it to customers (residential, business, institutional, or government entity) in the District of Columbia within 10 business days of a service order without extraordinary commitment of additional resources, the District of Columbia Public Service Commission encourages your participation in the State Broadband Mapping Program. We will be happy to discuss the benefits of participation with you.

1.10 Please provide a copy of your most recent filing of Form 477 to the FCC. Provide attachment filenames below.

Ex. of Spreadsheet - Includes Census Tract and Block; Maximum Download and Upload Speeds; Typical Download and Upload Speed; Total Users; and Percent Residential.

	A	B	C	D	E	F	G	H	I
1	Tract	Block	Technology	Max_Download	Max_Upload	Typ_Download	Typ_Upload	Total_Users	%_Residential
2	17.01	1000	10	8	8	5	3	25	100%
3	18.01	1000	10	8	8	5	3	175	78%
4	19.01	1000	10	8	8	5	3	62	95%

Sheet1 Sheet2 Sheet3

Ready 100%

Ex. Text File with Service Address - Includes Provider Name; FRN#; End-User Address; Technology of Transmission; Maximum

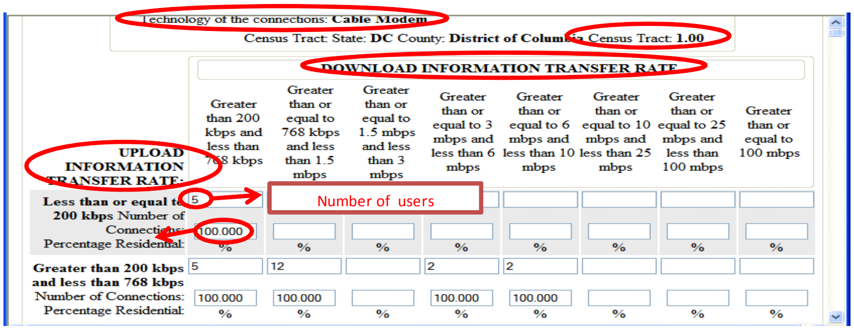
Sample_Address_Availability_DC - Notepad

File Edit Format View Help

```
Provider Name   FRN    ID    End-User Address     City    State   Zip    Technology of Transmission    Maximum Advertised Download Speed
Maximum Advertised Upstream Speed     Typical Download Speed  Typical Upload Speed

ACME Corporation     0001-2345-67   1    123 Main ST NW  123    WASHINGTON    DISTRICT OF COLUMBIA   20036  10    8    8    8    8
```

Ex. of Form 477 by Census Tract - Includes Technology of Transmission; Census Tract; Transfer Rate; Number of Users; and



Proceed to Sheet 2.

Figure 2. Wireless Spectrum

Provider Name

Wireless Spectrum Questions (Wireline only companies may skip this sheet.)

2.1 What spectrum(s) do you use to provide service? See table in Broadband Data Definitions guide for spectrum codes and descriptions.

<u>Proceed to Sheet 3.</u>

Figure 3. Middle Mile Facility Points

Broadband service providers shall provide a list of "middle-mile and backbone interconnection points" in the District of Columbia. Interconnection points are facilities that provide connectivity between (a) a service provider's network elements (or segments) or (b) between a service provider's network and another provider's network, including the Internet backbone. (Collectively, (a) and (b) are middle-mile and backbone interconnection points. Middle-mile and backbone interconnection points typically enable relatively fast data rates, are built to handle substantial capacities, and may be service-quality assured. Examples might include: points of interconnection enabling communications between an incumbent local exchange carrier's central office and the Internet, between a cable aggregation point (headend) and the Internet, or between a wireless base station and the provider's core network elements that connect to other networks, including the Internet.

3.1 Do you have any Middle Mile Facilities located in the District of Columbia?

"Yes" or "No"

3.2 If no, do you have Middle Mile Facilities in other states that serve customers within the District of Columbia?

3.3 Please list all Middle Mile Facilities that serve customers within the District of Columbia in the table below

Owned or Leased	*Serving Facility Capacity Code	**Serving Facility Type Code	Facility Address In DC (Street#, Street Name, Street Type, Quadrant)	*** Latitude (Optional if address provided)	*** Longitude (Optional if address provided)	Elevation (in feet from grade. Negative numbers are below grade)
Owned/Leased	*(1-6) See below*	*(1-4) See below*	*123 Main Street NW*	*38° 53' 43.6" N*	*77° 0' 56.35" W*	*15*
			…add rows as needed			

* Serving Facility Capacity Code	Data Rate
1	Multiple T1s and less than 40 mbps
2	Greater than 40 mbps and less than 150 mbps
3	Greater than 150 mbps and less than 600 mbps
4	Greater than or equal to 600 mbps and less than 2.4 gbps
5	Greater than or equal to 2.4 gbps and less than 10 gbps
6	Greater than or equal to 10 gbps

** Serving Facility Type Code	Description
1	Fiber
2	Copper
3	Hybrid Fiber Coax (HFC)
4	Wireless

*** Coordinates must be expressed using the WGS 1984 geographic coordinate system.

Appendix 4
Community Anchor Institution
Data Request Letter and Survey Form

Dear <Community Anchor Institution / Contact>:

The District of Columbia Government's Office of the Chief Technology Officer (OCTO) is in the fourth round of data collection as directed by the National Telecommunications and Information Administration's (NTIA) State Broadband Data and Development Program (SBDD). The SBDD is supported by a grant awarded by the United States Department of Commerce and NTIA to map the availability and adoption of broadband services in the District of Columbia (District).

A critical component of this grant requirement is to identify Community Anchor Institutions, such as <Community Anchor Institution>, in the District and to survey the availability of broadband service offered there, respectively. Community Anchor Institutions (CAI) consist of schools, libraries, health care providers, public safety entities, institutions of higher education, and other community supported organizations and entities.

Participation in the survey is strongly encouraged so as to develop a more accurate and comprehensive dataset of broadband availability in the District and to assist in the planning of District-wide broadband initiatives.
OCTO has developed a simple, one page web-based survey form that can be accessed and completed at this link: DC - Community Anchor Institutions Survey (web form)
NOTE: OCTO requests that the survey be completed on or before Friday, September 17, 2011. Thank you.

If you have any questions, please feel free to contact me.

Sincerely,

<Sender>

District of Columbia - Community Anchor Institutions

Please fill-out the following questions below.

* Required

Contact Name *

Title *

Contact Phone Number: *

Contact Email: *

Name of Institution *

Institution Type *

Select

Address *

Street Address

City, State, Zip *

Institution Website *

Do you currently have broadband (internet) service at this institution? *

- Yes
- No

Do you provide Public WiFi? *

- Yes
- No

Name of broadband provider

What type of broadband transmission technology is used?

Select

What is the maximum advertised download speed?

Data transfer speed

Select

What is the maximum advertised upload speed?

Data transfer speed

Select

Submit

Powered by Google Docs

Report Abuse - Terms of Service - Additional Terms

Appendix 5
Wireless Validation

Mobile Broadband Mapping

Commercial Cellular Networks

District of Columbia

Bob Pavlak

Chris San-Gaspar

September 29, 2010

Mobile Broadband Mapping of Commercial Cellular Networks: District of Columbia

Executive Summary

The outdoor downlink and uplink throughput speeds of the commercial cellular networks serving the District of Columbia were measured in September 2010, and compared with measurements made in September 2009. In addition to the three networks tested in 2009 (Verizon Wireless, Sprint, AT&T), our 2010 measurements also include Cricket and T-Mobile.

The results of the drive test measurements are shown in the two attached files (2010 results, and 2009 results), and a qualitative analysis of the results is presented here. A more detailed quantitative analysis will be prepared later.

All five of the service providers deliver broadband service (minimum 768 kbps downlink and 200 kbps uplink) in some areas of the District. However, there is a wide variation in coverage performance. Throughput speeds may be above the "broadband" thresholds in some areas and below the "broadband" thresholds in other areas. This variation in performance is shown by the color codes on the attached citywide maps.

There is also a significant variation in performance between the cellular service providers. The downlink speeds of the AT&T and T-Mobile networks are substantially above the broadband threshold of 768 kbps, with many areas above 1.5 Mbps. The speeds on AT&T's network are substantially higher in 2010 compared to 2009, which we believe is attributed to the 3G upgrade of the AT&T network to HSPA (High Speed Packet Access), a more recent version of 3G. Both AT&T and T-Mobile operate network infrastructure based on the 3GPP (3rd Generation Partnership Project) set of standards.

The uplink speeds on the AT&T network is by far the highest of any of the commercial service providers. We believe this is due to the more advanced version of the 3GPP standard used by AT&T. Uplink speeds on AT&T's network exceed 768 kbps and 1.5 Mbps in all but a few areas of the drive route.

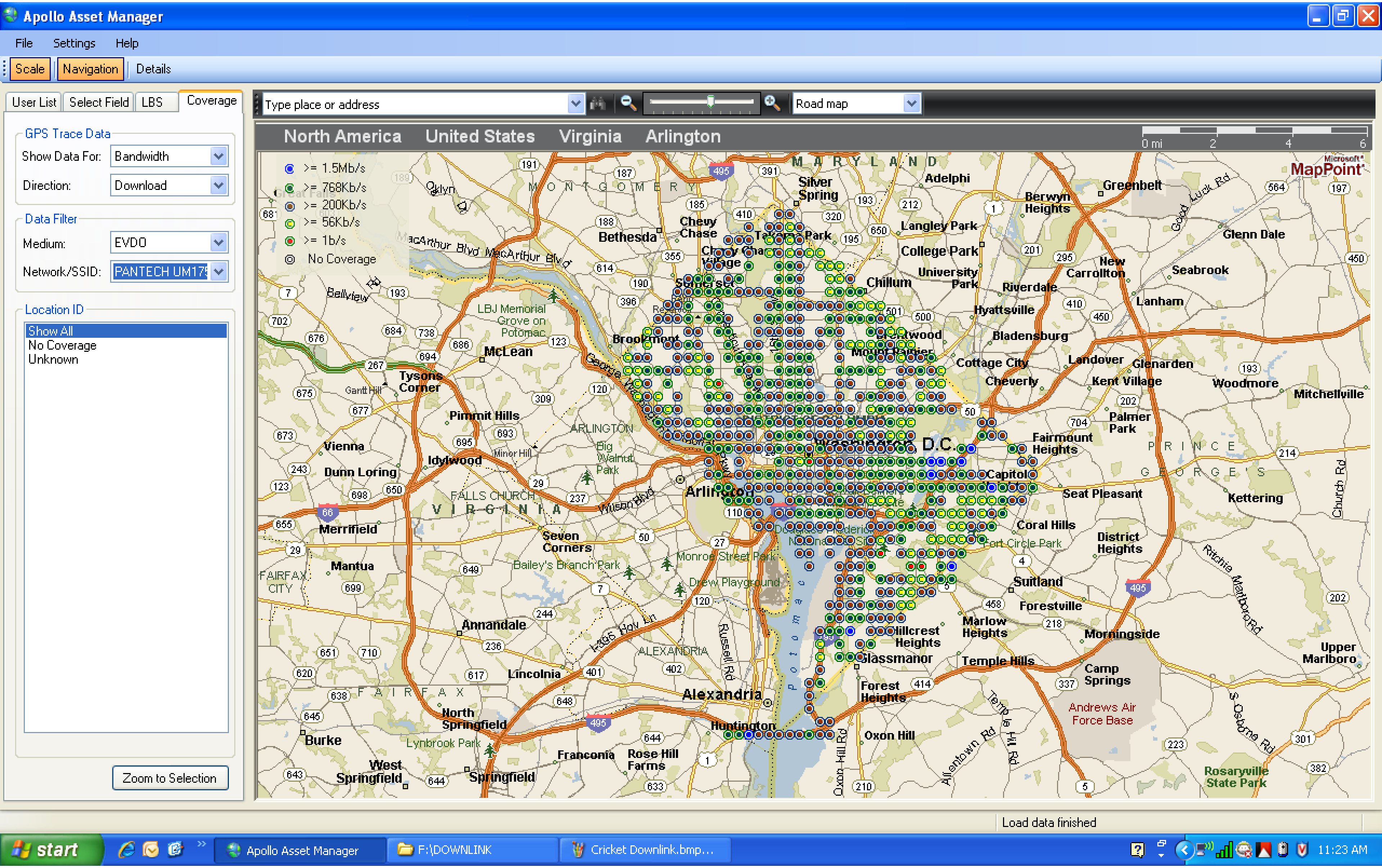
The downlink speeds on Verizon's network, between 2009 and 2010, appear about the same. The uplink performance has improved, with many areas in 2010 above 768 kbps. Many areas in 2009 were above 200 kbps uplink (but less than 768 kbps). Similarly, Sprint's downlink performance appears about the same between 2009 and 2010, and their uplink performance in 2010 is slightly improved from 2009, but not as high as any of the other service providers.

Sprint, via Clearwire, now offers 4G WiMax broadband service in the District. This network was not included in our broadband drive tests because the mobility performance of WiMax is poor. Sessions are frequently dropped during handoffs and the tool used for drive test measurements is unable to accommodate a high dropped session rate.

The authors wish to thank Felix Igbedior for his assistance in performing the drive tests with Chris San-Gaspar.

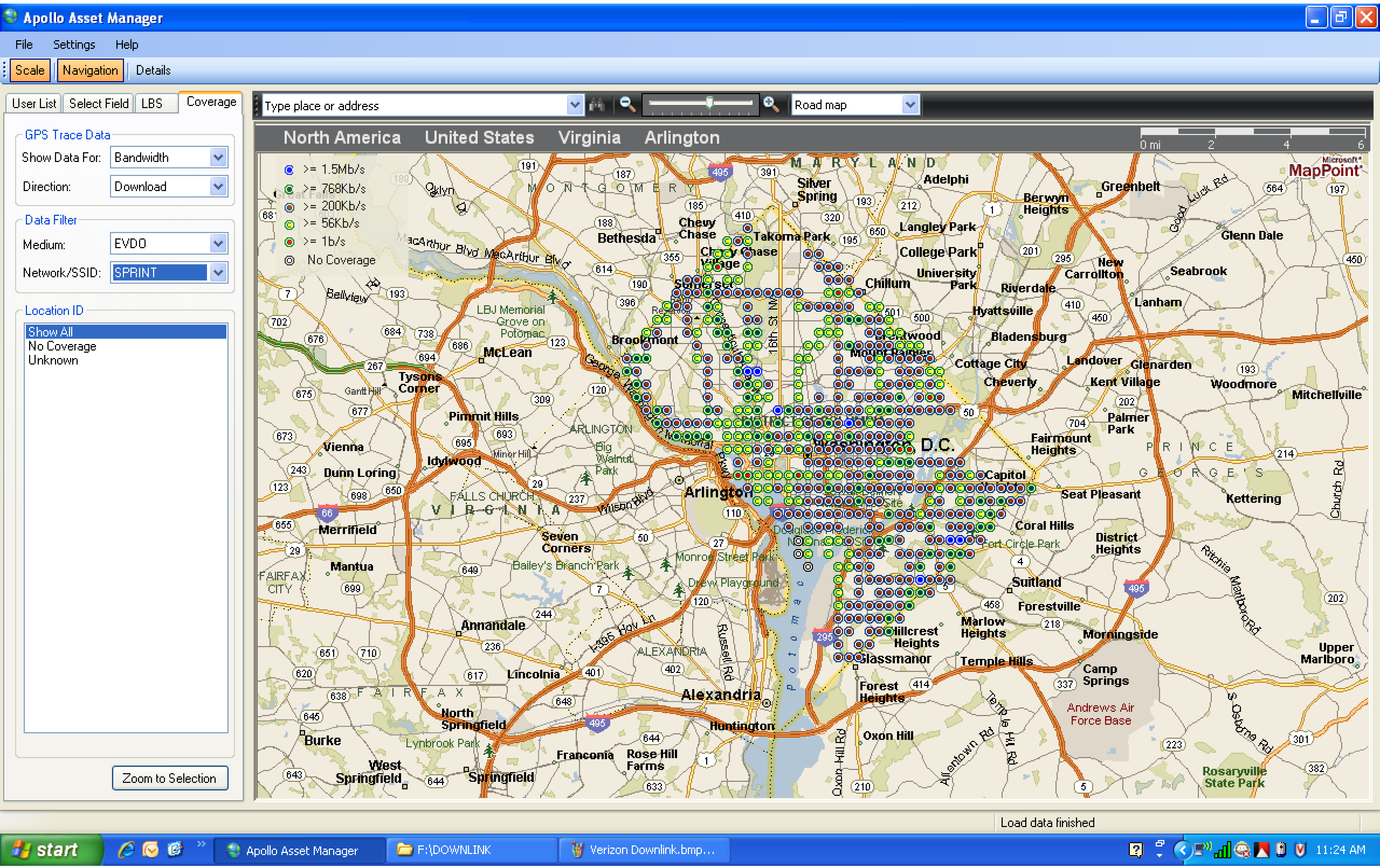
DC OFFICE OF THE CHIEF TECHNOLOGY OFFICER

VERIZON DOWNLINK 2010



octo
DC OFFICE OF THE CHIEF TECHNOLOGY OFFICER

SPRINT DOWNLINK 2010



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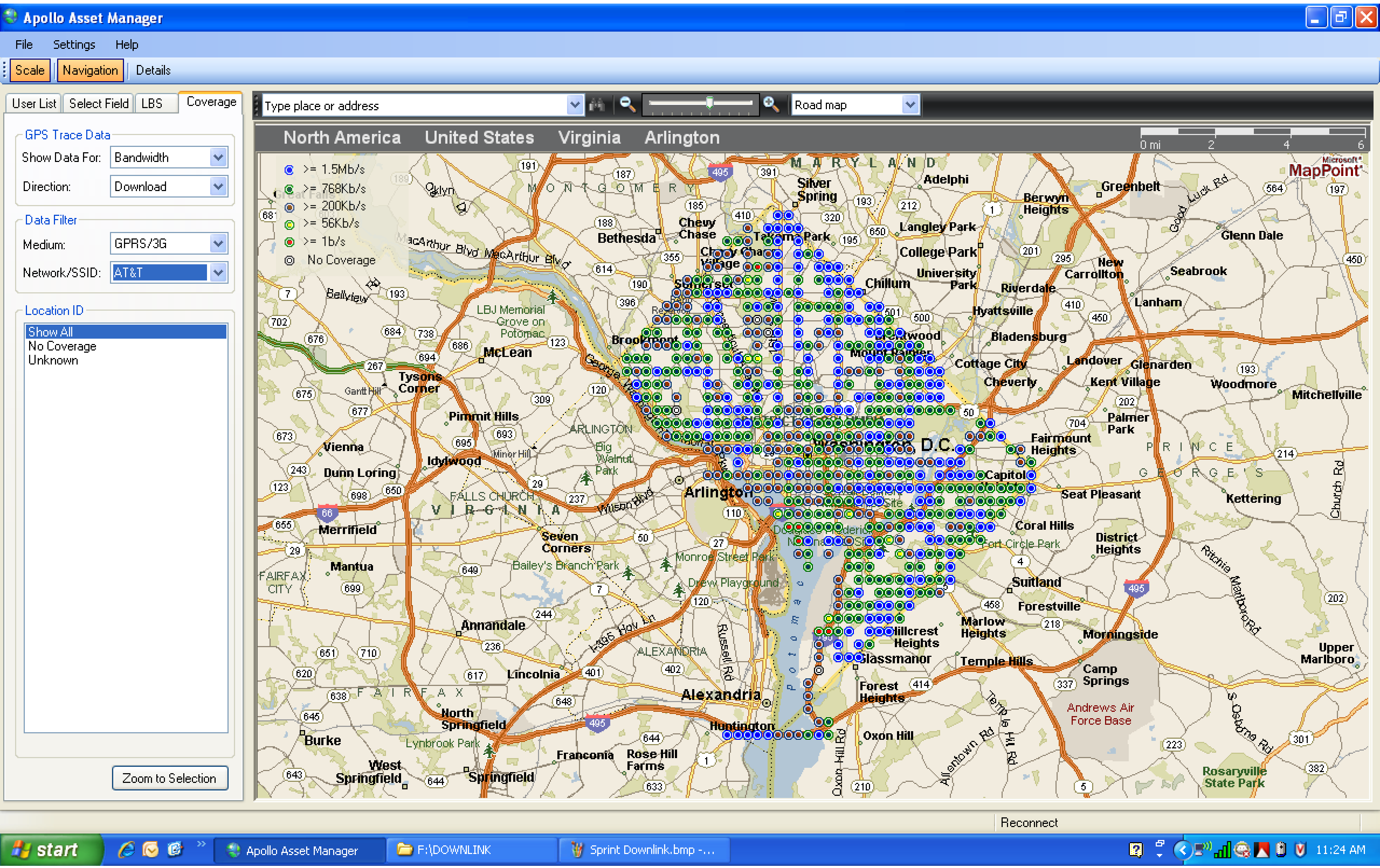
DC OFFICE OF THE CHIEF TECHNOLOGY OFFICER

AT&T DOWNLINK 2010



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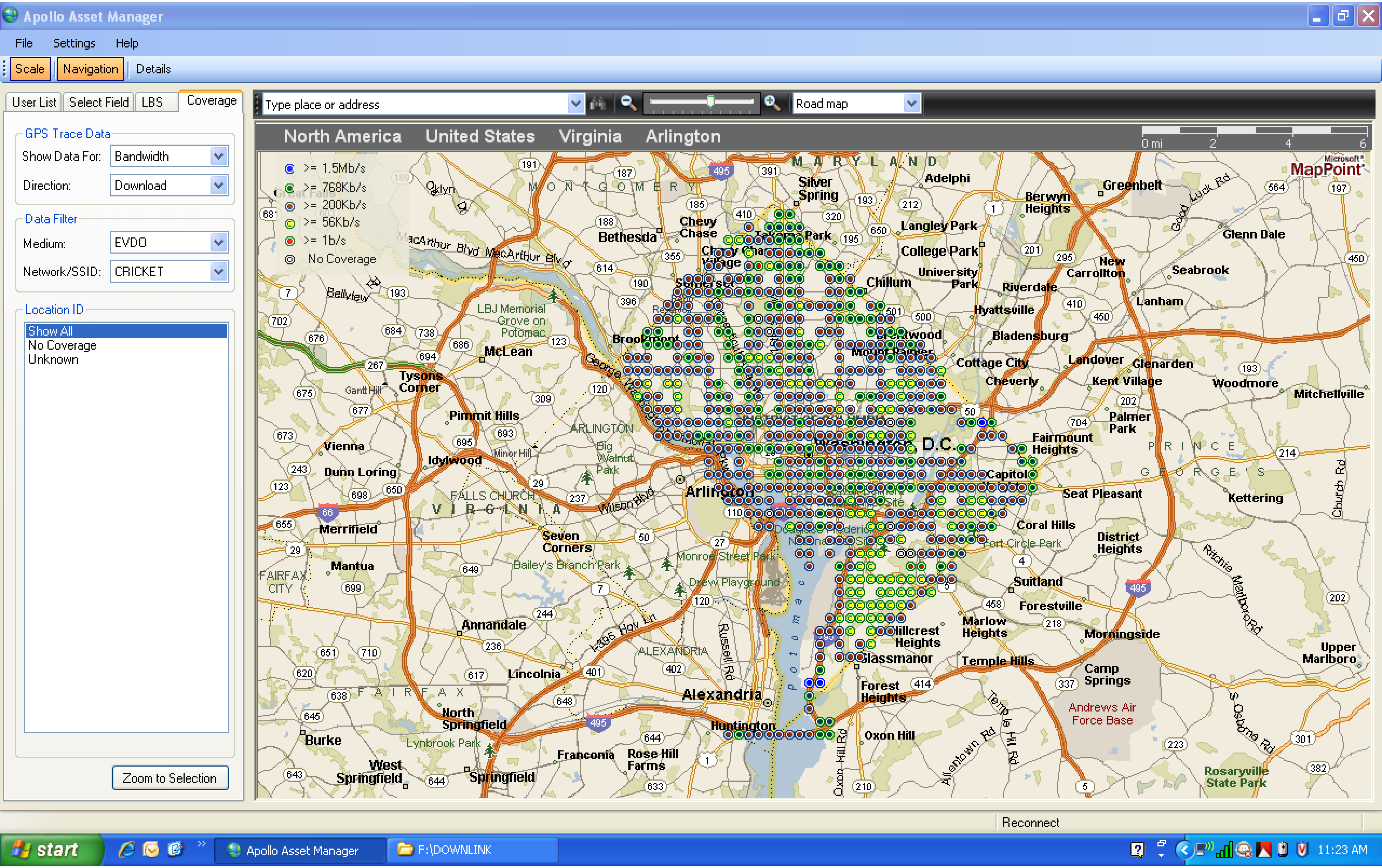
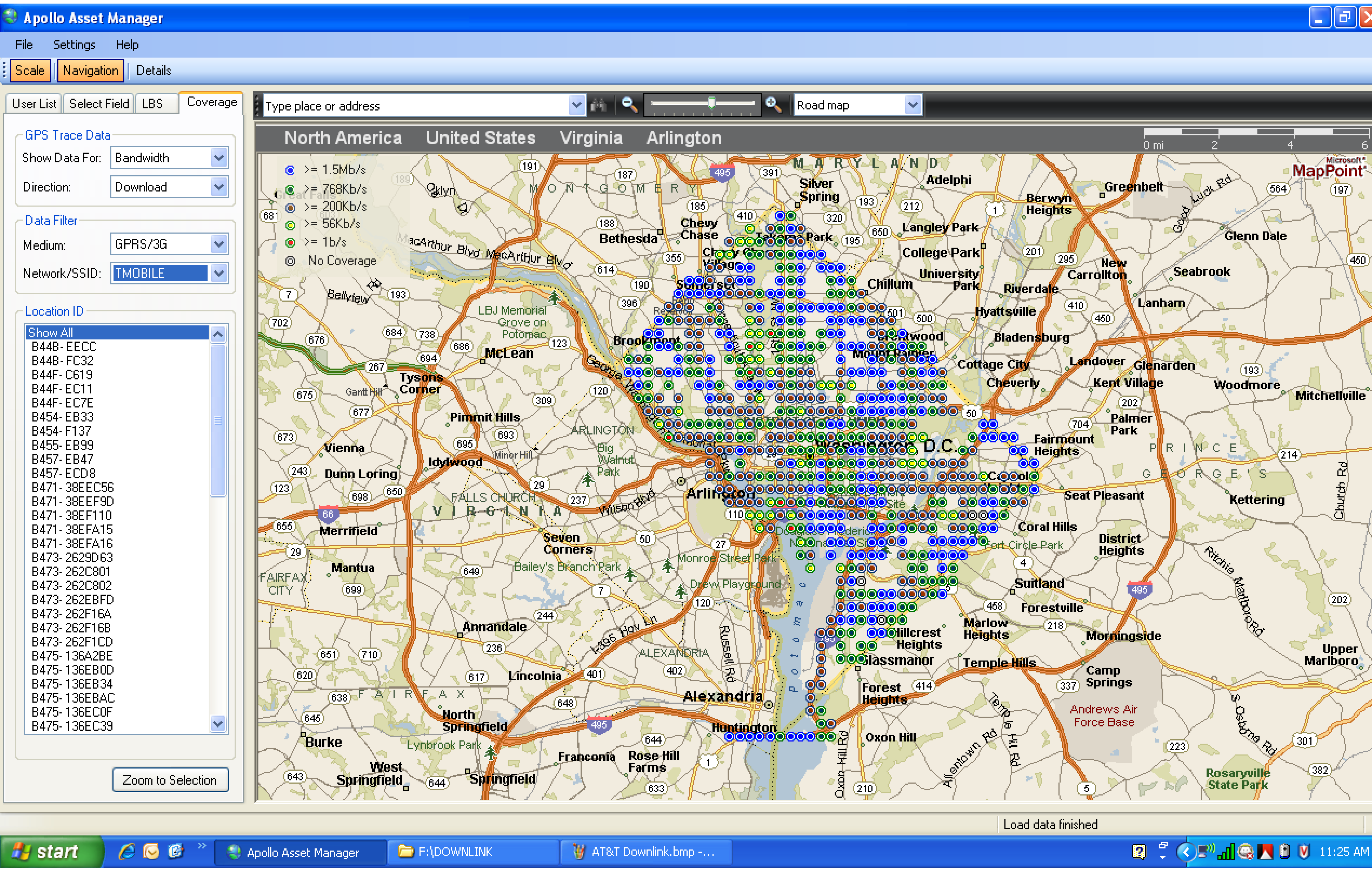
DC OFFICE OF THE CHIEF TECHNOLOGY OFFICER

CRICKET DOWNLINK 2010



DC OFFICE OF THE CHIEF TECHNOLOGY OFFICER

T-MOBILE DOWNLINK 2010



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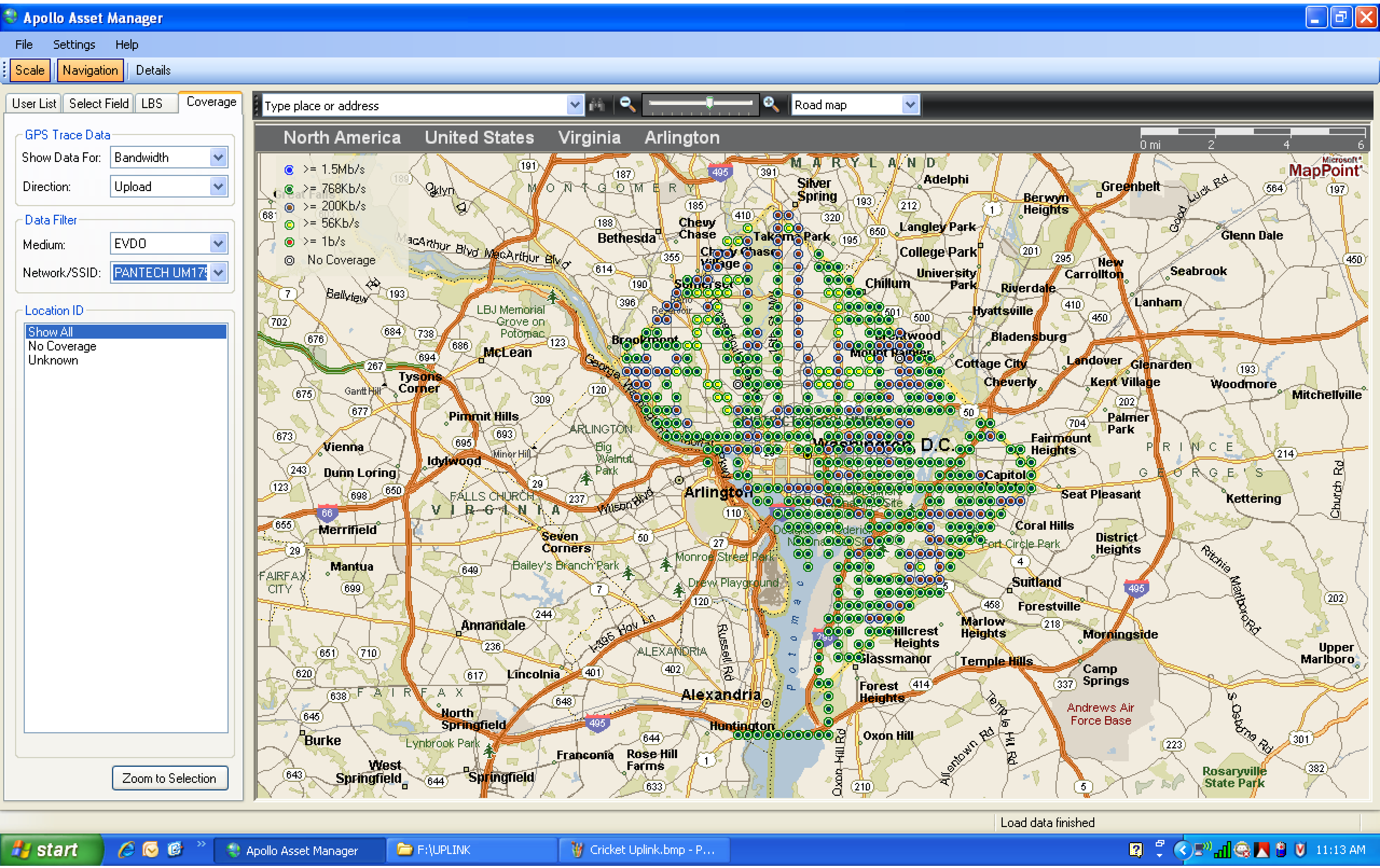
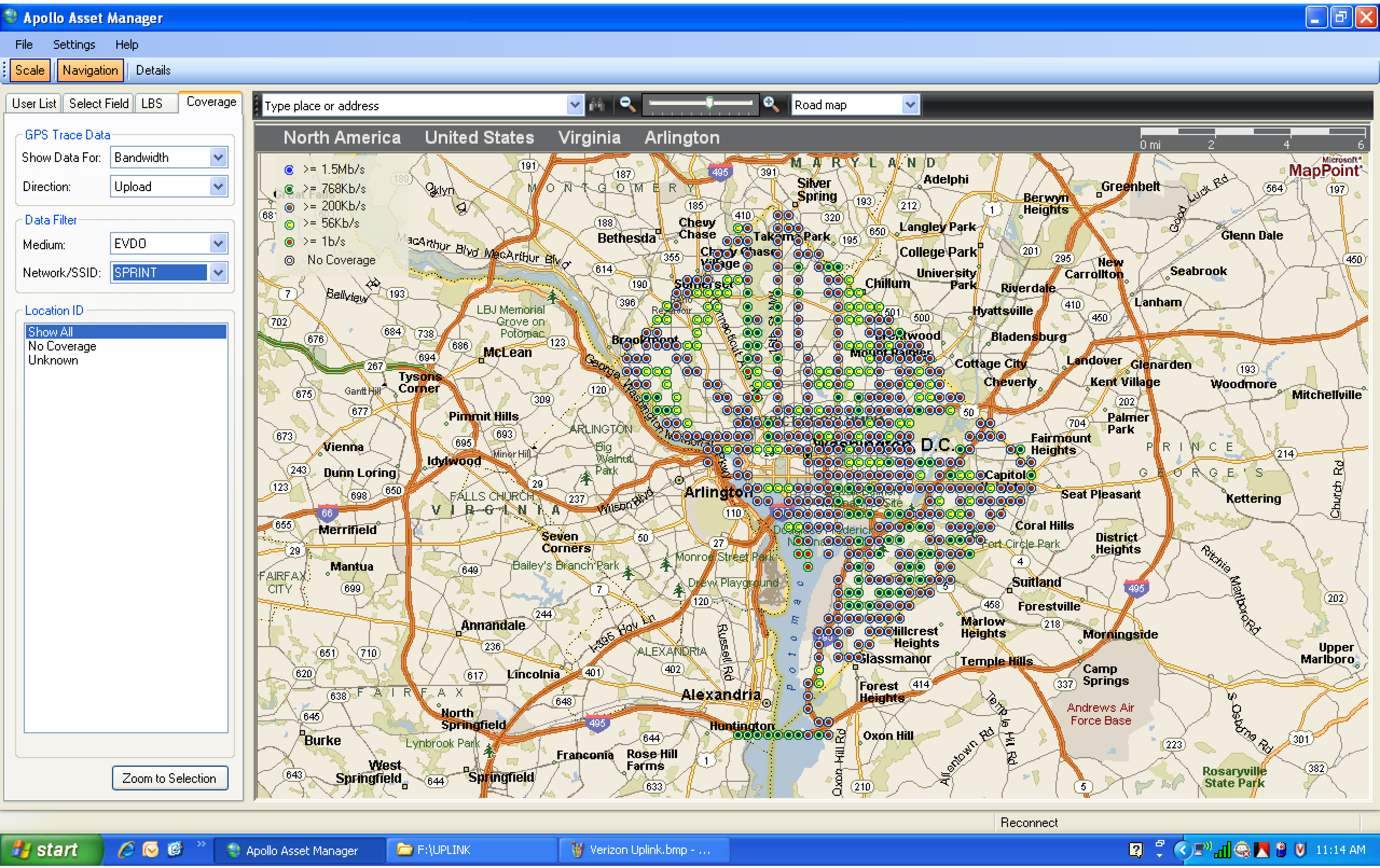
DC OFFICE OF THE CHIEF TECHNOLOGY OFFICER

VERIZON UPLINK 2010



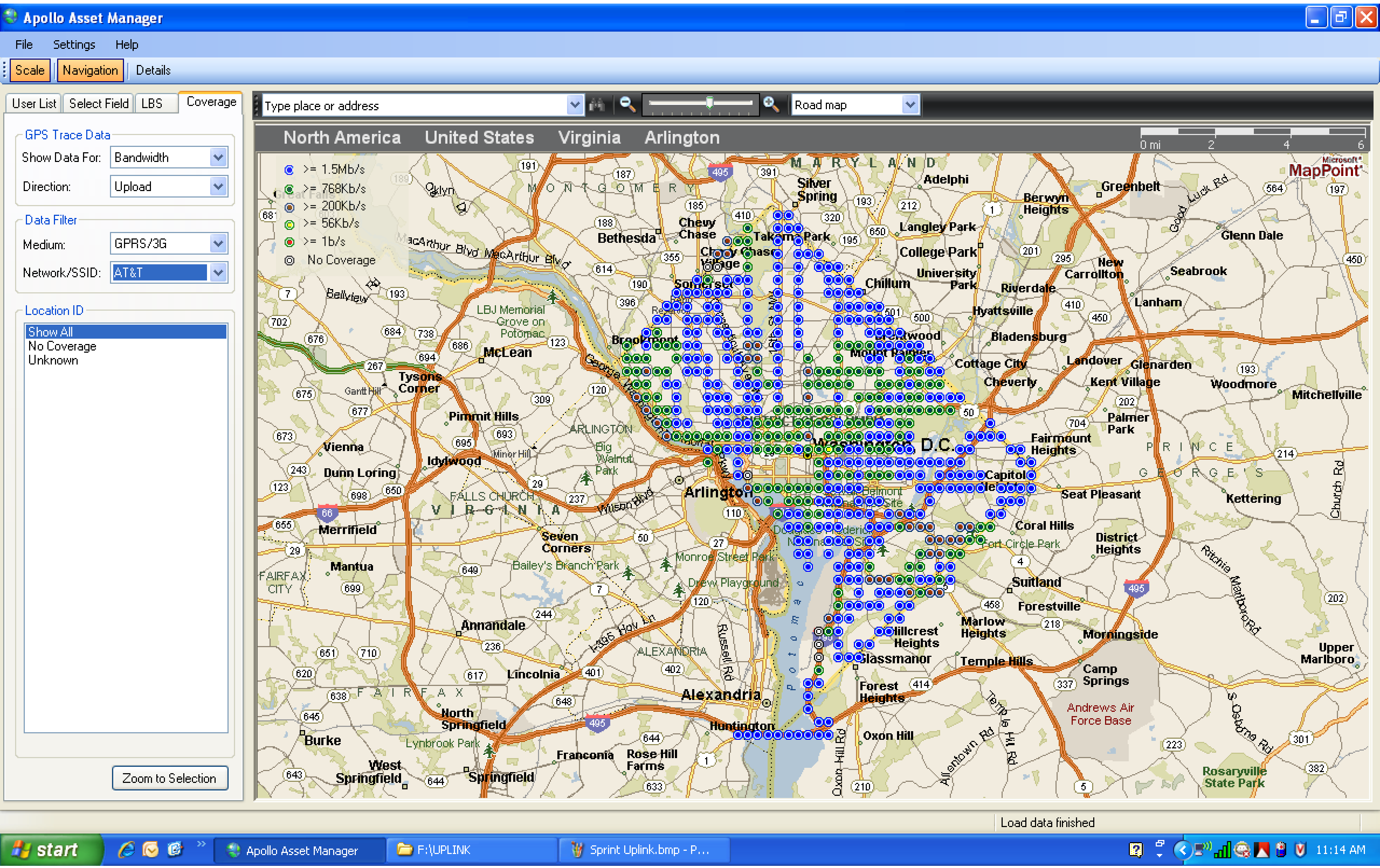
DC OFFICE OF THE CHIEF TECHNOLOGY OFFICER

SPRINT UPLINK 2010

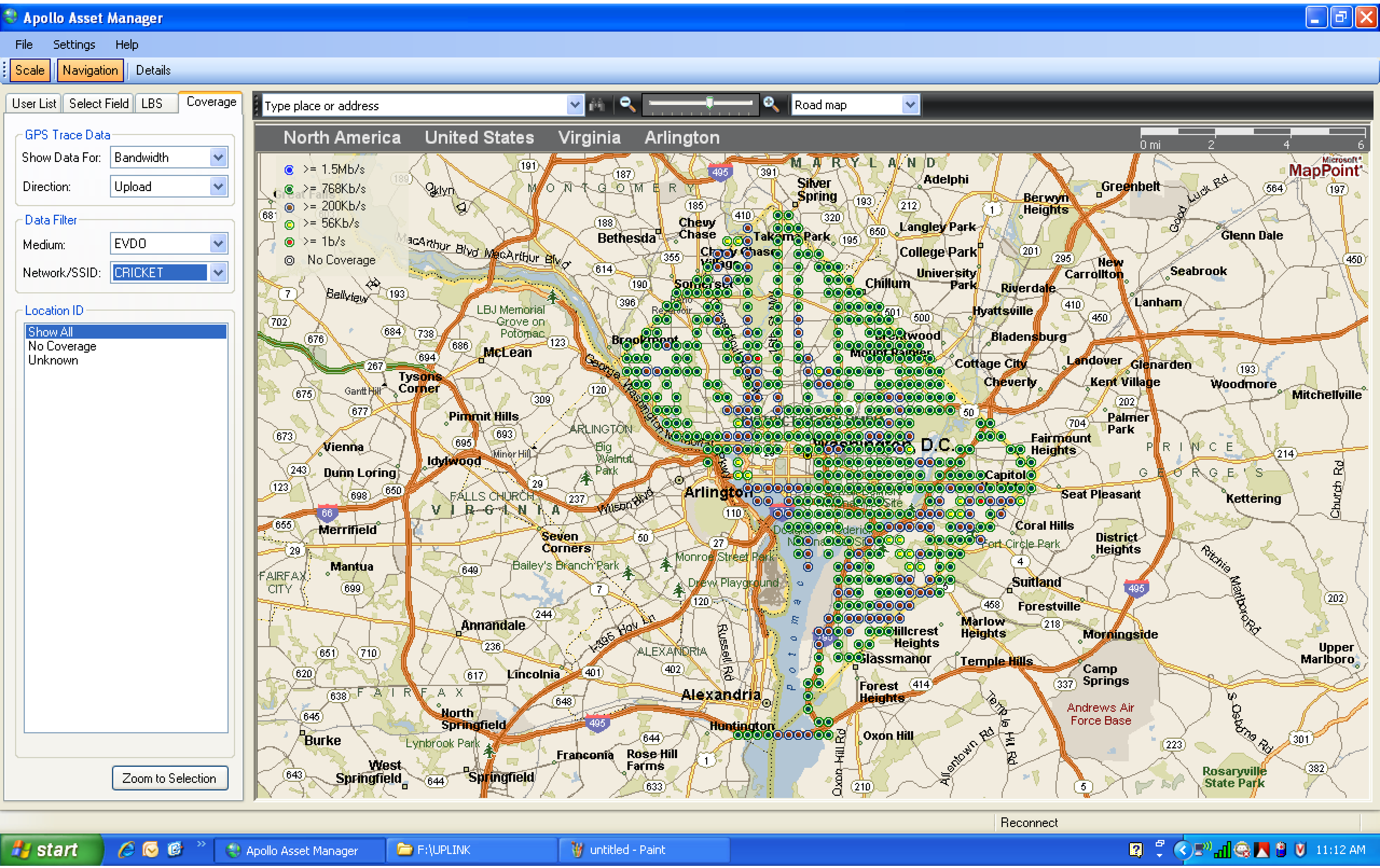


DC OFFICE OF THE CHIEF TECHNOLOGY OFFICER

AT&T UPLINK 2010

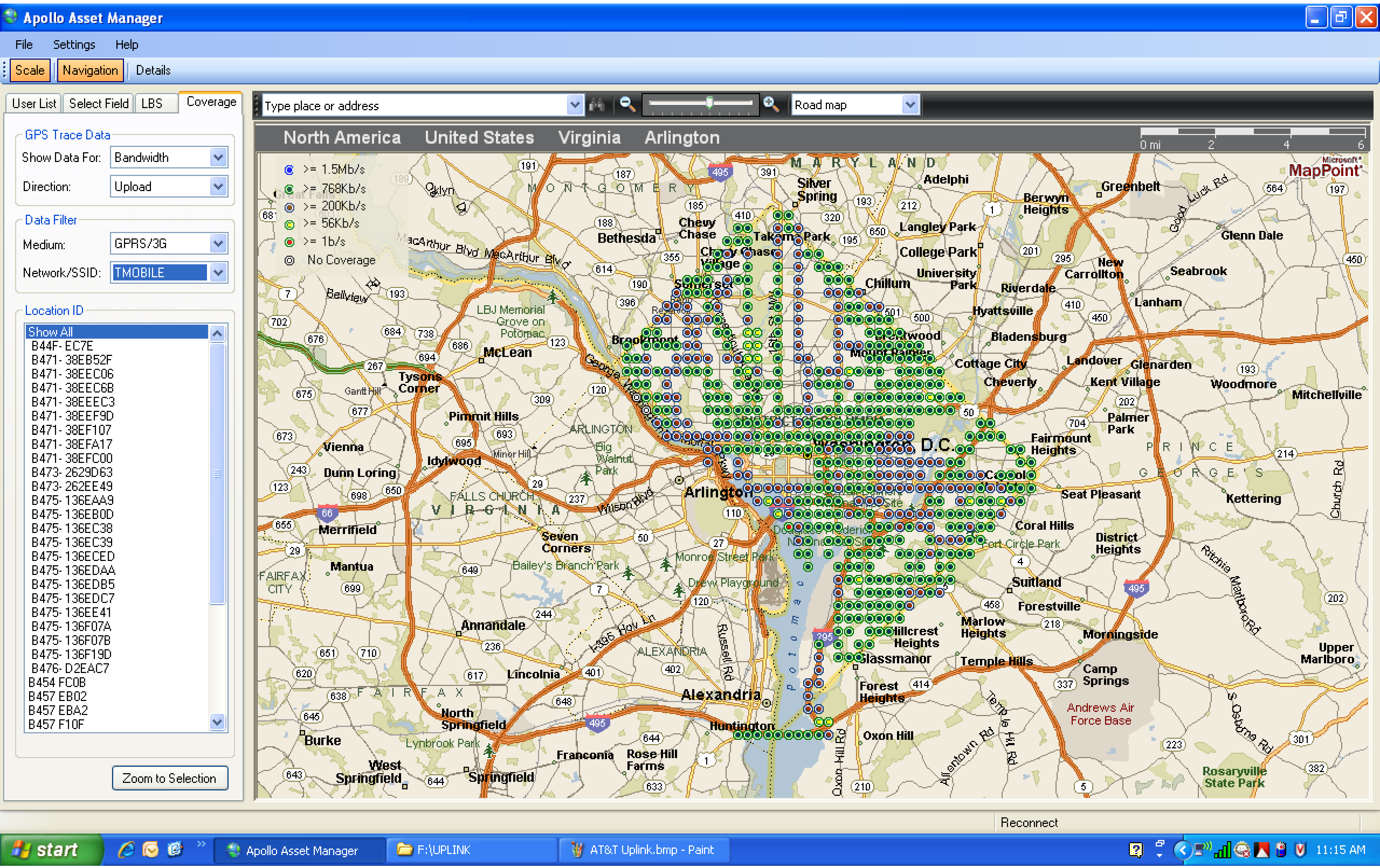


CRICKET UPLINK 2010



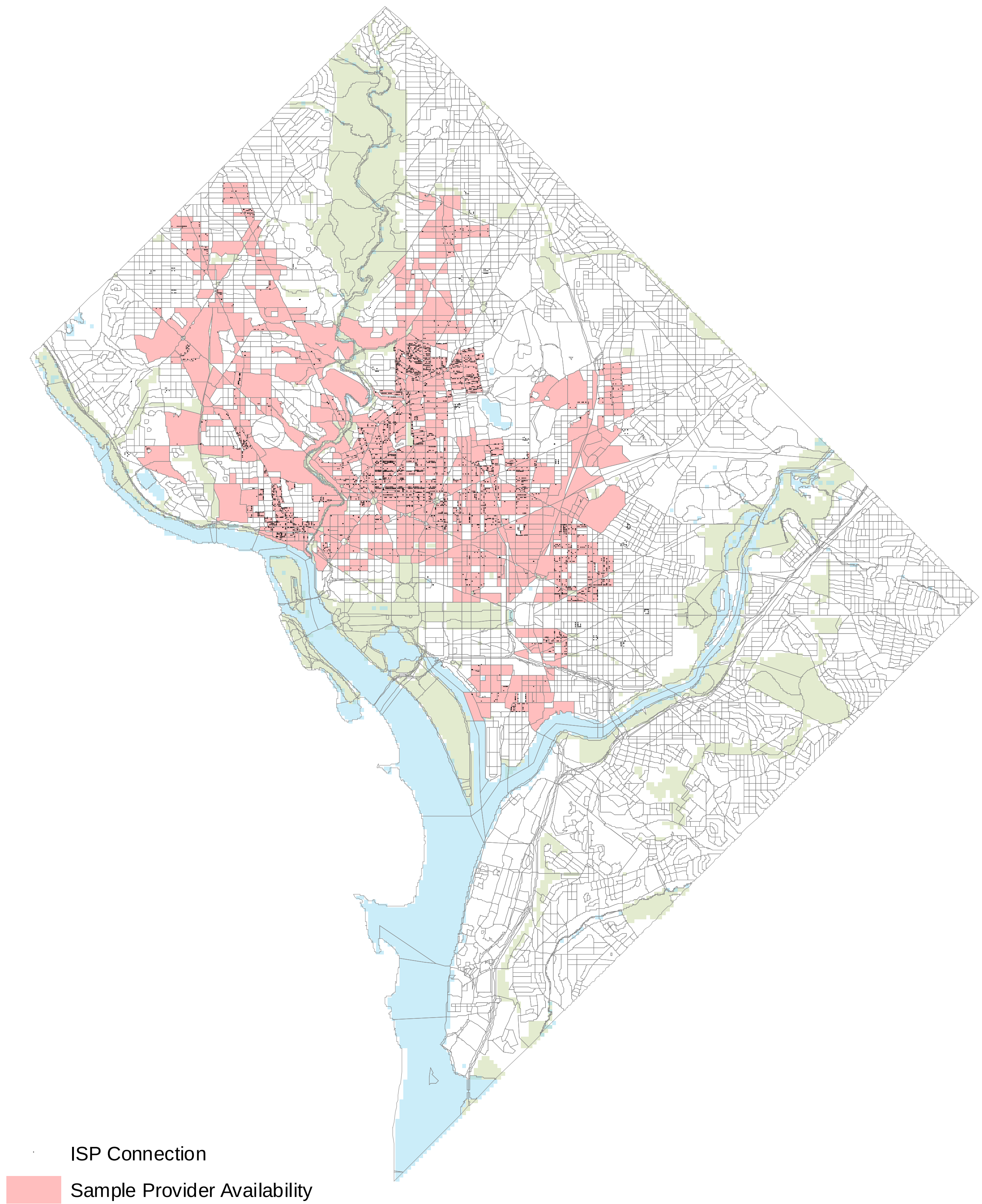
octo
DC OFFICE OF THE CHIEF TECHNOLOGY OFFICER

T-MOBILE UPLINK 2010



Appendix 6
Wireline Validation Sample

Sample Provider Reported Availability vs. InfoUSA ISP Connections



OFFICIAL OCTOBER 2011 UPDATE SUBMISSION TO THE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION UNDER THE STATE BROADBAND INITIATIVE PROGRAM FOR THE STATE OF FLORIDA

October 1, 2011

TABLE OF CONTENTS

Florida Cover Letter

October 1, 2011

Ms. Anne W. Neville
SBI Grant Program Director
National Telecommunications and Information Administration
U.S. Department of Commerce
1401 Constitution Avenue, NW Room 4716
Washington, DC 20230

Dear Ms. Neville:

The state of Florida and Connected Nation are pleased to present this submission for Florida's State Broadband Initiative (SBI) Grant Program known as Connect Florida.

These artifacts should be found to be compliant with the October 1, 2011, deadline for the semi-annual data update and in accordance with the terms of the July 1, 2009, Notice of Funds Availability (NOFA) and all subsequent clarifications pertaining to delivery of state-level mapping of broadband service availability. This packet includes:

Inventory of Deliverables, Connect Florida: October 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing

Appendix A: 4	n/a	Community Anchor Institutions-Narratives
VII.A.1(a)	n/a	Accuracy and Verification Report
n/a	DataPackage.xlsx	Worksheets of Contact Information, Record Count, and Provider Summary Table
n/a	n/a	List of Changes and Corrections to the Dataset
n/a	n/a	Non-Participating Provider Narratives
n/a	n/a	Broadband Provider Roster and Participation Status

In addition, this data update submission should be found to be compliant with the additional program requirements instituted by the National Telecommunications and Information Administration since the time of the April 2011 SBI data submission for the Connect Florida program. Specifically, these new requirements are:

SBI Data Transfer Model
The submission of the broadband dataset for October 1, 2011, is contained within the SBI Data Transfer Model as released on the Grantee Workspace on June 30, 2011. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information on each provider as possible.

Additional Submission Guidance
This submission also includes a list of changes and corrections made to the dataset between the April 2011 submission and the October 2011 submission. This represents a summary of why data displays and/or supplied speeds, etc. are different from the previous submission. Changes can include upgrades to infrastructure to allow for higher throughput speeds for customers, an expansion of the service area (e.g. additional fixed wireless towers, recently activated DSLAMs, etc.), or a new provider in the marketplace. Corrections can include revisions to speed tier information that was previously reported incorrectly or the addition of a previously existing provider that has not yet been submitted in a semi-annual dataset.

This October 2011 semi-annual data update under the State Broadband Initiative Grant Program continues to demonstrate our dedication to implementing the joint purposes of the Recovery Act and the Broadband Data Improvement Act (BDIA) by gathering comprehensive and accurate state-level broadband mapping data, developing state-level broadband maps, aiding in the development and maintenance of the National Broadband Map, and undertaking statewide initiatives for broadband planning.

Broadband Service Availability — Provider Outreach and Verification

This data update submission under the SBI program includes datasets for approximately 62.67 percent of the Florida provider community, or 47 of 75 total providers. Of the 47 participating providers, 25 supplied an update to their network or coverage area(s), while 17 have reported no change. The remaining 5 represent providers who previously supplied data but were non-responsive in the October 2011 update effort; therefore their previous dataset is being put forward as part of this compilation. A complete roster by provider depicting participation status and contact record is contained herein. Of the 28 providers that are not represented in the attached datasets, 2 have refused to participate in the voluntary program, 23 have been non-responsive to multiple contact attempts, and 3 providers are currently in some form of progress toward data submission but were not able to submit coverage areas at the time of this submission.

Connect Florida has also continued to perform broadband verification activities through several means. In addition to confirmation of service area(s) by each provider, Connect Florida conducts field validation efforts. To date, 24 (32 percent) providers have been validated through field verification activities. Additional details on verification activities are contained within the Field Validation Methodology.

As the aforementioned roster and attached methodology documentation will attest, it is the collective opinion of the Connect Florida principals that all commercially reasonable efforts were made to account for 100 percent of the known Florida broadband provider community, pursuant to this semi-annual data update submission.

As part of its ongoing broadband mapping efforts, Connected Nation has developed a series of processes with the goal of submitting mapping data to NTIA for every known and qualifying broadband provider, regardless of whether the provider has chosen to support and participate in the SBI mapping initiative. Coverage estimations and Maximum Advertised Speed information may be available for some of the non-participating providers through publicly available data while other data may require on-the-ground validation techniques that support the underlying data.

The Connect Florida website, www.connect-florida.org, continues to serve a prominent role in the outreach and data collection effort. This program asset provides a way for the general public to participate in the process by offering interactive tools for users to test their connection speed, submit broadband inquiries, or contact a program representative.

As an indicator of stakeholder penetration, the Connect Florida website encountered 1,319 unique visits during this reporting period (4,554 total to date for the life of the grant awarded on December 20, 2009). Additionally, this pronounced Web activity netted 7 broadband inquiries over this same reporting period (22 grant inception to date). The website also provides the BroadbandStat application, which allows the consumer to confirm or dispute the coverage represented on the broadband inventory map. These consumer-initiated actions are facilitated through the Connect Florida website and the Connect Florida interactive mapping tool (BroadbandStat) that offer the citizens the vehicles to provide information regarding availability in their respective service area, either in affirmation or contest of the reported data represented in the Connect Florida mapping artifacts. Since the initial data collection and release of corresponding maps, feedback in the form of broadband inquiries has allowed Connected Nation to identify additional areas that are in need of field validation, which is scheduled as soon as possible.

Community Anchor Institutions

Connect Florida has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBI NOFA Technical Appendix.

In conjunction with the State of Florida Department of Management Services (DMS), outreach was conducted during this data update reporting period by Connect Florida to continue identification of existing, centralized sources for CAI connectivity data. Connect Florida has specifically focused efforts during this reporting period on conducting survey outreach to private K-12 schools throughout the state with the assistance of the Florida Office of Independent Education. Additionally, a CAI survey continues to be made available for all institutions on the Connect Florida website. During this reporting period Connect Florida has continued developing relationships with statewide associations to promote the importance of broadband connectivity at anchor institutions and participation in this data collection process. Connect Florida will continue to build upon these new relationships over the coming months and utilize its contacts throughout the state to collect data and raise awareness of this project.

From our work in Florida, as well as other states, we recognize the great value of this data to future collaboration efforts within the state as well as its value to the National Broadband Map. We plan to continue to bring best practices to the Connect Florida efforts, along with an investment of both human and technical resources required to reach our goal of increasing the data that is secured and reported as part of this process.

The Connect Florida program exists to improve data on the deployment and adoption of broadband services and to assist in the extension of broadband technology across all regions of the great state of Florida, as well as the United States through contribution to the National Broadband Map. We look forward to the continuing work ahead.

Respectfully submitted,

Thomas W. Ferree
Chief Operating Officer
Connected Nation, Inc.

Approved for submittal by
Bill Price
Director Broadband Programs
Department of Management Services
State of Florida

Data Acquisition: Florida Community Anchor Institutions Methodology

In this fourth reporting period of the SBI, Connect Florida, working in close coordination with the Florida Department of Management Services, has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBI NOFA Technical Appendix. During this reporting period Connect Florida has continued to focus efforts on conducting outreach and raising awareness of this important project.

Connect Florida has continued to identify and process CAI data obtained through an ongoing statewide outreach campaign. Physical address information continues to be augmented through manual sourcing and geocoded by Connect Florida through ESRI ArcGIS software.

Connect Florida continues to utilize a customized online survey hosted through SurveyMonkey, with a landing page on the Connect Florida website that was developed during the first reporting period. This survey, in combination with a customized data-gathering spreadsheet, was distributed to a targeted list of CAI throughout the state. Connect Florida will continue to use these data-gathering tools for future targeted outreach efforts throughout the coming months leading up to the next reporting period. These materials are customized to fit the CAI categories as defined in the SBI NOFA.

The survey can be accessed at this link using the following password:
http://connect-florida.org/mapping/Community_Anchor_Institution_Data_Collection.php
Password: CAI_FL_7864

Connect Florida and the Florida Department of Management Services have worked closely together during this reporting period to conduct research as part of an ongoing process to identify existing, centralized sources for CAI connectivity data and contact information specifically focusing on the education sector. Connect Florida has developed a key relationship with the Florida Office of Independent Education and received a contact database for approximately 2,300 private schools within the state. Connect Florida distributed the CAI survey to each contact and will continue follow-up over the coming months to continue to secure data from the private school sector to serve as a comparison to the data we have already collected from public schools across the state.

In tandem with these efforts to identify existing data and contact information, Connect Florida continues to identify key CAI contacts in an effort to distribute and promote the online survey and raise awareness of the importance of CAI broadband connectivity. Connect Florida will continue to work with the Florida Department of Management Services over the next reporting period to identify new contacts and perform outreach to all contacts who have previously submitted data to the state. Efforts will be focused over the next reporting period to update all datasets, where applicable, that were previously submitted as part of the project.

Connect Florida has an ongoing mission to educate CAI throughout the state on the importance of participating in the project. Participation by these institutions will raise awareness about the importance of broadband connectivity and the need to report the requested data for inclusion on the National Broadband Map. Connect Florida will work with the Florida Department of Management Services over the next reporting period to identify new outreach methods that would be beneficial to the project.

A CAI summary of all processed and submitted data is provided below:

CAI Type	Total	Physical Address	Lat/Long	Technology of Transmission	Download Speed	Upload Speed
K-12	5,405	5,404	5,390	261	257	230
Libraries	923	911	917	534	560	97
Healthcare	3,890	3,889	3,888	170	164	159
Public Safety	3,908	3,904	3,902	1,133	1,157	1,142
Higher Ed Institutions	351	351	351	38	58	56
Other Government	3,100	3,092	3,098	2,796	2,773	2,728
Other Non-Government	679	678	665	34	31	18
Total	**18,256**	**18,229**	**18,211**	**4,966**	**5,000**	**4,430**

SBI Data Submission Methodology

The submission of the broadband dataset for October 1, 2011, is contained within the SBI Data Transfer Model and additional components as released on the Grantee Workspace on June 30, 2011. Connected Nation has reviewed all literature that relates to the release and use of this data transfer model and recognizes that it does not replace or dictate how data is stored, processed, or displayed for the state, as it is meant primarily as a means to transfer the broadband data from all states and territories and populate the National Broadband Map in a seamless fashion. Guidance from the Technical Mapping Guide, as released on the Grantee Workspace on March 24, 2011, was also followed to ensure the completeness and validity of the submission through completion steps and checklists, completing the DataPackage spreadsheet, uploading broadband datasets into the Data Transfer Model, and checking the dataset using the SBDD_CheckSubmission receipt process.

As part of the ongoing review and analysis process, NTIA has requested further information in the submission of the DataPackage spreadsheet. In addition to the information on providers whose coverage and accompanying attributes are submitted in the SBI Data Transfer Model, information on other providers that are considered to be non-viable is also included in the DataPackage. Providers deemed non-viable that have been excluded from continued outreach may have been eliminated for reasons such as (i) the company offers Internet service but at speeds below the current definition of broadband; (ii) the company was listed in advertisements as a broadband provider, but is actually a network solution or consulting firm, etc.; (iii) the company may build or install network infrastructure, but does not actually provide the broadband service to consumers;

and (iv) the company has gone out of business. The submitted DataPackage includes any relevant information that has been obtained through the course of due diligence and/or direct provider outreach, such as a Federal Registration Number (if applicable), the company's URL, the existence of an executed Nondisclosure Agreement, and brief notations regarding the status of the company.

In addition to the methodologies contained herein, as well as the DataPackage.xls containing contact information, the data dictionary, and a provider summary table, the following feature classes are submitted within the SBI Data Transfer Model for the state of Florida.

Inventory of Deliverables, Connect Florida: October 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area.
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles.
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address.
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points.
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing.

The provider data collected by Connected Nation on behalf of the state of Florida have been formatted per the given specifications and uploaded into the appropriate feature classes of the SBI Data Transfer Model. Wireline availability is contained within census blocks and road segments, wireless availability is contained as polygons of coverage areas, and middle-mile connections and Community Anchor Institutions are contained as point data. All speed data is contained at the census block, road segment, or wireless polygon level of availability. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information as possible.

Connected Nation has continued outreach to satellite providers on their availability, technology, and speed information, but granular coverage is not yet available. Submitted within the wireless feature class are the satellite companies providing service to Florida as a polygon of the state boundary. Efforts will continue to collect, process, or otherwise create more granular satellite data based on availability analyses and guidance received from NTIA.

Provider Changes and Corrections for October 2011

As requested by the SBI Program Office, a listing of the changes and/or corrections to the datasets between the April 2011 and October 2011 submissions is included in this narrative. This information is presented in this section as well as in the Broadband Provider Log. Changes to the data include expansion of service area(s), activation of new wireless towers, and upgrades to the network to provide higher download speeds to consumers. Corrections to the dataset include the addition of previously existing providers whose coverage has never been submitted, revision of coverage or speed information that was incorrect, and any other items that were misrepresented in the April 2011 dataset.

Changes

- Bright House Networks (cable): System upgrade to DOCSIS 3.0.
- ITS Telecommunications Systems, Inc. (fiber): Upgrade to network, expansion of service area.

Corrections

- Broadband South (fixed wireless): Provider offered service prior to this submission, but this is the first time data has been submitted.
- ITS Telecommunications Systems, Inc. (DSL): Boundary for DSL coverage was revised.
- Knology of Florida (cable): Provider was included for the first time in the October 2011 submission because we did not have its participation previously.
- Long Hammock Wireless, Inc. (fixed wireless): Provider was in service prior to this submission, but this is the first time data has been submitted.
- Northeast Florida Telephone Company (fiber): Boundaries for FTTH coverage were revised.
- Northeast Florida Telephone Company (DSL): Boundary for DSL coverage was revised.
- The Hometown Network, Inc. (fixed wireless): Fixed wireless coverage changed to actual propagations to replace the concentric circle polygon used previously.
- PDMNet (fixed wireless): Provider is being submitted for the first time with the October 2011 submission. Data was received for prior submissions but never received approval; October 2011 provider was non-responsive.
- Smart City Telecommunications LLC (DSL, fiber): Provider is being submitted for the first time with the October 2011 submission. Data was received for April 2011 submission but never received approval; October 2011 provider was non-responsive.

Changes and/or Corrections – Entirely New Dataset Submitted

- AT&T Inc. (DSL, mobile wireless)
- CenturyLink (DSL)
- Clearwire Corporation (mobile wireless)
- Comcast Cable Communications, LLC (cable)

- CoxCom Inc. (cable)
- GTC, Inc. (DSL)
- Quincy Telephone Company (DSL)
- Sprint Nextel Corporation (mobile wireless)
- T-Mobile USA, Inc. (mobile wireless)
- Verizon Florida LLC (DSL, fiber, mobile wireless)
- Windstream Communications (DSL)

FLORIDA FIELD VALIDATION METHODOLOGY

Connected Nation focused a portion of its time on specific validation processes such as:

- conducting random spectrum analysis studies throughout the state using an Avcom PSA-37-XP spectrum analyzer;
- conducting mobile speed tests throughout the state using an iPhone, Android (or other smart phone) as well as provider-specific aircards (Sprint 3G/4G, Clearwire et al);
- identifying pre-selected, provider-submitted wireless transmit tower sites and cross-referencing data about that tower against the Federal Communications Commission (FCC) databases such as Antenna Structure Registration and/or the Universal Licensing System;
- cross-referencing Federal Registration Number data against available FCC Form 477 data as well as the FCC **CO**mmission **RE**gistration **S**ystem (CORES);
- validating provider submitted data (for example: latitude/longitude) using a handheld Garmin eTrex Summit GPS unit or GPS enabled software such as Microsoft Streets and Trips;
- locating physical wire-line attributes (such as Remote Terminals, CATV plant, etc.) and comparing them against provider submitted data; and
- conducting on-net and off-net speed tests using the FCC portal at http://www.broadband.gov/qualitytest/about/ or using the Ookla Net Metrics enabled speed test utility located on each of Connected Nation's state specific websites.

Additionally, Connected Nation cross-referenced numerous public documents in order to ensure that all known broadband providers were located and contacted. This included searching membership logs from the trade associations (WISPA, WCAI, PCIA, etc.), the Cable Television Fact Book, Public Utility Commission records, Public Service Commission records, Chamber of Commerce, etc.

To date, Connected Nation's staff conducted on-site validation tests in Florida on the following providers: Airpowered; AT&T, Inc.; Bright House Networks LLC; Broadband South (d.b.a. Mainstreet Broadband LLC); Cellular South, Inc.; CenturyLink; City of Quincy (d.b.a. QuincyNet and TDS Telecom); Clearwire Corporation; Comcast; Frontier Communications; GTA, Inc. (d.b.a.

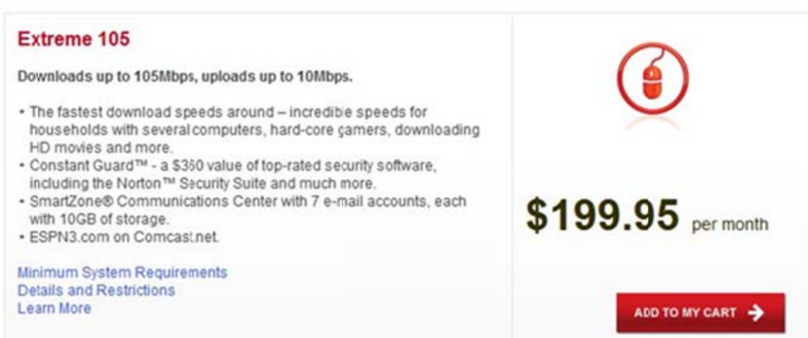
Fairpoint Communications, Inc.); MediaCom; MetroPCS; Northeast Florida Telephone Company (d.b.a. NEFCOM); Orlando Telephone Company; PCI Wireless; SouthernLight LLC; Spring Nextel Corporation; Summit Broadband; T-Mobile USA, Inc.; tw telecom; and Verizon Florida LLC. From program initiation through this reporting period, Connected Nation has completed in-the-field validation testing against 24 companies (out of a universe of 75 viable providers) totaling 32 percent within the state of Florida.

Connected Nation has also continued to review provider datasets for accurate speed information, platform listings, and other intricacies that may fall outside of the standard SBI Data Transfer Model parameters. Any providers whose submitted coverage and attributes are anticipated to come into question have been further reviewed and confirmed; details on a case-by-case basis are presented below.

Bright House Networks
Issue: Technology of transmission 40 with maximum advertised download speed in tier 7, lower than expected value range for the technology.
Resolution: Provider representative indicated that all coverage is DOCSIS 3.0, including areas where lower speeds are offered.

CenturyLink
Issue: DSL platform with maximum advertised download speed in tier 9, higher than expected value range for the technology.
Resolution: Provider representative indicated that tier 9 DSL service is indeed available, but to less than 10% of its customers, which is why it is not widely advertised.

Comcast
Issues: 1) Technology of transmission 40 with maximum advertised download speeds in tier 6 and 7, lower than expected value range for the technology; and 2) Technology of transmission 41 with maximum advertised speed tiers 9 and 10, higher than expected value range for the technology.
Resolution: Provider website advertises 105 Mbps; screenshot available below. However, additional input from provider on the technology listings and corresponding speed tiers was not received prior to the submission; dataset submitted as-is and work will continue to provide more accurate dataset in April 2012.



Cox Communications
Issue: Large provider with the same maximum advertised speeds across the entire state; more granular speed information requested.
Resolution: Provider representative indicated that equipment in use allows for uniform speed availability across the state.

The Hometown Network
Issue: Fixed wireless provider with maximum advertised download speed in tier 7, higher than expected value range for the technology.
Resolution: Provider website advertises service at 10 Mbps, screenshot available below.

Accuracy and Verification: Provider Validation Methodology

Broadband providers maintain their service area data in many different formats, all in varying levels of complexity and granularity. In order to ensure that the data required by the NTIA is standardized across all providers and that it is as accurate as possible, Connected Nation translates and formats the data that providers are able to supply into a GIS shapefile and produces maps for the provider to review. The resulting map(s) and review process allow for providers to see their service area in a geographic format – for some providers, this is the first time they have seen maps of their broadband service area. Having the mapped service area allows providers to quickly identify any issues that appear in the data representation, whether the issue is in the data translation into a GIS format or from the original data collection and submission. Often data is provided from various sources and through the review and revision process, local engineers who operate the networks and work in the field are able to ensure that the tabular data that has been submitted is accurate and represents the real-world network extent. Any issues in how the service area is represented on the map(s) are remedied by Connected Nation, whether they are additions, removal of service, or any other revisions. Revised maps of service area representations are sent to the provider for review and approval; Connected Nation will revise data and return maps as many times as necessary until the provider is in agreement that the map represents their service area as accurately as possible. Once the review process has been completed and final approval of the data is provided, the data is deemed ready for NTIA submission.

Once the data collection has been aggregated at a statewide level, static maps of statewide and county-level availability are produced and made publicly available. In addition, consumers can visit the interactive online tool, BroadbandStat, to create customized views of broadband service areas and analyze corresponding demographic information. Leveraging broadband service data on various platforms allows for public users, providers, and other stakeholders to review, scrutinize, and provide feedback on the represented data. This feedback becomes a validation method in itself as consumers submit inquiries to Connected Nation either affirming where service is not available or identifying areas where broadband service is shown on the map, but in actuality is not available. This allows for a follow-up to providers regarding revisions to the data as it is represented; it also allows for Connected Nation to identify locations where on-site visits may be necessary to complete field validation of available services. Public feedback on all forms of mapping products serves as a localized validation method for provider-supplied information and allows Connected Nation to resolve inaccuracies as they are identified to ensure that only the highest quality information is provided to stakeholders.

Estimates derived from provider-validated data indicate that approximately 2.63 percent of Florida households do not have terrestrial fixed broadband service available, and approximately 0.38 percent[1] of Florida households have neither mobile nor fixed broadband service available.[2]

Within rural areas of the state, results derived from provider-validated data indicate that approximately 3.34 percent of rural Florida households do not have terrestrial fixed broadband service available, and approximately 0.17 percent[3] of rural Florida households have neither mobile nor fixed broadband service available.[4] Please note that the availability estimates presented are based on Census 2000 household information; these figures will be updated in the near future with Census 2010 household information.

[1] In accordance with NTIA's definition of available broadband service as specified in the SBI NOFA, this estimate includes both terrestrial fixed *and* mobile broadband service, if the service offers download speeds of at least 768Kbps and upload speeds greater than 200Kbps.

[2] Due to the nature of the SBI data collection methodology as defined by the NTIA and based on both census block geographic units and street segment data, the estimates of broadband availability derived from provider-validated data may include an overstatement of the actual number of households with broadband availability. Under the census block-based data collection method, a provider will typically report broadband availability for an entire census block whether its network is present across the whole or only a subset of that census block. This potential overestimation at the census block level can be amplified as the data is aggregated across the entire state.

[3] See footnote 1.

[4] See footnote 2.

WIRELESS METHODOLOGY

Broadband Service Availability in Provider's Service Area
Wireless Services Not Provided to a Specific Address

Data solicited from a fixed wireless provider to create propagation models include, but are not limited to:

1. The name of the structure
2. Whether the transmitting device is operational or proposed
3. The maximum advertised downstream speed, the maximum advertised upstream speed
4. The typical downstream speed, the typical upstream speed (peak periods for both)
5. The frequency range of spectrum being used (as prescribed by NTIA)
6. The primary population center(s) being served (for geopolitical boundary reference)
7. The physical address of the transmit site (in the event latitude/longitude is unavailable from the provider this allows a quick reference point for geocoding)
8. Latitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
9. Longitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
10. Antenna pattern (e.g. omni-directional, 180°, 120°, 90°, etc.)
11. Azimuth of antenna (e.g. 360° with magnetic declination if known)
12. Approximate transmit radius (in feet, miles, or kilometers)
13. Polarity of transmit antenna (Vertical or Horizontal)
14. Transmit antenna gain (in dBi)
15. Line loss (applicable only to providers using coax, heliax, waveguide or other forms of cabling – excludes power-over-Ethernet devices)
16. Mechanical and/or Electrical beam tilt (if applicable)
17. Equipment Manufacturer (allows easy cross-reference against manufacturer's specification sheet)
18. Power output of the transmitting device (if unknown, FCC standards or manufacturer specifications are applied)
19. AMSL at base of tower site
20. Antenna centerline AGL (height of antenna above ground level measured at the centerline of the actual antenna)
21. Foliage factors (Evergreens/Deciduous and percent of ground cover)
22. Ground Clutter (primarily used in rural areas to account for foliage and in metropolitan areas to account for types and heights of buildings if known)
23. Average gain of receive antenna
24. Receive antenna is estimated at height above average terrain (HAAT) of 6.2 meters/20 feet

25. Federal Registration Numbers (if applicable) which may allow opportunities to cross-reference and/or obtain additional data from the Federal Communications Commission Universal Licensing System and the **CO**mmission **RE**gistration **S**ystem

Propagation modeling is an empirical mathematical formulation for the characterization of radio wave propagation as a function of frequency, distance, and other conditions. Propagation software(s) typically use the Irregular Terrain Model (also known as Longley-Rice) of radio propagation for frequencies between 20 MHz and 20 GHz. This model is based on electromagnetic theory and statistical analyses of the combination of terrain features and radio measurements, then predicting the median attenuation of a radio signal as a function of distance and the variability of the signal in time and in space. For metropolitan areas, the software can typically be adjusted to use the Okumura-Hata model which accounts for predicting the behavior of cellular transmissions in areas where buildings are the primary obstructions. The resulting product from either model depicts a graphical illustration of the theoretical propagation characteristics of a selected frequency range based on defined variables (receiver sensitivity of the home/mobile device, foliage factor, and digital elevation terrain input).

After converting propagation models into a geospatial format, additional processing is completed to remove the small pixels representing service present in the resulting dataset. These areas are initially created based on the parameters entered in the software from the provider equipment information, the underlying data parameters of elevation, hillshade, etc., and the limitations of the software itself to display a broadband service area as accurately as possible. Generally, these random pixel striations appear as a result of signal levels reaching the highest elevated points within the prescribed radius. Typically, while this pixilation anomaly shows legitimate areas where signals can be received, these highly elevated points may have exceedingly sparse populations or are entirely void of population. As a result, and congruent to the *Wireless Technology Methodologies and Business Logic* white paper submitted to NTIA on January 20, 2011, all independent pixels representing service that are less than 0.125 square miles in area have been removed from the geospatial representation of each wireless provider.

Broadband Inquiries Methodology

Connected Nation collects consumer feedback in the form of broadband inquiries (BBIs). These inquiries represent any type of communication received from the public regarding broadband service. Once BBIs are received across the state, this information is overlaid with the broadband availability information which was collected through the SBI program. This allows for a real-world comparison of the broadband landscape to the information received from broadband inquiries. Consumers submitting these inbound comments and/or inquiries are able to provide information regarding three categories: 1) residents who do not have broadband but want it; 2) residents who have broadband but want a different provider; and 3) residents who do not have broadband, but the broadband inventory maps indicate that they do.

BBIs are submitted frequently by consumers via the Connect Florida website. Inquiries often seek help to identify local broadband provider options, or to learn when a specific provider may be able to provide service to that consumer. Consumer comments also provide information which may help modify maps with actual service area information. The primary objectives of Connected Nation regarding these inquiries are 1) to improve the accuracy of the state maps with submitted consumer information and follow-up field research; 2) to provide broadband options to consumers through cooperation with mapped providers and by facilitating new broadband service options; and 3) to map and analyze information from consumers about areas of unmet broadband demand and alternatives to currently mapped services.

New BBIs are assigned to either the GIS department or the Engineering & Technical Services (ETS) team depending on the category entered by the consumer on the website submission form. The GIS or ETS team members respond to each inquiry according to the information requested by the consumer. Many BBIs can be resolved through desktop research; however, if a BBI requires research in the field, the assigned ETS team member conducts such research when performing field validations in the area of the inquiry, or at other such time as is practical and appropriate. GIS and ETS team members respond to and conclude BBIs via telephone contact and/or e-mail communication.

The broadband inquiry process has been implemented in each of the Connected Nation state programs with successful results. Altogether Connected Nation has received over 17,000 broadband inquiries since 2007, allowing the state programs to evaluate each inquiry for broadband demand and data verification. These inquiries are continuously examined against current broadband availability, updated every six months, to determine if previously unserved households have been expanded to and can now receive broadband at their residence. This database of broadband inquiries has also allowed the Connected Nation state programs to aggregate demand in concentrated areas to show providers the exact locations where the population has made it clear that they would purchase broadband if it was made available to them. Providers in the states have responded to this process and have expanded to areas knowing that their investment will be worthwhile. Data verification methods have also proven successful, as the state programs have been able to show those inquiries that indicate the broadband service areas are misrepresented on the map to providers, who then verify where service cannot reach in regard to that residence(s). The broadband coverage in these states has been altered to create a more accurate map based on the inquiries submitted by the public.

During this reporting period, the Connect Florida project has received a total of 7 inquiries (22 grant inception to date). As more inquiries are submitted to Connect Florida, a more thorough validation of the broadband landscape can be performed, while also allowing providers to see which areas have a high demand for broadband adoption.

BroadbandStat Methodology

BroadbandStat is an online, interactive mapping tool for viewing, analyzing, and validating broadband data. Developed through a partnership with ESRI, the market leader in geographic information system (GIS) software, BroadbandStat is a multi-functional, user-friendly way for local leaders, policymakers, consumers, and technology providers to devise a plan for the expansion and adoption of broadband.

First and foremost, BroadbandStat allows consumers to locate their residence and identify providers that offer broadband Internet service to that location. The interactive platform allows for users to build and evaluate broadband expansion scenarios using a wealth of data, including education and population demographics, broadband availability, and research about the barriers to adoption.

New functionality in BroadbandStat allows the consumer to provide feedback on the broadband data displayed on the interactive map. Through the collection of this feedback, a visual demand for broadband is presented. This visualization allows the Connected Nation state programs the ability to validate the broadband availability for accuracy. If residents within a region state they are without broadband, but the interactive map shows otherwise, this allows Connected Nation to approach the providers within that area in an effort to trim down their coverage to more accurately represent real-world availability on the ground.

The Connect Florida project launched BroadbandStat on May 2, 2010, and has received a total of 1,706 visits to date, of which 559 occurred this reporting period.

Speed Test Methodology

The 91 speed tests that are represented in the Connect Florida Speed Test Report during this reporting period (497 grant inception to date) are the result of a partnership between Connected Nation and Ookla Net Metrics. Utilizing this relationship increases the level of confidence in the data being collected and provides for a far greater sample size than could be collected by a single testing site.

Ookla owns and operates Speedtest.net, as well as develops and deploys speed tests, such as the Connect Florida speed test website, for partners around the world. This network of sites that is developed and run on its testing technology provides Ookla with a vast dataset that, due to the variability of geographic information collected across the varying speed test sites, is geocoded utilizing Geo-IP technology. This technology allows for tests to be geocoded to points of aggregation, typically larger nodes across provider networks. While there are hundreds of thousands of tests that have been conducted, the level of aggregation is only sufficient for county-level detail due to the test results being located at these larger nodes and not at an absolute location for each speed test.

In an effort to validate broadband data from the Connect Florida project, speed test information is collected throughout the state. Speed tests provide speed information on the path taken through all networks (a provider's network as well as additional networks) a local machine must connect to in order to reach the host test. The benefit of this collection of speed information is two-tiered. First, it allows for a comprehensive dataset of speeds, while also providing Connect Florida with the information on where broadband services are available. Second, unlike theoretical speed information which was received through the data collection process, the use of speed tests provide real-world information on the speeds that currently exist within the state of Florida.

Broadband Provider Log

Complete	62
Non-Responsive/Refused	29
In Progress	8
Count of Datasets by Status	**99**
Total Unique Providers Represented	**75**

Provider Name	Platform	Status	NDA Execution Date	Notes
AT&T Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/16/2009	[SEP-02-11 Amanda Bentley] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
AT&T Inc.	DSL	Data Added to Statewide Inventory	12/16/2009	[SEP-02-11 Amanda Bentley] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Bright House Networks, LLC	Cable	Data Added to Statewide Inventory	4/26/2010	[SEP-14-11 Amanda Bentley] Change: System upgrade to DOCSIS 3.0.
Broadband South	Fixed Wireless	Data Added to Statewide Inventory		[SEP-16-11 Ashley Littell] Correction: Provider offered service prior to this submission, but this is the first time data has been submitted.
CenturyLink	DSL	Data Added to Statewide Inventory	12/4/2009	[AUG-17-11 Amanda Bentley] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Clearwire Corporation	Mobile Wireless	Data Added to Statewide Inventory	3/3/2010	[AUG-11-11 Amanda Bentley] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Comcast Cable Communications, LLC	Cable	Data Added to Statewide Inventory	12/7/2009	[AUG-29-11 Amanda Bentley] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
CoxCom Inc.	Cable	Data Added to Statewide Inventory	1/29/2010	[SEP-02-11 Amanda Bentley] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
GTC, Inc.	DSL	Data Added to Statewide Inventory	1/28/2010	[AUG-25-11 Amanda Bentley] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
ITS Telecommunications Systems, Inc.	Fiber	Data Added to Statewide Inventory	4/28/2010	[SEP-02-11 Amanda Bentley] Change: Upgrade to network, expansion of service area.
ITS Telecommunications Systems, Inc.	DSL	Data Added to Statewide Inventory	4/28/2010	[SEP-02-11 Amanda Bentley] Correction: Boundary for DSL coverage was revised.
Knology of Florida, Inc.	Cable	Data Added to Statewide Inventory	7/13/2011	[AUG-25-11 Amanda Bentley] Correction: Provider was included for the first time in the October 2011 submission because we did not have their participation previously.
Long Hammock Wireless, Inc.	Fixed Wireless	Data Added to Statewide Inventory		[SEP-16-11 Ashley Littell] Correction: Provider was in service prior to this submission, but this is the first time data has been submitted.
Northeast Florida Telephone Company	Fiber	Data Added to Statewide Inventory	4/16/2010	[SEP-02-11 Amanda Bentley] Correction: Boundaries for FTTH coverage were revised.
Northeast Florida Telephone Company	DSL	Data Added to Statewide Inventory	4/16/2010	[SEP-02-11 Amanda Bentley] Correction: Boundary for DSL coverage was revised.
Quincy Telephone Company	DSL	Data Added to Statewide Inventory	1/27/2010	[AUG-18-11 Amanda Bentley] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Sprint Nextel Corporation	Mobile Wireless	Data Added to Statewide Inventory	1/14/2010	[AUG-11-11 Amana Bentley] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
T-Mobile USA, Inc.	Mobile Wireless	Data Added to Statewide Inventory	1/8/2010	[AUG-11-11 Amanda Bentley] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
The Hometown Network, Inc.	Fixed Wireless	Data Added to Statewide Inventory	5/5/2010	[SEP-02-11 Amanda Bentley] Correction: Fixed wireless coverage changed to actual propagations to replace the concentric circle polygon used previously.
Verizon Florida LLC	Fiber	Data Added to Statewide Inventory	12/14/2009	[AUG-24-11 Amanda Bentley] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Verizon Florida LLC	DSL	Data Added to Statewide Inventory	12/14/2009	[AUG-24-11 Amanda Bentley] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Verizon Florida LLC	Mobile Wireless	Data Added to Statewide Inventory	12/14/2009	[AUG-11-11 Amanda Bentley] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.

Windstream Communications	DSL	Data Added to Statewide Inventory	1/19/2010	[AUG-26-11 Amanda Bentley] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
CenturyLink	Backhaul	Backhaul Provider Only Processing Complete	12/4/2009	
EarthLink Business	Backhaul	Backhaul Provider Only Processing Complete	2/16/2010	
Fort Pierce Utilities Authority	Backhaul	Backhaul Provider Only Processing Complete	5/27/2011	
Level 3 Communications, LLC	Backhaul	Backhaul Provider Only Processing Complete	12/14/2009	
Sago Networks, Inc.	Backhaul	Backhaul Provider Only Processing Complete		
Southern Light	Backhaul	Backhaul Provider Only Processing Complete	6/16/2010	
T-Mobile USA, Inc.	Backhaul	Backhaul Provider Only Processing Complete	1/8/2010	
Windstream Communications	Backhaul	Backhaul Provider Only Processing Complete	1/19/2010	
PDMNet	Fixed Wireless	Approval for Update Not Received – Data Still Submitted	4/20/2010	[SEP-8-11 Amanda Bentley] Correction: Provider is being submitted for the first time with the October 2011 submission. Data was received for prior submissions but never received approval; October 2011 provider was non-responsive.
Smart City Telecommunications LLC	Fiber	Approval for Update Not Received – Data Still Submitted	6/24/2010	[SEP-8-11 Amanda Bentley] Correction: Provider is being submitted for the first time with the October 2011 submission. Data was received for April 2011 submission but never received approval; October 2011 provider was non-responsive.
Smart City Telecommunications LLC	DSL	Approval for Update Not Received – Data Still Submitted	6/24/2010	[SEP-8-11 Amanda Bentley] Correction: Provider is being submitted for the first time with the October 2011 submission. Data was received for April 2011 submission but never received approval; October 2011 provider was non-responsive.
airPowered	Fixed Wireless	No Update to Provide	2/17/2011	
AT&T Inc.	Backhaul	No Update to Provide	12/16/2009	
Cellular South, Inc.	Mobile Wireless	No Update to Provide	4/12/2010	
CenturyLink	Backhaul	No Update to Provide	12/4/2009	
City of Leesburg, Florida	Backhaul	No Update to Provide		
CoxCom Inc.	Backhaul	No Update to Provide	1/29/2010	
DISH Network Corporation	Satellite	No Update to Provide	1/27/2010	[SEP-16-11 Amanda Bentley] Correction: Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
Florida LambdaRail LLC	Backhaul	No Update to Provide	4/29/2010	
FPL FiberNet LLC	Backhaul	No Update to Provide	6/3/2010	
Frontier Communications Corporation	DSL	No Update to Provide	1/22/2010	
Frontier Communications Corporation	Backhaul	No Update to Provide	1/22/2010	
Gainesville Regional Utilities	Backhaul	No Update to Provide		
Hughes Network Systems, LLC	Satellite	No Update to Provide	2/5/2010	[SEP-16-11 Amanda Bentley] Correction: Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
Mediacom Southeast LLC	Cable	No Update to Provide	1/12/2010	
MegaPath Inc.	Backhaul	No Update to Provide	2/15/2010	
Nextlink Wireless, Inc.	Backhaul	No Update to Provide	2/12/2010	
Quincy Telephone Company	Backhaul	No Update to Provide	1/27/2010	
Quincy, City of	Fiber	No Update to Provide		
Sprint Nextel Corporation	Backhaul	No Update to Provide	1/14/2010	
tw telecom of florida, l.p.	Backhaul	No Update to Provide	4/22/2010	
Velocity Online	Backhaul	No Update to Provide	4/8/2010	
Verizon Florida LLC	Backhaul	No Update to Provide	12/14/2009	
WildBlue Communications, Inc.	Satellite	No Update to Provide	1/8/2010	[SEP-16-11 Amanda Bentley] Correction: Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
XO Communications, LLC	Backhaul	No Update to Provide	2/12/2010	
Advanced Cable Communications	Cable	No Update Provided - Use Last Submission Data	4/16/2010	
Cogent Communications, Inc.	Backhaul	No Update Provided - Use Last Submission Data		
Home Town Cable TV, LLC	Fiber	No Update Provided - Use Last Submission Data	4/21/2010	
Orlando Telephone Company, Inc.	Fiber	No Update Provided - Use Last Submission Data		
Orlando Telephone Company, Inc.	Cable	No Update Provided - Use Last Submission Data		
Orlando Telephone Company, Inc.	Backhaul	No Update Provided - Use Last Submission Data		
T3 Communications	Backhaul	No Update Provided - Use Last Submission Data	6/3/2010	
ClearSurf Broadband	Fixed Wireless	Provider Gathering Data	5/3/2010	
MegaPath Inc.	Backhaul	Solicited Initial Data	2/15/2010	[SEP-08-11 Wes Kerr] Still working to understand post merger network and if any data will be provided in the future.

Clearwire Corporation	Fixed Wireless	Other	3/3/2010	[AUG-11-11 Terry Holmes] Clearwire converted their last fixed wireless network in Florida to mobile wireless during the last reporting cycle. There is no remaining fixed wireless in Florida to report.
Nature Coast Networks	Fixed Wireless	Other		[JUN-18-11 Chip Spann] Due to current litigation, provider is embargoed from providing data at this time.
PAETEC Communications, Inc.	Backhaul	Other		[SEP-08-11 Wes Kerr] Multiple outreach attempts were conducted but no response was received. Paetec was bought out during the collection phase of this round by Windstream and we intend to be able to include the Paetec coverage as a part of the Windstream footprint during the next round.
PAETEC Communications, Inc.	DSL	Other		[SEP-08-11 Wes Kerr] Multiple outreach attempts were conducted but no response was received. Paetec was bought out during the collection phase of this round by Windstream and we intend to be able to include the Paetec coverage as a part of the Windstream footprint during the next round.
PAETEC Communications, Inc.	Fixed Wireless	Other		[SEP-08-11 Wes Kerr] Multiple outreach attempts were conducted but no response was received. Paetec was bought out during the collection phase of this round by Windstream and we intend to be able to include the Paetec coverage as a part of the Windstream footprint during the next round.
PAETEC Communications, Inc.	Backhaul	Other		[SEP-08-11 Wes Kerr] Multiple outreach attempts were conducted but no response was received. Paetec was bought out during the collection phase of this round by Windstream and we intend to be able to include the Paetec coverage as a part of the Windstream footprint during the next round.
Birch Communications, Inc.	DSL	Refused to Participate		[JUN-22-11 Daryl Coffey] a company representative sent an e-mail stating they are still not interested in participating.
Birch Communications, Inc.	Backhaul	Refused to Participate		[JUN-22-11 Daryl Coffey] a company representative sent an e-mail stating they are still not interested in participating.
CyberStreet Inc.	Fixed Wireless	Refused to Participate		[APR-14-10 Jill Lindgren] Provider relayed his wishes not to participate and requested we not call again.
561net	Fixed Wireless	Non-Responsive to Multiple Attempts		4 contact attempts were made between May 25, 2011 and August 5, 2011.
AreYouOnline.Net	Fixed Wireless	Non-Responsive to Multiple Attempts		4 contact attempts were made between May 25, 2011 and August 11, 2011.
Break Free Wireless Corporation	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between May 25, 2010 and February 4, 2011, 3 additional attempts were made this period.
Brevard Wireless	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between May 6, 2010 and March 8, 2011, 3 additional attempts were made this period.
Cablevision of Marion County LLC	Cable	Non-Responsive to Multiple Attempts		In addition to contact attempts made between July 1, 2010 and January 13, 2011, 3 additional attempts were made this period.
CommFunction, LLC	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between October 9, 2010 and February 18, 2011, 3 additional attempts were made this period.
CommFunction, LLC	DSL	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between October 9, 2010 and February 18, 2011, 3 additional attempts were made this period.
Desoto Life	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to contact attempts made between August 17, 2010 and January 5, 2011, 3 additional attempts were made this period.
FiberLight LLC	Backhaul	Non-Responsive to Multiple Attempts	4/19/2010	In addition to multiple contact attempts made between May 26, 2010 and February 15, 2011, 5 additional attempts were made this period.
GBS Online	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between May 12, 2010 and February 18, 2011, 3 additional attempts were made this period.
Global Crossing Telecommunications, Inc.	Backhaul	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between July 1, 2010 and February 17, 2011, 3 additional attempts were made this period.
James Cable LLC	Cable	Non-Responsive to Multiple Attempts	1/11/2010	In addition to contact attempts made between July 1, 2010 and January 5, 2011, 3 additional attempts were made this period.
KissimmeeWeb	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to contact attempts made between June 22, 2010 and February 18, 2011, 3 additional attempts were made this period.
Litestream Holdings, LLC	Cable	Non-Responsive to Multiple Attempts		4 contact attempts were made between May 14, 2011 and August 13, 2011.
Marco Island Cable, Inc.	Cable	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between June 30, 2010 and January 13, 2011, 3 additional attempts were made this period.
Omnispring LLC	Backhaul	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between May 11, 2010 and January 13, 2011, 3 additional attempts were made this period.
Palm Coast-Flagler Internet, LLC	Cable	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between July 1, 2010 and February 15, 2011, 3 additional attempts were made this period.

Rapid Systems Corporation	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between June 11, 2010 and February 15, 2011, 3 additional attempts were made this period.
Reliance Globalcom Services, Inc.	Backhaul	Non-Responsive to Multiple Attempts		In addition to contact attempts made between November 18, 2010 and February 3, 2011, 3 additional attempts were made this period.
SkyNet360	Fixed Wireless	Non-Responsive to Multiple Attempts		4 contact attempts were made between May 4, 2011 and August 11, 2011.
Sling Broadband	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to contact attempts made on July 1, 2010, Jaunary 5, 2011, and January 13, 2011, 3 additional attempts were made this period.

Georgia Broadband Mapping Project: Product Release White Paper

Contact Name Manager:	Rich Calhoun
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Submitted By:	Rich Calhoun
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Product Specification:	Fall 2011 NTIA Data Model
Product/Process:	NTIA—October 1, 2011 Data Deliverable
Dataset Submission QC:	NTIA—SBDD_CheckSubmission.py

Table of Contents

OVERVIEW

This white paper highlights the **Submission Summary** for this deliverable, as well as describes the **Data Gathering**, **Data Integration**, **Data Validation and Verification** and **Quality Control** processes used to create the Broadband Mapping Project's October 1, 2011 data submission. To support varying levels of technical and program knowledge, both a **high-level summary** and a **detailed process review** are supplied.

SUBMISSION SUMMARY

PROVIDER DETAILS

PROVIDER PARTICIPATION

- Providers Included

Abovenet Communications Inc	Cox Communications	Open Range Communications
Advanced Technology Group	Cricket Communications Inc.	Pembroke Telephone Company Inc
AL-GA Wireless Broadband LLC	Darien Telephone Company Inc.	Pineland Telephone Company Inc.
AllTel	DeltaCom Inc.	Plantation Cablevision, Inc.
AT&T Georgia	Depot Street Communications, Inc.	Planters Rural Telephone Cooperative
Brantley Telephone Inc.	ETC Communications LLC	Progressive Rural Telephone
Bright House Networks LLC	FairPoint Communications	Quitman Wireless
Bulldog Cable Georgia, LLC	Flint Cable Television	Ringgold Telephone Company
Bulloch County Rural Telephone Cooperative Inc.	Frontier Communications of Fairmount LLC	SGRITA
CenturyLink	Frontier Communications of Georgia LLC	Shentel Converged Services, Inc.
Charter Communications Inc.	Glenwood Telephone Company	Southeastern Services Inc.
Chickamauga Telephone Corporation	Hargray	Sprint
Citizens	Hart Telephone Company	StarBand Communications Inc.
CITY OF CAIRO	Hughes Network Systems	T-Mobile
CITY OF CAMILLA	Kings Bay Communications	TDS Telecom
City of Dublin	KitePilot Wireless Internet	tw telecom of georgia l.p.
City of Moultrie	Knology of Georgia Inc	University Corporation for Advanced Internet Development
CITY OF THOMASVILLE	Level 3 Communications LLC	Verizon Wireless
Clearwire	MainStreet Broadband	Waverly Hall Telephone LLC
Cogent Communications Inc.	Mediacom	WildBlue Communications Inc.
Columbia Country Information Technology Department	Megapath	Wilkes Telephone and Electric Co.
Comcast	New Edge Network, Inc., d/b/a New Edge Networks	Windstream
Communicom	Nextlink Wireless Inc.	XO Communications Services Inc. (Affiliated Entity)
Covad Communications Company		

- New Providers Since Last Data Submission
  - AboveNet Communications Inc
  - Bulldog Cable Georgia, LLC
  - City of Dublin
  - Glenwood Telephone Company
  - New Edge Networks, Inc.
  - Plantation Cablevision, Inc.
  - Public Service Telephone Company
  - Hughes Network Systems
  - Open Range Communications Inc.
  - Quitman Wireless
  - StarBand Communications

- Non-Responsive/Non-Cooperative Providers
  - Kennedy CableVision Inc.
  - NuLink Digital
  - Smartresort Co, LLC dba Beyond Communications
  - Airimba and Windchannel Communications
  - Georgia Business Net
  - VectorLink

COVERAGE AREA CHANGES

- **Coverage Footprint Reductions/Map Refinement -** Resulting from Validation (Provider Portal)
  - AT&T Mobility LLC (TT-80)
  - AL-Call (TT-10 and TT-40)
  - Bright House Networks, LLC (TT-41)
  - Camden Telephone &Telegraph Company, Inc. (TT-50)
  - CenturyLink (TT-10)
  - Charter Communications Inc. (TT-41)
  - Citizens Telephone Company (TT-10 and TT-40)
  - City of Camilla (TT-40 and TT-50)
  - City of Moultrie (TT-41 and TT-50)
  - City of Thomasville (TT-40 and TT-50)
  - Cogent Communications, Inc. (TT-50)
  - Comcast Cable Communications, LLC (TT-40 and TT-41)
  - ComSouth Corporation (TT-10 and TT-50)
  - Cox Communications, Inc (TT-40)
  - Darien Telephone Company, Inc. (TT-10 and TT-41)
  - Depot Street Communications Inc (TT-41)
  - DIECA Communications, Inc. (TT-10 and TT-20)
  - Ellijay Telephone Company (TT-50)
  - Frontier Communications of Georgia, LLC (TT-10)
  - Hart Telephone Company (TT-40)
  - Level 3 Communications, LLC (TT-50)
  - Nelson-Ball Ground Telephone Company (TT-50)
  - Plant Telephone Company (TT-50)

- **Coverage Footprint Expansion –**

    - ATC Broadband LLC (TT-40)
    - BellSouth Telecommunications, Inc. (TT-10)
    - Blue Ridge Telephone Company (TT-10 and TT-50)
    - Bulloch County Rural Telephone Cooperative, Inc. (TT-50)
    - Camden Telephone &Telegraph Company, Inc. (TT-10)
    - Chickamauga (TT-10)
    - Citizens Telephone Company (TT-50)
    - City of Cairo (TT-40 and TT-50)
    - City of Elberton, Ga. (TT-41)
    - ComSouth Corporation (TT-40)
    - Darien Telephone Company, Inc. (TT-50)
    - DIECA Communications, Inc. (TT-30)
    - Ellijay Telephone Company (TT-10 and TT-40)
    - Fort Valley Utility Commission (TT-50)
    - Frontier Communications of Fairmount, LLC (TT-10)
    - Glenwood Telephone Company (TT-20)
    - Hargray Of Georgia (TT-41)
    - Hart Telephone Company (TT-10)
    - James Cable, LLC (TT-41)
    - Kings Bay Communications (TT-50)
    - Knology, Inc (TT-40 and TT-50)
    - Mediacom Southeast LLC (TT-41)
    - Nelson-Ball Ground Telephone Company (TT-10)
    - NuLink Digital (TT-41)
    - Pembroke Telephone Company, Inc (TT-10 and TT-50)
    - Pineland Telephone Company, Inc. (TT-10, TT-20 and TT-50)
    - Plant Tifnet (TT-40 and TT-50)
    - Planters Rural Telephone Cooperative (TT-10 and TT-50)
    - Progressive Rural Telephone (TT-10)
    - Public Service Telephone Company (TT-10)
    - Ringgold Telephone Company (TT-10 and TT-50)
    - tw telecom of georgia l.p. (TT-30 and TT-50)
    - Waverly Hall Telephone, LLC (TT-30)
    - Waycross Cable Co. (TT-41)
    - Windstream (TT-10)
    - XO Communications, LLC (TT-30)
    - Wilkes Telephone and Electric Co. – (TT-10 and TT-50)
        - Supporting Business coverage footprint as well

DATA CORRECTIONS

- No corrections were required for this data round

- Prior to data collection for Data Set 4, GTA established a set of maximum speeds by Technology Type that reflects the local practices of the state.
  - For Dataset 3 and to follow up on NTIA's request, Georgia produced a summary of changes that details the specific coverage increases in miles by each operator who submitted significant changes from Dataset 2 to 3. This thorough process helped Georgia know where to focus in Dataset 4 and to watch for continued growth in Dataset 4.
    Overall we have seen Dataset 4's coverage reduce due to the improved census granularity of Census 2010 and diligence described below.

  - Georgia introduced a service provider portal in Year 2 that allows service providers to both verify and update GIS maps of their respective coverage areas. Providers can submit CAD or GIS coverage maps to BroadMap to review in the portal or draw their own coverage shapes and streets through the portal. Over 60 of Georgia's providers used this portal in Year 2 and it allowed them to make sure we have represented their areas accurately. The portal was particularly valuable for providers that offer services over many technology types including DSL, Cable, and Fiber. These providers could make sure that, for instance, the fiber footprint was limited to downtown while cable modem services were available throughout the suburbs.

  - Georgia used the Form 477 data for the first time in its verification activities for Dataset 4. This data has allowed Georgia to understand the context within which providers give their data to Georgia, and has allowed us to validate the consistency between the two data sources.
    Georgia has explored the purchase of MediaPrints and Pitney Bowes third party data. Georgia has not purchased MediaPrints due to accuracy concerns and has been unable to reach an agreement with Pitney Bowes. Georgia does use all central offices to evaluate the likelihood of DSL coverage.

  - Georgia has introduced a new process of manual verification for Dataset 4. Using Dataset 3, Georgia identified the top providers by technology type. As Dataset 4 submissions arrived over two months, BroadMap, GTA, and Civitium met each week to examine the submissions and determine the impact of any changes. The figure below illustrates AT&T's changing wireless broadband coverage map.

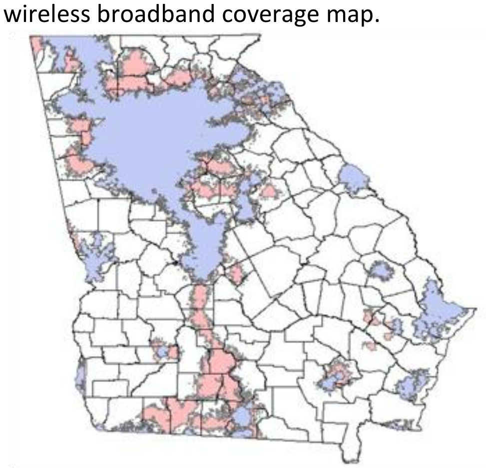


Figure1 AT&T Pink is Data Set 4, Blue is Data Set 3

COMMUNITY ANCHOR INSTITUTION (CAI) DETIALS

OVERALL STATISTICS

Community Anchor Institution - Categories	Overall Count	Broadband Subscriber (1 or 2)	Trans Tech	Advertised Speed Down	Advertised Speed Up
Category 1 - School K through 12	2065	2055	2055	2055	2055
Category 2 - Library	451	383	383	382	382
Category 3 - Medical/Healthcare	2633	0	0	0	0
Category 4 - Public Safety	2656	0	0	0	0
Category 5 - Universities/Colleges	202	99	99	99	99
Category 6 - Other: Government	747	0	0	0	0
Category 7 - Other: Non-Government	0	0	0	0	0
Total	**8754**	**2537**	**2537**	**2536**	**2536**

CAI CHANGES

- There were 2515 CAIIDs added to the CAI Inventory for Category 1: K-12 Schools, Category 2: Libraries and Category 5: Colleges, which were extracted from the three databases communicated by NTIA. These databases are as follows:
    - For K-12 institutions (CAI type 1) please add the NCES ID CCD ID value found here: **http://nces.ed.gov/ccd/bat/**
    - For Higher Education (CAI type 5) please add the NCES IPEDS ID value found here: **http://nces.ed.gov/ipeds/datacenter/**
    - For Libraries (CAI type 2) please. Combine (do not add) “FSCSKey” and “FSCs_SEQ” from the “puout08av2000” file and place them here: **http://harvester.census.gov/imls/data/pls/index.asp** (FYI the LIBID is your state’s unique ID for libraries)

SUBMISSION RECEIPT

SUBMISSION RECEIPT RESULTS

- Attached are the results from the NTIA data submission receipt quality script.

  GA_2011_10_01.txt

- Error Report
  - The only items flagged in the submission receipt output are as follows, which has been verified as correct entries within the data submission.
  - Field Check: FAILED CAInstitutions_TRANSTECH has 6217 UNEXPECTED VALUES for query: TRANSTECH <> 0 AND TRANSTECH <> 10 AND TRANSTECH <> 20 AND TRANSTECH <> 30 AND TRANSTECH <> 40 AND TRANSTECH <> 41 AND TRANSTECH <> 50 AND TRANSTECH <> 60 AND TRANSTECH <> 70 AND TRANSTECH <> 71 AND TRANSTECH <> 80 AND TRANSTECH <> 90 AND TRANSTECH <> 0
    - This was flagged due to an inconsistency between the data model and the submission receipt script, which has also been communicated by other Grantees on PBWorks.
  - Speed Tier: FAILED Go check data and keep only Maximum Advertised Speeds
  - Speed Tier: FAILED Go check data at: d:\hudson\workspace\BDIA_SBBD_QC\SBDD_TRANSFER.gdb\/Speed_FRQ
    - These two errors were flagged as the submission receipt script does not take the EndUserCat field into consideration, which differentiates between Residential and Business coverage footprints. This has also been communicated by other Grantees on PBWorks.

Hyperlink to Grantee Workspace in which the same issues were identified by other Grantees:
https://sbdd-granteeworkspace.pbworks.com/w/page/42442088/Data%20Model%20Issues-June2011

HIGH-LEVEL SUMMARY

DATA GATHERING

BROADBAND SERVICE AREAS, MIDDLE MILE AGGREGATION POINTS AND BROADBAND SERVICE OVERVIEW

The collection of Broadband Service Areas, Middle Mile Aggregation Points and Broadband Service Overview information is handled through the following Provider Outreach Process:

- Build and maintain an inventory of Broadband providers through research and State inputs.
- Update provider material that describes the data requirements and logistics for data transfer.
- Update Non-Disclosure Agreement (NDA) for use in project, where applicable.
- Maintain multiple protocols for the provider to submit data, including Secure File Transfer Protocol (SFTP) technology when desired.
- Conduct one-on-one informational discussions with each provider to communicate the following:
    - Requirements of this project;
    - Broadband data required to support the product data model;
    - Submission protocols available;
    - Capability to validate how the supplied data is aggregated.
- Download/receive provider data.
- Establish a repeatable process with provider. Maintain provider communication, transaction and data handling records throughout the project (dates contacted, data received, etc.).

COMMUNITY ANCHOR INSTITUTION (CAI)

The collection of CAI information is handled through the following CAI Collection Process:

- Collect and maintain inventory of CAIs through data mining, research and State inputs.
- Maintain web-based CAI portal for institutions to add or confirm attribution, location and enter broadband-specific information.
- Upload web-based data to Core Database for standardization.
- Perform internal cleansing, such as removing duplicate records, identifying gaps in broadband attribution and verifying category.
- Geocode CAI locations.
- Translate Core Database data to deliverable-ready format.
- Continue engagement with non-responsive institutions.

DATA INTEGRATION PROCESS

The data integration and processing mechanisms currently used allow for multiple types of inputs and result in a standardized output that meets the NTIA deliverable requirements. This flexible process supports data model changes and project-requested enhancements.

- Receive inputs from providers via submission protocols; upload into Sourcing Database and catalog with provider information.
- Review provider-supplied data for completeness and for potential discrepancies that require resolution prior to processing and flag as necessary.
- Categorize input into data-type category (addresses, block lists, paper maps, etc.).
- Standardize input based on data type within Staging Database.
- Create Compact Polygons (CP)—(internal methodology for generating area-based feature for coverage in Staging Database).
- Apply broadband attribution to CP; apply metadata to CP.
- Perform quality analysis of the CP against the source supplied to identify any completeness or accuracy issues.
- Request additional information from the provider if elements of coverage are missing or contain discrepancies. This is a second manual quality check to ensure data is complete.
    - Process coverage area to build the required NTIA data model layers.
- Process CAI data input into internal standardized format, as discussed above in the **Community Anchor Institution (CAI) subsection**, based on NTIA and State-level requirements.

DATA VALIDATION AND VERIFICATION

Following the creation of the product, process steps within Data Validation and Verification occur. To ensure the data collected and processed is as accurate and comprehensive as possible, provider validation and internal verification activities are employed. After the initial mapping of providers' coverage areas and serviceability claims, additional reviews are performed using the methods described in the subsections below (**Third-Party Data Verification**, **Broadband Provider Validation**, **Confidence Values**).

THIRD-PARTY DATA VERIFICATION

The coverage is visually and programmatically compared against third-party data. For this data submission, Form 477 data was used; however we are reviewing other sources for further verification. All anomalies identified during this analysis are reviewed with the providers.

BROADBAND PROVIDER VALIDATION—PROVIDER PORTAL APPLICATION

Providers are trained on and requested to use a secure interactive web application to review their current coverage area(s) and supporting broadband attribution and validate their data or submit change requests to update their data. All provider change requests go through the **Data Integration Process** and are reviewed with the provider to complete validation.

CONFIDENCE VALUES

All verification, validation and manual quality review results are tracked by provider/technology type and stored and maintained within a **Validation table**. A confidence value is assigned, based on internal assessments of the collected information, to highlight the provider coverage areas and/or attributions that would benefit from further investigation and/or enhancements.

QUALITY CONTROL

Following collection, processing and analysis of the provider and CAI data, the product is checked manually and algorithmically against the NTIA data model. Some of the items included within these checks are:

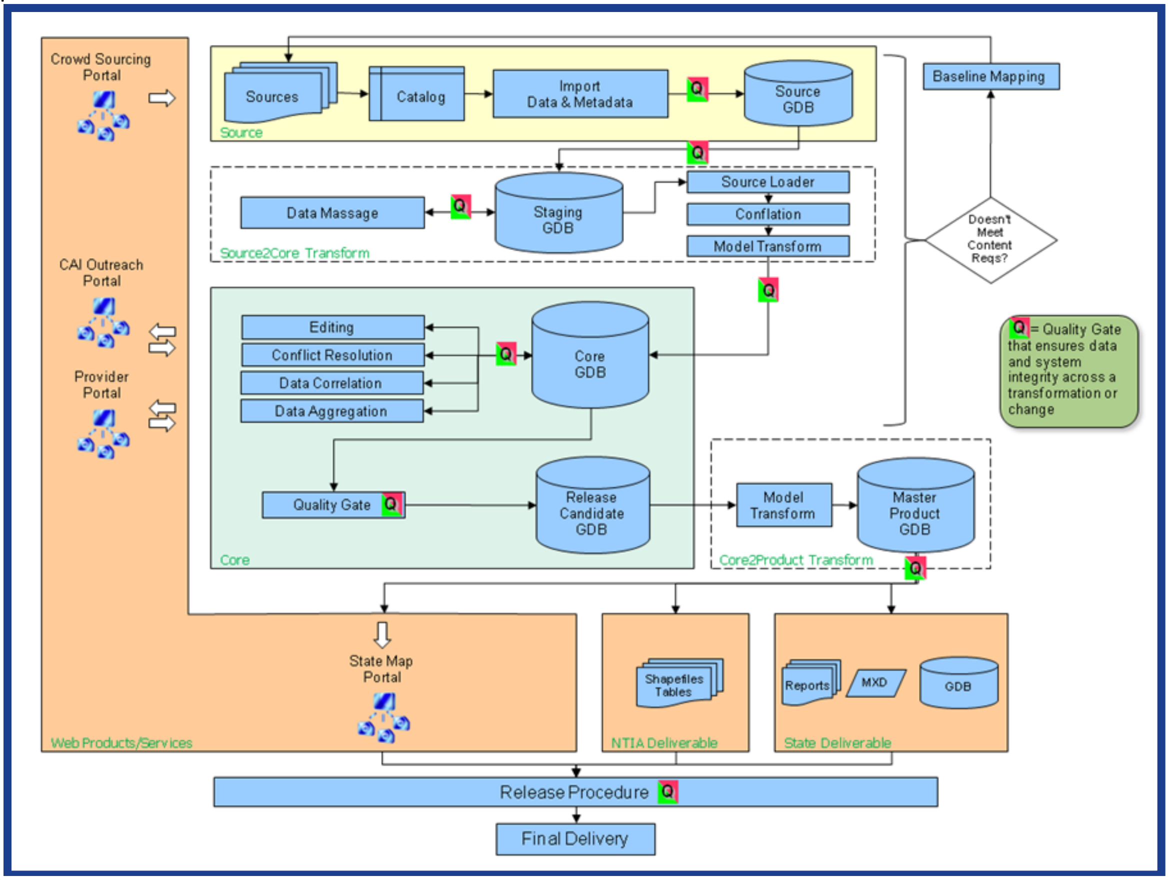
- Format correctness;
- Table and field structure;
- Valid values, including default values, where applicable;
- Geographic extent and topology errors.

Prior to data submission, another quality control script supplied by NTIA is run. This script, SBDD_CheckSubmission.py, creates an output in text form that is required to be submitted along with the final deliverable. All errors must come up clean, unless otherwise specified by NTIA. Exceptions to the script as noted by NTIA on the SBDD Workspace on 03/25/11 can be found at the following link: **https://sbdd-granteeworkspace.pbworks.com/w/page/38218329/CheckSubmissionExceptions**

- Longitude values for States outside the lower 48 (any table);
- CAI results for Transtech, MaxAdUp, MaxAdDown if BBService is “No” or “Unknown”;
- Overview MaxAdDown, MaxAdUp if 100% of record-level data has MaxAdDown or MaxAdUp populated.

DETAILED PROCESS REVIEW

A detailed review of the data collection, integration and quality control points within the broadband data gathering and mapping process are discussed in the subsections that follow. In addition, a diagram showing the overall process can be seen below.



PROVIDER OUTREACH

For the October 2011 data submission, an e-mail notification was sent to all providers with supporting deliverable dates. The providers mainly used the Provider Portal web application to submit changes to and/or validate their current coverage area(s).

In support of the data collection effort, providers that did not timely respond to the outreach were contacted by phone.

OUTREACH MATERIALS

The original provider packet sent via e-mail to the providers included the following documents and files:

- Letter from the State inviting them to participate in the program;
- Copy of the Non-Disclosure Agreement (NDA);
- Copy of the Mapping NOFA from the NTIA;
- Copy of the NOFA Clarification from the NTIA;
- Broadband service address example file in CSV format;
- Word document describing service address example file;
- Broadband service block example file in CSV format;
- Word document describing service block example file;
- Broadband service street example file in CSV format;
- Word document describing service street example file;
- Broadband subscriber example file in CSV format;
- Word document describing subscriber example file;
- Broadband wireless coverage area sample shapefile;
- Word document describing wireless coverage area sample shapefile;
- Instructions for downloading, installing and using the WinSCP SFTP application.

OUTREACH PROCESS

The provider outreach process is comprised of the following general steps:

- Send the provider package and introduction letter to the main point of contact for the provider.
- Follow up with e-mail and telephone to verify that the main point of contact is correct.
- If necessary, discuss the NDA further and resolve any redlines.
- Once the correct primary contact is established, set up a telephone call, if necessary, to learn more about the provider's offerings and direct them to the appropriate outreach materials.
- If providers are unable to be contacted (non-responsive) or indicate that they are not interested in participating (non-cooperative), mark them as such on the provider tracking sheet. These providers will be escalated to the State for further action.
- As the providers are collecting the required data, provide instructions on downloading, installing and using the WinSCP SFTP application, if required.
- Arrange with the providers to transfer the data in whatever way they are comfortable: some providers will find regular email acceptable; others will want to use the SFTP application.
- After data is received and reviewed, it may be necessary to contact a provider for clarification or to address incomplete datasets. In the interest of building and maintaining relationships, care is given not to push the provider but to work with it to obtain accurate data in the best possible format.

DATA COLLECTION

DATA TRANSFER PROCEDURES

There are three primary ways data is collected from providers. These are:

- Secure FTP (SFTP) using the WinSCP application;
- Regular e-mail;
- Mail.

INITIAL DATA REVIEW AND QUALITY ASSURANCE

The initial data review and quality assurance process consists of the following general steps:

1) Access the data from the SFTP site or e-mail.
   a. If e-mailed, place copy of original dataset in the appropriate provider folder on the SFTP site.
2) Place copy of raw data on local computer in a working directory.
3) Review data and determine course of action based on type of data received.
4) Ensure data is complete and contact provider to address any gaps.

NOTE:
The goal is to get as many providers as possible to provide subscriber address data in the correct format. Obviously, this will not be possible with all providers so we will continue to have to process various types of provider-supplied data.

DATA INGESTION

DATA INGESTION OVERVIEW

The following subsections outline the process steps taken based on the type of input supplied by the data provider:

- **Point Data**:
  - Subscriber location;
  - DSLAM location;
  - Central Office location;
  - Broadcast Tower location.
- **Linear Data**:
  - TIGER® street segments.
- **Polygonal Data**:
  - Census Blocks;
  - Coverage Area.

Overall, the process is geared toward taking the provider data supplied and creating polygon shapes to append to the bb_cov feature class. The bb_cov feature class is the interim dataset that is then processed using the makeDeliverable.py Python script to create the MapConnect™ data layers that will be delivered to the State and, ultimately, to the NTIA. Detailed instructions used in this process can be found in the subsections below.

POINT DATA

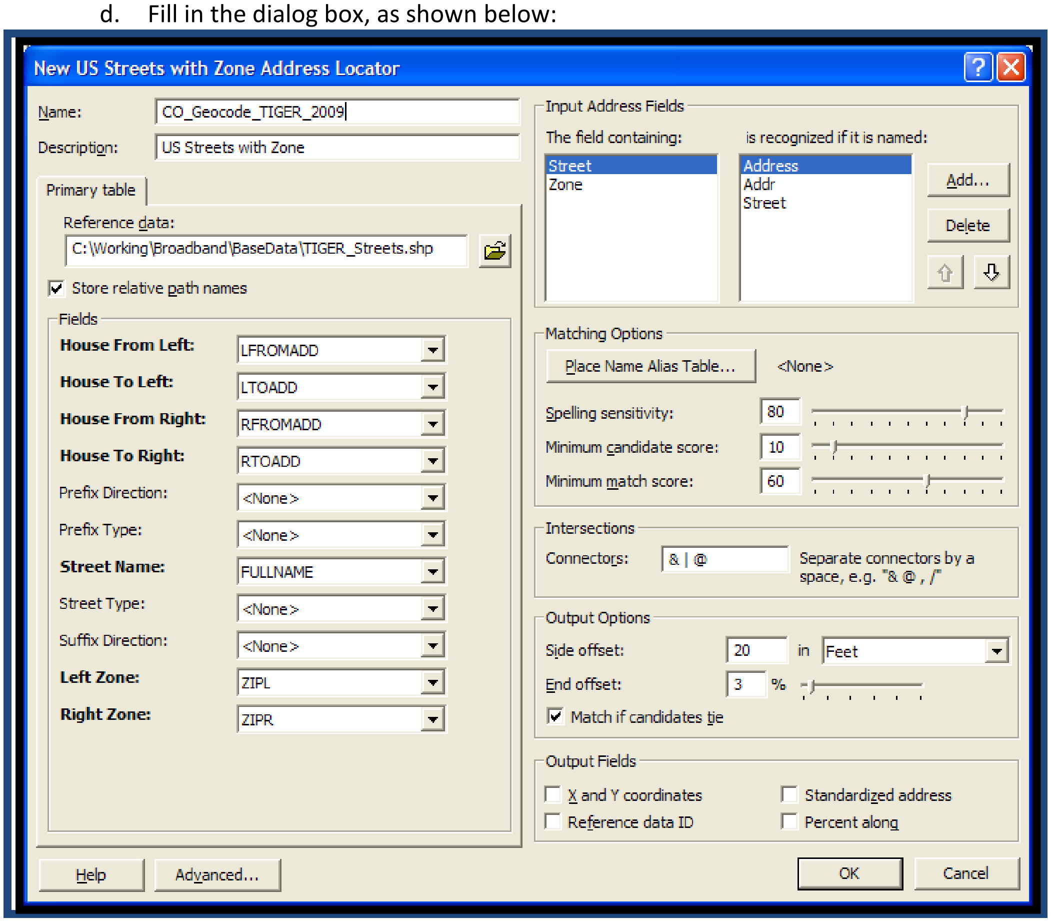
SUBSCRIBER LOCATION—ADDRESS DATA

In the event that the data provider supplies subscriber address data, the steps are as follows:

1) First, convert the address data to a clean Excel spreadsheet in an appropriate address data format.
    a. Usually, this has the following columns: street address (number, pre-directional, pre-modifier, street name, street type, post-directional and post-modifier concatenated), city, state, ZIP.
2) Configure the ArcGIS® geocoding tool to use the TIGER® 2009 streets dataset.
    a. In ArcCatalog®, create a new Address Locater by right-clicking in the white space of the appropriate directory and selecting **New>Address Locater** from the dropdown menu.
    b. Select **US Streets with Zone** and click **OK**.

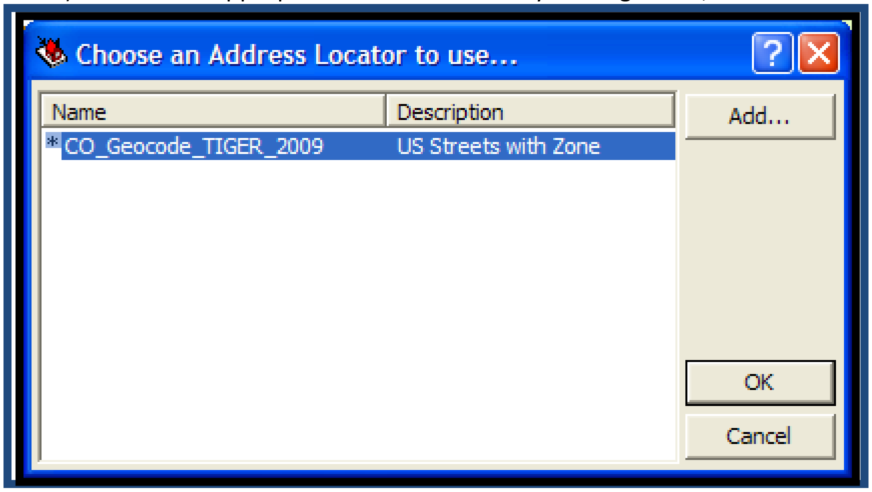
> **NOTE:**
> It is likely that multiple Address Locators will have to be set up to handle the variety of provider address data received.

    c. Navigate to the **TIGER Streets 2009 file** and click **OK**.
    d. Fill in the dialog box, as shown below:

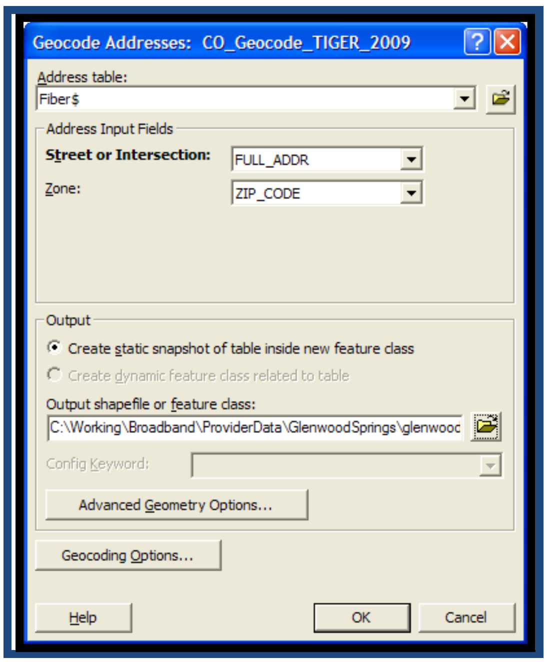


e. Click **OK**.

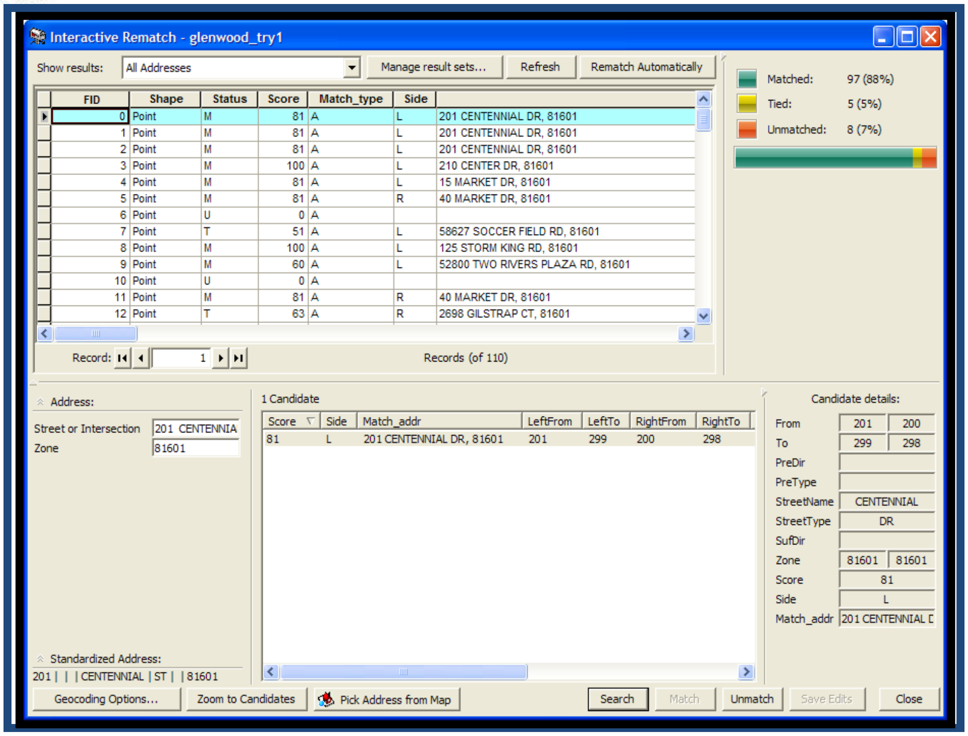
3) Open ArcMap® and add the Excel spreadsheet with the address information.
4) Right-click on the Excel spreadsheet and select **Geocode Addresses** from the dropdown menu.
5) Select the appropriate address locator by clicking **Add...**, then **OK**.



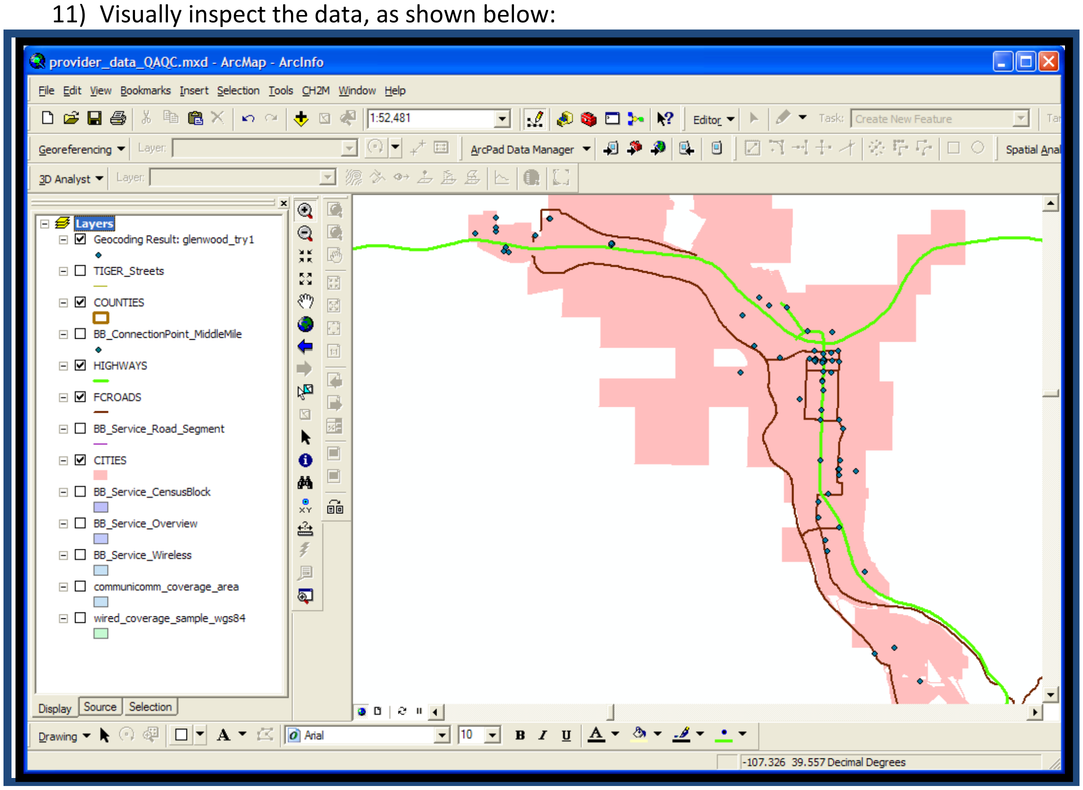
6) Fill out the **Geocode Addresses** dialog box, as shown below:



7) Geocode the list in batch mode using the geocode service set up in **Step 2** above, accepting all the default parameters.
8) Review results. See example below.



9) Adjust geocoding parameters accordingly and repeat batch to resolve issues.
10) Manually geocode unmatched addresses until target hit rate achieved, generally 90%.
11) Visually inspect the data, as shown below:



12) Follow the steps detailed in **Subscriber Location—GIS Data** below.

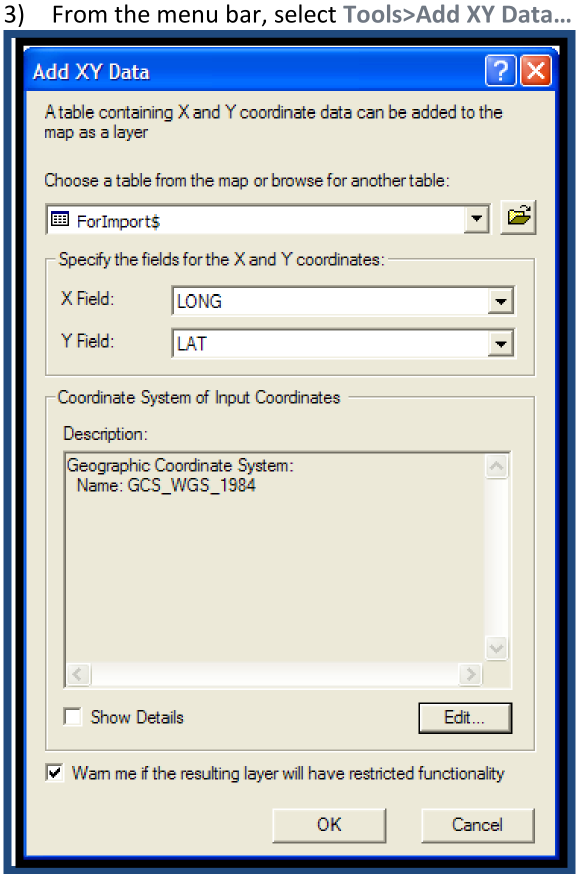
SUBSCRIBER LOCATION—XY DATA

If the provider supplies a list of subscriber data with accompanying XY data such as latitude and longitude, the steps are as follows:

1) Refine the format in Excel so that the data can be opened easily using ArcMap®.
    a. Remove all font color, highlighting, cell colors and borders, clean up column headers and make certain there are no merged cells.
    b. Make certain that XY locations are in decimal degrees.
        (i.) To convert from degrees, minutes, seconds (39º 26' 45.67") to decimal degrees, use the following formula: DD + (MM/60) + (SS.SSS/3600).

NOTE:
If XY locations from some other coordinate system are provided, you can use those in the process below but you must know what the coordinate system is.

2) Open the Excel worksheet in ArcMap®.
3) From the menu bar, select **Tools>Add XY Data…**

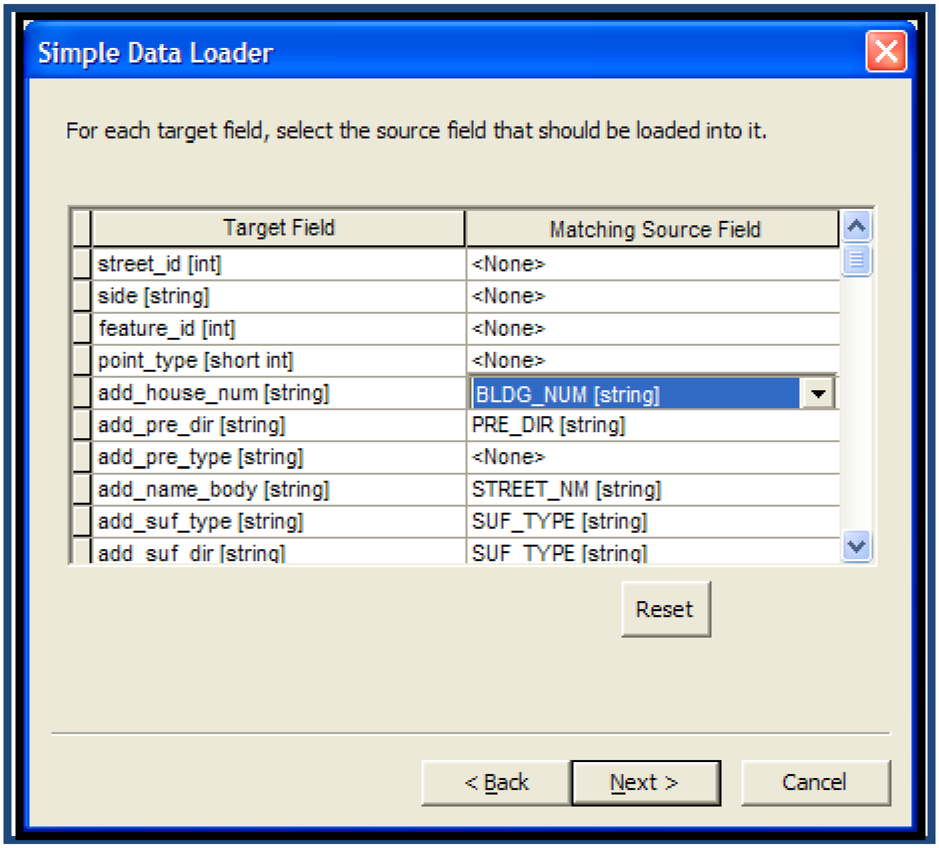


4) Supply the appropriate fields for the X and Y coordinates, choose the appropriate coordinate system and click **OK**.
5) Results are an event layer, not a true spatial layer. Export the data by right-clicking the event layer and selecting **Data>Export Data…** from the dropdown menu.
6) Follow the steps detailed in **Subscriber Location—GIS Data below**.

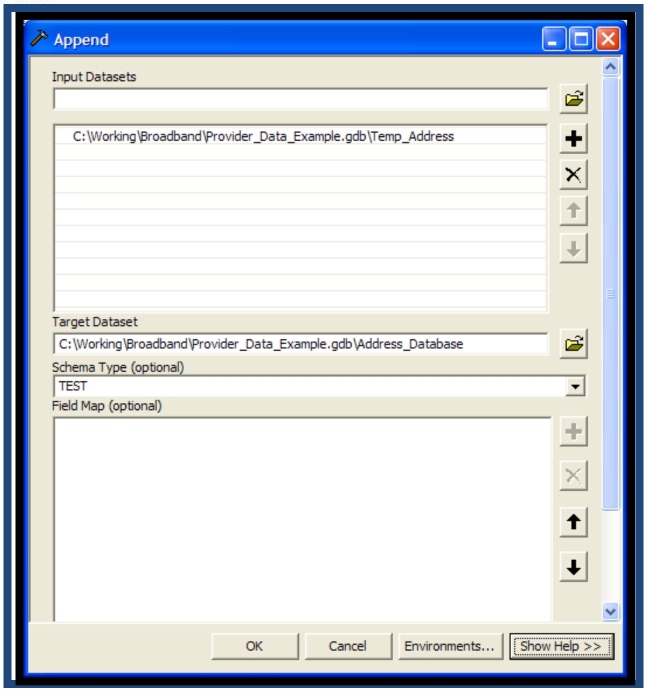
SUBSCRIBER LOCATION—GIS DATA

If the provider supplies subscriber location in GIS format, the only process step is to load that data into the appropriate data schema and it will be ready for processing.

1) First, load the data into the Point Address database schema using an empty feature class in that schema.
2) In ArcCatalog®, right-click on the empty feature class and select **Load** from the dropdown menu.
3) Navigate to the provider address GIS dataset and then map the attribute fields accordingly, as shown below:



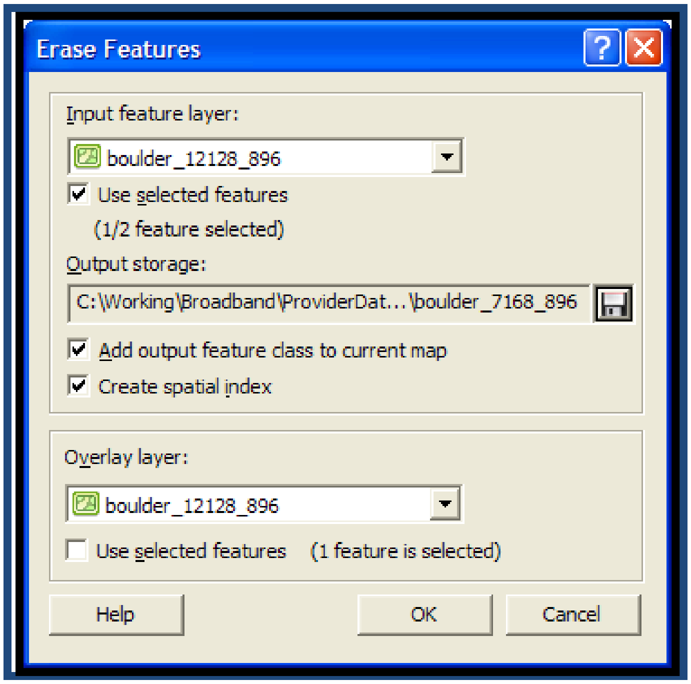
4) Once you have successfully loaded the provider address data into the temporary database with the correct schema, you now will append that data to the overall Point Address database.
5) In ArcToolbox®, use the **Append** command (**Data Management Tools>General> Append***)* to add the features into the overall Point Address database, as shown below:



6) Since the data is already in the Point Address database schema, there is no need to alter the Field Map in the Append tool.
7) After appending, calculate metadata reflecting geometry source and representation values.
8) Break provider-specific points into separate county feature classes and perform the following steps per county feature class:
   a. Within ArcGIS®:
      (i.) Summarize download and upload speeds [first,last] to determine all speeds available for county.
         (1) This will save as a DBF table. Keep track of location for future reference.
      (ii.) Buffer county address point featureclass to 150'.
         (1) During buffer command, dissolve on ad_down; ad_up; provider; dba; frn; tt; all metadata fields; stctyfips. Save as…. county_fastestdown_fastestup.
         (2) Example using Qwest data: boulder_40128_20128, where boulder=county; 40128=ad_down; 20128=ad_up.

NOTE:
These attribute fields are specific to the Point Address database.

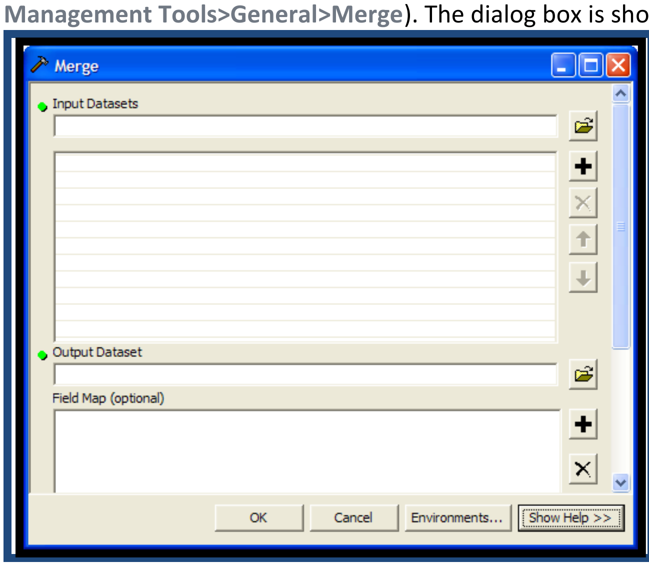
      (iii.) Select the features that represent the lowest speeds.
   b. Using XtoolsPro (***http://www.xtoolspro.com/***):
      (i.) In the XTools Pro toolbar, select **XTools Pro>Layer Operations>Erase Features.**
      (ii.) Use the same feature class for Input and Overlay.
      (iii.) Check **Use selected features** on the **Input** feature, as shown below.
      (iv.) Repeat and erase slowest speeds one speed at a time. Save each new feature class as the next slowest speed, using the same naming convention as shown in **a.(ii.)(1)** above. A general example is shown below:



c. Return to ArcGIS®:

(i.) Edit/delete speeds from the attribution table of each feature class, so each remaining feature class has only one speed value.

(ii.) Merge individual speed feature classes using the **Merge** command in ArcToolbox® (**Data Management Tools>General>Merge**). The dialog box is shown below:



(iii.) Merge individual county feature classes using the **Merge** command in ArcToolbox (**Data Management Tools>General>Merge**).

(iv.) Since the county files are all in the same schema, DO NOT alter the Field Map portion of the command interface.

(v.) When all the county files are merged into one dataset, use the Append command in ArcToolbox® (Data Management Tools>General>Append) to add the features to the bb_cov interim dataset. Use the Field Map portion of the Append tool to map the appropriate field values to their corresponding fields in the bb_cov feature class.

DSLAM OR CENTRAL OFFICE LOCATION—ADDRESS DATA

In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office address data, the steps are as follows:

1) Follow the process for geocoding points in **Subscriber Location—Address Data** above.
2) Follow the steps detailed in **DSLAM or Central Office Location—GIS Data** below.

DSLAM OR CENTRAL OFFICE LOCATION—XY DATA

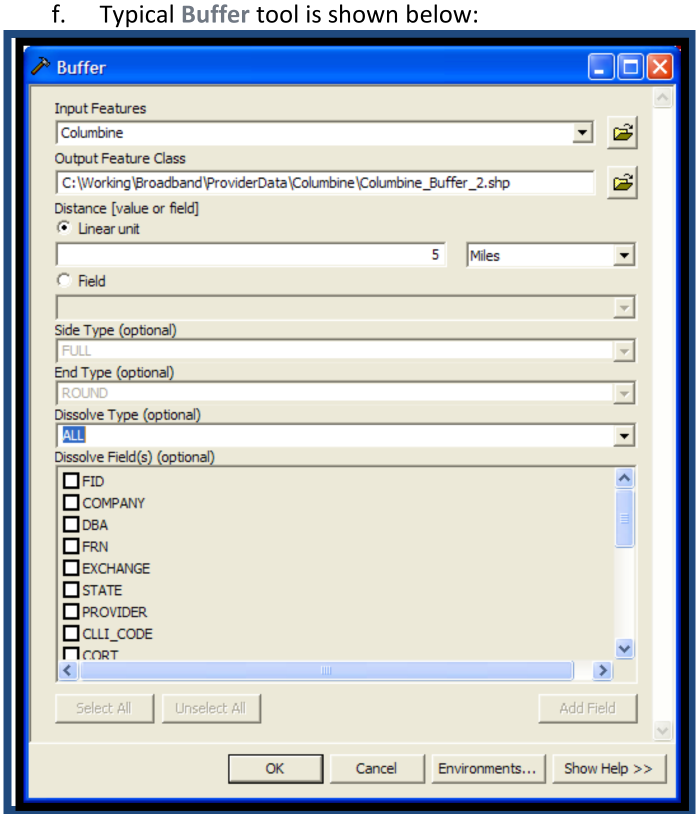
In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office XY data, the steps are as follows:

1) Follow the process for creating points from XY data in **Subscriber Location—XY Data** above.
2) Follow the steps detailed in **DSLAM or Central Office Location—GIS Data** below.

DSLAM OR CENTRAL OFFICE LOCATION—GIS DATA

In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office GIS data, the steps are as follows:

1) Buffer the DSLAM/Central Office points feature class.
    a. Add the point feature class to ArcMap®.
    b. Open the ArcToolbox® and go to Analysis Tools>Proximity>Buffer.
    c. Set the buffer distance to 5 miles.
    d. Set the dissolve type to ALL.
    e. Name the output feature class.
    f. Typical Buffer tool is shown below:



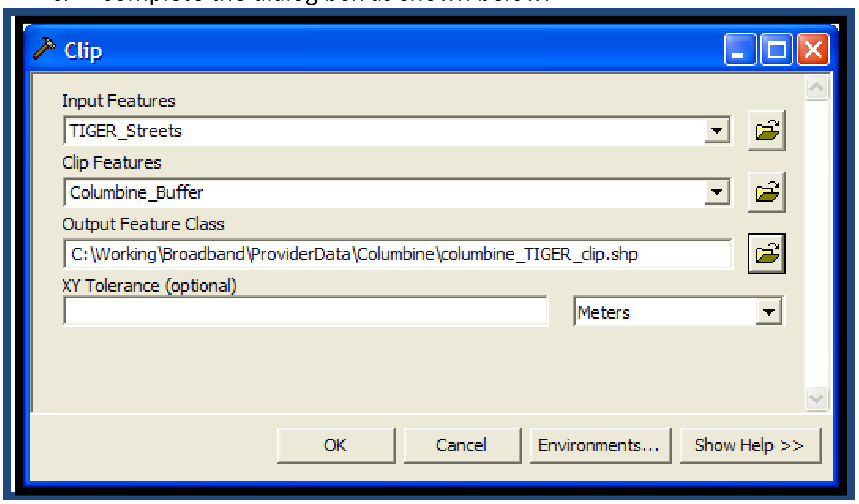
g. Click **OK**.

2) Use the resulting buffer feature class to clip the TIGER® street layer:

a. Add TIGER® street layer to ArcMap®.

b. Open the ArcToolbox® and go to **Analysis Tools>Extract>Clip**.

c. Complete the dialog box as shown below:



d. Click **OK**.

3) Using ArcCatalog® and within the file geodatabase:

a. Right-click and create a new Feature Dataset.

(i.) For the Feature Dataset settings:

(1) Name the feature dataset accordingly.

(2) Select horizontal coordinate system by importing the coordinate system associated with the clipped TIGER® street layer by selecting **Import** and navigating to the location of that feature class.

(3) No vertical coordinate system needed.

(4) Leave all x,y,z,m values at default.

(5) Click **Finish**.

4) Import previously created street feature class into new **Feature Dataset**.

5) Right-click **Feature Dataset** and create new Network Dataset—accept all default setting for the Network Dataset.

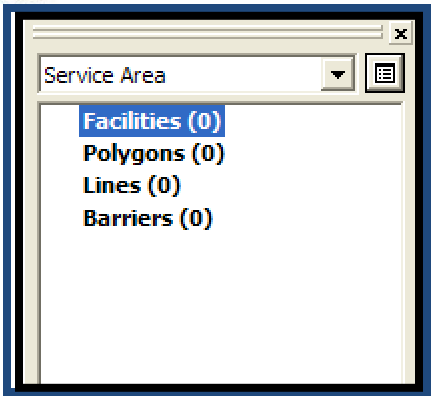
NOTE:
The Network Analyst extension must be turned on.

6) In ArcMap® turn on the **Network Analyst Toolbar** by going to **View>Toolbars>Network Analyst**.

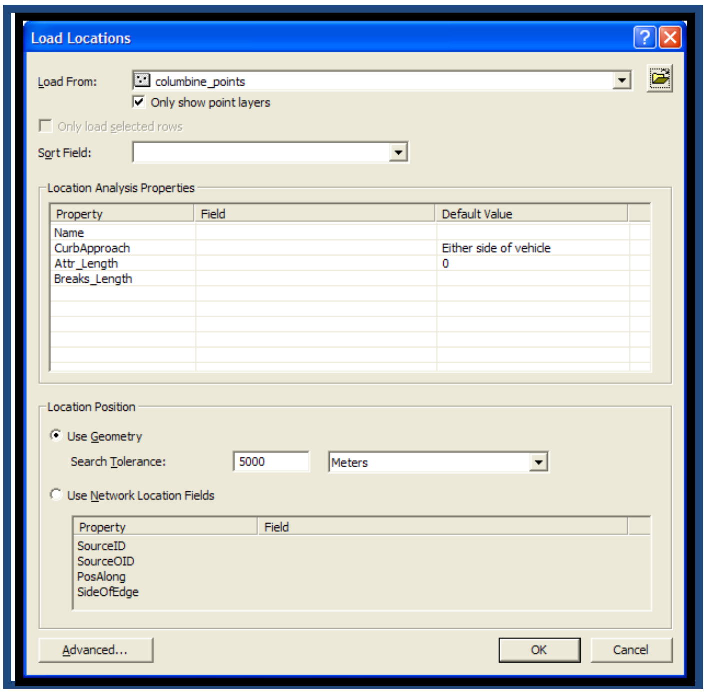
7) Add the Network Dataset created in **Step 5** to ArcMap.

8) Using the **Network Analyst Toolbar** dropdown, create **New Service Area**.

9) Open the **Network Analyst Window** by selecting the button. See below.



10) Right-click **Facilities** layer, select **Load Locations** and navigate to the DSLAM/Central Office facilities feature class.



11) Click **OK**.

12) Click the **Service Area Properties** button.

13) For the following tabs, change the following properties:

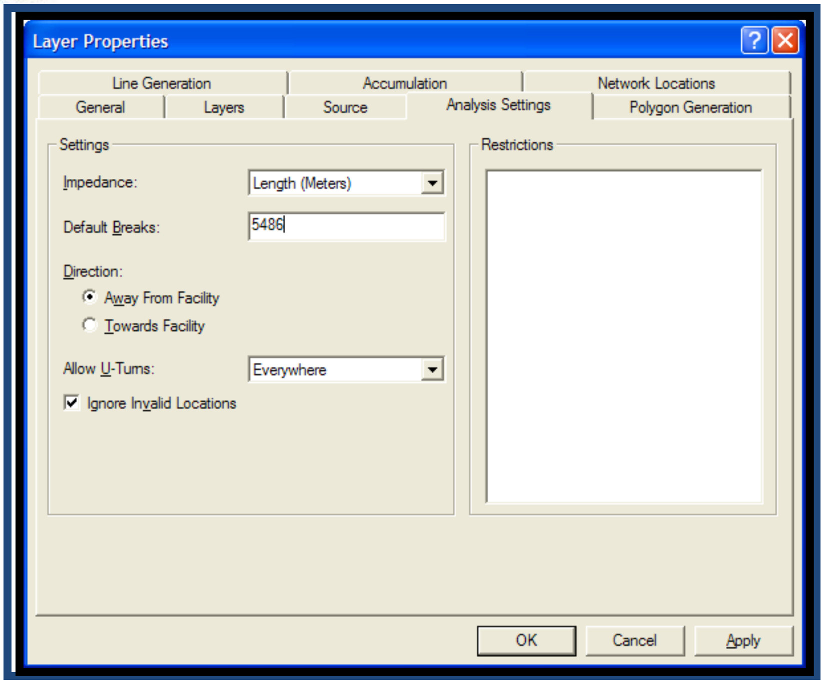
   a. **Polygon Generation** tab:

      (i.) Select **Merge by break value**.

      (ii.) Also disable the **Trim Polygons** option.

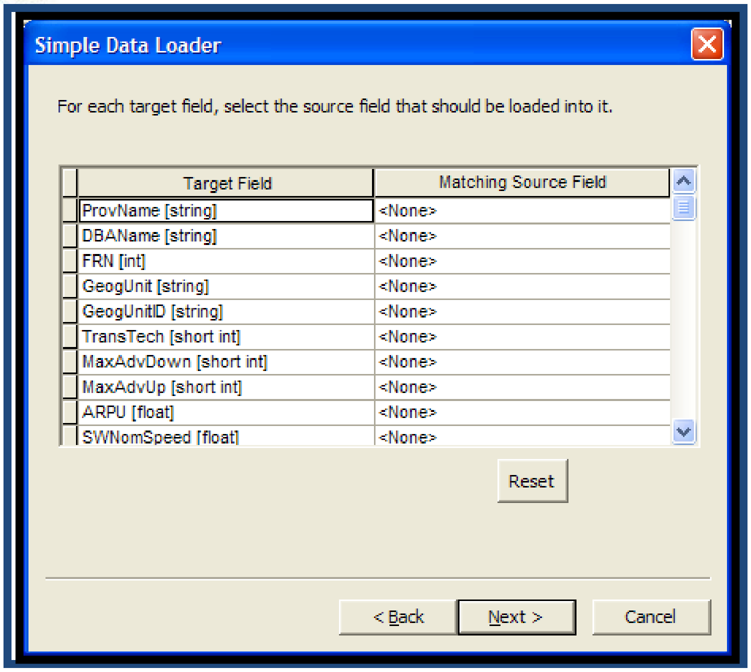
   b. **Analysis Settings** tab—using and converting the specified DSLAM buffer distance from feet to meters—input buffer distance value in meters into the **Default Breaks** location.

      (i.) Generally, 18,000 feet (5486 meters) from DSLAM or Central Office location is used as the buffer distance. See below.



c. Click **OK**.

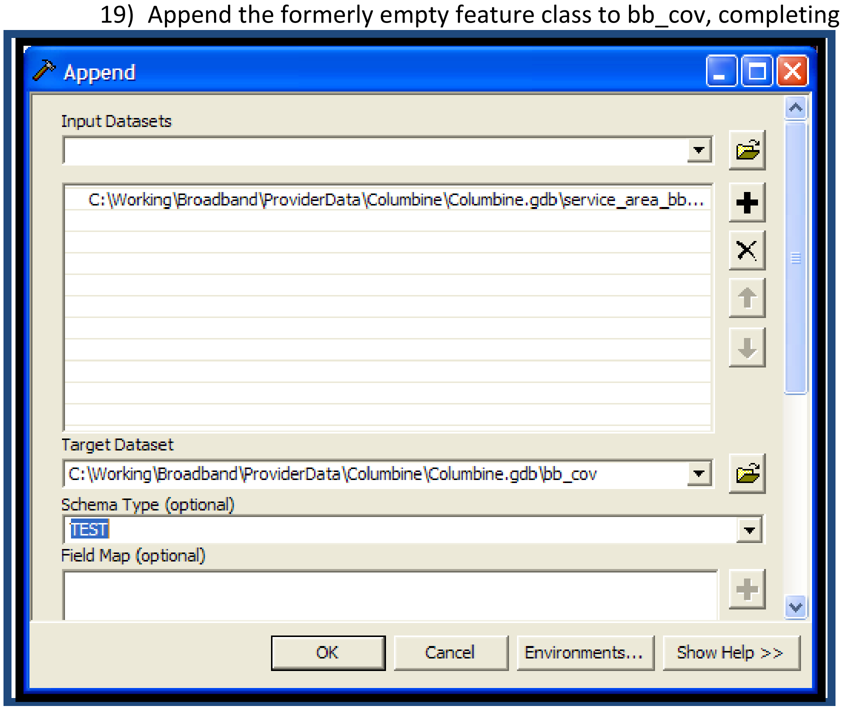
14) On the **Network Analyst Toolbar**, click the **Solve** button to create service area polygons.
15) Right-click on the created service area polygon in the layer list, and select **Data>Export Data** from the dropdown list.
16) Export to a feature class in the file geodatabase you created earlier.
17) In ArcCatalog®, create an empty feature class with the schema of the bb_cov feature class and load the feature class created in **Step 16** into it.
    a. Right-click on the empty feature class, select **Load>Load Data** from the dropdown menu and navigate to the location of the service area feature class.
    b. Click the **Add** button, then click **Next**.
    c. Accept the defaults and click **Next**.
    d. DO NOT attempt to map any fields, as shown below:



e. Click **Next**, then **Next** again, then **Finish**.

18) In ArcToolbox®, go to **Data Management Tools>General>Append**.

19) Append the formerly empty feature class to bb_cov, completing the dialog box, as shown below:



20) Leave the **Schema Type** as TEST.

21) Click **OK**.

22) In ArcMap®, open bb_cov for editing and manually input associated attribution.

BROADCAST TOWER LOCATION—ADDRESS DATA

In the event that the provider supplies wireless broadcast tower location address data, the steps are as follows:

1) Follow the process for geocoding points in **Subscriber Location—Address Data** above.
2) Follow the steps detailed in **Broadcast Tower Location—GIS Data** below.

BROADCAST TOWER LOCATION—XY DATA

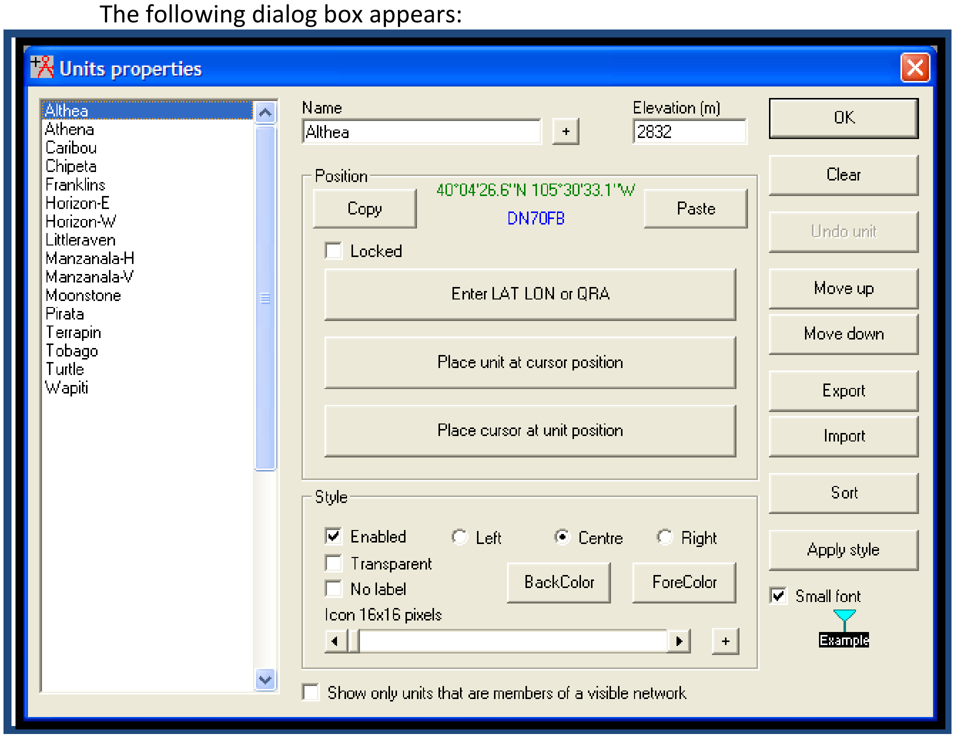
In the event that the provider supplies wireless broadcast tower location XY data, the steps are as follows:

1) Follow the process for creating points from XY data in **Subscriber Location—XY Data** above.
2) Follow the steps detailed in **Broadcast Tower Location—GIS Data** below.

BROADCAST TOWER LOCATION—GIS DATA

In the event that the provider supplies wireless broadcast tower location GIS data, the steps are as follows:

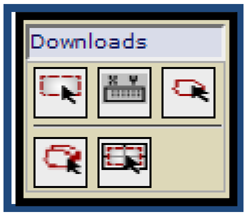
1) Download the required software (Radio Mobile) from the website: **http://www.cplus.org/rmw/english1.html**
2) Install the software according to the standard directions, found here: **http://www.cplus.org/rmw/download/download.php?S=1**
3) Open the application.
4) Load the broadcast tower location and elevation information by selecting **File>Unit properties**. The following dialog box appears:



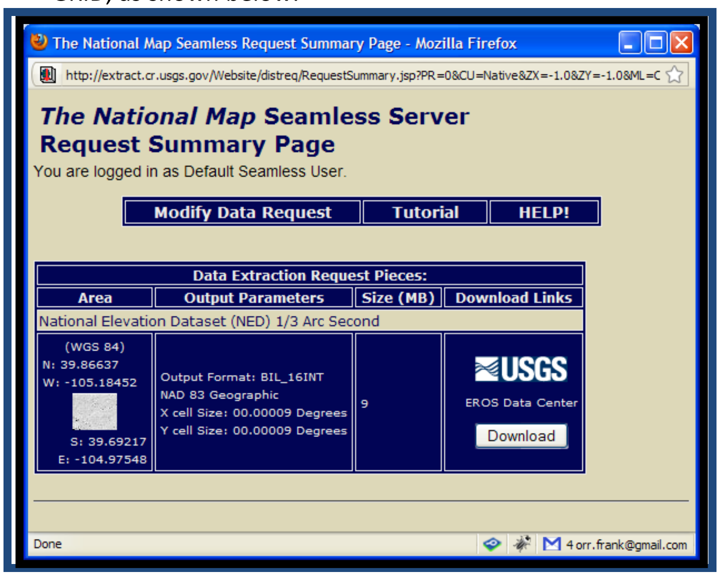
5) Add the information for all the towers supplied by the WISP data provider, including the elevation. If provider does not supply elevation, this information can be obtained from Google Earth.
   a. If available, use the **Import** button to import a Google Earth KML of the tower locations.
6) Go to the National Map Seamless Server (**http://seamless.usgs.gov/**) and download elevation data sufficient to contain the tower locations.

a. At least the 1/3" NED data is needed. Select this by clicking the **Download** button in the upper right of the website and checking the box next to **1/3" NED**.

b. Zoom to the area of interest and use the **Download** tools to define the area to download:

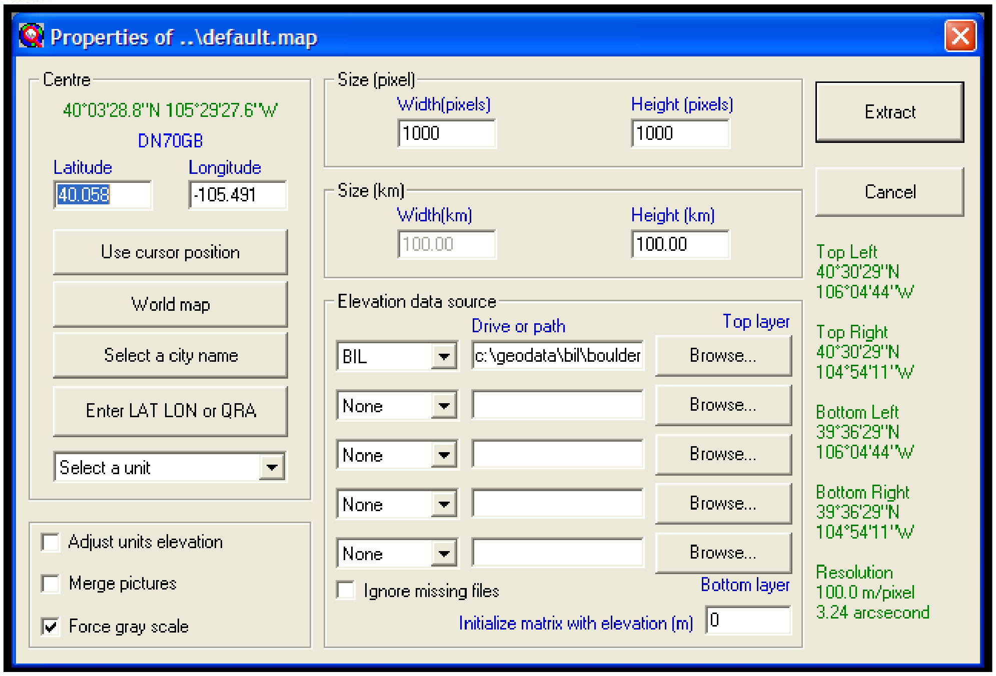


c. Click the **Modify Data Request** button to request the data in BIL_16INT format, not ESRI GRID, as shown below:



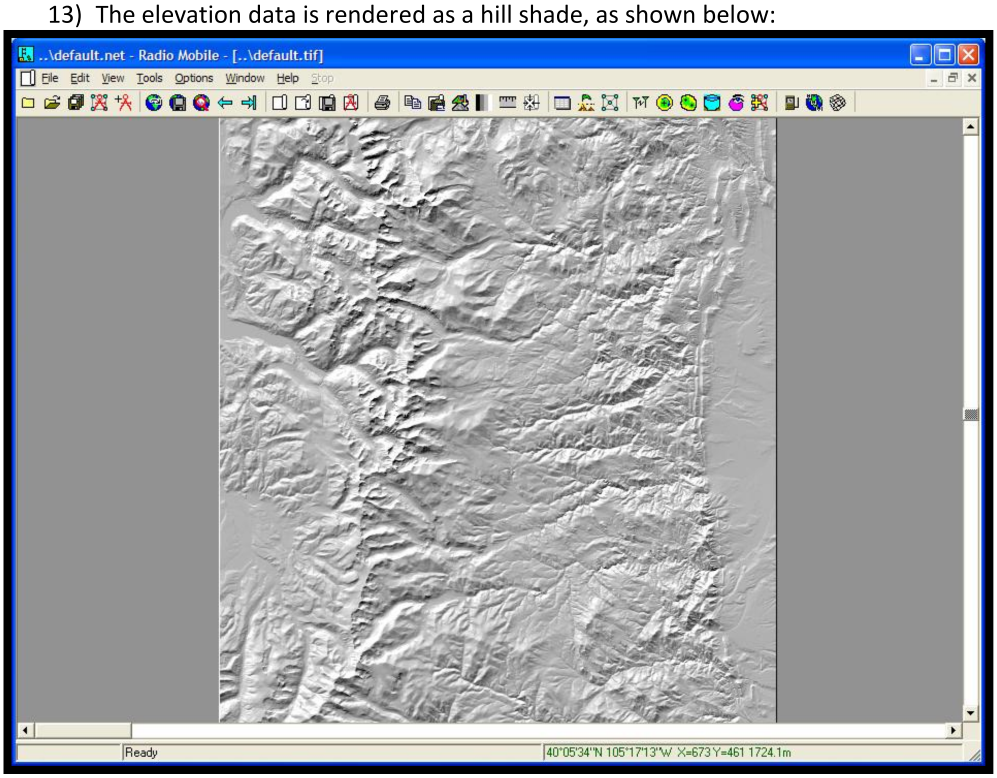
d. Download the data and unzip it.

7) Select **File>Map Properties** to define the map.
8) Enter a latitude and longitude in the center of the tower locations.
9) Set the size (in pixels) and the size (in kilometers) of the map.
10) Set the directory path leading to the BIL elevation data just downloaded.
11) The dialog box is shown below:



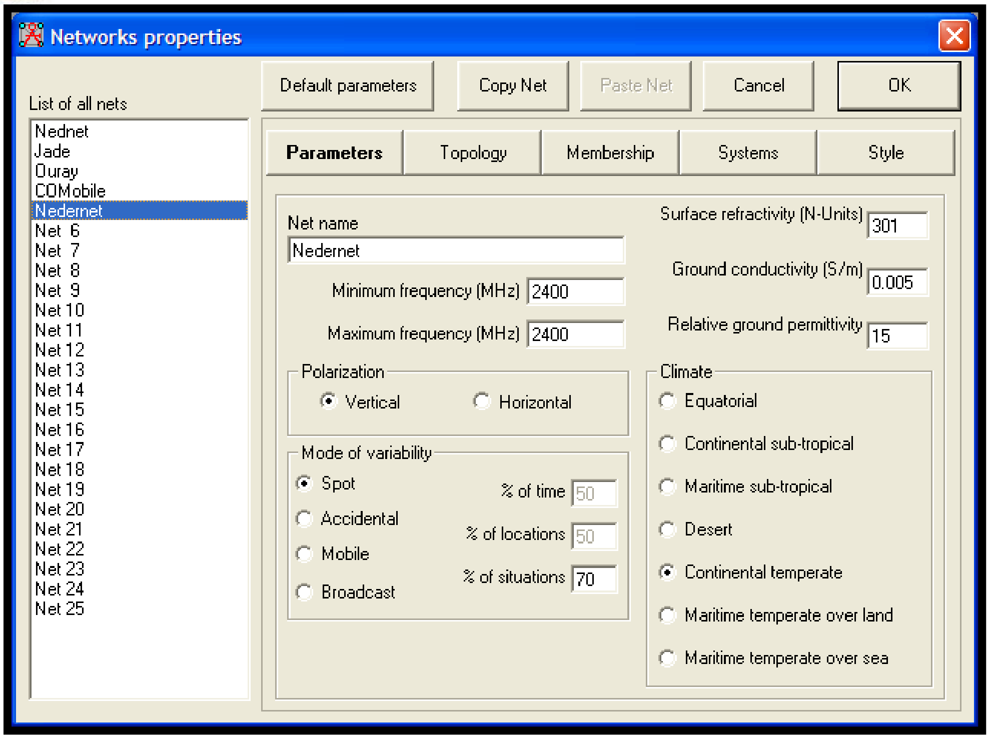
12) Click **Extract**.

13) The elevation data is rendered as a hill shade, as shown below:

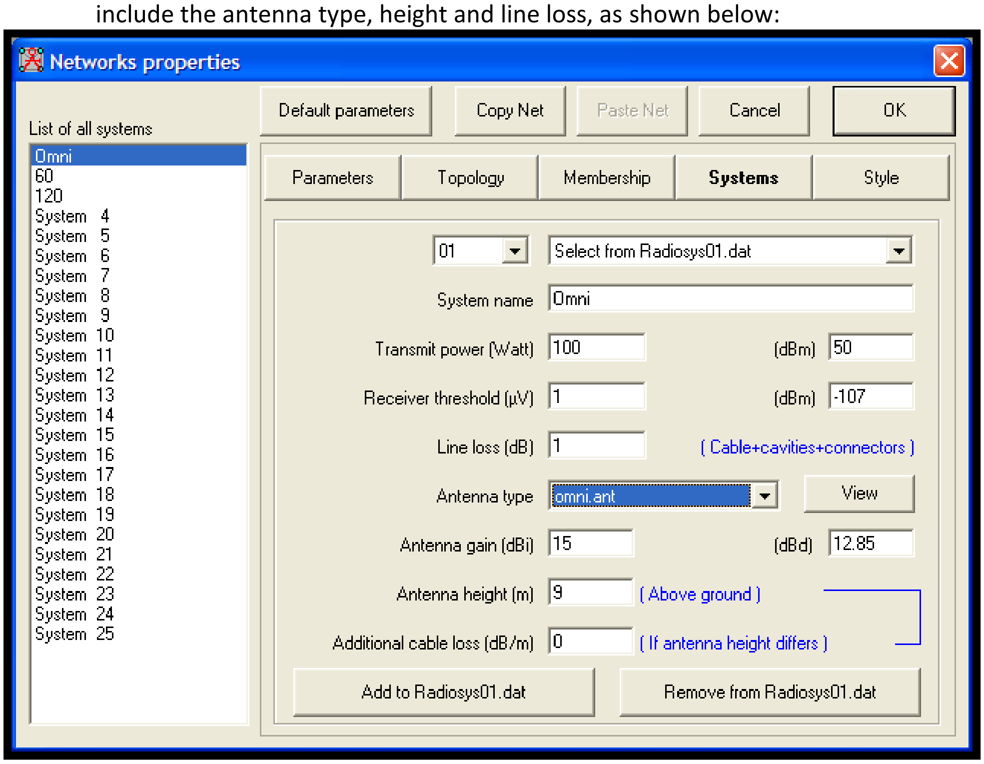


14) Select **File>Network properties** from the main menu.

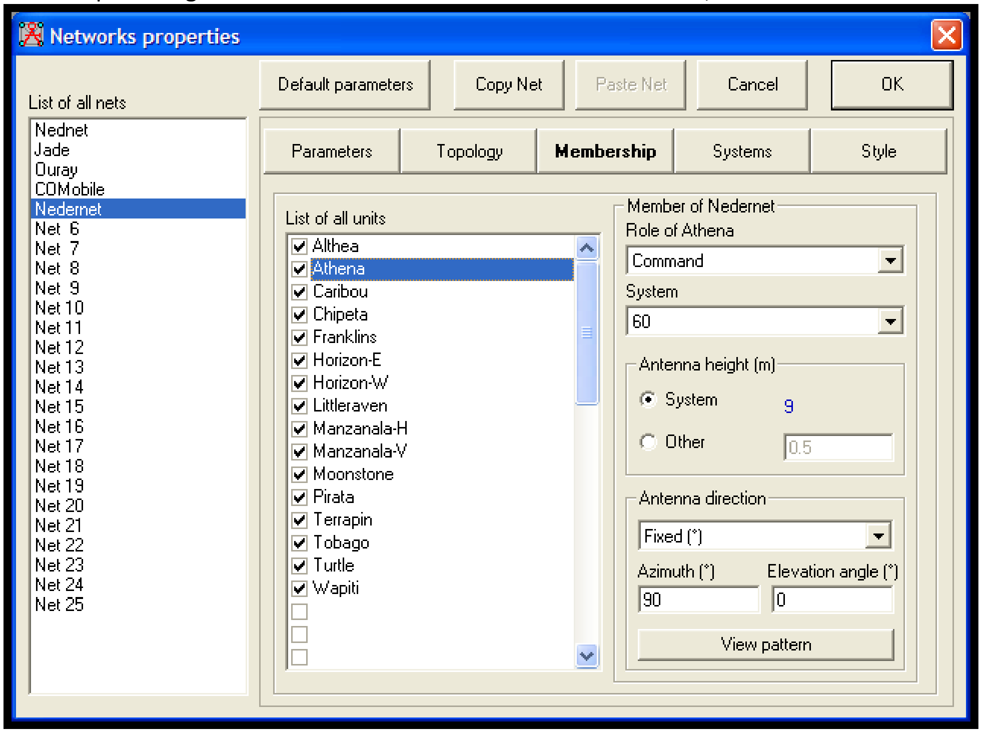
15) Create a new network and enter in the frequency range under the **Parameters** tab, as shown below:



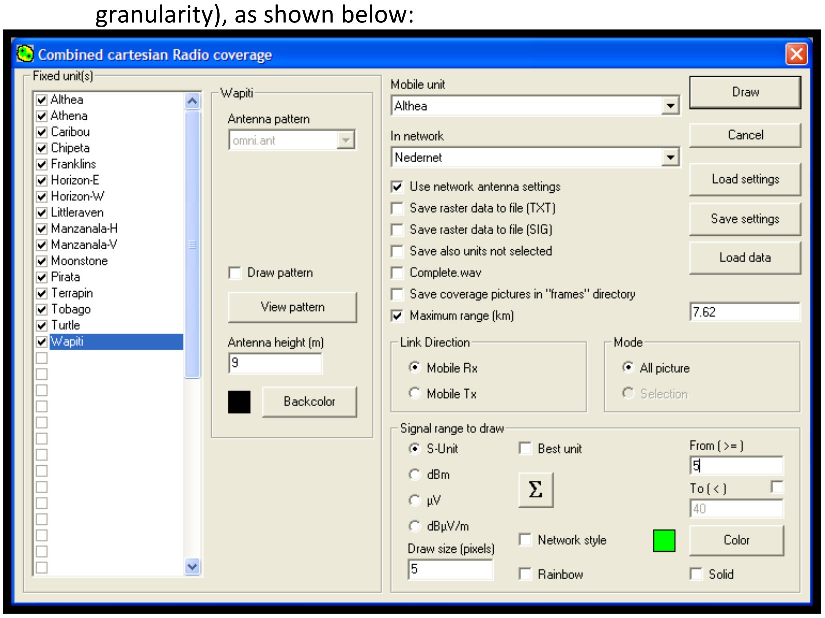
16) Leave all the other values as they appear, and select the **Systems** tab.
17) Create enough systems to cover all the varieties of equipment in the provider network. This will include the antenna type, height and line loss, as shown below:



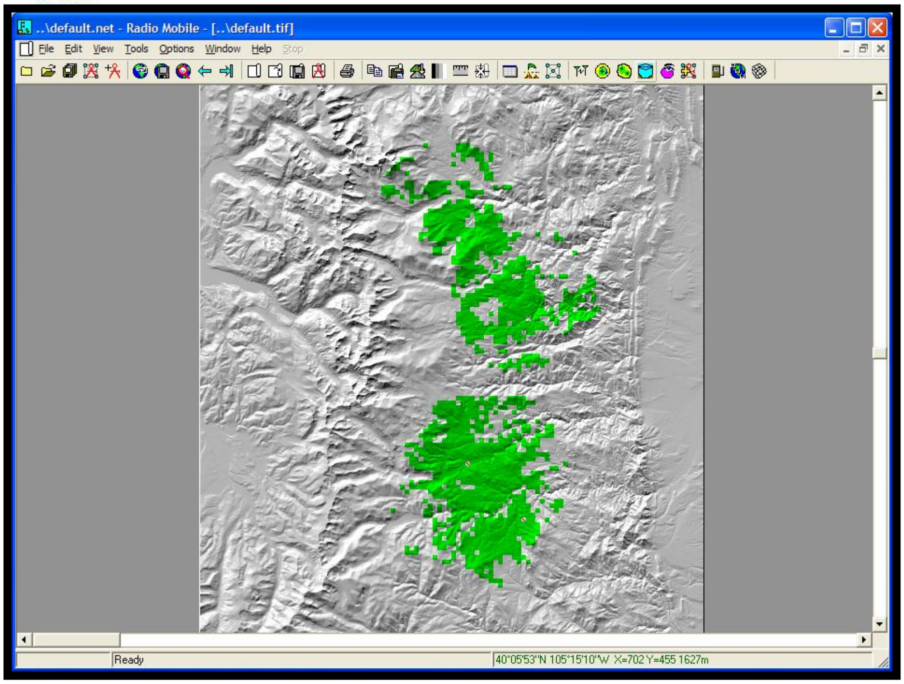
18) Now click on the **Membership** tab, and assign the individual towers to their respective systems, providing the azimuth for non-omnidirectional antennas, as shown below:



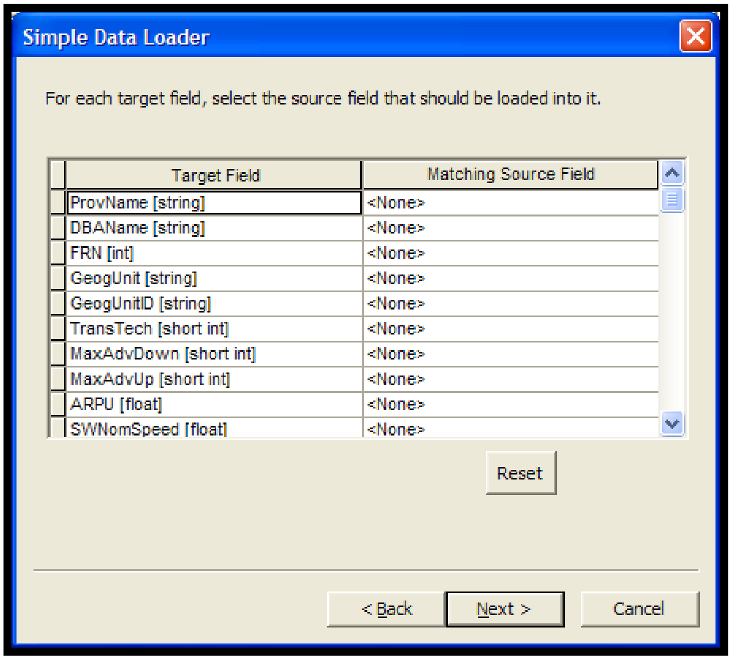
19) Click **OK**.
20) Select **Tools>Radio Coverage>Combined Cartesian** from the main menu.
21) Complete the dialog box as shown below, providing the **Maximum Range** from the highest tower beam radius supplied by the provider.
22) Set the **Pixel Size** at 5 (experiment depending on the area covered to get the right level of granularity), as shown below:



23) Set the **Signal range to draw** to S-Unit and type 5 in the **From (>=)** box.
24) Click on **Draw**. See below.



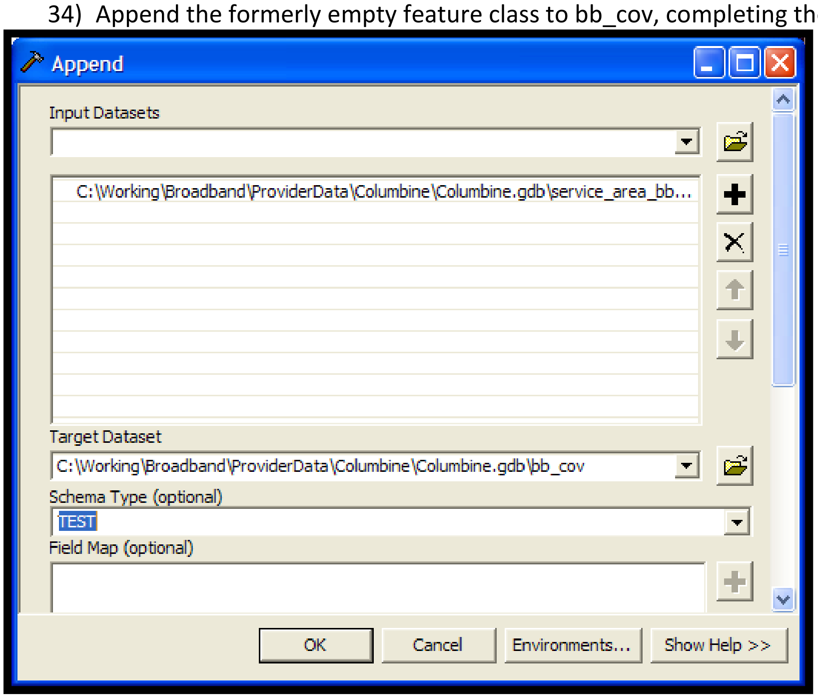
25) Save the resulting image as a TIF by selecting **File>Save Picture as**.
26) Open ArcMap® and load the BIL elevation data you used in Radio Mobile.
27) Load the TIF image you created and georeference it using the corners of the BIL data.
    a. The corners of the data can be seen in the TIF image.
28) Follow the georeferencing directions from the **Coverage Area—PDF/JPG/Other Image Format** section below.
29) Use the **Georeferencing Toolbar** to **Update the Georeferencing** for the TIF dataset.
30) In ArcToolbox®, select **Data Transformations>From Raster>Raster to Polygon** and input the georeferenced TIF you just created.
31) Open the resulting polygon feature class for editing using the **Editing** toolbar in ArcMap® and clean up as necessary.
32) In ArcCatalog®, create an empty feature class with the schema of the bb_cov feature class and load the feature class created above into it.
    a. Right-click on the empty feature class, select **Load>Load Data** from the dropdown menu and navigate to the location of the service area feature class.
    b. Click the **Add** button, then click **Next**.
    c. Accept the defaults and click **Next**.
    d. DO NOT attempt to map any fields, as shown below:



e. Click **Next**, then **Next** again, then **Finish**.

33) In ArcToolbox®, go to **Data Management Tools>General>Append**.

34) Append the formerly empty feature class to bb_cov, completing the dialog box, as shown below:



35) Leave the **Schema Type** as TEST.

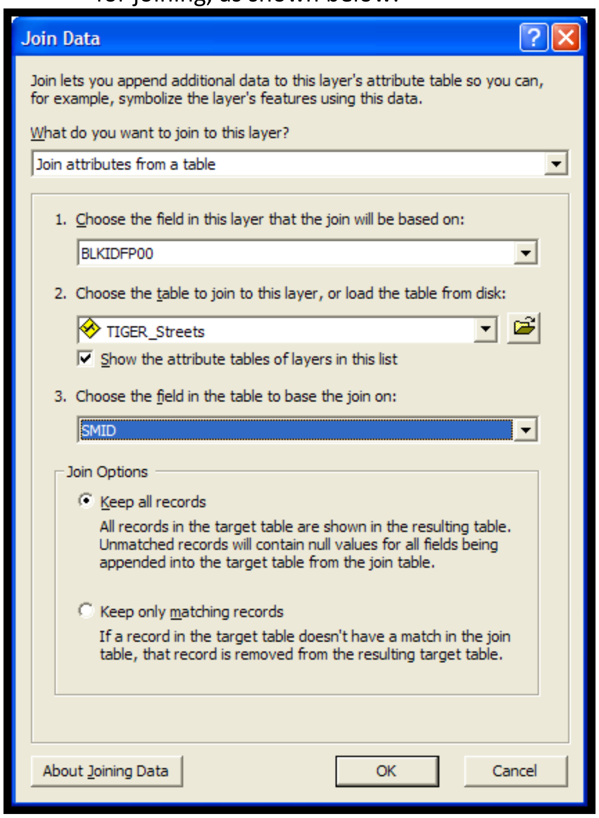
36) Click **OK**.

37) In ArcMap®, open bb_cov for editing and manually input associated attribution.

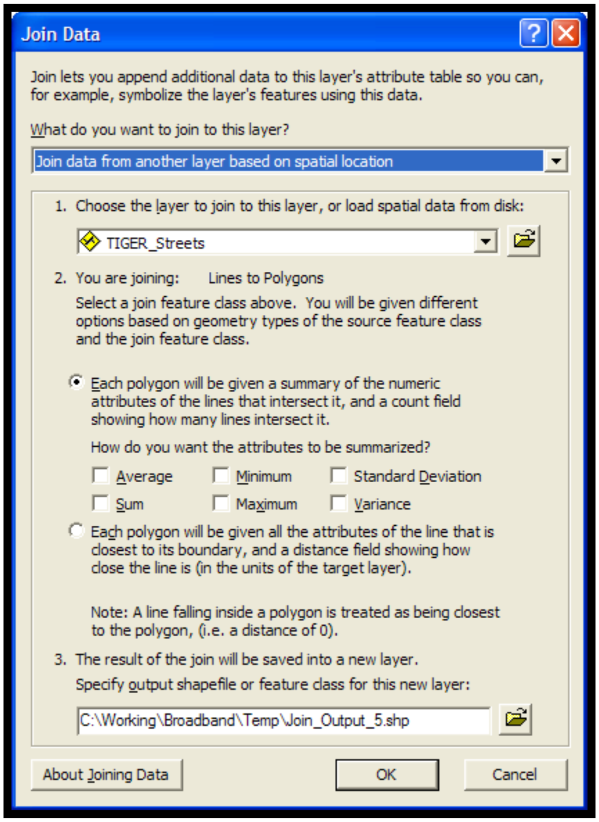
TIGER® STREET SEGMENTS—LIST, SPREADSHEET OR GIS DATA

In the event that the provider supplies TIGER® street segments in list or spreadsheet format, the steps are as follows:

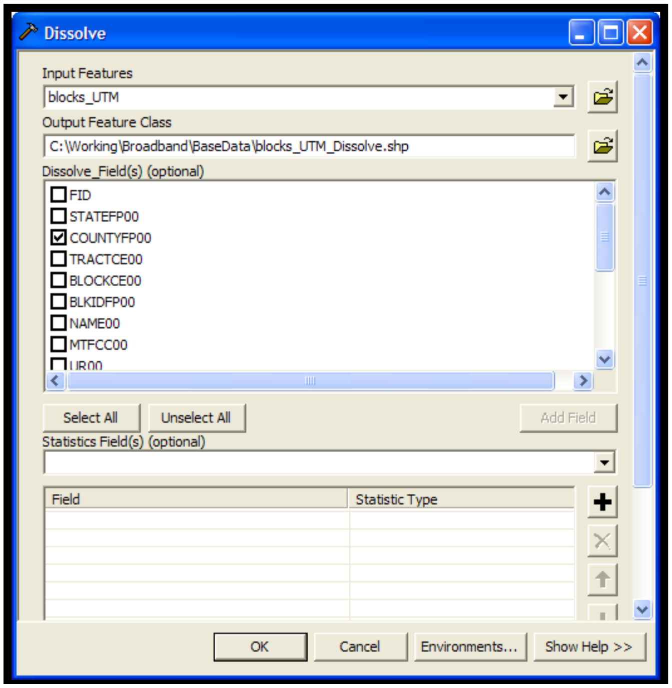
1) Join TIGER® road segments to 2000 census blocks feature class using one of two methods based on how the data is provided:
   a. If the TIGER® data is provided with a Census Block ID, then join the segments to the Census Block geometry based on that ID:
      (i.) Load both datasets into ArcMap®;
      (ii.) In the layer list, right-click on the 2000 census block feature class and select **Joins and Relates>Join**;
      (iii.) In the dialog box, select the TIGER® road segments data and the proper attribute fields for joining, as shown below:



      (iv.) Click **OK**.
   b. If the data provided is a list containing TLIDs, then join to the TIGER®/Line data using the TLID, and use a spatial join to associate the TIGER® segment with the coterminous block based on the block ID:
      (i.) Load both datasets into ArcMap®;
      (ii.) In the layer list, right-click on the 2000 census block feature class and select **Joins and Relates>Join**;
      (iii.) Select **Join data from another layer based on spatial location** from the dropdown menu;
      (iv.) Complete the dialog box, as shown below and click **OK**.

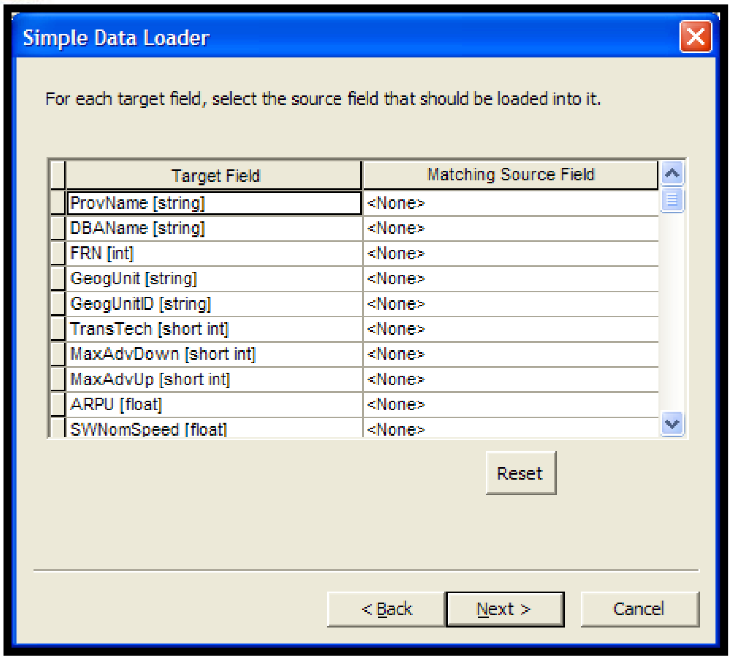


2) Export joined records into a temporary feature class.
3) If joined Census Block geometry is confined to one specific area, then dissolve blocks into one record. If joined Census Block geometry is distributed throughout a particular State, then dissolve sub-selections of census blocks for each county.
   a. Use the County FIPS code to dissolve by county.
   b. In ArcToolbox®, select **Data Management Tools>Generalization>Dissolve**.
   c. Complete the **Dissolve** dialog box, as shown below:



  d. Click **OK**.

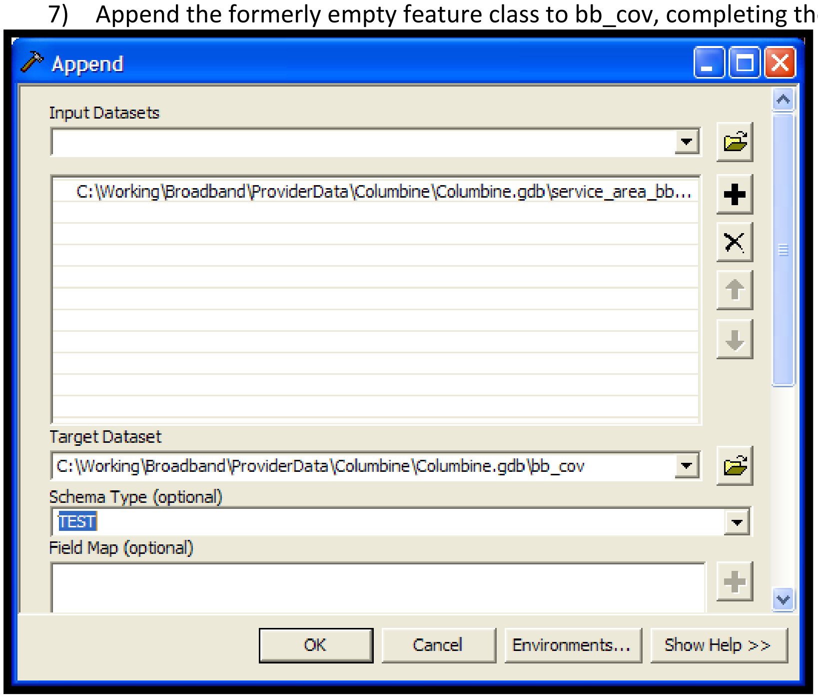
4) For each dissolved region, open the feature class for editing using the **Editing** tool in ArcMap® and remove unnecessary slivers and other small holes. For general guidance on editing features in ArcMap®, see **http://webhelp.esri.com/arcgisdesktop/9.3/pdf/Editing_Tutorial.pdf**
5) In ArcCatalog®, create an empty feature class with the schema of the bb_cov feature class and load the feature class created above into it.
  a. Right-click on the empty feature class, select **Load>Load Data** from the dropdown menu and navigate to the location of the service area feature class.
  b. Click on the **Add** button, then click **Next**.
  c. Accept the defaults and click **Next**.
  d. DO NOT attempt to map any fields, as shown below:



e. Click **Next**, then **Next** again, then **Finish**.

6) In ArcToolbox®, go to **Data Management Tools>General>Append**.

7) Append the formerly empty feature class to bb_cov, completing the dialog box, as shown below:



8) Leave the **Schema Type** as TEST.

9) Click **OK**.

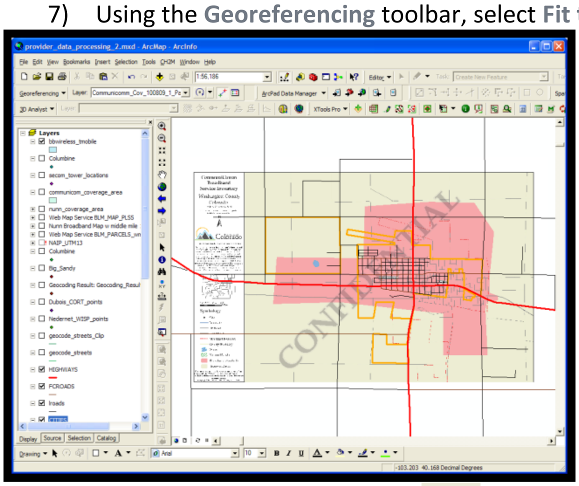
10) In ArcMap®, open bb_cov for editing and manually input associated attribution if necessary.

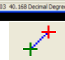
POLYGONAL DATA

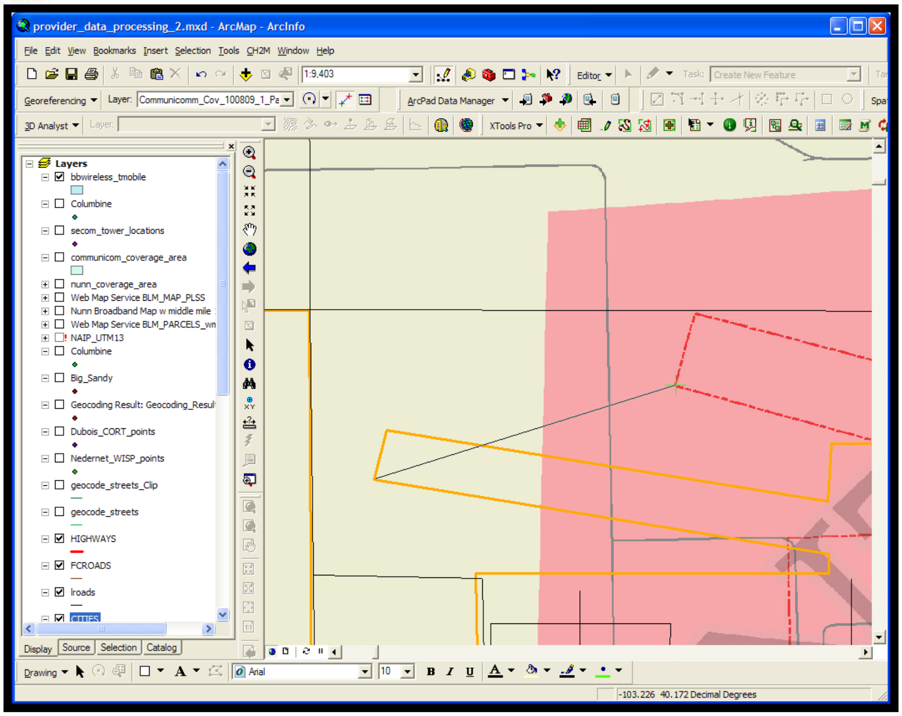
COVERAGE AREA—PDF/JPG/OTHER IMAGE FORMAT

In the event that the provider supplies coverage area data in some image format such as PDF or JPG format, the steps are as follows:

1) If in PDF format, open in Adobe Acrobat and **Save As…** JPG format.
2) Open the JPG image in ArcMap®.
3) Add the required base map vector data for georeferencing.
    a. This generally will be either the CDOT data or TIGER® data.
4) Change the coordinate system of the data frame to the desired end coordinate system.
5) Zoom to the general location of the JPG map image.
    a. This is the location based on the vector data, not the JPG image itself. For example, if you know that the JPG image represents an area around the town of Limon, zoom to the town of Limon in your vector data.
6) Open the **Georeferencing** toolbar by selecting **View>Toolbars>Georeferencing** from the main menu bar.
7) Using the **Georeferencing** toolbar, select **Fit to Display**; results are shown below:



8) Use the **Control Point** button  to add control points to the map.
9) Use common points in the base dataset and the JPG image.
    a. For example, find major street intersections, county/city boundaries, etc.
    b. Try to distribute the points more or less in the four corners on the image for the best transformation.
10) Click on the location on the image first, then click on the corresponding location on the vector database map, as shown in the image below:



11) After placing each control point, the image transformation will update automatically.
12) Repeat until satisfied with the transformation.

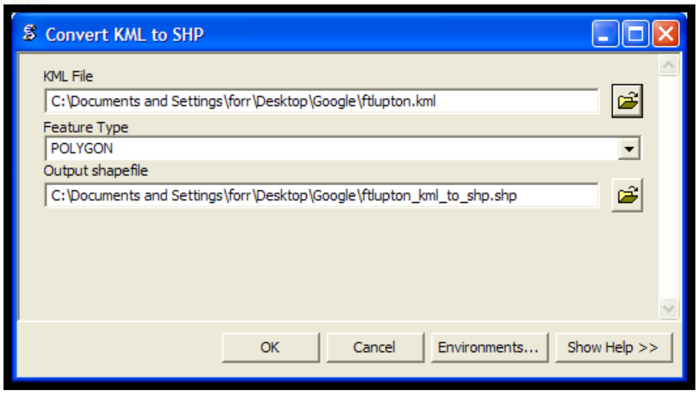
NOTE:
The transformation may take up to four points, although sometimes only two are necessary.

13) When satisfied with the transformation, select **Update Georeferencing** from the **Georeferencing** toolbar dropdown.
    a. This will create a "world" file (.jgw in the case of JPGs) in the same directory as the image file.
14) In ArcCatalog®, create a new polygon shapefile with the appropriate data schema for a provider coverage area.
15) Add the shapefile to ArcMap®.
16) Using the **Editor** toolbar, select **Start Editing**. Set the **Task** to **Create New Feature**.
17) Use the **Sketch Tool** to digitize a new coverage polygon using the coverage area outline from the georeferenced JPG and add the required attributes manually.
18) Repeat the above steps for all subscriber speed coverage areas provided.
19) Follow the steps detailed in **Coverage Area—GIS Data** below.

COVERAGE AREA—KML/KMZ

In the event that the provider supplies coverage area data in Google Earth KML or KMZ format, the steps are as follows:

1) Use a KML to SHP converter to translate file into an Esri® format.
2) **http://arcscripts.esri.com/details.asp?dbid=15603**
3) Download the script and follow the provided instructions for installing it in ArcToolbox®.
4) Double-click on the script in ArcToolbox® and navigate to the location of the KML file, as shown below:



5) Add the new shapefile to ArcMap®. Repeat for all KML files provided.
6) Follow the steps detailed in **Coverage Area—GIS Data** below.

COVERAGE AREA—CAD DATA

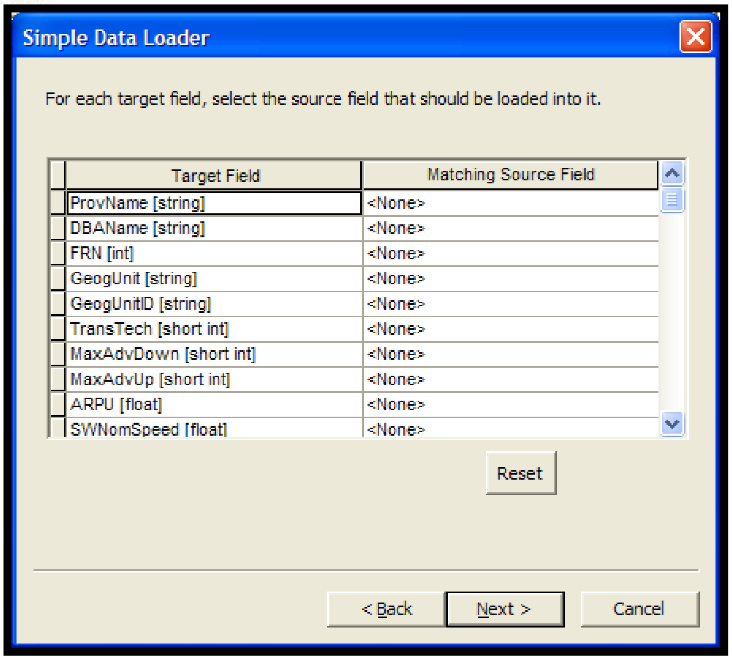
In the event that the provider supplies coverage area data in GIS format, the steps are as follows:

1) Transform the CAD dataset into an Esri® format.
2) **http://webhelp.esri.com/arcgisdesktop/9.2/index.cfm?TopicName=Transforming_CAD_datasets**
3) It may be necessary to contact the provider first to determine the coordinate system of the CAD data.
4) If the CAD data is not in a standard coordinate system, it may be necessary first to use ArcMap® to georeference the CAD data to a known coordinate system.
a) To do so, follow the instructions provided above in **Coverage Area—PDF/JPG/Other Image Format**.
5) In ArcCatalog®, create a new polygon shapefile with the appropriate data schema for a provider coverage area.
6) Add the shapefile to ArcMap®.
7) Using the **Editor Toolbar**, select **Start Editing**. Set the **Task** to **Create New Feature**.
8) Use the **Sketch Tool** to digitize a new coverage polygon using the coverage area outline from the georeferenced CAD file and add the required attributes manually.
9) Follow the steps detailed in **Coverage Area—GIS Data** below.

COVERAGE AREA—GIS DATA

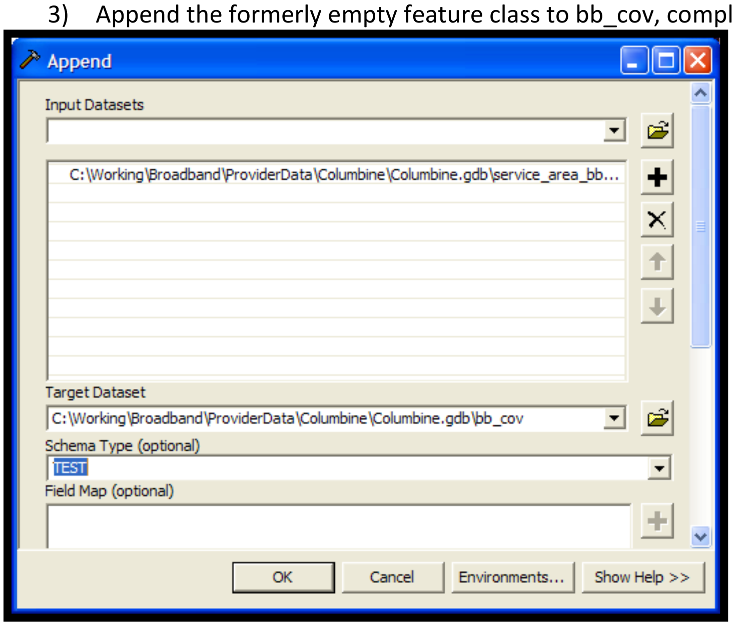
In the event that the provider supplies coverage area data in GIS format, the steps are as follows:

1) In ArcCatalog®, create an empty feature class with the schema of the bb_cov feature class and load the GIS feature class either created above or supplied by the provider into it.
   a. Right-click on the empty feature class, select **Load>Load Data** from the dropdown menu and navigate to the location of the service area feature class.
   b. Click on the **Add** button, then click **Next**.
   c. Accept the defaults and click **Next**.
   d. DO NOT attempt to map any fields, as shown below:



e. Click **Next**, then **Next** again, then **Finish**.

2) In ArcToolbox®, go to **Data Management Tools>General>Append**.
3) Append the formerly empty feature class to bb_cov, completing the dialog box, as shown below:



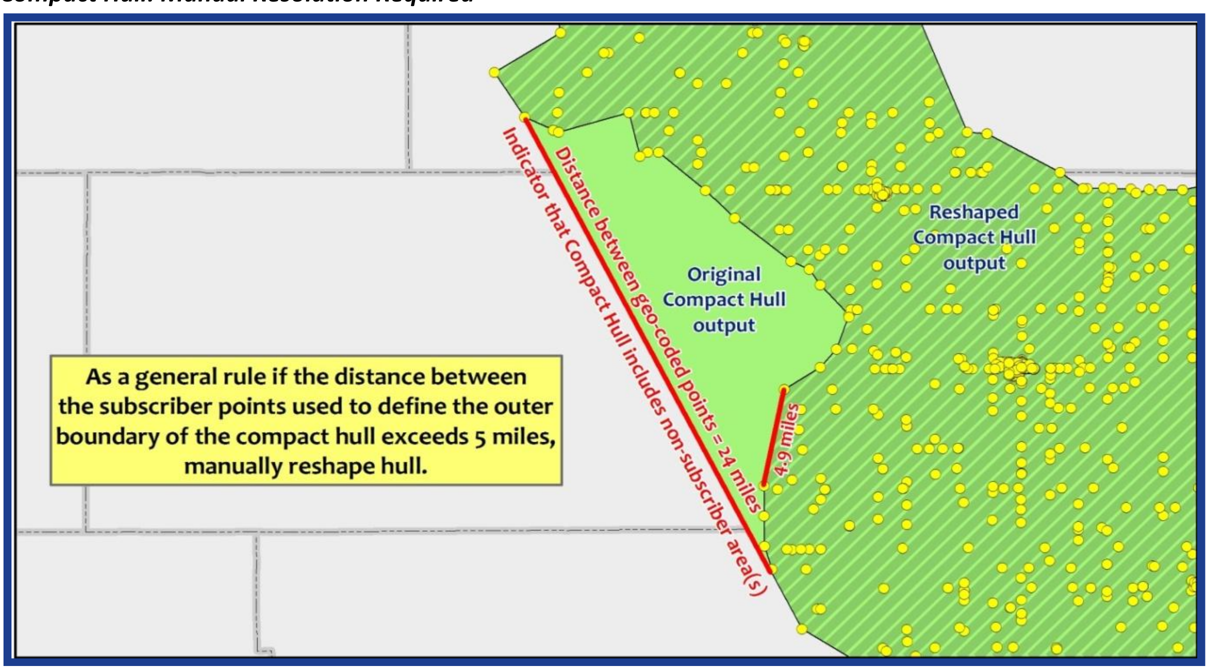
4) Leave the **Schema Type** as TEST.
5) Click **OK**.
6) In ArcMap®, open bb_cov for editing and manually input associated attribution, if necessary.

COMPACT POLYGON FROM SUBSCRIBER POINTS

1) Geocode address list using latest **State Composite Locator**.
2) Verify that your geocoded file has only one TT (Technology Type). If not, export individual geocoded layers for each Technology Type.

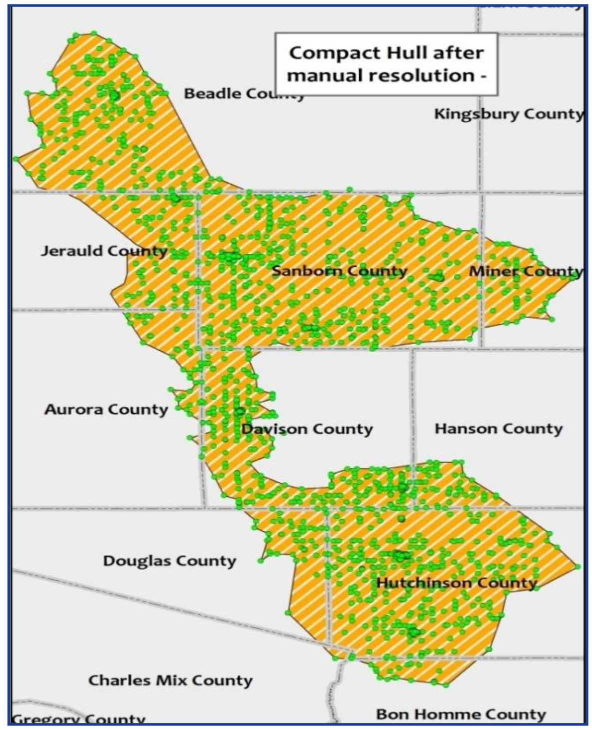
3) For each TT, check for differences in speed values or speed tiers and create separate layers for each speed value/tier.
4) Clean your geocoding results: remove any points that geocode to accuracy levels below ZIP+4 (ZIP centroids, carrier route centroids, etc). Also, verify that outliers with acceptable accuracy levels are legitimate, i.e., fall in correct city and Zip.
5) Perform spatial join between county polygons (using stcnyfips field) and the cleaned geocoded subscriber points in order to carry the county name and stcnty fips.
6) Summarize the number of subscribers by county and use the subscriber counts by county to populate the Rate Tier table.
7) Un-join the county data from the geocode subscribers list.
8) Create Compact Polygon using cleaned geocoded layer or sub-selection of XtoolsPro—ConvexHull-DetailedHull option. A sub-selection of geocoded points will be used in areas where more than one polygon will need to be created for one provider's service area.
9) Evaluate output Hull carefully, looking for areas that should not be covered by hull polygon.
   a. If it is determined that an area or areas should not be represented in coverage area, manually reshape hull polygon until coverage area is adequate.
   b. When not obvious and as a general rule, manually resolve compact polygon when the distance between the subscriber points used to define the outer boundary of the compact polygon exceeds 5 miles . When reshaping the hull polygon, snap to the outermost geocoded points. See the three figures below for examples.

Compact Hull: Manual Resolution Required



Compact Hull: Manual Resolution Required

Compact Hull: After Manual Resolution



10) To attribute the compact polygon, perform a spatial join where your Target Feature Class is the compact polygon and the Join Feature Class is your geocoded point layer. Export compact hull with joined attributes and name file appropriately.
11) Append attributed compact polygon to Broadband TT template Feature Class and, if required, manually input any provider attribution that may not have carried over in the append process.
12) Intersect compact polygon with county boundaries to create unique records by county and use the state-county-fips field to populate stcty_fips field. Also use the county name field to populate the BBCov_Name field.
    a. Exception: where a provider's coverage is distributed throughout more than one area of any given county where the BBcov_Name should be populated using an appropriate city or other logical name based on geographical location.
13) Export/load into appropriate BB TT model dataset.

CENSUS BLOCKS—LIST OR SPREADSHEET

In the event that the provider supplies census block data in a list or spreadsheet, the steps are as follows:

1) Ensure block polygons supplied by the provider are 2000 currency.
2) If other currency, convert to 2000 currency before proceeding.
    a. To do this, remove the trailing letter (a, b, etc.) from the block ID.
    b. You will now have two blocks that equate to one block in the 2000 block geometry.
    c. Delete duplicate block IDs, retaining the higher service tier in each case.
3) Prepare the block list in clean Excel format, removing all Excel-only formatting, merged cells, colors, borders, etc.
4) Import the spreadsheet into ArcMap®.
5) Right-click on the 2000 census block feature class in the layer list in ArcMap® and select **Joins and Relates>Join** from the dropdown menu. Join the census block list to the 2000 census blocks feature class using the block ID and export joined records in a new feature class. The **Join** dialog

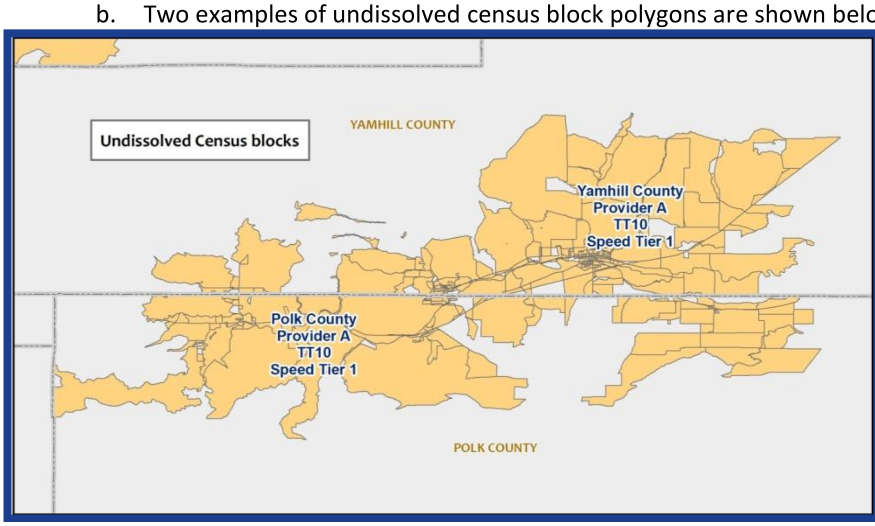
box and process can be seen above in the **TIGER® Street Segments—List, Spreadsheet or GIS Data** subsection.

6) Follow the steps in **Census Blocks—GIS Data** below.

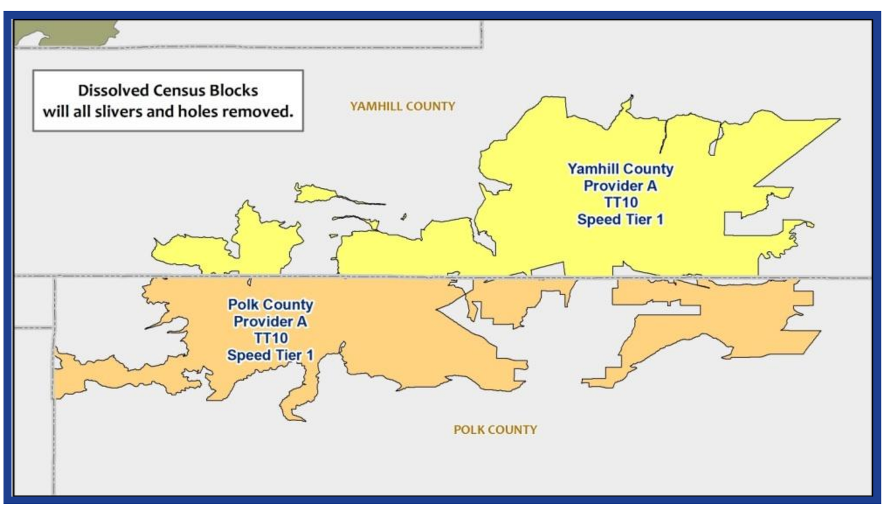
CENSUS BLOCKS—GIS DATA

In the event that the provider supplies census block GIS data, the steps are as follows:

1) Ensure that the blocks supplied by the provider are in the required data schema and are complete as far as required attribution.
   a. If not, manually enter the required attribution or contact the provider to fill gaps.
2) If census block geometry is distributed throughout more than one county, then select **Data Management Tools>Generalization>Dissolve** in ArcToolbox® and dissolve based on County/Provider/TT/Speed Tier so that unique records are created for each unique combination.
   a. The **Dissolve** dialog box is shown above in the **TIGER® Street Segments—List, Spreadsheet or GIS Data** section.
   b. Two examples of undissolved census block polygons are shown below:



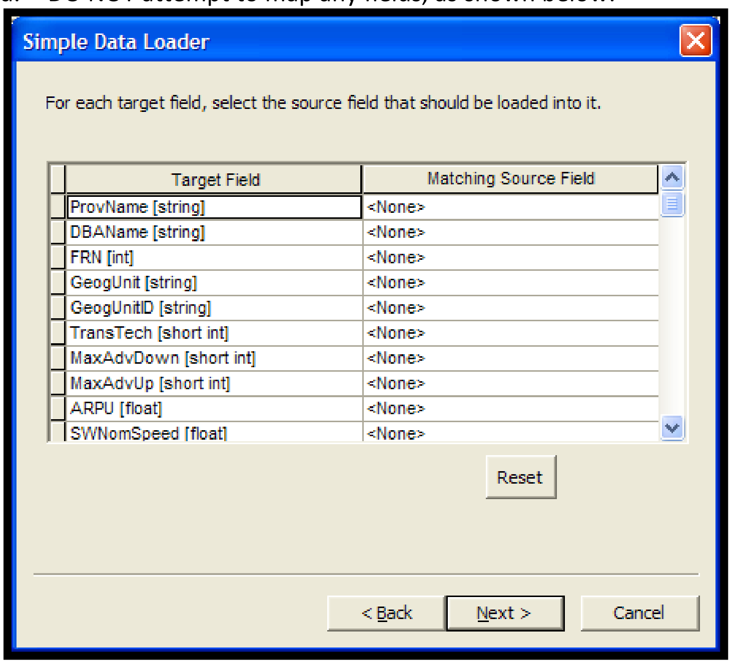
Undissolved census block polygons



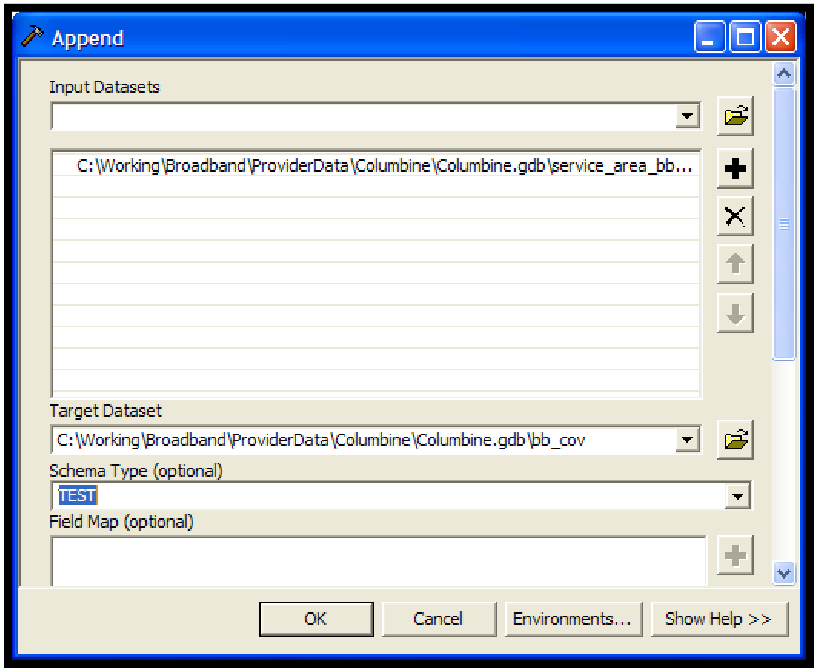
Census block polygons dissolved by county

3) For each dissolved region use the **Editing** toolbar in ArcMap® to remove unnecessary slivers and other small holes.

4) In ArcToolbox®, select **Data Management Tools>General>Merge** and merge the processed polygons into a single layer.
5) The merged census blocks will need to have the subscriber's frn field added and populated.
6) In ArcCatalog®, create an empty feature class with the schema of the bb_cov feature class and load the GIS feature class either created above or supplied by the provider into it.
   a. Right-click on the empty feature class, select **Load>Load Data** from the dropdown menu and navigate to the location of the service area feature class.
   b. Click the **Add** button, the click **Next.**
   c. Accept the defaults and click **Next.**
   d. DO NOT attempt to map any fields, as shown below:



   e. Click **Next**, then **Next** again, then **Finish**.
7) In ArcToolbox®, go to **Data Management Tools>General>Append**.
8) Append the formerly empty feature class to bb_cov, completing the dialog box, as shown below:



9) Leave the **Schema Type** as TEST.
10) Click **OK**.
11) In ArcMap®, open bb_cov for editing and manually input associated attribution, if necessary.

METADATA TRANSACTIONS

Following any updates or changes completed within the file geodatabase (fGDB) stored on the GIS-Analysts staging environment, the GIS-Analyst runs transactions to compare that fGDB with the one stored on the Core server to ensure metadata on all changes is recorded.

The steps taken to run transactions on the updated Core database are outlined below:

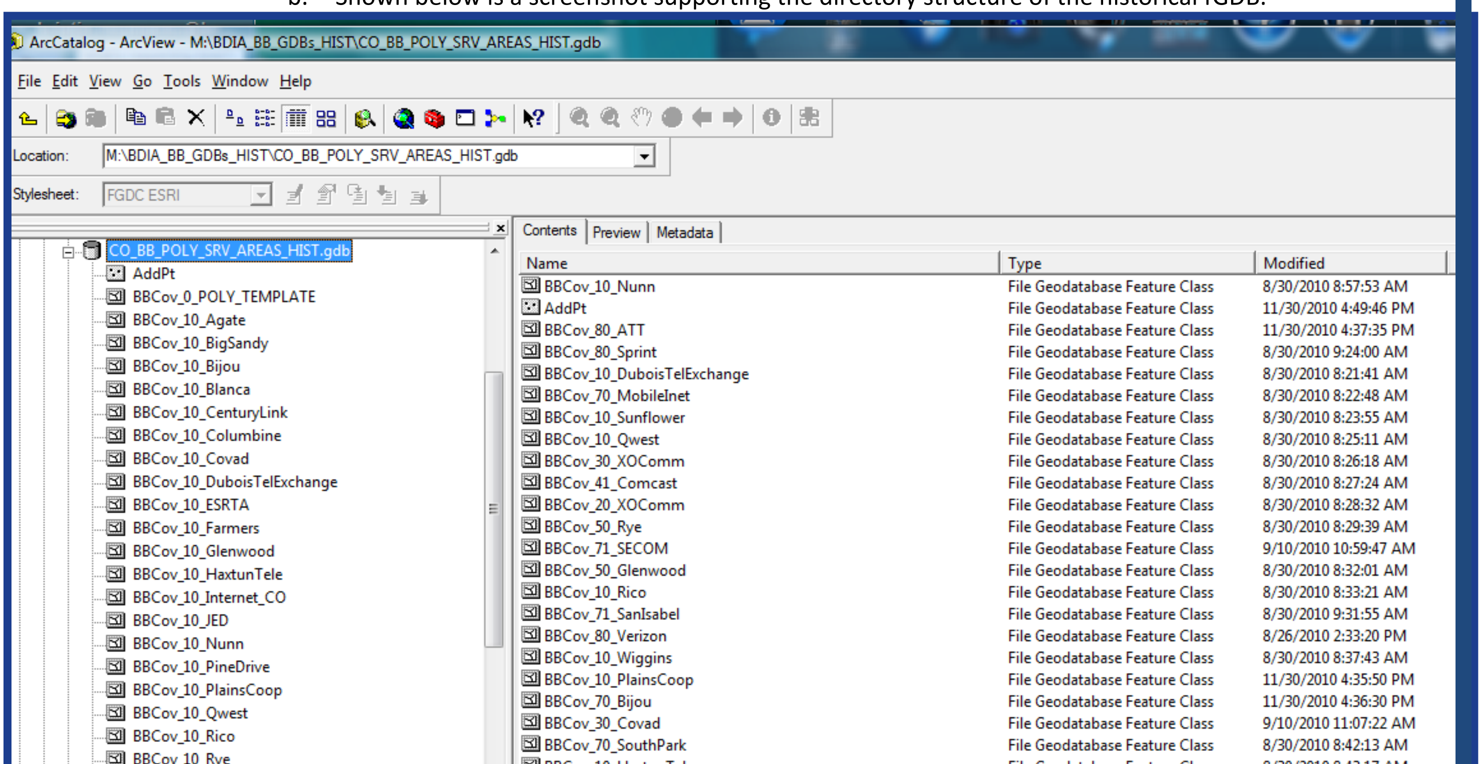
1) Open a command line window and run generateTransactions.py:
   a. Usage: **generateTransactions.py [Core fGDB] [Staging Environment fGDB]**
   b. Example of command line:

<path>**generateTransactions.py** <path>**ST_BB_POLY_SRV_AREAS.gdb** <path>**ST_BB_POLY_SRV_AREAS.gdb**

2) Shown below is an example of the output screen that will be displayed:

```
-----------  Collecting Transactions  ----------------


Calculating rec_id field for BBCov_0_BB_POLY_TEMPLATE
value can not be 0 or less
Trouble creating the progress meter


Calculating rec_id field for BBCov_10_CenturyLink

%   10   20   30   40   50   60   70   80   90   100

----|----|----|----|----|----|----|----|----|----|      Goal = 8

Merging change: X:\BDIA_BB_GDBs\MS_BB_POLY_SRV_AREAS.gdb\AddPt
Calculating Transaction fields for AddPt

%   10   20   30   40   50   60   70   80   90   100

----|----|----|----|----|----|----|----|----|----|      Goal = 1
**************************************************
X:\BDIA_BB_GDBs\MS_BB_POLY_SRV_AREAS.gdb\AddPt...changes is complete.


Your transaction FeatureClasses are in:
\\michigan\AllAccess\BDIA_BB_GDBs_HIST\MS_BB_POLY_SRV_AREAS_HIST.gdb
--------------------------------------------------------------------------------
------------
elapsed time = 2994.4 seconds
```

3) After the process has completed, results can be found in the ST_BB_POLY_SRV_AREAS_HIST.gdb:
   a. The transactions scripts records changes at a feature level.
   b. Shown below is a screenshot supporting the directory structure of the historical fGDB.



   c. Attribution associated with each added/removed/changed feature is tracked, including the following additional columns appended to the end of each:

(i.) Commit_by

(1) Records the GIS-Analyst who committed the changes to the historical fGDB.

(ii.) Commit_date

(1) Records the date and time stamp on which the changes were committed.

(iii.) Trans_type

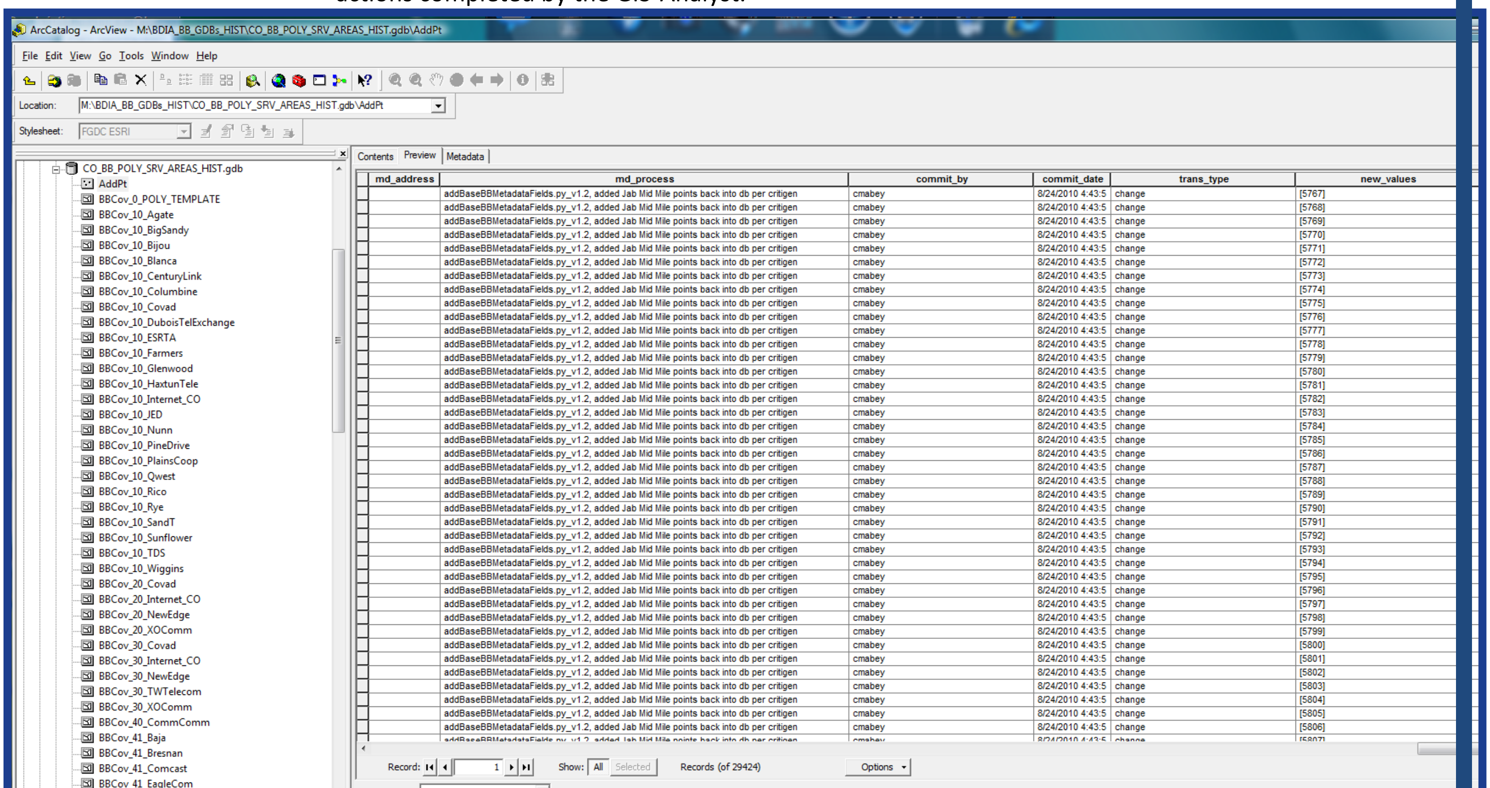
(1) This field reflects the type of change recorded;

(2) Categorized by: Adds/Change/Deletes.

(iv.) New_values

(1) Records the new values when a change was completed on a feature. Example: Name or speed change.

d. MD_Process also is transferred from the edited fGDB to the historical fGDB, which states the actions completed by the GIS-Analyst.



DATA PROCESSING

DATA PROCESSING OVERVIEW

The following subsections detail the steps and layout required to process the service provider data further to meet NTIA requirements:

- **Weighted Nominal Speed**;
- **Middle Mile**;
- **Broadband Coverage Template**.

WEIGHTED NOMINAL SPEED

The weighted nominal speed is populated in one of the following two ways: **subscriber data supplied by provider** or **value supplied by provider**.

SUBSCRIBER DATA SUPPLIED BY PROVIDER

Where the data provider supplies subscriber speed information, the following formula from the NOFA is used:

$$\frac{(\text{speed tier-1 in kbps} \times \text{no. of tier-1 subscribers}) + (\text{speed tier-2 in kbps} \times \text{no. of tier-2 subscribers}) + (\text{etc.})}{\text{Total average monthly subscribers}}$$

Data is initially broken up in the following order:

1) Stcty_fips;
2) Transmission technology type;
3) Subscriber tiers.

VALUE SUPPLIED BY PROVIDER

Some providers will supply their weighted nominal speed. In these cases, the data supplied will be populated instead of using the NOFA formula. These obtained or calculated values are used to update the service overview layer.

This can be done manually or by creating a table with the provider's FRN and average weighted speed and joining it to the service overview table in ArcMap®.

1) To join, right-click on the layer to join to and select **Joins and Relates>Join** from the dropdown menu.
2) Then navigate to the table to join to and select the join fields from the dropdown list.
3) Then open the source table (the table in ArcMap®) and right-click on the header of the **Average Weighted Speed** field and select **Calculate Field** from the dropdown menu.
4) Use the value of the average weighted speed from the joined table.

MIDDLE MILE

Middle mile information generally is provided in spreadsheet or text file format. The process is to take what is supplied by the provider and translate it into the required data schema.

1) If the data is supplied with address information, follow the process outlined above in **Subscriber Location—Address Data**.
2) If the data is supplied with associated XY coordinates, follow the process outlined above in **Subscriber Location—XY Data**.
3) Once the data is in GIS format, use the **Append** (**Data Management Tools>General>Append**) command in ArcToolbox® to append the data to the overall middle mile dataset.
4) Set the schema type to NO_TEST and use the Field Map to map the attribute fields from the source to the target dataset.

BROADBAND COVERAGE TEMPLATE

The table below lists descriptions of the fields within the bb_cov layer, which is the interim dataset used to create the final product deliverable.

NAME	ALIAS	DESCRIPTION
objectid	OBJECTID	Internal Object ID
shape	SHAPE	Internal Shape storage
prov_id	PROVIDER_ID	Unique numeric identifier for each provider
prov_name	PROVIDER_NAME	Unique name for each provider
dba_name	DOING_BUSINESS_AS	An alternative "Doing-Business-As" name for the provider
frn	FCC_REGISTRATION_NUMBER	Provider FCC Registration Number
bbcov_name	BBCOV_NAME	BroadMap Broadband Coverage name
trans_code	TRANSMISSION_CODE	Unique code for the transmission technology type described by this layer
trans_name	TRANSMISSION_NAME	Name for the transmissions technology type
trans_desc	TRANSMISSION_DESC	Description for the transmissions technology type
spect_code	SPECTRUM_CODE	Unique code for the spectrum [WIRELESS ONLY]
spect_name	SPECTRUM_NAME	Name for the spectrum [WIRELESS ONLY]
spect_desc	SPECTRUM_DESC	Description for the spectrum [WIRELESS ONLY]
mad_dwn_t	MAX_AD_DOWN_TIER	Maximum advertised downstream speed available within given area (speed tier)
mad_up_t	MAX_AD_UP_TIER	Maximum advertised upstream speed available within given area (speed tier)
typ_dwn_t	TYPICAL_DOWN_TIER	Typical downstream speed available within given area (speed tier)
typ_up_t	TYPICAL_UP_TIER	Typical upstream speed available within given area (speed tier)
mad_dwn_k	MAX_AD_DOWN_KBPS	Maximum advertised downstream speed available within given area (kbps)
mad_up_k	MAX_AD_UP_KBPS	Maximum advertised upstream speed available within given area (kbps)
typ_dwn_k	TYPICAL_DOWN_KBPS	Typical downstream speed available within given area (kbps)
typ_up_k	TYPICAL_UP_KBPS	Typical upstream speed available within given area (kbps)
subs	SUBSCRIBERS	Total average monthly subscribers for this provider for this technology for this coverage polygon
md_geom	MD_GEOMETRY	Metadata: Comma separated list of source ids from which the polygon extent was produced
md_exists	MD_EXISTS	Metadata: Comma-separated list of source ids used in understanding and editing the provider data for this polygon

NAME	ALIAS	DESCRIPTION
md_who	MD_WHO	Metadata: Name of the editor who last edited this feature at the time in md_when
md_when	MD_WHEN	Metadata: Date/time that this feature was last edited
md_process	MD_PROCESS	Metadata: Comma-separated list of processes used to create and/or modify this layer
stcty_fips	STATE_COUNTY_FIPS	State/County FIPS code
rec_id	RECORD_ID	Compound Key formed from STCTY_FIPS+"|"+Provider_ID+"|"+Trans_Code+"|"+BBCov_Name
st_area	ST_AREA(SHAPE)	Area in square decimal degrees
st_length	ST_LENGTH(SHAPE)	Length in decimal degrees
Provider_Type	Type of Provider	Has Subtype (1:Broadband provider as described in the NOFA,2:Reseller,3:Unknown), default value=1 (New 04/11 Model)

VERIFICATION AND VALIDATION

PROVIDER VALIDATION—PROVIDER PORTAL/PDF MAP REVIEW

Following the collection and aggregation of provider data, the aggregated data is validated by the provider to ensure it is an accurate representation of their coverage area and supporting broadband information.

- This validation is completed through the Provider Portal web application, which is a secure interactive map that displays the provider's coverage areas and allows the provider to validate, submit feedback or request changes.
    - If changes are requested, then the features on the portal are updated and an automatic request is sent to the provider to complete the validation process.
- Providers that did not use the Provider Portal are asked to validate a PDF map displaying their coverage area(s). This is accomplished via e-mail notification.

PROVIDER VERIFICATION—THIRD PARTY SOURCE REVIEW

After the provider has validated its coverage areas, a third-party source comparison and analysis is performed.

- Where anomalies or discrepancies are identified, a "SCAN" point is dropped and descriptive comments are applied to be reviewed later with the provider.
- During the provider review, the map is displayed along with the "SCAN" points and potential refinement is completed based on input from the provider.

The table below shows third-party sources used:

THIRD-PARTY SOURCE NAME	SOURCE TYPE	VERIFICATION TYPE
InfoUSA	Consumer and Business Listings	Community Anchor Institutions; Can also be used for demographic information supporting the State websites.
Pitney Bowes (PBBI)	Exchange Info Plus (Central Office Locations)	Exchange datasets are used to verify the following Transmission Technologies (TT): Asymmetric xDSL (10), Symmetric xDSL (20), Other Copper Wireline (30), and Optical Carrier/Fiber to the End User (50).

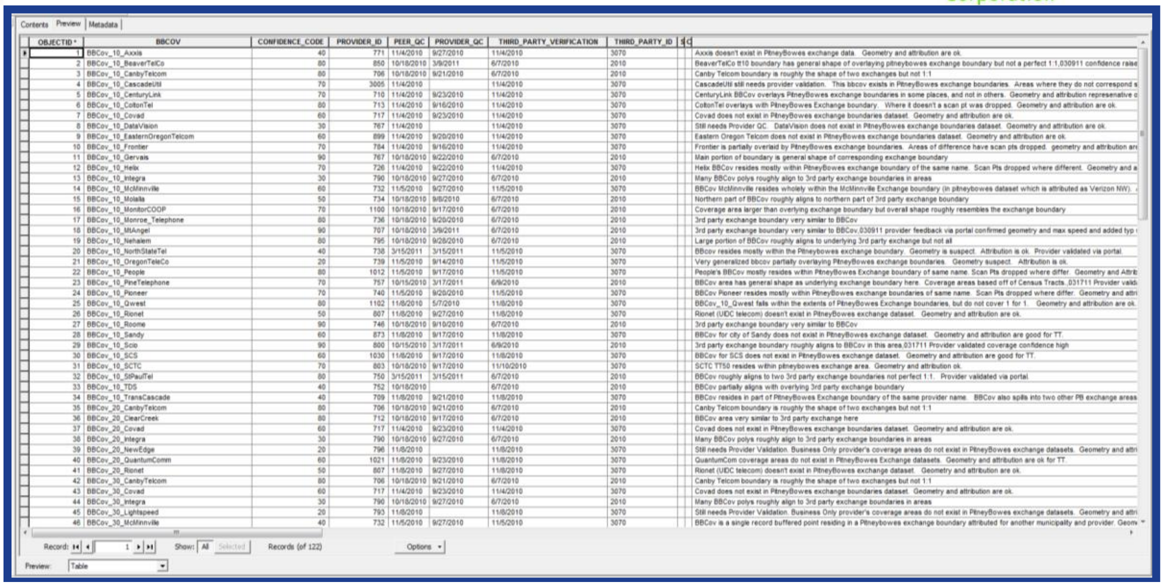
THIRD-PARTY SOURCE NAME	SOURCE TYPE	VERIFICATION TYPE
Media Prints	Cable Boundaries	Used to verify the following TT: Cable Modem—DOCSIS 3.0 (40) and Cable Modem—Other (41).
American Roamer	Wireless Coverage Patterns (EVDO, GPRS, WISP, HSPA)	Used to verify the following TT: Terrestrial Fixed Wireless—Unlicensed (70), Terrestrial Fixed Wireless—Licensed (71) and Terrestrial Mobile Wireless (80).
ComSearch	Wireless Spectrum Holdings and Tower Data	Used to verify the following TT: Terrestrial Fixed Wireless—Unlicensed (70), Terrestrial Fixed Wireless—Licensed (71) and Terrestrial Mobile Wireless (80).

ASSIGNING CONFIDENCE VALUES

All findings and results from the abovementioned **validation and verification activities**, plus internal peer quality reviews, are captured and tracked in a **Validation table** (see example on the following page) and form the basis of the confidence value assigned for each provider and then each technology.

CONFIDENCE VALUE	DESCRIPTION
0	Coverage area has not been reviewed.
10	Extremely Low: Single Source QC.
20	Very Low: Needs additional validation\verification.
30	Low: Even with validation\verification, coverage still is suspect.
40	Acceptable: Confirm with State prior to shipment.
50	Meets requirements to be included in shipment.
60	Moderate: Meets NTIA/State's standards, representative of Technology Type (TT).
70	High: Accurate representation of coverage based upon TT.
80	Very High: Multiple validation\verification with most third-party sources.
90	Extremely High: Multiple validation\verification sources.
100	Perfect: Multiple validation\verification sources, with complete alignment with sources and ground truth verification activities.

The **Validation table** is maintained as updates or changes occur for each provider, down to technology type, with the overall goal to improve the confidence values and overall map representation. An example of the Validation table is shown below:


Contents | Preview | Metadata

OBJECTID *	BBCOV	CONFIDENCE_CODE	PROVIDER_ID	PEER_QC	PROVIDER_QC	THIRD_PARTY_VERIFICATION	THIRD_PARTY_ID	S	C
1	BBCov_10_Axxis	40	771	11/4/2010	9/27/2010	11/4/2010	3070		Axxis doesn't exist in PitneyBowes exchange data. Geometry and attribution are ok.
2	BBCov_10_BeaverTelCo	80	850	10/18/2010	3/9/2011	6/7/2010	2010		BeaverTelCo tt10 boundary has general shape of overlaying pitneybowes exchange boundary but not a perfect 1:1,030911 confidence raise
3	BBCov_10_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010		Canby Telcom boundary is roughly the shape of two exchanges but not 1:1
4	BBCov_10_CascadeUtil	70	3005	11/4/2010		11/4/2010	3070		CascadeUtil still needs provider validation. This bbcov exists in PitneyBowes exchange boundaries. Areas where they do not correspond s
5	BBCov_10_CenturyLink	70	710	11/4/2010	9/23/2010	11/4/2010	3070		CenturyLink BBCov overlays PitneyBowes exchange boundaries in some places, and not in others. Geometry and attribution represenative o
6	BBCov_10_ColtonTel	80	713	11/4/2010	9/16/2010	11/4/2010	3070		ColtonTel overlays with PitneyBowes Exchange boundary. Where it doesn't a scan pt was dropped. Geometry and attribution are ok.
7	BBCov_10_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070		Covad does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
8	BBCov_10_DataVision	30	767	11/4/2010		11/4/2010	3070		Still needs Provider QC. DataVision does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
9	BBCov_10_EasternOregonTelcom	60	899	11/4/2010	9/20/2010	11/4/2010	3070		Eastern Oregon Telcom does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
10	BBCov_10_Frontier	70	784	11/4/2010	9/16/2010	11/4/2010	3070		Frontier is partially overlaid by PitneyBowes exchange boundaries. Areas of difference have scan pts dropped. geometry and attribution are
11	BBCov_10_Gervais	90	767	10/18/2010	9/22/2010	6/7/2010	2010		Main portion of boundary is general shape of corresponding exchange boundary
12	BBCov_10_Helix	70	726	11/4/2010	9/22/2010	11/4/2010	3070		Helix BBCov resides mostly within PitneyBowes exchange boundary of the same name. Scan Pts dropped where different. Geometry and a
13	BBCov_10_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010		Many BBCov polys roughly align to 3rd party exchange boundaries in areas
14	BBCov_10_McMinnville	60	732	11/5/2010	9/27/2010	11/5/2010	3070		BBCov McMinnville resides wholely within the McMinnville Exchange boundary (in pitneybowes dataset which is attributed as Verizon NW).
15	BBCov_10_Molalla	50	734	10/18/2010	9/8/2010	6/7/2010	2010		Northern part of BBCov roughly aligns to northern part of 3rd party exchange boundary
16	BBCov_10_MonitorCOOP	70	1100	10/18/2010	9/17/2010	6/7/2010	2010		Coverage area larger than overlying exchange boundary but overall shape roughly resembles the exchange boundary
17	BBCov_10_Monroe_Telephone	80	736	10/18/2010	9/20/2010	6/7/2010	2010		3rd party exchange boundary very similar to BBCov
18	BBCov_10_MtAngel	90	707	10/18/2010	3/9/2011	6/7/2010	2010		3rd party exchange boundary very similar to BBCov,030911 provider feedback via portal confirmed geometry and max speed and added typ
19	BBCov_10_Nehalem	80	795	10/18/2010	9/28/2010	6/7/2010	2010		Large portion of BBCov roughly aligns to underlying 3rd party exchange but not all
20	BBCov_10_NorthStateTel	40	738	3/15/2011	3/15/2011	11/5/2010	3070		BBcov resides mostly within the Pitneybowes exchange boundary. Geometry is suspect. Attribution is ok. Provider validated via portal.
21	BBCov_10_OregonTeleCo	20	739	11/5/2010	9/14/2010	11/5/2010	3070		Very generalized bbcov partially overlaying PitneyBowes exchange boundaries. Geometry suspect. Attribution is ok.
22	BBCov_10_People	80	1012	11/5/2010	9/17/2010	11/5/2010	3070		People's BBCov mostly resides within PitneyBowes Exchange boundary of same name. Scan Pts dropped where differ. Geometry and Attrib
23	BBCov_10_PineTelephone	70	757	10/15/2010	3/17/2011	6/9/2010	2010		BBCov area has general shape as underlying exchange boundary here. Coverage areas based off of Census Tracts.,031711 Provider valid
24	BBCov_10_Pioneer	70	740	11/5/2010	9/20/2010	11/5/2010	3070		BBCov Pioneer resides mostly within PitneyBowes exchange boundaries of same name. Scan Pts dropped where differ. Geometry and attri
25	BBCov_10_Qwest	80	1102	11/8/2010	5/7/2010	11/8/2010	3070		BBCov_10_Qwest falls within the extents of PitneyBowes Exchange boundaries, but do not cover 1 for 1. Geometry and attribution are ok.
26	BBCov_10_Rionet	50	807	11/8/2010	9/27/2010	11/8/2010	3070		Rionet (UIDC telecom) doesn't exist in PitneyBowes exchange dataset. Geometry and attribution are ok.
27	BBCov_10_Roome	90	746	10/18/2010	9/10/2010	6/7/2010	2010		3rd party exchange boundary very similar to BBCov
28	BBCov_10_Sandy	60	873	11/8/2010	9/17/2010	11/8/2010	3070		BBCov for city of Sandy does not exist in PitneyBowes exchange dataset. Geometry and attribution are good for TT.
29	BBCov_10_Scio	90	800	10/15/2010	3/17/2011	6/9/2010	2010		3rd party exchange boundary roughly aligns to BBCov in this area,031711 Provider validated coverage confidence high
30	BBCov_10_SCS	60	1030	11/8/2010	9/17/2010	11/8/2010	3070		BBCov for SCS does not exist in PitneyBowes exchange dataset. Geometry and attribution are good for TT.
31	BBCov_10_SCTC	70	803	10/18/2010	9/17/2010	11/10/2010	3070		SCTC TT50 resides within pitneybowes exchange area. Geometry and attribution ok.
32	BBCov_10_StPaulTel	80	750	3/15/2011	3/15/2011	6/7/2010	2010		BBCov roughly aligns to two 3rd party exchange boundaries not perfect 1:1. Provider validated via portal.
33	BBCov_10_TDS	40	752	10/18/2010		6/7/2010	2010		BBCov partially aligns with overlying 3rd party exchange boundary
34	BBCov_10_TransCascade	40	709	11/8/2010	9/21/2010	11/8/2010	3070		BBCov resides in part of PitneyBowes Exchange boundary of the same provider name. BBCov also spills into two other PB exchange areas
35	BBCov_20_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010		Canby Telcom boundary is roughly the shape of two exchanges but not 1:1
36	BBCov_20_ClearCreek	80	712	10/18/2010	9/17/2010	6/7/2010	2010		BBCov area very similar to 3rd party exchange here
37	BBCov_20_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070		Covad does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
38	BBCov_20_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010		Many BBCov polys roughly align to 3rd party exchange boundaries in areas
39	BBCov_20_NewEdge	20	796	11/8/2010		11/8/2010	3070		Still needs Provider Validation. Business Only provider's coverage areas do not exist in PitneyBowes exchange datasets. Geometry and attri
40	BBCov_20_QuantumComm	60	1021	11/8/2010	9/23/2010	11/8/2010	3070		QuantumCom coverage areas do not exist in PitneyBowes Exchange datasets. Geometry and attribution are ok for TT.
41	BBCov_20_Rionet	50	807	11/8/2010	9/27/2010	11/8/2010	3070		Rionet (UIDC telecom) doesn't exist in PitneyBowes exchange dataset. Geometry and attribution are ok.
42	BBCov_30_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010		Canby Telcom boundary is roughly the shape of two exchanges but not 1:1
43	BBCov_30_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070		Covad does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
44	BBCov_30_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010		Many BBCov polys roughly align to 3rd party exchange boundaries in areas
45	BBCov_30_Lightspeed	20	793	11/8/2010		11/8/2010	3070		Still needs Provider Validation. Business Only provider's coverage areas do not exist in PitneyBowes exchange datasets. Geometry and attri
46	BBCov_30_McMinnville	40	732	11/5/2010	9/27/2010	11/5/2010	3070		BBCov is a single record buffered point residing in a Pitneybowes exchange boundary attributed for another municipality and provider. Geom

Record: 1 Show: All Selected Records (of 122) Options

Preview: Table

COMMUNITY ANCHOR INSTITUTION (CAI) DATA

DATA COLLECTION

The CAI data was initially collected from the State to create the baseline inventory. All location information and broadband coverage data supplied also was ingested into the data deliverable. Additional collection of CAI information was done via data mining and/or webscraping to build out the inventory further. For example: Collection of additional CAIs and location information.

The State-agency-provided CAI inventory was comprehensive but the challenge is collecting broadband related data: service provider(s), technology and speed data for each CAI. Availability of the CAI portal has not significantly increased submission of this data. Additional promotion to CAIs to use the CAI portal will be needed to increase this data for subsequent deliverables.

INSTITUTION DATA

Institution data is obtained from a variety of sources and almost always provided in Excel spreadsheet format. The general process for incorporating this data is as follows:

1) If the data is provided in Excel or some similar format:
   a. Clean and standardize the Excel spreadsheet, removing any cell formats, merged cells, etc.
   b. Standardize the address format as defined in the staging CAI database.
   c. If the spreadsheet includes X and Y values, such as latitude and longitude, use the **Add XY Data** tool in ArcMap® to create a spatial data layer.
   d. If there are only addresses, then follow the geocoding steps outlined above to create spatial data points for each of the institutions.
      (i.) Institutions that do not geocode based on the TIGER® 2010 dataset will have to be located manually using Google Maps, Google Earth or some other information source.
2) If the CAI source data is in GIS format, add the Latitude and Longitude fields and use the **Calculate Geometry** tool to populate them, using the WGS 84 coordinate system.
3) Using ArcCatalog®, load the new data into the staging CAI database.
4) This database is ready for the makeDeliverable.py script to process the information into the final State and NTIA deliverables.

COMMUNITY ANCHOR INSTITUTION (CAI) PORTAL UPDATES

A web application has been released to allow for further data collection and validation of anchor institution location information, broadband coverage and speed test data. Information collected from the CAI Portal is then ingested into the overall inventory and will be compared later against the provider coverage areas mapped to locate any potential discrepancies.

PRODUCT EXTRACT

PYTHON SCRIPTS

The following subsections make use of Python scripts. In general, to use a Python script you must have Python installed on your computer. To download the latest version of Python, go to **http://www.python.org/download/** and download the latest stable version. As of August 2010, this was version 2.7. Once this is installed, the general way to run a script is to type the following at a command prompt: C:\Python27\python.exe C:\<location of script>. Many of the scripts provided have environment variables that must be set before they can be run.

The Python code for BroadMap's product extract has been incorporated into a Hudson CI System, which is detailed in the **Process Operation and Monitoring** section of this document. This was a process improvement activity so that all processes can be monitored, controlled and will contain historical tracking on each process.

PRODUCT EXTRACT PROCESS

NOTE:
Specific Python scripts are called out in **red** font in the subsections below.

The MapConnect™ product extract process, makeDeliverable.py, uses the BB_Cov and BROADMAP_POINTS interim datasets to create the following layers according to the current specifications:

- BB_Service_Road_Segment
  - This layer contains all broadband services associated with specific street segments for census 2000 blocks larger in area than two square miles.
- BB_ServiceCensusBlock
  - Contains all broadband services associated with census blocks of no greater than two square miles.
- BB_Service_Wireless
  - This layer contains all wireless services not associated with specific addresses.
- BB_ServiceOverview
  - This layer contains subscriber-weighted nominal speed for each provider's service area at a county level and is meant to act as a summarized view.
- BB_ConnectionPoint_MiddleMile
  - This layer contains middle-mile and backbone interconnection points.
- BB_Service_CAInstitutions
  - Broadband Service at Community Anchor Institutions (CAI).
  - Community Anchor Institutions consist of schools, libraries, medical and healthcare providers, public safety entities, community colleges and other institutions of higher education as well as other community support organizations and entities.

Because of a NTIA model change for the October 2010 data deliverable, an addition to this code was created to support both models in case a comparison is later desired or a request is made to revert to the original model. This script name is bdia2ntia.py and creates the following layers in addition to the layers mentioned above, rolled up to NATL_Broadband_Map.

- BB_ConnectionPoint_LastMile
  - This layer contains last mile infrastructure points, which is populated only if data cannot be provided at a more granular level.
- BB_Service_Address
  - Represents broadband availability for service address points. Address Point availability refers to those individual addresses at which each facilities-based provider of broadband service can provide broadband services of minimal characteristics within 7-10 business days.
- State_Boundary
  - State boundary supporting topological validation of point feature classes.
- NATL_Broadband_Topology
  - Supports basic topology quality checking. Example: No CAIs or Middle Mile points outside of the State boundary.

The following process flow provides a view of how the Core fGDB is extrapolated to the NTIA final deliverable via the makeDeliverable.py script. Following that, the bdia2ntia.py script is run, which limits what is placed in the final layers based on the NTIA modeling standards.

The product scripts and supporting extract were originally created separately per request, in case data model comparisons were to be completed.

PRODUCT STATISTICS

Following the completion of a product extract, the product statistics script (BDIA_ReleaseNotesStats.py) extracts the following information supporting that product deliverable.

- Provider Statistics:
  - Collects all provider information, listing by Provider Name.
  - Provides output of FRN.
  - Counts the number of features supported within the following layers:
    - Census Block;
    - Street Segment;
    - Max Upstream;
    - Wireless Services;
    - Infrastructure Points.
  - These updates were made to support the Data Package required to accompany every NTIA product deliverable.
- Community Anchor Institution (CAI) Statistics:
  - Breaks down CAI to the eight categories:
    - 1: School: K through 12;
    - 2: Library;
    - 3: Medical/Healthcare;
    - 4: Public Safety;
    - 5: University/College;
    - 6: Other Government;
    - 7: Other Community non-government;
    - None: Unknown Category. In cases where this occurs, further investigation is completed prior to product shipment to ensure all CAIs are categorized accurately.

- Reports out the following counts:
    - Total CAIs within that category;
    - Total CAIs that contain partial BB coverage. Contains any of the following information for a given CAI: BB Subscriber, Transmission Technology, Speed Down Speed Up;
    - Total CAIs that contain full BB coverage. Contains all of the abovementioned BB information for a given CAI.

The output of this script is two CSV files: AnchorInstitutions.csv and Providers.csv. These files then can be inspected to ensure that there are the expected number of CAIs and providers for every release.

QUALITY ASSURANCE

Quality assurance is supported manually and algorithmically on the interim data, BB_Cov file geodatabase and on the final product. For scheduled product releases, a test product extract and subsequent manual and algorithmic QC run is completed along with a release review. The product specifications, project status reports and previous product release notes are used as references throughout this review.

The following parameters are tested using the methodology listed below each:

- Product Deliverable Format:
    - Correct names and format of data deliverables.
        - BDIA_QC_SUITES.
    - Correct Projections/Datum.
        - Manual interaction with product.
    - Metadata Present and Correct.
        - Manual interaction with product.
- Table Structure:
    - All required tables included.
        - BDIA_QC_SUITES.
    - Extraneous tables identified.
        - BDIA_QC_SUITES.
- Field Structure:
    - All fields included.
        - BDIA_QC_SUITES.
    - Extraneous fields identified.
        - BDIA_QC_SUITES.
    - Correct field names, types and widths.
        - BDIA_QC_SUITES.
- Field Domains:
    - Values in all tables are constrained to the specified values specified:
        - This action is accomplished via BDIA_QC_SUITES and manual review of the product;
        - This tends to identify project completeness issues as fields with a null value are identified.
- Geometric Representation:
    - Identify if all layers have the correct geometric representation:
        - Manual review of the BB_ServiceOverview layer;
        - Dependent on NTIA and client requirements.
- Geographic Extent:
    - Product includes the necessary Geography associated with Product?
        - Manual Review—ArcGIS®.
    - Is there extraneous geography included in Product?
        - Manual Review—ArcGIS®.

- Completeness:
    - Products contain the expected amount of data?
        - Manual review of product statistics relative to weekly State reports and defined expectations.
- Accuracy:
    - Product meets the stated accuracy requirements for the deliverable?
        - Sampling procedure to manually review source material to resulting product;
        - Provider Validation;
        - Verification using Third-Party Data;
        - Verification against reality, where applicable.
- Data Regression:
    - Any unexplainable data loss or change?
        - This action is accomplished by comparing results within product statistics script (BDIA_ReleaseNotesStats.py) from previous releases, as well as manual review of the product.
- Confidentiality:
    - Any unauthorized confidential information included in the delivery?
        - Review of NDAs and delivery expectations.
- Prior Issues Resolved:
    - Have expected internal issues been resolved?
        - Manual review of data against previous product release notes.
    - Have agreed-upon customer issues been resolved?
        - Manual review of data against previous product release notes, status report and client feedback.
- Delivery Medium:
    - Has the product medium been verified?
        - Manual review.
    - All files present.
        - Manual review of SFTP site to ensure all files are copied correctly, including file/directory size.
    - Correct location.
        - Manual review—confirmation of SFTP link, username and password.

QC SUITE

The BDIA_QC_SUITES consists of four main types of scripts supporting the overall QC process. These scripts are all run in concert and are called from the test_runner script and the test_BDIAProductGDB script.

CONFIGURATION

These scripts establish the configuration for the test_BDIAProductGDB script, which is the core of the QC Suite.

update_test_config
active_config
config_PROCESS01_automated
config_PROCESS01_manual
set_active_config

LIBRARIES

These scripts provide additional functionality that is called from with the test_BDIAProductGDB script.

bb_unittest_fixture
bbcov_structure
BC_XmlWriter

file_folder
search_and_replace
unittst_fixture
validate_BB_DB
validate_BB_GDB
xmlrunner_gui

QC SUITE

This is the core script for performing automated QA/QC on the interim and final data deliverables.
test_BDIAProductGDB

OTHER

These scripts perform other functions detailed below:
test_runner—this is the main script that runs all the other QC scripts and imports all the necessary scripts and libraries.
which_build—this determines the current build and passes information to the configuration scripts.

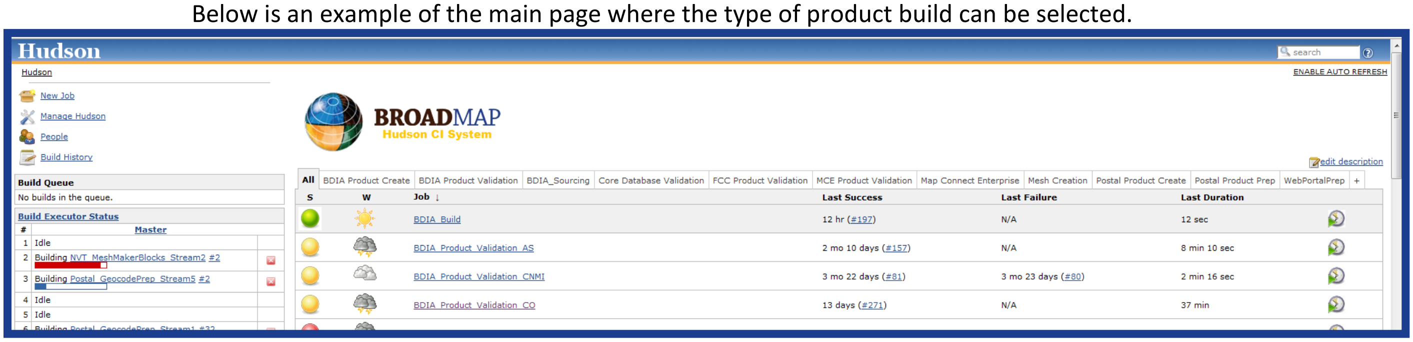
PROCESS OPERATION AND MONITORING

Product Extract, makeDeliverable.py and bdia2ntia.py, is run within BroadMap using a platform called Hudson that has been enhanced to support BDIA product extraction, process monitoring, as well as product validation. The same platform can be planned for implementation for the State, if desired.

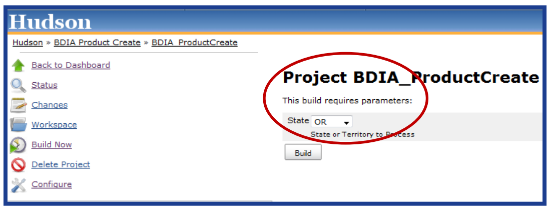
Below are examples of the product create, product validation, product statistics and monitoring processes that are managed within the BroadMap Hudson CI-System. All of the **abovementioned Python scripts**, with the exception of metadata transactions script, are run via this system.

BDIA PRODUCT CREATE

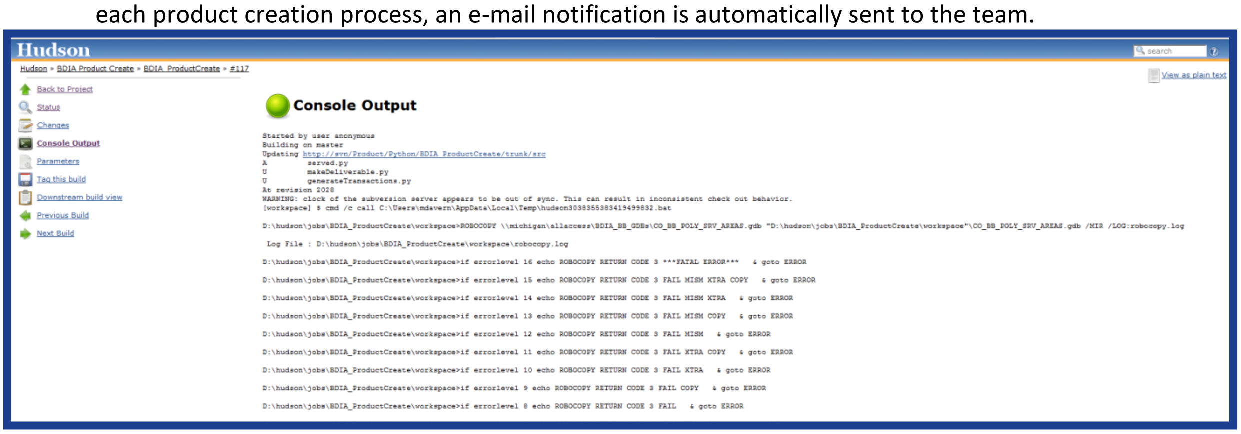
Below is an example of the main page where the type of product build can be selected.



Selecting based on the type of process that will be initiated is shown below:



The Console Output can be reviewed to see the progress of product create. Following the completion of each product creation process, an e-mail notification is automatically sent to the team.



All processes run via the BroadMap Hudson CI-System are stored for historical reporting. Each process can be reviewed, including the Console Output and Build Artifacts from that run.

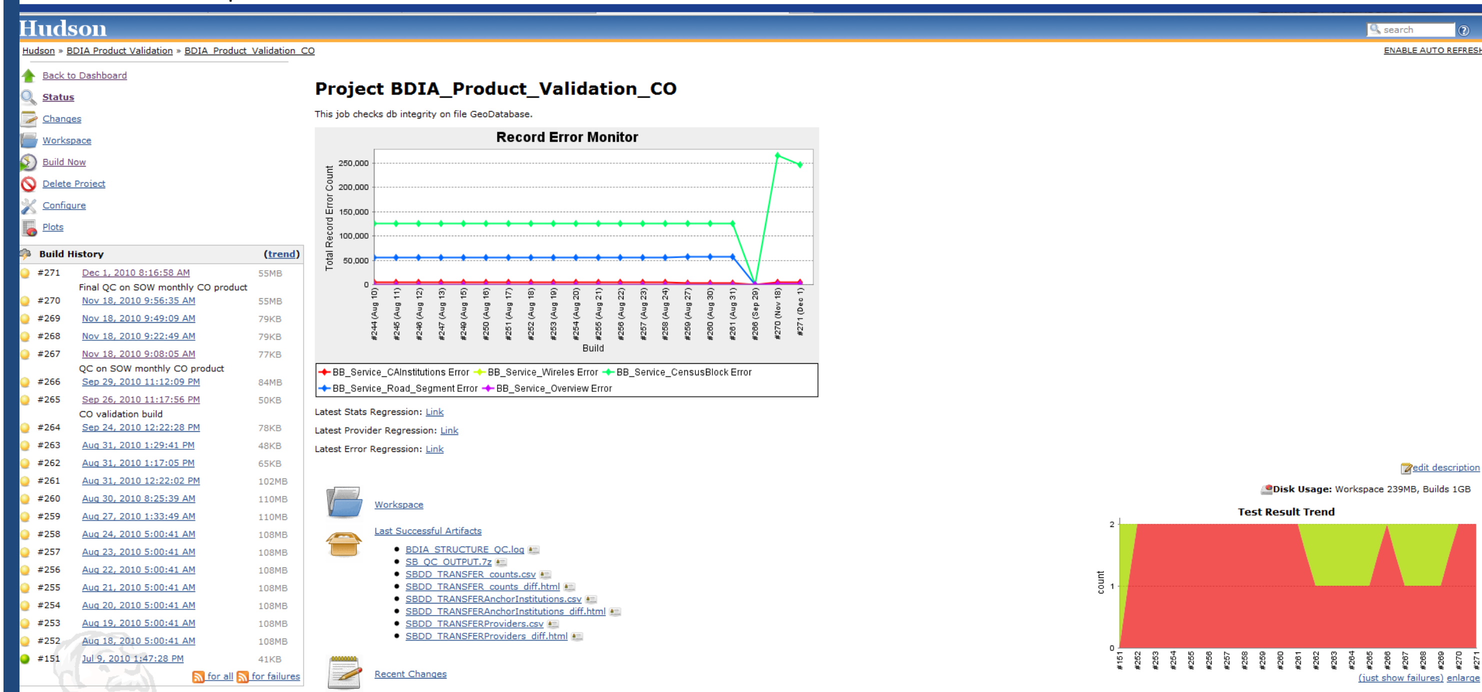

Hudson
search
Hudson » BDIA Product Create » BDIA ProductCreate » #161
ENABLE AUTO REFRESH
Back to Project
Status
Changes
Console Output
Parameters
Tag this build
Downstream build view
Previous Build
Next Build
Build #161 (Mar 28, 2011 9:44:40 PM)
OR Pre-Release Build
Delete this build
Started 1 day 1 hr ago
Took 3 hr 31 min on Alaska
edit description
Build Artifacts
bdia2ntia.log
makeDeliverable.log
robocopy.log
Revision: 3099
No changes.
Started by user anonymous

PRODUCT VALIDATION AND STATISTICS

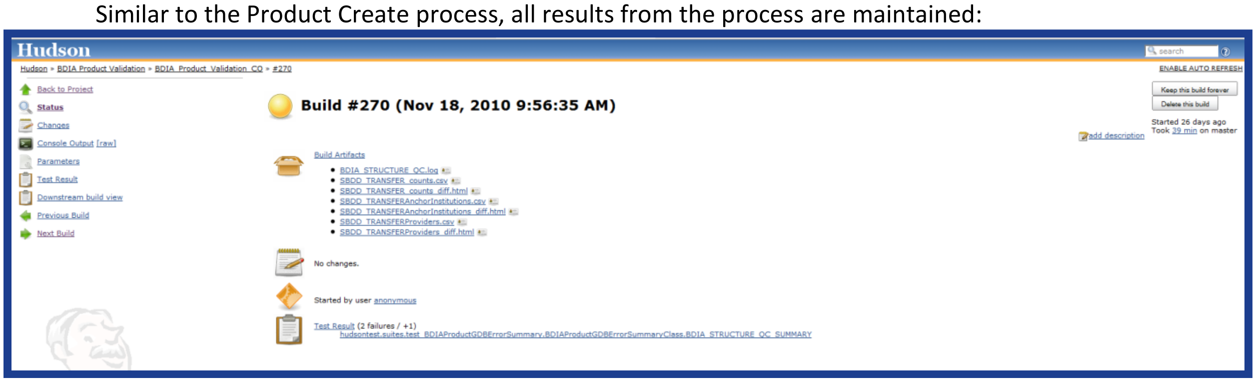
Once the product creation process is complete, Product Validation and Statistics are then initiated. These support the BDIA_ReleaseNotesStats.py script and the BDIA_QC_SUITES scripts detailed above.

All statistics and reports are stored for historical review with the capability to place violation criticality on each quality control check, allowing the identification of errors because of project status/completeness verses project correctness. Example: Typical Speeds populated.

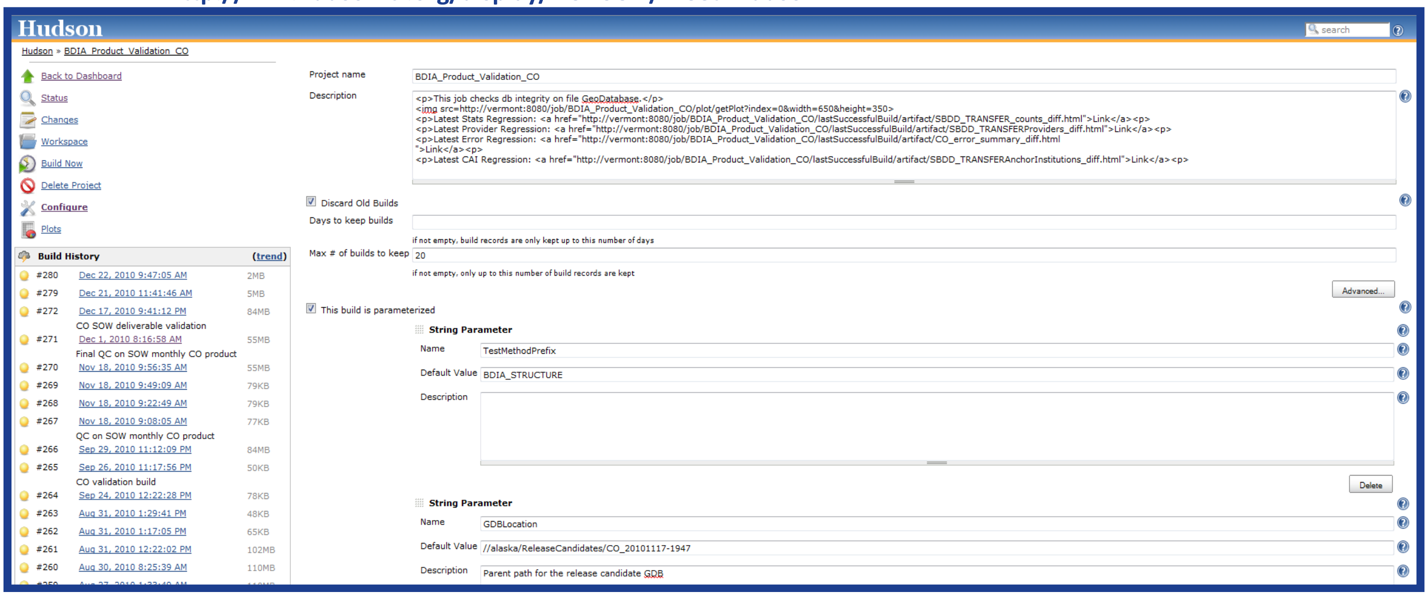
Below is an example of the report provided based on various control points running over a specified period:



Similar to the Product Create process, all results from the process are maintained:



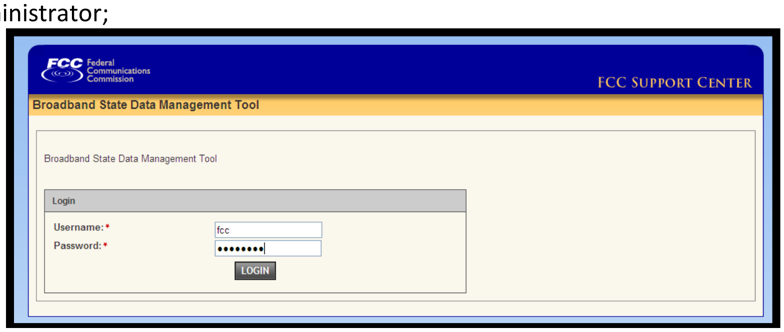
Results are then reviewed manually to ensure no errors reported are critical or in violation of the NTIA data model or project completion statements. Any errors of concern are communicated ahead of product delivery and included within the product release notes. Further detail on the Hudson-CI System environment can be found by navigating to the following link: **http://wiki.hudson-ci.org/display/HUDSON/Meet+Hudson**



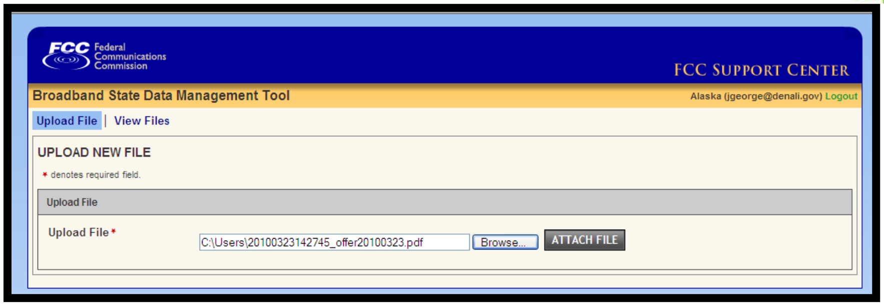
PRODUCT EXTRACT DATA DELIVERY

Product delivery for MapConnect™ Broadband is handled two ways, depending on client requirements:

1) State Submittal:
   a. Data is submitted via SFTP site;
   b. Product Release Notes and QC Test Report accompany the delivery.
2) NTIA Submittal:
   a. Directions for using the NTIA State Broadband Data file submission tool:
      (i.) Go to the following website: **https://esupport.fcc.gov/statedata**;
      (ii.) Enter your **username and password** as provided to you from the NTIA program administrator;



      (iii.) Click in **Upload a file** field;
      (iv.) Browse to local file for submission using the **Browse** button. Select file, then select **ATTACH FILE**. See example below.



(v.) **Logout/Receipt** using the **Logout** button in the top right of the screen;

(vi.) A receipt of submission is e-mailed to username e-mail address.

Guam Broadband Mapping Project: Product Release White Paper

Contact Name Manager:	Daniel Calarco
Contact Phone Number:	202-393-1175
Contact E-mail:	**dcalarco@one-economy.com**
Submitted By:	Kristin Rousseau
Contact E-mail:	**kristin.rousseau@broadmap.com**

Product Specification:	Fall 2011 NTIA Data Model
Product/Process:	NTIA—October 1, 2011 Data Deliverable
Dataset Submission QC:	NTIA—SBDD_CheckSubmission.py

Table of Contents

OVERVIEW

This white paper highlights the **Submission Summary** for this deliverable, as well as describes the **Data Gathering**, **Data Integration**, **Data Validation and Verification** and **Quality Control** processes used to create the Broadband Mapping Project's October 1, 2011 data submission. To support varying levels of technical and program knowledge, both a **high-level summary** and a **detailed process review** are supplied.

SUBMISSION SUMMARY

PROVIDER DETAILS

PROVIDER PARTICIPATION

- Providers Included
  - Docomo Pacific
  - GTA
  - IT& E
  - MCV
  - PDS (Pacific Data Systems) Guam

- New Providers Since Last Data Submission
  - Docomo Pacific
  - GTA

- Other Provider Comments
  - iConnect
    - Currently not a broadband service provider; however they are researching further on entering the Terrestrial Fixed Wireless market

COVERAGE AREA CHANGES

- Coverage Footprint Reductions/Map Refinement –
  - No significant refinement required for this data submission

- Coverage Footprint Expansion –
  - Pacific Data Systems

DATA CORRECTIONS

- There were no data corrections required for this data submission

SUBMISSION RECEIPT RESULTS

- Attached are the results from the NTIA data submission receipt quality script.

GU_2011_10_01.txt

- Error Report
  - The only item flagged in the submission receipt output is the following error, which has been verified as a correct entry within the data submission.

  - Field Check: FAILED MiddleMile_LONGITUDE has 70 UNEXPECTED VALUES for query: LONGITUDE Is Null OR (LONGITUDE < -170 OR LONGITUDE > -60)

COMMUNITY ANCHOR INSTITUION (CAI) DETIALS

OVERALL STATISTICS

Community Anchor Institution - Categories	Overall Count	Broadband Subscriber	Trans Tech	Advertised Speed Down	Advertised Speed Up
Category 1 - School K through 12	56	0	0	0	0
Category 2 - Library	9	5	5	5	5
Category 3 - Medical/Healthcare	8	6	6	6	6
Category 4 - Public Safety	28	19	19	19	19
Category 5 - Universities/Colleges	5	0	0	0	0
Category 6 - Other: Government	79	0	0	0	0
Category 7 - Other: Non-Government	69	0	0	0	0
Total	**254**	**30**	**30**	**30**	**30**

CAI CHANGES

- A new CAI was added to this data submission:
  - Pacific Islands University

- The only other change for this data submission was the inclusion of the CAIID extracted from the three databases communicated by NTIA. They are as follows:

  - For K-12 institutions (CAI type 1) please add the NCES ID CCD ID value found here: **http://nces.ed.gov/ccd/bat/**

  - For Higher Education (CAI type 5) please add the NCES IPEDS ID value found here: **http://nces.ed.gov/ipeds/datacenter/**

  - For Libraries (CAI type 2) please. Combine (do not add) "FSCSKey" and "FSCs_SEQ" from the "puout08av2000" file and place them here: **http://harvester.census.gov/imls/data/pls/index.asp** (FYI the LIBID is your state's unique ID for libraries)

HIGH-LEVEL SUMMARY

DATA GATHERING

BROADBAND SERVICE AREAS, MIDDLE MILE AGGREGATION POINTS AND BROADBAND SERVICE OVERVIEW

The collection of Broadband Service Areas, Middle Mile Aggregation Points and Broadband Service Overview information is handled through the following Provider Outreach Process:

- Build and maintain an inventory of Broadband providers through research and State inputs.
- Update provider material that describes the data requirements and logistics for data transfer.
- Update Non-Disclosure Agreement (NDA) for use in project, where applicable.
- Maintain multiple protocols for the provider to submit data, including Secure File Transfer Protocol (SFTP) technology when desired.
- Conduct one-on-one informational discussions with each provider to communicate the following:
    - Requirements of this project;
    - Broadband data required to support the product data model;
    - Submission protocols available;
    - Capability to validate how the supplied data is aggregated.
- Download/receive provider data.
- Establish a repeatable process with provider. Maintain provider communication, transaction and data handling records throughout the project (dates contacted, data received, etc.).

COMMUNITY ANCHOR INSTITUTION (CAI)

The collection of CAI information is handled through the following CAI Collection Process:

- Collect and maintain inventory of CAIs through data mining, research and State inputs.
- Maintain web-based CAI portal for institutions to add or confirm attribution, location and enter broadband-specific information.
- Upload web-based data to Core Database for standardization.
- Perform internal cleansing, such as removing duplicate records, identifying gaps in broadband attribution and verifying category.
- Geocode CAI locations.
- Translate Core Database data to deliverable-ready format.
- Continue engagement with non-responsive institutions.

DATA INTEGRATION PROCESS

The data integration and processing mechanisms currently used allow for multiple types of inputs and result in a standardized output that meets the NTIA deliverable requirements. This flexible process supports data model changes and project-requested enhancements.

- Receive inputs from providers via submission protocols; upload into Sourcing Database and catalog with provider information.
- Review provider-supplied data for completeness and for potential discrepancies that require resolution prior to processing and flag as necessary.
- Categorize input into data-type category (addresses, block lists, paper maps, etc.).
- Standardize input based on data type within Staging Database.
- Create Compact Polygons (CP)—(internal methodology for generating area-based feature for coverage in Staging Database).
- Apply broadband attribution to CP; apply metadata to CP.
- Perform quality analysis of the CP against the source supplied to identify any completeness or accuracy issues.
- Request additional information from the provider if elements of coverage are missing or contain discrepancies. This is a second manual quality check to ensure data is complete.
  - Process coverage area to build the required NTIA data model layers.
- Process CAI data input into internal standardized format, as discussed above in the **Community Anchor Institution (CAI) subsection**, based on NTIA and State-level requirements.

DATA VALIDATION AND VERIFICATION

Following the creation of the product, process steps within Data Validation and Verification occur. To ensure the data collected and processed is as accurate and comprehensive as possible, provider validation and internal verification activities are employed. After the initial mapping of providers' coverage areas and serviceability claims, additional reviews are performed using the methods described in the subsections below (**Third-Party Data Verification**, **Broadband Provider Validation**, **Confidence Values**).

THIRD-PARTY DATA VERIFICATION

The coverage is visually and programmatically compared against third-party data. Pitney Bowes and American Roamer data are used in cases where a coverage area is questionable. All anomalies identified during this analysis are reviewed with the providers.

BROADBAND PROVIDER VALIDATION—PROVIDER PORTAL APPLICATION

Providers are trained on and requested to use a secure interactive web application to review their current coverage area(s) and supporting broadband attribution and validate their data or submit change requests to update their data. All provider change requests go through the **Data Integration Process** and are reviewed with the provider to complete validation.

CONFIDENCE VALUES

All verification, validation and manual quality review results are tracked by provider/technology type and stored and maintained within a **Validation table**. A confidence value is assigned, based on internal assessments of the collected information, to highlight the provider coverage areas and/or attributions that would benefit from further investigation and/or enhancements.

QUALITY CONTROL

Following collection, processing and analysis of the provider and CAI data, the product is checked manually and algorithmically against the NTIA data model. Some of the items included within these checks are:

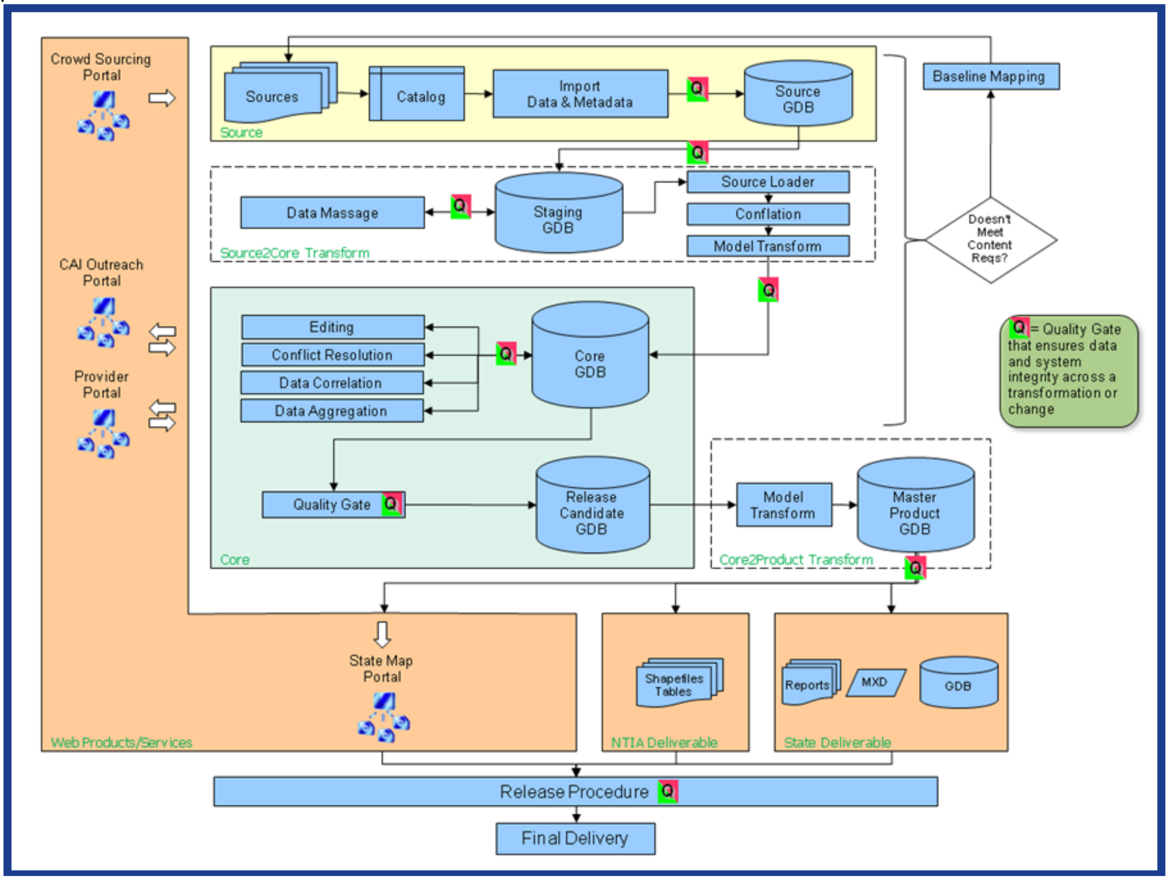
- Format correctness;
- Table and field structure;
- Valid values, including default values, where applicable;
- Geographic extent and topology errors.

Prior to data submission, another quality control script supplied by NTIA is run. This script, SBDD_CheckSubmission.py, creates an output in text form that is required to be submitted along with the final deliverable. All errors must come up clean, unless otherwise specified by NTIA. Exceptions to the script as noted by NTIA on the SBDD Workspace on 03/25/11 can be found at the following link: **https://sbdd-granteeworkspace.pbworks.com/w/page/38218329/CheckSubmissionExceptions**

- Longitude values for States outside the lower 48 (any table);
- CAI results for Transtech, MaxAdUp, MaxAdDown if BBService is “No” or “Unknown”;
- Overview MaxAdDown, MaxAdUp if 100% of record-level data has MaxAdDown or MaxAdUp populated.

DETAILED PROCESS REVIEW

A detailed review of the data collection, integration and quality control points within the broadband data gathering and mapping process are discussed in the subsections that follow. In addition, a diagram showing the overall process can be seen below.



PROVIDER OUTREACH

For the October 2011 data submission, an e-mail notification was sent to all providers with supporting deliverable dates. The providers mainly used the Provider Portal web application to submit changes to and/or validate their current coverage area(s).

In support of the data collection effort, providers that did not timely respond to the outreach were contacted by phone.

OUTREACH MATERIALS

The original provider packet sent via e-mail to the providers included the following documents and files:

- Letter from the State inviting them to participate in the program;
- Copy of the Non-Disclosure Agreement (NDA);
- Copy of the Mapping NOFA from the NTIA;
- Copy of the NOFA Clarification from the NTIA;
- Broadband service address example file in CSV format;
- Word document describing service address example file;
- Broadband service block example file in CSV format;
- Word document describing service block example file;
- Broadband service street example file in CSV format;
- Word document describing service street example file;
- Broadband subscriber example file in CSV format;
- Word document describing subscriber example file;
- Broadband wireless coverage area sample shapefile;
- Word document describing wireless coverage area sample shapefile;
- Instructions for downloading, installing and using the WinSCP SFTP application.

OUTREACH PROCESS

The provider outreach process is comprised of the following general steps:

- Send the provider package and introduction letter to the main point of contact for the provider.
- Follow up with e-mail and telephone to verify that the main point of contact is correct.
- If necessary, discuss the NDA further and resolve any redlines.
- Once the correct primary contact is established, set up a telephone call, if necessary, to learn more about the provider's offerings and direct them to the appropriate outreach materials.
- If providers are unable to be contacted (non-responsive) or indicate that they are not interested in participating (non-cooperative), mark them as such on the provider tracking sheet. These providers will be escalated to the State for further action.
- As the providers are collecting the required data, provide instructions on downloading, installing and using the WinSCP SFTP application, if required.
- Arrange with the providers to transfer the data in whatever way they are comfortable: some providers will find regular email acceptable; others will want to use the SFTP application.
- After data is received and reviewed, it may be necessary to contact a provider for clarification or to address incomplete datasets. In the interest of building and maintaining relationships, care is given not to push the provider but to work with it to obtain accurate data in the best possible format.

DATA COLLECTION

DATA TRANSFER PROCEDURES

There are three primary ways data is collected from providers. These are:

- Secure FTP (SFTP) using the WinSCP application;
- Regular e-mail;
- Mail.

INITIAL DATA REVIEW AND QUALITY ASSURANCE

The initial data review and quality assurance process consists of the following general steps:

1) Access the data from the SFTP site or e-mail.
    a. If e-mailed, place copy of original dataset in the appropriate provider folder on the SFTP site.
2) Place copy of raw data on local computer in a working directory.
3) Review data and determine course of action based on type of data received.
4) Ensure data is complete and contact provider to address any gaps.

NOTE:

The goal is to get as many providers as possible to provide subscriber address data in the correct format. Obviously, this will not be possible with all providers so we will continue to have to process various types of provider-supplied data.

DATA INGESTION

DATA INGESTION OVERVIEW

The following subsections outline the process steps taken based on the type of input supplied by the data provider:

- **Point Data**:
    - Subscriber location;
    - DSLAM location;
    - Central Office location;
    - Broadcast Tower location.
- **Linear Data**:
    - TIGER® street segments.
- **Polygonal Data**:
    - Census Blocks;
    - Coverage Area.

Overall, the process is geared toward taking the provider data supplied and creating polygon shapes to append to the bb_cov feature class. The bb_cov feature class is the interim dataset that is then processed using the makeDeliverable.py Python script to create the MapConnect™ data layers that will be delivered to the State and, ultimately, to the NTIA. Detailed instructions used in this process can be found in the subsections below.

POINT DATA

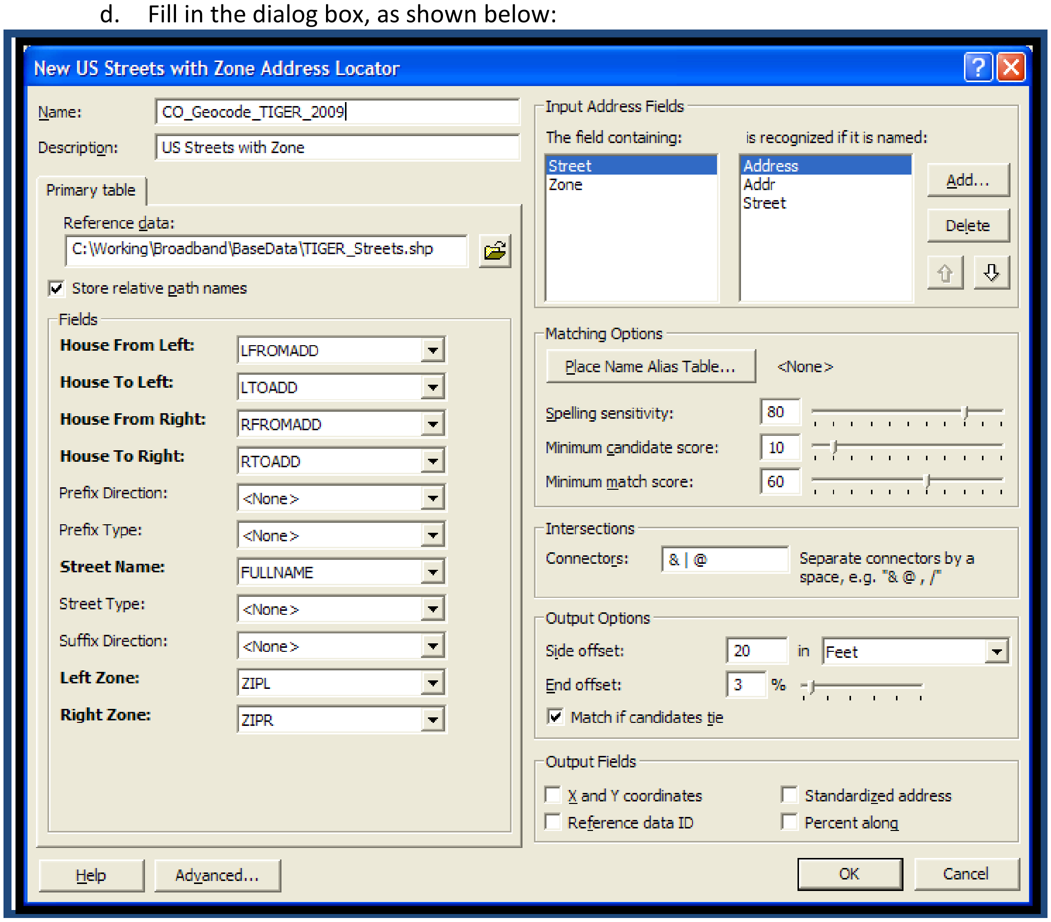
SUBSCRIBER LOCATION—ADDRESS DATA

In the event that the data provider supplies subscriber address data, the steps are as follows:

1) First, convert the address data to a clean Excel spreadsheet in an appropriate address data format.
   a. Usually, this has the following columns: street address (number, pre-directional, pre-modifier, street name, street type, post-directional and post-modifier concatenated), city, state, ZIP.
2) Configure the ArcGIS® geocoding tool to use the TIGER® 2009 streets dataset.
   a. In ArcCatalog®, create a new Address Locater by right-clicking in the white space of the appropriate directory and selecting **New>Address Locater** from the dropdown menu.
   b. Select **US Streets with Zone** and click **OK**.

NOTE:
It is likely that multiple Address Locators will have to be set up to handle the variety of provider address data received.

   c. Navigate to the **TIGER Streets 2009 file** and click **OK**.
   d. Fill in the dialog box, as shown below:

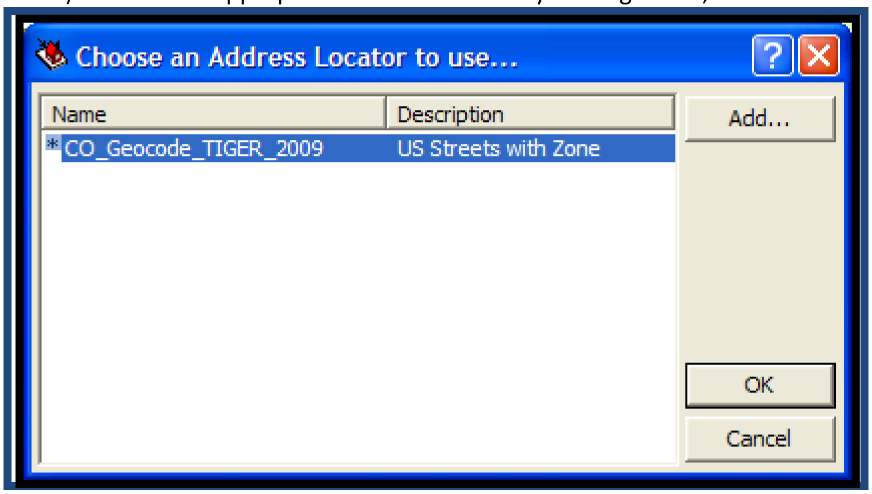


e. Click **OK**.

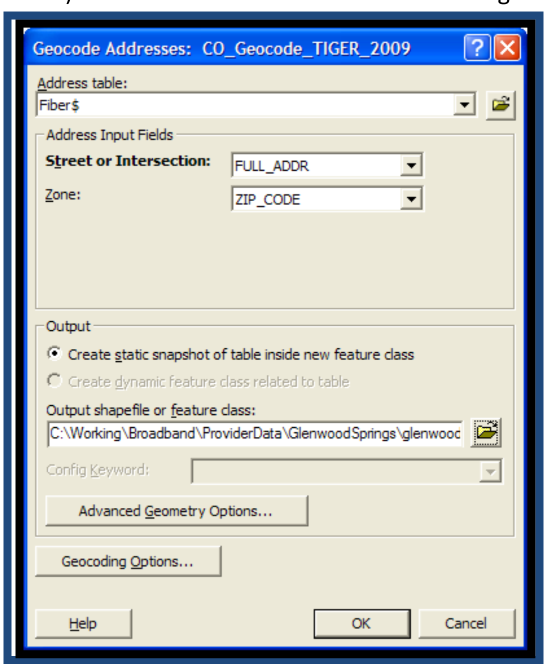
3) Open ArcMap® and add the Excel spreadsheet with the address information.

4) Right-click on the Excel spreadsheet and select **Geocode Addresses** from the dropdown menu.

5) Select the appropriate address locator by clicking **Add…**, then **OK**.

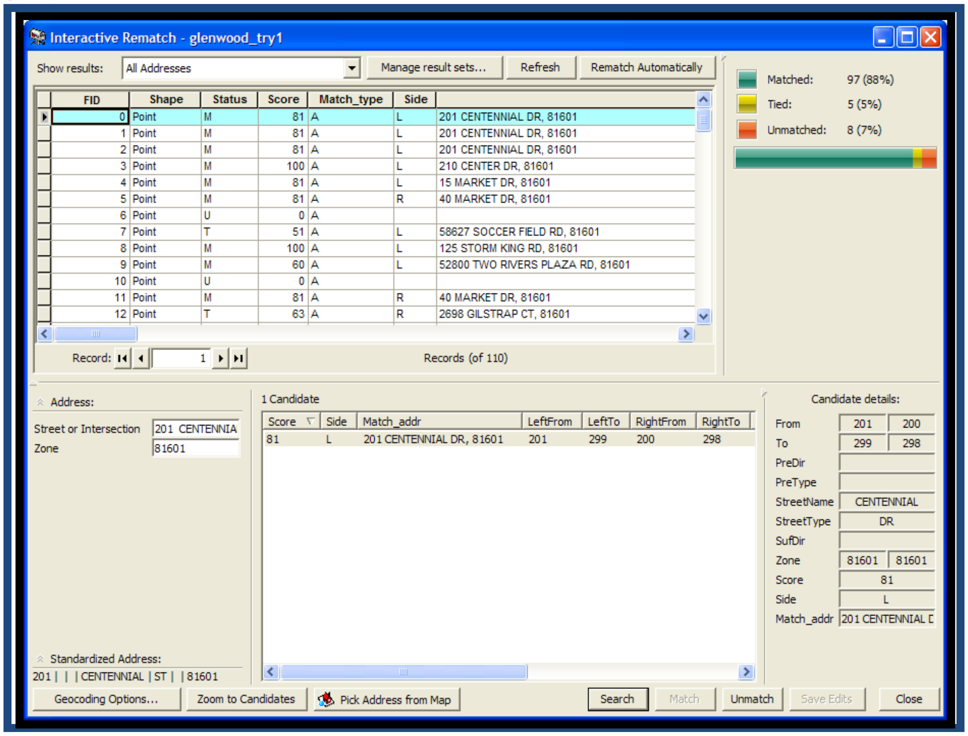


6) Fill out the **Geocode Addresses** dialog box, as shown below:

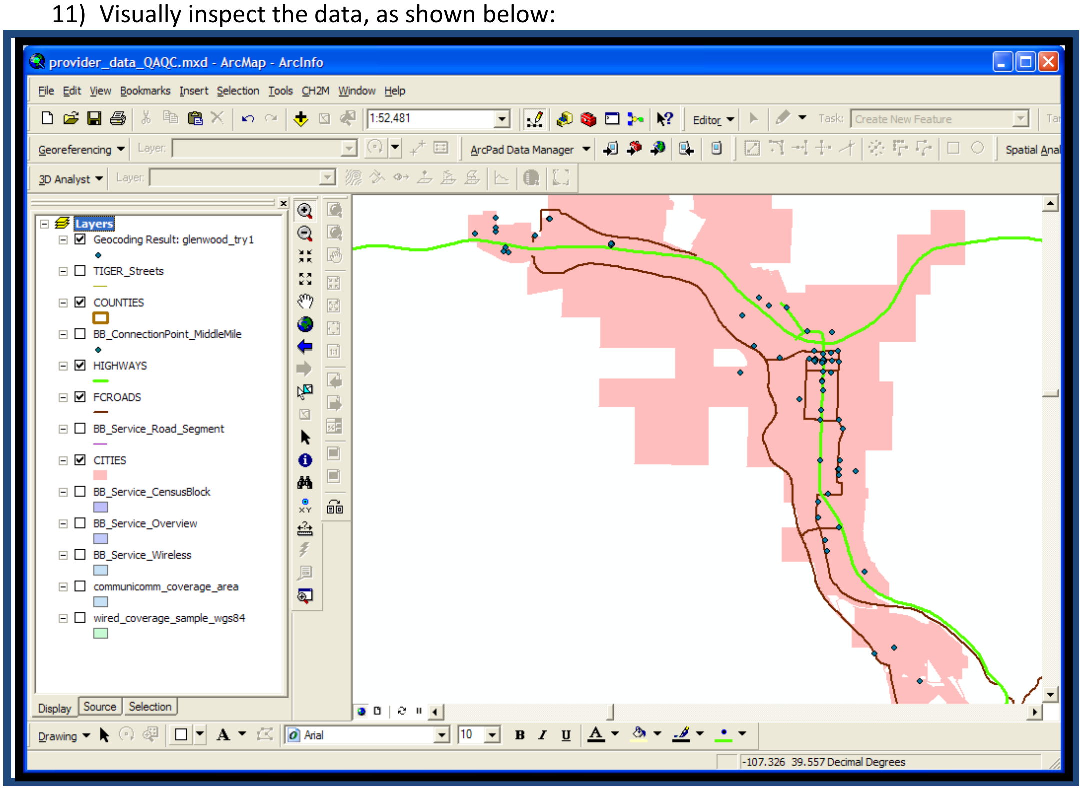


7) Geocode the list in batch mode using the geocode service set up in **Step 2** above, accepting all the default parameters.

8) Review results. See example below.



9) Adjust geocoding parameters accordingly and repeat batch to resolve issues.
10) Manually geocode unmatched addresses until target hit rate achieved, generally 90%.
11) Visually inspect the data, as shown below:



12) Follow the steps detailed in **Subscriber Location—GIS Data** below.

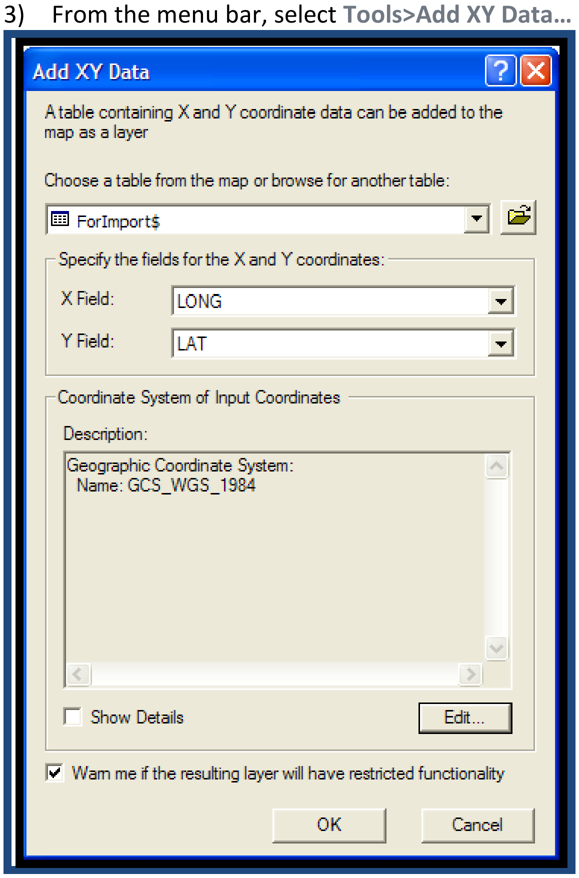
SUBSCRIBER LOCATION—XY DATA

If the provider supplies a list of subscriber data with accompanying XY data such as latitude and longitude, the steps are as follows:

1) Refine the format in Excel so that the data can be opened easily using ArcMap®.
   a. Remove all font color, highlighting, cell colors and borders, clean up column headers and make certain there are no merged cells.
   b. Make certain that XY locations are in decimal degrees.
      (i.) To convert from degrees, minutes, seconds (39º 26’ 45.67”) to decimal degrees, use the following formula: DD + (MM/60) + (SS.SSS/3600).

NOTE:
If XY locations from some other coordinate system are provided, you can use those in the process below but you must know what the coordinate system is.

2) Open the Excel worksheet in ArcMap®.
3) From the menu bar, select **Tools>Add XY Data…**

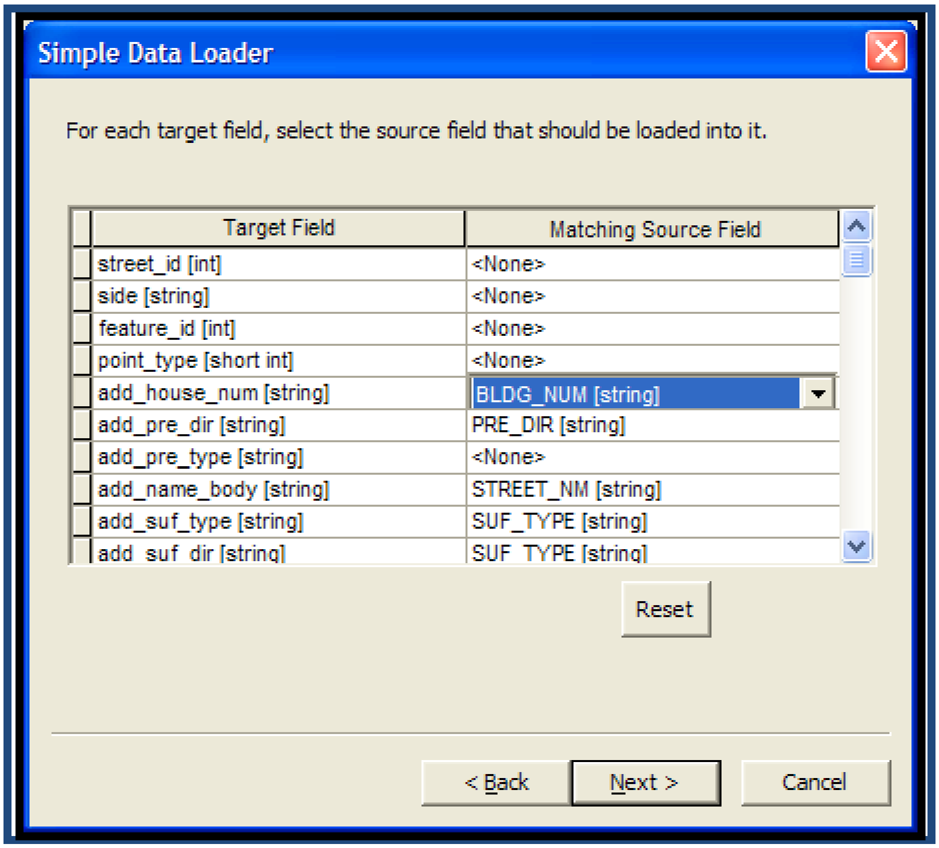


4) Supply the appropriate fields for the X and Y coordinates, choose the appropriate coordinate system and click **OK**.
5) Results are an event layer, not a true spatial layer. Export the data by right-clicking the event layer and selecting **Data>Export Data…** from the dropdown menu.
6) Follow the steps detailed in **Subscriber Location—GIS Data below**.

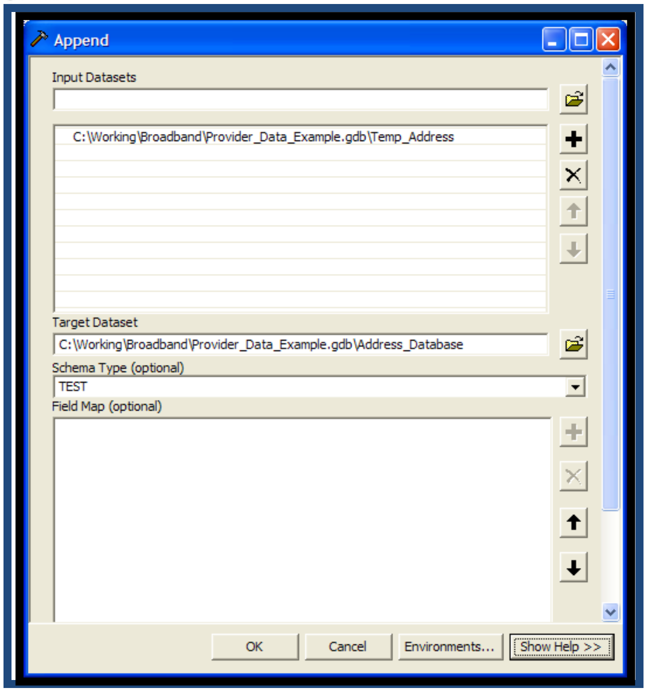
SUBSCRIBER LOCATION—GIS DATA

If the provider supplies subscriber location in GIS format, the only process step is to load that data into the appropriate data schema and it will be ready for processing.

1) First, load the data into the Point Address database schema (please see Appendix D for an example of the Point Address database schema.) using an empty feature class in that schema.
2) In ArcCatalog®, right-click on the empty feature class and select **Load** from the dropdown menu.
3) Navigate to the provider address GIS dataset and then map the attribute fields accordingly, as shown below:



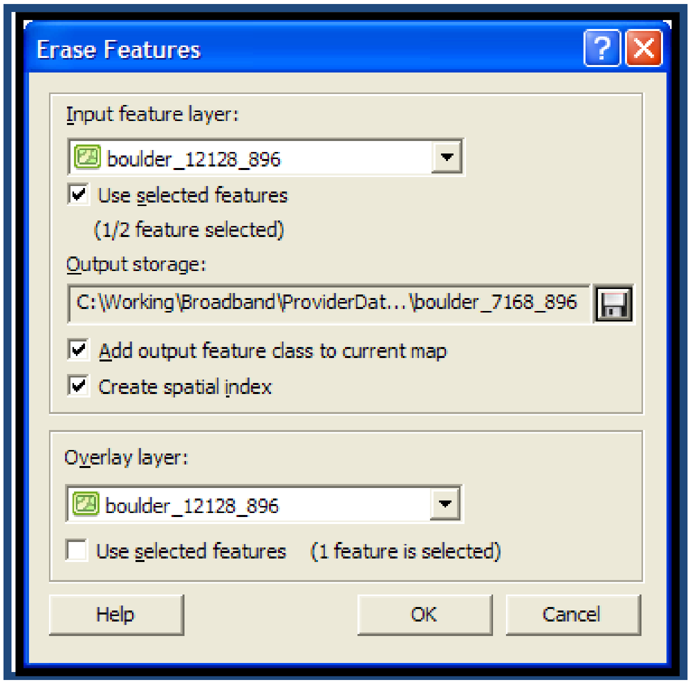
4) Once you have successfully loaded the provider address data into the temporary database with the correct schema, you now will append that data to the overall Point Address database.
5) In ArcToolbox®, use the **Append** command (**Data Management Tools>General> Append***)* to add the features into the overall Point Address database, as shown below:



6) Since the data is already in the Point Address database schema, there is no need to alter the Field Map in the Append tool.
7) After appending, calculate metadata reflecting geometry source and representation values.
8) Break provider-specific points into separate county feature classes and perform the following steps per county feature class:
   a. Within ArcGIS®:
      (i.) Summarize download and upload speeds [first,last] to determine all speeds available for county.
         (1) This will save as a DBF table. Keep track of location for future reference.
      (ii.) Buffer county address point featureclass to 150'.
         (1) During buffer command, dissolve on ad_down; ad_up; provider; dba; frn; tt; all metadata fields; stctyfips. Save as…. county_fastestdown_fastestup.
         (2) Example using Qwest data: boulder_40128_20128, where boulder=county; 40128=ad_down; 20128=ad_up.

NOTE:
These attribute fields are specific to the Point Address database.

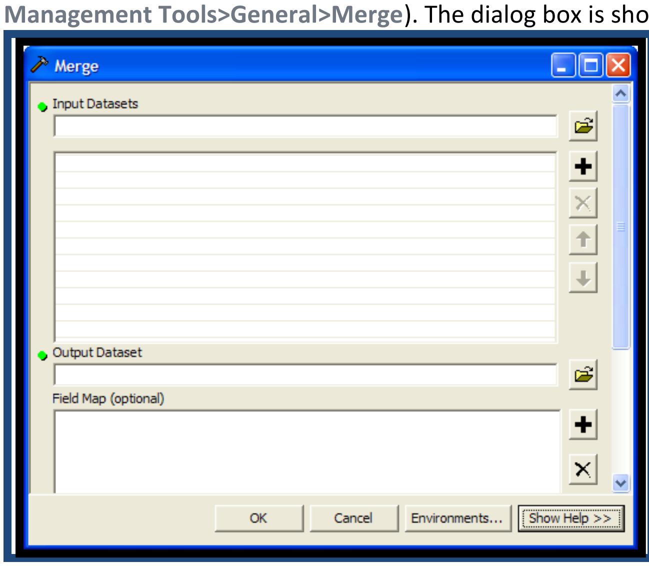
      (iii.) Select the features that represent the lowest speeds.
   b. Using XtoolsPro (***http://www.xtoolspro.com/***):
      (i.) In the XTools Pro toolbar, select **XTools Pro>Layer Operations>Erase Features.**
      (ii.) Use the same feature class for Input and Overlay.
      (iii.) Check **Use selected features** on the **Input** feature, as shown below.
      (iv.) Repeat and erase slowest speeds one speed at a time. Save each new feature class as the next slowest speed, using the same naming convention as shown in **a.(ii.)(1)** above. A general example is shown below:



c. Return to ArcGIS®:

(i.) Edit/delete speeds from the attribution table of each feature class, so each remaining feature class has only one speed value.

(ii.) Merge individual speed feature classes using the **Merge** command in ArcToolbox® (**Data Management Tools>General>Merge**). The dialog box is shown below:



(iii.) Merge individual county feature classes using the **Merge** command in ArcToolbox (**Data Management Tools>General>Merge**).

(iv.) Since the county files are all in the same schema, DO NOT alter the Field Map portion of the command interface.

(v.) When all the county files are merged into one dataset, use the **Append** command in ArcToolbox® (**Data Management Tools>General>Append**) to add the features to the bb_cov interim dataset. Use the **Field Map** portion of the **Append** tool to map the appropriate field values to their corresponding fields in the bb_cov feature class.

DSLAM OR CENTRAL OFFICE LOCATION—ADDRESS DATA

In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office address data, the steps are as follows:

1) Follow the process for geocoding points in **Subscriber Location—Address Data** above.
2) Follow the steps detailed in **DSLAM or Central Office Location—GIS Data** below.

DSLAM OR CENTRAL OFFICE LOCATION—XY DATA

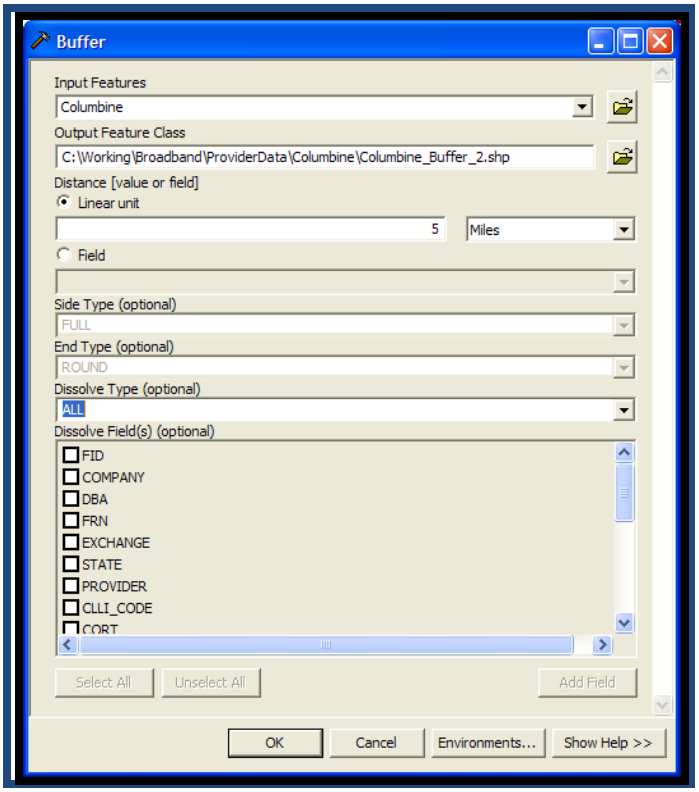
In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office XY data, the steps are as follows:

1) Follow the process for creating points from XY data in **Subscriber Location—XY Data** above.
2) Follow the steps detailed in **DSLAM or Central Office Location—GIS Data** below.

DSLAM OR CENTRAL OFFICE LOCATION—GIS DATA

In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office GIS data, the steps are as follows:

1) Buffer the DSLAM/Central Office points feature class.
    a. Add the point feature class to ArcMap®.
    b. Open the ArcToolbox® and go to **Analysis Tools>Proximity>Buffer**.
    c. Set the buffer distance to 5 miles.
    d. Set the dissolve type to **ALL**.
    e. Name the output feature class.
    f. Typical **Buffer** tool is shown below:



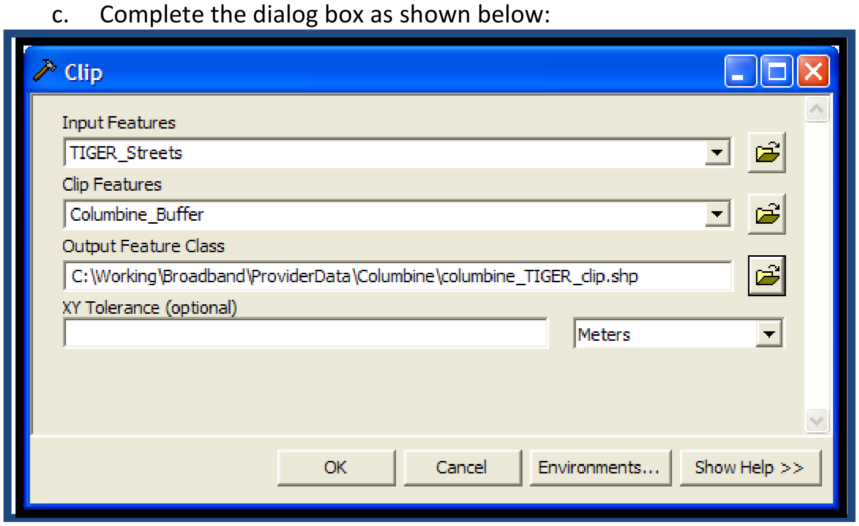
g. Click **OK**.

2) Use the resulting buffer feature class to clip the TIGER® street layer:

a. Add TIGER® street layer to ArcMap®.

b. Open the ArcToolbox® and go to **Analysis Tools>Extract>Clip**.

c. Complete the dialog box as shown below:



d. Click **OK**.

3) Using ArcCatalog® and within the file geodatabase:

a. Right-click and create a new Feature Dataset.

(i.) For the Feature Dataset settings:

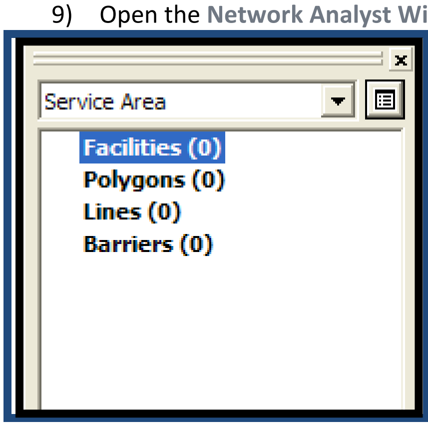
(1) Name the feature dataset accordingly.

(2) Select horizontal coordinate system by importing the coordinate system associated with the clipped TIGER® street layer by selecting **Import** and navigating to the location of that feature class.
(3) No vertical coordinate system needed.
(4) Leave all x,y,z,m values at default.
(5) Click **Finish**.

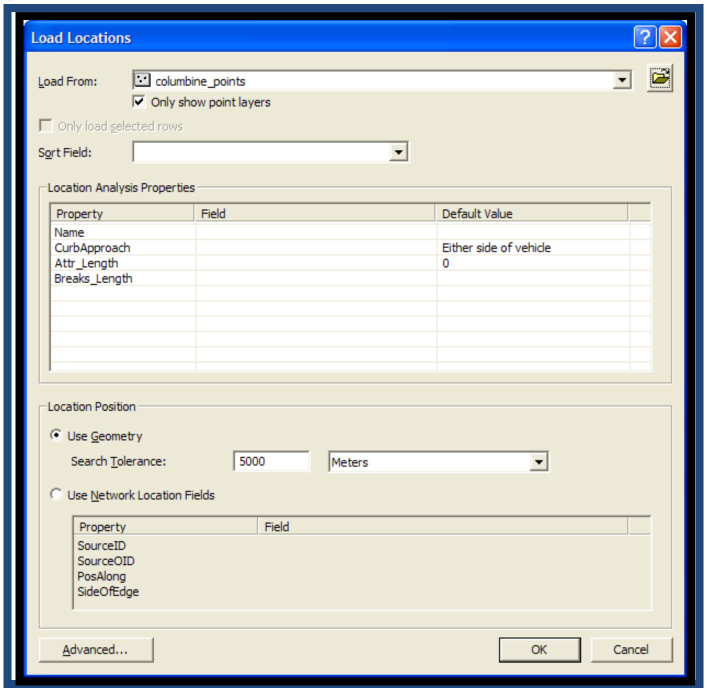
4) Import previously created street feature class into new **Feature Dataset**.
5) Right-click **Feature Dataset** and create new Network Dataset—accept all default setting for the Network Dataset.

NOTE:
The Network Analyst extension must be turned on.

6) In ArcMap® turn on the **Network Analyst Toolbar** by going to **View>Toolbars>Network Analyst**.
7) Add the Network Dataset created in **Step 5** to ArcMap.
8) Using the **Network Analyst Toolbar** dropdown, create **New Service Area**.
9) Open the **Network Analyst Window** by selecting the button. See below.



10) Right-click **Facilities** layer, select **Load Locations** and navigate to the DSLAM/Central Office facilities feature class.



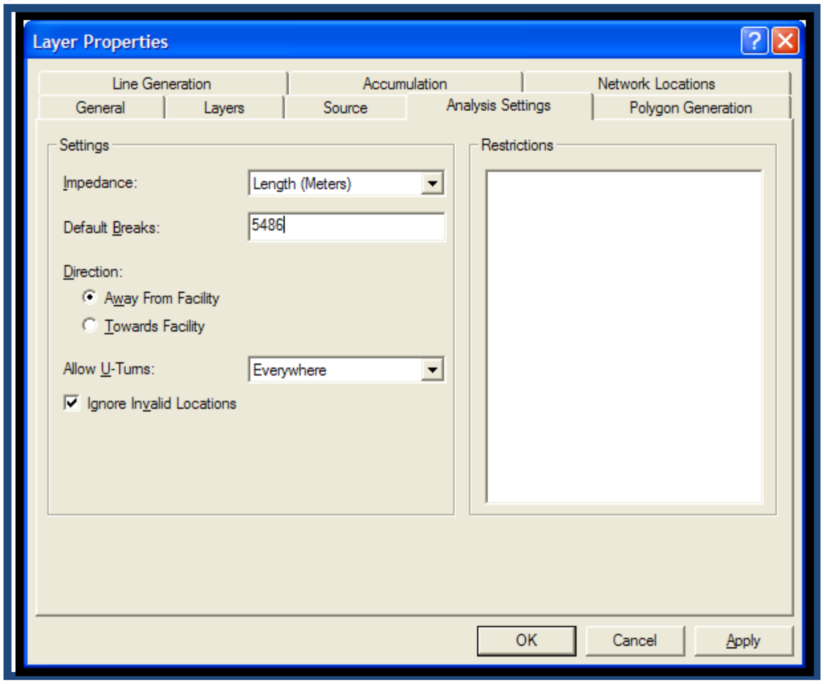
11) Click **OK**.

12) Click the **Service Area Properties** button .

13) For the following tabs, change the following properties:

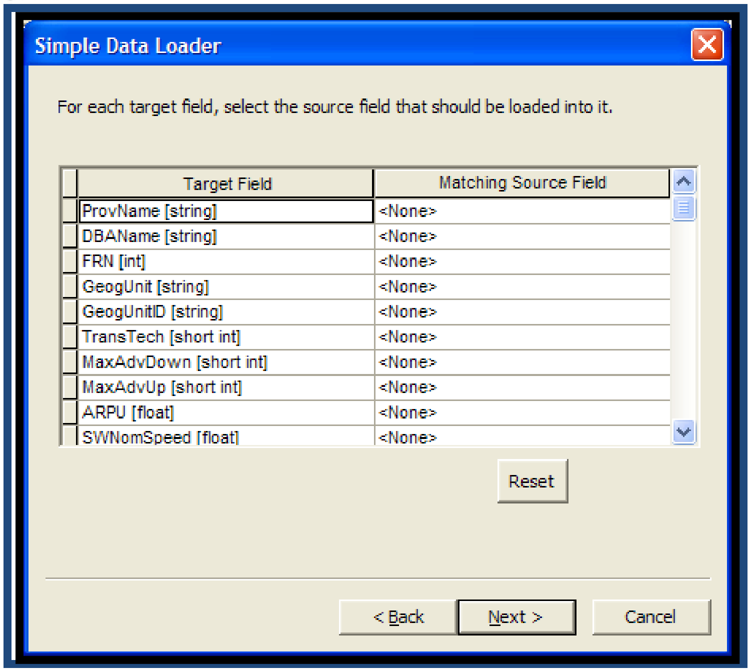
 a. **Polygon Generation** tab:
  (i.) Select **Merge by break value**.
  (ii.) Also disable the **Trim Polygons** option.

 b. **Analysis Settings** tab—using and converting the specified DSLAM buffer distance from feet to meters—input buffer distance value in meters into the **Default Breaks** location.
  (i.) Generally, 18,000 feet (5486 meters) from DSLAM or Central Office location is used as the buffer distance. See below.



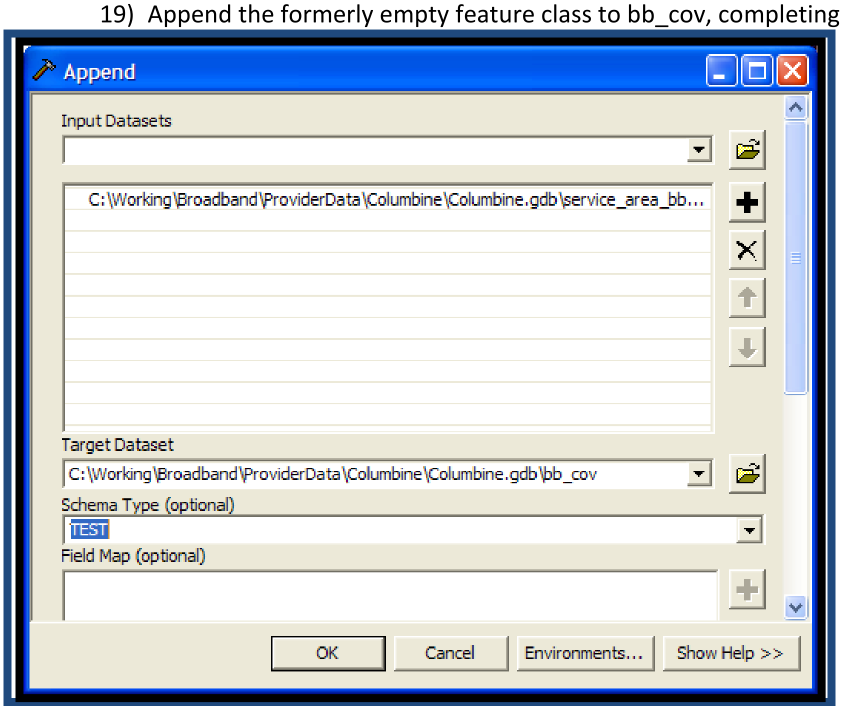
c. Click **OK**.

14) On the **Network Analyst Toolbar**, click the **Solve** button to create service area polygons.
15) Right-click on the created service area polygon in the layer list, and select **Data>Export Data** from the dropdown list.
16) Export to a feature class in the file geodatabase you created earlier.
17) In ArcCatalog®, create an empty feature class with the schema of the bb_cov feature class and load the feature class created in **Step 16** into it.
    a. Right-click on the empty feature class, select **Load>Load Data** from the dropdown menu and navigate to the location of the service area feature class.
    b. Click the **Add** button, then click **Next**.
    c. Accept the defaults and click **Next**.
    d. DO NOT attempt to map any fields, as shown below:



e. Click **Next**, then **Next** again, then **Finish**.

18) In ArcToolbox®, go to **Data Management Tools>General>Append**.
19) Append the formerly empty feature class to bb_cov, completing the dialog box, as shown below:



20) Leave the **Schema Type** as TEST.
21) Click **OK**.
22) In ArcMap®, open bb_cov for editing and manually input associated attribution.

BROADCAST TOWER LOCATION—ADDRESS DATA

In the event that the provider supplies wireless broadcast tower location address data, the steps are as follows:

1) Follow the process for geocoding points in **Subscriber Location—Address Data** above.
2) Follow the steps detailed in **Broadcast Tower Location—GIS Data** below.

BROADCAST TOWER LOCATION—XY DATA

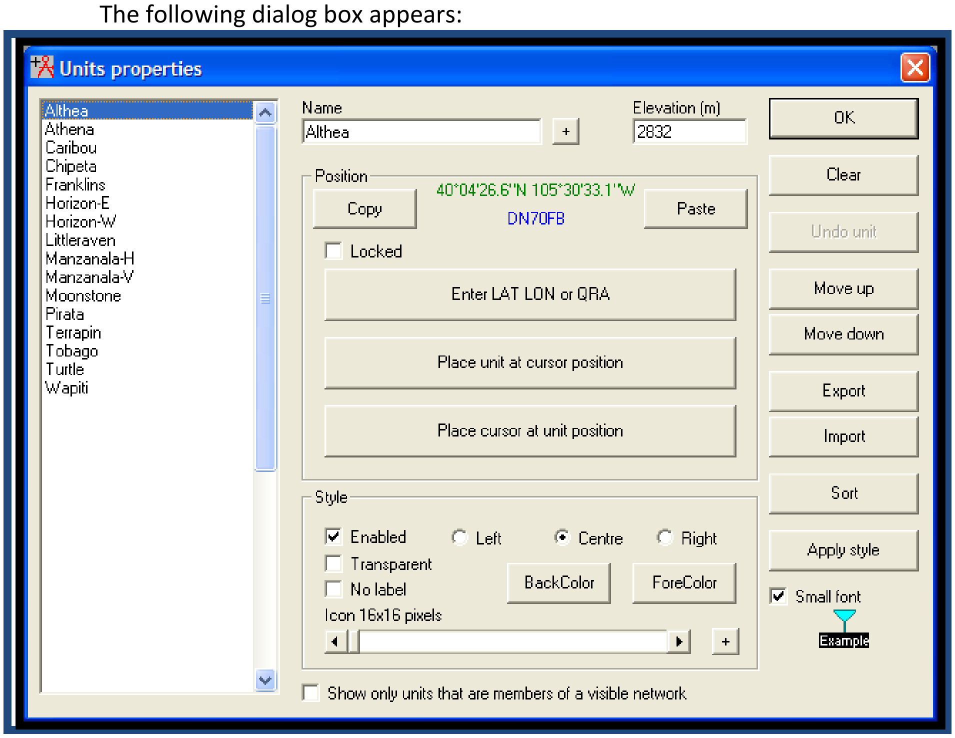
In the event that the provider supplies wireless broadcast tower location XY data, the steps are as follows:

1) Follow the process for creating points from XY data in **Subscriber Location—XY Data** above.
2) Follow the steps detailed in **Broadcast Tower Location—GIS Data** below.

BROADCAST TOWER LOCATION—GIS DATA

In the event that the provider supplies wireless broadcast tower location GIS data, the steps are as follows:

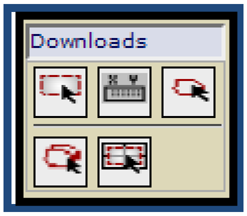
1) Download the required software (Radio Mobile) from the website: **http://www.cplus.org/rmw/english1.html**
2) Install the software according to the standard directions, found here: **http://www.cplus.org/rmw/download/download.php?S=1**
3) Open the application.
4) Load the broadcast tower location and elevation information by selecting **File>Unit properties**. The following dialog box appears:



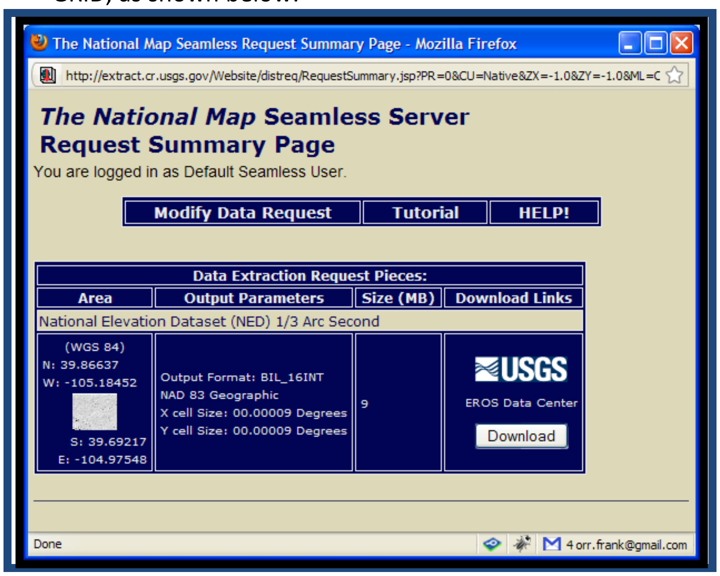
5) Add the information for all the towers supplied by the WISP data provider, including the elevation. If provider does not supply elevation, this information can be obtained from Google Earth.
   a. If available, use the **Import** button to import a Google Earth KML of the tower locations.
6) Go to the National Map Seamless Server (**http://seamless.usgs.gov/**) and download elevation data sufficient to contain the tower locations.

a. At least the 1/3” NED data is needed. Select this by clicking the **Download** button in the upper right of the website and checking the box next to **1/3“ NED**.

b. Zoom to the area of interest and use the **Download** tools to define the area to download:

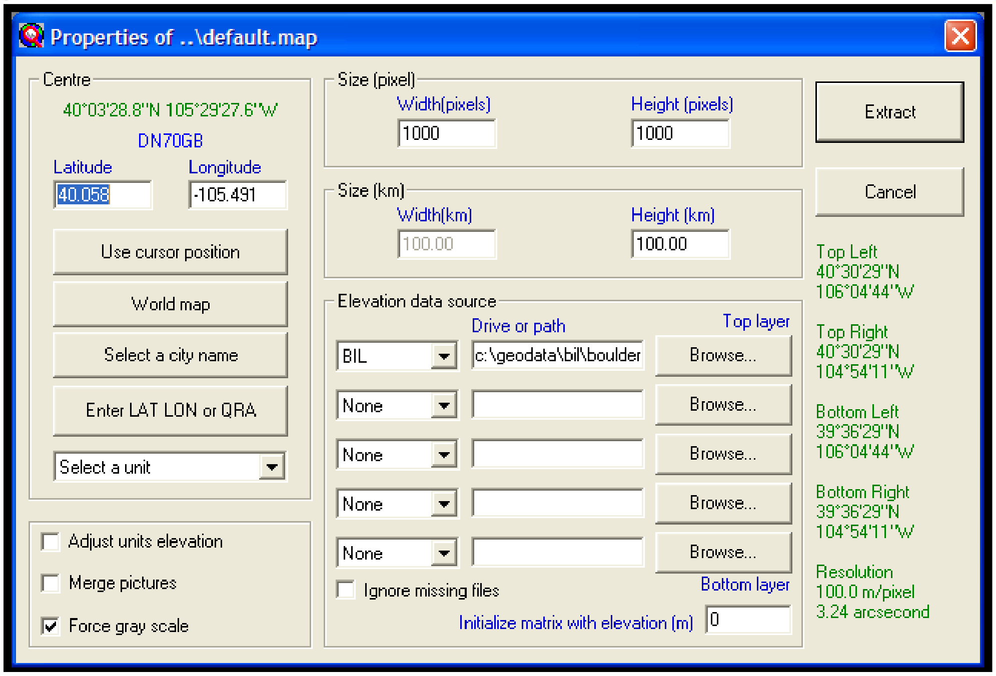


c. Click the **Modify Data Request** button to request the data in BIL_16INT format, not ESRI GRID, as shown below:



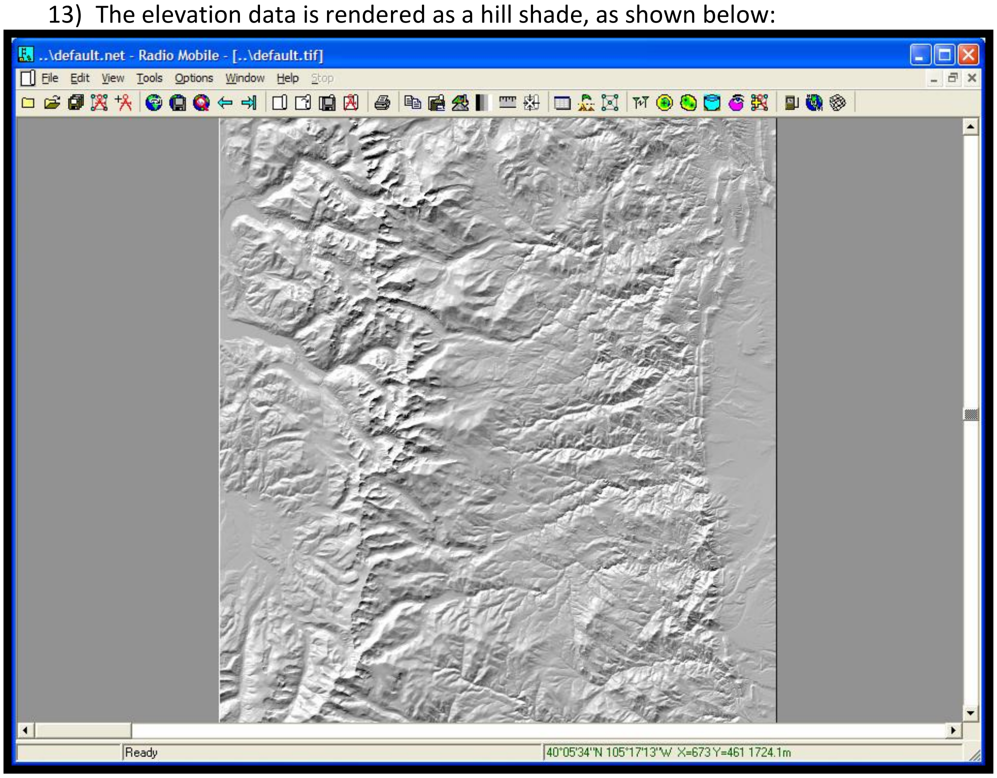
d. Download the data and unzip it.

7) Select **File>Map Properties** to define the map.
8) Enter a latitude and longitude in the center of the tower locations.
9) Set the size (in pixels) and the size (in kilometers) of the map.
10) Set the directory path leading to the BIL elevation data just downloaded.
11) The dialog box is shown below:



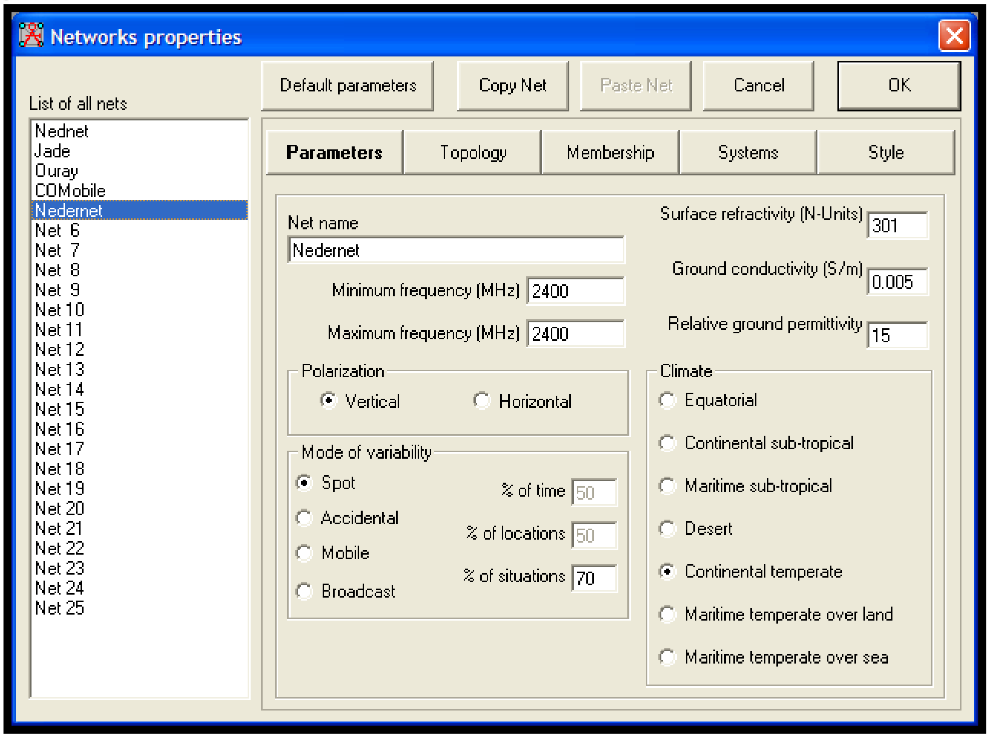
12) Click **Extract**.

13) The elevation data is rendered as a hill shade, as shown below:

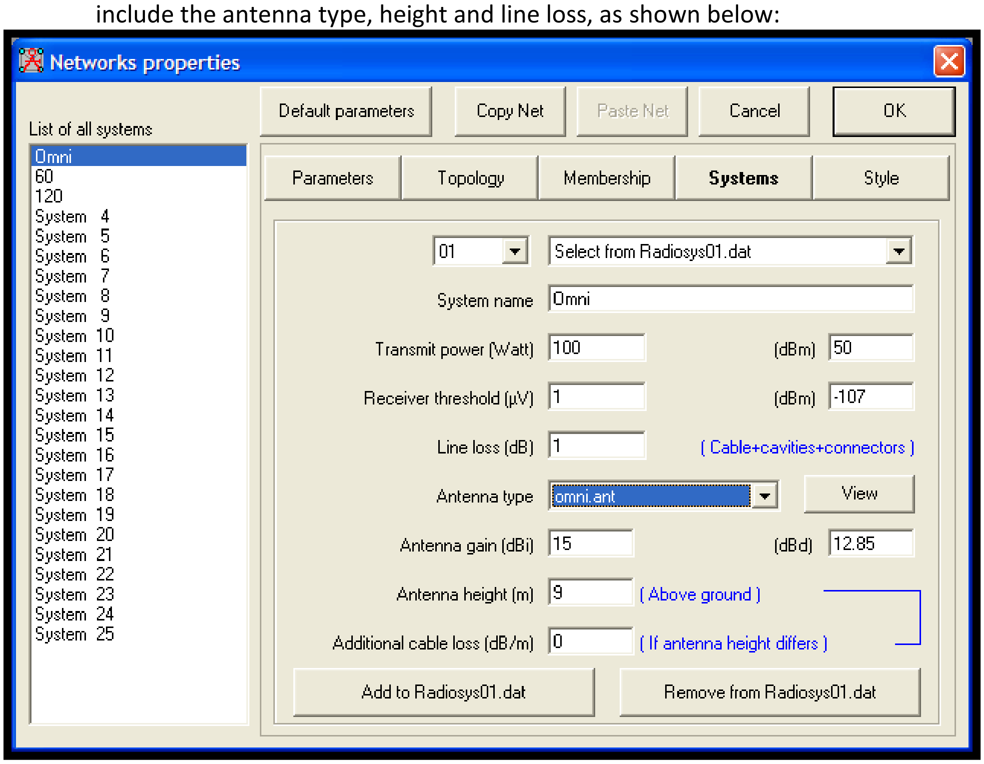


14) Select **File>Network properties** from the main menu.

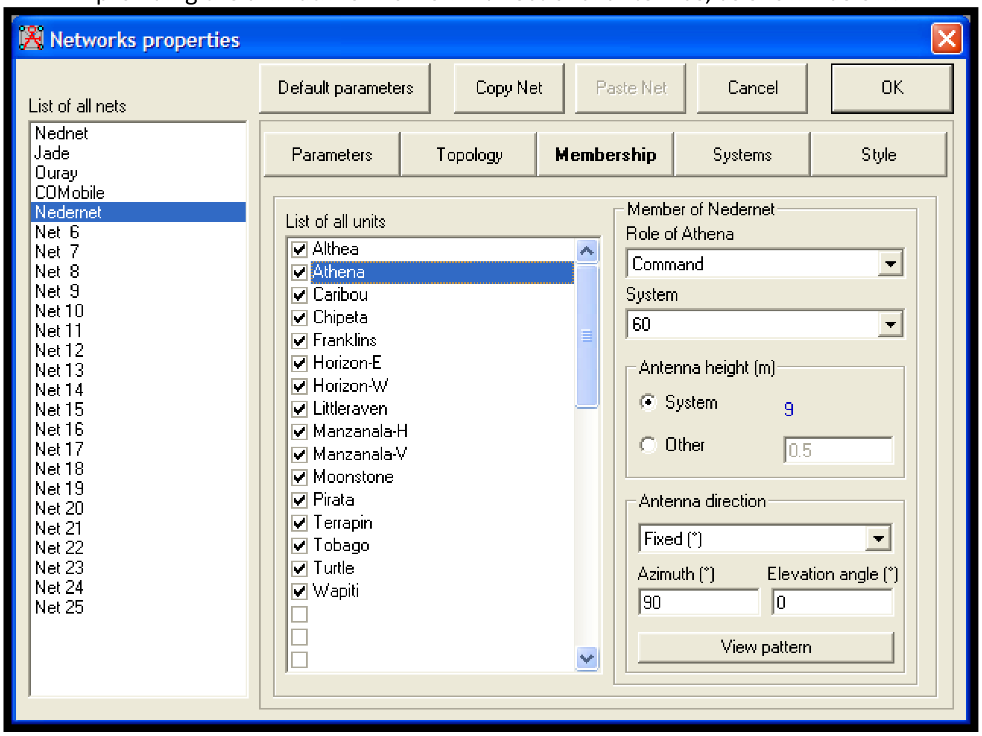
15) Create a new network and enter in the frequency range under the **Parameters** tab, as shown below:



16) Leave all the other values as they appear, and select the **Systems** tab.
17) Create enough systems to cover all the varieties of equipment in the provider network. This will include the antenna type, height and line loss, as shown below:



18) Now click on the **Membership** tab, and assign the individual towers to their respective systems, providing the azimuth for non-omnidirectional antennas, as shown below:

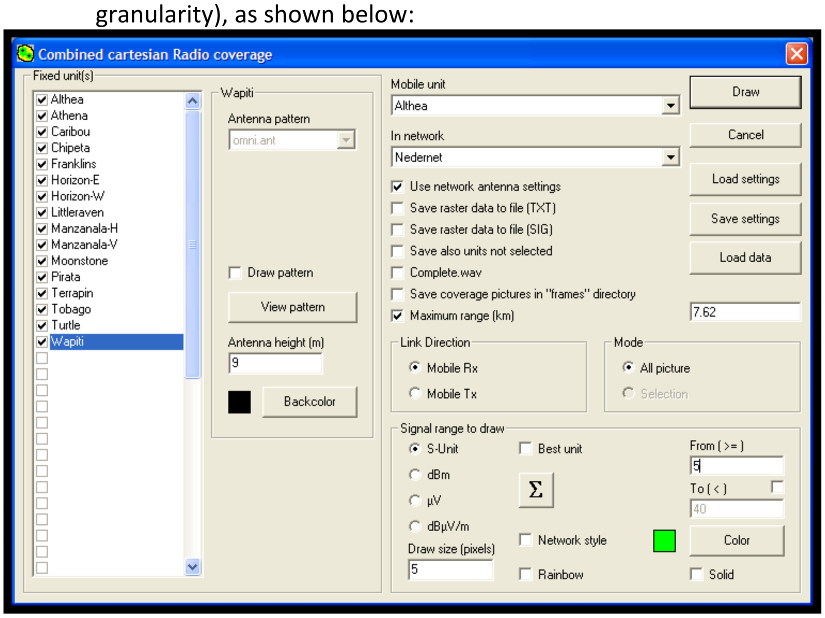


19) Click **OK**.

20) Select **Tools>Radio Coverage>Combined Cartesian** from the main menu.

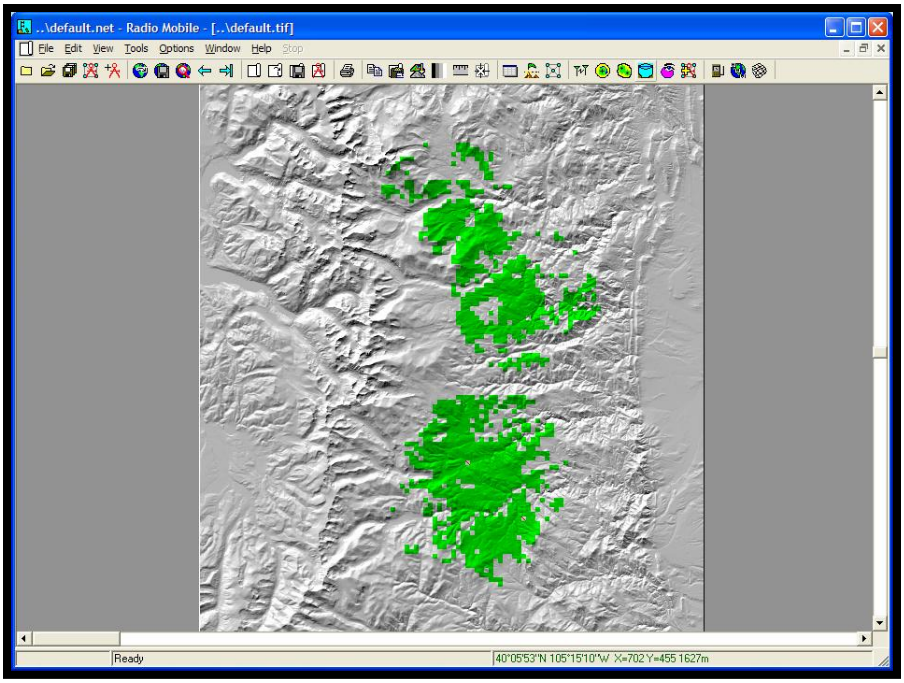
21) Complete the dialog box as shown below, providing the **Maximum Range** from the highest tower beam radius supplied by the provider.

22) Set the **Pixel Size** at 5 (experiment depending on the area covered to get the right level of granularity), as shown below:

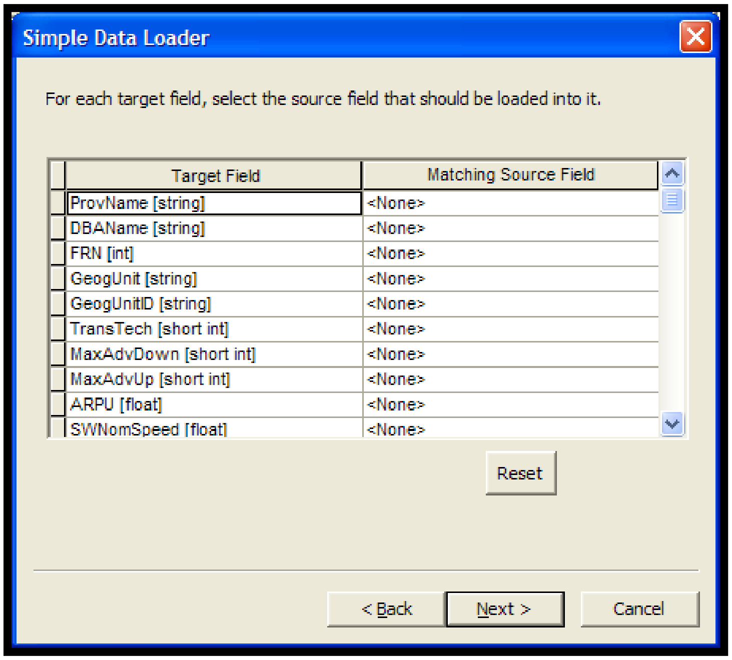


23) Set the **Signal range to draw** to S-Unit and type 5 in the **From (>=)** box.

24) Click on **Draw**. See below.



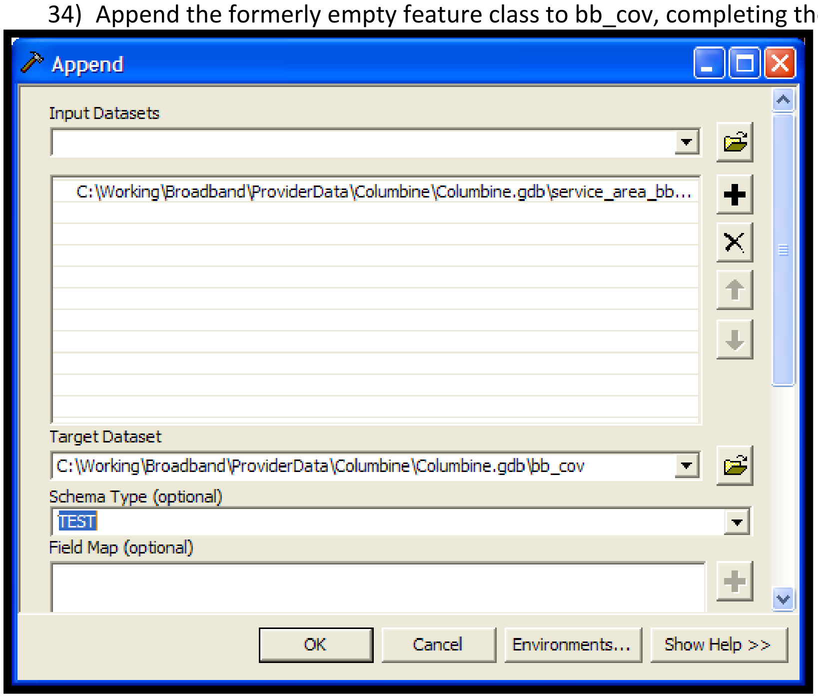
25) Save the resulting image as a TIF by selecting **File>Save Picture as**.
26) Open ArcMap® and load the BIL elevation data you used in Radio Mobile.
27) Load the TIF image you created and georeference it using the corners of the BIL data.
    a. The corners of the data can be seen in the TIF image.
28) Follow the georeferencing directions from the **Coverage Area—PDF/JPG/Other Image Format** section below.
29) Use the **Georeferencing Toolbar** to **Update the Georeferencing** for the TIF dataset.
30) In ArcToolbox®, select **Data Transformations>From Raster>Raster to Polygon** and input the georeferenced TIF you just created, as shown below:
31) Open the resulting polygon feature class for editing using the **Editing** toolbar in ArcMap® and clean up as necessary.
32) In ArcCatalog®, create an empty feature class with the schema of the bb_cov feature class and load the feature class created above into it.
    a. Right-click on the empty feature class, select **Load>Load Data** from the dropdown menu and navigate to the location of the service area feature class.
    b. Click the **Add** button, then click **Next**.
    c. Accept the defaults and click **Next**.
    d. DO NOT attempt to map any fields, as shown below:



e. Click **Next**, then **Next** again, then **Finish**.

33) In ArcToolbox®, go to **Data Management Tools>General>Append**.

34) Append the formerly empty feature class to bb_cov, completing the dialog box, as shown below:



35) Leave the **Schema Type** as TEST.

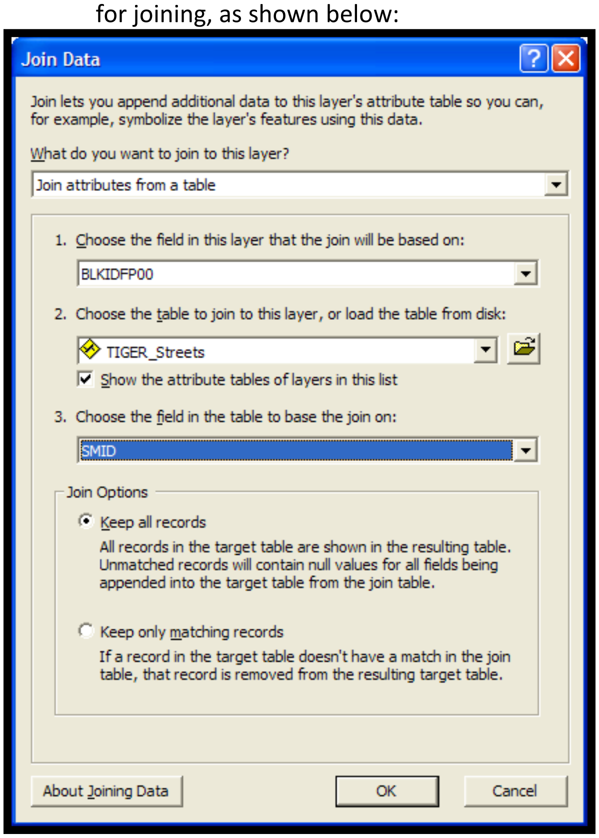
36) Click **OK**.

37) In ArcMap®, open bb_cov for editing and manually input associated attribution.

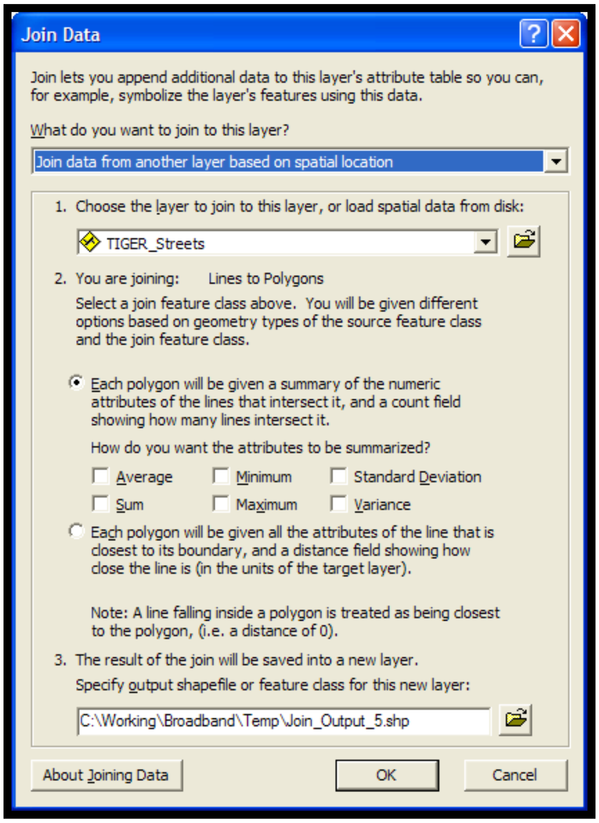
TIGER® STREET SEGMENTS—LIST, SPREADSHEET OR GIS DATA

In the event that the provider supplies TIGER® street segments in list or spreadsheet format, the steps are as follows:

1) Join TIGER® road segments to 2000 census blocks feature class using one of two methods based on how the data is provided:
   a. If the TIGER® data is provided with a Census Block ID, then join the segments to the Census Block geometry based on that ID:
      (i.) Load both datasets into ArcMap®;
      (ii.) In the layer list, right-click on the 2000 census block feature class and select **Joins and Relates>Join**;
      (iii.) In the dialog box, select the TIGER® road segments data and the proper attribute fields for joining, as shown below:



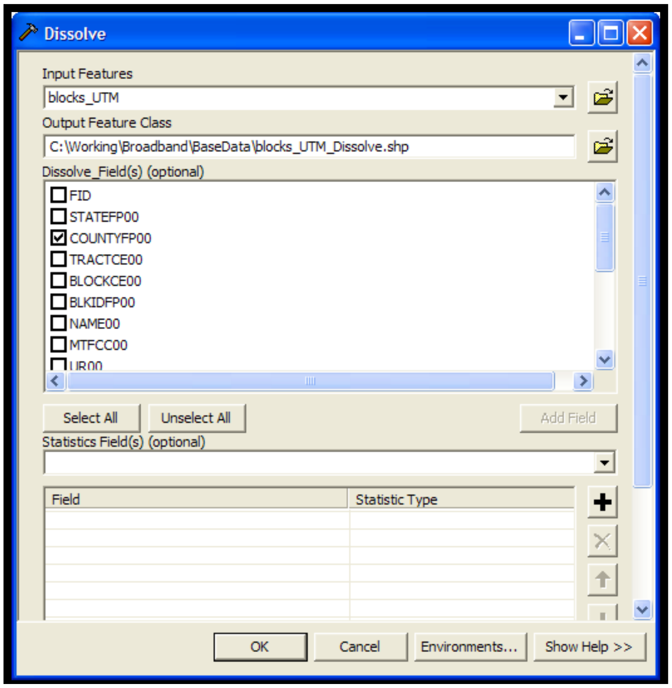
      (iv.) Click **OK**.
   b. If the data provided is a list containing TLIDs, then join to the TIGER®/Line data using the TLID, and use a spatial join to associate the TIGER® segment with the coterminous block based on the block ID:
      (i.) Load both datasets into ArcMap®;
      (ii.) In the layer list, right-click on the 2000 census block feature class and select **Joins and Relates>Join**;
      (iii.) Select **Join data from another layer based on spatial location** from the dropdown menu;
      (iv.) Complete the dialog box, as shown below and click **OK**.



2) Export joined records into a temporary feature class.

3) If joined Census Block geometry is confined to one specific area, then dissolve blocks into one record. If joined Census Block geometry is distributed throughout a particular State, then dissolve sub-selections of census blocks for each county.

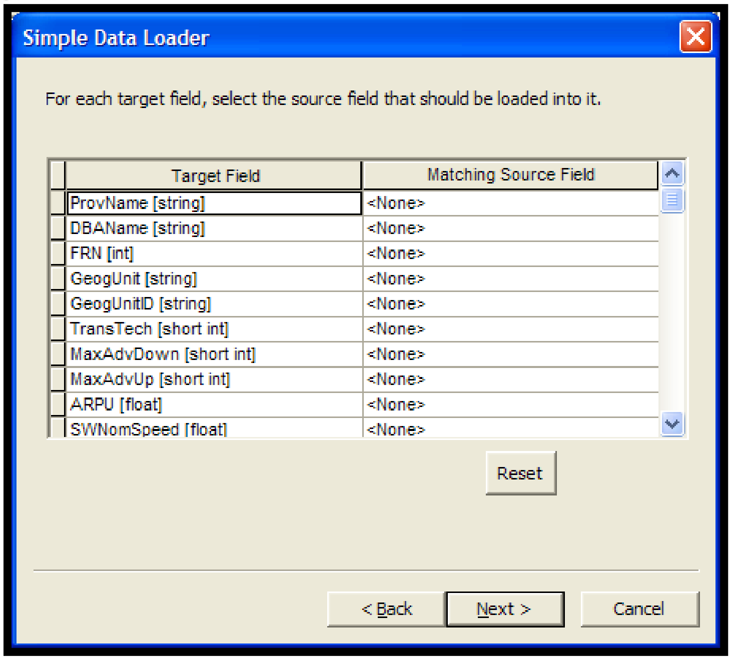
   a. Use the County FIPS code to dissolve by county.
   b. In ArcToolbox®, select **Data Management Tools>Generalization>Dissolve**.
   c. Complete the **Dissolve** dialog box, as shown below:



   d. Click **OK**.

4) For each dissolved region, open the feature class for editing using the **Editing** tool in ArcMap® and remove unnecessary slivers and other small holes. For general guidance on editing features in ArcMap®, see **http://webhelp.esri.com/arcgisdesktop/9.3/pdf/Editing_Tutorial.pdf**

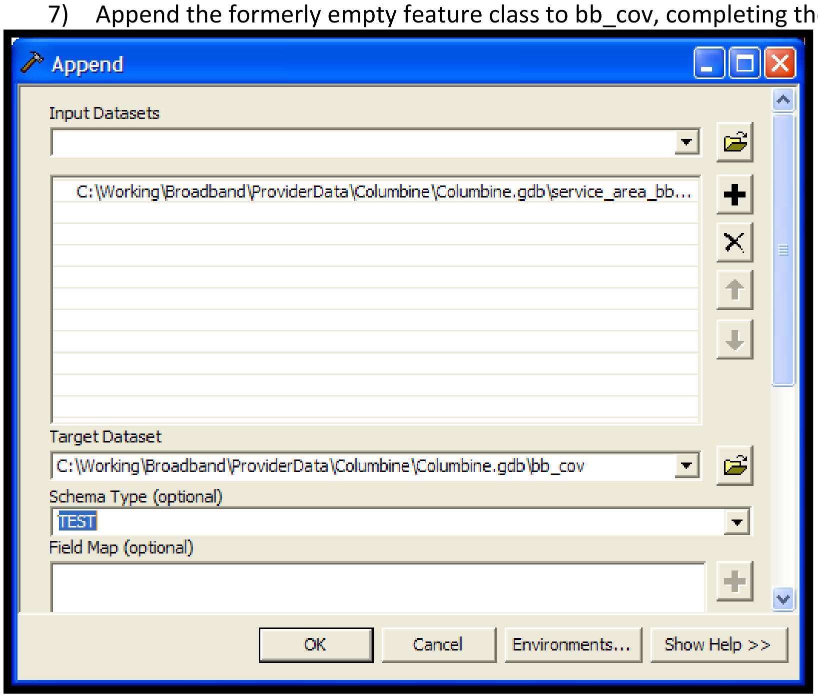
5) In ArcCatalog®, create an empty feature class with the schema of the bb_cov feature class and load the feature class created above into it.
   a. Right-click on the empty feature class, select **Load>Load Data** from the dropdown menu and navigate to the location of the service area feature class.
   b. Click on the **Add** button, then click **Next**.
   c. Accept the defaults and click **Next**.
   d. DO NOT attempt to map any fields, as shown below:



e. Click **Next**, then **Next** again, then **Finish**.

6) In ArcToolbox®, go to **Data Management Tools>General>Append**.

7) Append the formerly empty feature class to bb_cov, completing the dialog box, as shown below:



8) Leave the **Schema Type** as TEST.

9) Click **OK**.

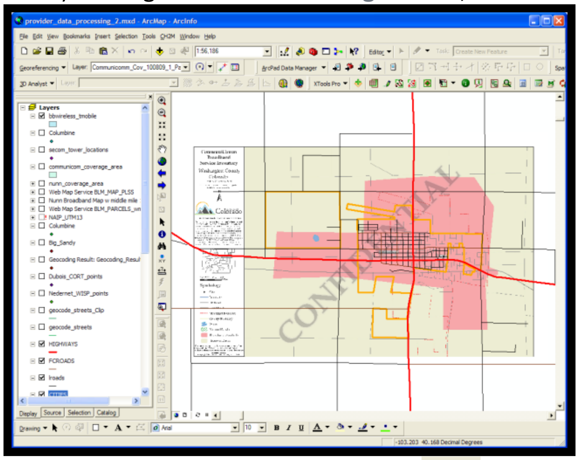
10) In ArcMap®, open bb_cov for editing and manually input associated attribution if necessary.

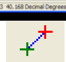
POLYGONAL DATA

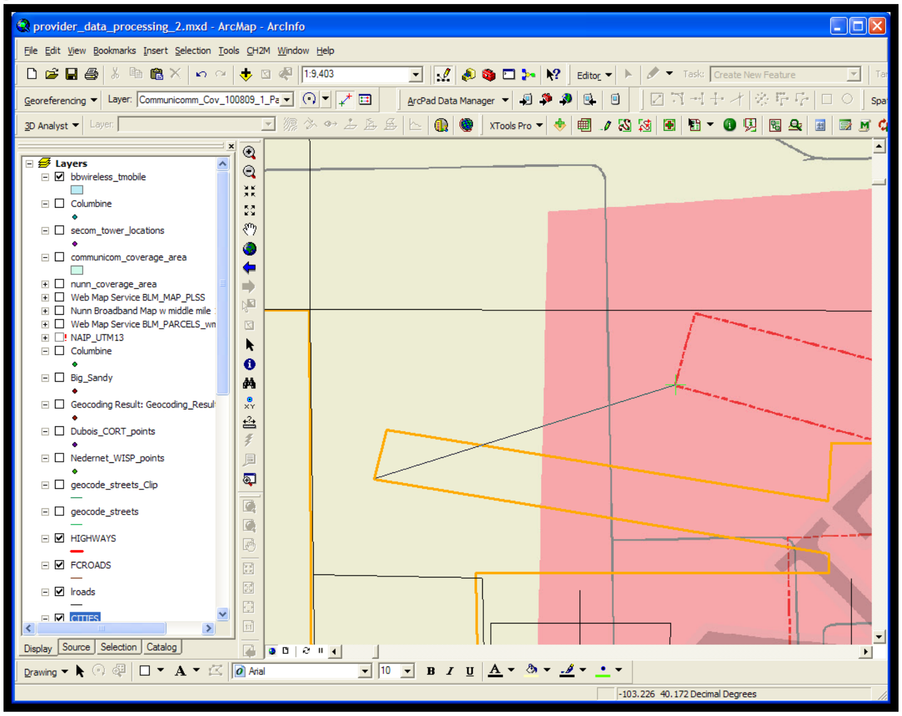
COVERAGE AREA—PDF/JPG/OTHER IMAGE FORMAT

In the event that the provider supplies coverage area data in some image format such as PDF or JPG format, the steps are as follows:

1) If in PDF format, open in Adobe Acrobat and **Save As…** JPG format.
2) Open the JPG image in ArcMap®.
3) Add the required base map vector data for georeferencing.
    a. This generally will be either the CDOT data or TIGER® data.
4) Change the coordinate system of the data frame to the desired end coordinate system.
5) Zoom to the general location of the JPG map image.
    a. This is the location based on the vector data, not the JPG image itself. For example, if you know that the JPG image represents an area around the town of Limon, zoom to the town of Limon in your vector data.
6) Open the **Georeferencing** toolbar by selecting **View>Toolbars>Georeferencing** from the main menu bar.
7) Using the **Georeferencing** toolbar, select **Fit to Display**; results are shown below:



8) Use the **Control Point** button  to add control points to the map.
9) Use common points in the base dataset and the JPG image.
    a. For example, find major street intersections, county/city boundaries, etc.
    b. Try to distribute the points more or less in the four corners on the image for the best transformation.
10) Click on the location on the image first, then click on the corresponding location on the vector database map, as shown in the image below:



11) After placing each control point, the image transformation will update automatically.
12) Repeat until satisfied with the transformation.

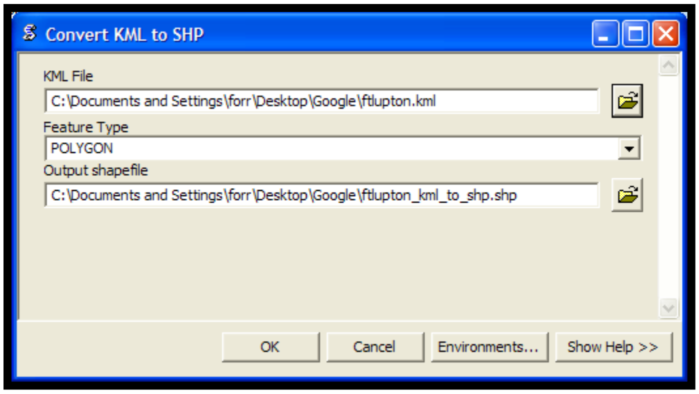
NOTE:
The transformation may take up to four points, although sometimes only two are necessary.

13) When satisfied with the transformation, select **Update Georeferencing** from the **Georeferencing** toolbar dropdown.
    a. This will create a "world" file (.jgw in the case of JPGs) in the same directory as the image file.
14) In ArcCatalog®, create a new polygon shapefile with the appropriate data schema for a provider coverage area, which can be found in Appendix D.
15) Add the shapefile to ArcMap®.
16) Using the **Editor** toolbar, select **Start Editing**. Set the **Task** to **Create New Feature**.
17) Use the **Sketch Tool** to digitize a new coverage polygon using the coverage area outline from the georeferenced JPG and add the required attributes manually.
18) Repeat the above steps for all subscriber speed coverage areas provided.
19) Follow the steps detailed in **Coverage Area—GIS Data** below.

COVERAGE AREA—KML/KMZ

In the event that the provider supplies coverage area data in Google Earth KML or KMZ format, the steps are as follows:

1) Use a KML to SHP converter to translate file into an Esri® format.
2) **http://arcscripts.esri.com/details.asp?dbid=15603**
3) Download the script and follow the provided instructions for installing it in ArcToolbox®.
4) Double-click on the script in ArcToolbox® and navigate to the location of the KML file, as shown below:



5) Add the new shapefile to ArcMap®. Repeat for all KML files provided.
6) Follow the steps detailed in **Coverage Area—GIS Data** below.

COVERAGE AREA—CAD DATA

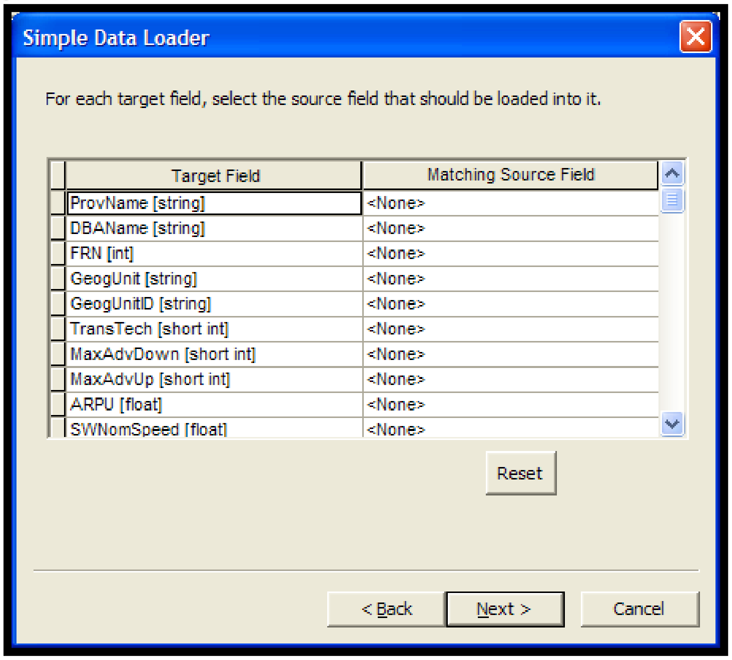
In the event that the provider supplies coverage area data in GIS format, the steps are as follows:

1) Transform the CAD dataset into an Esri® format.
2) **http://webhelp.esri.com/arcgisdesktop/9.2/index.cfm?TopicName=Transforming_CAD_datasets**
3) It may be necessary to contact the provider first to determine the coordinate system of the CAD data.
4) If the CAD data is not in a standard coordinate system, it may be necessary first to use ArcMap® to georeference the CAD data to a known coordinate system.
a) To do so, follow the instructions provided above in **Coverage Area—PDF/JPG/Other Image Format**.
5) In ArcCatalog®, create a new polygon shapefile with the appropriate data schema for a provider coverage area, which can be found in Appendix D.
6) Add the shapefile to ArcMap®.
7) Using the **Editor Toolbar**, select **Start Editing**. Set the **Task** to **Create New Feature**.
8) Use the **Sketch Tool** to digitize a new coverage polygon using the coverage area outline from the georeferenced CAD file and add the required attributes manually.
9) Follow the steps detailed in **Coverage Area—GIS Data** below.

COVERAGE AREA—GIS DATA

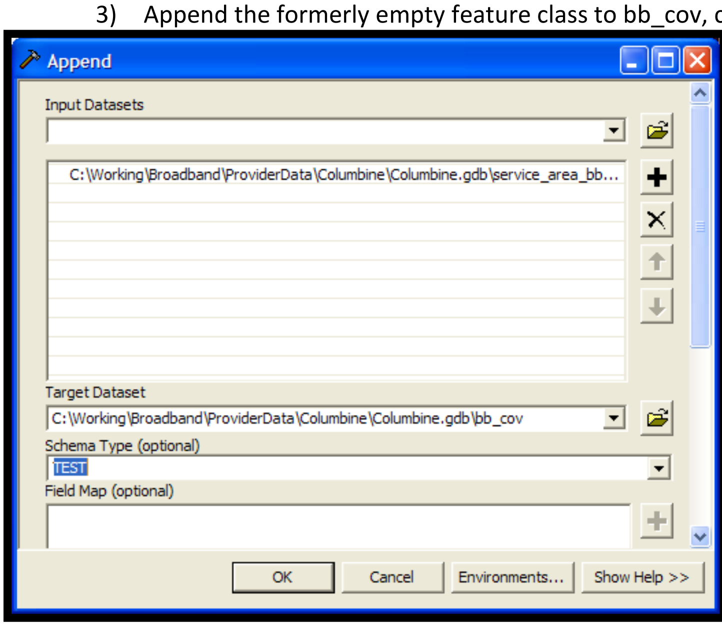
In the event that the provider supplies coverage area data in GIS format, the steps are as follows:

1) In ArcCatalog®, create an empty feature class with the schema of the bb_cov feature class and load the GIS feature class either created above or supplied by the provider into it.
   a. Right-click on the empty feature class, select **Load>Load Data** from the dropdown menu and navigate to the location of the service area feature class.
   b. Click on the **Add** button, then click **Next**.
   c. Accept the defaults and click **Next**.
   d. DO NOT attempt to map any fields, as shown below:



e. Click **Next**, then **Next** again, then **Finish**.

2) In ArcToolbox®, go to **Data Management Tools>General>Append**.
3) Append the formerly empty feature class to bb_cov, completing the dialog box, as shown below:



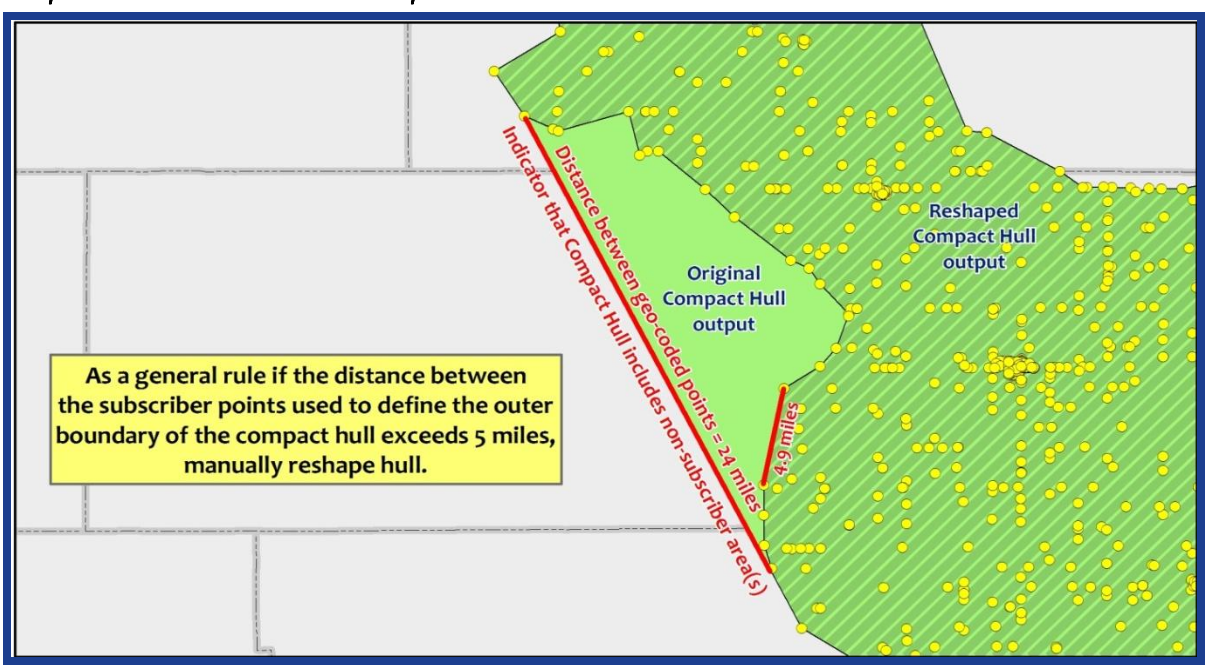
4) Leave the **Schema Type** as TEST.
5) Click **OK**.
6) In ArcMap®, open bb_cov for editing and manually input associated attribution, if necessary.

COMPACT POLYGON FROM SUBSCRIBER POINTS

1) Geocode address list using latest **State Composite Locator**.
2) Verify that your geocoded file has only one TT (Technology Type). If not, export individual geocoded layers for each Technology Type.

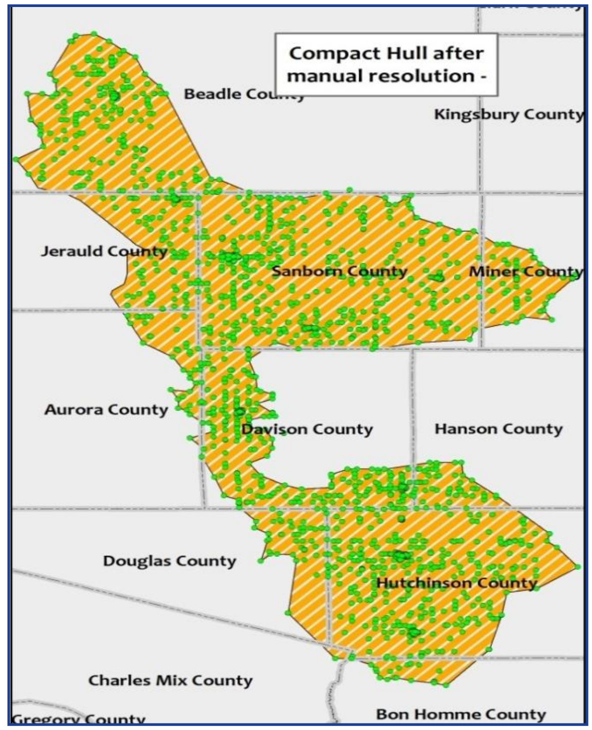
3) For each TT, check for differences in speed values or speed tiers and create separate layers for each speed value/tier.
4) Clean your geocoding results: remove any points that geocode to accuracy levels below ZIP+4 (ZIP centroids, carrier route centroids, etc). Also, verify that outliers with acceptable accuracy levels are legitimate, i.e., fall in correct city and Zip.
5) Perform spatial join between county polygons (using stcnyfips field) and the cleaned geocoded subscriber points in order to carry the county name and stcnty fips.
6) Summarize the number of subscribers by county and use the subscriber counts by county to populate the Rate Tier table.
7) Un-join the county data from the geocode subscribers list.
8) Create Compact Polygon using cleaned geocoded layer or sub-selection of XtoolsPro—ConvexHull-DetailedHull option. A sub-selection of geocoded points will be used in areas where more than one polygon will need to be created for one provider's service area.
9) Evaluate output Hull carefully, looking for areas that should not be covered by hull polygon.
   a. If it is determined that an area or areas should not be represented in coverage area, manually reshape hull polygon until coverage area is adequate.
   b. When not obvious and as a general rule, manually resolve compact polygon when the distance between the subscriber points used to define the outer boundary of the compact polygon exceeds 5 miles . When reshaping the hull polygon, snap to the outermost geocoded points. See the three figures below for examples.

Compact Hull: Manual Resolution Required



Compact Hull: Manual Resolution Required

Compact Hull: After Manual Resolution



10) To attribute the compact polygon, perform a spatial join where your Target Feature Class is the compact polygon and the Join Feature Class is your geocoded point layer. Export compact hull with joined attributes and name file appropriately.
11) Append attributed compact polygon to Broadband TT template Feature Class and, if required, manually input any provider attribution that may not have carried over in the append process.
12) Intersect compact polygon with county boundaries to create unique records by county and use the state-county-fips field to populate stcty_fips field. Also use the county name field to populate the BBCov_Name field.
    a. Exception: where a provider's coverage is distributed throughout more than one area of any given county where the BBcov_Name should be populated using an appropriate city or other logical name based on geographical location.
13) Export/load into appropriate BB TT model dataset.

CENSUS BLOCKS—LIST OR SPREADSHEET

In the event that the provider supplies census block data in a list or spreadsheet, the steps are as follows:

1) Ensure block polygons supplied by the provider are 2000 currency.
2) If other currency, convert to 2000 currency before proceeding.
    a. To do this, remove the trailing letter (a, b, etc.) from the block ID.
    b. You will now have two blocks that equate to one block in the 2000 block geometry.
    c. Delete duplicate block IDs, retaining the higher service tier in each case.
3) Prepare the block list in clean Excel format, removing all Excel-only formatting, merged cells, colors, borders, etc.
4) Import the spreadsheet into ArcMap®.
5) Right-click on the 2000 census block feature class in the layer list in ArcMap® and select **Joins and Relates>Join** from the dropdown menu. Join the census block list to the 2000 census blocks

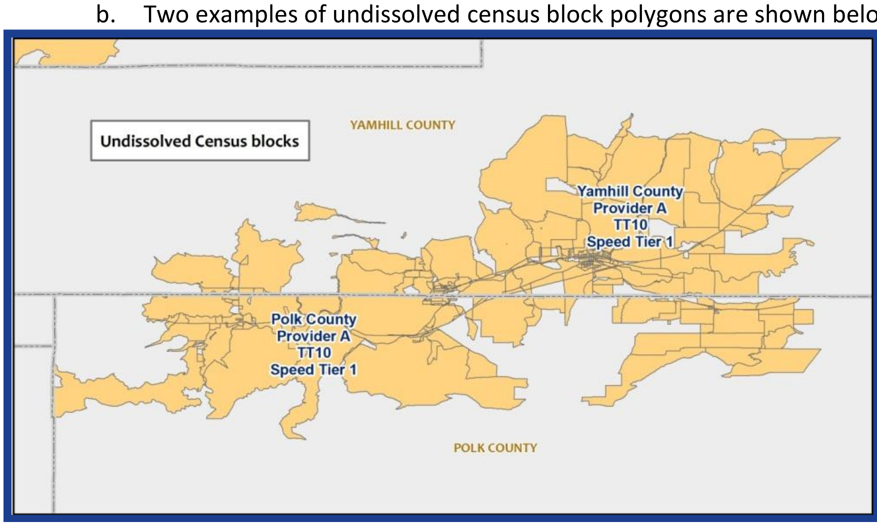
feature class using the block ID and export joined records in a new feature class. The **Join** dialog box and process can be seen above in the **TIGER® Street Segments—List, Spreadsheet or GIS Data** subsection.

6) Follow the steps in **Census Blocks—GIS Data** below.

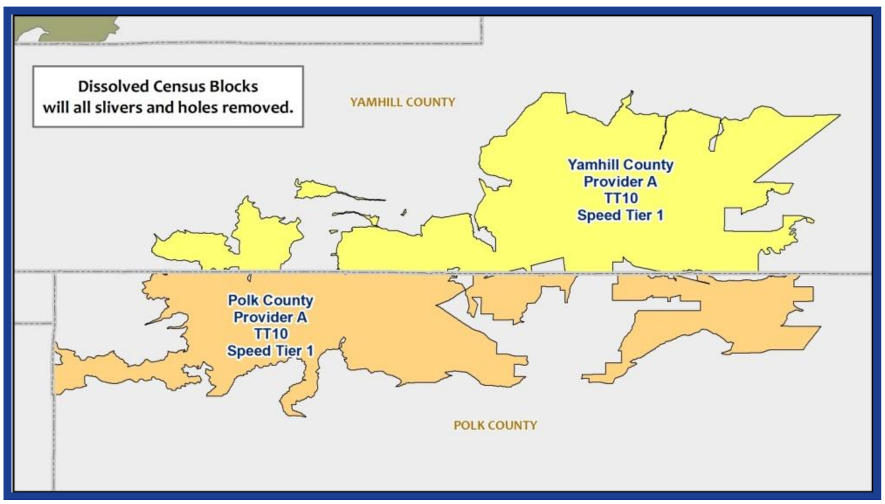
<u>CENSUS BLOCKS—GIS DATA</u>

In the event that the provider supplies census block GIS data, the steps are as follows:

1) Ensure that the blocks supplied by the provider are in the required data schema and are complete as far as required attribution.
   a. If not, manually enter the required attribution or contact the provider to fill gaps.
2) If census block geometry is distributed throughout more than one county, then select **Data Management Tools>Generalization>Dissolve** in ArcToolbox® and dissolve based on County/Provider/TT/Speed Tier so that unique records are created for each unique combination.
   a. The **Dissolve** dialog box is shown above in the **TIGER® Street Segments—List, Spreadsheet or GIS Data** section.
   b. Two examples of undissolved census block polygons are shown below:

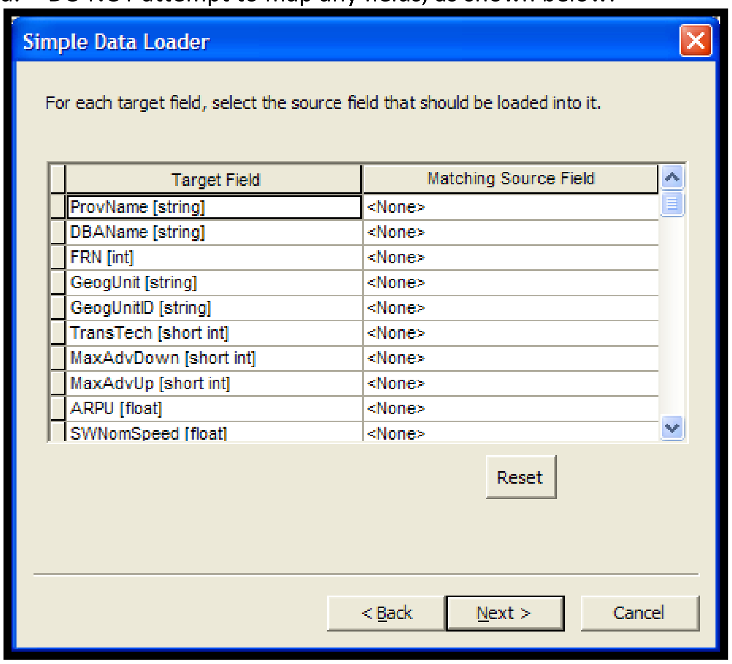


Undissolved census block polygons

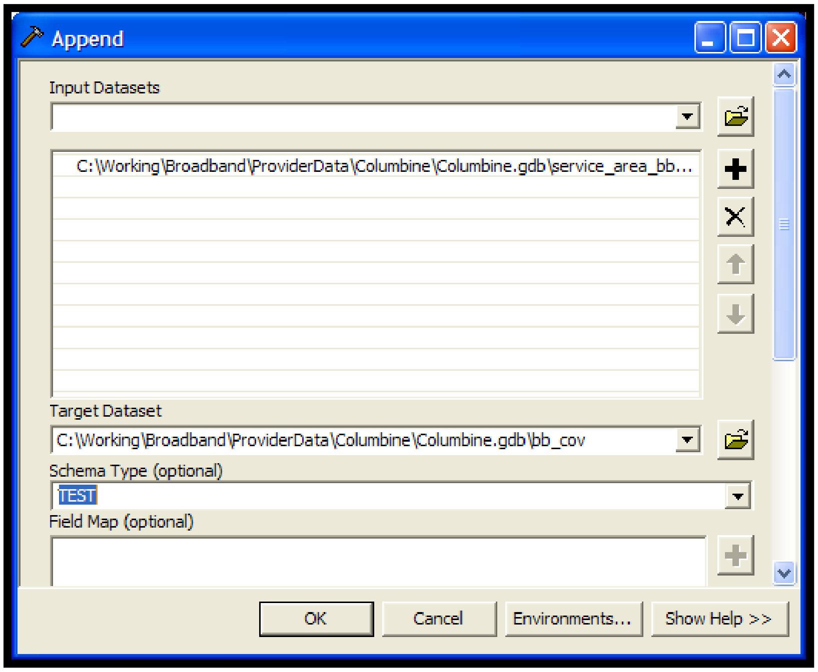


Census block polygons dissolved by county

3) For each dissolved region use the **Editing** toolbar in ArcMap® to remove unnecessary slivers and other small holes.
4) In ArcToolbox®, select **Data Management Tools>General>Merge** and merge the processed polygons into a single layer.
5) The merged census blocks will need to have the subscriber's frn field added and populated.
6) In ArcCatalog®, create an empty feature class with the schema of the bb_cov feature class and load the GIS feature class either created above or supplied by the provider into it.
    a. Right-click on the empty feature class, select **Load>Load Data** from the dropdown menu and navigate to the location of the service area feature class.
    b. Click the **Add** button, the click **Next.**
    c. Accept the defaults and click **Next.**
    d. DO NOT attempt to map any fields, as shown below:



    e. Click **Next**, then **Next** again, then **Finish**.
7) In ArcToolbox®, go to **Data Management Tools>General>Append**.
8) Append the formerly empty feature class to bb_cov, completing the dialog box, as shown below:



9) Leave the **Schema Type** as TEST.
10) Click **OK**.
11) In ArcMap®, open bb_cov for editing and manually input associated attribution, if necessary.

METADATA TRANSACTIONS

Following any updates or changes completed within the file geodatabase (fGDB) stored on the GIS-Analysts staging environment, the GIS-Analyst runs transactions to compare that fGDB with the one stored on the Core server to ensure metadata on all changes is recorded.

The steps taken to run transactions on the updated Core database are outlined below:

1) Open a command line window and run generateTransactions.py:
   a. Usage: **generateTransactions.py [Core fGDB] [Staging Environment fGDB]**
   b. Example of command line:

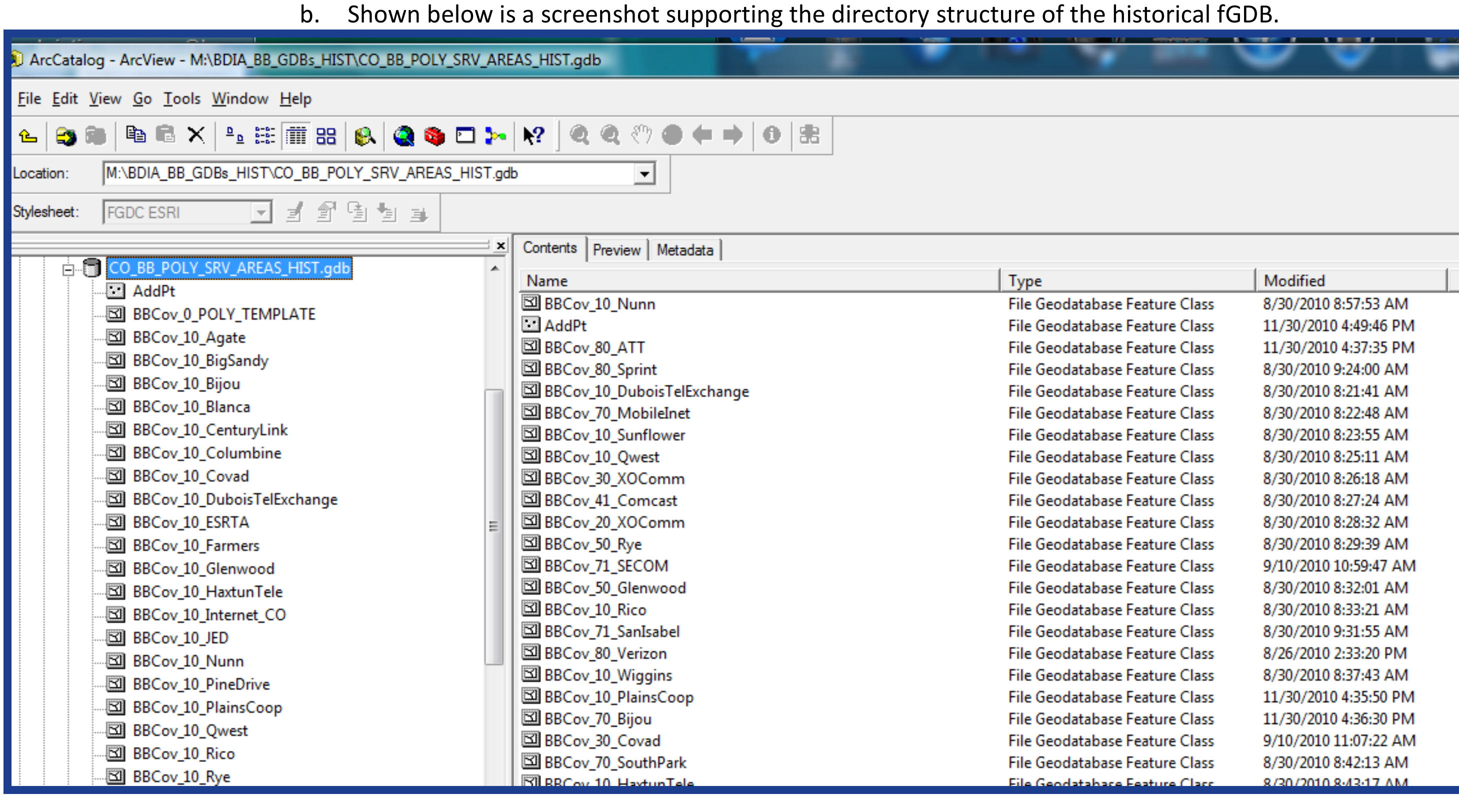
<path>**generateTransactions.py** <path>**ST_BB_POLY_SRV_AREAS.gdb** <path>**ST_BB_POLY_SRV_AREAS.gdb**

2) Shown below is an example of the output screen that will be displayed:

```
-----------  Collecting Transactions  ----------------

Calculating rec_id field for BBCov_0_BB_POLY_TEMPLATE
value can not be 0 or less
Trouble creating the progress meter

Calculating rec_id field for BBCov_10_CenturyLink
%   10   20   30   40   50   60   70   80   90   100
----|----|----|----|----|----|----|----|----|----|      Goal = 8
```

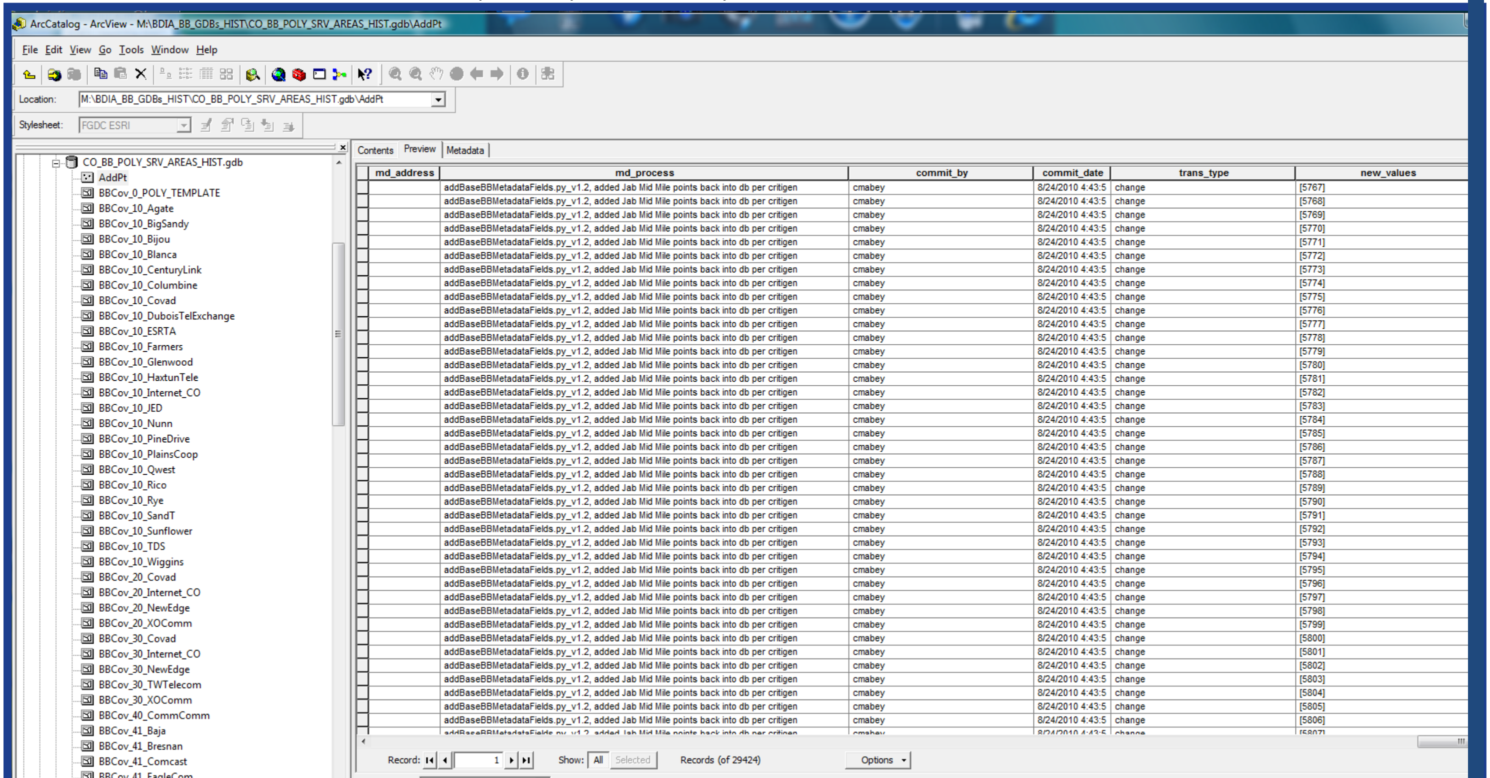
```
Merging change: X:\BDIA_BB_GDBs\MS_BB_POLY_SRV_AREAS.gdb\AddPt
Calculating Transaction fields for AddPt
%   10   20   30   40   50   60   70   80   90   100
----|----|----|----|----|----|----|----|----|----|      Goal = 1
**************************************************
X:\BDIA_BB_GDBs\MS_BB_POLY_SRV_AREAS.gdb\AddPt...changes is complete.

Your transaction FeatureClasses are in:
\\michigan\AllAccess\BDIA_BB_GDBs_HIST\MS_BB_POLY_SRV_AREAS_HIST.gdb
--------------------------------------------------------------------------------
------------
elapsed time = 2994.4 seconds
```

3) After the process has completed, results can be found in the ST_BB_POLY_SRV_AREAS_HIST.gdb:
   a. The transactions scripts records changes at a feature level.
   b. Shown below is a screenshot supporting the directory structure of the historical fGDB.



c. Attribution associated with each added/removed/changed feature is tracked, including the following additional columns appended to the end of each:
   (i.) Commit_by
      (1) Records the GIS-Analyst who committed the changes to the historical fGDB.
   (ii.) Commit_date
      (1) Records the date and time stamp on which the changes were committed.
   (iii.) Trans_type
      (1) This field reflects the type of change recorded;
      (2) Categorized by: Adds/Change/Deletes.
   (iv.) New_values
      (1) Records the new values when a change was completed on a feature. Example: Name or speed change.

d. MD_Process also is transferred from the edited fGDB to the historical fGDB, which states the actions completed by the GIS-Analyst.



DATA PROCESSING

DATA PROCESSING OVERVIEW

The following subsections detail the steps and layout required to process the service provider data further to meet NTIA requirements:

- **Weighted Nominal Speed**;
- **Middle Mile**;

- **Broadband Coverage Template**.

WEIGHTED NOMINAL SPEED

The weighted nominal speed is populated in one of the following two ways: **subscriber data supplied by provider** or **value supplied by provider**.

SUBSCRIBER DATA SUPPLIED BY PROVIDER

Where the data provider supplies subscriber speed information, the following formula from the NOFA is used:

$$\frac{(\text{speed tier-1 in kbps} \times \text{no. of tier-1 subscribers}) + (\text{speed tier-2 in kbps} \times \text{no. of tier-2 subscribers}) + (\text{etc.})}{\text{Total average monthly subscribers}}$$

Data is initially broken up in the following order:

1) Stcty_fips;
2) Transmission technology type;
3) Subscriber tiers.

VALUE SUPPLIED BY PROVIDER

Some providers will supply their weighted nominal speed. In these cases, the data supplied will be populated instead of using the NOFA formula. These obtained or calculated values are used to update the service overview layer.

This can be done manually or by creating a table with the provider's FRN and average weighted speed and joining it to the service overview table in ArcMap®.

1) To join, right-click on the layer to join to and select **Joins and Relates>Join** from the dropdown menu.
2) Then navigate to the table to join to and select the join fields from the dropdown list.
3) Then open the source table (the table in ArcMap®) and right-click on the header of the **Average Weighted Speed** field and select **Calculate Field** from the dropdown menu.
4) Use the value of the average weighted speed from the joined table.

MIDDLE MILE

Middle mile information generally is provided in spreadsheet or text file format. The process is to take what is supplied by the provider and translate it into the required data schema.

1) If the data is supplied with address information, follow the process outlined above in **Subscriber Location—Address Data**.
2) If the data is supplied with associated XY coordinates, follow the process outlined above in **Subscriber Location—XY Data**.
3) Once the data is in GIS format, use the **Append** (**Data Management Tools>General>Append**) command in ArcToolbox® to append the data to the overall middle mile dataset.
4) Set the schema type to NO_TEST and use the Field Map to map the attribute fields from the source to the target dataset.

BROADBAND COVERAGE TEMPLATE

The table below lists descriptions of the fields within the bb_cov layer, which is the interim dataset used to create the final product deliverable.

NAME	ALIAS	DESCRIPTION
objectid	OBJECTID	Internal Object ID
shape	SHAPE	Internal Shape storage
prov_id	PROVIDER_ID	Unique numeric identifier for each provider
prov_name	PROVIDER_NAME	Unique name for each provider
dba_name	DOING_BUSINESS_AS	An alternative "Doing-Business-As" name for the provider
frn	FCC_REGISTRATION_NUMBER	Provider FCC Registration Number
bbcov_name	BBCOV_NAME	BroadMap Broadband Coverage name
trans_code	TRANSMISSION_CODE	Unique code for the transmission technology type described by this layer
trans_name	TRANSMISSION_NAME	Name for the transmissions technology type
trans_desc	TRANSMISSION_DESC	Description for the transmissions technology type
spect_code	SPECTRUM_CODE	Unique code for the spectrum [WIRELESS ONLY]
spect_name	SPECTRUM_NAME	Name for the spectrum [WIRELESS ONLY]
spect_desc	SPECTRUM_DESC	Description for the spectrum [WIRELESS ONLY]
mad_dwn_t	MAX_AD_DOWN_TIER	Maximum advertised downstream speed available within given area (speed tier)
mad_up_t	MAX_AD_UP_TIER	Maximum advertised upstream speed available within given area (speed tier)
typ_dwn_t	TYPICAL_DOWN_TIER	Typical downstream speed available within given area (speed tier)
typ_up_t	TYPICAL_UP_TIER	Typical upstream speed available within given area (speed tier)
mad_dwn_k	MAX_AD_DOWN_KBPS	Maximum advertised downstream speed available within given area (kbps)
mad_up_k	MAX_AD_UP_KBPS	Maximum advertised upstream speed available within given area (kbps)
typ_dwn_k	TYPICAL_DOWN_KBPS	Typical downstream speed available within given area (kbps)
typ_up_k	TYPICAL_UP_KBPS	Typical upstream speed available within given area (kbps)
subs	SUBSCRIBERS	Total average monthly subscribers for this provider for this technology for this coverage polygon
md_geom	MD_GEOMETRY	Metadata: Comma separated list of source ids from which the polygon extent was produced

NAME	ALIAS	DESCRIPTION
md_exists	MD_EXISTS	Metadata: Comma-separated list of source ids used in understanding and editing the provider data for this polygon
md_who	MD_WHO	Metadata: Name of the editor who last edited this feature at the time in md_when
md_when	MD_WHEN	Metadata: Date/time that this feature was last edited
md_process	MD_PROCESS	Metadata: Comma-separated list of processes used to create and/or modify this layer
stcty_fips	STATE_COUNTY_FIPS	State/County FIPS code
rec_id	RECORD_ID	Compound Key formed from STCTY_FIPS+"|"+Provider_ID+"|"+Trans_Code+"|"+BBCov_Name
st_area	ST_AREA(SHAPE)	Area in square decimal degrees
st_length	ST_LENGTH(SHAPE)	Length in decimal degrees
Provider_Type	Type of Provider	Has Subtype (1:Broadband provider as described in the NOFA,2:Reseller,3:Unknown), default value=1 (New 04/11 Model)

VERIFICATION AND VALIDATION

PROVIDER VALIDATION—PROVIDER PORTAL/PDF MAP REVIEW

Following the collection and aggregation of provider data, the aggregated data is validated by the provider to ensure it is an accurate representation of their coverage area and supporting broadband information.

- This validation is completed through the Provider Portal web application, which is a secure interactive map that displays the provider's coverage areas and allows the provider to validate, submit feedback or request changes.
    - If changes are requested, then the features on the portal are updated and an automatic request is sent to the provider to complete the validation process.
- Providers that did not use the Provider Portal are asked to validate a PDF map displaying their coverage area(s). This is accomplished via e-mail notification.

PROVIDER VERIFICATION—THIRD PARTY SOURCE REVIEW

After the provider has validated its coverage areas, a third-party source comparison and analysis is performed.

- Where anomalies or discrepancies are identified, a "SCAN" point is dropped and descriptive comments are applied to be reviewed later with the provider.
- During the provider review, the map is displayed along with the "SCAN" points and potential refinement is completed based on input from the provider.

The table below shows third-party sources used:

THIRD-PARTY SOURCE NAME	SOURCE TYPE	VERIFICATION TYPE
InfoUSA	Consumer and Business Listings	Community Anchor Institutions; Can also be used for demographic information supporting the State websites.
Pitney Bowes (PBBI)	Exchange Info Plus	Exchange datasets are used to verify the following

THIRD-PARTY SOURCE NAME	SOURCE TYPE	VERIFICATION TYPE
	(Central Office Locations)	Transmission Technologies (TT): Asymmetric xDSL (10), Symmetric xDSL (20), Other Copper Wireline (30), and Optical Carrier/Fiber to the End User (50).
Media Prints	Cable Boundaries	Used to verify the following TT: Cable Modem—DOCSIS 3.0 (40) and Cable Modem—Other (41).
American Roamer	Wireless Coverage Patterns (EVDO, GPRS, WISP, HSPA)	Used to verify the following TT: Terrestrial Fixed Wireless—Unlicensed (70), Terrestrial Fixed Wireless—Licensed (71) and Terrestrial Mobile Wireless (80).
ComSearch	Wireless Spectrum Holdings and Tower Data	Used to verify the following TT: Terrestrial Fixed Wireless—Unlicensed (70), Terrestrial Fixed Wireless—Licensed (71) and Terrestrial Mobile Wireless (80).

ASSIGNING CONFIDENCE VALUES

All findings and results from the abovementioned **validation and verification activities**, plus internal peer quality reviews, are captured and tracked in a **Validation table** (see example on the following page) and form the basis of the confidence value assigned for each provider and then each technology.

CONFIDENCE VALUE	DESCRIPTION
0	Coverage area has not been reviewed.
10	Extremely Low: Single Source QC.
20	Very Low: Needs additional validation\verification.
30	Low: Even with validation\verification, coverage still is suspect.
40	Acceptable: Confirm with State prior to shipment.
50	Meets requirements to be included in shipment.
60	Moderate: Meets NTIA/State's standards, representative of Technology Type (TT).
70	High: Accurate representation of coverage based upon TT.
80	Very High: Multiple validation\verification with most third-party sources.
90	Extremely High: Multiple validation\verification sources.
100	Perfect: Multiple validation\verification sources, with complete alignment with sources and ground truth verification activities.

The **Validation table** is maintained as updates or changes occur for each provider, down to technology type, with the overall goal to improve the confidence values and overall map representation. An example of the Validation table is shown below:

Contents | Preview | Metadata

OBJECTID *	BBCOV	CONFIDENCE_CODE	PROVIDER_ID	PEER_QC	PROVIDER_QC	THIRD_PARTY_VERIFICATION	THIRD_PARTY_ID	S	C
1	BBCov_10_Axxis	40	771	11/4/2010	9/27/2010	11/4/2010	3070		Axxis doesn't exist in PitneyBowes exchange data. Geometry and attribution are ok.
2	BBCov_10_BeaverTelCo	80	850	10/18/2010	3/9/2011	6/7/2010	2010		BeaverTelCo tt10 boundary has general shape of overlaying pitneybowes exchange boundary but not a perfect 1:1,030911 confidence raise
3	BBCov_10_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010		Canby Telcom boundary is roughly the shape of two exchanges but not 1:1
4	BBCov_10_CascadeUtil	70	3005	11/4/2010		11/4/2010	3070		CascadeUtil still needs provider validation. This bbcov exists in PitneyBowes exchange boundaries. Areas where they do not correspond s
5	BBCov_10_CenturyLink	70	710	11/4/2010	9/23/2010	11/4/2010	3070		CenturyLink BBCov overlays PitneyBowes exchange boundaries in some places, and not in others. Geometry and attribution represenative o
6	BBCov_10_ColtonTel	80	713	11/4/2010	9/16/2010	11/4/2010	3070		ColtonTel overlays with PitneyBowes Exchange boundary. Where it doesn't a scan pt was dropped. Geometry and attribution are ok.
7	BBCov_10_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070		Covad does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
8	BBCov_10_DataVision	30	767	11/4/2010		11/4/2010	3070		Still needs Provider QC. DataVision does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
9	BBCov_10_EasternOregonTelcom	60	899	11/4/2010	9/20/2010	11/4/2010	3070		Eastern Oregon Telcom does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
10	BBCov_10_Frontier	70	784	11/4/2010	9/16/2010	11/4/2010	3070		Frontier is partially overlaid by PitneyBowes exchange boundaries. Areas of difference have scan pts dropped. geometry and attribution are
11	BBCov_10_Gervais	90	767	10/18/2010	9/22/2010	6/7/2010	2010		Main portion of boundary is general shape of corresponding exchange boundary
12	BBCov_10_Helix	70	726	11/4/2010	9/22/2010	11/4/2010	3070		Helix BBCov resides mostly within PitneyBowes exchange boundary of the same name. Scan Pts dropped where different. Geometry and a
13	BBCov_10_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010		Many BBCov polys roughly align to 3rd party exchange boundaries in areas
14	BBCov_10_McMinnville	60	732	11/5/2010	9/27/2010	11/5/2010	3070		BBCov McMinnville resides wholely within the McMinnville Exchange boundary (in pitneybowes dataset which is attributed as Verizon NW).
15	BBCov_10_Molalla	50	734	10/18/2010	9/8/2010	6/7/2010	2010		Northern part of BBCov roughly aligns to northern part of 3rd party exchange boundary
16	BBCov_10_MonitorCOOP	70	1100	10/18/2010	9/17/2010	6/7/2010	2010		Coverage area larger than overlying exchange boundary but overall shape roughly resembles the exchange boundary
17	BBCov_10_Monroe_Telephone	80	736	10/18/2010	9/20/2010	6/7/2010	2010		3rd party exchange boundary very similar to BBCov
18	BBCov_10_MtAngel	90	707	10/18/2010	3/9/2011	6/7/2010	2010		3rd party exchange boundary very similar to BBCov,030911 provider feedback via portal confirmed geometry and max speed and added typ
19	BBCov_10_Nehalem	80	795	10/18/2010	9/28/2010	6/7/2010	2010		Large portion of BBCov roughly aligns to underlying 3rd party exchange but not all
20	BBCov_10_NorthStateTel	40	738	3/15/2011	3/15/2011	11/5/2010	3070		BBcov resides mostly within the Pitneybowes exchange boundary. Geometry is suspect. Attribution is ok. Provider validated via portal.
21	BBCov_10_OregonTeleCo	20	739	11/5/2010	9/14/2010	11/5/2010	3070		Very generalized bbcov partially overlaying PitneyBowes exchange boundaries. Geometry suspect. Attribution is ok.
22	BBCov_10_People	80	1012	11/5/2010	9/17/2010	11/5/2010	3070		People's BBCov mostly resides within PitneyBowes Exchange boundary of same name. Scan Pts dropped where differ. Geometry and Attrib
23	BBCov_10_PineTelephone	70	757	10/15/2010	3/17/2011	6/9/2010	2010		BBCov area has general shape as underlying exchange boundary here. Coverage areas based off of Census Tracts.,031711 Provider valida
24	BBCov_10_Pioneer	70	740	11/5/2010	9/20/2010	11/5/2010	3070		BBCov Pioneer resides mostly within PitneyBowes exchange boundaries of same name. Scan Pts dropped where differ. Geometry and attri
25	BBCov_10_Qwest	80	1102	11/8/2010	5/7/2010	11/8/2010	3070		BBCov_10_Qwest falls within the extents of PitneyBowes Exchange boundaries, but do not cover 1 for 1. Geometry and attribution are ok.
26	BBCov_10_Rionet	50	807	11/8/2010	9/27/2010	11/8/2010	3070		Rionet (UIDC telecom) doesn't exist in PitneyBowes exchange dataset. Geometry and attribution are ok.
27	BBCov_10_Roome	90	746	10/18/2010	9/10/2010	6/7/2010	2010		3rd party exchange boundary very similar to BBCov
28	BBCov_10_Sandy	60	873	11/8/2010	9/17/2010	11/8/2010	3070		BBCov for city of Sandy does not exist in PitneyBowes exchange dataset. Geometry and attribution are good for TT.
29	BBCov_10_Scio	90	800	10/15/2010	3/17/2011	6/9/2010	2010		3rd party exchange boundary roughly aligns to BBCov in this area,031711 Provider validated coverage confidence high
30	BBCov_10_SCS	60	1030	11/8/2010	9/17/2010	11/8/2010	3070		BBCov for SCS does not exist in PitneyBowes exchange dataset. Geometry and attribution are good for TT.
31	BBCov_10_SCTC	70	803	10/18/2010	9/17/2010	11/10/2010	3070		SCTC TT50 resides within pitneybowes exchange area. Geometry and attribution ok.
32	BBCov_10_StPaulTel	80	750	3/15/2011	3/15/2011	6/7/2010	2010		BBCov roughly aligns to two 3rd party exchange boundaries not perfect 1:1. Provider validated via portal.
33	BBCov_10_TDS	40	752	10/18/2010		6/7/2010	2010		BBCov partially aligns with overlying 3rd party exchange boundary
34	BBCov_10_TransCascade	40	709	11/8/2010	9/21/2010	11/8/2010	3070		BBCov resides in part of PitneyBowes Exchange boundary of the same provider name. BBCov also spills into two other PB exchange areas
35	BBCov_20_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010		Canby Telcom boundary is roughly the shape of two exchanges but not 1:1
36	BBCov_20_ClearCreek	80	712	10/18/2010	9/17/2010	6/7/2010	2010		BBCov area very similar to 3rd party exchange here
37	BBCov_20_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070		Covad does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
38	BBCov_20_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010		Many BBCov polys roughly align to 3rd party exchange boundaries in areas
39	BBCov_20_NewEdge	20	796	11/8/2010		11/8/2010	3070		Still needs Provider Validation. Business Only provider's coverage areas do not exist in PitneyBowes exchange datasets. Geometry and attri
40	BBCov_20_QuantumComm	60	1021	11/8/2010	9/23/2010	11/8/2010	3070		QuantumCom coverage areas do not exist in PitneyBowes Exchange datasets. Geometry and attribution are ok for TT.
41	BBCov_20_Rionet	50	807	11/8/2010	9/27/2010	11/8/2010	3070		Rionet (UIDC telecom) doesn't exist in PitneyBowes exchange dataset. Geometry and attribution are ok.
42	BBCov_30_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010		Canby Telcom boundary is roughly the shape of two exchanges but not 1:1
43	BBCov_30_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070		Covad does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
44	BBCov_30_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010		Many BBCov polys roughly align to 3rd party exchange boundaries in areas
45	BBCov_30_Lightspeed	20	793	11/8/2010		11/8/2010	3070		Still needs Provider Validation. Business Only provider's coverage areas do not exist in PitneyBowes exchange datasets. Geometry and attri
46	BBCov_30_McMinnville	40	732	11/5/2010	9/27/2010	11/5/2010	3070		BBCov is a single record buffered point residing in a Pitneybowes exchange boundary attributed for another municipality and provider. Geom

Record: 1 Show: All Selected Records (of 122) Options

Preview: Table

COMMUNITY ANCHOR INSTITUTION (CAI) DATA

DATA COLLECTION

The CAI data was initially collected from the State to create the baseline inventory. All location information and broadband coverage data supplied also was ingested into the data deliverable. Additional collection of CAI information was done via data mining and/or webscraping to build out the inventory further. For example: Collection of additional CAIs and location information.

The State-agency-provided CAI inventory was comprehensive but the challenge is collecting broadband related data: service provider(s), technology and speed data for each CAI. Availability of the CAI portal has not significantly increased submission of this data. Additional promotion to CAIs to use the CAI portal will be needed to increase this data for subsequent deliverables.

INSTITUTION DATA

Institution data is obtained from a variety of sources and almost always provided in Excel spreadsheet format. The general process for incorporating this data is as follows:

1) If the data is provided in Excel or some similar format:
   a. Clean and standardize the Excel spreadsheet, removing any cell formats, merged cells, etc.
   b. Standardize the address format as defined in the staging CAI database.
   c. If the spreadsheet includes X and Y values, such as latitude and longitude, use the **Add XY Data** tool in ArcMap® to create a spatial data layer.
   d. If there are only addresses, then follow the geocoding steps outlined above to create spatial data points for each of the institutions.
      (i.) Institutions that do not geocode based on the TIGER® 2009 dataset will have to be located manually using Google Maps, Google Earth or some other information source.
2) If the CAI source data is in GIS format, add the Latitude and Longitude fields and use the **Calculate Geometry** tool to populate them, using the WGS 84 coordinate system.
3) Using ArcCatalog®, load the new data into the staging CAI database.
4) This database is ready for the makeDeliverable.py script to process the information into the final State and NTIA deliverables.

COMMUNITY ANCHOR INSTITUTION (CAI) PORTAL UPDATES

A web application has been released to allow for further data collection and validation of anchor institution location information, broadband coverage and speed test data. Information collected from the CAI Portal is then ingested into the overall inventory and will be compared later against the provider coverage areas mapped to locate any potential discrepancies.

PRODUCT EXTRACT

PYTHON SCRIPTS

The following subsections make use of Python scripts. In general, to use a Python script you must have Python installed on your computer. To download the latest version of Python, go to **http://www.python.org/download/** and download the latest stable version. As of August 2010, this was version 2.7. Once this is installed, the general way to run a script is to type the following at a command prompt: C:\Python27\python.exe C:\<location of script>. Many of the scripts provided have environment variables that must be set before they can be run.

The Python code for BroadMap's product extract has been incorporated into a Hudson CI System, which is detailed in the **Process Operation and Monitoring** section of this document. This was a process improvement activity so that all processes can be monitored, controlled and will contain historical tracking on each process.

PRODUCT EXTRACT PROCESS

NOTE:
Specific Python scripts are called out in **red** font in the subsections below.

The MapConnect™ product extract process, makeDeliverable.py, uses the BB_Cov and BROADMAP_POINTS interim datasets to create the following layers according to the current specifications:

- BB_Service_Road_Segment
  - This layer contains all broadband services associated with specific street segments for census 2000 blocks larger in area than two square miles.
- BB_ServiceCensusBlock
  - Contains all broadband services associated with census blocks of no greater than two square miles.
- BB_Service_Wireless
  - This layer contains all wireless services not associated with specific addresses.
- BB_ServiceOverview
  - This layer contains subscriber-weighted nominal speed for each provider's service area at a county level and is meant to act as a summarized view.
- BB_ConnectionPoint_MiddleMile
  - This layer contains middle-mile and backbone interconnection points.
- BB_Service_CAInstitutions
  - Broadband Service at Community Anchor Institutions (CAI).

- Community Anchor Institutions consist of schools, libraries, medical and healthcare providers, public safety entities, community colleges and other institutions of higher education as well as other community support organizations and entities.

Because of a NTIA model change for the October 2010 data deliverable, an addition to this code was created to support both models in case a comparison is later desired or a request is made to revert to the original model. This script name is bdia2ntia.py and creates the following layers in addition to the layers mentioned above, rolled up to NATL_Broadband_Map.

- BB_ConnectionPoint_LastMile
  - This layer contains last mile infrastructure points, which is populated only if data cannot be provided at a more granular level.
- BB_Service_Address
  - Represents broadband availability for service address points. Address Point availability refers to those individual addresses at which each facilities-based provider of broadband service can provide broadband services of minimal characteristics within 7-10 business days.
- State_Boundary
  - State boundary supporting topological validation of point feature classes.
- NATL_Broadband_Topology
  - Supports basic topology quality checking. Example: No CAIs or Middle Mile points outside of the State boundary.

The following process flow provides a view of how the Core fGDB is extrapolated to the NTIA final deliverable via the makeDeliverable.py script. Following that, the bdia2ntia.py script is run, which limits what is placed in the final layers based on the NTIA modeling standards.

The product scripts and supporting extract were originally created separately per request, in case data model comparisons were to be completed.

PRODUCT STATISTICS

Following the completion of a product extract, the product statistics script (BDIA_ReleaseNotesStats.py) extracts the following information supporting that product deliverable.

- Provider Statistics:
  - Collects all provider information, listing by Provider Name.
  - Provides output of FRN.
  - Counts the number of features supported within the following layers:
    - Census Block;
    - Street Segment;
    - Max Upstream;
    - Wireless Services;
    - Infrastructure Points.
  - These updates were made to support the Data Package required to accompany every NTIA product deliverable.
- Community Anchor Institution (CAI) Statistics:
  - Breaks down CAI to the eight categories:
    - 1: School: K through 12;
    - 2: Library;
    - 3: Medical/Healthcare;
    - 4: Public Safety;
    - 5: University/College;

- 6: Other Government;
- 7: Other Community non-government;
- None: Unknown Category. In cases where this occurs, further investigation is completed prior to product shipment to ensure all CAIs are categorized accurately.

- Reports out the following counts:
  - Total CAIs within that category;
  - Total CAIs that contain partial BB coverage. Contains any of the following information for a given CAI: BB Subscriber, Transmission Technology, Speed Down Speed Up;
  - Total CAIs that contain full BB coverage. Contains all of the abovementioned BB information for a given CAI.

The output of this script is two CSV files: AnchorInstitutions.csv and Providers.csv. These files then can be inspected to ensure that there are the expected number of CAIs and providers for every release.

QUALITY ASSURANCE

Quality assurance is supported manually and algorithmically on the interim data, BB_Cov file geodatabase and on the final product. For scheduled product releases, a test product extract and subsequent manual and algorithmic QC run is completed along with a release review. The product specifications, project status reports and previous product release notes are used as references throughout this review.

The following parameters are tested using the methodology listed below each:

- Product Deliverable Format:
  - Correct names and format of data deliverables.
    - BDIA_QC_SUITES (please see below for details).
  - Correct Projections/Datum.
    - Manual interaction with product.
  - Metadata Present and Correct.
    - Manual interaction with product.
- Table Structure:
  - All required tables included.
    - BDIA_QC_SUITES.
  - Extraneous tables identified.
    - BDIA_QC_SUITES.
- Field Structure:
  - All fields included.
    - BDIA_QC_SUITES.
  - Extraneous fields identified.
    - BDIA_QC_SUITES.
  - Correct field names, types and widths.
    - BDIA_QC_SUITES.
- Field Domains:
  - Values in all tables are constrained to the specified values specified:
    - This action is accomplished via BDIA_QC_SUITES and manual review of the product;
    - This tends to identify project completeness issues as fields with a null value are identified.
- Geometric Representation:
  - Identify if all layers have the correct geometric representation:
    - Manual review of the BB_ServiceOverview layer;
    - Dependent on NTIA and client requirements.

- Geographic Extent:
  - Product includes the necessary Geography associated with Product?
    - Manual Review—ArcGIS®.
  - Is there extraneous geography included in Product?
    - Manual Review—ArcGIS®.
- Completeness:
  - Products contain the expected amount of data?
    - Manual review of product statistics relative to weekly State reports and defined expectations.
- Accuracy:
  - Product meets the stated accuracy requirements for the deliverable?
    - Sampling procedure to manually review source material to resulting product;
    - Provider Validation;
    - Verification using Third-Party Data;
    - Verification against reality, where applicable.
- Data Regression:
  - Any unexplainable data loss or change?
    - This action is accomplished by comparing results within product statistics script (BDIA_ReleaseNotesStats.py) from previous releases, as well as manual review of the product.
- Confidentiality:
  - Any unauthorized confidential information included in the delivery?
    - Review of NDAs and delivery expectations.
- Prior Issues Resolved:
  - Have expected internal issues been resolved?
    - Manual review of data against previous product release notes.
  - Have agreed-upon customer issues been resolved?
    - Manual review of data against previous product release notes, status report and client feedback.
- Delivery Medium:
  - Has the product medium been verified?
    - Manual review.
  - All files present.
    - Manual review of SFTP site to ensure all files are copied correctly, including file/directory size.
  - Correct location.
    - Manual review—confirmation of SFTP link, username and password.

QC SUITE

The BDIA_QC_SUITES consists of four main types of scripts supporting the overall QC process. These scripts are all run in concert and are called from the test_runner script and the test_BDIAProductGDB script.

CONFIGURATION

These scripts establish the configuration for the test_BDIAProductGDB script, which is the core of the QC Suite.

update_test_config
active_config
config_PROCESS01_automated
config_PROCESS01_manual
set_active_config

LIBRARIES

These scripts provide additional functionality that is called from with the test_BDIAProductGDB script.
bb_unittest_fixture
bbcov_structure
BC_XmlWriter
file_folder
search_and_replace
unittst_fixture
validate_BB_DB
validate_BB_GDB
xmlrunner_gui

QC SUITE

This is the core script for performing automated QA/QC on the interim and final data deliverables.
test_BDIAProductGDB

OTHER

These scripts perform other functions detailed below:
test_runner—this is the main script that runs all the other QC scripts and imports all the necessary scripts and libraries.
which_build—this determines the current build and passes information to the configuration scripts.

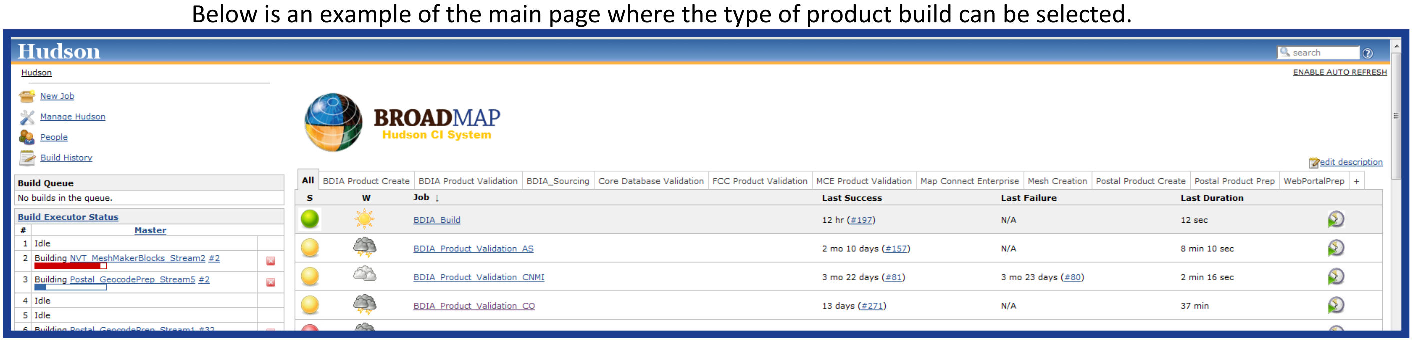
PROCESS OPERATION AND MONITORING

Product Extract, makeDeliverable.py and bdia2ntia.py, is run within BroadMap using a platform called Hudson that has been enhanced to support BDIA product extraction, process monitoring, as well as product validation. The same platform can be planned for implementation for the State, if desired.

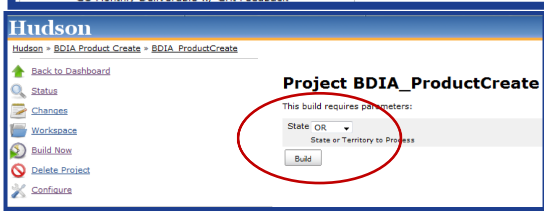
Below are examples of the product create, product validation, product statistics and monitoring processes that are managed within the BroadMap Hudson CI-System. All of the **abovementioned Python scripts**, with the exception of metadata transactions script, are run via this system.

BDIA PRODUCT CREATE

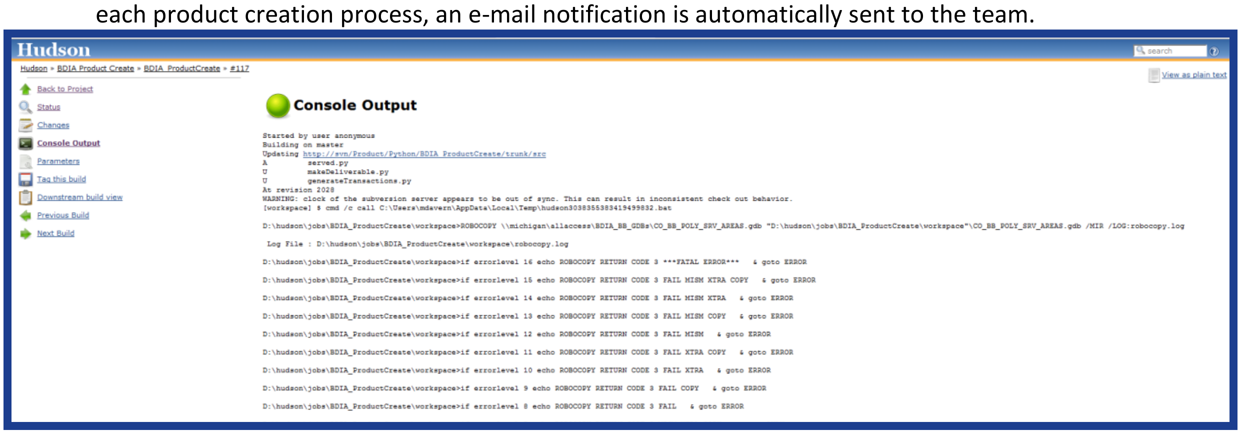
Below is an example of the main page where the type of product build can be selected.



Selecting based on the type of process that will be initiated is shown below:



The Console Output can be reviewed to see the progress of product create. Following the completion of each product creation process, an e-mail notification is automatically sent to the team.



All processes run via the BroadMap Hudson CI-System are stored for historical reporting. Each process can be reviewed, including the Console Output and Build Artifacts from that run.

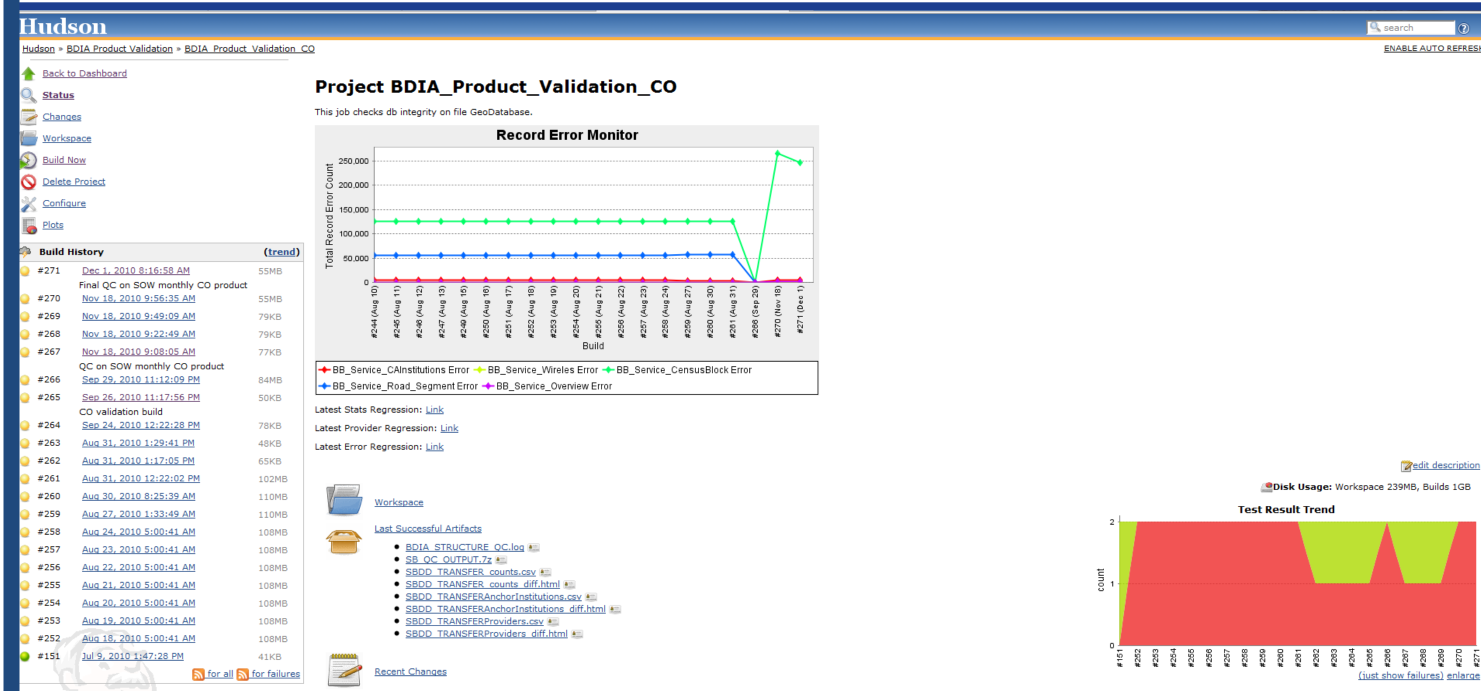
Hudson
search
Hudson » BDIA Product Create » BDIA_ProductCreate » #161
ENABLE AUTO REFRESH
Back to Project
Status
Changes
Console Output
Parameters
Tag this build
Downstream build view
Previous Build
Next Build
Build #161 (Mar 28, 2011 9:44:40 PM)
OR Pre-Release Build
Build Artifacts
bdia2ntia.log
makeDeliverable.log
robocopy.log
Revision: 3099
No changes.
Started by user anonymous
Delete this build
Started 1 day 1 hr ago
Took 3 hr 31 min on Alaska
edit description

PRODUCT VALIDATION AND STATISTICS

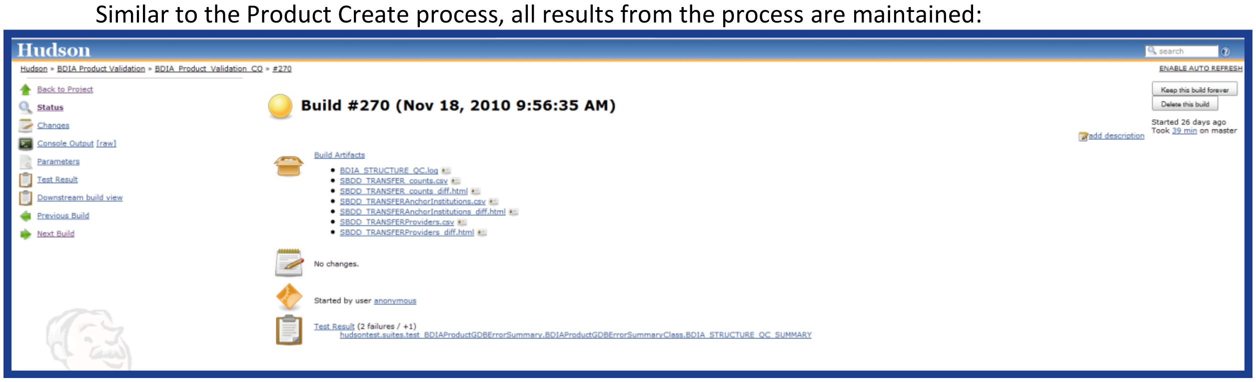
Once the product creation process is complete, Product Validation and Statistics are then initiated. These support the BDIA_ReleaseNotesStats.py script and the BDIA_QC_SUITES scripts detailed above.

All statistics and reports are stored for historical review with the capability to place violation criticality on each quality control check, allowing the identification of errors because of project status/completeness verses project correctness. Example: Typical Speeds populated.

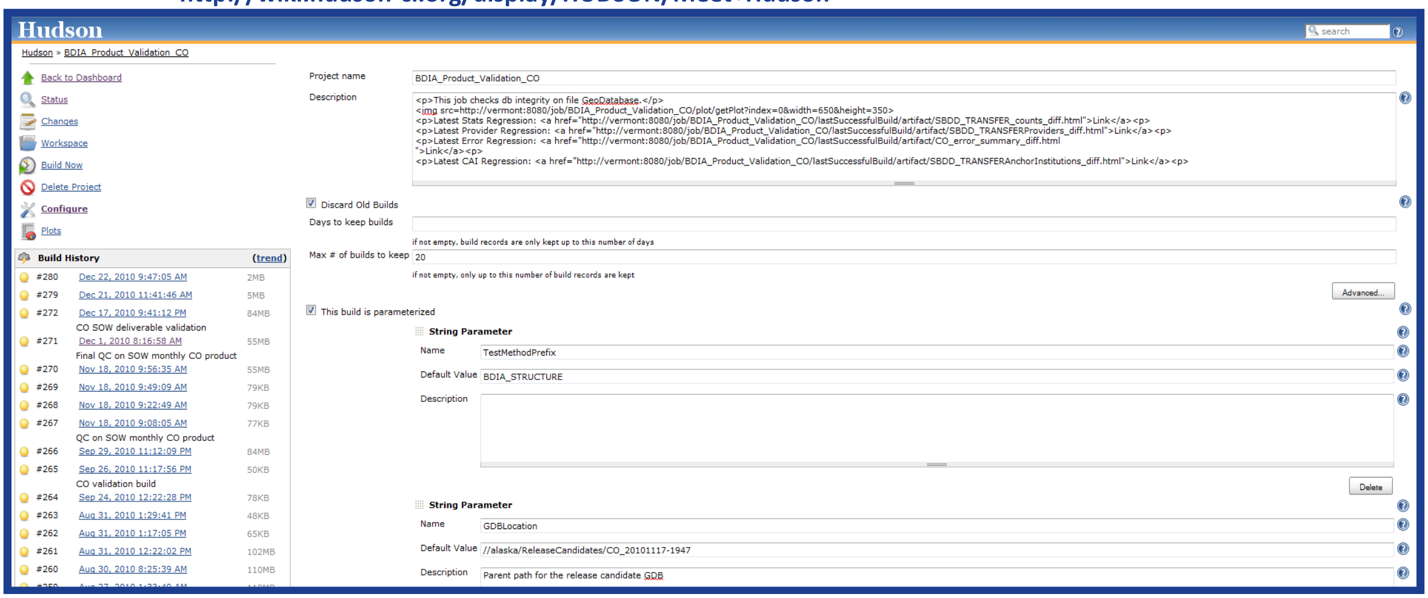
Below is an example of the report provided based on various control points running over a specified period:



Similar to the Product Create process, all results from the process are maintained:



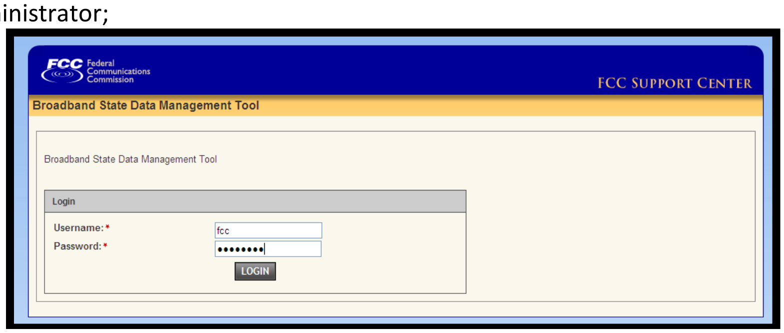
Results are then reviewed manually to ensure no errors reported are critical or in violation of the NTIA data model or project completion statements. Any errors of concern are communicated ahead of product delivery and included within the product release notes. Further detail on the Hudson-CI System environment can be found by navigating to the following link: **http://wiki.hudson-ci.org/display/HUDSON/Meet+Hudson**



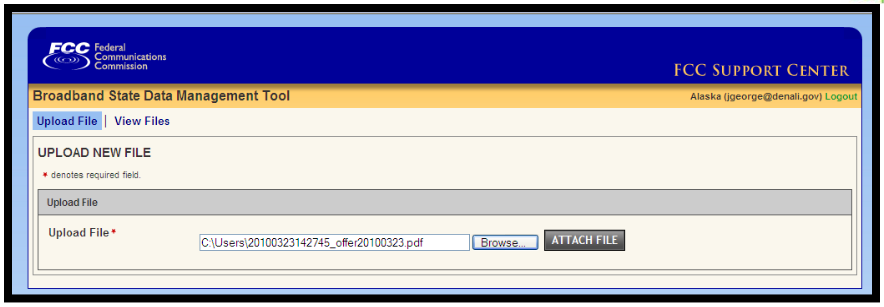
PRODUCT EXTRACT DATA DELIVERY

Product delivery for MapConnect™ Broadband is handled two ways, depending on client requirements:

1) State Submittal:
   a. Data is submitted via SFTP site;
   b. Product Release Notes and QC Test Report accompany the delivery.
2) NTIA Submittal:
   a. Directions for using the NTIA State Broadband Data file submission tool:
      (i.) Go to the following website: **https://esupport.fcc.gov/statedata**;
      (ii.) Enter your **username and password** as provided to you from the NTIA program administrator;



      (iii.) Click in **Upload a file** field;
      (iv.) Browse to local file for submission using the **Browse** button. Select file, then select **ATTACH FILE**. See example below.



(v.) **Logout/Receipt** using the **Logout** button in the top right of the screen;
(vi.) A receipt of submission is e-mailed to username e-mail address.

Methodology Guidance

The white paper should:

1. Effectively describe the deliverable data;
2. Effectively describe the data collection process;
3. Effectively describe the verification process.

1. Data Description Provide a general description / summary of data submission including file names and a brief description of each dataset.

Contents of the data submission folder:

1. Final Geodatabase (HI_SBDD_2011_10_01.gdb)

Description: This data submission follows FCC/NTIA guidelines including Metadata for the project.
The SBDD File Geodatabase contains the following layers:

BB_Service_Address	12 Records
BB_Service_Road_Segment	11,160 Records
BB_Service_CensusBlock	19,720 Records
BB_Service_CAInstitutions	1,173 Records
BB_Service_Wireless	12 Records
BB_Service_Overview	0 Records
BB_ConnectionPoint_LastMile	1 Records
BB_ConnectionPoint_MiddleMile	110 Records

2. Submission Receipt (HI_2011_9_26.txt)

Description: This is the submission receipt from the NTIA receipt tool.

3. Data Package (HI_DataPackage_2011_10_01.xlsx)

Description: This is the NTIA “datapackage.xls” spreadsheet that is used to document the data submission.

4. Changes and Corrections (HI_2011_10_01_Changes_and_Corrections.pdf)

Description: This is the NTIA “Changes and Corrections” document that is used to describe the changes and corrections to the data submission.

5. Whitepaper (HI_WhitePaper_2011_10_01.pdf)

Description: This is the methodology guidance document requested by NTIA to document the data submission. Page 1 of 6 (this document)

2. Provider Participation Provide a summary of provider cooperation (datapackage.xls).

The project team has been collecting and processing broadband data from eleven (11) providers (Oceanic Time Warner Cable, Hawaiian Telcom Communications, Inc., Clearwire Corp., TW Telecom Holdings, Inc., Verizon Communications, Inc., Sprint Nextel, AT&T Inc., MOBI PCS, T-Mobile USA, Inc., Sandwich Isles Communications, Inc., and TrexBroadband, Inc.). These eleven (11) providers account for the overwhelming majority of actual broadband subscribers in Hawaii. The project team has identified a 12th provider as Pacific Light Net, Inc. dba/Wavecom Solutions, but the team has not yet received any data from Pacific Light Net, Inc.

Hawaii Department of Commerce and Consumer Affairs ("DCCA") has encountered challenges in fully executing NDAs with providers and subcontracts under the grant. This has affected the signing of certain NDAs with data providers as well as subcontracts dealing with data processing and delivery. Subsequently, throughout this term, DCCA has experienced some delays in obtaining necessary information. However, to-date DCCA has been able to process data representing the overwhelming majority of broadband providers in the State of Hawaii. – DCCA continues to overcome these challenges through cooperation between the parties and improving process expediency. Nine (9) of the twelve (12) Providers identified have executed confidentiality agreements for data sharing.

Hawaiian Telcom Communications, Inc. and Oceanic Time Warner Cable: Last-mile and middle-mile facility capacity and more specifically backhaul from the facilities has been deemed proprietary. Further, providers maintain that they do not have information documented in a form that they would be able to easily provide. No information regarding this has been shared to-date by these providers. DCCA is working to compel these Providers to furnish more detailed information.

Hawaiian Telcom Communications, Inc., Clearwire Corp., TW Telecom and MOBI PCS did not provide new data updates for the Fall 2011 data delivery. However, TW Telecom and MOBI PCS verified the existing coverage was accurate and there was no need for Fall 2011 data update.

The project team continues to verify these coverage areas and broadband speed claims as well as to collect data from other providers as they are identified.

The most recent iteration of updated and verified mapping data was submitted to NTIA on October 1, 2011 in accordance with the latest FCC/NTIA broadband data model.

3. Data Collection and Integration

a. Primary Data Collection describes the data collection process and list any surveys distributed to retrieve data.

Data was obtained by working with Providers (phone conference calls and email) to get the latest information at the most detailed level possible. The team furnished Providers with a data request including the latest table specifications via email that included the specific information needed for the project. All other terrestrial broadband Providers maintained census block level detail. Wireless providers submitted RF propagation polygons illustrating coverage.

Broadband coverage data for Hawaiian Telcom Communications has been extrapolated as a three-mile buffer from each Central Office location. For every other provider, the DCCA has obtained census block level information and coverage footprints from the wireless providers. Since the data is being provided at the census block level or via a coverage footprint from wireless providers, exact levels of service provided within these boundaries in some cases has been limited to a single tier of service per census block or wireless footprint. TW Telecom has furnished customer addresses which have been geocoded and inserted into the FCC file geodatabase model as appropriate.

No address level detail from any Providers has been submitted for this data submission. For wireless providers, the project team is requesting more detailed RF propagation maps, tower locations, and greater detail on wireless service coverage and technology. Further, the project team will be analyzing and adjusting existing census block data to fit within Tax Map Key (TMK) boundaries in an effort to increase the accuracy of the stated data coverage areas for use on the State's broadband website and for planning purposes.

b. Community Anchor Institutions Summarize Community Anchor Institutions by type, describe your data collection process, and list any surveys distributed to retrieve data.

The baseline Community Anchor Institutions database has been amended, updated and verified. The Community Anchor Institutions database is composed of 1173 points that include:

Schools – K through 12 (public and private)	367
Libraries	56
Medical/Healthcare	212
Public Safety	95
Universities, Colleges, other Post-Secondary (public and private)	44
Other Community Support – Nongovernmental (Hotels,Resorts)	399

The data was collected from various State databases (i.e. Schools, Libraries, Public Safety), and from InfoUSA data downloads. Data was verified by personal telephone calls and information collected from websites. No surveys were distributed. The project team plans to include restaurant lounges, malls and coffee shops with advertised free Wi-Fi in the next deliverable, as well as, continue with telephone verification to obtain more information from CAI's.

For this data submission we collected additional information (speed and provider information) from each CAI. However, individual Public Schools were not able to verify who their provider is or speeds, we were able to obtain this information from the Department of Education. Thus far, all CAI's contacted have been very cooperative in providing information.

4. Validation

a. **Overview Provide a general summary of the validation process and methodology used**.
   See below.

b. Business Logic Rules Define the business logic related to data validation including a clear structure or methodology used.

Data Excluded by Business Rules (Organized by layer)

Broadband_Service_CensusBlock - Total Excluded: 15,586 Census Blocks

- Excluded by Business Rule
    - The block must contain population
        - 8,362 Census Blocks – Hawaiian Telecom
        - 5,823 Census Blocks – Time Warner Cable
        - 414 Census Blocks – TW Telecom
        - 984 Census Blocks – Sandwich Isles Communications
    - Combination business rule for transmission technology speed combinations
        - 3 Census Blocks – TW Telecom

Broadband_Service_RoadSegment - Total Excluded: 823 Segments

- Excluded by Business Rule
    - The block must contain population
        - 734 Segments – Hawaiian Telecom
        - 47 Segments – Sandwich Isles Communications
        - 42 Segments – Time Warner Cable

c. Feedback Loop Describe any outreach to Broadband Providers after you processed their data.

Working with Providers on an ongoing basis to rectify data including the provision of coverage maps.

d. Statistical Models List and describe any statistical models used to compile and analyze the data.

None used to date.

e. 3rd Party Publicly Available Data identify all 3rd party datasets used and describe how they were used to validate the data. (3rd party datasets include American Roamer, Form 477, Form 325, etc.

Info USA used for address validation of CAI's.

Used updated Hawaiian Homelands boundaries.

f. Crowd Sourced Data Identify whether or not crowd sourced data was used and how the data was used for validation.

Hawaii broadband website Ookla tools and FCC Ookla/MLabs speed test results are being collected on a monthly basis.

The project team is implementing the following verification activities:

• Coverage Verification via Website: DCCA launched a dedicated website (hibroadbandmap.org) that contains the latest information on the project as well as a speed and line test application and database for consumers to use. Additionally, consumers are able to report unserved areas on the website. – December 1, 2010.

• CAI Verification by Telephone: DCCA will independently verify access to broadband services by Community Anchor Institutions ("CAI") where no data currently exists via personal contact by telephone. – October 1, 2011.

• CAI Verification by External Data Source Comparison: The project team will be collecting data from InfoUSA to verify the completeness of the CAI inventory. – October 1, 2011.

• Provider Verification via Map Products: DCCA will present the data to the individual providers in the form of a map product, ask them to verify the results visually, and, if necessary, ask them to provide more accurate information if available. – October 1, 2011.

• Speed Test Verification via Website: DCCA will announce the speed and line test application and website for consumers via press releases and newspaper articles to encourage subscriber participation. The database will be maintained throughout the course of the project. – by December 1, 2011.

• Speed Test Verification via FCC Ookla/MLabs: FCC databases are being collected on a monthly basis and integrated into a coverage verification layer that will also appear on the website. – October 1, 2011.

• Provider Verification via Website: Providers will also be able to access the maps of their data through a secure portal on the website. – Ongoing

The project team's status on implementing the following verification activities:

• Coverage Verification via Website: The dedicated website (hibroadbandmap.org) was launched on December 1, 2010 and includes a customized Ookla speed test application and database for consumers to use, as well as, ESRI's BBStat application. – In Progress.

• CAI Verification by Telephone: DCCA has and will continue to verify Community Anchor Institution data via telephone. – In Progress.

• CAI Verification by External Data Source Comparison: InfoUSA data is being downloaded to augment and verify the completeness of the CAI inventory. – In Progress.

• Provider Verification via Map Products: Maps that illustrate coverage gaps are being prepared for provider review. – In Progress.

• Speed Test Verification via Website: The dedicated website (hibroadbandmap.org) launched on December 1, 2010 includes a customized Ookla speed test application and database for consumers to use, as well as, ESRI's BBStat application.– In Progress.

• Speed Test Verification via FCC Ookla/MLabs: FCC speed test data is also being integrated into an independent map layer. – In Progress.

• Provider Verification via Website: Providers will also be able to access the maps of their data through a secure portal on the website. – In Progress.

Note: These verification activities and direct updates from providers are anticipated to continue through the next data delivery date.

In addition, the project team is participating in a program sponsored by Akaku: Maui Community Television on Broadband. Our website Hibroadbandmap.org will be listed on their site and they will be requiring all students to perform daily speed tests using our Site to test as well as theirs. The team will be talking about broadband, the national and state programs and the importance of speed test accuracy. This will be starting in November 2011.

OFFICIAL OCTOBER 2011 UPDATE SUBMISSION TO THE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION UNDER THE STATE BROADBAND INITIATIVE GRANT PROGRAM FOR THE STATE OF IOWA

CONNECT IOWA®

October 1, 2011

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IOWA COVER LETTER

October 1, 2011

Ms. Anne W. Neville
SBI Grant Program Director
National Telecommunications and Information Administration
U.S. Department of Commerce
1401 Constitution Avenue, NW Room 4716
Washington, DC 20230

Dear Ms. Neville:

As the State Broadband Designated Entity, in partnership with Iowa Department of Economic Development, please accept this submission from Connected Nation on behalf of the state of Iowa's State Broadband Initiative (SBI) Grant Program, known as Connect Iowa.

These artifacts should be found to be compliant with the October 1, 2011, deadline for the semi-annual data update and in accordance with the terms of the July 1, 2009, Notice of Funds Availability (NOFA) and all subsequent clarifications pertaining to delivery of state-level mapping of broadband service availability. This packet includes:

Inventory of Deliverables, Connect Iowa: October 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing

Appendix A: 4	n/a	Community Anchor Institutions-Narratives
VII.A.1(a)	n/a	Accuracy and Verification Report
n/a	DataPackage.xlsx	Worksheets of Contact Information, Record Count, and Provider Summary Table
n/a	n/a	List of Changes and Corrections to the Dataset
n/a	n/a	Non-Participating Provider Narratives
n/a	n/a	Broadband Provider Roster and Participation Status

In addition, this data update submission should be found to be compliant with the additional program requirements instituted by the National Telecommunications and Information Administration since the time of the April 2011 SBI data submission for the Connect Iowa program. Specifically, these new requirements are:

SBI Data Transfer Model
The submission of the broadband dataset for October 1, 2011, is contained within the SBI Data Transfer Model as released on the Grantee Workspace on June 30, 2011. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information on each provider as possible.

Additional Submission Guidance
This submission also includes a list of changes and corrections made to the dataset between the April 2011 submission and the October 2011 submission. This represents a summary of why data displays and/or supplied speeds, etc. are different from the previous submission. Changes can include upgrades to infrastructure to allow for higher throughput speeds for customers, an expansion of the service area (e.g. additional fixed wireless towers, recently activated DSLAMs, etc.), or a new provider in the marketplace. Corrections can include revisions to speed tier information that was previously reported incorrectly or the addition of a previously existing provider that has not yet been submitted in a semi-annual dataset.

Another addition in this submission is a narrative describing the data and coverage estimation of a non-participating provider. While Connect Iowa continues outreach to all providers prior to each submission period, the need to submit broadband service data for all providers regardless of their participation is evident as the SBI program continues into this fourth round of data submissions. The submission of this estimated broadband service area for providers that have not supplied data to Connect Iowa is essential in being able to portray a more accurate depiction of the current broadband landscape.

This October 2011 semi-annual data update under the State Broadband Initiative Grant Program continues to demonstrate our dedication to implementing the joint purposes of the Recovery Act and the Broadband Data Improvement Act (BDIA) by gathering comprehensive and accurate state-level broadband mapping data, developing state-level broadband maps, aiding in the development and maintenance of the National Broadband Map, and undertaking statewide initiatives for broadband planning.

Broadband Service Availability — Provider Outreach and Verification

This data update submission under the SBI program includes datasets for approximately 96.08 percent of the Iowa provider community, or 196 of 204 total providers. There are 195 participating providers and 1 additional non-participating provider whose estimated coverage areas have been submitted. Of the 195 participating providers, 48 supplied an update to their network or coverage area(s), while 144 have reported no change. The remaining 3 represent providers who previously supplied data but were non-responsive in the October 2011 update effort; therefore their previous dataset is being put forward as part of this compilation. A complete roster by provider depicting participation status and contact record is contained herein. Of the 8 providers that are not represented in the attached datasets, 6 have refused to participate in the voluntary program or were non-responsive to multiple contact attempts, and 2 providers are currently in some form of progress toward data submission but were not able to submit coverage areas at the time of this submission.

As the aforementioned roster and attached methodology documentation will attest, it is the collective opinion of the Connect Iowa principals that all commercially reasonable efforts were made to account for 100 percent of the known Iowa broadband provider community, pursuant to this semi-annual data update submission.

Connect Iowa has also continued to perform broadband verification activities through several means. In addition to confirmation of service area(s) by each provider, Connect Iowa conducts field validation efforts. To date, 94 (46.08 percent) providers have been validated through field verification activities. Additional details on verification activities are contained within the Field Validation Methodology.

The Connect Iowa website, www.connectiowa.org, continues to serve a prominent role in the outreach and data collection effort. This program asset provides a way for the general public to participate in the process by offering interactive tools for users to test their connection speed, submit broadband inquiries, or contact a program representative.

As an indicator of stakeholder penetration, the Connect Iowa website encountered 2,933 unique visits during this reporting period (17,710 total to date for the life of the grant awarded on January 1, 2010). Additionally, this pronounced Web activity netted 17 broadband inquiries over this same reporting period (190 grant inception to date). The website also provides the BroadbandStat application, which allows the consumer to confirm or dispute the coverage represented on the broadband inventory map. These consumer-initiated actions are facilitated through the Connect Iowa website and the Connect Iowa interactive mapping tool (BroadbandStat) that offer the citizens the vehicles to provide information regarding availability in their respective service area, either in affirmation or contest of the reported data represented in the Connect Iowa mapping artifacts. Since the initial data collection and release of corresponding maps, feedback in the form of broadband inquiries has allowed Connected Nation to identify additional areas that are in need of field validation, which is scheduled as soon as possible.

Community Anchor Institutions

Connect Iowa has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBI NOFA Technical Appendix.

Outreach was conducted during this data update reporting period by Connect Iowa to continue identification of existing, centralized sources for CAI connectivity data. Connect Iowa is coordinating closely with our new client within the Iowa Department of Economic Development to identify new department heads within the state who can assist our program with outreach to all CAI sectors. Additionally, outreach was coordinated to distribute a CAI survey to institutions throughout the state through multiple methods including a customized online survey available on the Connect Iowa website. Connect Iowa will continue to build upon these new relationships being developed over the coming months and utilize its contacts throughout the state to collect data and raise awareness of this project.

During this reporting period a Connect Iowa CAI newsletter has been drafted to assist with outreach and highlight the virtual health technology innovations taking place at Iowa Health-Des Moines. From our work in Iowa, as well as other states, we recognize the great value of this data to future collaboration efforts within the state as well as its value to the National Broadband Map. We plan to continue to bring best practices to the Connect Iowa efforts, along with an investment of both human and technical resources required to reach our goal of increasing the data that is secured and reported as part of this process.

The Connect Iowa program exists to improve data on the deployment and adoption of broadband services and to assist in the extension of broadband technology across all regions of the great state of Iowa, as well as the United States through contribution to the National Broadband Map. We look forward to the continuing work ahead.

Respectfully submitted,

Thomas W. Ferree
Chief Operating Officer
Connected Nation, Inc.

DATA ACQUISITION: IOWA COMMUNITY ANCHOR INSTITUTIONS METHODOLOGY

In this fourth reporting period of the SBI, Connect Iowa, working in close coordination with the state of Iowa, has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBI NOFA Technical Appendix. During this reporting period Connect Iowa has continued to focus efforts on conducting outreach and raising awareness of this important project.

Connect Iowa has continued to identify and process CAI data obtained through an ongoing statewide outreach campaign. Physical address information continues to be augmented through manual sourcing and geocoded by Connect Iowa through ESRI ArcGIS software.

Connect Iowa continues to utilize a customized online survey hosted through SurveyMonkey, with a landing page on the Connect Iowa website that was developed during the first reporting period. This survey, in combination with a customized data-gathering spreadsheet, was distributed to a targeted list of CAI throughout the state. Connect Iowa will continue to use these data-gathering tools for future targeted outreach efforts throughout the coming months leading up to the next reporting period. These materials are customized to fit the CAI categories as defined in the SBI NOFA.

The survey can be accessed at this link using the following password:
http://connectiowa.org/mapping/Community_Anchor_Institution_Data_Collection.php
Password: CAI_IA_3654

Connect Iowa and the state of Iowa have worked closely together during this reporting period to conduct research as part of an ongoing process to identify existing, centralized sources for CAI connectivity data. During this reporting period Connect Iowa conducted an extensive CAI overview to engage a new client contact with the Iowa Department of Economic Development. As a result of this overview, a plan has been developed to engage new department head appointees within the state who represent key CAI sectors. Developing these relationships with these new appointees will be key to assisting with data-gathering efforts leading up to the next submission.

Additionally, Connect Iowa has an ongoing mission to educate CAI throughout the state on the importance of participating in the project. Participation by these institutions will raise awareness about the importance of broadband connectivity and the need to report the requested data for inclusion on the National Broadband Map. During this reporting period Connect Iowa developed and distributed a CAI newsletter to CAI contacts throughout the state across all CAI sectors. This newsletter highlights the CAI, Iowa Health - Des Moines and encourages institutions to share their data by participating in the CAI online survey. This newsletter will continue to be utilized for outreach, will be made available on the CAI page of the Connect Iowa website, and will be updated over the next reporting period.

The greatest challenge with collecting this data continues to be the difficulty in securing CAI broadband connectivity data Connect Iowa will continue its ongoing work with the state of Iowa and continue to educate and coordinate with key organization contacts in an effort to raise awareness of this project among CAI. The Iowa Department of Economic Development will continue to be briefed on the current CAI data and provided information so it can assist with outreach and promotion within the state.

A CAI summary of all processed and submitted data is provided below:

CAI Type	Total	Physical Address	Lat/Long	Technology of Transmission	Download Speed	Upload Speed
K-12	1,851	1,851	1,851	119	119	122
Libraries	562	562	562	313	399	232
Healthcare	143	143	143	40	40	39
Public Safety	1,175	1,175	1,174	72	64	65
Higher Ed Institutions	77	77	77	30	30	30
Other Government	706	706	706	320	265	299
Other Non-Government	3	3	3	3	3	3
Total	**4,517**	**4,517**	**4,516**	**897**	**920**	**790**

SBI Data Submission Methodology

The submission of the broadband dataset for October 1, 2011, is contained within the SBI Data Transfer Model and additional components as released on the Grantee Workspace on June 30, 2011. Connected Nation has reviewed all literature that relates to the release and use of this data transfer model and recognizes that it does not replace or dictate how data is stored, processed, or displayed for the state, as it is meant primarily as a means to transfer the broadband data from all states and territories and populate the National Broadband Map in a seamless fashion. Guidance from the Technical Mapping Guide, as released on the Grantee Workspace on March 24, 2011, was also followed to ensure the completeness and validity of the submission through completion steps and checklists, completing the DataPackage spreadsheet, uploading broadband datasets into the Data Transfer Model, and checking the dataset using the SBDD_CheckSubmission receipt process.

As part of the ongoing review and analysis process, NTIA has requested further information in the submission of the DataPackage spreadsheet. In addition to the information on providers whose coverage and accompanying attributes are submitted in the SBI Data Transfer Model, information on other providers that are considered to be non-viable is also included in the DataPackage. Providers deemed non-viable that have been excluded from continued outreach may have been eliminated for reasons such as (i) the company offers Internet service but at speeds below the current definition of broadband; (ii) the company was listed in advertisements as a broadband provider, but is actually a network solution or consulting firm, etc.; (iii) the company may build or install network infrastructure, but does not actually provide the broadband service to consumers; and (iv) the company has gone out of business. The submitted DataPackage includes any relevant information that has been obtained through the course of due diligence and/or direct provider outreach, such as a Federal Registration Number (if applicable), the company's URL, the existence of an executed Nondisclosure Agreement, and brief notations regarding the status of the company. In addition to the methodologies contained herein, as well as the DataPackage.xls containing contact information, the data dictionary, and a provider summary table, the following feature classes are submitted within the SBI Data Transfer Model for the state of Iowa.

Inventory of Deliverables, Connect Iowa: October 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area.
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles.
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address.
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points.
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing.

The provider data collected by Connected Nation on behalf of the state of Iowa have been formatted per the given specifications and uploaded into the appropriate feature classes of the SBI Data Transfer Model. Wireline availability is contained within census blocks and road segments, wireless availability is contained as polygons of coverage areas, and middle-mile connections and community anchor institutions are contained as point data. All speed data is contained at the census block, road segment, or wireless polygon level of availability. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information as possible.

Connected Nation has continued outreach to satellite providers on their availability, technology, and speed information, but granular coverage is not yet available. Submitted within the wireless feature class are the satellite companies providing service to Iowa as a polygon of the state boundary. Efforts will continue to collect, process, or otherwise create more granular satellite data based on availability analyses and guidance received from NTIA.

Provider Changes and Corrections for October 2011

As requested by the SBI Program Office, a listing of the changes and/or corrections to the datasets between the April 2011 and October 2011 submissions is included in this narrative. This information is presented in this section as well as in the Broadband Provider Log. Changes to the data include expansion of service area(s), activation of new wireless towers, and upgrades to the network to provide higher download speeds to consumers. Corrections to the dataset include the addition of previously existing providers whose coverage has never been submitted, revision of coverage or speed information that was incorrect, and any other items that were misrepresented in the April 2011 dataset.

Changes

- Alliance Communications Cooperative, Inc. (fiber): Provider expanded fiber service area.
- Alpine Communications, LC (DSL): Provider upgraded infrastructure and can now provide speed tier 7 download speeds.
- Atkins Telephone Company (fiber): Provider upgraded infrastructure and can now offer speed tier 8 download speeds.
- Aventure Communications (fixed wireless): Provider expanded fixed wireless service area.
- Baldwin Nashville Telephone Company, Inc. (fiber): Provider upgraded infrastructure and can now provide fiber broadband to parts of its service area.
- Bernard Telephone Company, Inc. (fixed wireless): Provider expanded a portion of its fixed wireless coverage area.
- Bernard Telephone Company, Inc. (fiber): Provider updated infrastructure and can now provide fiber broadband to its entire service area.
- Cedar Falls Utilities (fiber): Provider expanded fiber service area.
- Colo Telephone Company (fiber): Provider upgraded infrastructure and can now offer speed tier 7 download speeds.
- Communications 1 Network, Inc. (fiber): Provider upgraded infrastructure and can now offer speed tier 10 download speeds.
- Corn Belt Telephone Company (fiber): Provider expanded its fiber service area.
- Farmers & Merchants Mutual Telephone Company (fixed wireless): Provider has two new fixed wireless towers in operation.
- Farmers Cooperative Telephone Company-Dysart (DSL): Provider expanded its DSL service area.
- Frontier Communications Corporation (DSL): Provider expanded coverage area.
- Grand Mound Cooperative Telephone Association (fiber): Provider expanded its fiber service area.
- Grand River Mutual Telephone Corporation (DSL): Provider expanded its DSL service area.
- Loganet (fixed wireless): New fixed wireless tower in operation.
- Lone Rock Cooperative Telephone Company (DSL): Provider upgraded speeds but they fell within the same speed tier, so provider still offers speed tier 5 download speeds.
- MidIowa Net (fixed wireless): Provider sent frequency change, but it fell within the previously submitted frequency range that was included in the April 2011 submission.
- Miles Cooperative Telephone Association (DSL): Provider upgraded infrastructure and can now offer speed tier 5 download speeds.
- NetConX, Inc. (fixed wireless): New wireless tower in operation.

- New Ulm Telecom, Inc. (DSL): Provider upgraded infrastructure and can now offer speed tier 5 download speeds.
- North English Cooperative Telephone Company (DSL): Provider upgraded infrastructure and can now offer speed tier 4 download speeds.
- Panora Communications Cooperative (fiber): Provider expanded its fiber service area while also upgrading its infrastructure, and can now offer speed tier 7 download speeds.
- Partner Communications Cooperative (fiber): Provider upgraded infrastructure and can now provide fiber broadband to portions of its service area.
- Preston Telephone Company (DSL): Provider upgraded infrastructure and can now offer speed tier 6 download speeds.
- SpeedNet, LLC (fixed wireless): Four new fixed wireless towers in operation.
- West Liberty Telephone Company (DSL): Provider upgraded speeds but it fell within the same speed tier, so provider still offers speed tier 5 download speeds.
- West Liberty Telephone Company (fixed wireless): New wireless tower in operation.
- Windstream Communications (DSL): Windstream Iowa Communications acquired Iowa Telecom.

Corrections

- DISH Network Corporation (satellite): Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
- East Buchanan Telephone Cooperative (fixed wireless): Provider submitted initial data for October 2011 submission.
- HickoryTech Corporation (DSL): Provider had indicated speed tier 6 in a small portion of its service area, but this has been changed to a tier 4 download speed across its entire service area.
- Hughes Network Systems, LLC (satellite): Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
- Internet Solver, Inc. (DSL): Coverage not submitted in previous datasets; coverage created from data found on provider website.
- Kalnet (fixed wireless): Provider reduced speeds to more accurately represent its infrastructure.
- Knology of the Plains, Inc. (cable): Provider submitted initial data for the October 2011 submission.
- Prairieburg Telephone Company (DSL): Provider previously submitted a technology of transmission code 20, but it was corrected to a technology of transmission code 10 for the October 2011 submission.
- Walnut Telephone Company (DSL): To more accurately represent the provider's DSL service area, the service area was reduced in certain locations.
- Walnut Telephone Company (cable, fiber): To more accurately represent the provider's cable and fiber service areas, the service areas were expanded in certain locations.

- WildBlue Communications, Inc. (satellite): Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.

Changes and/or Corrections – Entirely New Dataset Submitted

- AT&T Inc. (mobile wireless)
- Cable ONE Inc. (cable)
- CenturyLink (DSL)
- Chat Mobility (mobile wireless)
- CoxCom (cable)
- Leap Wireless International, Inc. (mobile wireless)
- Sprint Nextel Corporation (mobile wireless)
- T-Mobile USA, Inc. (mobile wireless)
- United States Cellular Corporation (mobile wireless)
- Verizon Communications, Inc. (mobile wireless)

IOWA FIELD VALIDATION METHODOLOGY

Connected Nation focused a portion of its time on specific validation processes such as:

- conducting random spectrum analysis studies throughout the state using an Avcom PSA-37-XP spectrum analyzer;
- conducting mobile speed tests throughout the state using an iPhone, Android (or other smart phone) as well as provider-specific aircards (Sprint 3G/4G, Clearwire et al);
- identifying pre-selected, provider-submitted wireless transmit tower sites and cross-referencing data about that tower against the Federal Communications Commission (FCC) databases such as Antenna Structure Registration and/or the Universal Licensing System;
- cross-referencing Federal Registration Number data against available FCC Form 477 data as well as the FCC **CO**mmission **RE**gistration **S**ystem (CORES);
- validating provider submitted data (for example: latitude/longitude) using a handheld Garmin eTrex Summit GPS unit or GPS enabled software such as Microsoft Streets and Trips;
- locating physical wire-line attributes (such as Remote Terminals, CATV plant, etc.) and comparing them against provider submitted data; and
- conducting on-net and off-net speed tests using the FCC portal at http://www.broadband.gov/qualitytest/about/ or using the Ookla Net Metrics enabled speed test utility located on each of Connected Nation's state specific websites.

Additionally, Connected Nation cross-referenced numerous public documents in order to ensure that all known broadband providers were located and contacted. This included searching membership logs from the trade associations (WISPA, WCAI, PCIA, etc.), the Cable Television Fact

Book, Public Utility Commission records, Public Service Commission records, Chamber of Commerce, etc.

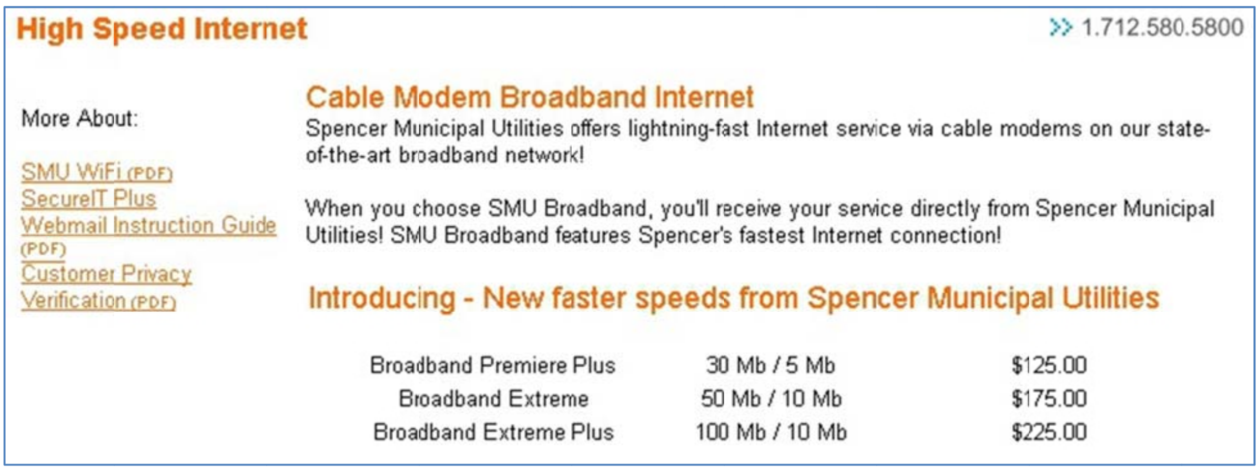
To date, Connected Nation's staff conducted on-site validation tests in Iowa on the following providers: Algona Municipal Utilities; Ambercomm; AT&T, Inc.; Aventure Communications; Ayrshire Farmers Mutual Telephone Company; Brooklyn Mutual Telecommunications Cooperative; Cable ONE, Inc.; Cedar Falls Utilities; Central Scott Telephone; Chat Mobility; Circle Computer Resources; Citizens Mutual Telephone Cooperative; Clarence Telephone Company; Clearwire; Cloudburst 9; Community Cable Television Agency of O'Brien County; Cornbelt Telephone; Cramer IT; Cumberland Telephone; Danville Mutual Telephone Company; East Buchanan Telephone Cooperative; Evertek Enterprises; Farmers & Merchants Mutual Telephone Company; Farmers Cooperative Telephone Company-Dysart; Farmers Mutual Telephone Company-Jessup; Farmers Mutual Telephone of Stanton; Farmers Telephone Company-Essex; Fenton Co-Op Telephone Company; FiberComm L.C.; Frontier Communications Corporation; Goldfield Access Network; Grand Mound Cooperative; Grand River Mutual Telephone Cooperative; Grundy Center Municipal Utilities; Harlan Municipality Utilities; Heartland Net; Hot Spots; I-35 Telephone Company; ImOn Communications; Internet Consulting Services LLC; Iowa Telecom Services; Jefferson Telephone Company; Kalona Cooperative Telephone Company; KDSC, Inc.; KeyOn Communications (d.b.a. Dynamic Broadband); LaPorte City Telephone Company; Laurens Municipal Communications Utility; Lenox Municipal Utilities; Liberty Communications; Logannet; Lone Rock Cooperative Telephone Company; Long Lines; Mahaska Communications Group; Marne Elkhorn Telephone; MCC Iowa LLC (d.b.a. Mediacom Iowa LLC); Mediapolis Telephone Company; MidIowa Net; MidlandsNet LLC; Milford Cable TV, Inc.; Minburn Communications; Muscatine Power & Water (d.b.a. Machlink); Mutual Telephone Company of Morning Sun Iowa; NetConx; Northern Iowa Telephone Company; Northeast Telephone Company; Panora Communications Cooperative; Partner Communications Cooperative; Prairie iNet; Premier Communications; Qwest Corporation; RingTel Communications; River Valley Telecommunications Coop; Royal Telephone Company; Sac County Mutual Telephone; Sharon Telephone Company; SpeedNet LLC (d.b.a. Speed Connect); Spencer Municipal Utilities; Sprint Nextel Corporation; Sully Telephone Association; Superior Telephone Cooperative; Terril Telephone Cooperative; T-Mobil USA, Inc.; Traer Municipal Utilities; USA Communications (d.b.a. Farmers Mutual Telephone Cooperative-Shellsburg; Van Buren Telephone Company, Inc.; Verizon Communications, Inc.; Villisca Farmers Telephone Company; Walnut Telephone Company; Webster-Calhoun-Cooper Telephone Association; Wellman Cooperative Telephone Association; West Liberty Telephone Company; Western Iowa Telephone Association; Woolstock Mutual Telephone; and WTC Communications, Inc.

From program initiation through this reporting period, Connected Nation has completed in-the-field validation testing against 94 companies (out of a universe of 204 viable providers) totaling 46.08 percent within the state of Iowa.

Connected Nation has also continued to review provider datasets for accurate speed information, platform listings, and other intricacies that may fall outside of the standard SBI Data Transfer Model parameters. Any providers whose submitted coverage and attributes are anticipated to come into question have been further reviewed and confirmed; details on a case-by-case basis are presented below.

Mediacom
Issue: Cable platform with a maximum advertised download speed in tier 10, higher than expected value range for the technology.
Resolution: Provider representative confirmed availability of speed tier 10 service.

Spencer Municipal Utilities
Issue: Cable platform with maximum advertised download speed in tier 10, higher than expected value range for the technology.
Resolution: Provider's website advertises cable service at 100 Mbps; screenshot available below.



WTC Communications
Issue: Technology of transmission 40 with a maximum advertised download speed in tier 4, lower than expected value range for the technology.
Resolution: Input from provider on the technology listing and corresponding speed tier was not received prior to the submission; dataset submitted as-is and work will continue to confirm information in dataset for April 2012.

DATA SUBMISSION AND COVERAGE ESTIMATION OF NON-PARTICIPATING PROVIDER

Internet Solver, Inc.

As part of its ongoing broadband mapping efforts, Connected Nation (CN) has developed a series of processes with the goal of submitting mapping data to NTIA for every known and qualifying broadband provider, regardless of whether the provider has chosen to support and participate in the SBI mapping initiative.

The following narrative provides detail regarding the recent data collection activities related to Internet Solver, Inc., a DSL provider, located in Urbandale, Iowa, with service areas in Dallas and Polk Counties. The narrative will include information regarding how and where CN obtained publicly available data and will perform the on-the-ground validation techniques after the October 2011 submission has been completed for inclusion in the April 2012 submission.

Background

CN staff members have continued trying to obtain participation of the provider with 3 instances of communication via telephone and e-mail sessions since July 27, 2011, through August 22, 2011. Only one e-mail reply was received from a company representative on August 22, 2011, with a response of electing not to participate. A CN staff member will visit the Internet Solver, Inc. office after the conclusion of the October 2011 submission to discuss the broadband mapping project in person with Internet Solver, Inc. and will include the results of that visit in the April 2012 submission.

The Issue

Internet Solver, Inc. has indicated its unwillingness to participate in the Iowa broadband mapping initiative.

Identification of Provider's Service Plans, Service Area, Legal Name, d.b.a., FRN, and Licensing

CN began building a file based on information obtained from a spokesperson of the provider as well as research information and, as time progressed, enriched the file with information obtained through the public domain. For example, CN reviewed the provider's website, www.internetsolver.com, to determine the residential service plans **(Exhibit A)** and the service area **(Exhibit B)** of the provider's network. A search for a Federal Registration Number ("FRN") on the FCC **CO**mmission **RE**gistration **S**ystem ("CORES") system yielded an FRN of 0015518053 **(Exhibit C)** with contact information relative to the owner of the company. Exhibits A, B, and C are presented on the following pages.

Exhibit A: Service Plans

INTERNET SOLVER PREMIER DSL INTERNET ACCESS

Premier DSL coverage is provided by installing our own DSL equipment in the telephone office that services your home or business. This allows us to offer speeds and capabilities that no one else does.

You can use our online qualification system to instantly see which services are available to you!

The Premier service includes all of the benefits of the Standard service, plus additional benefits.

- Unsurpassed Speed and Coverage
- No telephone service required
- Free Installation
- Free Technical Support
- Effective Spam Filtering
- Free Modem Rental
- 30-Day Satisfaction Guarantee

Due to the nature of the advanced technology used to deliver these services, the coverage area is different than the Standard DSL service. All of our DSL services include free onsite installation for one computer. This is a $99 value for free!

The pricing reflects a 1-year contract term with automatic payment from a credit card or checking account.

Home DSL Service		
This service includes an email account, free modem rental, spam filtering, technical support, and free installation.		Per Month
Speed	16-24 Meg	$100.00
	11-15 Meg	$90.00
	8-10 Meg	$80.00
	5-7 Meg	$60.00
	3 Meg	$45.00
	1.5 Meg	$40.00
	256 K	$30.00

Business DSL Service		
This service includes a static IP address, free modem rental, technical support, and free installation.		Per Month
Speed	16-24 Meg	$110.00
	11-15 Meg	$100.00
	8-10 Meg	$90.00
	5-7 Meg	$80.00
	3 Meg	$55.00
	1.5 Meg	$50.00
	256 K	$35.00

Internet Solver offers three types of DSL service to meet the differing needs of our clients.

Exhibit B: Service Area

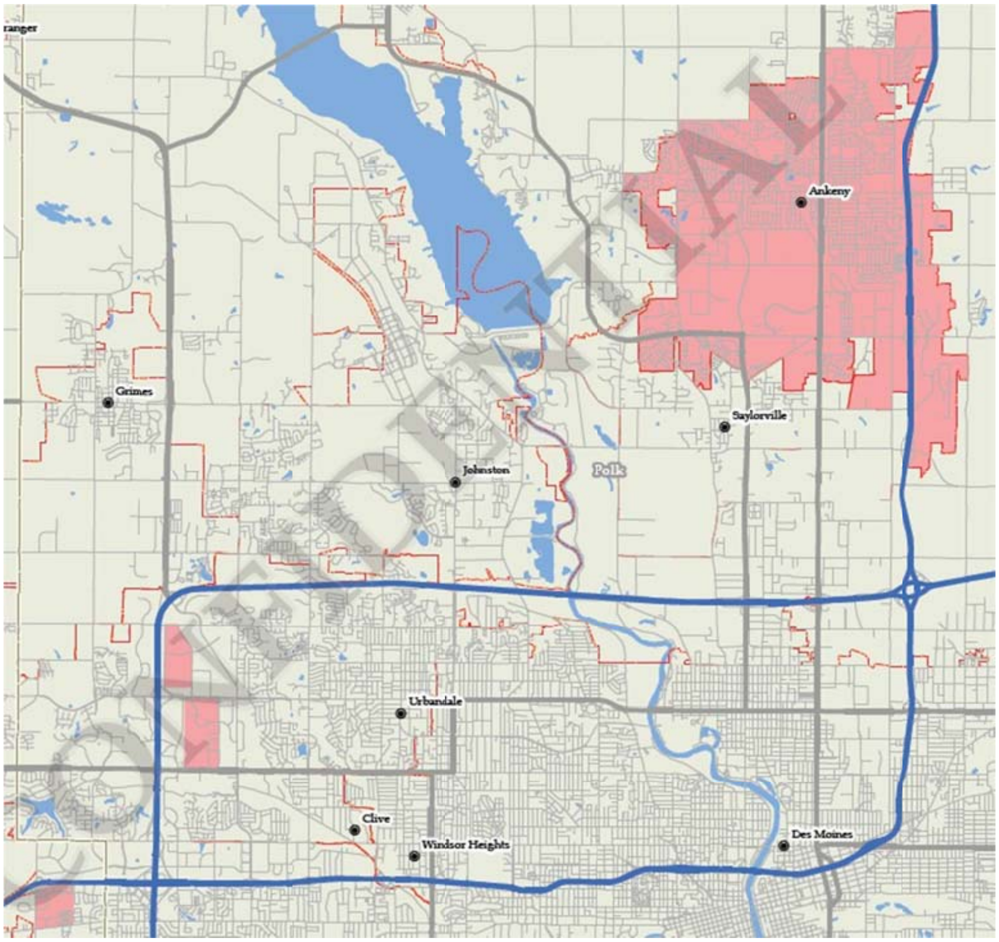


Exhibit C: Federal Registration Number

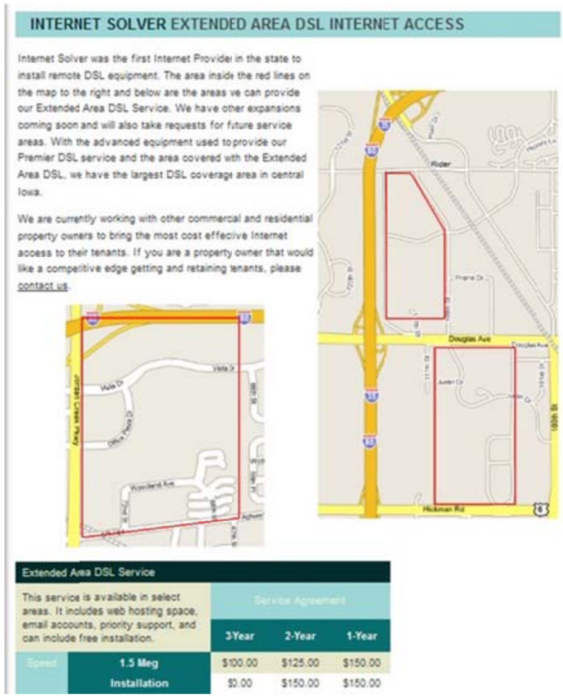
Registration Detail

FRN:	0015518053
Registration Date:	09/19/2006 11:28:00 AM
Last Updated:	09/19/2006 12:02:00 PM
Business Name:	Internet Solver, Inc.
Business Type:	Private Sector , Corporation
Contact Organization:	Internet Solver, Inc.
Contact Position:	President
Contact Name:	Mr David J Weis
Contact Address:	1129 42nd Street Des Moines, IA 50311 United States
Contact Email:	djweis@internetsolver.com
ContactPhone:	(515) 224-9229
ContactFax:	(515) 224-0829

Preliminary Identification of Provider's Coverage Area

Connected Nation extracted the Internet Solver, Inc. extended service area map **(Exhibit D)** from the provider's website and the information obtained from the provider in a telephone conversation indicating it provides broadband DSL service within the city limits of Ankeny, Iowa.

Exhibit D: Provider's Extended Service Area



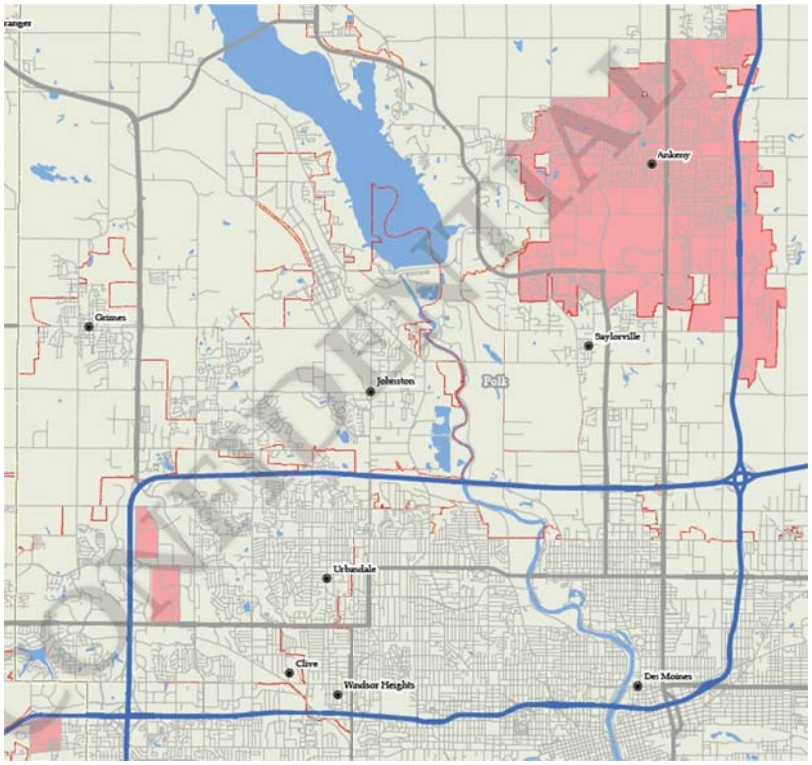
Testing Techniques

Connected Nation staff will develop a site validation route based on data established with the PDF map image created for Internet Solver, Inc. and will begin the validation process after the October 2011 submission has been completed for inclusion in the April 2012 submission.

Results and Submission for October 2011

From the information obtained from a spokesperson for Internet Solver, Inc. and its website, the staff of Connected Nation created a composite coverage map **(Exhibit E)** that was presented to the provider for approval on August 15, 2011. We received an e-mail from the spokesperson on August 22, 2011, stating they are not interested in participating. E-mail notification was sent to the provider advising the information will be submitted to Connect Iowa and the NTIA broadband mapping project for processing if there are no discrepancies of the estimated coverage received from the provider within a 48-hour period.

Exhibit E: Internet Solver, Inc. Composite Coverage



ACCURACY AND VERIFICATION: PROVIDER VALIDATION METHODOLOGY

Broadband providers maintain their service area data in many different formats, all in varying levels of complexity and granularity. In order to ensure that the data required by the NTIA is standardized across all providers and that it is as accurate as possible, Connected Nation translates and formats the data that providers are able to supply into a GIS shapefile and produces maps for the provider to review. The resulting map(s) and review process allow for providers to see their service area in a geographic format – for some providers, this is the first time they have seen maps of their broadband service area. Having the mapped service area allows providers to quickly identify any issues that appear in the data representation, whether the issue is in the data translation into a GIS format or from the original data collection and submission. Often data is provided from various sources and through the review and revision process, local engineers who operate the networks and work in the field are able to ensure that the tabular data that has been submitted is accurate and represents the real-world network extent. Any issues in how the service area is represented on the map(s) are remedied by Connected Nation, whether they are additions, removal of service, or any other revisions. Revised maps of service area representations are sent to the provider for review and approval; Connected Nation will revise data and return maps as many times as necessary until the provider is in agreement that the map represents their service area as accurately as possible. Once the review process has been completed and final approval of the data is provided, the data is deemed ready for NTIA submission.

Once the data collection has been aggregated at a statewide level, static maps of statewide and county-level availability are produced and made publicly available. In addition, consumers can visit the interactive online tool, BroadbandStat, to create customized views of broadband service areas and analyze corresponding demographic information. Leveraging broadband service data on various platforms allows for public users, providers, and other stakeholders to review, scrutinize, and provide feedback on the represented data. This feedback becomes a validation method in itself as consumers submit inquiries to Connected Nation either affirming where service is not available or identifying areas where broadband service is shown on the map, but in actuality is not available. This allows for a follow-up to providers regarding revisions to the data as it is represented; it also allows for Connected Nation to identify locations where on-site visits may be necessary to complete field validation of available services. Public feedback on all forms of mapping products serves as a localized validation method for provider-supplied information and allows Connected Nation to resolve inaccuracies as they are identified to ensure that only the highest quality information is provided to stakeholders.

Estimates derived from provider-validated data indicate that approximately 2.54 percent of Iowa households do not have terrestrial fixed broadband service available, and approximately 0.04 percent[1] of Iowa households have neither mobile nor fixed broadband service available.[2]

Within rural areas of the state, results derived from provider-validated data indicate that approximately 4.21 percent of rural Iowa households do not have terrestrial fixed broadband service available, and approximately 0.05 percent[3] of rural Iowa households have neither mobile nor fixed broadband service available.[4] Please note that the availability estimates presented are based on Census 2000 household information; these figures will be updated in the near future with Census 2010 household information.

[1] In accordance with NTIA's definition of available broadband service as specified in the SBI NOFA, this estimate includes both terrestrial fixed *and* mobile broadband service, if the service offers download speeds of at least 768 Kbps and upload speeds greater than 200 Kbps.

[2] Due to the nature of the SBI data collection methodology as defined by the NTIA and based on both census block geographic units and street segment data, the estimates of broadband availability derived from provider-validated data may include an overstatement of the actual number of households with broadband availability. Under the census block-based data collection method, a provider will typically report broadband availability for an entire census block whether its network is present across the whole or only a subset of that census block. This potential overestimation at the census block level can be amplified as the data is aggregated across the entire state.

[3] See footnote 1.

[4] See footnote 2.

WIRELESS METHODOLOGY

Broadband Service Availability in Provider's Service Area
Wireless Services Not Provided to a Specific Address

Data solicited from a fixed wireless provider to create propagation models include, but are not limited to:

1. The name of the structure
2. Whether the transmitting device is operational or proposed
3. The maximum advertised downstream speed, the maximum advertised upstream speed
4. The typical downstream speed, the typical upstream speed (peak periods for both)
5. The frequency range of spectrum being used (as prescribed by NTIA)
6. The primary population center(s) being served (for geopolitical boundary reference)
7. The physical address of the transmit site (in the event latitude/longitude is unavailable from the provider this allows a quick reference point for geocoding)
8. Latitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
9. Longitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
10. Antenna pattern (e.g. omni-directional, 180°, 120°, 90°, etc.)
11. Azimuth of antenna (e.g. 360° with magnetic declination if known)
12. Approximate transmit radius (in feet, miles, or kilometers)
13. Polarity of transmit antenna (Vertical or Horizontal)
14. Transmit antenna gain (in dBi)
15. Line loss (applicable only to providers using coax, heliax, waveguide or other forms of cabling – excludes power-over-Ethernet devices)
16. Mechanical and/or Electrical beam tilt (if applicable)
17. Equipment Manufacturer (allows easy cross-reference against manufacturer's specification sheet)
18. Power output of the transmitting device (if unknown, FCC standards or manufacturer specifications are applied)
19. AMSL at base of tower site
20. Antenna centerline AGL (height of antenna above ground level measured at the centerline of the actual antenna)
21. Foliage factors (Evergreens/Deciduous and percent of ground cover)
22. Ground Clutter (primarily used in rural areas to account for foliage and in metropolitan areas to account for types and heights of buildings if known)
23. Average gain of receive antenna
24. Receive antenna is estimated at height above average terrain (HAAT) of 6.2 meters/20 feet

25. Federal Registration Numbers (if applicable) which may allow opportunities to cross-reference and/or obtain additional data from the Federal Communications Commission Universal Licensing System and the **CO**mmission **RE**gistration **S**ystem

Propagation modeling is an empirical mathematical formulation for the characterization of radio wave propagation as a function of frequency, distance, and other conditions. Propagation software(s) typically use the Irregular Terrain Model (also known as Longley-Rice) of radio propagation for frequencies between 20 MHz and 20 GHz. This model is based on electromagnetic theory and statistical analyses of the combination of terrain features and radio measurements, then predicting the median attenuation of a radio signal as a function of distance and the variability of the signal in time and in space. For metropolitan areas, the software can typically be adjusted to use the Okumura-Hata model which accounts for predicting the behavior of cellular transmissions in areas where buildings are the primary obstructions. The resulting product from either model depicts a graphical illustration of the theoretical propagation characteristics of a selected frequency range based on defined variables (receiver sensitivity of the home/mobile device, foliage factor, and digital elevation terrain input).

After converting propagation models into a geospatial format, additional processing is completed to remove the small pixels representing service present in the resulting dataset. These areas are initially created based on the parameters entered in the software from the provider equipment information, the underlying data parameters of elevation, hillshade, etc., and the limitations of the software itself to display a broadband service area as accurately as possible. Generally, these random pixel striations appear as a result of signal levels reaching the highest elevated points within the prescribed radius. Typically, while this pixilation anomaly shows legitimate areas where signals can be received, these highly elevated points may have exceedingly sparse populations or are entirely void of population. As a result, and congruent to the *Wireless Technology Methodologies and Business Logic* white paper submitted to NTIA on January 20, 2011, all independent pixels representing service that are less than 0.125 square miles in area have been removed from the geospatial representation of each wireless provider.

Broadband Inquiries Methodology

Connected Nation collects consumer feedback in the form of broadband inquiries (BBIs). These inquiries represent any type of communication received from the public regarding broadband service. Once BBIs are received across the state, this information is overlaid with the broadband availability information which was collected through the SBI program. This allows for a real-world comparison of the broadband landscape to the information received from broadband inquiries. Consumers submitting these inbound comments and/or inquiries are able to provide information regarding three categories: 1) residents who do not have broadband but want it; 2) residents who have broadband but want a different provider; and 3) residents who do not have broadband, but the broadband inventory maps indicate that they do.

BBIs are submitted frequently by consumers via the Connect Iowa website. Inquiries often seek help to identify local broadband provider options, or to learn when a specific provider may be able to provide service to that consumer. Consumer comments also provide information which may help modify maps with actual service area information. The primary objectives of Connected Nation regarding these inquiries are 1) to improve the accuracy of the state maps with submitted consumer information and follow-up field research; 2) to provide broadband options to consumers through cooperation with mapped providers and by facilitating new broadband service options; and 3) to map and analyze information from consumers about areas of unmet broadband demand and alternatives to currently mapped services.

New BBIs are assigned to either the GIS department or the Engineering & Technical Services (ETS) team depending on the category entered by the consumer on the website submission form. The GIS or ETS team members respond to each inquiry according to the information requested by the consumer. Many BBIs can be resolved through desktop research; however, if a BBI requires research in the field, the assigned ETS team member conducts such research when performing field validations in the area of the inquiry, or at other such time as is practical and appropriate. GIS and ETS team members respond to and conclude BBIs via telephone contact and/or e-mail communication.

The broadband inquiry process has been implemented in each of the Connected Nation state programs with successful results. Altogether Connected Nation has received over 17,000 broadband inquiries since 2007, allowing the state programs to evaluate each inquiry for broadband demand and data verification. These inquiries are continuously examined against current broadband availability, updated every six months, to determine if previously unserved households have been expanded to and can now receive broadband at their residence. This database of broadband inquiries has also allowed the Connected Nation state programs to aggregate demand in concentrated areas to show providers the exact locations where the population has made it clear that they would purchase broadband if it was made available to them. Providers in the states have responded to this process and have expanded to areas knowing that their investment will be worthwhile. Data verification methods have also proven successful, as the state programs have been able to show those inquiries that indicate the broadband service areas are misrepresented on the map to providers, who then verify where service cannot reach in regard to that residence(s). The broadband coverage in these states has been altered to create a more accurate map based on the inquiries submitted by the public.

During this reporting period, the Connect Iowa project has received a total of 17 inquiries (190 grant inception to date). As more inquiries are submitted to Connect Iowa, a more thorough validation of the broadband landscape can be performed, while also allowing providers to see which areas have a high demand for broadband adoption.

BroadbandStat Methodology

BroadbandStat is an online, interactive mapping tool for viewing, analyzing, and validating broadband data. Developed through a partnership with ESRI, the market leader in geographic information system (GIS) software, BroadbandStat is a multi-functional, user-friendly way for local leaders, policymakers, consumers, and technology providers to devise a plan for the expansion and adoption of broadband.

First and foremost, BroadbandStat allows consumers to locate their residence and identify providers that offer broadband Internet service to that location. The interactive platform allows for users to build and evaluate broadband expansion scenarios using a wealth of data, including education and population demographics, broadband availability, and research about the barriers to adoption.

New functionality in BroadbandStat allows the consumer to provide feedback on the broadband data displayed on the interactive map. Through the collection of this feedback, a visual demand for broadband is presented. This visualization allows the Connected Nation state programs the ability to validate the broadband availability for accuracy. If residents within a region state they are without broadband, but the interactive map shows otherwise, this allows Connected Nation to approach the providers within that area in an effort to trim down their coverage to more accurately represent real-world availability on the ground.

The Connect Iowa project launched BroadbandStat on June 18, 2010, and has received a total of 5,818 visits to date, of which 618 occurred this reporting period.

SPEED TEST METHODOLOGY

The 1,068 speed tests that are represented in the Connect Iowa Speed Test Report during this reporting period (4,229 grant inception to date) are the result of a partnership between Connected Nation and Ookla Net Metrics. Utilizing this relationship increases the level of confidence in the data being collected and provides for a far greater sample size than could be collected by a single testing site.

Ookla owns and operates Speedtest.net, as well as develops and deploys speed tests, such as the Connect Iowa speed test website, for partners around the world. This network of sites that is developed and run on its testing technology provides Ookla with a vast dataset that, due to the variability of geographic information collected across the varying speed test sites, is geocoded utilizing Geo-IP technology. This technology allows for tests to be geocoded to points of aggregation, typically larger nodes across provider networks. While there are hundreds of thousands of tests that have been conducted, the level of aggregation is only sufficient for county-level detail due to the test results being located at these larger nodes and not at an absolute location for each speed test.

In an effort to validate broadband data from the Connect Iowa project, speed test information is collected throughout the state. Speed tests provide speed information on the path taken through all networks (a provider's network as well as additional networks) a local machine must connect to in order to reach the host test. The benefit of this collection of speed information is two-tiered. First, it allows for a comprehensive dataset of speeds, while also providing Connect Iowa with the information on where broadband services are available. Second, unlike theoretical speed information which was received through the data collection process, the use of speed tests provide real-world information on the speeds that currently exist within the state of Iowa.

Broadband Provider Log

Complete	344
Non-Responsive/Refused	9
In Progress	5
Count of Datasets by Status	**358**
Total Unique Providers Represented	**204**

Provider Name	Platform	Status	NDA Execution Date	Notes
Alliance Communications Cooperative, Inc.	Fiber	Data Added to Statewide Inventory	1/28/2010	[SEPT-15-11 Matthew Brunt] Change: Provider expanded fiber service area.
Alpine Communications, LC	DSL	Data Added to Statewide Inventory	2/24/2010	[SEPT-15-11 Matthew Brunt] Change: Provider upgraded infrastructure and can now provide speed tier 7 download speeds.
AT&T Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/16/2009	[AUG-26-11 Matthew Brunt] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Atkins Telephone Company	Fiber	Data Added to Statewide Inventory	5/14/2010	[SEPT-15-11 Matthew Brunt] Change: Provider upgraded infrastructure and can now offer speed tier 8 download speeds.
Aventure Communications	Fixed Wireless	Data Added to Statewide Inventory	4/8/2010	[SEPT-15-11 Matthew Brunt] Change: Provider expanded fixed wireless service area.
Baldwin Nashville Telephone Company, Inc.	Fiber	Data Added to Statewide Inventory	2/3/2010	[SEPT-15-11 Matthew Brunt] Change: Provider upgraded infrastructure and can now provide fiber broadband to parts of their service area.
Bernard Telephone Company, Inc.	Fiber	Data Added to Statewide Inventory	5/19/2010	[SEPT-15-11 Matthew Brunt] Change: Provider updated infrastructure and can now provide fiber broadband to their entire service area.
Bernard Telephone Company, Inc.	Fixed Wireless	Data Added to Statewide Inventory	5/19/2010	[SEPT-15-11 Matthew Brunt] Change: Provider expanded a portion of their fixed wireless coverage area.
Cable ONE Inc.	Cable	Data Added to Statewide Inventory	12/7/2009	[AUG-26-11 Matthew Brunt] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Cedar Falls Utilities	Fiber	Data Added to Statewide Inventory	6/16/2010	[SEPT-15-11 Matthew Brunt] Change: Provider expanded fiber service area.
CenturyLink	DSL	Data Added to Statewide Inventory	12/4/2009	[AUG-26-11 Matthew Brunt] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Chat Mobility	Mobile Wireless	Data Added to Statewide Inventory	1/19/2010	[AUG-26-11 Matthew Brunt] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Colo Telephone Company	Fiber	Data Added to Statewide Inventory	1/28/2010	[SEPT-15-11 Matthew Brunt] Change: Provider upgraded infrastructure and can now offer speed tier 7 download speeds.
Communications 1 Network, Inc.	Fiber	Data Added to Statewide Inventory	4/14/2010	[SEPT-15-11 Matthew Brunt] Change: Provider upgraded infrastructure and can now offer speed tier 10 download speeds.
Corn Belt Telephone Company	Fiber	Data Added to Statewide Inventory	2/15/2010	[SEPT-15-11 Matthew Brunt] Change: Provider expanded their fiber service area.
CoxCom Inc.	Cable	Data Added to Statewide Inventory	1/29/2010	[AUG-26-11 Matthew Brunt] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
East Buchanan Telephone Cooperative	Fixed Wireless	Data Added to Statewide Inventory	4/30/2010	[AUG-26-11 Matthew Brunt] Correction: Provider submitted initial data for October 2011 submission.
Farmers & Merchants Mutual Telephone Company	Fixed Wireless	Data Added to Statewide Inventory	5/7/2010	[SEPT-15-11 Matthew Brunt] Change: Provider has two new fixed wireless towers in operation.
Farmers Cooperative Telephone Company-Dysart	DSL	Data Added to Statewide Inventory	3/12/2010	[SEPT-15-11 Matthew Brunt] Change: Provider expanded their DSL service area.
Frontier Communications Corporation	DSL	Data Added to Statewide Inventory	1/22/2010	[AUG-26-11 Matthew Brunt] Change: Provider expanded coverage area.
Grand Mound Cooperative Telephone Association	Fiber	Data Added to Statewide Inventory		[SEPT-15-11 Matthew Brunt] Change: Provider expanded their fiber service area.
Grand River Mutual Telephone Corporation	DSL	Data Added to Statewide Inventory	2/5/2010	[SEPT-15-11 Matthew Brunt] Change: Provider expanded their DSL service area.
HickoryTech Corporation	DSL	Data Added to Statewide Inventory	2/2/2010	[SEPT-15-11 Matthew Brunt] Correction: Provider had indicated speed tier 6 in a small portion of their service area, but this has been changed to a tier 4 download speed across their entire service area.
Kalnet	Fixed Wireless	Data Added to Statewide Inventory	5/21/2010	[AUG-26-11 Matthew Brunt] Correction: Provider reduced speeds to more accurately represent their infrastructure.
Knology of the Plains, Inc.	Cable	Data Added to Statewide Inventory	7/13/2011	[SEPT-15-11 Matthew Brunt] Correction: Provider submitted initial data for the October 2011 submission.
Leap Wireless International, Inc.	Mobile Wireless	Data Added to Statewide Inventory	4/6/2010	[AUG-26-11 Matthew Brunt] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Loganet	Fixed Wireless	Data Added to Statewide Inventory		[SEPT-15-11 Matthew Brunt] Change: New fixed wireless tower in operation.
Lone Rock Cooperative Telephone Company	DSL	Data Added to Statewide Inventory	2/15/2010	[SEPT-15-11 Matthew Brunt] Change: Provider upgraded speeds but they fell within the same speed tier, so provider still offers speed tier 5 download speeds.

MidIowa Net	Fixed Wireless	Data Added to Statewide Inventory		[SEPT-15-11 Matthew Brunt] Change: Provider sent frequency change, but it fell within the previously submitted frequency range that was included in the April 2011 submission.
Miles Cooperative Telephone Association	DSL	Data Added to Statewide Inventory	5/17/2010	[SEPT-15-11 Matthew Brunt] Change: Provider upgraded infrastructure and can now offer speed tier 5 download speeds.
NetConX, Inc.	Fixed Wireless	Data Added to Statewide Inventory	4/6/2010	[AUG-30-11 Matthew Brunt] Change: New wireless tower in operation.
New Ulm Telecom, Inc.	DSL	Data Added to Statewide Inventory	3/10/2010	[SEPT-15-11 Matthew Brunt] Change: Provider upgraded infrastructure and can now offer speed tier 5 download speeds.
North English Cooperative Telephone Company	DSL	Data Added to Statewide Inventory	5/12/2010	[SEPT-15-11 Matthew Brunt] Change: Provider upgraded infrastructure and can now offer speed tier 4 download speeds.
Panora Communications Cooperative	Fiber	Data Added to Statewide Inventory	1/29/2010	[SEPT-15-11 Matthew Brunt] Change: Provider expanded their fiber service area while also upgrading their infrastructure, and can now offer speed tier 7 download speeds.
Partner Communications Cooperative	Fiber	Data Added to Statewide Inventory	5/15/2010	[SEPT-15-11 Matthew Brunt] Change: Provider upgraded infrastructure and can now provide fiber broadband to portions of their service area.
Prairieburg Telephone Company, Inc.	DSL	Data Added to Statewide Inventory	3/25/2010	[SEPT-15-11 Matthew Brunt] Correction: Provider previously submitted a technology of transmission code 20, but it was corrected to a technology of transmission code 10 for the October 2011 submission.
Preston Telephone Company	DSL	Data Added to Statewide Inventory	2/5/2010	[SEPT-15-11 Matthew Brunt] Change: Provider upgraded infrastructure and can now offer speed tier 6 download speeds.
SpeedNet, LLC	Fixed Wireless	Data Added to Statewide Inventory		[SEPT-15-11 Matthew Brunt] Change: Four new fixed wireless towers in operation.
Sprint Nextel Corporation	Mobile Wireless	Data Added to Statewide Inventory	1/14/2010	[AUG-26-11 Matthew Brunt] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
T-Mobile USA, Inc.	Mobile Wireless	Data Added to Statewide Inventory	1/8/2010	[AUG-26-11 Matthew Brunt] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
United States Cellular Corporation	Mobile Wireless	Data Added to Statewide Inventory	2/15/2011	[AUG-26-11 Matthew Brunt] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Verizon Communications, Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/14/2009	[AUG-26-11 Matthew Brunt] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Walnut Telephone Company	DSL	Data Added to Statewide Inventory	4/14/2010	[SEPT-15-11 Matthew Brunt] Correction: To more accurately represent the provider's DSL service area, the service area was reduced in certain location.
Walnut Telephone Company	Cable	Data Added to Statewide Inventory	4/14/2010	[SEPT-15-11 Matthew Brunt] Correction: To more accurately represent the provider's cable service area, the service area was expanded in certain location.
Walnut Telephone Company	Fiber	Data Added to Statewide Inventory	4/14/2010	[SEPT-15-11 Matthew Brunt] Correction: To more accurately represent the provider's fiber service area, the service area was expanded in certain location.
West Liberty Telephone Company	Fixed Wireless	Data Added to Statewide Inventory	1/25/2010	[SEPT-15-11 Matthew Brunt] Change: New wireless tower in operation.
West Liberty Telephone Company	DSL	Data Added to Statewide Inventory	1/25/2010	[SEPT-15-11 Matthew Brunt] Change: Provider upgraded speeds but they fell within the same speed tier, so provider still offers speed tier 5 download speeds.
Windstream Communications	DSL	Data Added to Statewide Inventory		[SEPT-15-11 Matthew Brunt] Change: Windstream Iowa Communications acquired Iowa Telecom.
Ace Telephone Association	Backhaul	Backhaul Provider Only Processing Complete	3/8/2010	
Aventure Communications	Backhaul	Backhaul Provider Only Processing Complete	4/8/2010	
Level 3 Communications, LLC	Backhaul	Backhaul Provider Only Processing Complete	12/14/2009	
Mediacom Iowa, LLC	Backhaul	Backhaul Provider Only Processing Complete	1/12/2010	
Northeast Iowa Telephone Company	Backhaul	Backhaul Provider Only Processing Complete	4/13/2010	
Sprint Nextel Corporation	Backhaul	Backhaul Provider Only Processing Complete	1/14/2010	
Internet Solver, Inc.	DSL	Estimated Coverage Submitted for Non-Participating Provider		[AUG-22-11 Jill Lindgren] Received e-mail stating, "The owner of our company is not interested." [AUG-24-11 Matthew Brunt] Correction: Coverage not submitted in previous datasets; coverage created from data found on provider website.
360networks	Backhaul	No Update to Provide	1/19/2010	
Ace Telephone Association	DSL	No Update to Provide	3/8/2010	
Algona Municipal Utilities	Cable	No Update to Provide	2/9/2010	
Algona Municipal Utilities	Fiber	No Update to Provide	2/9/2010	
Alliance Communications Cooperative, Inc.	DSL	No Update to Provide	1/28/2010	
Alliance Communications Cooperative, Inc.	Backhaul	No Update to Provide	1/28/2010	
Alpine Communications, LC	Fiber	No Update to Provide	2/24/2010	
Alta Municipal Utilities	Cable	No Update to Provide	5/18/2010	
Andrew Telephone Company	DSL	No Update to Provide	1/19/2010	
Arcadia Telephone Cooperative	DSL	No Update to Provide	5/6/2010	
AT&T Inc.	Backhaul	No Update to Provide	12/16/2009	
Atkins Telephone Company	DSL	No Update to Provide	5/14/2010	
Ayrshire Farmers Mutual Telephone Company	DSL	No Update to Provide	2/17/2010	
Ayrshire Farmers Mutual Telephone Company	Fixed Wireless	No Update to Provide	2/17/2010	
Baldwin Nashville Telephone Company, Inc.	DSL	No Update to Provide	2/3/2010	

Bellevue Municipal Utilities	Fiber	No Update to Provide	5/20/2010	
Bernard Telephone Company, Inc.	DSL	No Update to Provide	5/19/2010	
Bernard Telephone Company, Inc.	Backhaul	No Update to Provide	5/19/2010	
BEVCOMM	DSL	No Update to Provide	6/16/2010	
BitWind Communications, LLC	Fixed Wireless	No Update to Provide		
Board of Water Electric & Communication Trustees of the City of Muscatine	DSL	No Update to Provide	5/14/2010	
Board of Water Electric & Communication Trustees of the City of Muscatine	Cable	No Update to Provide	5/14/2010	
Board of Water Electric & Communication Trustees of the City of Muscatine	Fiber	No Update to Provide	5/14/2010	
Brooklyn Mutual Telecommunications Cooperative	DSL	No Update to Provide	4/21/2010	
Butler-Bremer Communications	DSL	No Update to Provide	4/20/2010	
Butler-Bremer Communications	Fiber	No Update to Provide	4/20/2010	
Butler-Bremer Communications	Cable	No Update to Provide	4/20/2010	
Cascade Communications Company	DSL	No Update to Provide	1/23/2010	
Cascade Communications Company	Fiber	No Update to Provide	1/23/2010	
Casey Mutual Telephone Company	DSL	No Update to Provide	5/3/2010	
Casey Mutual Telephone Company	Backhaul	No Update to Provide	5/3/2010	
Cedar Falls Utilities	Cable	No Update to Provide	6/16/2010	
Center Junction Telephone Company	DSL	No Update to Provide	3/12/2010	
Central Scott Telephone Company, Inc.	Fixed Wireless	No Update to Provide	4/22/2010	
Central Scott Telephone Company, Inc.	DSL	No Update to Provide	4/22/2010	
CenturyLink	Backhaul	No Update to Provide	12/4/2009	
Circle Computer Resources	Fixed Wireless	No Update to Provide	7/6/2010	
Citizens Mutual Telephone Cooperative	DSL	No Update to Provide	2/26/2010	
Citizens Mutual Telephone Cooperative	Fiber	No Update to Provide	2/26/2010	
City of Hawarden	Cable	No Update to Provide	5/20/2010	
Clarence Telephone Company, Inc.	Fiber	No Update to Provide		
Clear Lake Independent Telephone Company	DSL	No Update to Provide	5/6/2020	
Clear Lake Independent Telephone Company	Fiber	No Update to Provide	5/6/2020	
CML Telephone Cooperative, Association of Meriden, Iowa	Fiber	No Update to Provide	1/25/2010	
Comelec Services, Inc.	Fixed Wireless	No Update to Provide	5/7/2010	
Community Cable Television Agency of O'Brien County	Cable	No Update to Provide	5/5/2010	
Community Cable Television Agency of O'Brien County	Fixed Wireless	No Update to Provide	5/5/2010	
Community Digital Wireless, LLC	Fixed Wireless	No Update to Provide	5/6/2010	
Complete Communication Services	Cable	No Update to Provide	6/17/2010	
Complete Communication Services	Fiber	No Update to Provide	6/17/2010	
Coon Rapids Municipal Utilities	Cable	No Update to Provide	4/22/2010	
Coon Valley Co-op Telephone Association, Inc.	DSL	No Update to Provide		
Coon Valley Co-op Telephone Association, Inc.	Fixed Wireless	No Update to Provide		
Cooperative Telephone Company	DSL	No Update to Provide	2/2/2010	
Cooperative Telephone Company	Fixed Wireless	No Update to Provide	2/2/2010	
Cooperative Telephone Exchange	Backhaul	No Update to Provide	2/2/2010	
Cooperative Telephone Exchange	Fiber	No Update to Provide	2/2/2010	
Corn Belt Telephone Company	DSL	No Update to Provide	2/15/2010	
Corn Belt Telephone Company	Fixed Wireless	No Update to Provide	2/15/2010	
Cumberland Telephone Company	DSL	No Update to Provide	4/27/2010	
Cumberland Telephone Company	Fixed Wireless	No Update to Provide	4/27/2010	
Danville Mutual Telephone Company	DSL	No Update to Provide		
DISH Network Corporation	Satellite	No Update to Provide	1/27/2010	[SEPT-16-11 Matthew Brunt] Correction: Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
Dixon Telephone Company	Cable	No Update to Provide	5/5/2010	
Dumont Telephone Company	DSL	No Update to Provide	2/25/2010	
Dumont Telephone Company	Fiber	No Update to Provide	2/25/2010	
Dunkerton Telephone Cooperative	DSL	No Update to Provide	4/15/2010	
East Buchanan Telephone Cooperative	DSL	No Update to Provide	4/30/2010	
Eastlight, LLC	Fixed Wireless	No Update to Provide		
Ellsworth Cooperative Telephone Association	DSL	No Update to Provide	1/25/2010	
Evertek Enterprises	Cable	No Update to Provide	2/3/2010	
Evertek Enterprises	Fiber	No Update to Provide	2/3/2010	
Evertek Enterprises	Fixed Wireless	No Update to Provide	2/3/2010	
F&B Communications, Inc.	DSL	No Update to Provide	2/19/2010	
F&B Communications, Inc.	Fixed Wireless	No Update to Provide	2/19/2010	
Farmers & Merchants Mutual Telephone Company	Fiber	No Update to Provide	5/7/2010	
Farmers Mutual Cooperative Telephone Company - Harlan	DSL	No Update to Provide	2/5/2010	
Farmers Mutual Cooperative Telephone Company - Harlan	Cable	No Update to Provide	2/5/2010	
Farmers Mutual Cooperative Telephone Company - Harlan	Fiber	No Update to Provide	2/5/2010	
Farmers Mutual Cooperative Telephone Company - Harlan	Fixed Wireless	No Update to Provide	2/5/2010	
Farmers Mutual Cooperative Telephone Company-Moulton	Fiber	No Update to Provide	5/21/2010	
Farmers Mutual Telephone Company - Jesup	DSL	No Update to Provide	4/20/2010	
Farmers Mutual Telephone Company - Nora Springs	DSL	No Update to Provide	1/26/2010	
Farmers Mutual Telephone Company - Nora Springs	Cable	No Update to Provide	1/26/2010	
Farmers Mutual Telephone Company - Nora Springs	Fiber	No Update to Provide	1/26/2010	
Farmers Mutual Telephone Company - Nora Springs	Fixed Wireless	No Update to Provide	1/26/2010	
Farmers Mutual Telephone Company of Stanton, Iowa	DSL	No Update to Provide	4/9/2010	
Farmers Mutual Telephone Company of Stanton, Iowa	Cable	No Update to Provide	4/9/2010	
Farmers Mutual Telephone Company of Stanton, Iowa	Backhaul	No Update to Provide	4/9/2010	
Farmers Mutual Telephone Company of Stanton, Iowa	DSL	No Update to Provide	4/9/2010	
Farmers Telephone Company-Essex	DSL	No Update to Provide	1/27/2010	
Farmers Telephone Company-Essex	Fixed Wireless	No Update to Provide	1/27/2010	
FiberComm L.C.	DSL	No Update to Provide	2/15/2010	
FiberComm L.C.	Fixed Wireless	No Update to Provide	2/15/2010	
FiberComm L.C.	Backhaul	No Update to Provide	2/15/2010	
Fibernet Communications, LLC	Backhaul	No Update to Provide	3/9/2010	
Frontier Communications Corporation	Backhaul	No Update to Provide	1/22/2010	
Goldfield Access Network, L.C.	DSL	No Update to Provide	1/22/2010	
Goldfield Access Network, L.C.	DSL	No Update to Provide	1/22/2010	
Grand Mound Cooperative Telephone Association	DSL	No Update to Provide		
Grand Mound Cooperative Telephone Association	Fixed Wireless	No Update to Provide		
Grand River Mutual Telephone Corporation	Fixed Wireless	No Update to Provide	2/5/2010	
Grand River Mutual Telephone Corporation	DSL	No Update to Provide	2/5/2010	
Griswold Cooperative Telephone Company	DSL	No Update to Provide	4/21/2010	
Grundy Center Municipal Utilities	Cable	No Update to Provide		
Grundy Center Municipal Utilities	Fixed Wireless	No Update to Provide		
Harlan Municipal Utilities	Cable	No Update to Provide	5/5/2010	
Harmony Telephone Company	Fiber	No Update to Provide	1/12/2010	
Hawkeye Telephone Company	DSL	No Update to Provide	2/12/2010	
Heart of Iowa Communications Cooperative	DSL	No Update to Provide	1/7/2010	
Heart of Iowa Communications Cooperative	Fiber	No Update to Provide	1/7/2010	
Heart of Iowa Communications Cooperative	Backhaul	No Update to Provide	1/7/2010	

Hospers Telephone Exchange, Inc.	DSL	No Update to Provide	1/11/2010	
Hospers Telephone Exchange, Inc.	Cable	No Update to Provide	1/11/2010	
Hubbard Cooperative Telephone Association and Cable	DSL	No Update to Provide	5/14/2010	
Hughes Network Systems, LLC	Satellite	No Update to Provide	2/5/2010	[SEPT-16-11 Matthew Brunt] Correction: Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
Huxley Communications Cooperative	Backhaul	No Update to Provide	1/25/2010	
Huxley Communications Cooperative	DSL	No Update to Provide	1/25/2010	
Huxley Communications Cooperative	Fiber	No Update to Provide	1/25/2010	
I-35 Telephone Company	DSL	No Update to Provide	2/2/2010	
I-35 Telephone Company	Fiber	No Update to Provide	2/2/2010	
I-35 Telephone Company	Fixed Wireless	No Update to Provide	2/2/2010	
IAMO Telephone Company	DSL	No Update to Provide	1/25/2010	
IAMO Telephone Company	Fixed Wireless	No Update to Provide	1/25/2010	
ImOn Communications, LLC	Cable	No Update to Provide		
ImOn Communications, LLC	Fiber	No Update to Provide		
ImOn Communications, LLC	Backhaul	No Update to Provide		
Independence Telecommunications Utility	Cable	No Update to Provide	4/9/2010	
Internet Consulting Services, LLC	Fixed Wireless	No Update to Provide	5/19/2010	
Iowa Connect, Inc.	Fixed Wireless	No Update to Provide	5/12/2010	
Iowa Network Services	Backhaul	No Update to Provide	3/5/2010	
Jefferson Telephone Company	DSL	No Update to Provide	1/22/2010	
Jefferson Telephone Company	Fiber	No Update to Provide	1/22/2010	
Kalona Cooperative Telephone Company	DSL	No Update to Provide	1/20/2010	
Kalona Cooperative Telephone Company	Fiber	No Update to Provide	1/20/2010	
KDSC, Inc.	Fixed Wireless	No Update to Provide	5/18/2010	
KeyOn Communications, Inc.	Fixed Wireless	No Update to Provide	10/15/2009	
KeyOn Communications, Inc.	DSL	No Update to Provide	10/15/2009	
KeyOn Communications, Inc.	Fixed Wireless	No Update to Provide	10/15/2009	
Keystone Farmers Cooperative Telephone Company	DSL	No Update to Provide	4/12/2010	
Killduff Telephone Company	DSL	No Update to Provide		
La Motte Telephone Company, Inc.	DSL	No Update to Provide	2/16/2010	
La Motte Telephone Company, Inc.	Fixed Wireless	No Update to Provide	2/16/2010	
La Porte City Telephone Co	DSL	No Update to Provide	2/22/2010	
Laurens Municipal Communications Utility	Cable	No Update to Provide	6/2/2010	
Lehigh Valley Cooperative Telephone Association	Fiber	No Update to Provide	4/16/2010	
Lenox Municipal Utilities	Cable	No Update to Provide	4/20/2010	
LISCO Wireless	DSL	No Update to Provide	1/28/2010	
LISCO Wireless	Fiber	No Update to Provide	1/28/2010	
LISCO Wireless	Backhaul	No Update to Provide	1/28/2010	
Long Lines	DSL	No Update to Provide	5/4/2010	
Long Lines	Cable	No Update to Provide	5/4/2010	
Long Lines	Backhaul	No Update to Provide	5/4/2010	
Long Lines	Backhaul	No Update to Provide	5/4/2010	
Long Lines	Backhaul	No Update to Provide	5/4/2010	
Long Lines	Backhaul	No Update to Provide	5/4/2010	
Long Lines	Backhaul	No Update to Provide	5/4/2010	
Long Lines	Backhaul	No Update to Provide	5/4/2010	
Lost Nation-Elwood Telephone Company	Fiber	No Update to Provide	4/13/2010	
Lynnville Telephone Company, Inc.	DSL	No Update to Provide		
Mabel Cooperative Telephone Company	DSL	No Update to Provide	4/8/2010	
Mahaska Communication Group	Fiber	No Update to Provide	5/10/2010	
Mahaska Communication Group	Fixed Wireless	No Update to Provide	5/10/2010	
Manning Municipal Communication & Television System Utility	Cable	No Update to Provide	4/22/2010	
Manning Municipal Communication & Television System Utility	Fixed Wireless	No Update to Provide	4/22/2010	
Marne & Elk Horn Telephone Company	DSL	No Update to Provide	2/11/2010	
Marne & Elk Horn Telephone Company	Fixed Wireless	No Update to Provide	2/11/2010	
Marne & Elk Horn Telephone Company	Backhaul	No Update to Provide	2/11/2010	
Martelle Cooperative Telephone Association	Cable	No Update to Provide	5/5/2010	
Martelle Cooperative Telephone Association	DSL	No Update to Provide	5/5/2010	
Massena Telephone Company	Backhaul	No Update to Provide	6/18/2010	
Massena Telephone Company	DSL	No Update to Provide	6/18/2010	
Mediacom Iowa, LLC	Cable	No Update to Provide	1/12/2010	
Mediapolis Telephone Company	DSL	No Update to Provide	4/14/2010	
MidIowa Net	DSL	No Update to Provide		
Midwest Broadband LLC	Fixed Wireless	No Update to Provide	7/6/2010	
Milford Cable TV Inc.	Cable	No Update to Provide	4/21/2010	
Minburn Communications	DSL	No Update to Provide	4/7/2010	
Minburn Communications	Fiber	No Update to Provide	4/7/2010	
Minburn Communications	DSL	No Update to Provide	4/7/2010	
Minburn Communications	Fiber	No Update to Provide	4/7/2010	
Minerva Valley Telephone Cablevision, Inc.	DSL	No Update to Provide	4/7/2010	
Modern Cooperative Telephone Company Inc.	DSL	No Update to Provide		
Monarc Technologies	Fiber	No Update to Provide	2/16/2011	
Mutual Telephone Company	DSL	No Update to Provide	1/25/2010	
Mutual Telephone Company	Fiber	No Update to Provide	1/25/2010	
Mutual Telephone Company of Morning Sun, Iowa	DSL	No Update to Provide	5/5/2010	
Mutual Telephone Company of Morning Sun, Iowa	DSL	No Update to Provide	5/5/2010	
Nexgen Integrated Communications, LLC	DSL	No Update to Provide		
Nexgen Integrated Communications, LLC	Fiber	No Update to Provide		
Northeast Iowa Telephone Company	DSL	No Update to Provide	4/13/2010	
Northeast Iowa Telephone Company	Fixed Wireless	No Update to Provide	4/13/2010	
Northern Iowa Telephone Company	DSL	No Update to Provide	1/25/2010	
Northwest Telephone Cooperative Association	DSL	No Update to Provide	2/17/2010	
Northwest Telephone Cooperative Association	Fixed Wireless	No Update to Provide	2/17/2010	
Northwest Telephone Cooperative Association	Backhaul	No Update to Provide	2/17/2010	
Ogden Telephone Company	DSL	No Update to Provide	3/17/2010	
Ogden Telephone Company	Backhaul	No Update to Provide	3/17/2010	
Olin Telephone Company, Inc.	DSL	No Update to Provide	2/23/2010	
Onslow Cooperative Telephone Association	DSL	No Update to Provide	2/3/2010	
Oran Mutual Telephone Company	DSL	No Update to Provide	2/8/2010	
Osage Municipal Communications Utility	Cable	No Update to Provide	5/18/2010	
Osage Municipal Communications Utility	Fixed Wireless	No Update to Provide	5/18/2010	
Palmer Mutual Telephone Company	DSL	No Update to Provide	1/21/2010	
Palo Cooperative Telephone Association	DSL	No Update to Provide	5/19/2010	
Panora Communications Cooperative	Fixed Wireless	No Update to Provide	1/29/2010	
Panora Communications Cooperative	Fixed Wireless	No Update to Provide	1/29/2010	
Panora Communications Cooperative	Fiber	No Update to Provide	1/29/2010	
Panora Communications Cooperative	Cable	No Update to Provide	1/29/2010	
Panora Communications Cooperative	Cable	No Update to Provide	1/29/2010	
Partner Communications Cooperative	DSL	No Update to Provide	5/15/2010	
Partner Communications Cooperative	Cable	No Update to Provide	5/15/2010	

Prairieburg Telephone Company, Inc.	Fixed Wireless	No Update to Provide	3/25/2010	
Premier Communications	Cable	No Update to Provide	1/25/2010	
Radcliffe Telephone Company, Inc.	Fiber	No Update to Provide	4/26/2010	
Radcliffe Telephone Company, Inc.	Backhaul	No Update to Provide	4/26/2010	
Readlyn Telephone Company	DSL	No Update to Provide	2/23/2010	
Readlyn Telephone Company	Fiber	No Update to Provide	2/23/2010	
Reasnor Telephone Company, LLC	DSL	No Update to Provide		
RingTel Communications	DSL	No Update to Provide	2/17/2010	
River Valley Telecommunications Coop	DSL	No Update to Provide	3/23/2010	
River Valley Telecommunications Coop	Fiber	No Update to Provide	3/23/2010	
River Valley Telecommunications Coop	Fixed Wireless	No Update to Provide	3/23/2010	
Rockwell Cooperative Telephone Association	DSL	No Update to Provide	5/12/2010	
Rockwell Cooperative Telephone Association	Fiber	No Update to Provide	5/12/2010	
Rockwell Cooperative Telephone Association	Backhaul	No Update to Provide	5/12/2010	
Royal Telephone Company	Fiber	No Update to Provide	2/12/2010	
Sac County Mutual Telephone Co.	DSL	No Update to Provide	2/15/2010	
Sac County Mutual Telephone Co.	Backhaul	No Update to Provide	2/15/2010	
Scranton Telephone Company	DSL	No Update to Provide	2/1/2010	
Scranton Telephone Company	Backhaul	No Update to Provide	2/1/2010	
Searsboro Telephone Company	DSL	No Update to Provide		
Sharon Telephone Company	DSL	No Update to Provide	5/20/2010	
Sharon Telephone Company	Fiber	No Update to Provide	5/20/2010	
Sharon Telephone Company	Fixed Wireless	No Update to Provide	5/20/2010	
Sharon Telephone Company	Backhaul	No Update to Provide	5/20/2010	
Sioux Valley Wireless	Fixed Wireless	No Update to Provide	6/7/2010	
South Slope Cooperative Telephone Company	DSL	No Update to Provide	2/2/2010	
South Slope Cooperative Telephone Company	Fiber	No Update to Provide	2/2/2010	
Spencer Municipal Utilities	Fiber	No Update to Provide	2/18/2010	
Spencer Municipal Utilities	Backhaul	No Update to Provide	2/18/2010	
Spencer Municipal Utilities	Cable	No Update to Provide	2/18/2010	
Spring Grove Cooperative Telephone Co.	Fiber	No Update to Provide		
Springville Cooperative Telephone Association, Inc.	DSL	No Update to Provide	2/15/2010	
Sully Telephone Association Inc.	DSL	No Update to Provide	4/28/2010	
Sully Telephone Association Inc.	Fiber	No Update to Provide	4/28/2010	
Superior Telephone Cooperative	DSL	No Update to Provide	5/24/2010	
Swisher Telephone Company	Fiber	No Update to Provide	2/2/2010	
Templeton Telephone Company	DSL	No Update to Provide	3/12/2010	
Templeton Telephone Company	Backhaul	No Update to Provide	3/12/2010	
Terril Telephone Cooperative	DSL	No Update to Provide	2/12/2010	
Titonka Telephone Company	DSL	No Update to Provide	5/4/2010	
Titonka Telephone Company	Backhaul	No Update to Provide	5/4/2010	
Traer Municipal Utilities	Fixed Wireless	No Update to Provide	4/14/2010	
USA Communications	DSL	No Update to Provide	1/27/2010	
USA Communications	Cable	No Update to Provide	1/27/2010	
USA Communications	Fiber	No Update to Provide	1/27/2010	
Van Buren Telephone Co Inc.	DSL	No Update to Provide	1/26/2010	
Van Horne Cooperative Telephone Company	DSL	No Update to Provide	5/18/2010	
Van Horne Cooperative Telephone Company	Fiber	No Update to Provide	5/18/2010	
Van Horne Cooperative Telephone Company	Backhaul	No Update to Provide	5/18/2010	
Walnut Telephone Company	Fixed Wireless	No Update to Provide	4/14/2010	
Walnut Telephone Company	Backhaul	No Update to Provide	4/14/2010	
Webb-Dickens Telephone Corporation	Fiber	No Update to Provide	1/25/2010	
Webster-Calhoun Cooperative Telephone Association	Fiber	No Update to Provide	5/21/2010	
Wellman Cooperative Telephone Association	DSL	No Update to Provide	5/19/2010	
Wellman Cooperative Telephone Association	Fixed Wireless	No Update to Provide	5/19/2010	
West Iowa Telephone Company	DSL	No Update to Provide	1/27/2010	
West Iowa Telephone Company	Cable	No Update to Provide	1/27/2010	
West Liberty Telephone Company	Fiber	No Update to Provide	1/25/2010	
West Liberty Telephone Company	Backhaul	No Update to Provide	1/25/2010	
Western Iowa Networks	DSL	No Update to Provide	2/22/2010	
Western Iowa Networks	Fiber	No Update to Provide	2/22/2010	
Western Iowa Networks	Fixed Wireless	No Update to Provide	2/22/2010	
Western Iowa Telephone Association	DSL	No Update to Provide	4/22/2010	
WildBlue Communications, Inc.	Satellite	No Update to Provide	1/8/2010	[SEPT-16-11 Matthew Brunt] Correction: Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
Winnebago Cooperative Telecom Association	DSL	No Update to Provide	1/22/2010	
Winnebago Cooperative Telecom Association	Fiber	No Update to Provide	1/22/2010	
Winnebago Cooperative Telecom Association	Fixed Wireless	No Update to Provide	1/22/2010	
Winnebago Cooperative Telecom Association	Backhaul	No Update to Provide	1/22/2010	
Woolstock Mutual Telephone	DSL	No Update to Provide	5/19/2010	
Woolstock Mutual Telephone	Fixed Wireless	No Update to Provide	5/19/2010	
WTC Communications, Inc.	DSL	No Update to Provide	3/22/2010	
WTC Communications, Inc.	Fixed Wireless	No Update to Provide	3/22/2010	
WTC Communications, Inc.	Cable	No Update to Provide	3/22/2010	
Wyoming Mutual Telephone Company	DSL	No Update to Provide	2/19/2010	
Cogent Communications, Inc.	Backhaul	No Update Provided - Use Last Submission Data		
Fenton Co-Op Telephone Company	DSL	No Update Provided - Use Last Submission Data	4/16/2010	
Prairie iNet	Fixed Wireless	No Update Provided - Use Last Submission Data	3/16/2010	
Knology of the Plains, Inc.	Backhaul	Provider Gathering Data	7/13/2011	
Netconnect	Fixed Wireless	Solicited Initial Data		
Community Digital Wireless, LLC	Backhaul	Other	5/6/2010	[SEP-02-11 Matthew Brunt] Provider stated that they do not resell their backhaul, but that it's only for internal use.
PAETEC Communications, Inc.	Backhaul	Other		[SEP-08-11 Wes Kerr] Multiple outreach attempts were conducted but no response was received. PAETEC was bought out during the collection phase of this round by Windstream and we intend to be able to include the PAETEC coverage as a part of the Windstream footprint during the next round.
Panora Communications Cooperative	DSL	Other	1/29/2010	[AUG-08-11 Layne Wagner] I received an e-mail response from the provider stating that all of Panora Communications Cooperative DSL has been upgraded to FTTH.
Eastlight, LLC	Fiber	Refused to Participate		[JUL-19-11 Matthew Brunt] Provider stated that they do not wish to provide their fiber coverage at this time.

Mechanicsville Telephone Company	DSL	Refused to Participate		[AUG-04-11 Layne Wagner] I spoke with provider and they stated they refused to participate last year and they haven't changed their mind this year.
Mechanicsville Telephone Company	Cable	Refused to Participate		[AUG-04-11 Layne Wagner] I spoke with provider and they stated they refused to participate last year and they haven't changed their mind this year.
Amberwave Communications	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between June 22, 2010 and January 27, 2011, 6 additional attempts were made this period.
Coon Creek Telecommunications Corp.	DSL	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between July 30, 2010 and February 11, 2011, 5 additional attempts were made this period.
Global Crossing Telecommunications, Inc.	Backhaul	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between July 1, 2010 and February 17, 2011, 3 additional attempts were made this period.
RuralWaves Wireless Internet	DSL	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between August 5, 2010 and February 18, 2011, 4 additional attempts were made this period.
RuralWaves Wireless Internet	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between August 5, 2010 and February 18, 2011, 4 additional attempts were made this period.
Schaller Telephone Company	DSL	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between August 3, 2010 and February 10, 2011, 5 additional attempts were made this period.

State Broadband Initiative Mapping Methodology

For the States of Alabama, Idaho, Wisconsin and Wyoming
Revised September 30, 2011

CostQuest Associates

LinkAMERICA Alliance

Contents

Overview

The following documentation provides an overview of how the fourth required data set was collected and processed for the State Broadband Initiative (SBI) in the states of Alabama, Idaho, Wisconsin, and Wyoming.

Although we could separate this draft into state-specific deliverables, the majority of methodology remains intentionally consistent among the states. As one important validation test is comparability across states, we find value in this cross-state approach. This cross-state approach also helps the LinkAMERICA team focus on comparable outcomes across the four states, where appropriate. Our intent is not to make the states look and be the same, rather it is to leverage economies of scope and scale among the business processes.

As expected, this document rests heavily on the prior drafts, but has also been updated and expanded.

Significant changes include additions covering:

1. Trends in provider inputs
2. Expansion in retrieval of WISP coverage
3. Requested changes based upon NTIA guidance
    a. Modification of Satellite providers as a Type 1 Broadband provider;
    b. Discontinuation of estimating Community Anchor Institution coverage and speed;
    c. Review of submitted speed with respect to NTIA supplied frequency table
4. Transition planning with respect to capacity building within the State for Broadband map development
5. Development and posting of a provider Type classification rubric

Treatment of the following subjects has been expanded:

1. Community anchor institutions and survey methodology
2. Verification and validation
3. Data production methods
4. Conversion to Census 2010

As anticipated, the SBI program continues to mature and evolve. Technical leadership and strong program office guidance has been appreciated. We continue to focus resources on establishing stable business processes to track submissions, verify received and processed data, test for temporal stability and provide reporting deliverables consistent with NTIA expectations.

In our view, the mapping deliverable reflects (1) a good faith effort, which results in a reasoned response to the NOFA, Technical Appendix A, as well as supplementary program office guidance and modifications offered in phone calls, emails, and webinars, (2) a stable foundation for improvement and prioritization of both NTIA and state needs and interests , (3) a valid data processing model to support

online mapping, consumer feedback, provider verification and reporting, and finally, (4) a valid use of the evolving data transfer model and its intrinsic validation methods. More importantly, the resulting data and online coverage maps that follow from this work are providing good input and context for the Broadband planning teams working across the states we have the pleasure to serve.

We close this methodology document with two Appendices. Appendix One describes Data Collection Challenges. This section describes some of the open issues, challenges and questions we are exploring. Our hope is to receive clarification and counsel from NTIA in how best to confront some of these issues, which are likely common across states. Appendix Two describes the confidentiality framework explained by NTIA.

Purpose of This Manual

This technical document was developed to provide transparency in our data production process.

Our goal is to illustrate a thoughtful process designed to meet the intent of the submission. Our hope is that we have developed a process that is reasonable, with respect to the data it deals with, as well as flexible enough to change with evolving NTIA requirements and lessons learned from the Broadband mapping community.

Data Sources

Developing the Provider List

Provider lists for all states were developed at project inception from the following sources:

- State lists of regulated telecommunications, cable and wireless service providers
- State and national industry organizations (i.e. cable associations, wireless service provider organizations, telecommunications associations)
- FCC Form 477 respondents
- Independent web searches
- Prior comparable mapping/research efforts
- Interviews with key state staff members and important community influencers

After the April 1, 2011 "Round 3" submission, we continued our research and added new providers to the program as discovered. As one would expect in a dynamic marketplace, provider identification is an ongoing and important component of our work. Mergers and acquisitions, the use of multiple regional DBAs, the lack of any universal identity management attribute, and the generally complex parent-subsidiary structure of many telecommunications companies, make provider identification and tracking very challenging.

In early July 2011, we once again initiated an email and telephone outreach campaign to contact all known providers. This is an extremely time consuming process, but it is necessary to ensure that the list of contact persons remains current, and that providers are aware of data request changes and deadlines

associated with each round. Where necessary, we execute new NDAs with providers. In "Round 4", this effort continued on a daily basis until we reached our final data submission deadline on August 19, 2011. After August 19, we continued to work with providers who were not able to meet the deadline. In most cases were able to "crash" our process to accommodate this extra data, but late submissions continue to create inefficiencies and add costs to the overall program. In Round 4 providers that responded too late to be included in the final dataset will be included in our Round 5 submission. Once again, as contact is made in each round, we verbally qualify each provider by asking a series of questions regarding the type of service and speeds offered. If the provider does not meet the minimum specifications for a Broadband provider (as defined in the NOFA) we make a note of their status and remove them from the data submitted to NTIA.[1] We continue to reach out to them in future rounds in the event that their service is upgraded or expanded.

Provider Outreach

To meet the program's aggressive deadlines and participation goals, LinkAMERICA believes it is critical to maintain rapport with providers. To do this, we continued to reach out to providers with regular project communications, including a program newsletter and links to the various state mapping websites. As described above, individual e-mails and/or telephone calls were made to all providers explaining the status of the program and requesting their continued support in Round Four. We've also had the opportunity to support providers in their BTOP / BIP applications in certain cases. Through these collective outreach initiatives, and our engagement with various industry associations, we continue to enjoy a healthy and appropriate relationship with Broadband service providers.

NDA

To provide protection for all parties involved, LinkAMERICA continues to honor the terms of our NDA. If providers did not execute the NDA in previous rounds they were offered the opportunity to do so in this collection round. New providers were of course also supplied with a copy of the NDA.

To facilitate the execution of NDA's, LinkAMERICA continues to use the DocuSign online document management solution. This system allows providers to review and digitally sign the NDA in a legally binding manner, and has been instrumental in achieving rapid approval and execution of NDAs with the majority of providers. In some cases, NDA's were individually negotiated to address specific provider concerns. In all cases, minimum standards established by the NOFA are honored. In other cases, providers chose to submit data without executing an NDA.

Provider Survey

Since three prior rounds of data collection had been completed, the LinkAMERICA team had a solid base of coverage and speed information with which to begin Round 4. This allowed us to provide two response options to providers. The first was for them to review check maps of their coverage and speed data – submitting only corrections and additions to the existing dataset. (For provider convenience the

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[1] As with other Grantees, we struggle with appropriate and consistent classification for service providers who opportunistically provision Broadband services. In this submission we continue to bring them into the analysis as a provider type "other". As the inclusion of this category isn't our primary goal, we are working to process data as we can. We are similarly categorizing and retaining reseller information. Our datapackage.xls illustrates the categorization of non Broadband providers within our provider tracking and verification systems.

check maps were created in both PDF and Google Earth (.KMZ) formats.) The second was to allow submittal of completely new datasets, either in tabular form or in multiple other digital formats. For those without sophisticated CAD or GIS systems, we continued to allow the submittal of printed/scanned maps and other written materials.

Survey Methods

Once again, we used a secure digital survey process (via our provider portal websites) to collect and display information for providers. The Round 4 survey process was designed to accommodate both new and returning providers, and the different types of information they would be submitting. The following is a summary of the process encountered by each group:

New providers: New providers were routed directly to our standard survey where they were provided with templates for uploading data in tabular NTIA-compliant formats. As in previous rounds, if providers could not supply information in the requested format, alternatives were offered. These alternatives included uploading service-area boundary maps, exchange area maps, CAD drawings or customer address lists. From that information, the LinkAMERICA team developed a geographic representation of coverage and was able to build coverage features for each provider.

Returning providers: For Round 4 we continued to work with participating providers to improve their datasets. The change in Census Data vintage was explained to providers and links to appropriate files were provided to assist with the transition to the new vintage data.

Check maps continue to be a useful tool to show providers how their area would be displayed on the resulting interactive state map and to get constructive feedback regarding corrections and changes that need to be made to their coverage and speed data. Generating these customized documents in each round is an extremely time consuming verification process, but it allows us to close many of the gaps that might have otherwise persisted.

Follow Up

After the release of the Round 4 survey in early July 2011, LinkAMERICA launched an extensive effort to encourage responses. Every known provider was contacted at least twice during the months of July and August. The initial data submission deadline was set for August 19, but, as previously noted, we continued to accept "straggler" submissions into September.

No Response Policy

As mentioned above, every effort was made to contact each provider who appeared on our initial list. However, if no current information could be found on the company (i.e. no website, no valid phone number, no contact person identified) they were removed from the list of "known providers". We believe the vast majority of those we were unable to reach were providers who have simply ceased to exist[2].

[2]The list of known providers and important submission statistics are contained in the datapackage.xls file.

Summary

In summary, an intensive 45-60 day provider outreach and data collection process is initiated at the beginning of each round. In Round 4, given the data vintage of June 30, 2011, we began this process in July and the last submissions were accepted in September, 2011.

While we continue to successfully engage the majority of providers in each round, the amount of manpower required to solicit complete and timely responses should not be underestimated. This process is one of the most costly and complex within the entire SBI program.

Third Party Data Used

Beyond the data obtained from providers, we acquired the following commercial data products:

- American Roamer, Coverage Right Advanced Services. This data served two purposes. The first was to verify the provider list and help find Broadband service providers not on other lists. The second was to verify the reasonableness of the Broadband service provider's submission.
- MapInfo ExchangeInfo, Professional. This data was used in the verification of telephone Broadband provider data. Where a public domain exchange boundary wasn't available, the MapInfo boundary was used for coverage containment tests.
- Media Prints Cable boundaries. This data was used in the verification of Cable/HFC Broadband provider data. It was used to research valid providers and discover if that provider was offering Internet service. In very rough terms the contained boundaries were used to test the location of some provider data.
- FCC 477 restricted use data were analyzed to find valid providers within a given area.

We have included third party data sources, which touch on each of the three major technologies analyzed within the SBI program. Each of these data sources tie back to a public domain data source, which provides a cross-verification mechanism for the commercial data product.

Although there are a large number of third party licensed data sources available, we remain conservative in our acquisition plans. From our limited analysis we are concerned about the ability to cross-verify additional third party licensed sources against public domain data. Further, we are unsure of how we may be able to integrate another data provider's view of valid Broadband providers within the definitions used by the NOFA (eg. Are they using an FRN/DBA identity view or a marketing view? Can the provider supply in a 7-10 day window? Are they facilities based or not?). This leads us back to a statement we made in a 'lessons learned' Webinar (April 2010) about exploring a consortia to lower the cost of data acquisition and allow multiple entities to peer review the quality and methodologies behind licensed data products.[3]

Beyond these commercial data sources, we used a number of public domain sources. These included:

a. Geographic Data Files

[3] We also suggested forming a technical standards committee and a consistent system for confidence reporting.

i. US Census TIGER data[4]

b. Sources that helped isolate providers, identity management or provider service areas
   i. NECA Tariff 4
   ii. State produced exchange boundaries
   iii. Carrier produced wirecenter boundaries
   iv. FCC Coals reports (321/325)
   v. FCC FRN API lookup tool
   vi. FCC/FAA Antenna Registration System
   vii. FCC FRN Lookup Tool (plain text search)
   viii. USAC High Cost FCC Filing Appendices
c. Sources that helped isolate anchor institutions
   i. USAC Grant lookup tool
   ii. USAC High-Cost FCC Filing Appendices
   iii. HRSA data warehouse
   iv. NCES data lookup
   v. State managed lists of schools (K-12), post-secondary institutions and libraries
   vi. List of museums, conventions, and visitors bureaus from www.onlineatlas.us

Finally, challenges exist when dealing with the inevitable conflicts between provider-submitted data and third party sources (public or commercial). There is no guarantee third party sources are more accurate or timely than the providers' own reports. Indeed, some third party sources are based upon different standards than those specified in the NOFA, perhaps making them less reliable than information collected directly from providers. At the very minimum, provider data has a lineage and temporal status that we can identify. A concern we have with increasing use of third party data is that we have no way to verify its quality or development methodology. In other words, we may hit a wall in which we can't determine how the commercial source derived its coverage conclusion. To us this means that third party data sources are beneficial, but represent a supplementary view, not an authoritative one, of the NOFA defined Broadband market.

In short, we have chosen to use provider data as the baseline. We will challenge provider reports when third party data shows major anomalies, when submitted data conflict with prior submissions or when a consistent volume of consumer feedback points to a potential error.

As the program evolves it is also our intention to provide tools that allow end users to evaluate the accuracy of the data in their own way. A confidence score or the presentation of multiple (and potentially competing) reports for the same location may be made available. This notion is discussed further in the "Validation" section.

[4] Census data were derived from < http://www.census.gov/cgi-bin/geo/shapefiles2010/main>, Census 2010 files. Roads were derived from the county faces and edges file downloaded at the same location and tiled for a full state.

Confidentiality and the Use of Licensed Materials

As a mapping vendor, we are reliant upon the cooperation of Broadband service providers. In large part, what underlies this cooperation is trust that we will not violate the proprietary and confidential nature of the data provided to us.

We are thankful for the confidentiality clarification that NTIA shared with us (included as Appendix Two). We intend to use this as a guiding document to help us communicate with providers about what information NTIA considers to be confidential. Our suggestion is that NTIA publish this, or something comparable, to ensure a consistent interpretation of the NOFA and how it guides NDAs.

As some providers are non-responsive to requests for information, or lack resources necessary to put data into NTIA compliant formats, we have fallen back to the use of commercial data sources in several places.

For instance, some mobile wireless providers were unable to submit coverage information to us. In these circumstances we have generalized the American Roamer coverage. For incumbent telephone providers we have used commercial wirecenter boundary products to filter Census Blocks that are clearly out of their exchange areas.

Public Engagement: Crowd Sourcing, Surveys and Social Media

Crowd sourcing (i.e., an intentional and carefully designed effort to tap into the collective intelligence of the public at large to expand our knowledge base) continues to be an important element of our data collection and validation process. In addition to the various opportunities the public has to provide input via the online service coverage maps and the related 'Broadband story' process, our crowd sourcing efforts are grounded in a time tested telephone survey approach focused on the consumer market. In addition, we continue to advance our process to include certain initiatives centered in two social media outlets – Facebook and Twitter. These initiatives are discussed below.

Consumer Surveys

Working under contract for the state of Alabama in 2009, our initial consumer survey was performed before the NTIA SBI grant was in place. Subsequent consumer surveys funded by the SBI grant were hosted in 2010 for the states of Idaho, Wisconsin and Wyoming and then again in 2011 for Alabama (as noted below). These surveys will be repeated after two years to establish and evaluate trends. To this end, in August/September 2011 we are wrapping up a second-round survey in Alabama designed to expand our understanding of important adoption issues and to establish important local trends from the initial 2009 survey. Survey results from this effort are currently under evaluation. These primarily telephone based surveys include two distinct and carefully scripted tracks: one for Internet users and one for non-users. The telephone survey approach allows us to reach the non-Internet user group as well as the current Internet user. A secondary online approach is also used to augment input from current Internet users. In the most recent Alabama survey we added a third tier to our approach as we equipped local field survey teams with an iPad-based survey tool and targeted their time to reaching the younger market. For non-users, the surveys help determine why they don't have or don't use

Broadband. For current Broadband users, the survey helps determine the nature of their Broadband access and how they use that connectivity in their daily lives. In addition to our state-specific surveys a nation-wide survey was also hosted to provide a broader view of consumer views for comparison purposes. State-specific surveys are, where possible, framed to match the state's regional Broadband planning structure (e.g., the updated consumer survey in Alabama was designed to produce results relevant to the state's twelve Broadband planning regions).

The resulting data is helpful on a number of fronts in the SBI's mission to advance the access and adoption to Broadband. Survey data provides an important, albeit broad, gauge for assessing coverage information obtained by providers. For example, areas with widely available coverage (according to provider information), but lower consumer subscription levels (according to survey results), or perhaps where survey results suggest Broadband is not available, can be examined in more detail. Survey results are also very important to the Broadband planning (and capacity building) components of the SBI program in that they help inform and formulate Broadband advancement priorities. Survey results also help inform Broadband policy discussions on both the local and state levels. Finally, survey results provide important information to the service provider community regarding market demand and specific Internet use in specific communities (i.e., regions).

Our ongoing consumer survey process adheres to a consistent process. For example, consistent with prior practice the 2011 Alabama survey was launched in June 2011 with a test number of survey calls to confirm (and adjust as needed) the structure of the survey and the underlying survey process. Our surveys typically run for three to four months. All telephone surveys are completely random beginning with the acquisition of a list of state-specific, randomly selected landline telephone numbers. Mobile phones are not typically included in the surveys. Upon evaluation of the survey statistics, auxiliary surveys are executed to ensure appropriate representation is achieved on both demographic and geographic fronts. For example and as noted above, the recent Alabama survey was augmented with a field effort to ensure the younger demographic (i.e., age 18 – 25) was adequately represented. This secondary step is required because of the continued migration (by younger markets) to non-landline based communications. This younger market is also surveyed by reaching out through social media outlets to encourage their participation in an online survey process.

Survey statistics from the Alabama update survey are currently being developed and evaluated. Survey statistics from our initial surveys in Idaho, Wisconsin and Wyoming were summarized in our last filing. Survey volumes are designed to achieve statistical validity.

As noted above, our telephone survey process is augmented by providing online access to the survey. Participation in the online survey is promoted on all of our state-specific public web sites and selected social media.

As a final relevant point with respect to the consumer survey process the length of the survey is noteworthy. By survey standards, these tend to be long surveys. The surveys typically average just over fifteen minutes. While this clearly contributes to the number of survey call attempts that were required to reach the level of statistical validity, it is not insurmountable.

Social Media

The phenomenon of social media is widely documented and yet still emerging as an effective access point for public engagement. We continue to explore appropriate ways to use a variety of social media venues in our SBI efforts. All of our efforts are informed by and consistent with relevant state statues and guidelines. Different states have different perspectives on if and how the state will participate in the use of social media. Some state requirements are well defined and some are still being formed. Where appropriate, we use LinkedIn, Facebook and Twitter to support our work. A central focus is on promoting awareness. As noted above, we are able to promote additional input on the consumer surveys through a social media outreach program aimed at our younger market segments.

In addition, we continue to evaluate how Facebook and Twitter can be used to drive public input on two important crowd sourced issues: online speed tests and input on map accuracy. Based on data obtained through our web site traffic monitoring process and readily available social media tracking processes, our most recent results are promising.

Capacity Building and Transitioning to State Partners

A foundational goal of LinkAMERICA has always been to transfer knowledge and capacity to our State partners. As we move into program year 3, distinct tasks are migrating to the responsibility of our State partners.

Within each State, transition planning and responsibility for specific activities is on a slightly different timeline. Much of this is driven by resource availability and partner identification within the State. For example in round 3, the State of Alabama used interns to validate Community Anchor Institution (CAI) data. In this submission Alabama took on greater responsibility for the CAI submission. To support this LinkAMERICA developed a detailed transition document describing the current CAI efforts.

Other States are looking more towards program year 3 and the in-State hire of a Broadband Coordinator as the initiation point to support their transition efforts.

Data Production Process

To support our objective of transitioning the data development process to our State partners, we continue to model and document our data production process. We find this to be a very beneficial step for two purposes.

First, it helps us understand why (and if) a task is being done, and if it is being done efficiently. Much of this program started so quickly that it was difficult to plan logical integration and hand off points among the various workgroups. Further, we are currently in the process of consolidating much of the process data (check-ins, check-outs, metadata) and we can use this process model to efficiently plan a cohesive information architecture.

Second, our process documentation and modeling helps explain why resources are being consumed in a particular way. This helps our State partners plan for in-sourcing specific tasks as their time and

budgetary constraints allow.   It also helps our LinkAMERICA team better plan and cross-train members to deal with the work surge that occurs 30-45 days prior to submission.

Finally, documenting and modeling our process helps us to take advantage of increasing specialization and proficiency with certain types of data and management responsibilities.   In submission 3, we had identified data “czars” responsible for check-in and check-out of data. That data czar helped to bridge the gap among receipt functions, provider feedback, production and DBA.

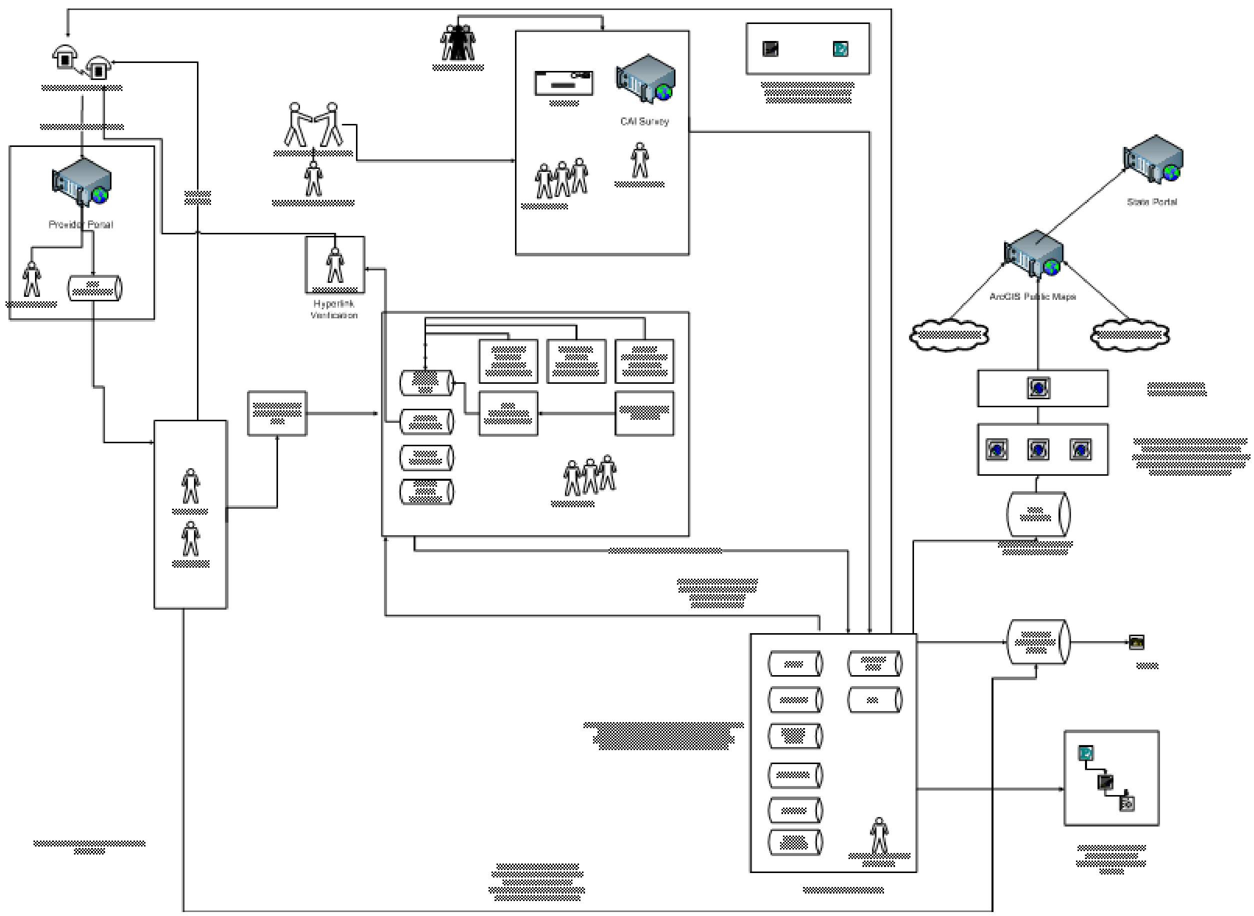

Figure 1—SBI Data Development Business Process Diagram

Data Production Methods

As raw data were received from the provider community, attention turned to normalizing the disparate submission formats[5]. The team considered each submission with respect to the following criteria. These criteria are important because they perform the basis for our verification and quality assurance

[5] In line with NTIA Best Practices we continue to request and receive a large number of data input formats. This ranges from tabular Block lists to hand drawn maps.

process. In other words, we have to appropriately scale our data verification efforts to match the scale or ambiguity of the following:

- Locational certainty
- Speed certainty
- Temporal certainty
- provider and network ownership certainty

The team's goal was NOT to quantify a particular degree of precision with respect to any of these criteria. Rather, we are working to attribute the above "certainty attributes" to each submission, and will continue to implement quality assurance and verification mechanisms that are resource-appropriate for each.

Deriving Broadband Coverage Information

Broadband Coverage[6] was normalized into four formats:

1. Coverage in Census Blocks (2010) of 2.00 or less square miles
2. Covered Street Segments (2010) in Census Blocks greater than 2 square miles[7]
3. Address Level Coverage (point data)
4. Wireless Service Areas (SHP file format)

With each submission, the team went through a series of steps to normalize and categorize the data. Since data arrived in many different formats, and at many levels of granularity, the following normalization procedures were used:

1. Determining the nature of service being provisioned (who is providing service and what technologies are in use)
2. Planning an attack strategy for the submission –understanding the data and assigning team members to various tasks
3. Geo-referencing the data; QA the geo-referenced data
4. Geoprocessing the geo-referenced response
5. Segregating the submission into the correct NOFA-compliant submission formats.
6. Apply appropriate source metadata[8]

[6] Speed, Anchor institutions and Middle Mile facilities are discussed in later sections.

[7] To help clarify issues relating to Census block area and vintages in use, our team published a technical paper to the Grantee workspace. Because we were unsure if this standard should be implemented uniformly, this document was never distributed to the provider community.

[8] When our team logs a submission into the staging database we record at least two attributes. One records the method used to derive the coverage, the other records the method by which speed was attributed to that object. Other attributes carried to NTIA carry source meta values as well.

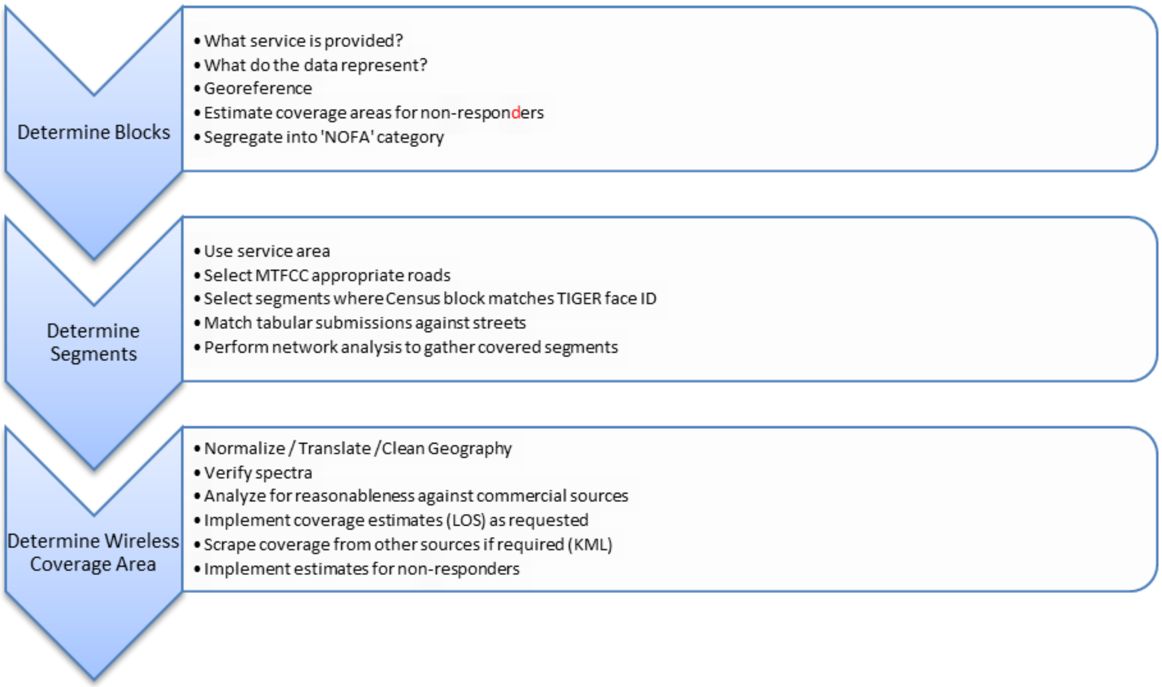

Figure 2-Broadband Coverage Process

Impact of Program Change

There were several important program changes that impacted how Broadband coverage was developed and submitted to NTIA in Round 4.

Census Conversion

The first and most obvious change in submission 4 was the conversion to a Census 2010 coverage baseline. This impacted all wireline providers, the data submitted, the appearance of the mapped information and the baseline coverage metric comparisons against prior submissions.

Release of the June 30 Grantee guidance document, allowed LinkAMERICA to communicate this change with providers. LinkAMERICA provided by FTP access appropriately formatted and sized[9] TIGER 2010 Census blocks and Tiger Road Segments. Given the relatively late release date, we received a mix of responses from Broadband providers. Some easily produced Census 2010 information. Others requested that we do the translation from their supplied blocks and segments. Others requested that we translate their engineering data into appropriate formats. A small number of providers committed to producing Census 2010 data but struggled internally with the conversion in this rapid time frame.

Census 2010 has significantly more Blocks than Census 2000. For the most part there are far more small Census 2010 blocks (less than 2.0 sq mi) than Census 2000. As our team worked through the QA process, this presented a significant challenge in comparing our converted results to prior submissions. We use a block count metric as our first test of consistency across submissions. Since the block count

[9] In Submission 3 we released a technical note describing how we measure Census block area. Although there remains no consensus on this, we used the same process as outlined in the paper.

increased it was hard to distinguish coverage area changes from coverage chances resulting only from a change in Census shapes.

The converse side of this challenge was even more precarious to work through. Because many road segments dropped out due to the covered area now being in a small block area it was difficult to determine how effective our covered segment process was given the fact that many segments naturally dropped out due to changes in Census shapes.

The tendency for large blocks becoming small was not universal. We note in some of our very rural areas of Wyoming and Idaho, small block covered areas become large. This created a contrary situation where small blocks become road segment areas. The image below shows a coverage area change between submission 3 and 4. The covered number of blocks is comparable but the appearance of the coverage is different as a manifestation of the Census change.

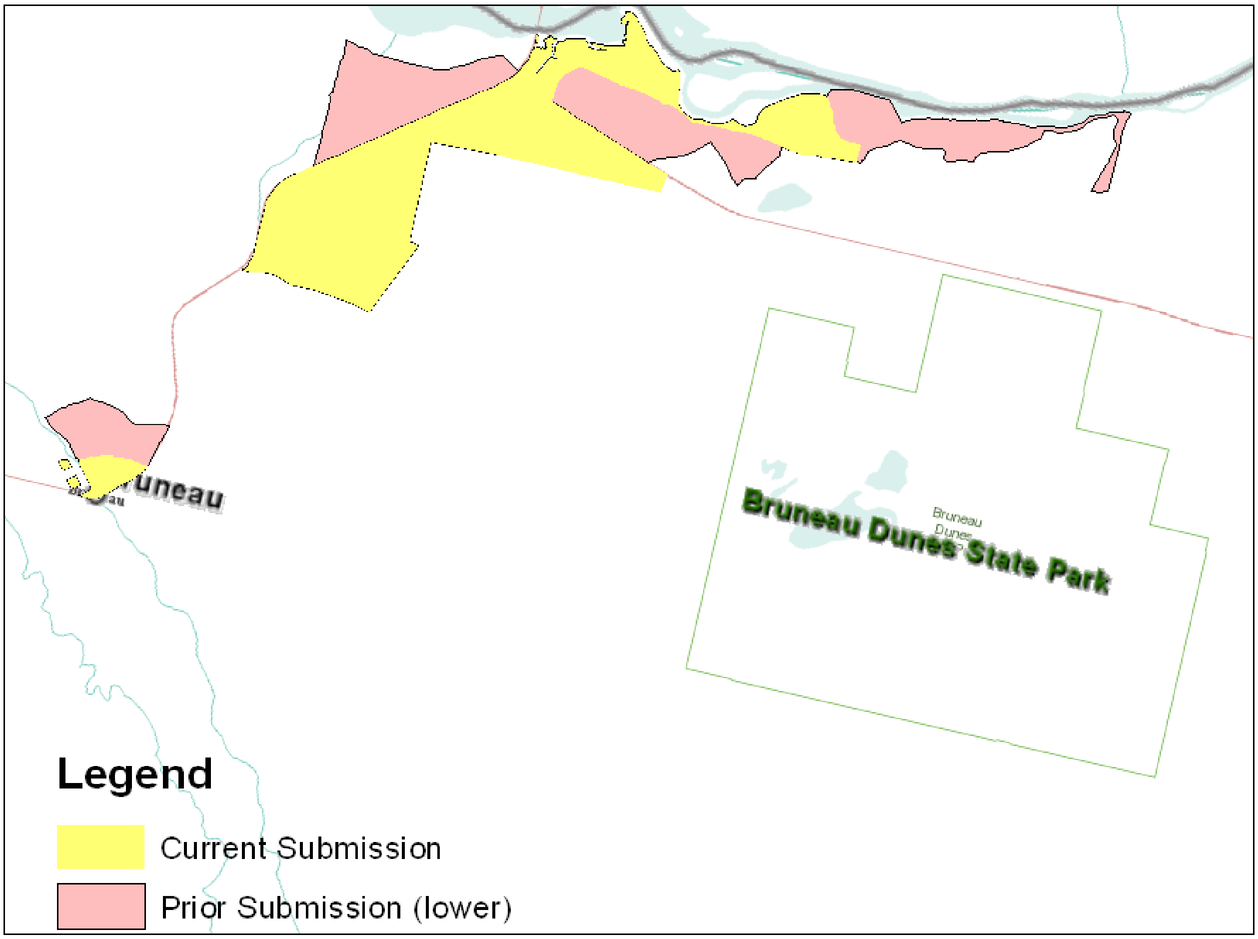

Figure 3--Coverage Change across submissions

This somewhat indeterminate process required our QA analysts to examine a number of submissions in detail. The conclusion was that although the appearance of coverage was significantly different, the underlying engineering data was the same (or very similar) but how the coverage was manifested was a product of the Census conversion.

Census Conversion Practices

Although we had hoped there would be a single process we could follow for all Census conversions our experience has been that it is necessary to be flexible and base the Census conversion process upon the data received.

On a subjective level, we felt the most comfortable converting into Census 2010 where we had facility or demand data to guide the block and segment selection process. In these circumstances we used geoprocessing methods like intersections or network analysis Analyst to make an objective determination. The geoprocessing methods mirrored those discussed in the next section. This was probably the majority of our submitted data.

In circumstances where we were provided Tiger 2010 blocks or segments, we used those as given and performed our standard validation process. Some providers used the TIGER blocks and segments which we supplied them and made their own selections.

Finally, in circumstances where we had either a Census 2000 block list or a geographic file containing Census 2000 geographies and were told there was no coverage change for this submission, we used the Census crosswalk tables[10] to derive a list of candidate blocks. The output of a conversion process is shown below.

[10] See http://www.census.gov/geo/www/2010census/rel_blk.html

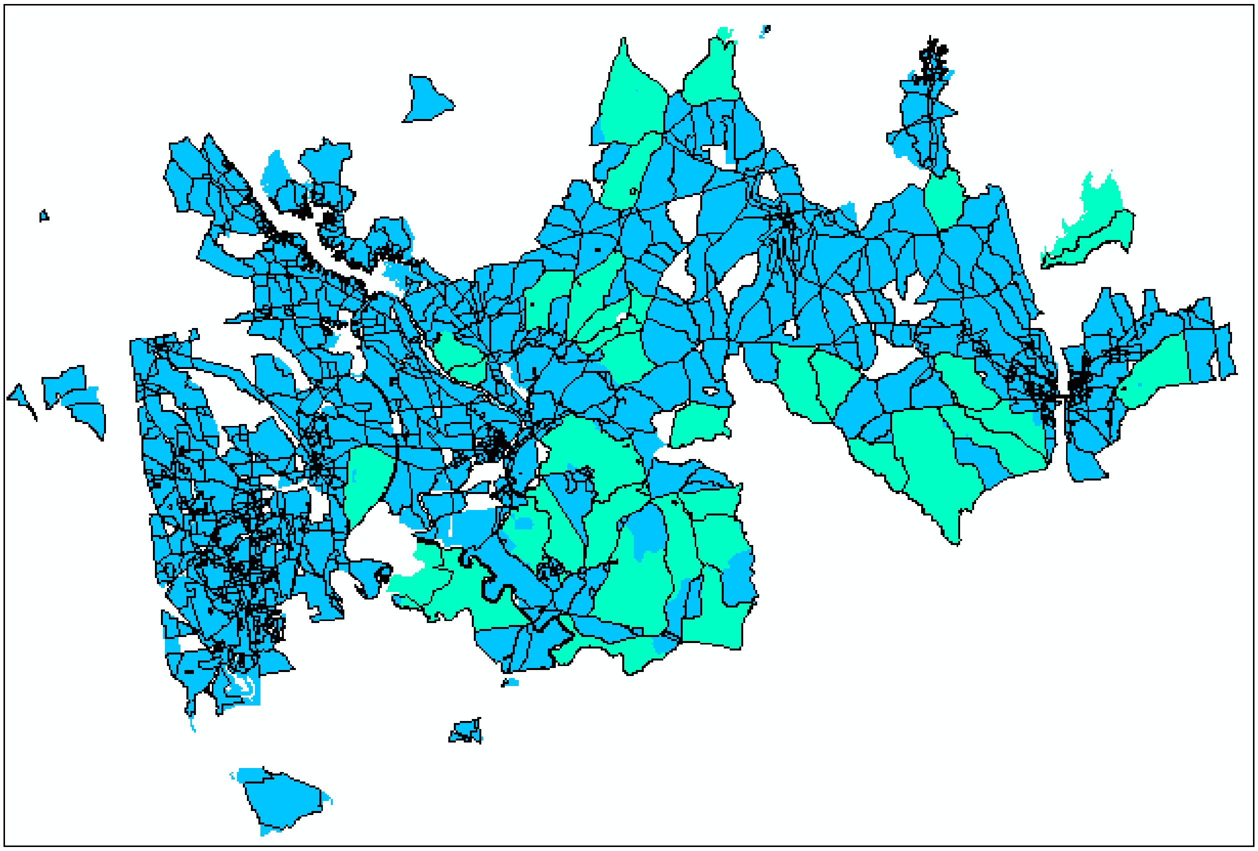

Figure 4—Block Conversion Process, Census 2000 black outline, no fill. Green is 2010 large blocks, so any shading without an outline is 2010 block area not covered in 2000

For the most part it is difficult to discern the impact of a conversion into Census 2010. We don't see vast changes in areas covered. Nonetheless because the block shapes do change the overall coverage area will look different.

As the 2010 data gets pushed into public deliverables, our sense is we will receive questions about the appearance of the new data.

Speed Examination

Given recent concerns about the depiction of speed and what that mapped speed represents, LinkAMERICA invested considerable time requesting detailed information on speed which appeared to be beyond normal speeds for a given Technology of Transmission given the NTIA supplied frequency tables.

Based upon these conversations we learned

A) For a large incumbent telephone provider; the speeds beyond the normal DSL range represent significantly shortened copper loops.

B) For a large national cable provider the intermixing of Docsis 3.0 and non 3.0 systems in a market area is typical and sometimes reflects a circumstance where segments of plant cannot

be upgraded to Docsis 3.0. This variance can be at a level below the Census block. In these cases the maximum advertised speeds remain to represent the market area but the plant variance is typical. This same provider expressed concern with moving reported advertised speeds below the market level.

C) We have a minority of providers who submit a theoretical speed that is unmatched by their web advertising. In these cases we request clarification from the provider on the inconsistency. Our experience has been that providers will modify the speed to be consistent with their web coverage.

Provider Definitions

Within our provider verification process we work to derive a state level provider match against third party data sources. As discussed in the early pages of this manual, there is no guarantee that a third party data source is any more accurate than submitted data, nor does it necessarily reflect the provider ecosystem specified in the NOFA, Technical Appendix A. We devote significant resources to matching our submitted data against three, third party data sources. In many cases this becomes a judgment call trying to match provider names across systems. It is a difficult and somewhat arbitrary process. Nonetheless we do believe it has value because it forces a re-examination of who we believe is an appropriate provider within a non-NOFA context[11].

The use of a provider match system, as well as the webinar comments (3/17/11) directing grantees to estimate, wherever possible, non-participating providers have made us back away from one of our fundamental assumptions in data collection. As discussed in the prior draft of this manual, we had developed a certain "hold-out" class of data when a provider's data wasn't of sufficient quality to verify, or we were unable to put it into the data model (eg. address points submitted for a wireless). In this submission, much of this hold-out data has been included[12]. In some cases this means we are using simple polygons to capture a wireless ISPs serving area. Other times, if we are confident in the coverage, but can get little clarification on the submitted speeds or frequencies, we release the coverage and note in our internal metadata the source issues with the other attributes.

Finally, we have used the new provider type classification of 'other' to bring some aspect of the provider's data into our submission. There still seems to be confusion on how to handle provider types where a provider offers multiple paths to provision Broadband for typically business customers. Rather than waiting for certainty on the answer, we bring the provider in and list them as provider Type "other". Our sense is provider Type "other" will continue to expand in subsequent submissions.

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[11] We have requested from NTIA information on how provider matching is done within their QA process; beyond the relatively short whitepaper posted with the national map <http://www.broadbandmap.gov/blog/wp-content/uploads/2011/02/DataComparison_Methodology2.pdf>, we have not received any more detailed information on how providers are cross verified between submitted and third party sources at the national level. Our understanding is licensing concerns are holding the release of this information.

[12] We continue to process older submission data looking for information and methods by which we can estimate coverage information. This will be an ongoing process.

Clearly one challenge is the data, but an equally significant challenge is appropriate messaging around this "other" provider type category. We do not want to leave consumers with the impression that they can get a high capacity fiber or microwave link despite the fact that the hospital next to them in the same Census block can get this service.

After the Grantee conference, LinkAMERICA submitted a paper describing our provider classification system[13]. It is our feeling that understanding the type of provider is essential to appropriate verification methods.

Coverage Geoprocessing Methods

The next section discusses how data were georeferenced and geoprocessed given a particular submission format. We have yet to find a particular method that works across all submissions. Rather we tend to tailor our geoprocessing to meet the specifics of the service provider and data submitted.

In most cases, in Round 4 we were still not provided with street segment level information for Blocks greater than two square miles (large Blocks). This necessitated subsidiary geoprocessing. As stated before, our first goal was to derive block level coverage. Then, for Blocks greater than 2.00 square miles, we moved to a segment gathering processing. The segment process will be described in the last section.[14]

Block Level Coverage Derivation Using Service Point Data

A number of providers submitted point level customer data.

In some cases the submissions themselves were not internally consistent. For example, in the image below, unprojected points are shown, while the Census block polygon to which the points are supposed to "belong" is highlighted. In this case, one of the following scenarios has occurred: block attribution is wrong, the points are not in the location to which they are attributed, or different block shapes were used than what is assumed.

[13] https://sbdd-granteeworkspace.pbworks.com/w/file/42309493/provider%20ClassificationFINAL.docx

[14] As has been discussed previously, we note inconsistency in how providers are supplying information at the block and segment level. Beyond the temporal differences, we see that providers are computing area differently, as well as including or excluding water areas. This provides an inconsistent measure across providers for the 2.00 sq mile cut off. Our preference would be to provide guidance to service providers within our states, but our concern is that we will inconsistently message this with grantees in other states. We would appreciate consistent guidance from FCC/NTIA on this topic.

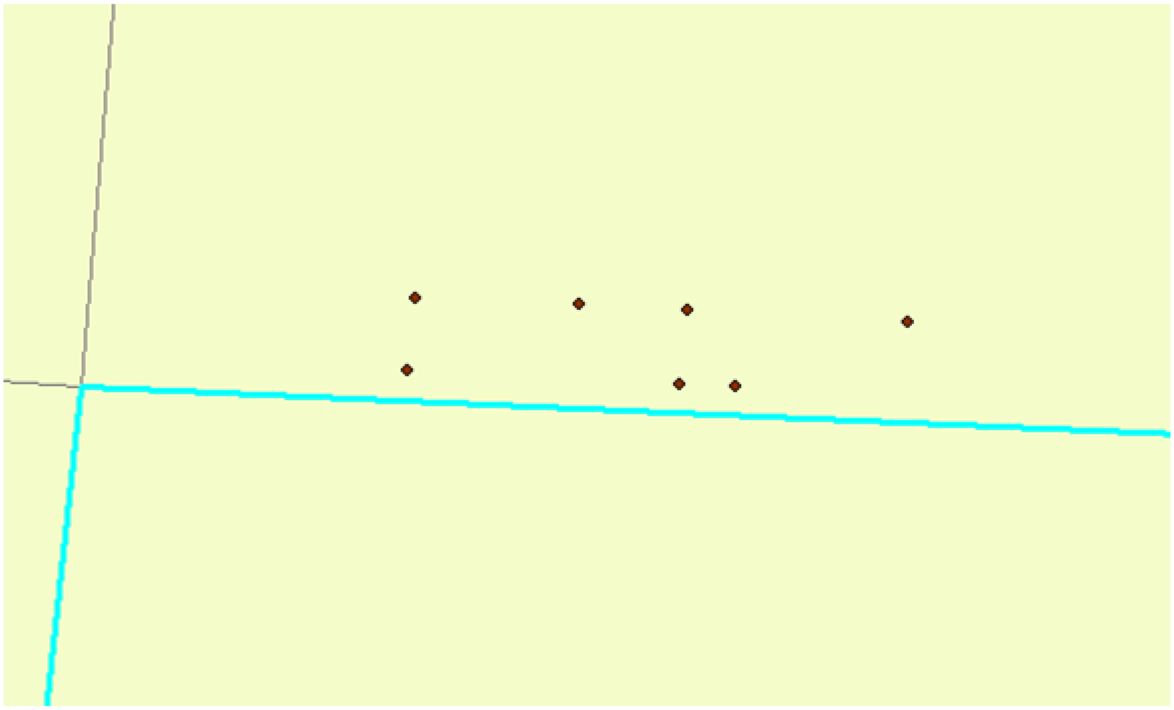


Figure 5-Internal inconsistency in submitted data

In other circumstances, we found that inconsistent geocoding standards may produce misleading results. The next image shows point level data, and the Blocks are colored based upon the counts of points intersecting Blocks. The challenge this presents is that if geocoding was performed on a different dataset than the block boundaries (the road traces are not coincident with block boundaries) and/or geocoding was done without an offset, it becomes problematic to assign coverage to a Census block based upon only the point locations.

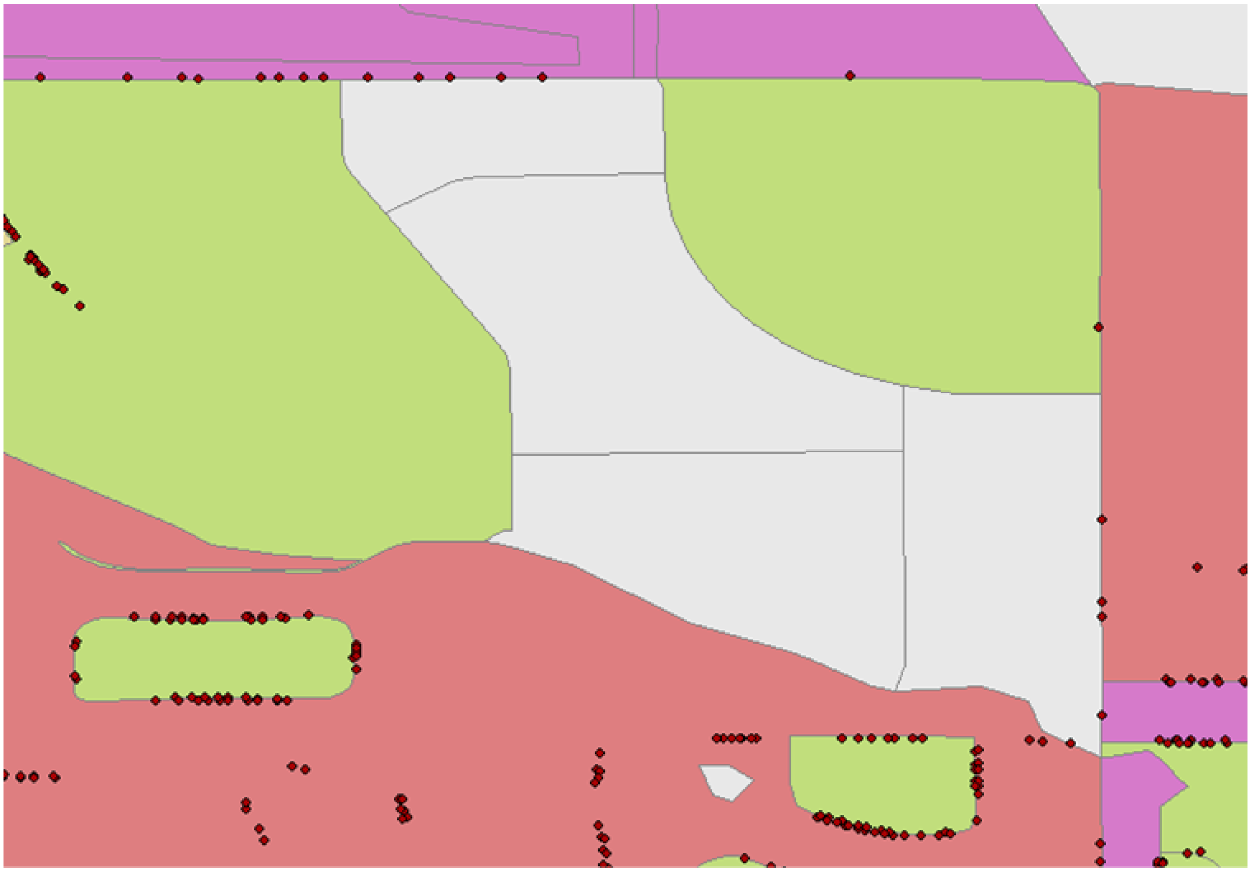


Figure 6-Block Coverage

For this reason, where we were provided address point data and asked to generate covered Census blocks, we elected to use a 200-foot buffer to select Census Blocks that intersect our points.

We are also starting to see a number of providers submit customer data and facility data. Their intent is to allow us to have two primary sources from which to derive the most accurate coverage. In these cases we tend to look for clusters of customers in areas where we see no facility based coverage.

With respect to deriving Block level speed from sub-Block data, we have instituted a business rule where the predominant speed in a Block is the speed we attribute to the Block.

Block Level Coverage Derivation Using Customer Facing Plant Level Point Data

In other circumstances, providers submitted point level plant data. From what we could gather, these points tended to be customer-dedicated terminals. Typically, these providers were high speed Broadband producers—which may somewhat strain the definition of Broadband as other providers supplying comparable services specifically disclaimed the ability to provide high-capacity Broadband services in the required 7-10 day interval. In these plant point data submissions, we had similar concerns to the point level customer data, but two factors tended to make us use a more conservative intersection buffer. First, we tended to have far fewer points to work from, so our concern was grabbing too many covered Blocks as the Blocks tended to be much smaller in these urban areas.

Second, these plant points tended to be dedicated to distinct customers, but it was difficult to know which element of the customer's campus to attach coverage to.

In the case of the image below, given a small shift to the left, it would be easily possible to gather 1 to 3 Census Blocks from this point. Although orthoimagery is helpful in a circumstance such as this, it is still indeterminate.

Thus, in the circumstance of plant level point data, we used a 100-foot intersection buffer.

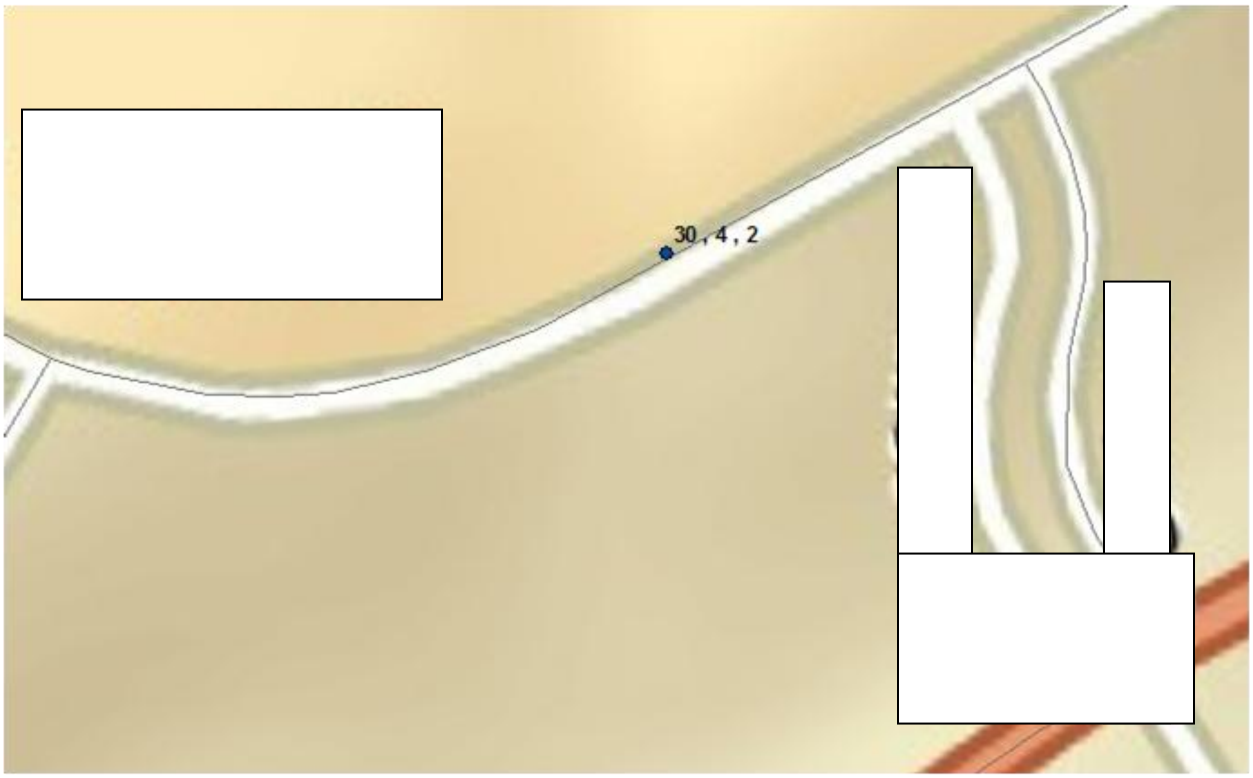


Figure 7-Plant Point level data

Coverage Derivation Using Linear Facilities Data

A number of providers submitted facilities data. We handled this data in different ways depending upon what we believed the facility data represented.

Most telecommunications networks are divided into two components. Feeder supplies higher capacity nodes (eg. DSLAMs, Fiber Nodes). Distribution usually supplies customer premises (NIDs, Pedestals, Taps, ONTs). Where we could discern what strand we were provided, we used different methods.

The next image demonstrates a geo-referenced CAD image as given to us by a Broadband service provider. Note the light and dark green shading. We would infer that the lighter segments represent distribution and the dark green represents the feeder network.

In the case of a combined strand map, we used a relatively tight buffer of 200 feet to gather covered Census Blocks. Our intersection tolerance is based upon an assumption that our data likely represent a

situation comparable to customer point level submission in that we have most of the network footprint captured.

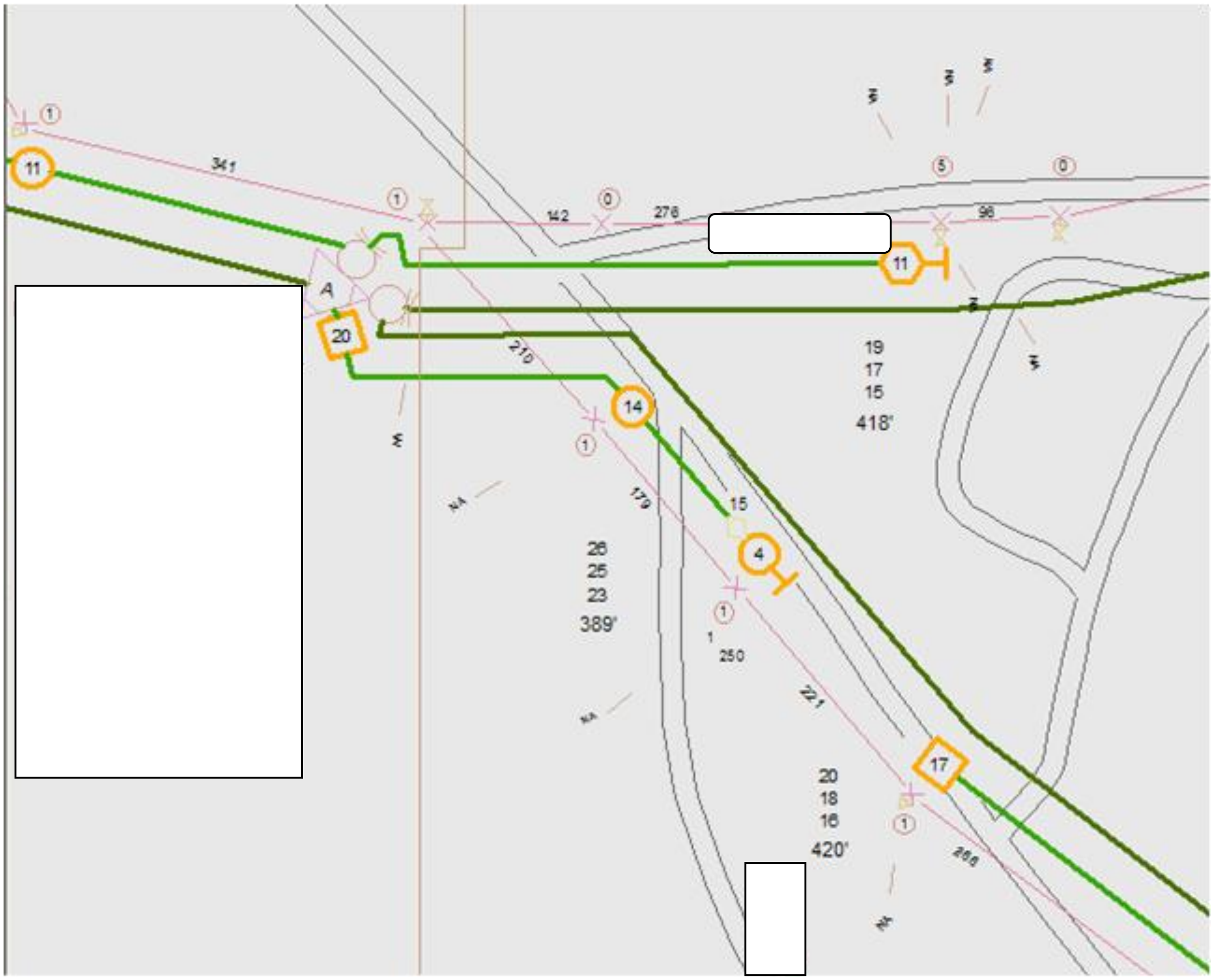


Figure 8-Georeferenced CAD information supplied by Broadband provider

In other circumstances, we were provided engineering information that we inferred to be feeder only. This inference was typically based upon the presence of fiber optic equipment only. In these cases, we used a more generous 2,000 meter Census block intersection. The 2,000 meter criteria was based upon an informal survey of population in proximity to the geo-referenced strand data, but it could be varied based upon a more complete survey.

Coverage Derivation Using Covered Street Segment Data

In some cases we were provided with covered street segment data. Covered segments tended to come from two sources.

In some circumstances, providers gave us CAD data, which was not drawn in a projected manner. This is relatively common for older engineering data derived from hand drawn records. This meant that our

team geo-registered the image into an approximate position. In this case, the boundary streets were selected, and an enclosing polygon was derived. The intersection of this polygon and the Blocks within became the geoprocessing method to derive Blocks.

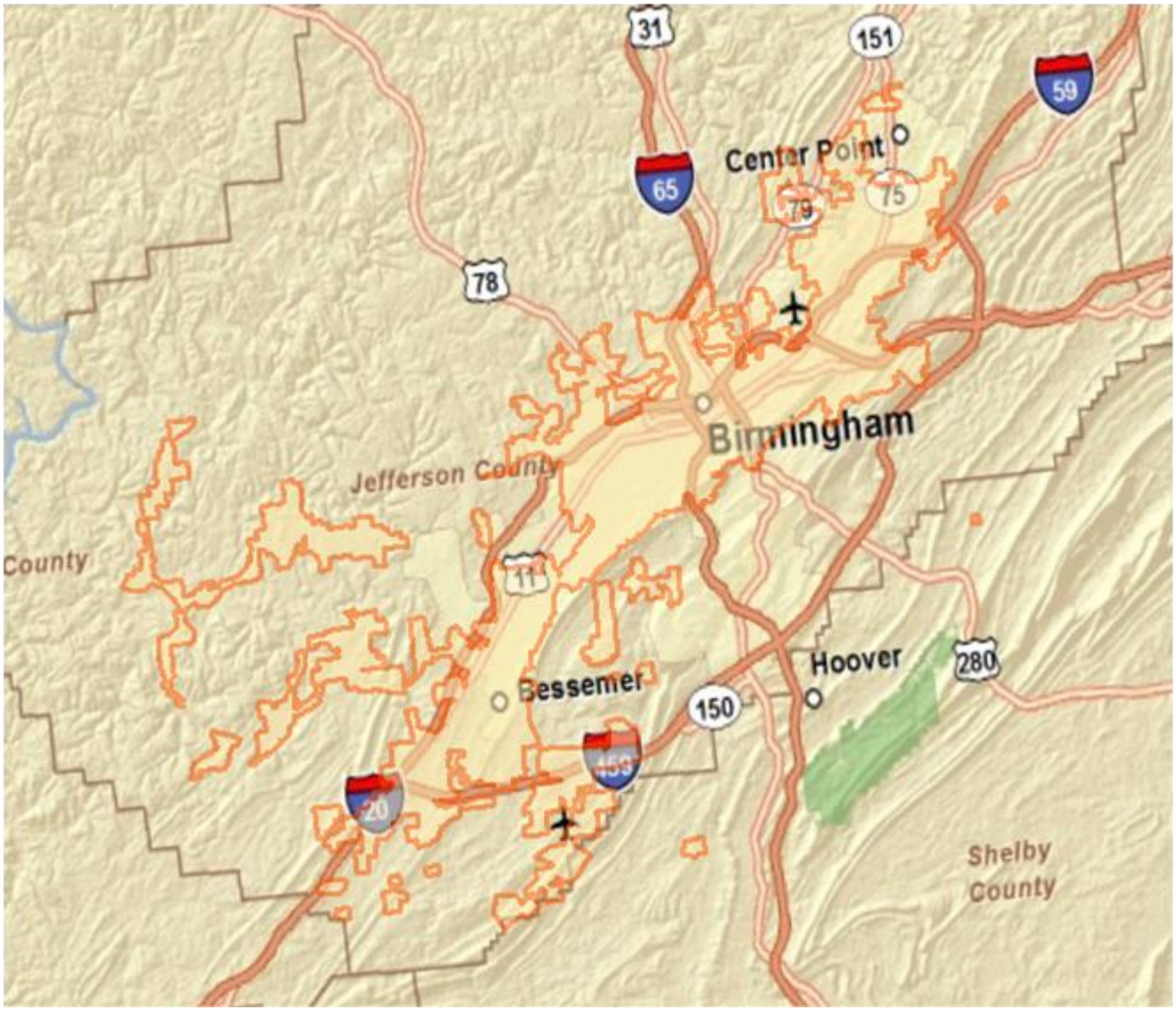


Figure 9-Coverage derived from street segments

In a second circumstance, street segment data was developed during coverage estimation. Handling the estimated data is discussed below.

Coverage Derivation Using Serving Area Point Submission Data

In other cases we worked with providers to derive service areas based upon point plant data. In these cases we were given a serving node and an appropriate road length service boundary. There is an important distinction from the plant data discussed above. In this specific case, the data submitted was a node that served many locations--such as a Central Office or DSLAM. This is contrasted with the earlier example in which the point represents a node serving only a few customers.

When trying to derive coverage from Central Office or DSLAM nodes, the team used ESRI Network Analyst to derive covered road segments honoring these road engineering parameters.

The figure below shows street level coverage derived from Central Office and remote DSLAM point data.

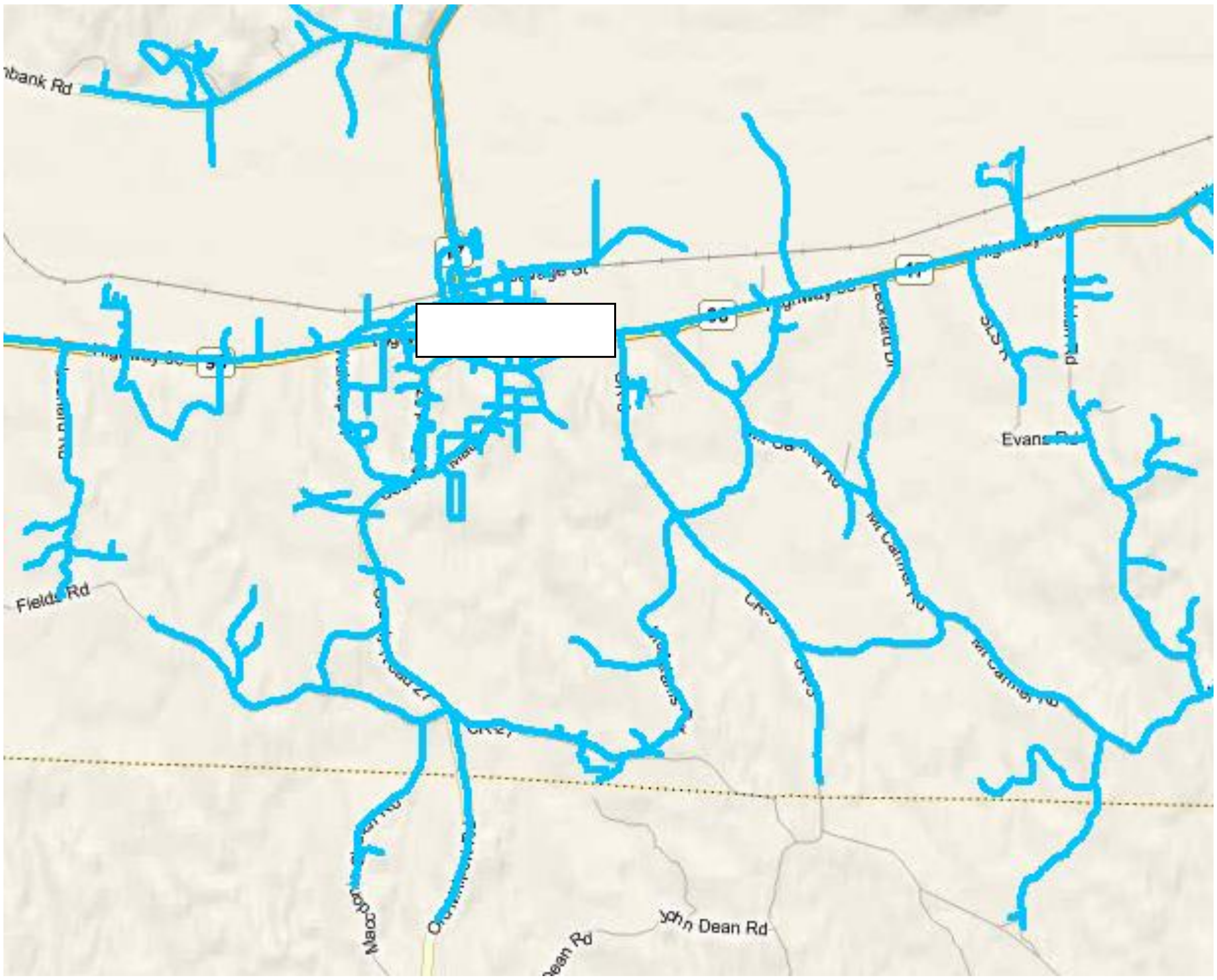


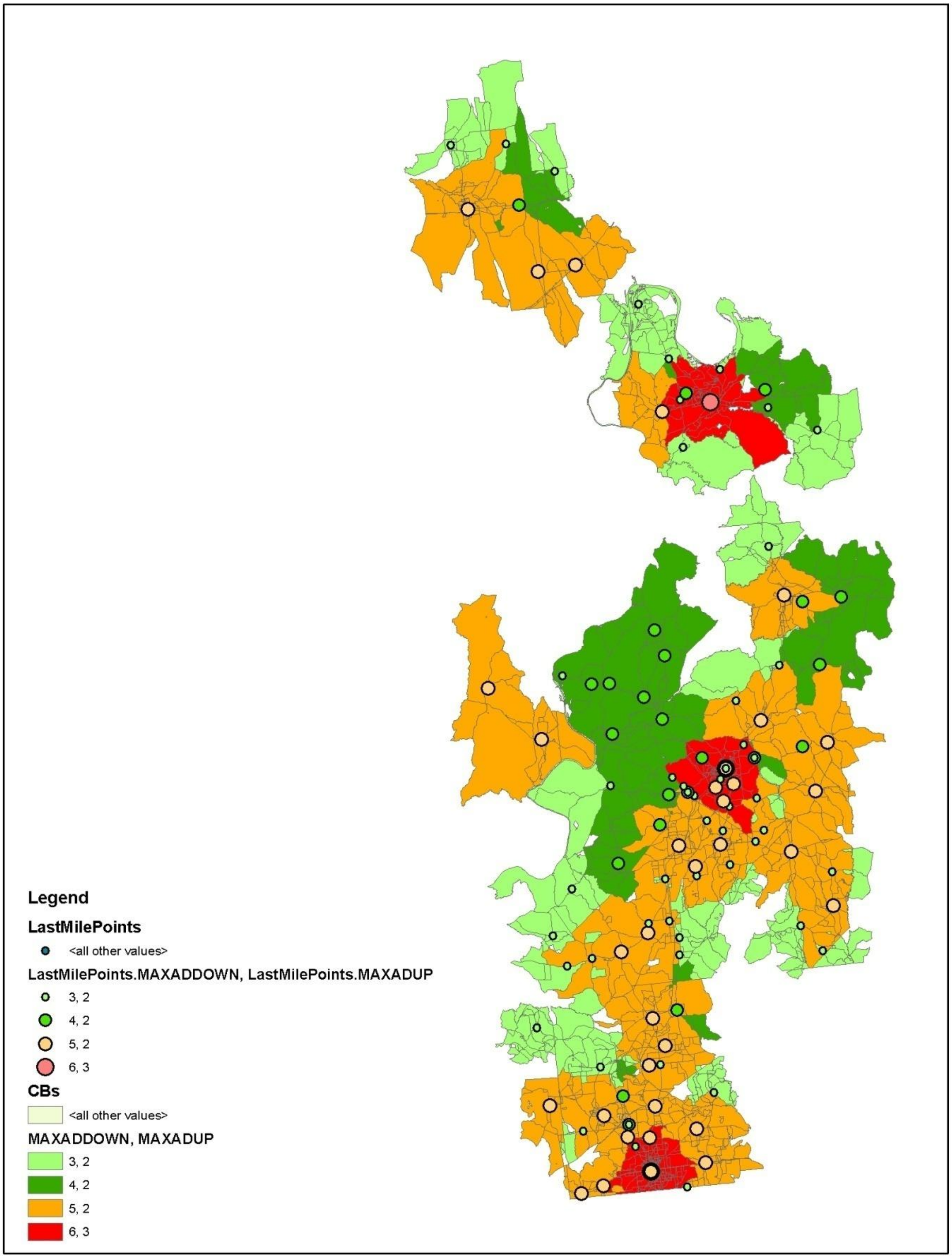
Figure 10-Coverage derived through road paths

In response to Provider feedback we revised this process to include a larger variety of TIGER road types. In Round 1, unimproved roads were not used. In the current submission -- particularly to improve estimates in areas bordering parks and public lands -- a wider class of TIGER roads was used.[15]

The segment level coverage is easily extendable to derivations of Census block level speed. The figure below shows the attributions of block level speed based upon the Maximum Advertised Speed available from a DSLAM. Although the methodology isn't perfect, it does provide insight into the value of granular infrastructure data.

[15]Only TIGER features of MTFCC type S1100 and S1200 were excluded from use.

Over time we have seen an increase in the number of providers submitting this type of data for our use. Our sense is some providers find plant level data easier to generate and are satisfied with the results of derived coverage.


Legend
LastMilePoints
<all other values>
LastMilePoints.MAXADDOWN, LastMilePoints.MAXADUP
3, 2
4, 2
5, 2
6, 3
CBs
<all other values>
MAXADDOWN, MAXADUP
3, 2
4, 2
5, 2
6, 3

Coverage Derivation Using Polygon/Polyline Serving Areas

Broadband service providers sometimes submitted coverage in terms of served areas. This was either in direct geospatial formats, CAD files, or paper maps. The image below reflects a carrier's service area. Within that service area, there are variations in technology of transmission and served speeds. When polygons with speed data and technology of transmission were available, we used a spatial intersection to gather covered Census Blocks. In many cases, using covered Census Blocks resulted in a loss of the speed variation (sometimes the speed variation was at a level smaller than a Block and did not get picked up within a spatial query).

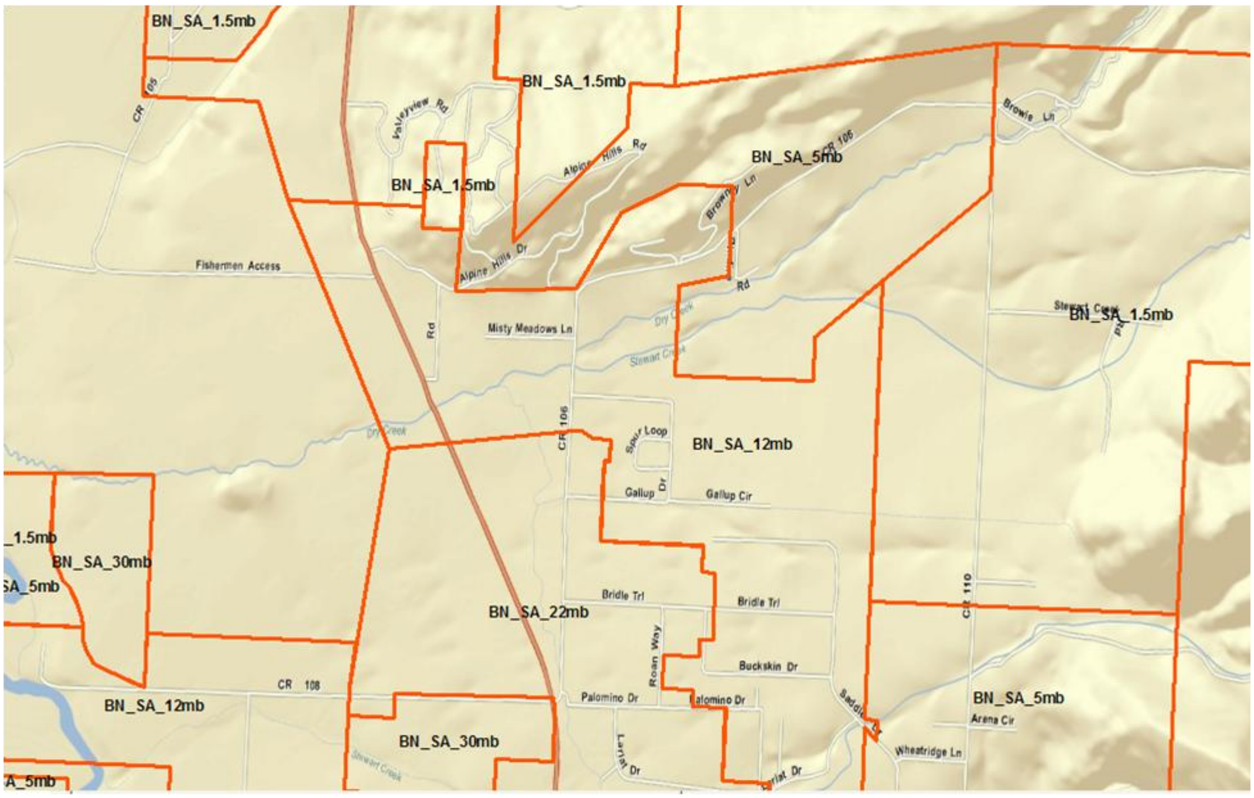


Figure 11-Coverage derived through serving area polygons

Although we cannot directly solve the loss of speed granularity due to Block shapes, we honor a business rule wherein we always select Blocks from the highest speed areas first, and then allow the lower speeds to select from the remaining Blocks. This is an arbitrary rule, but our feeling was that it should be a consistent selection, rather than an unordered selection.

Street Segment Derivation, Large Blocks

For those calculated Blocks greater than 2.00 square miles (large Blocks), we provided coverage in terms of covered street segments and corresponding geography.

With respect to segments we had four sources of data:

1. Covered large Blocks
2. Tabular street segments and address ranges for large Blocks

3. Geographic segments either with street attributes or without
4. Service area boundaries

A number of providers only provided a list of covered large Blocks without corresponding segment information beneath the block. This provided the dichotomy of either selecting all segments in the block, or none. Because we had little information from which to make the selection, we elected to be conservative and did NOT pass any covered segments to NTIA from this submission format. Some Broadband providers submitted covered street names and street ranges. In these cases we performed a manual analysis trying to link to specific segment names and address ranges within covered Blocks. Sometimes this was a simple process because a provider used a TIGER derived street database. In other cases we could not determine the source of the provider's street data. Street and Address matching tended to yield a relatively good result (typically between 30% and 100% of possible segments in the Block), but was very time consuming. Where yield rates were low, our result was a shredded segment coverage pattern, like the image shown

below.[16]

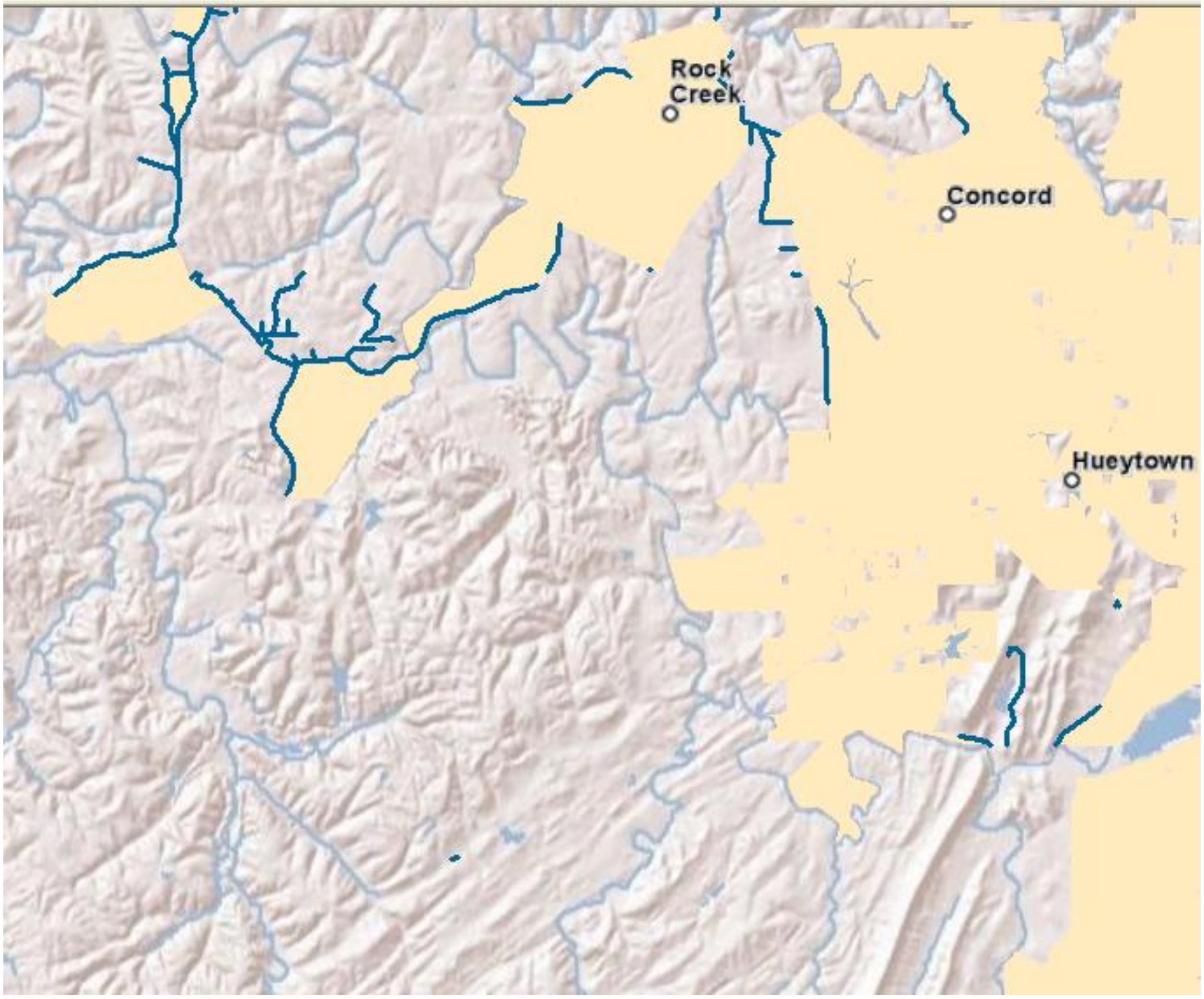


Figure 12-Blue road segments adjacent to peach covered small Blocks

A number of providers submitted geographic objects. In this case, our manual process was directed toward a conflation of data sources. The goal was to take provider submitted segments and put these segments in terms of our TIGER 2010 basemap. Although there is a trade-off in the accuracy using non-provider submitted segments, we felt it was more important to have a road set that would edgematch our Block features and remain consistent with the Block size standards we used for other providers. This is important for the appearance of the online maps, as well as potential verification work where we are attempting to judge a feature based upon its attachment to a covered small Census block. The figure below shows street segment input data.

[16] We continue to hear providers expressing concern that our request for either a geographic object or TIGER Line ID is beyond the scope of the NOFA clarification. Therefore, they cannot supply additional information to us.

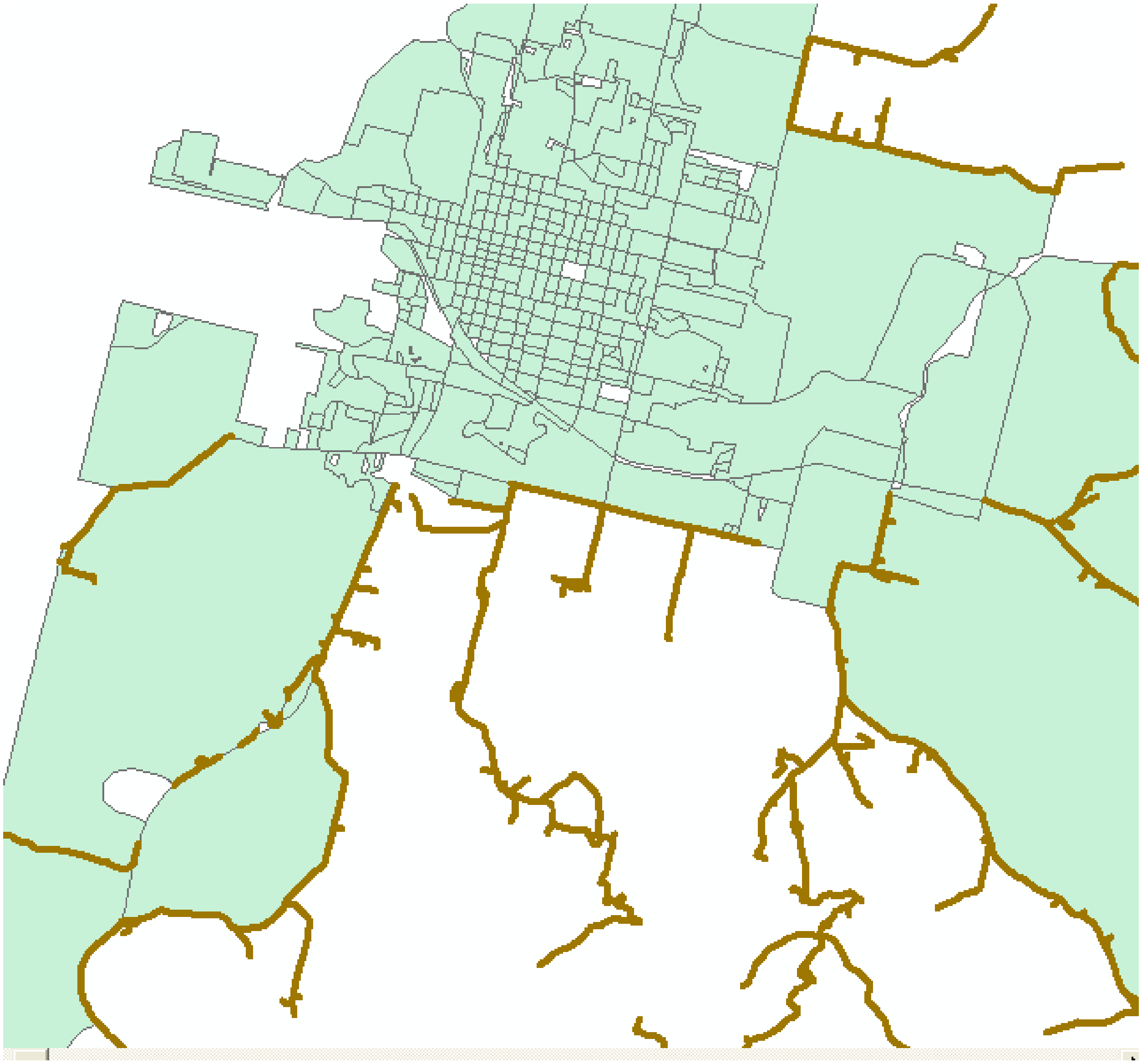


Figure 13-provider Submitted Street Segment Objects. The segments don't edge match the Blocks nor are they continuous.

The figure following demonstrates the same area after the conflation process. Blue segments are the conflated TIGER roads which will be passed to NTIA.

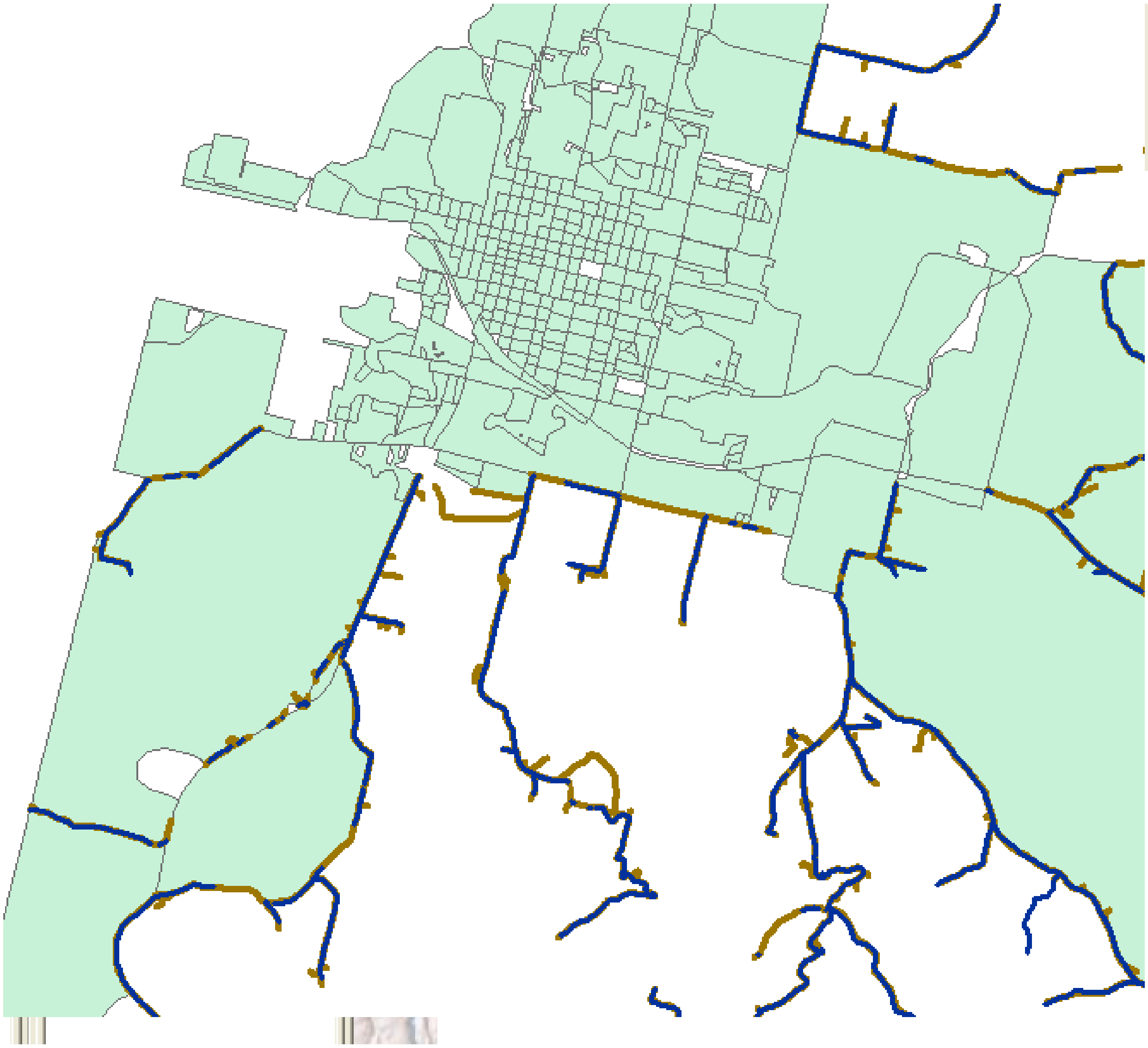


Figure 14-provider submitted segments in gold, selected TIGER in blue—Conflation result; in many cases what was a continuous segment is made discontinuous because even with a distance buffer the TIGER segment doesn't always intersect the provider segment

The final segment process was used when we were supplied with a Broadband covered area polygon. In this case, we found the segments within covered areas and eliminated those segments inside of Blocks less than or equal to 2.00 square miles.

Because there was more control over the format of the inputs (we knew we had a boundary and were working with TIGER segments), this was an automated process that followed this general format:

1. Select large covered Blocks by provider ID (from updated Large Block table)
2. Select TIGER 2010 road segments (MTFCC like 'S%') that face (CB = CBLeft2010 or CB = CBRight2010) covered large Blocks for provider

4. Select segments as distinct records, max speed with corresponding technology, join in feature names, export selected records to temporary DBMS table
5. Join TIGER roads feature class to temporary table on TLID
6. Select covered segments (Python script)
7. Select service area polygons for provider
8. Clip selected facing segments with selected service area
9. Export clipped segments to staging feature class, keyed by providerID

In this figure, orange represents covered small Blocks; black lines are covered segments in large Census Blocks (light blue). The service area boundary is shown in grey. Based upon feedback from providers, we have elected to clip segments at the end of a coverage boundary.[17]

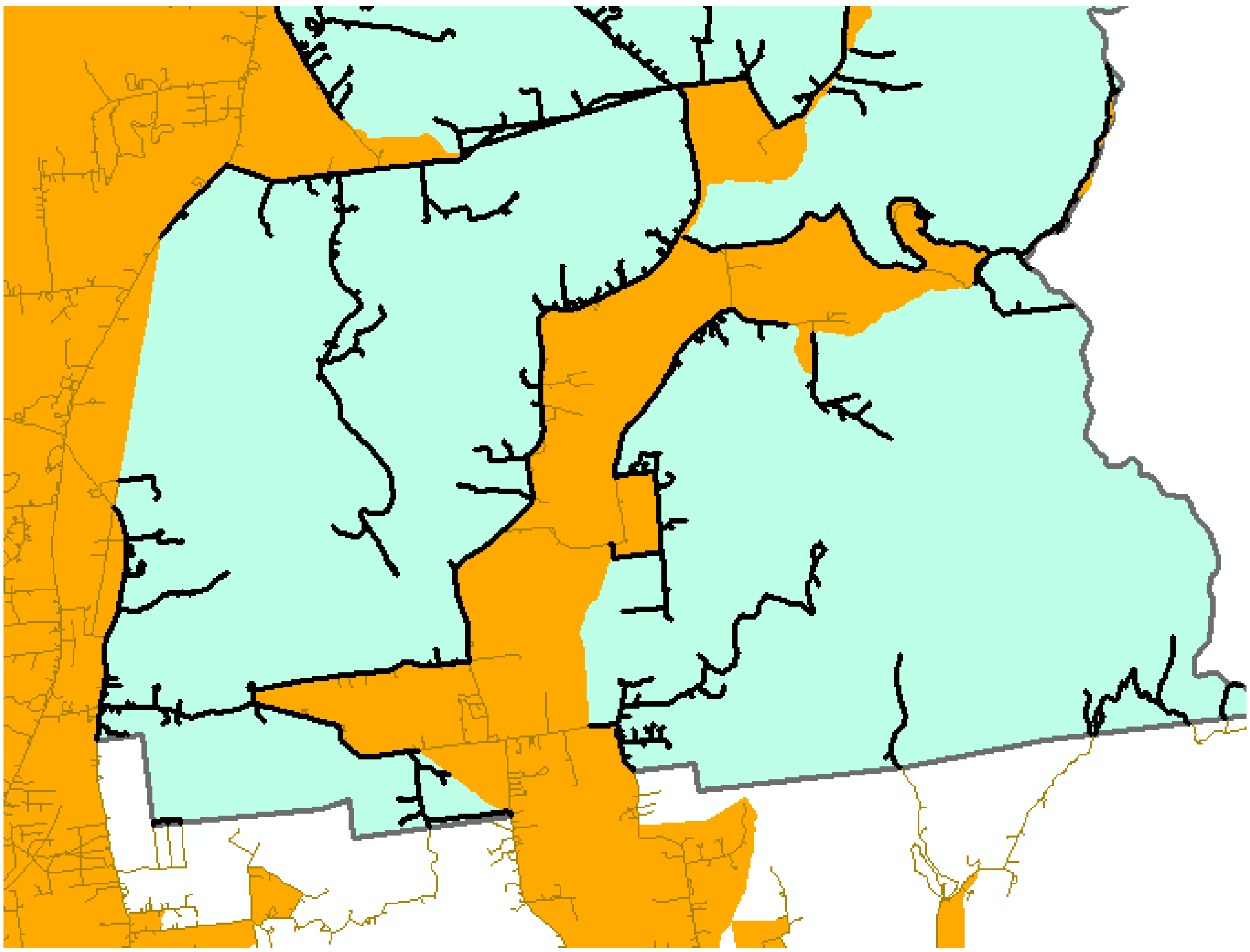


Figure 15-Output of the Segment Process

Wireless Coverage Process

In general, most providers of mobile Broadband submitted coverage information in a NOFA-compliant format. Other than attributions for spectrum and speed, little was done to this coverage.[18]

[17] An outcome not discussed here is how to handle address ranges on segments. As NTIA is asking for a Min and Max on the segment, deriving theses values for clipped segments is very problematic. Also the prevalence of alphabetic characters in addresses makes the min/max selections very arbitrary. We are grateful that addresses are nullable data elements.

LinkAMERICA continues to make aggressive efforts to bring additional WISP coverage into the NTIA dataset. For the most part, our outreach was with providers who were unable to supply sufficiently granular data in the past or those that could only submit wireless address points which is no longer a valid submission format.

In Round 4 fixed wireless providers generally either supplied coverage information or infrastructure from which coverage estimates could be derived. Many allowed us to use their tower locations, antenna heights and direction/spread of coverage to derive a line of sight coverage estimate. In our experience, this is a conservative and reasonable derivation of coverage.

Some wireless providers submitted RF studies. When this was done, there was a request that the signal strength be removed from coverage data. The request was honored.

Other fixed providers were able to supply us with hand drawn maps or polygons/polylines drawn in Google Earth format. In these cases we did our best to georeference and verify the coverage areas with the WISP.

When we received coverage information in KML format, like the image below, we accepted the data as it was presented to us.

[18] Some polygon data did exceed the node count threshold. In these cases, data was rasterized to 100m cells and then converted back to polygons. The polygons were dissolved to multi-part geometry. This addressed the node count concern.

As the image above shows, in some cases we were provided hand-drawn coverage, as well as infrastructure. Instead of estimating their coverage using a line of sight or RF study, we elected to stick with the provider's supplied information. Our decision was guided by two primary factors:

- If the provider is advertising using this coverage they must have specific confidence in its accuracy.
- If the provider can supply coverage, as well as infrastructure that reasonably supports the coverage, there is a very high likelihood in the accuracy of the information.

The downside, of course, is the polygon shown on the map may not represent our notion of how wireless coverage should appear.

In general we note several interesting trends in the wireless data. First, we can be successful in increasing the amount of WISP coverage when we aggressively pursue WISPs. This means we have to be willing to accept data on their terms and convey it into SBI formats. Some of our WISP submissions have taken over 12 hours to normalize into SBI formats. Second, we have to accept that some WISPs will not be able to supply FRNs. There remains a minority of WISP providers who are not aware of the FCC FRN. Third, there appears to be some variation on how the NOFA coverage definition is met. In other words, there seems to be a disparity on the necessary strength (e.g. -80 dB, -98 db, -120 dB, etc) to provide the appropriate quality of service for data services. Fourth, it was very difficult getting providers to identify spectra used for Broadband data services[19]. We are unsure if this is a competitive concern, or if the same coverage pattern is yielded for multiple frequencies. Typically, the spectra returned were those that a provider was licensed for. At this point, we have no reliable way to locally determine what set of frequencies are used to provide Broadband data services in a local area.

Service Address Point Process

A handful of providers have requested that customer level, service address point data be submitted to NTIA. In these circumstances we have done minimal processing to preserve the provider's intent with this deliverable and not bias downstream NTIA use.

Our verification included checks against commercial or Public Utility/Public Service Commission exchange boundary maps. Points not contained within one mile of a boundary are not submitted to NTIA. The percentage of excluded data variesacross providers.

We retain from the provider the provided latitude and longitude, as well as Census block. For some coverage data, if a provider is unable to supply a longitude, latitude or Census block, we fill in these attributes. In those circumstances where we do not have a Census block, but we do have a longitude

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[19] One provider responded by email, "This mapping program is to provide the coverage area for Broadband provided by a company. Not to keep a detailed account of every aspect of a companies (sic) network."

and latitude, we accept the given longitude and latitude and use that as the basis for our Census block assignment.

With point data we have tested for comparable geocoding success rates but do not overwrite provider information.[20] From this type of analysis we note the amount (usually little more than 10%) of addresses that seem to locate with less than street segment certainty. Deriving a thematic representation of the points on speed also illustrates some of the locational certainty issues in this point level data.

Coverage Estimation Process

Although the derivation of Broadband coverage into Census Blocks, street segments, or wireless coverage files is, in itself, a bit of an estimation process, there was an explicit estimation process required in cases where a Broadband provider either refused to participate in our survey, or provided such a threadbare submission that no carrier-based coverage information could be gleaned[21].

We typically resorted to three possible estimation paths.

For Cable (HFC) providers who did not provide any coverage information, we fell back to Media Prints data. Rather than using the entire Census Block Group gathered by Media Prints, we used only those Census Designated Places carrying the same or similar names to the Media Prints p_com field. Our reasoning was that Cable systems tend to be franchised on a municipal or at least administrative basis so the coverage will likely follow a governmental boundary. As a general rule, cable infrastructure is not available in the public domain[22] and what could be found was poor in quality and difficult to ascertain for validity.

For DSL providers who did not provide any coverage information, we estimated road-based coverage from their Central Offices[23]. We only used Central Offices that showed evidence of DSL or fiber-based services in the NECA 4 tariff. Road-based engineering areas were derived via ESRI Network Analyst to 18kft. These segments/boundaries were clipped to commercial wirecenter boundary edges.

For mobile Broadband providers who were non-responsive to our requests, we fell back to American Roamer coverage patterns. We generalized the American Roamer coverage to ½ km in order to protect the licensed information.

For fixed wireless providers who provided no coverage information, we relied on their public websites to derive coverage maps. When these maps were available, we georeferenced them and tried to use the

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[20] We will make a second geocoding pass on locations with no longitude or latitude from provider. We typically pick up ~5% from our second geocoding pass. Typically the issue is address quality but also difficulties in geocoding in very rural areas.

[21] We report estimated submissions to NTIA as a non-responsive provider but we have data in the submission for them. This is the reason for datapackage.xls entries which are non responsive but contain submitted data.

[22] The team tried to use data from the FCC Coals system and 321/325 fillings but this seemed to be a bit non-uniform in quality.

[23] Central Office location was derived from MapInfo ExchangeInfo Professional. Wirecenter boundaries also came from this commercial product.

outer polygon boundary to represent their serving area. In other cases, when only a tower could be provided, we used a view shed analysis and estimated coverage at 10mi per tower[24]. Because much wireless propagation is driven far below the Census Block and much engineering information isn't known (frequency in use, polarization of the signal, coverage pattern of antenna(s), local terrain/land cover) this was the most complicated group to estimate.

Speed

Speed attributes are reported both at the block (typical) and higher levels (maximum advertised and subscriber weighted). We note that in many cases, providers did not supply typical or subscriber-weighted speeds. In some cases, it appears--although we cannot verify--that their maximum advertised speeds were used to populate typical speed columns.

We do have limited testing data on reported speeds, but we have been careful to not use our typical reported values with carrier-provided information. If we do not have a speed value from a provider, we report an empty value.

Several service providers claim they do not have data on typical speeds available, but estimate a 20% overhead factor between the advertised speed and what may be experienced by an end user.

We continue to request advertised speed at the block level. Nevertheless we appear to be getting speeds that do not vary over a large geographic area – leading us to believe that providers may still be submitting the maximum speed advertised in local media for the entire market. For the most part, we have been unsuccessful in messaging that advertised speed should not correspond to a market area, but instead, the maximum speed, which can be provided to a household—what some may describe as a 'qualified speed.'[25]

As a general rule, in circumstances where a provider supplies a range of speed attributes, we assign NTIA categories based upon the midpoint of the range. We follow this rule unless we can determine other grantees are handling the same submitted information differently.

To support NTIA program office requests, we have also modified the structure of the Service Overview table. Even if Maximum Advertised Speed is supplied at the market or county level, we push that speed down to the contained Blocks. The only records that remain in this table, will be those wireline records with either a non NULL nominal weighted speed or ARPU value.

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[24] In some cases we had an approximate radius of coverage but no height. In this case we used a 50' height estimate and then clipped the coverage to the provided coverage range. We also clipped wireless coverage to honor state boundaries but did not look for providers serving coverage with out of study state facilities.

[25] As an example of a response to our request for Block level advertised speeds, we received the following comment from one anonymous provider, "This is and of itself does not require anything new of us – just states the NTIA supports efforts focused on getting that information on the CB level." It would be helpful to have broader messaging so that providers understand this new direction.

Community Anchor Institutions

In the first submission, the Community Anchor Institution (CAI) process was referred to in terms of a learning curve. This continues to be an appropriate metaphor. The mapping team continues to focus on data that will support and help inform policy makers and the SBI planning process.

In the first submission, the team gathered information on what data was available and what resources will be required to engage these categories of important institutions. In the second submission we continued to obtain additional connectivity information. For the Spring 2011 collection, the team began a survey process to directly engage these important organizations. As the October 2011 submission represents a transitional phase, much of the CAI effort encompassed getting this dataset stabilized for work outside the LinkAMERICA team.[26]

In the current submission we worked to achieve four goals

1) Modify the source data so as to no longer pass NTIA any connectivity estimates

2) Propagate administrative capabilities in our Community Anchor Verification System (CAVS) systems to the Regional Planning Teams

3) Verify the available connectivity information based upon new survey information

4) Update the Federal record identifiers (NCES codes, etc).

CAI Philosophy

Our work with CAIs is guided by three principles.

First, CAIs are important stakeholders within the planning process. Our goal is to engage participants in regional planning that have strong ties into the CAI categories identified by NTIA. This has a direct benefit of engaging an established stakeholder community. It also allows Broadband planning to tie into existing organizational and planning networks. In each of our states, key relationships with education, public safety, libraries, and economic development sectors are being identified and developed.

Second, we believe that CAIs will likely be one of the primary beneficiaries of targeted Broadband funding. Our belief stems from the sense that many of the benefits of Broadband will extend from these community 'anchor points'. In other words, it isn't solely the existence of Broadband at a library that provides a benefit. It is people using applications that work only on a Broadband network to upgrade their skills (e.g., online training) and gain access to online content (e.g., job postings, goods and services), etc. The targeted use of a specific application--that can only take place with Broadband networks-- is what produces the priority benefit. Put another way, there seems to be a realization that

[26] LinkAMERICA began transitioning the CAI data collection effort in the state of Alabama to ConnectingALABAMA in Round 3. For Round 4 ConnectingALABAMA assumed full responsibility for the CAI data collection effort in Alabama. To facilitate the reporting process, the ConnectingALABAMA team continued to use the Community Anchor Verification System (CAVS) to store CAI data collected or modified. CostQuest maintained responsibility for the CAI data submission for Alabama for round 4.

things are less about pure connectivity (for the sake of connectivity) than about connectivity in terms of an application (for the sake of the benefit obtained through the application).

Third, we continue to use a rational and targeted approach to derive information. This means we will utilize our planning teams for as much ground work as possible. This also means that a goal of our CAI process is not an exhaustive Census of anything that could be a CAI; rather, it is the discovery, inventory and integration of Broadband planning activities into those CAIs that stand to produce the greatest synergies with the SBI planning process.

The above implies two significant points. First, the team's goal is to document community anchor institution connectivity within a broader context of regional and statewide planning objectives. Second, if a particular category of CAI has an independent Broadband planning effort underway, we will encourage that organization to take the lead, and we will provide relevant expertise and support as warranted. For example, in one of our states, the public safety community is already engaged in a mobile Broadband survey effort. We have aligned our CAI data collection process with that effort and are sharing information and expertise (e.g., hosting a survey) to support their mission. In another state we are attempting to glean connectivity information from a municipal government survey. There may be some downside to this collaborative approach in that we may have to work with data spanning different times or we may not have all of the location-specific information we need, but this does prevent the same user from receiving multiple inquiries.

Anchor Institution Survey

During the third submission period we designed and developed a simple on-line survey system called CAVS (Community Anchor Verification Survey). The intent of the survey was to both verify received connectivity information and garner additional connectivity information from CAIs. For round 4 we continued the use of the on-line survey process. Although we have found that reaching out to central contacts, for specific institution groups, is the most fruitful way of collecting connectivity data we find value in inviting individual anchor institutions to participate through means of a survey. From our perspective this approach gives the individual institutions an opportunity to become engaged in the broadband planning process. The link for the survey is housed on the Home Page of the website developed for each state, thus providing the added opportunity for responding institutions to learn more about activities in their state.

The survey remains open between collection periods to provide opportunity for the Regional Planning Teams to update information as they engage with the community and to allow responding institutions to update their data as necessary.

Anchor Institution Trends

At this point we have focused our CAI attention on schools and libraries, with respect to connectivity. We benefit from strong relationships throughout the education sector (K-12 and Post-Secondary). We have also found excellent resources within State librarians in all States.

To supplement the education and library information we have formed organizational relationships with the major hospital associations within each state. Our goal with this relationship is to cull information from their planning process. We continue to formalize/advance this relationship.

As in the prior submissions, we rely on public domain sources of information for the public safety-category . Collecting connectivity data for this group continues to be one of our most significant challenges. Our hope is that in subsequent submissions, we will reduce the size of this category and connectivity information specific to root nodes of the public safety network--such as County Emergency Operation Centers.[27] At this point we have had minimal success gaining this information.

Because we have a wide ranging population of CAIs in our data set we have a variety of Broadband services that don't always fit NOFA parameters. Services like PRI or T1 are classified into "other copper," We also had difficulty obtaining both the upstream and downstream channel capacities. In most instances, when it was logical to do so, we made the speeds symmetrical, but this is an assumption on our part. If a site records bandwidth across several services (eg. video and data), we record the total bandwidth to give a picture of available site bandwidth. We are also working to standardize our response to NTIA in circumstances where an entity shares a Broadband connection among a campus which is fiber fed. In this case we use the total campus bandwidth and use the primary campus Internet connection.

As a final verification step, we attempt to screen the CAI data for duplicate values. Because many CAI are closely clustered together we perform the de-duplication based upon the ANCHORNAME within the ZIP5.

Middle Mile

Middle Mile information was collected directly from providers via survey or interview. Middle Mile is a "chicken or egg" type of challenge in that it is possible to verify that the infrastructure exists, but extremely difficult to know what is the site is doing without engineering level assistance. Although most providers submitted "something," there was a significant variance in what that "something" represented.

The purpose of this section is to record some of the comments and questions we have received about Middle Mile. We hope this provides better context for our data submission.

[27] Within the public safety category, it is also very difficult to derive precise locations as many CAI are addressed to PO boxes.

Within the NOFA, Middle Mile was defined as (a) a service provider's network elements (or segments) or (b) between a service provider's network and another provider's network, including the Internet backbone. (Collectively, (a) and (b) are "middle-mile and backbone interconnection points.")[28]

Given the existence of the "or" in this definition, providers submitted a variety of information. Based upon the NOFA example, several fixed wireless providers interpreted Middle Mile in terms of the connection points from their towers to their own serving backhaul location. The topology was commonly Microwave from their distribution towers to their NOC. The NOC and towers were listed as the Middle Mile points. This seems to be consistent with the first definition clause (a).

Telephone, Mobile Wireless, and Cable providers tended to remain either silent on the question, or would provide a single location in which Internet peering occurred (clause b). A number of participants explained that the NOFA was quite ambiguous with data traffic moving back and forth over both TDM and IP networks--it was unclear where the distinction should be drawn. As a general rule it seemed like many providers listed a single location where Internet Peering occurred.

A number of providers refused to answer the question on grounds of confidentiality[29]. Others would not disclose as their Middle Mile points are not owned--another company provides the physical and electronic connection to their network. In other words, the entity providing Broadband is not the entity providing Middle Mile.

Additionally, based upon the new Provider Type classification of "other," we have started to integrate points provided by Broadband service providers not meeting the NOFA definition. This includes POP locations and aggregation points for public / private networks.[30] Within a given submission there were two final attributes that tended to concern respondents. First, speed should be measured in terms of only data capacity and what exactly is "data" (e.g., can/should you segregate out voice or video), and is the relevant capacity of the physical connection, channelized to a specific virtual circuit on their network.

Finally, a number of other providers were unsure of the height above grade measure (is this their floor, the street outside, etc). We seem to have a combination of height above or below grade, as well as heights above mean sea level (AMSL).

To the extent possible in our timeframe, we verified the location of a sample of Middle Mile points. Where we could see infrastructure that appeared to be consistent in location with other provider

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[28] From http://broadbandusa.gov/files/BroadbandMappingNOFA(FederalRegisterVersion).pdf at 54, visited March 28, 2010

[29] As received in email 9/30/10, "Due to security concerns and the risk of public disclosure of highly sensitive data, whether inadvertent or otherwise, ***REDACT***response to the Middle Mile and backbone interconnection request is limited to publicly available information available on {remainder not included}"

[30] As discussed in our readme.txt file, a number of middle mile points were lost in validation due to their location in adjacent state. This will cause a decrease in some providers relative to prior submission.

infrastructure, we felt that the location was accurate. In some cases, the point provided seems sensible (is on a road, near other equipment), but using imagery, we couldn't find a place where this type of connection could occur. This wouldn't be unforeseen, in that Middle Mile connectivity likely takes place in a protected environment much smaller than a standard Central Office installation.

Mobile Wireless Coverage

We have received mobile wireless coverage from most mobile Broadband providers in each state. At this point we have cleaned the geometry of the data and attributed it with spectra and FRN as required.

Provider derived coverage has been reviewed against the commercial licensed product for consistency. To a limited extent we also use licensing locations and tower infrastructure to spot-check supplied coverage. This mode of verification remains complex, given the lack of facility-based information with mobile wireless.

Finally with respect to mobile Broadband services, we note several trends.

First LinkAMERICA used the NTIA supplied frequency tables to report speeds consistent with other grantees. In circumstances where a provider supplied a range of experienced speeds, we used the portion of the range consistent with the most frequently reported Grantee value.

Second where a provider reports multiple frequency bands in use but doesn't distinguish these bands by submitted SHP file, we submit identical geometries but attribute one geometry to each submitted spectrum value.

Third we are seeing a trend toward increasing Broadband speed. As of this writing, there is not consistency across providers in how they attribute the advertised 4G speed values. In other words, for some providers 4G means advertised speed categories increase. For other providers, the speed value did not change.

Verification

Almost by definition, data verification is an ongoing and evolving process. Clearly, with each new data submission there will be a validation process at hand and at the same time, our team continues to expand and improve the efficiency and effectiveness our data verification routines. Consistent with the movement toward an fGDB export database and use of a data receipt script, much of our validation effort was spent in supporting the ETL processes into the required formats. In future data submissions we will continue our work to stabilize and improve the business process that normalizes provider submissions into NOFA formats and expands in more depth on the confidence analysis within the data.

Verification Standard

Our overall verification standard is focused on the level at which we supply processed data to NTIA. This means that the vast majority of our verification process will be focused on ascertaining coverage for Census block's less than 2 square miles and covered road segments.

We are learning that Verification has multiple dimensions.

Provider verification is finding providers who supply Broadband and discriminate out providers not meeting Technical Appendix A's definition of Broadband.

Identity verification is taking the provider's categorized in the first step and ensuring that the provider either has a valid FRN or is assigned a default FRN. Identity verification is very complicated because of the Technical Appendix A's mandate to record data at the FRN, provider Name and DBA level. Each of these attributes could be unique for a single provider going to market under different or the same names. As a result, rolling up each provider into an identity collection that matches either the FCC data integration team or a third party Broadband provider's data view, is very, very time intensive. Identity verification is discussed in the earlier section-- Developing the provider List.

Coverage verification is a broad term, but in our definition it boils down to determining if Broadband coverage is in the right place. For a given provider, the question is whether the coverage is assigned to appropriate Census Blocks, road segments or area features. Coverage verification can be further broken out into two distinct classes:

- Technology verification, which is determining if the provider is listed with a technology consistent with their marketing information.
- Speed verification, which is determining if the speed supplied for that block, road segment, point area file or market area is consistent with the technology and the marketing information received.

The final verification dimension is consumer feedback and crowd-source verification. This is a dynamic set of steps we are beginning to implement. One side of this is responding to consumer concerns. The second is using the crowd sourced data to validate provider claims and, if appropriate, update the map and the underlying data.

At this stage, our working hypothesis (confirmed by our experience) is that there will not be a single dispositive measure to indicate Broadband coverage availability in a Census block or along a segment. From prior work, and examining our current provider submissions, we believe that there is too much variation below the submitted record to make a single binary yes/no indication. Rather, there will be a series of measures that combine to provide qualitative confidence (a classification scheme) in our indication of Broadband availability at the block, segment, or wireless polygon level. We believe such a qualitative confidence scheme is both relevant to and supportive of NTIA interests, as well as the interests of our end-user community – that is, the states and citizens we serve through this program.

The intent of this section is to illustrate why we are moving toward a particular verification methodology. Our team is learning as we go along, and will adjust and improve this thinking. But given our experience to date, this is where we are heading. As stated above:

- First, coverage verification is at the level of data submitted to NTIA.
- Second, coverage verification is enhanced when there is a secondary measure of availability (such as infrastructure presence or serving area boundaries)
- Third, given the limited resources of this effort, the most important coverage verification process to implement is the erroneous dispersion of coverage. These are the “islands” of coverage isolated by significant distance from other covered areas. . In other words, Broadband Internet likely doesn’t exist far away from other areas with Broadband Internet access.

Before explaining our overall verification thought process, we have several examples, which illustrate the complexity of coverage verification.

The first example is taken from a gentleman who requested a map change in Alabama. His home is near the yellow dot. The darker grey Blocks are covered Census Blocks. The black lines are covered road segments. He cannot receive DSL from his incumbent provider, although his neighbors can. The incumbent carrier does have at least one structure in that block from which Broadband services can be provided; unfortunately his home is not served.

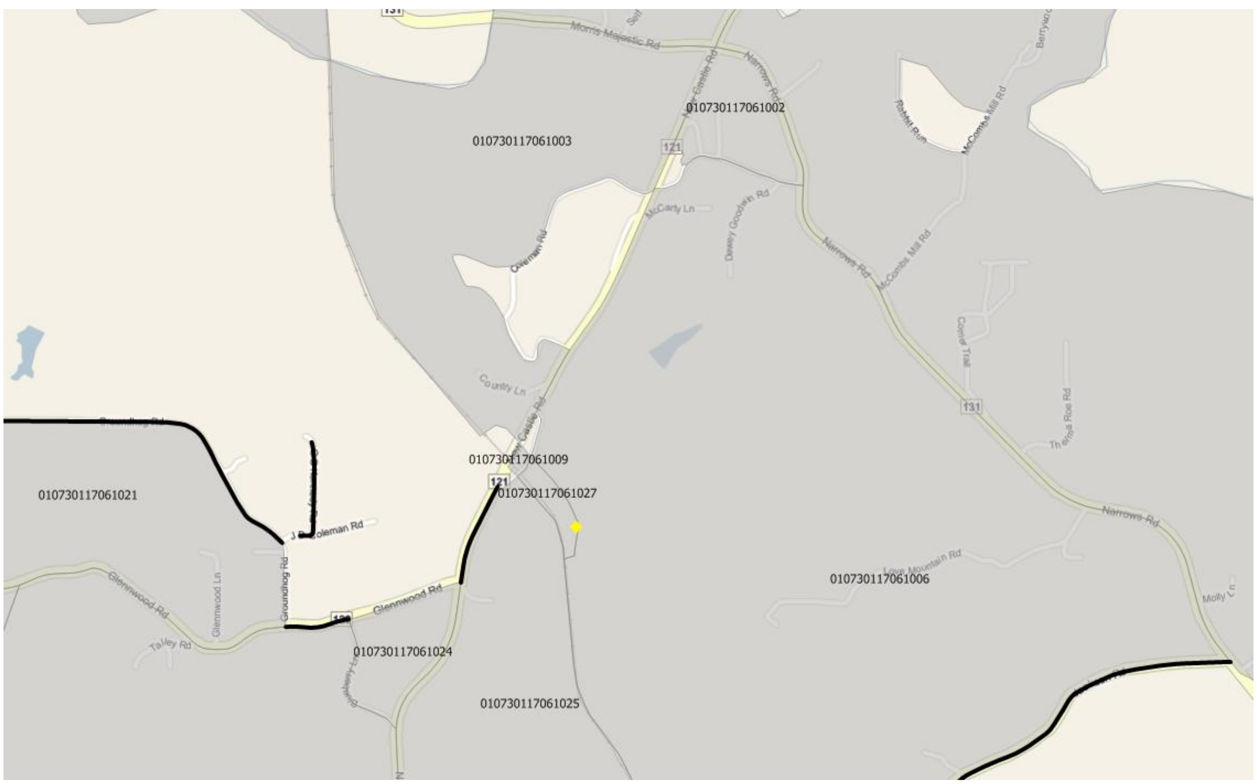


Figure 16--Sub block variation

Because the SBI program requires the depiction of coverage at the block level, the above map has been correctly generated. However, from the customer's point of view, the map is inaccurate. This requires us to explain that the maps are not intended to be a structure-level qualification, at which point some consumers question the value of the maps when seeking service information. Of course, we also share this information with the incumbent carrier in the area so they are aware of a potential customer market.

Beyond this type of one-off structure-level qualification, sometimes, as shown below, we have even larger gaps in provided coverage. The image here shows an "outlier" block that could be an error, or it could indicate missing Blocks along a major road that should have been filled in. In this figure, the outlier block is highlighted in turquoise.

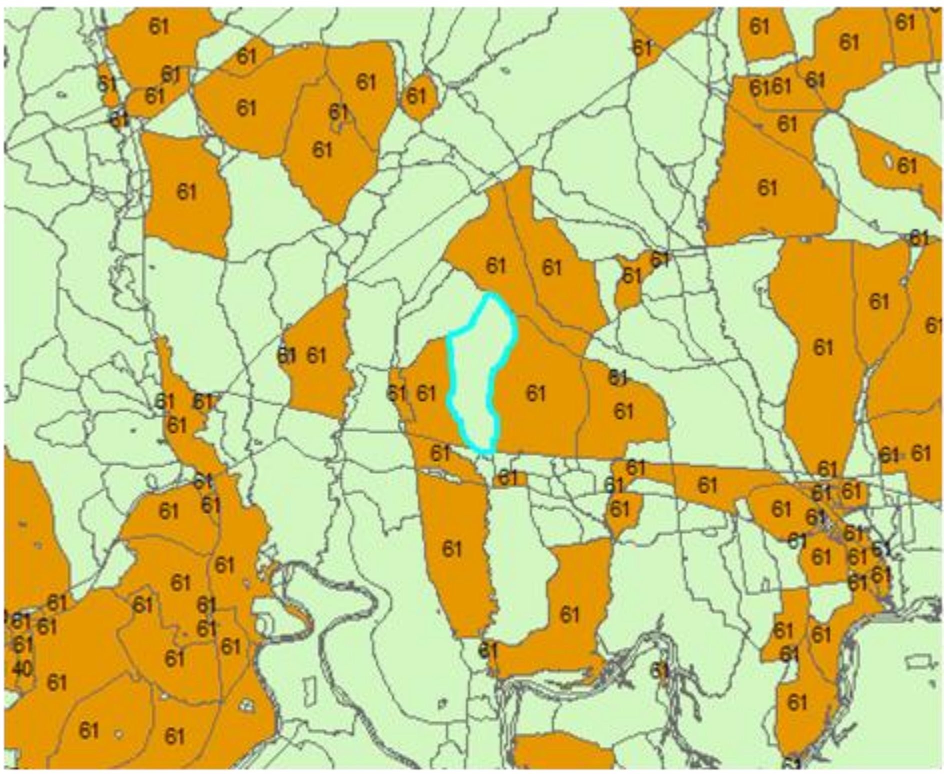


Figure 17--Dispersion in Submitted Data

In this particular case, we are faced with a different verification question. Based upon the properties of the neighbors, we believe this block should likely be covered (coverage interpolation,) but supplied data from the incumbent says otherwise.

The next example shows where an interpolation process could require some adjustment. The figure below shows a town level. There are some smaller Blocks that are likely covered by interpolation logic, but we also do not want to extend coverage beyond a franchise boundary as in the areas shown in a box on the bottom of the map.

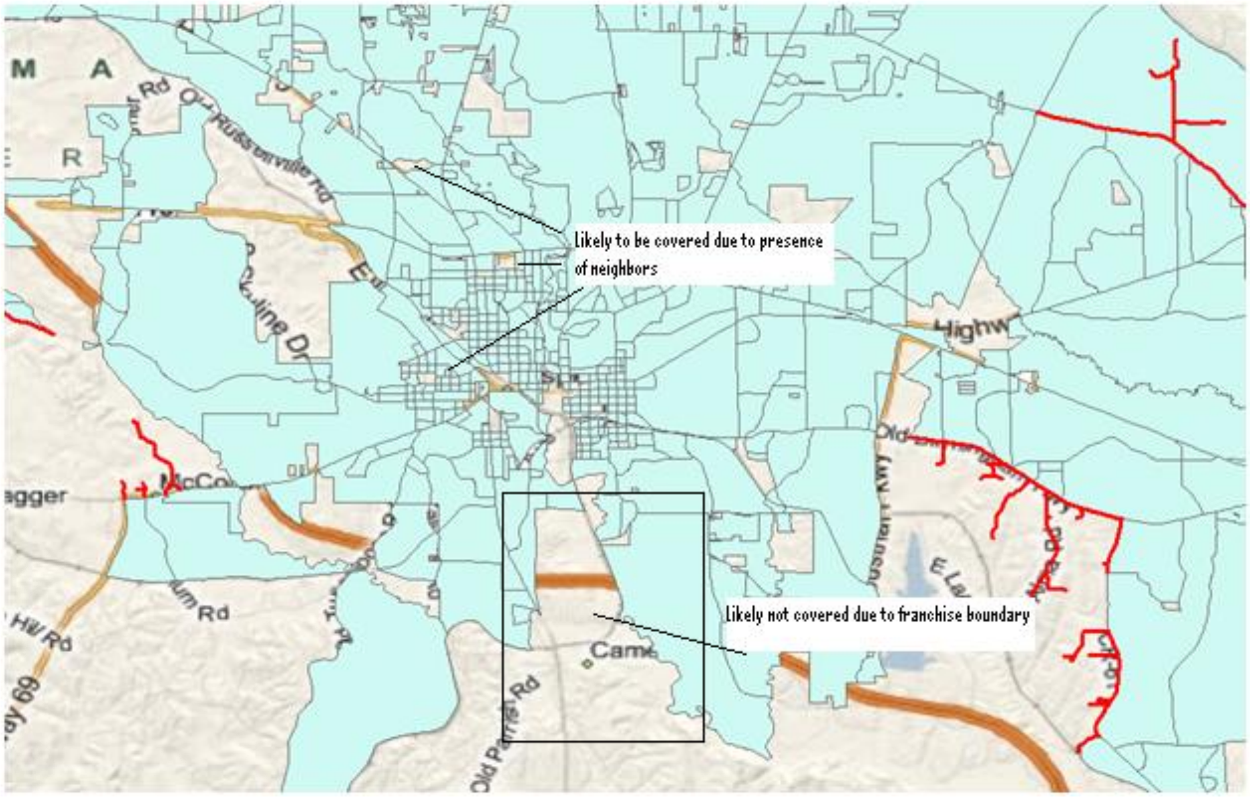


Figure 18-Where do you stop interpolating?

From what we can gather from some providers, the submitted data—data with consistently high degrees of dispersion or coverage holes—tends to come from geocoded billing records. In this paradigm, this means where there are no customers; service is not identified on a map. The interpolation verification question then takes on two dimensions.

> First, if a provider has no customers in an area, how can we know if they would be able to provide service in a 7-10 day interval?
>
> Second, if we use the properties of neighboring Blocks to interpolate coverage, when should we stop (e.g., at a franchise boundary, at a certain distance, etc.)?

We continue to work with providers to get additional information to help us better understand and contend with this type of circumstance. However, we have not been entirely successful at getting franchise boundaries that would address much of the issue.

The final map shows this dispersion problem, but to an even larger degree. This solitary large block is likely the result of a bad geocode, but we don't know, given the data that has been submitted by the provider and the "single customer in a block standard" set by the NOFA clarification.

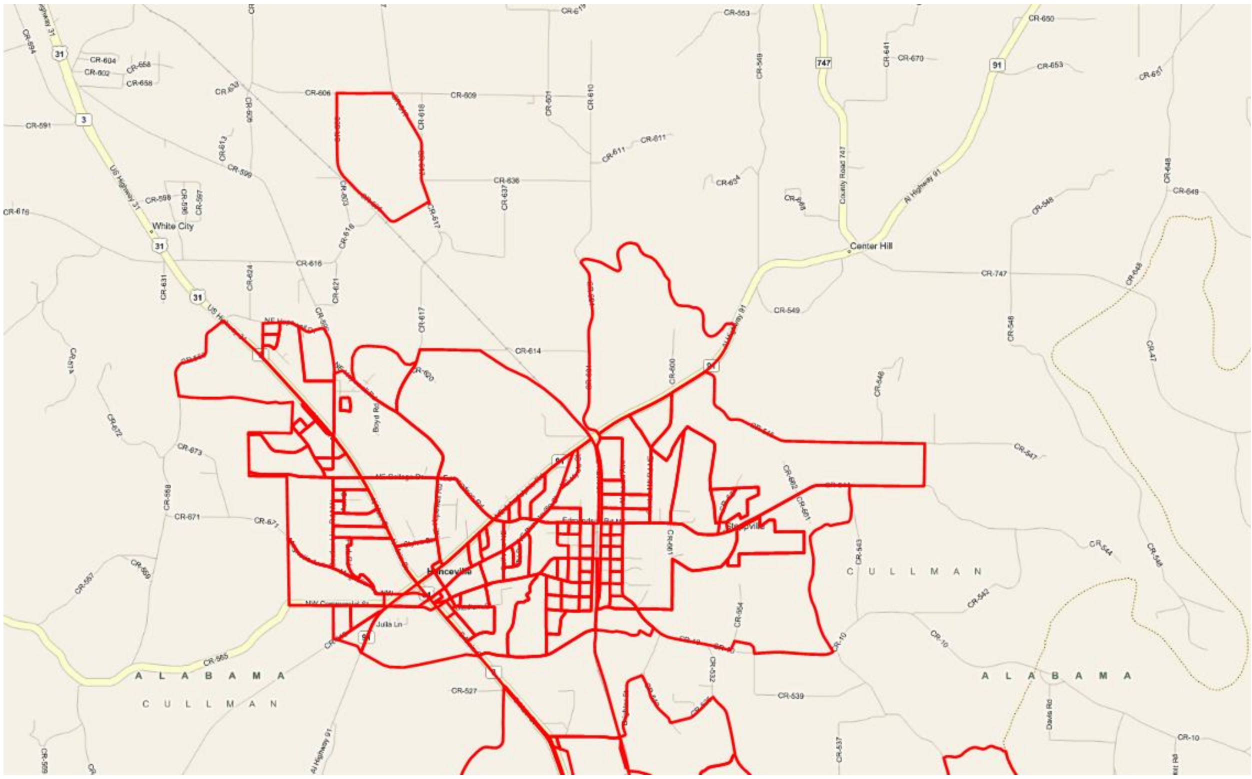


Figure 19-Dispersion in covered Blocks

Due to the fact that this situation is quite obvious in display, this type of problem is one that we are more aggressively trying to resolve. Where a single block has no neighbor offering comparable coverage and is a specified distance beyond an exchange boundary, our approach has been to filter these Blocks out. As of now, this filter is limited to incumbent DSL providers because we have a good source of exchange boundaries.

The exchange boundary dispersion verification method breaks down when examining smaller providers who are more likely to CLEC into neighboring territory. In the figure below, the black line represents the exchange boundary, while the continuity in the DSLAMs likely points to coverage extending along a road into another provider's territory.

Figure 20--DSL Coverage outside of exchange boundary

In sum, the variability in our source data continues to suggest that our dynamic verification process is relevant, appropriate and evolving in a manner consistent with the overall program. And, as noted above, we believe the more meaningful outcome of our verification processes will likely be a series of qualitative indicators or expressed confidence levels. Our concern, as with the development of any sort of classification process, is how rigid we should make this classification given the variation in our input data and the varied perceptions of service providers, map viewers and down-stream data consumers.

Verification Work Process

To support our dynamic multi-factor verification process, we have implemented the following steps.

First, when data is received, an analyst reviews the submission and any immediate questions or concerns are sent back to the provider as quickly as possible. We have found this gatekeeping step very helpful in making sure we understand the intent of the submission.

Second, for all providers who submitted data to us in the third round, they received both a tabular data summary and mapped output[31]. Prior to releasing the "check maps" to providers, we had a team of analysts visually inspect each provider's coverage area. The focus on this QC effort has been to identify and flag suspect Blocks. After this in-house review, we solicited a second level of feedback from providers and received a number of requested changes and corrections used in the development of the October, 2011 round 4 dataset.

For those providers who submit only block or segment level coverage (i.e., in those cases where we have no infrastructure to test with) we test for coverage containment within known service boundaries. The intent of this validation step is to remove Blocks that are obviously erroneous. We also verify the submitted speeds against the typical speed ranges in the NTIA frequency tables. If we note a value outside of typical range, we ask the provider for clarification.

As mentioned in the sections above, we have implemented a check on dispersed Blocks, but we have implemented less with respect to coverage interpolation (holes in coverage). We continue to work on a series of mechanical tools to assist with the inspection process but have run into challenges related to geographic basemap and timing.

As our submissions have moved online, we have also begun to benefit from crowd source feedback. In some cases this has helped us identify and fix errors in our underlying data. In other cases, as we have shared with NTIA, we have encountered some perceptual issues rooted in how the data are developed and modeled to comply with the NOFA. Depiction of uniform coverage in small Census Blocks continues to be a challenge. Despite our best efforts to explain the full block coverage requirement, we continue to receive complaints that the coverage shown on the map is not accurate for a particular location within that block.

[31] For the verification of round 3 data, we submitted both PDF and KMZ (Google Earth) format check maps. Some providers prefer to work with the Google format as it supports easier modification. Others continue to submit marked up PDFs.

Consumer and Provider Responses to Deliverables

Here, we segue from internal verification to external verification. We view responses to our work product as a form of validation and verification. On the one hand, this gives us the opportunity to fix mistakes and then generate QA steps to make sure that the problem does not reoccur. We also learn how to improve what we are doing or better explain what we are doing to a community not always familiar with the NOFA and program office framework. On the other hand, listening and learning from this feedback helps us better target our mapping deliverable to meet the needs of our external customers. In this second case, external feedback not only provides feedback on perceived qualities (or lack of quality) in the data, it helps us to learn if we are developing data that is truly helpful to downstream users.

At this point, our external deliverables take three forms: State Broadband Maps, data transfer to NTIA used for the National Broadband Map, and text format data requested by outside parties.

Online Map Experiences

With our State maps are online, we continue to harvest viewer feedback and comments. Because an online map allows someone to zoom in far below the scale of the data, a large number of comments reflect sub-Census block concerns. While important to the citizens reporting these issues and to our Broadband planning teams, this level of data is outside the scope of our core validation process, which as noted above, is focused on the level of data submitted to NTIA.

There are several other themes that our team believes are important to share. These comments are actually quite helpful because they also improve our data processes to better meet the needs of map viewers. For example, we have invested significant time in harvesting more segments from provider data. Because the appearance of segments is so important, we are putting time into ensuring a visually appropriate edge match between the roads we harvest and the Blocks/roads we will show online. On a technical level, we also believe that a good segment process will help us understand more about dispersion in the data, and what is valid versus what is not valid.

Online Display of Consumer Feedback

We have completed development of a consumer feedback layer for our online maps.

The intent of the new layer is to show viewers the feedback of other map viewers. We anticipate the feedback layer will go live when the Round 4 data is posted on our state maps. We expect this to be prior to the end of October, 2011.

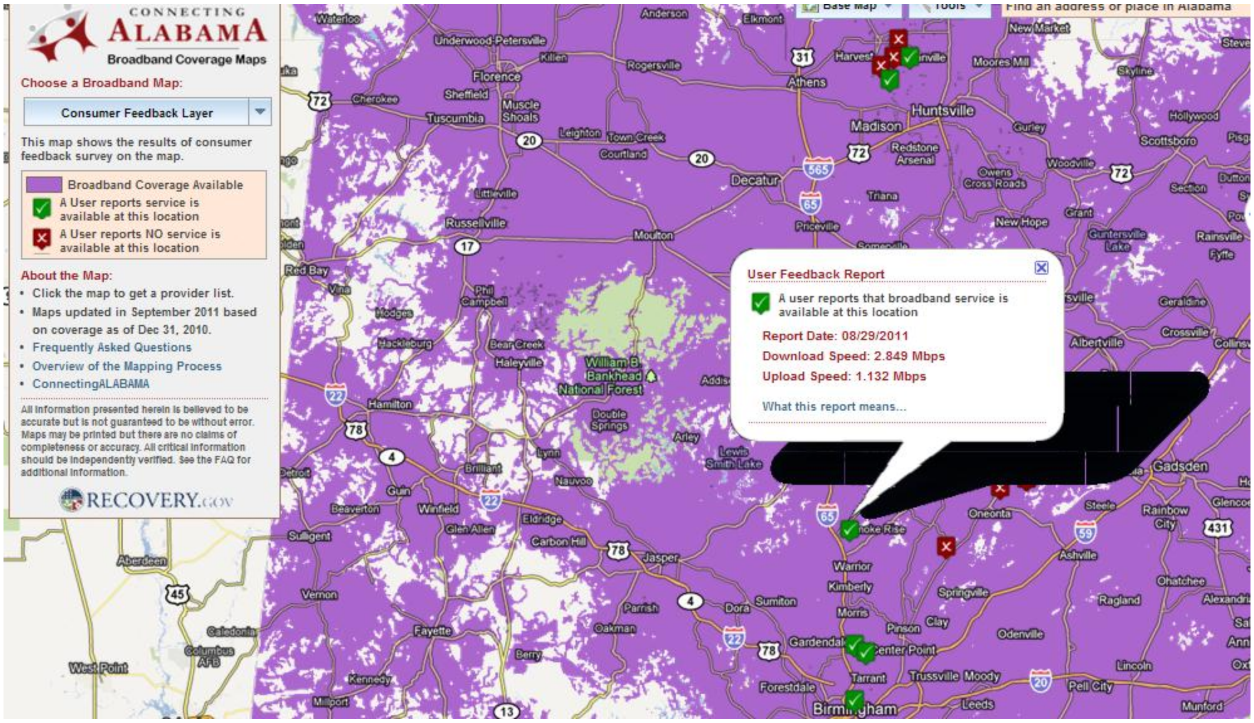
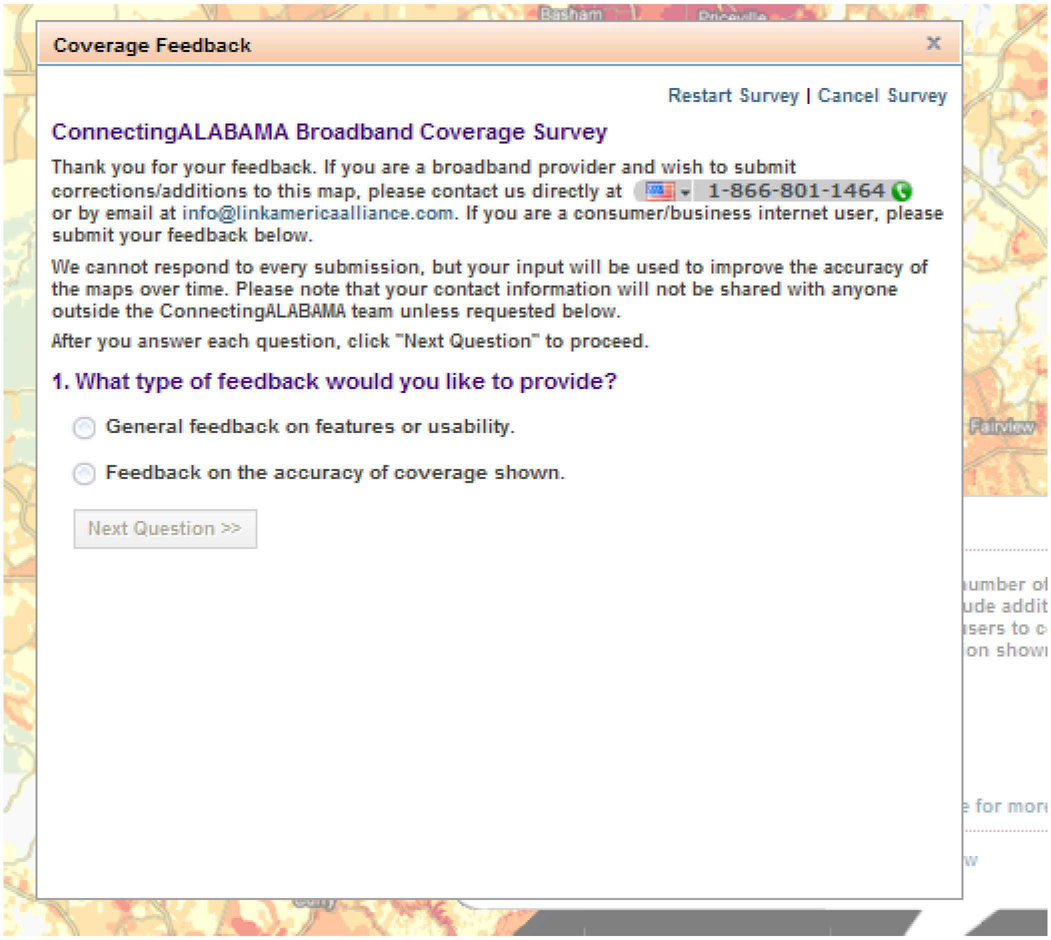


Figure 21--Consumer Feedback Layer

To gather feedback, we use a survey wizard which asks the end users to categorize their concerns. The survey went through several iterations of design and usability testing. Our experience has been unless we get a way to constrain the user feedback into manageable categories, it becomes very difficult to act upon.



As mentioned by other Grantees we struggle with how to use all of the feedback we receive. The qualified data points seem to fall below a volume in which we can infer significant modifications to the map data. Nevertheless, we believe it is important to gather structure and display the feedback to support project transparency.

Perception of Unfair Treatment Across Technologies

Several Broadband service providers have expressed strong concerns regarding how wireline services are displayed, as contrasted to how wireless coverage is displayed. This is an artifact of the SBI data model. As an example, consider the figure below.

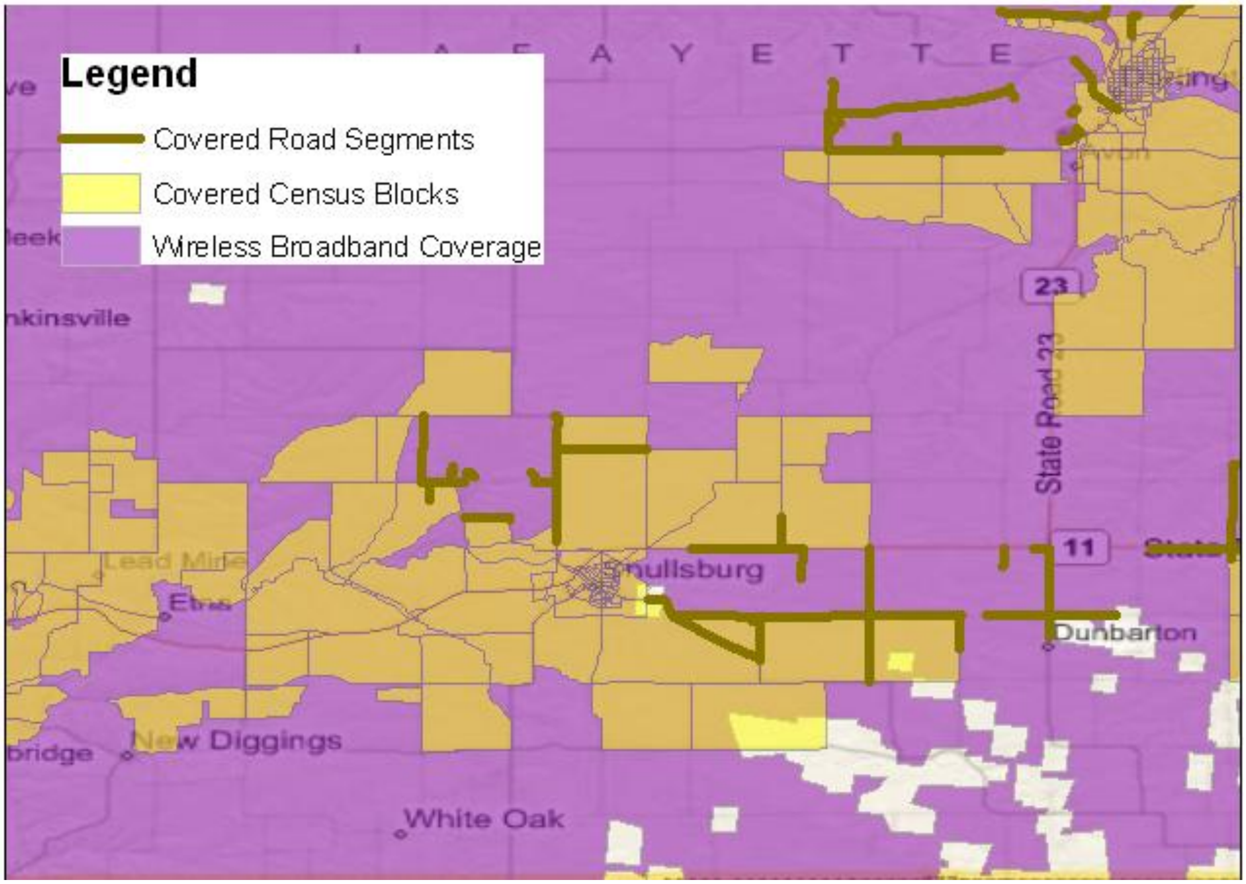


Figure 22--Multi Network Coverage portrayal

In this image, covered Census Blocks are light gold. Covered road segments are a darker gold and wireless coverage is purple. The concern seems to come down to how a wireline provider's coverage is shown in the large Census Blocks (greater than 2.0 sq mi). Some wireline providers have expressed dissatisfaction because their coverage is only tied to road geography, which leads to a visual "hole" in their coverage map. At the same time, they feel that it is unfair that the wireless provider's coverage is shown to be uniform in the same area. Put another way, if our maps show wireline in terms of Blocks and segments, why don't our maps show wireless the same way?

Perceptions of Carrier of Last Resort (COLR) Obligations

Some wireline providers have also expressed dissatisfaction because online maps limit the distance of coverage from a road segment. In our current online maps we buffer a wireline carrier's service 300' from road centerline. A number of providers have expressed that they are mandated to provide voice coverage (which Broadband will accompany) anywhere in the Exchange. There seem to be many dimensions to this argument, but the basic concern comes down to not being able to accurately reflect the scope of their COLR obligation within the mixed block/segment view. Their ability (or lack thereof) to actually provision such services for new users within a 7-10 day period adds yet another level of complexity when attempting to fairly portray their coverage capabilities.

Intentions of Coverage Mapping

When a viewer of an online map clicks on the map (or zooms to an address), they are provided with a pop-up of service provider coverage in the area. The critical question is this: what is the area to which that pop-up window responds to? In the past, we reported back to the specific Census block, or buffered road segment intersected by the user click. As far as the map was concerned, once we move off of that road, or out of that segment, we have a new area to examine.

Our sense, given feedback received, is that our provider view should be a bit more tilted toward finding providers in a general area, rather than finding providers at a single-click location. If the goal of the map is to get someone to call a provider for service, our bias should be to include all of the potential providers in the general area, rather than giving potential customers a method to self-disqualify. That is, we want to cast a wider coverage net, rather than one too narrow. The problem with this approach is that it will create a number of false positive Broadband reports. As of this date we cannot determine if the claims of inaccurate coverage in online maps are due to the looser provider view standard or not. We keep this looser standard in place to minimize the likelihood of self-disqualifications.

CAI Survey Fatigue

We are beginning to note an increase in survey fatigue among CAIs. Sometimes, as part of a direct survey process an end user will tell us how unhappy they are with the repeated Broadband survey efforts. Within several states BTOP grants are in effect that also survey Community Anchor Institutions.. As stated earlier we will defer to other Grantees when there are overlapping survey efforts.

Appendix One

Data Collection Challenges

This section summarizes some of the challenges we have experienced with data collection and processing. The team believes it is important to categorize these challenges as they help inform the geoprocessing and verification methods used. It is also our hope that some of the more global issues can be discussed and decided within the Grantee community.

We begin with several global issues and then continue toward more granular challenges.

Global Data Collection Issues

Census Block and Road Standards are not clear

We receive a variety of Census data. Some were able to supply 2010 Census blocks. Others continued to provide Census 2000. Managing this set of heterogeneous inputs has proved to be a challenge.

There seem to be several methods by which providers are calculating the Census block area. So the distinction between at 2.00 square miles can be uniform, it would be ideal to articulate an operational area calculation definition as early as possible.

Providers Not Wishing for Block Level Aggregation of Their Data

Both ***REDACT*** have supplied address point level data. Both carriers want NTIA to have the point level information, and they have asked CostQuest/LinkAMERICA not to aggregate their coverage to Blocks. Other than a verification to make sure that point data were contained within, or fell within 1 mile of exchange boundaries, the only other processing was normalization into NTIA formats.

Broadband providers not Meeting the NOFA "provider" Definition

PBWorks appears to reflect a concern among a number of grantees about what a Broadband provider is--and how that definition impacts mapping.

If the 7-10 day provisioning rule is to be strictly enforced, it would seem to eliminate a number of prominent Broadband providers[32]. Further, the need for clarification around a facilities-based provider, versus the reseller, has injected even more ambiguity into the mix. Right now we are unclear on how strictly to interpret either of these important distinctions, but we are concerned that we are beginning to create an NTIA exclusion criteria that is going to confuse downstream consumers of the data.

[32] By email ***REDACT*** informed us they could not provision in 7-10 days, but they also supply information on qualified locations to the address point level. Therefore, we draw a distinction between an incumbent provider owning the facility--which terminates at a customer premise--who cannot turn up service at a qualified location, versus a provider not reporting any specific qualified locations in which they cannot turnup service in the 7-10 day window. In the first case we have a sense of where service can be offered and verified. In the second, we have no evidence that a service could exist there until a specific location becomes a customer.

Again, we do not want to exclude a service provider, but we believe there needs to be further clarification around the 7-10 day ”rule,” the definition of a “reseller,” and better interpretation of facility-based providers, versus equipping UNEs, SpA or leased lines.

We have used the provider Type of ”Other” to classify a number of providers who offer Broadband services, but we do not offer them in a manner consistent with Technical Appendix A definitions.

To What Extent Should We Begin “Classifying” the Data and Maps?

The question immediately preceding gets to the intent of a Broadband provider. This question gets to the intent of the Data and Maps.

Earlier in this document we discussed the question of what type of bias we should introduce to our online map messaging. In an online environment, do we want to more likely create an overstatement of coverage for a provider than an understatement? In other words, is the larger problem allowing a consumer to self-disqualify, versus calling a number of neighboring providers? There is a related issue to this. Clearly in our maps there is a lot of scatter in data that we believe should be more continuous. These are the islands of coverage from an incumbent provider[33]. There are a number of processes that could be put in place to deal with this type of scatter, but without more information from the service provider-- essentially the last mile facilities-- it will be difficult to perform this clean up in an informed manner. On the one hand, we can aesthetically clean the maps up and reduce the scatter, but we have little sub-block engineering information upon which to make this decision. Right now our preference is to put out a somewhat aesthetically messier deliverable and work with providers to get better information to clean their submission. If that isn't forthcoming, we are limited in what can be done given the lack of facility level information. In summary this yields two questions

1. In our online maps should we error on overstating coverage to prevent consumer self-disqualification?
2. In our online maps should we work to clean up a lot of the scatter that we see without having facility-based evidence from which to remove it?

Granular Data Collection Issus

Non-Uniform Submission Standards

It is clear among providers that there isn't a consistent method used to derive Broadband coverage. Some providers appear to be use a geocoding approach and then point in polygon or point on segment process. Others may be using GPS locations. In some cases, it is difficult to infer what reference data was used to georeference plant (is it the carrier's roadbase?). This leads to uncertainty regarding the input data scale or accuracy relative to other base layers. Although we may be trading off absolute

[33] For a provider who sells opportunistically (not within a franchise area) it becomes even more problematic to classify their coverage because the points are more related to the type of consumer purchasing the service than a bounded offering. In a matter of speaking, the ProviderType is more determined by the technology and/or location than a type of business. The core intent of the NOFA and our grant application was centered around the 7-10 day providers but we believe maintaining information on provider Type “Other” and “Reseller” is important to assist in validation and market segment analysis as resources are available.

accuracy, our standard has been to conflate submitted data to TIGER 2010 Blocks and TIGER 2010 roads. We perform our verification against this conflated data product.

Temporal

We are unsure of how well the data are temporally consistent. Some providers gave us their best effort to control to June 30, 2011. We note that some providers were clear that the submission was as of extract date without any way to move back in time. They have no means to control for time and cannot provide any audit support beyond when the data are released to us. Some data-especially loop qualification data-may change from day to day. It will be very difficult to clarify why something was changed from a given point in time.

Perceived Inaccuracy with Respect to Internal Standards

The NOFA is clear on submitting a list of Blocks in which a provider delivers Broadband service. This is a different objective than perfectly reflecting service territories. If a firm's accuracy standard is a reflection of their service area, then the data created under the NOFA will not meet their perception of accuracy. This leads to two other issues: First, using Census Blocks rather than serving area may overstate or understate a particular provider's Broadband serving area. This was a significant concern of ***REDACT*** who specifically required us to submit only address-level qualification data. The second issue this brings up is how or if, there should be some standard on how much of a Census Block needs to be covered to call it covered.

Confidentiality

Several providers have noted concerns with CPNI-related issues and have stated this as a reason for non-participation. We have also heard expressions of comparable concern regarding identifiable responses to Anchor Institution information.

Unclear on Definitions

As discussed earlier, several providers claimed confusion on several key terms involved in Middle Mile. We note a consistent stream of questions around the interpretation of Maximum Advertised Speed. Some providers understand this to be the most common speed package bought within the mass market, while others view this as a speed that can be purchased for an additional cost above a mass market offering (eg. a Turbo option for an additional fee per month). Others interpret this as the fastest speed that is available for that particular location--in terms of xDSL, a structure qualified speed, for example.

Perception of Data Use

There seems to be some hesitancy releasing speed information because no one is sure of how the information will be used, or what the speed is intended to reflect. A number of providers have verbally indicated that typical speed will be about (on average) 80% of purchased speed due to overhead. But there are many other factors (such as a user's home network) that influence speeds measures. Providers are concerned about introducing statistics without a clear understanding of how those statistics are derived and will then be used. Also, as advertised speed is pushed down to a block level, we sense more trepidation to report speed values. This quickly begins to touch on parity across network types (why is wireline down at the block when wireless is half the state, etc.). Finally we note a

significant increase in speed reported to us. This may be due to network upgrades or competitive concerns to match the theoretical network speed.

Location Uncertainty In Source Data

Within this document we have noted concerns about the impact of source data accuracy. Our geoprocessing methodology provided what we believe is a relatively conservative tolerance to account for the scale issue in the source data, but we are unsure of how this may impact downstream users. Clearly, it also impacts the verification process because we can't attempt to verify received data beyond a scale at which it was developed.

Covered Segment Process

Deriving those Broadband covered segments in Census Blocks greater than 2 square miles has proved to be a challenge. Moving from a NOFA specified tabular deliverable to a requested geographic deliverable also increases the complexity of the effort.

Record Level Metadata

It would be helpful to have one or two additional fields in each feature class transmitted to NTIA. One User Defined field could be helpful as an expression of record level confidence. The second field could be used as a Key between the transfer geodatabase and our systems. Ideally, both fields could be large text fields (50 char) so the Grantee can use them to express a variety of attributes.

Miscellaneous Data Collection Notes

We note the following important observations regarding our data submission:

1. There are Middle Mile plant records for providers who are not present in the Census block, segment or wireless area feature classes. This is due to classification as non-NOFA Broadband providers.
2. In some cases, we have trimmed wireless coverage estimates to honor state boundaries.
3. We believe some providers are trimming their coverage to honor license area boundaries.
4. As a departure from past practice, where a provider submitted Middle Mile points out of state, we are no longer passing those points to NTIA as they fail the validation script. We experienced validation errors for BroadbandServed=N records in the CAI table. These records were attributed a Technology of Transfer=0. This cleared validation.
5. In tables with mandatory Street and Zip5 attributes(Service Address), if the value is unavailable it is filled with N/A. was not available, we have inserted 'N/A
6. As with submission three, there remains a tension between the Data Model, Data Model Default Values and the Python Validation Script. As an example the data model allows a NULL for the Maximum Advertised speeds in a Census block record. A default 'zz' is available for this condition as well but zz will fail the validation script. In the case where we have data which is missing Maximum Advertised Speeds, we are holding that data back to prevent downstream validation problems.
7. We have a significant amount of VDSL, ADSL 2 and ADSL 2+ coverage categorized into the xADSL category. This introduces a variance in speed availability as some providers are using VDSL, shortened loops and/or pair bonding to increase speed over 10 Mbps.

8. We have left in the data Middle Mile locations with above grade elevations that appear to be unreasonable, given review of orthoimagery. This seems to be confusion between above grade request and above sea level readings.
9. All fGDB have passed validation except in cases where attributed speeds did not agree with domains associated with technology of transmission (eg Upstream Speed of 2 with ADSL). We have modified the Python script to allow for conditions in the CAI table in which default data model values are disallowed in the Python submission script.
10. We note a few providers who have speeds seemingly inconsistent with their technology of transmission. This is either very low speeds with optical fiber, or very high speeds with non DOCSIS 3.0 systems. We have verified on provider websites that the reported speeds are available in the area but these speeds will fall out of the NTIA frequency table analysis.
11. We have a small number of providers who serve an area with both a residential and business speed tier. In cases where we cannot distinguish which speed tier offering to use, we use the lower of the speed tiers.
12. Per NTIA request we have modified the manner in which we handle Wireless coverage polygons. If a Provider submits a single geometry but specifies multiple spectrum codes in use in that polygon, we duplicate the polygon for each spectrum code. In other words the geographic object is identical but the attribute data for the object is unique.
13. In point level data submissions (Service Address and CAI) we note points that are spatially coincident. With respect to Service Address points our thought is these represent multi-unit dwellings or businesses but we don't have enough address detail to determine if these are multi-unit structures or duplicated customers. Because we cannot determine the reason for the duplication we leave spatially coincident records in our submission. We also leave in our CAI submission points which may be the same physical structure but have slight variations in addressing.
14. In point level middle mile data, we are finding a variance in the quality of the geocoded longitude and latitude returned. Given the data received we are unsure if this is an issue where the plant address is difficult to geocode or if the longitude and latitude provided to us is different than what would be returned in geocoding.
15. We note two important issues in our datapackage.xls. First the number of records in the provider tab will not sum up to the total record count. This is due to the requested grouping within the Excel table.. Second for estimated broadband coverage, we internally mark that coverage as an estimate but the provider is described as non-responsive within the datapackage.xls.
16. We made one modification to the NTIA supplied verification script. For the CAI layer we The query to check the TRANSTECH field now includes: "AND TRANSTECH <> -9999"

Appendix Two

This appendix contains the confidentiality clarification supplied in a series of emails between CostQuest and NTIA.

Feature Class	*Metadata*	*NOFA Confidential?*	*Online Map*	*Public Disclosure*	*Exemption*
Last Mile	Constraints on accessing and using the data	Yes	No	No	None
	Access constraints: None				
	Use constraints:				
	This data is confidential as defined in the NOFA.				
Middle Mile	Constraints on accessing and using the data	Yes	No	No	None
	Access constraints: None				
	Use constraints:				
	This data is confidential as defined in the NOFA.				
Service Address	Constraints on accessing and using the data	No	No	Yes	
	Access constraints: None				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
CAI	Constraints on accessing and using the data	No	Yes	Yes	NO attributes on any record in this feature class are considered confidential

	Access constraints: None				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
Census Block	Constraints on accessing and using the data	No	Yes	Yes	NO attributes on any record in this feature class are considered confidential
	Access constraints: None				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
Service Overview	Constraints on accessing and using the data	No	Yes	Yes	The only provider who may not show up this table is a provider who has provided only confidential data (last mile, Middle Mile,

					address point with provider name)
	Access constraints: None				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
Road Segment	Constraints on accessing and using the data	No	Yes	Yes	NO attributes on any record in this feature class are considered confidential
	Access constraints: None.				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
Wireless	Constraints on accessing and using the data	No	Yes	Yes	NO attributes on any record in this feature class are considered confidential
	Access constraints: None				
	Use constraints:				

	There are no restrictions on distribution of the data by users

OFFICIAL OCTOBER 2011 UPDATE SUBMISSION TO THE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION UNDER THE STATE BROADBAND DATA AND DEVELOPMENT GRANT PROGRAM FOR THE STATE OF ILLINOIS

Partnership for a Connected Illinois

broadbandillinois.org

October 2011

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COVER LETTER

October 2011

Ms. Anne W. Neville
SBDD Grant Program Director
National Telecommunications and Information Administration
U.S. Department of Commerce
1401 Constitution Avenue, NW Room 4716
Washington, DC 20230

Dear Ms. Neville:

Please accept this submission from the Partnership for a Connected Illinois (PCI), the Designated Entity for Illinois.

These artifacts should be found to be compliant with the October 1, 2011, deadline for the semi-annual data update and in accordance with the terms of the July 1, 2009, Notice of Funds Availability (NOFA) and all subsequent clarifications.

This cycle, PCI continued its full responsibility for the data-collection activities from broadband providers in the State. Assuming this role is vital to achieve the State's goals with regard to improving broadband access and adoption – and which are in turn central objectives of the Partnership for a Connected Illinois. All facets of this data-collection transition, and the activities that flowed from it, are included in the narrative that follows.

If you have any questions about this Data Narrative, please do not hesitate to contact me, at 217-816-4151.

Respectfully submitted,

Drew Clark
Executive Director
Partnership for a Connected Illinois, Inc.

INTRODUCTION

The data submission cycle ending on October 1, 2011 marks the first round that PCI has held the full responsibility of data collection and publishing for the entirety of the six months. In this round, PCI used creative new strategies in its outreach to the carriers. PCI continued to establish Non-Disclosure Agreements (NDAs) with broadband providers for confidential information. The data that accompanies this narrative contains edited data for 57 out of the 122 carriers included in the submission. The census block data that accompanies this narrative has also undergone a conversion from 2000 to 2010 census blocks in accordance with regulations laid forth by the NTIA. This round gave PCI the opportunity to refine its data verification process through the use of GeoPDF maps and third party data sources. PCI also improved its Community Anchor Institution database through the use of Illinois e-Rate databases in the State.

In this round, the Partnership for a Connected Illinois (PCI) took major steps in its three-fold mission to collect and publish broadband data, to ensure broadband access throughout the State, and to maximize broadband's impact. Assuming this data collection role is vital to achieve the State's goals with regard to improving broadband access and adoption. PCI appreciates the assistance provided by NTIA as PCI improved its collection, processing, and verification of broadband data for submission according to NTIA standards.

PCI has continued to refine the Broadband Illinois web site. This consumer-friendly interface allows for residents of the State to intuitively access the information collected by PCI – and provides the ability to "crowdsource" the collection of price information, actual speed data, and to let consumers verify the data provided by broadband providers. Since the last submission cycle that ended on April 1, 2011, PCI has included a range of maps not previously available. The Broadband Illinois website contains county-level GeoPDFs for each of Illinois's 102 counties. These maps can be downloaded and edited using the TerraGo Technologies toolbar, which will be explained in great depth in various parts of this narrative.

This narrative will summarize the carrier outreach, the data production methods, carrier data verification, and the community anchor institution data. It will conclude with an examination of the Broadband Illinois website and the ways in which PCI is publishing carrier data in a user-friendly manner that allows for feedback from the consumer, and a significant report, "Supply Broadband in Illinois: A Statewide Baseline Inventory," published on August 15, 2011.

CARRIER OUTREACH

From June 30 to July 9, 2011, all providers currently in the PCI census block and wireless layers were sent GeoPDFs that displayed their coverage area in the State of Illinois. The GeoPDFs were fully editable by the provider using the TerraGo technologies' toolbar. As part of this e-mail, PCI requested that updated data be submitted to PCI for its Cycle 4 submission to the NTIA and for the update to the Illinois Broadband map. For those providers who had not previously established a Non-Disclosure Agreement with PCI, a copy of PCI's draft version accompanied these maps.

This entire outreach process was tracked on Salesforce, PCI's content management tool. As maps were created, distributed, and verified, fields were populated in Salesforce to denote that a map that met the approval of the provider had been created. For those providers who did not respond to their initial map request, multiple follow-up e-mail and phone call attempts were made. PCI also tracked whether there would be an update to the data for this submission, what version number of the data PCI would be submitting, and the dates in which an NDA had been established.

This section will explain the way in which PCI conducted its outreach to the carriers and the different ways in which it received data. It will outline some of the major updates that were received in this round as well as describe both quantitatively and qualitatively the extent to which data was updated in this round.

NDA

PCI continues to offer and abide by the terms of our NDA. If providers did not establish an NDA in a previous round, they were given the opportunity to do so in this round. Since PCI assumed the data collection process in January 2011, there were still several providers who had not yet established an NDA with PCI, but who had done so in a previous round with PCI's prior subcontractor. A total of 15 providers did not feel the need for an NDA with PCI and worked to update their data in this round. An additional 15 providers who had previously had an NDA with the previous subcontractor established one with PCI in this round of data collection. In other instances, NDA's were individually negotiated to address specific provider concerns.

When an NDA was established with a provider, the date that the NDA was established was recorded on Salesforce. A field in Salesforce was also populated as to whether or not the provider would be submitting new data for this Cycle 4 submission. If a provider responded with no change to the data, PCI removed priority from that provider and refocused attention on those providers who reported that there was a change to their data as of July 31, 2010. PCI wanted to establish the NDAs by focusing on those providers with new data to submit.

To date, PCI has established 89 NDA's with the 122 providers in the database that accompanies this submission. Many of the carriers who have chosen not to establish an NDA with PCI, never had one with the previous mapping contractor, and continue to work with PCI to refine the data. The data package demonstrates that PCI is providing updated data for several providers with whom an NDA has not been established.

Updates to Data

Of these 122 providers submitted as part of the data package in this round, edited data has been submitted for 57 of them. This data comes in the form of new infrastructure, speed changes, and corrections from PCI's previously submitted data. Additionally, two new providers were added to the dataset: WideOpenWest Illinois and Sidera LLC. Two other providers, Hughes Network Systems, LLC & WildBlue Communications, Inc. provided satellite data. That satellite information was not included as part of the geodatabase. An additional two providers who submitted data in a previous round, AT Cyber and Avenue Broadband, were submitted by competitors, E-Vergent.com & Telecommunications Management, and their data has been merged with their purchasers.

Broadband service providers submitted coverage in terms of the areas that they served, either in edited GeoPDFs, direct geospatial formats, CAD files, or as paper maps. The submitted polygons were overlaid on the census block polygons and those blocks touching were selected and used. The proper speed tier categories were assigned as necessary.

Throughout August and early September, the PCI data team formatted data as it was received. A cutoff date of August 26, 2011, was established for the acquisition of new data to include in this submission. However, PCI continued to accept data after that date, and all providers who submitted updated coverage in this round is included in this submission.

The table below summarizes the status of data among providers.

Provider with no data, unresponsive in this round to PCI and previous rounds	43
No update to coverage area/ verified previous data/previous data submitted	63
Provider reported/provided an update to coverage area that was included in this cycle.	57
Provider provided update in the form of an edited GeoPDF	*21*
Provider provided update in shapefile format	*7*
Provider provided update in excel format	*19*
Provider provided update in other format	*10*
New provider for this round	2
Total number of providers included in this submission	122

Changes and Corrections

On August 19, 2011, PCI along with the other SBDD's designated entities submitted a changes and corrections document to the NTIA for the data that was submitted in Round 3. PCI felt this was a very useful document, and would like to incorporate it into this narrative to demonstrate the extent to which PCI updated its data in this round. While the last section quantitatively expressed how data was changed, this section qualitatively explains each of the updates that were made. Some of the more extensive changes and corrections will be described in later sections.

Provider	Change	Correction	Description
Telecommunications Management	X	X	GeoPDF, Added DOCSIS 3.0 to Newton, as well as Lawrenceville, Mt. Carmel, Bridgeport, merged Avenue Broadband data due to recent purchase.
Harrisonville Telephone Company	X	X	GeoPDF, added fiber, increased speeds, asymmetric & symmetric DSL
Grafton Telephone Company	X	X	GeoPDF, Expanded footprint, added fiber, increased speeds

Flat Rock Telephone	X	X	GeoPDF, filled holes in coverage & increased speeds
New Windsor Telephone Company	X	X	GeoPDF, increased speeds across coverage area & trimmed coverage
Mediacom Communications	X	X	GeoPDF, Increased speeds within city limits of Carbondale and removed areas of coverage outside East St. Louis.
Frontier Communications	X	X	GeoPDF, updated data to reflect recently purchased Verizon territory
Qwest Communications	X	X	New DBA name
Covad Communications		X	Added Census block data, provider previously only provided Middle Mile
Fairpoint Communications		X	Added Census block data, provider previously only provided Middle Mile
Crossville Telephone Company		X	GeoPDF, to make slight changes
Hamilton County Telephone		X	GeoPDF, cut back on footprint
Egyptian Internet Services		X	GeoPDF, filled holes in coverage
LaHarpe Telephone Company		X	GeoPDF, filled holes in coverage & increased speeds across footprint
Montrose Mutual Telephone		X	GeoPDF, first submission to wireless layer.
Moultrie Independent Telephone Company		X	GeoPDF, increase speeds
Viola Home Telephone Company		X	GeoPDF, increase speeds
Gridley Telephone Company		X	GeoPDF, patched hole in coverage area
Home Telephone Company		X	GeoPDF, to change speeds
Leaf River Telephone Company		X	GeoPDF, to increase speeds and patch holes in footprint.
Tonica Telephone Company		X	GeoPDF, to remove census blocks from coverage area
Comcast Cable Company		X	included DOCSIS 3.0
360networks		X	Middle Mile reincluded
Broadband Heaven		X	Middle Mile reincluded
Cogent Communications		X	Middle Mile reincluded
DeKalb Fiber Optic		X	Middle Mile reincluded
Fox Valley Internet		X	Middle Mile reincluded
XO Communications		X	Middle Mile reincluded
Zayo Group		X	Middle Mile reincluded
WideOpenWest Illinois		X	New Cable Provider

Cass Communications	X		1 new site
Full Choice Communications	X		1 new site & speed upgrades
Cellular Properties	X		1 new site with three sector antennas
Heartland Cable	X		2 new sites
Bspeedy Wireless Inc.	X		4 new sites
Computer Dynamics	X		40 new sites added to network at various speed tiers, increased capacity and speeds.
Jo-Carroll Energy	X		6 new sites
Cequel Communications	X		Expanded coverage area
Tel-Star Cablevision	X		GeoPDF, expanded coverage to Goodfield and Congerville
Madison Telephone Company	X		GeoPDF, increased speeds
McNabb Telephone Company	X		GeoPDF, increased speeds
RCN Regulatory	X		Included DOCSIS 3.0, and corrected speeds in region
Leap Wireless Inc.	X		Mobile Wireless Update
T-Mobile USA	X		Mobile Wireless Update
Sprint Nextel Corporation	X		Mobile Wireless Update
Verizon Communications	X		Mobile Wireless Update
Sidera LLC	X		New provider that had submitted data with RCN Regulatory previously
One-Eleven Internet Services	X		New service area in old one that had new construction & speed upgrades
Corn Belt Wireless	X		Old footprint had speed upgrades, new footprint overlays part of existing network with speed upgrades as well
Charter Communications	X		Speed upgrades across footprint
Illinois Consolidated Telephone Company	X		Two new fiber to the home sites, increased speeds in select DSL areas
Level 3 Communications	X		Updated address & middle mile data
Clearwire Corporation	X		Updated census block layer
CenturyLink	X		Updated census block layer
Time Warner Cable	X		Updated data and coverage area
E-Vergent.com, LLC	X		Updated data to reflect recently purchased AT Cyber territory
AT&T	X		Updated mobile, middle mile, and census block data

SBDD DATA TRANSFER MODEL METHODOLOGY

The submission of the broadband dataset for October 1, 2011 is contained within the SBDD Data Transfer Model. PCI has reviewed all literature that relates to the release and use of this data transfer model and recognizes that it does not replace or dictate how data is stored, processed, or displayed for the State, as it is meant primarily as a means to transfer the broadband data from all states and territories and populate the National Broadband Map in a seamless fashion.

In addition to the narratives and methodologies contained herein, as well as the DataPackage.xls containing contact information, the data dictionary, and a provider summary table, the following feature classes are submitted within the SBDD Data Transfer Model for the state of Illinois.

Inventory of Deliverables, Partnership for a Connected Illinois: October 1, 2011:

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census blocks of No Greater Than Two Square Miles in Area
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census blocks Larger in Area Than Two Square Miles
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing

The provider data collected by PCI on behalf of the State of Illinois have been formatted per the given specifications and uploaded into the appropriate feature classes of the SBDD Data Transfer Model. Wireline availability is contained within census blocks and road segments. Wireless availability is contained as polygons of coverage areas. Middle-mile connections and community anchor institutions are contained as point data. The subscriber weighted nominal speed (if available) is contained within the overview feature class. All speed data is contained at the census block, road segment, or wireless polygon level of availability. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information as possible. (Methodology Paper, April 2011)

DATA PRODUCTION METHODS

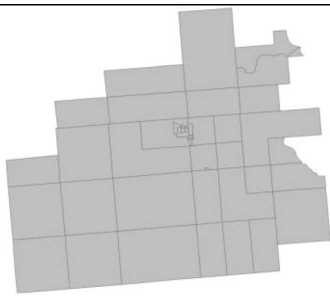
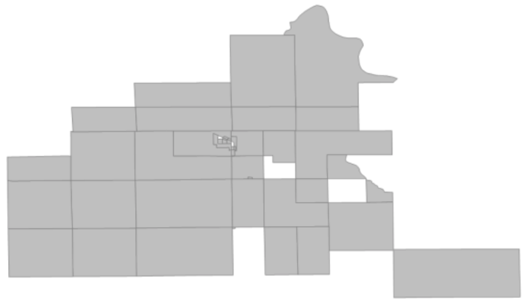
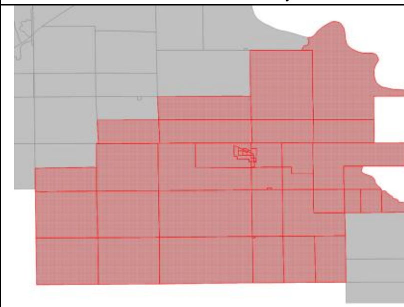
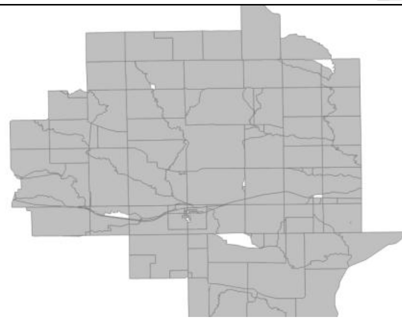
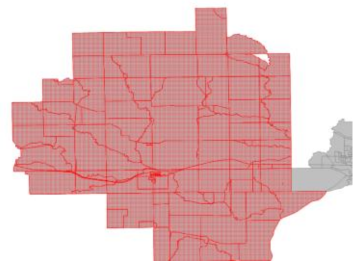
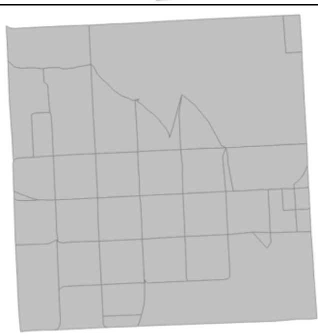
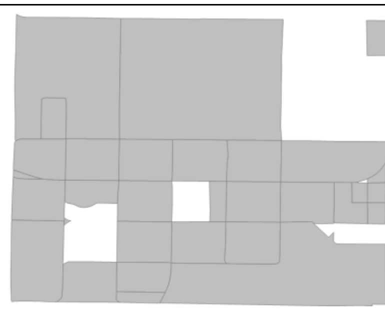
As mentioned, data was received in a number of formats that required processing in order preparte the data for submission in accordance with NTIA requirements. The PCI data team also went to great lengths to convert the 2000 census block data to 2010 as requested by the NTIA. In this round the primary format in which updates were received were through the GeoPDFs submitted to the providers and the TerraGo Technologies toolbar. This section will discuss the census block conversion and the various means in which PCI took as raw data were received from the provider, as well as how PCI assisted the provider in making the update process as easy as possible. It will examine each layer and the steps PCI took in updating the data that NTIA is in receipt of.

CENSUS BLOCK CONVERSION

In this round, PCI made the conversion from 2000 to 2010 census blocks at the instruction of the NTIA. Using existing 2000 coverage, PCI created coverage polygons based upon provider, transtech, and maximum advertised download speeds. Using a spatial overlay, PCI selected census blocks in the 2010 layer with a centroid point in the carrier polygons. These new census blocks then inherited the same attributes as they were previously recognized in the 2000 census block layer.

PCI initially attempted to use the conversion table that was provided by the Census Bureau to make the conversion from 2000 to 2010 census blocks. PCI noticed holes in the data when this process was used. The images that follow demonstrate the difference in the conversion from 2000 census blocks to 2010 using the spatial overlay as opposed to the conversion table.

Using the conversion table process, we had a total of only 605,038 census blocks covered. The all-inclusive spatial overlay filled these holes and contained a more accurate 652,602 census blocks.

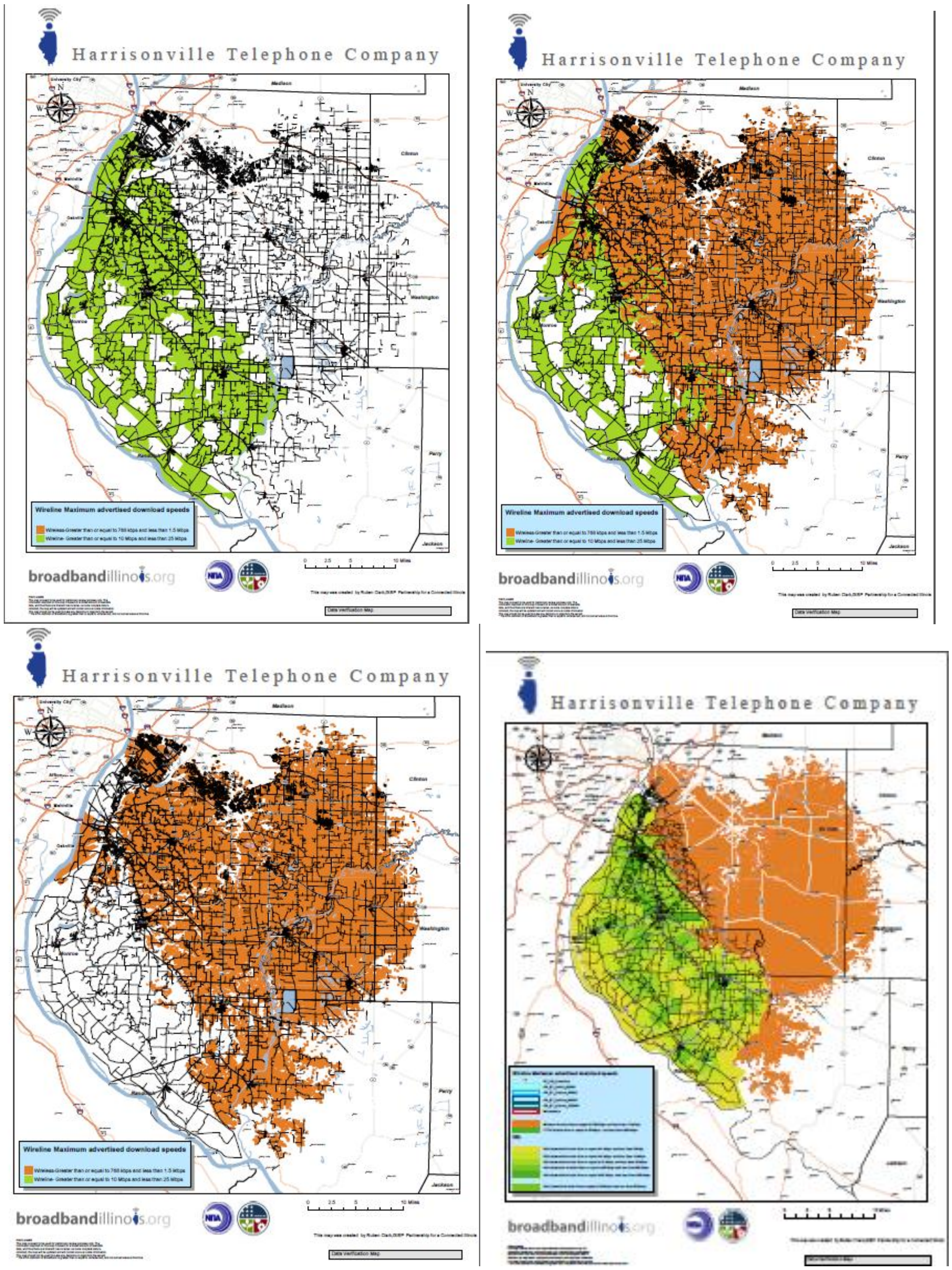
2000	Conversion using Conversion Table	Conversion using all-inclusive spatial overlay
		
		
		

GeoPDF and TerraGo Technologies Toolbar

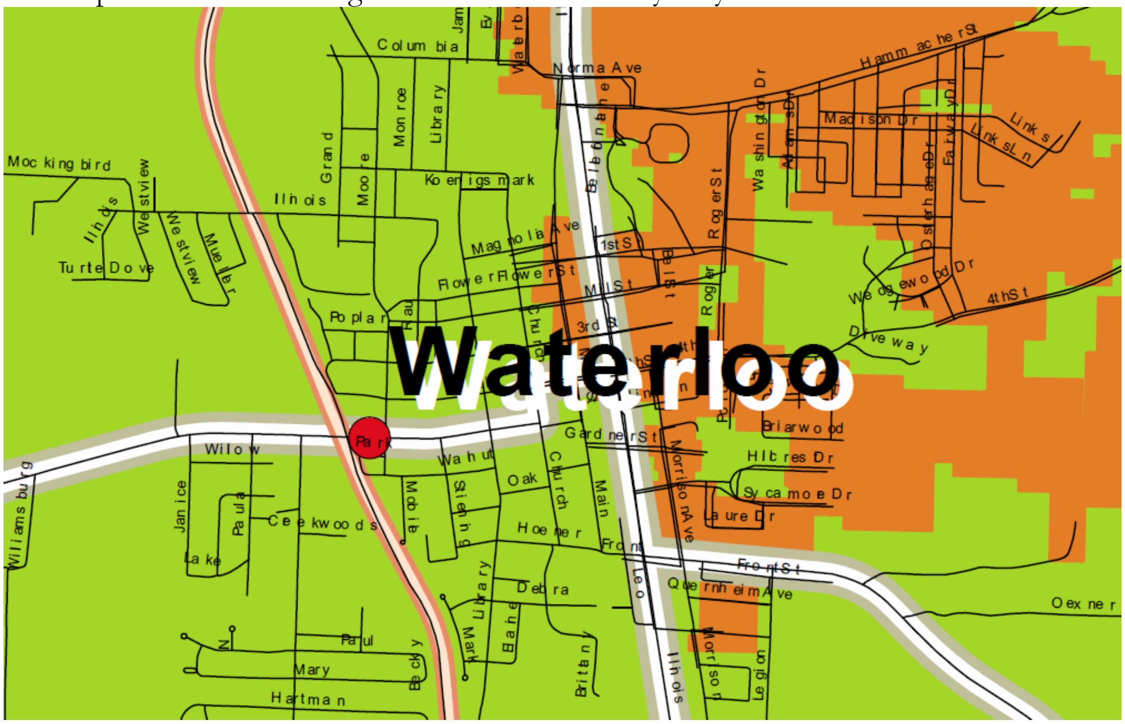
The GeoPDFs that PCI sent to the providers proved to be the single greatest improvement PCI made to its data collection and outreach process in this round. In the initial outreach made to the provider from June 30 to July 9, they received both the GeoPDF and a letter describing how they could use the GeoPDF software to make their edits for this Round.

The provider, upon opening the map was instructed to use the  icon to turn layers on and off. The images below show the intial map PCI sent to Harrisonville Telephone Company. It demonstrates the map as layers are switched on and off to show varying levels of Harrisonville Telephone Company's coverage area.

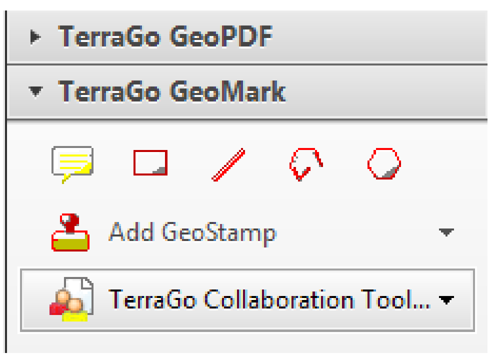
The two maps on the left side display the wireline and wireless coverage areas respectively. The map in the top right corner displays the Cycle 3 data with both layers turned on. The images on the right display the Cycle 3 and Cycle 4 data respectively. This displays the flexibility of the TerraGo toolbar as data is turned on and off and edited.



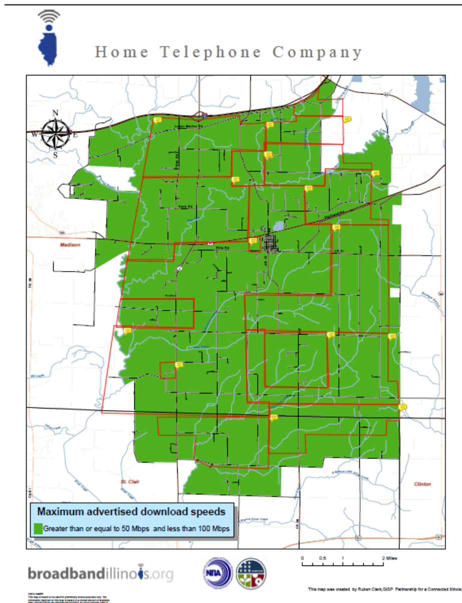
The provider is also able to zoom into specific parts of their data as demonstrated by the image on the following page. As the provider zooms into certain cities, the high resolution GeoPDF allows the provider to see exactly how their coverage looks at the address level. This is extremely helpful for the provider in indicating fiber buildouts that may only cover a small number of census blocks.

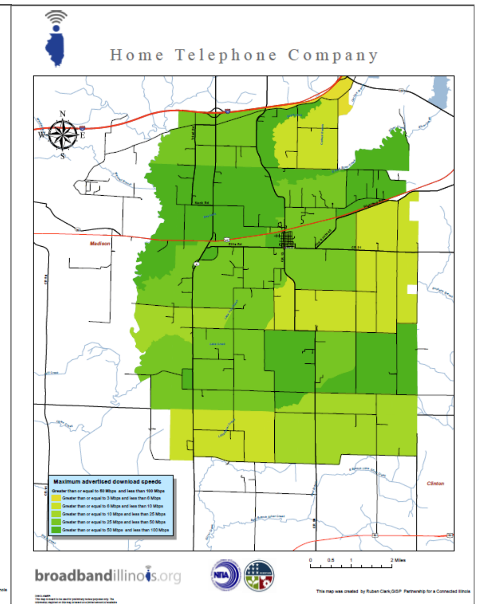


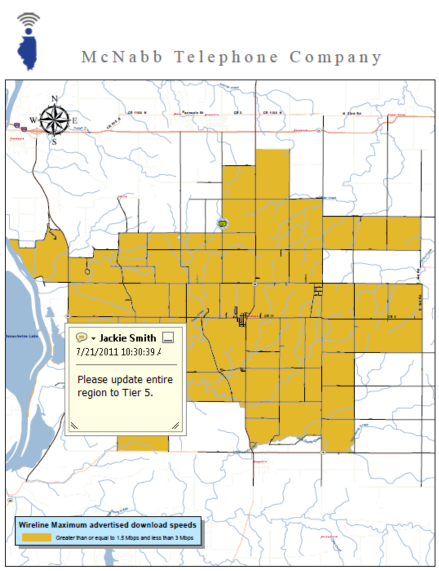
The provider was also instructed to download the TerraGo technologies's toolbar at http://www.terragotech.com/products/terrago-toolbar. This free adobe plug-in allows the provider to create geomarks on their maps which can be uploaded into ESRI software to assist in making the updates.

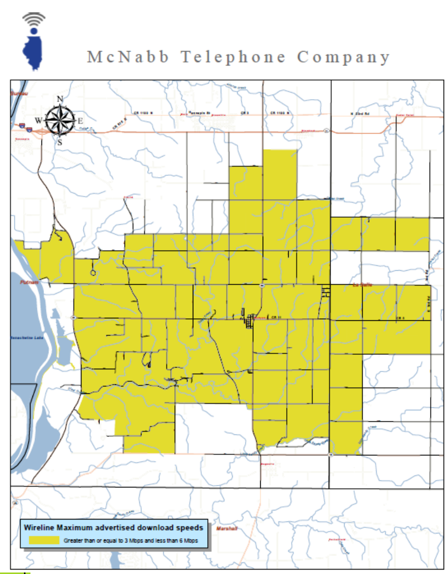


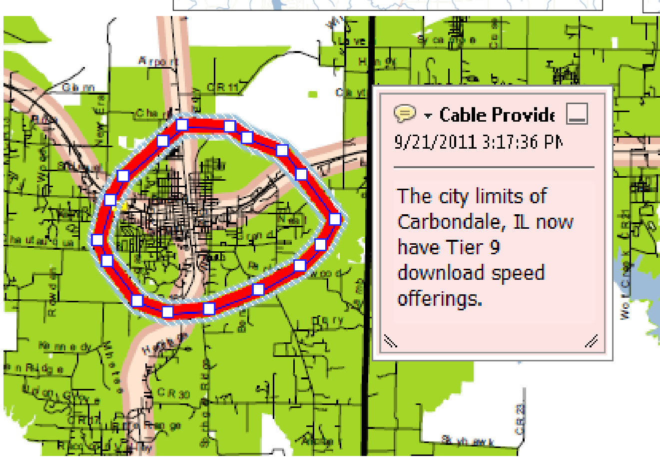
This toolbar created several opportunities for the provider to really zoom in and edit their coverage area according to how their was actually represented. When it comes to verifying carrier level data, PCI felt the GeoPDF and the virtual meetings where PCI and the provider started carving up the data were extremely useful. The images on the next page demonstrate how DSL and Cable providers were able to use the toolbar to carve up coverage areas to update their data.

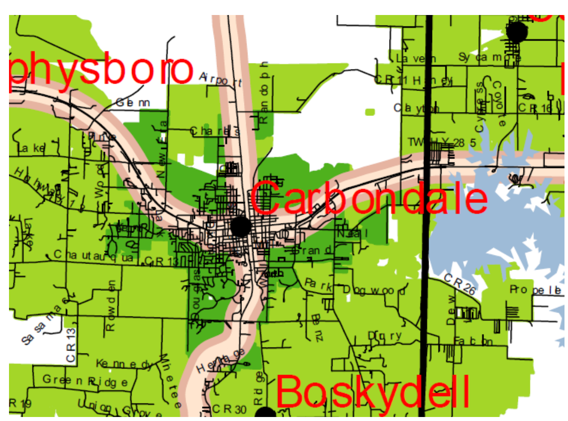

Home Telephone Company
Maximum advertised download speeds
Greater than or equal to 50 Mbps and less than 100 Mbps
broadbandillinois.org


Home Telephone Company
broadbandillinois.org


McNabb Telephone Company
Jackie Smith
7/21/2011 10:30:39
Please update entire region to Tier 5.
Wireline Maximum advertised download speeds


McNabb Telephone Company
Wireline Maximum advertised download speeds


Cable Provide
9/21/2011 3:17:36 PM
The city limits of Carbondale, IL now have Tier 9 download speed offerings.

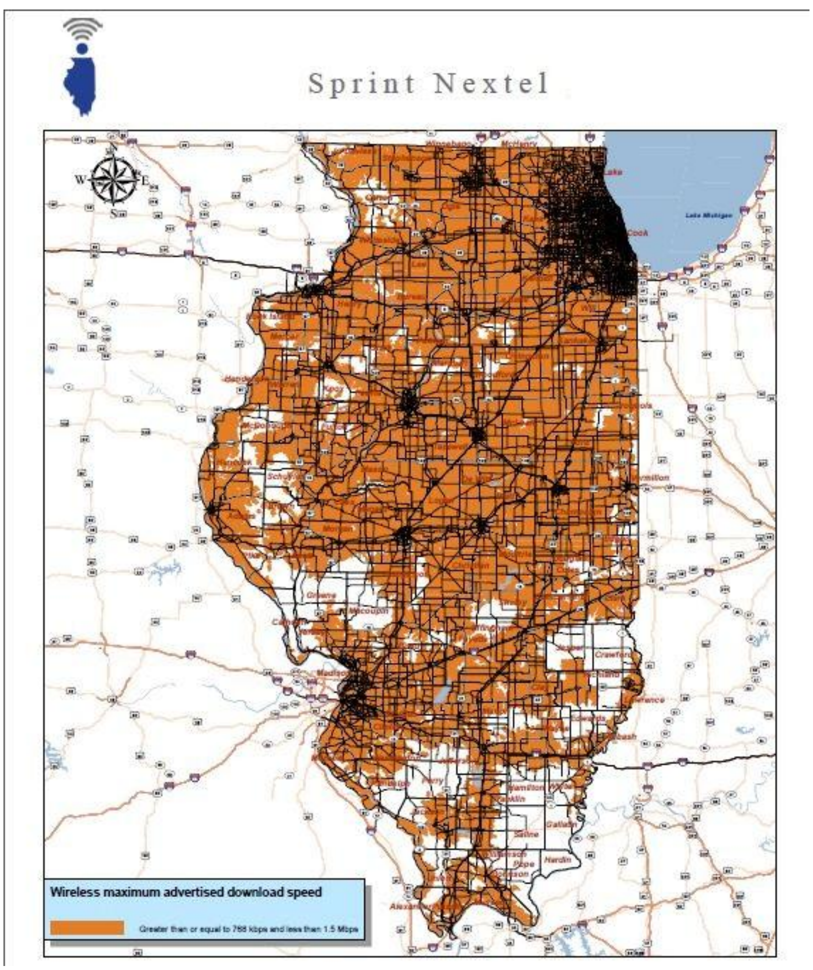

physboro
Carbondale
Boskydell

These images display how data was updated in this round using the toolbar. The image at the top displays an image drawn by the provider that contains the actual speeds he promises in the indicated regions. The images of McNabb Telephone Company displays how simple speed updates were made using the TerraGo toolbar. A provider would attach a note to the map indicating the need for a speed change. The image at the bottom shows a cable provider in this round who made speed upgrades in the city limits of Carbondale, IL. The simple note they made to the map allowed for quick updates using a city limits layer on the map.

When uploaded into ESRI software these geomarks were extremely useful in making quick updates to both a provider's footprint and speeds. These GeoPDFs proved to be a source of provider level verification, and there were a couple of instances where the GeoPDFs actually worked to verify speeds across a provider's coverage area. These instances will be discussed at depth in a later section.

MOBILE WIRELESS COVERAGE

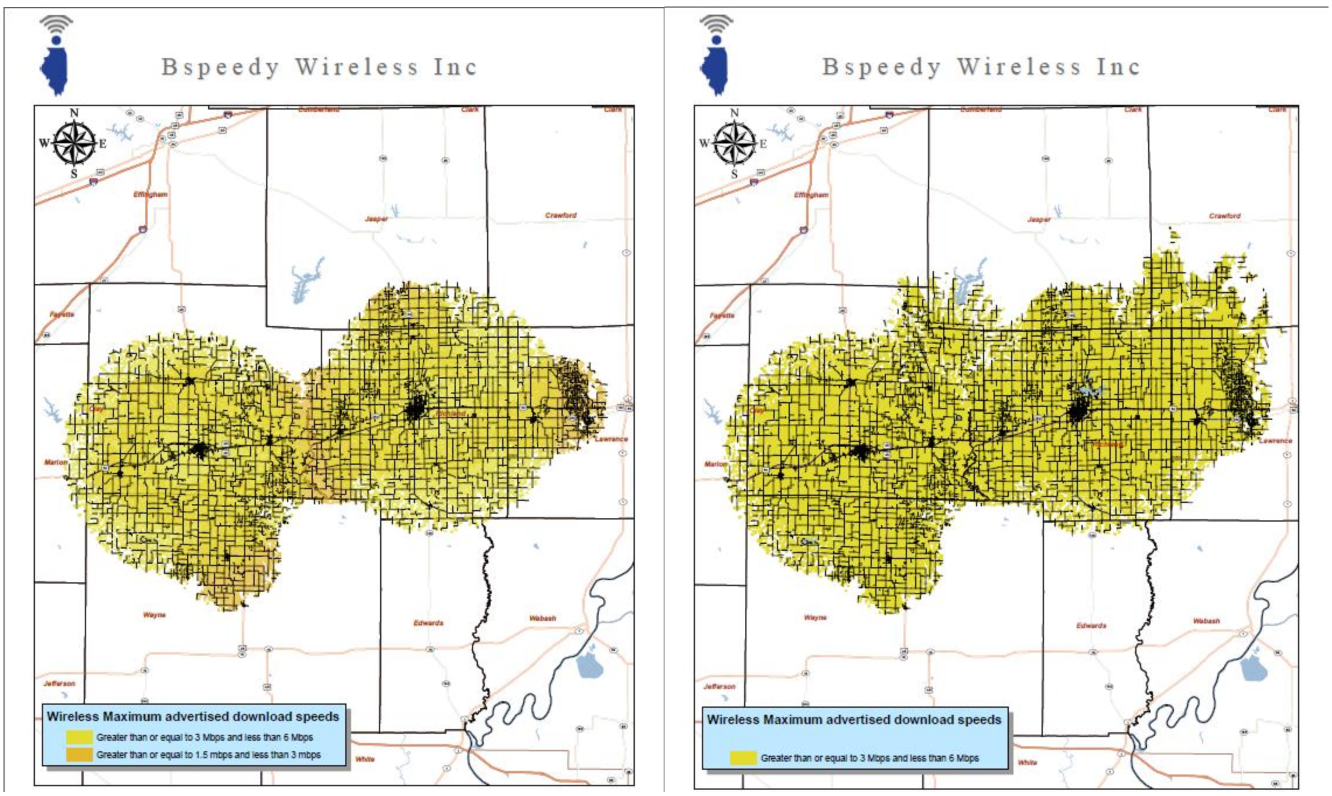
PCI has collected mobile wireless coverage from most providers in the State. These shapefiles were imported into the database and formatted to fit NTIA requirements. Every mobile wireless provider submitted updated data in this round. An example of this data is below.



WIRELESS METHODOLOGY

In addition to the wireless approach deployed in 2010, for this cycle, many fixed wireless providers allowed us to use their tower locations, antenna heights and direction/spread of coverage to derive coverage areas. With the provided tower information, professionally prepared radio frequency coverage studies were conducted and converted to shape file format. These studies have proven to be very accurate and represent service areas where the maximum advertised speeds can be delivered. These studies take in to account full consideration for terrain and tree clutter data.

We do note two interesting trends in the wireless data. First, there appears to be some variation on how the NOFA coverage definition is met. In other words, there seems to be a disparity on the necessary strength (e.g. -80 dB, -98 db, -120 dB, etc.) to provide the appropriate quality of service for data services and still be able to deliver the maximum advertised speeds.



The images above show an increase in coverage for Bspeedy wireless. The image on the left displays the data that was submitted in Cycle 3 and the image on the right displays the data for Cycle 4. One is able to see an increase in coverage in the center and eastern parts of the map. This came through the construction of additional towers that were not included in previous submittals.

MIDDLE MILE

In the last round, PCI did not submit any Middle Mile points that the previous mapping contractor had collected under the protection of a Non-Disclosure Agreement. PCI made an effort to include these Middle Mile points in this round as well as collect data from other providers who had semi-annually be contributing this data.

The NOFA defines Middle Mile as (a) a service provider's network elements (or segments) or (b) between a service provider's network and another provider's network, including the Internet backbone. A range of telephone, mobile wireless, and cable providers submitted data for this layer, while others remained silent on the question, or chose not to submit.

METADATA

Metadata, which literally means data about data, represent PCI's attempt to document procedures, coding, and overall methodology used in managing broadband supply data. Both short and long terms goals of developing PCI's metadata are to improve communication on Geographic Information Systems (GIS) data management issues for both internal and external partners. PCI's metadata is organized and structured around Federal Geographic Data Committee (FGDC) standards associated with key information impacting the following issues:

- What GIS data layers are managed by an organization?
- How is data coded or classified in assisting outside partners or organization use the GIS data developed?
- When was the data developed and how often is it updated?
- Who developed the data layers and who should be contacted if anyone has questions?

The net result of developing PCI's metadata connects to the idea of communication and standards. When applied correctly over time PCI's metadata will assist in educating other users on essential questions needed when applying GIS data. In addition, it will assist PCI internally as metadata will help the organization identify and document critical developing issues shaping data development. Any new employee or organization will be pointed to metadata files when asking questions relating to methodology, attribute codes, dates of data edits or updates, and follow-up contact information within PCI's data team.

DATA VERIFICATION

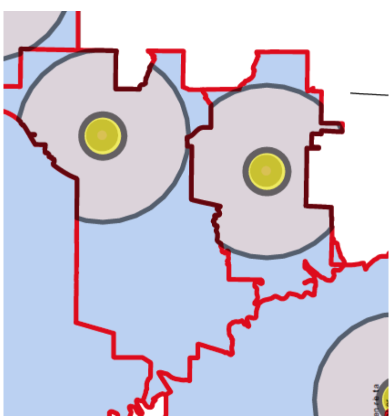
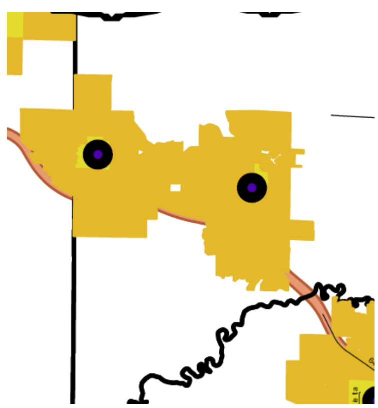
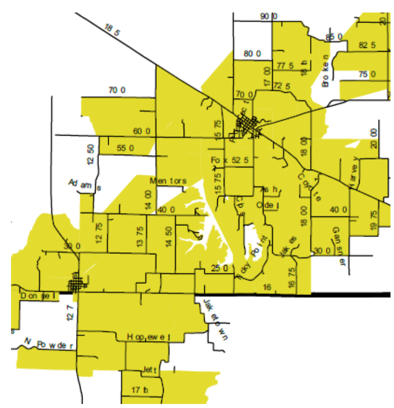
Verification has become an evolving and ongoing process at PCI. The development of the Broadband Illinois website, along with the evolution of the GeoPDF process has created a feedback loop between provider and consumer and PCI that allows PCI to verify the carrier level data that it submits semi-annually to the NTIA. PCI continues to develop eTeams throughout the state that are able to take county and provider level maps and visualize the data and begin indicating areas where the data may not be accurate. PCI has also published a Supply Side Inventory, which is included in the appendix of this paper, in which PCI developed a system to rank Illinois's counties by broadband connectivity and looked at two major sets of third-party data to verify the data it had collected. Various means are as well being used to aggregate demand in parts of the state which indicate there is a need for better broadband and better data.

PROVIDER

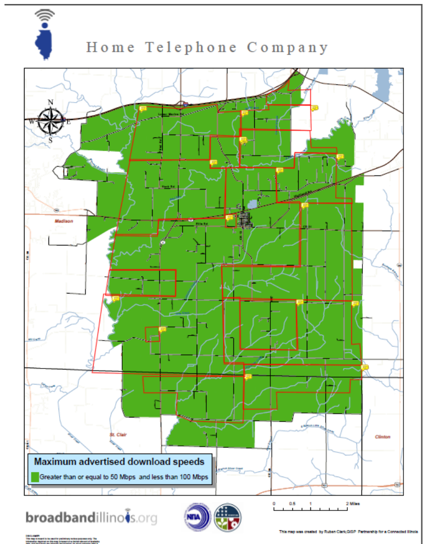
In this Round, PCI worked very closely with the provider sending back versions of the GeoPDF until the data was represented according to the provider. PCI considers this process to be the first of five forms of verification PCI has and will continue to carry out to ensure the data that is submitted to the National Broadband Map is as accurately as possible.

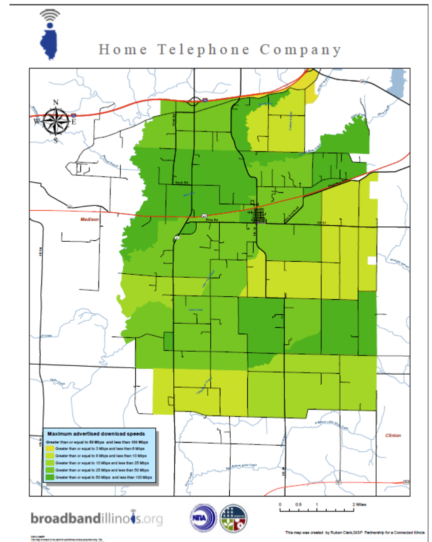
In this round, PCI purchased a set of wire center boundaries which PCI used to map out DSL coverage for a couple of providers. Knowing that a DSL provider's Central Office or Remote Terminal that fell in a certain wire boundary could not extend service outside that boundary allowed PCI to map out these locations and create buffers around these locations based upon the speed. PCI recognized that locations 7500 feet from a DSL C.O. or R.T. would not receive the same speeds as locations only 1000 feet from that location. These buffers allowed PCI to make these changes. Due to confidentiality of these locations, maps that contain these locations with these buffers and boundaries are protected under the NDAs that have been established.

However, the images below provide an example of how PCI would use a C.O. or R.T. location to map out the coverage that a provider is able to provide in that wire center boundary. The image on the left shows two wire center boundaries that contain a C.O. The buffers are indicating that the areas closest to the C.O. receive speeds that are in Tier 5 while areas outside that initial ring receive download speeds in Tier 4. The second image shows how the data beneath these buffers looks when the wire boundaries and buffers are removed. The third image shows how this data would have been submitted in a previous round by the previous mapping contractor. As you can see, the same flat speed is dispersed across the entire region surrounding C.O. and R.T. locations. This is undoubtedly a form of verification.

PCI has worked through this process for one of the two largest DSL providers in Illinois as well as a handful of small telephone companies throughout the State. This is a process that PCI will focus on quite heavily in the next round. In some instances, small telephone companies admittingly provided this data without sharing the locationsand the GeoPDFs made this possible. The images of Home Telephone Company on the next page demonstrate how they used the TerraGo toolbar to reel back the previous data that was incorrectly submitted as DSL data with speeds across the region in Tier 9.



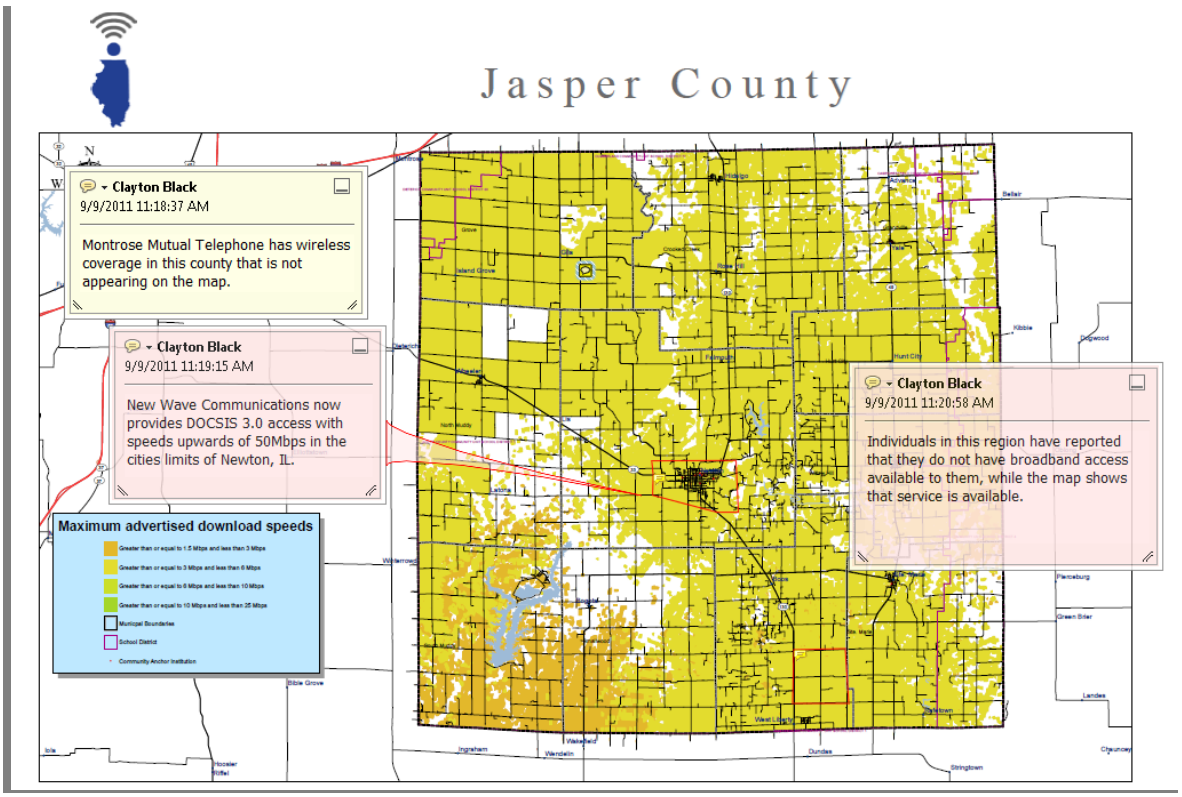


USER

PCI views the user as the second form of verification and has developed a tool to allow feedback on the data that is on the Illinois Broadband Map and in the semi-annual submission to the NTIA. When a consumer clicks on Broadband Illinois's search map they see the carriers that service that census block. The widget below allows the consumer to give PCI feedback on the providers that service that location. PCI is preparing to launch this tool in the upcoming round of data collection. The data that PCI receives from this tool will be used to start plotting points on a map that can be given to the provider to show areas the consumer is claiming does not have coverage.

TRUSTED USER

The third form of verification comes from the Trusted User. PCI has created GeoPDFs of all 102 of Illinois's counties that are available on the Broadband Illinois website. It has also deployed eTeams throughout the state that are capable of editing these maps and returning them to PCI as a form of verification. The map below shows an example of all the changes that PCI made to Jasper County in this round thanks to user feedback from eTeam members on the ground. As you can see, New Wave Communications launched DOCSIS 3.0 technology to the city of Newton in this round. PCI had also not been including wireless data for Montrose Mutual Telephone Company. PCI recognized this error and included this data in this round. The county maps are currently available on the website, and the provider level GeoPDFs will soon be published and available for editing as well.



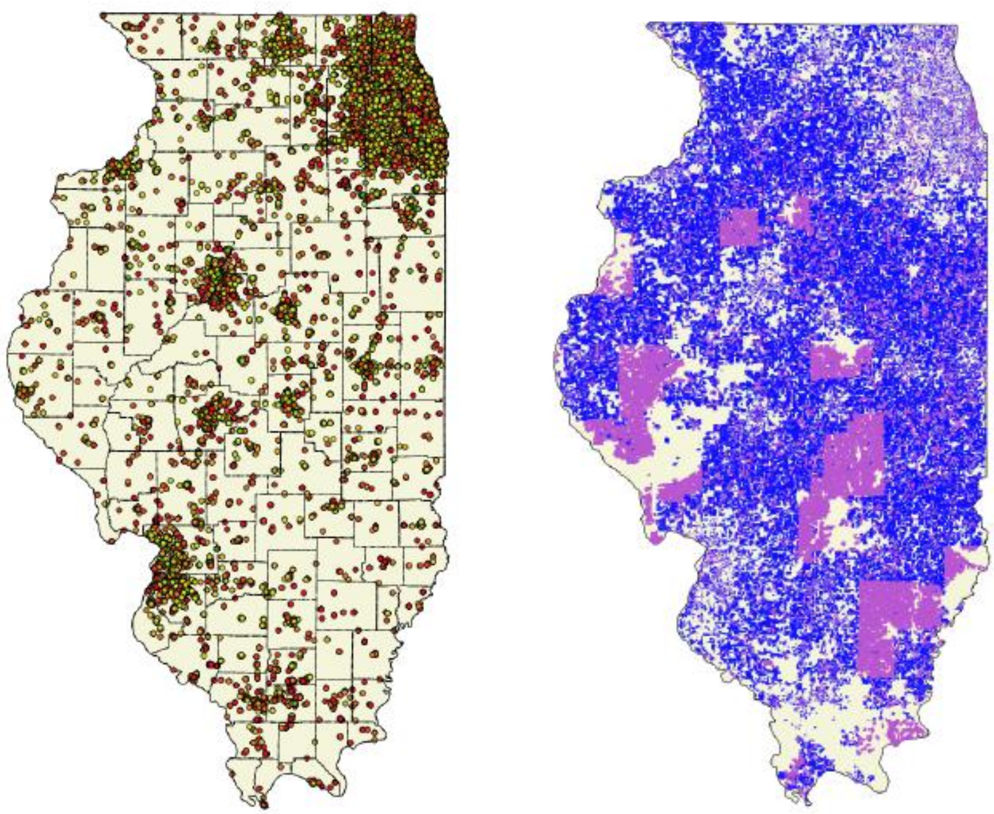
THIRD PARTY DATA SOURCES

On August 15, 2011, PCI published a Supply Baseline Study, "Broadband Access in Illinois: A Baseline Snapshot", that summarized the state of broadband supply in Illinois. The report, a product of the data analysis by the PCI data team aims to quantify what is known about broadband data in Illinois and publish it along with an analysis of Third-Party data sources.

The first method of third-party verification used in this examination was user speed test data through the broadbad.gov website. Through this website, the NTIA and the FCC solicited street address information with each speed test. They provided PCI with speed test data gathered over a 12 month period. This has been mapped and some limited studies have been conducted. These speed

tests were accompanied by mini surveys which allowed for some analysis. The users were asked to input their street address and the type of internet connection they were using.
The second set of third-party data used for verification used in this study was gathered by the Gadberry Company. The Gadberry data is a combination of various user/crowd sourced data sets. They indicate if there is broadband activity at the street address level and they then incorporate that information at the census block level. We have compared blocks showing coverage as stated by the carriers against the user reported information. There are some areas of the state where there are low or no user reported information.

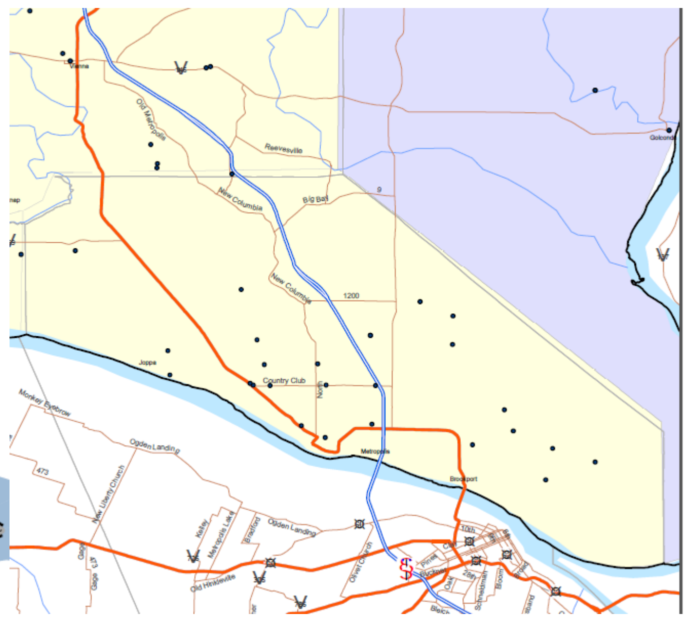
The maps below show these third party data sources projected on a map of Illinois. The map on the left shows the location and results of the FCC speed tests, while the image on the right shows census blocks where the Gadberry dataset did not provide enough results for a significant analysis. On the Gadberry map, census blocks in blue indicate where there is a low sample rate, and census blocks in pink show where no samples were obtained. For more information on these third party data analyses, the Supply Side Baseline has been included in the appendix of this paper.



DEMAND RESEARCH

PCI is undergoing efforts to develop a survey process to survey demand across the state of Illinois. This demand research is the fifth form of data verification that PCI is using to verify the data. This survey process once developed will identify current broadband adoption trends, applications, and barriers for community anchor institutions, businesses, and residents. It will be referenced around critical geographic units for analysis.

Connect SI, a regional broadband initiative in Southern Illinois, developed a tool called "I Want My Broadband" that surveyed consumers who felt they were underserved or unserved in terms of broadband service. Working with eTeams, PCI has followed the Connect SI model to launch this tool in other regions around the State. The images below demonstrate just how powerful this tool can be. The image on the left shows the current broadband supply data sits in a given part of the state. As you can see, the reported speeds fall in download tiers 3 &4. The image on the right shows the same part of the state and displays locations where consumers have reported that they need better service. While PCI continues to think of the best way to launch a similar effort state wide, this demand aggregation is an exceptional form of verification.



Illinois Community Anchor Institutions

PCI has established an ongoing procedure for gathering data on the physical location and broadband connectivity of Community Anchor Institutions (CAIs) in accordance with the data requirements of the SBDD NOFA Technical Appendix.

As with the April 1, 2011, submittal, PCI identified existing, centralized sources for CAI connectivity data. PCI geocoded each submitted data point by using ESRI software and Google batch geocoding programs. As opposed to previous rounds where PCI submitted secondary CAI's that did not fit perfectly into NTIA parameters, PCI has decided to submit only those CAI's that clearly and perfectly fall into the seven categories laid forth by the NTIA. This has led to a significant decrease in the total number of CAI's submitted, but a significant increase in the quality of the data that is being submitted. PCI continued to follow some of the same outreach methods developed in previous rounds, but in this round made the greatest gains in terms of data quality in the areas of K-12 schools and libraries.

This section will describe the process used to build the foundation of the Illinois CAI database in much the same way it has been described in previous rounds, but it will focus on how the dataset has been improved for this submission.

PREVIOUS ROUNDS

Outreach in Round 1 focused on collecting the point and address data while subsequent submissions in Rounds 2 & 3 focused heavily on survey development, web site database research and teleconferences. Together with the Illinois Department of Commerce and Economic Opportunity (DCEO), PCI engaged in a process of working with CAIs on an organized basis. Other state agencies and organizations have included the Illinois Commerce Commission, Illinois Board of Education, and the Illinois State Police. Additional Agencies and organizations have been referenced throughout this presentation.

PCI created a survey using Survey Monkey and both carrier and price information were requested, and the speed test became a required item for completion of the survey. The speed test(s) that was administered was the one on the Federal Communications Commission web site.

PCI worked with a number of organizations in gathering data for these submissions. We are encouraged that relationships with these organizations will continue to develop and facilitate our electronic data collection efforts in future filings. These organizations are listed below:

K-12	Illinois Association of Regional School Superintendents, Illinois State Board of Education
Libraries	Illinois Library Association
Healthcare	Illinois Critical Access Hospital Network, Illinois Rural HealthNet, Illinois Healthcare Association
Public Safety	Existing Database
Colleges & Universities	Illinois Community Colleges Board
Other Government	Existing Database
Other Non-Government	Man-Tra-Con

For Category 1, K-12, PCI worked with Gil Morrison of the Illinois Association of Regional School Superintendents. A cover letter and link was sent to each of the Regional Superintendents with instructions to disseminate to the Technical Director for each their respective School Districts. From there, the Technical Director distributed the survey to each school location. PCI also worked with Kathy Barnhart of the Illinois State Board of Education in distributing the survey. Kathy distributed the survey to the fifteen Learning Technology Centers in the State of Illinois who then distributed the survey to the various school districts.

PCI had an existing database of email contacts for Category 2, Libraries in Illinois. We worked with the Illinois Library Association and found that generally the libraries were receptive to taking the survey, given need for broadband in the library sciences.

In Category 3, Healthcare, PCI worked with Pat Schou of the Illinois Critical Access Hospital Network and Alan Kraus of the Illinois Rural Health Network. Both organizations were referenced in our cover letter, and the survey was sent from PCI's email database. David Voepel, of the Illinois Health Care Association, also assisted in distributing the survey to Category 3 institutions which included long-term care facilities, nursing homes, and rehab facilities. The data that has been acquired through these two methods have been added to the database of community anchor institution data included in this submission.

For Category 4, Public Safety, surveys were also sent via the PCI database. As with the Libraries, the response from this category was favorable.

PCI worked with Elaine Johnson at the Illinois Community Colleges Board for Category 5, Universities and Colleges. A cover letter and link was sent to over 40 Community Colleges, with a very positive response. The remaining Category 5 surveys we sent via email.

For Category 6, Community Support-Government, the survey was distributed electronically via PCI's existing database.

For Category 7, Community Support-Non Government, PCI worked with Kathy Lively at Man-Tra-Con to disseminate the survey to Illinois WorkNet Centers. The remaining surveys were sent via our exiting email database.

Round 4 Corrections

The total number of CAIs stands at 12,334. Notwithstanding this relatively high number, PCI has made an effort to refine the survey process to identify priority CAIs within each category, and to collect connectivity data for these locations.

As an example, of the 26,869 locations submitted in October, there were 14,000 Category 3 Healthcare locations which were geocoded, yet had no connectivity data. Many of these were for actual practitioners as opposed to clinics, or what might be considered institutions. PCI has elected to remove this larger number for the October filing, we have also identified 1,327 priority Healthcare locations, which include hospitals, clinics and other significant facilities that are included in this filing. PCI also removed duplicates where they existed in the other categories. For instance, the previous mapping contractor included a record for each individual college and university in both the K-12 and Higher Education categories. PCI felt it made sense to include only one record of this category in only the Category 5 Higher Education category.

In this Round, PCI enhanced the quality of the data in the K-12 category through the use of an eRate database that showed what schools had applied for the eRate and what providers were servicing their location. This allowed PCI to populate the BBService and TransTech fields for those CAI's.

Round 4 Gains

In Round 4, PCI made the aforementioned corrections to the database, and continued to push the Survey Monkey tool designed to collect the required information. The table on the following page indicates the improvements that have been made to the database over time, as well as shows the impact the removal of the 14000 category 3 locations made to the quality of the database.

	Oct 2011			Mar 2011			Oct 2010		
Cat	**Total**	**Connected Points**	**% with connectivity data**	**Total**	**Connected Points**	**% with connectivity data**	**Total**	**Connected Points**	**% with connectivity data**
1	5,314	3236	60.90%	5,604	1,417	25.29%	5,651	1,165	20.62%
2	1,422	721	50.70%	1,444	713	49.38%	1,505	633	42.06%
3	1,327	138	10.40%	15,267	138	0.90%	15,358	96	0.63%
4	2,319	449	19.36%	2,339	433	18.12%	2,360	384	16.27%
5	271	115	42.44%	266	111	29.47%	307	116	37.79%
6	1,446	1445	99.93%	1,449	1,449	100.00%	1,454	1,454	100.00%
7	235	37	15.74%	230	27	11.74%	234	19	8.12%
Totals	12,334	6,141	49.79%	26,599	4,288	16.12%	26,869	3,867	14.39%

While the significant increase in total number of anchor institutions with connectivity data comes from the removal of the secondary institutions, one can see that the total number of anchor institutions with connected points has increased substantially from 4,288 to 6,141. This comes primarily from the use of the e-Rate data and the continued deployment of the survey.

BROADBAND ILLINOIS WEBSITE

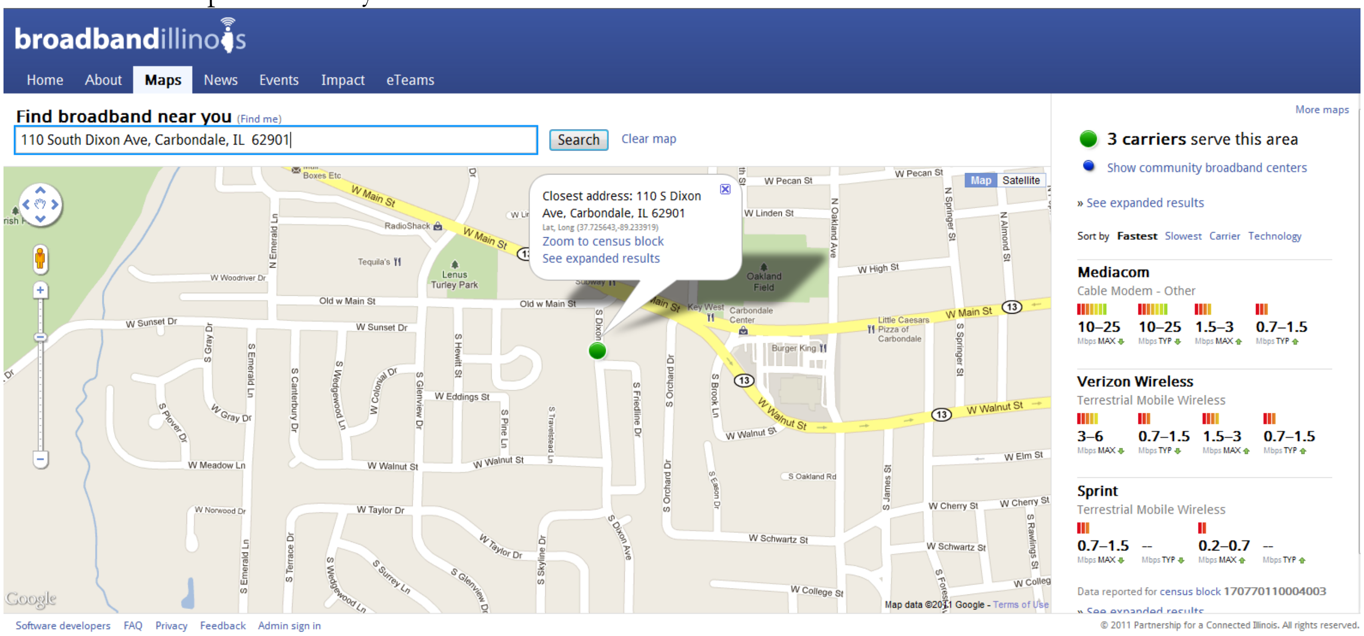
On February 17, 2011, the Partnership for a Connected Illinois launched its new web site, featuring an easy graphical interface for accessing PCI data about broadband providers with a single mouse click or touch on a smart phone. In this first, initial version, the web site offered a broadband location finder with detailed service provider information and assessments of internet speeds, as well as locations of community broadband providers. This map remains on the website along with other maps in the "Maps" section of the website. The aforementioned county GeoPDFs have also been made available with the data current as of December 31, 2010. Soon after this submission, county and provider maps will be posted on the website with the data currently being submitted.

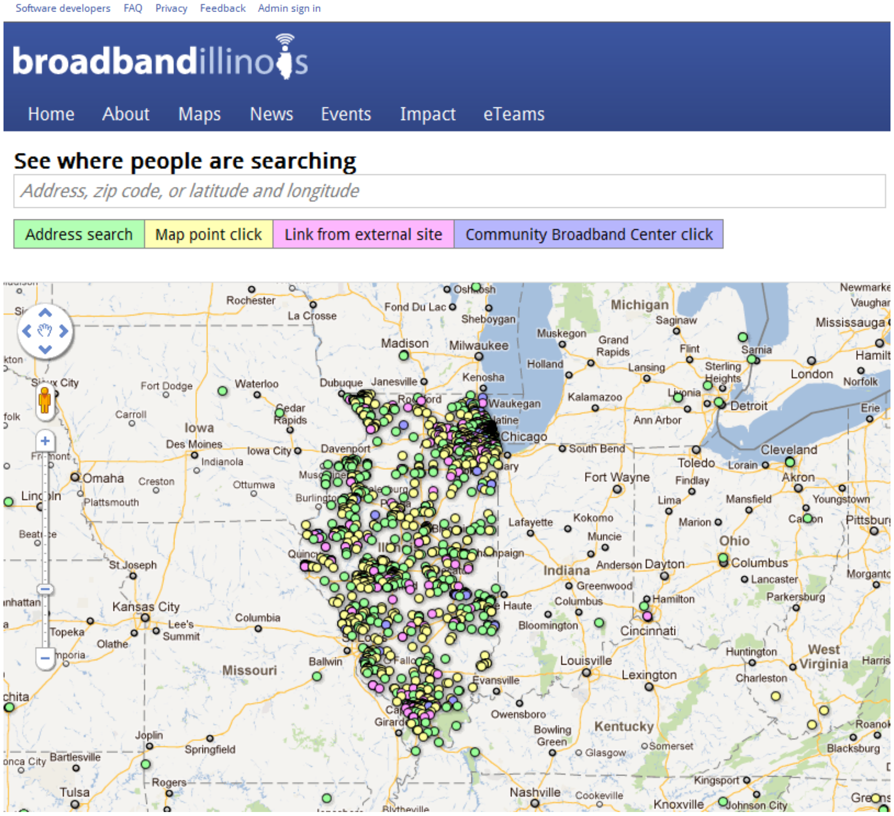
METHODOLOGY FOR THE BROADBANDILLINOIS.ORG WEB SITE

Clicking on the home page map opens a side panel with broadband providers. Expanded results also show the libraries, schools, and public building in the area with broadband. As the State-designated entity under the NTIA's State Broadband Data and Development, PCI provides, on http://broadbandillinois.org, the same data that it submits to the NTIA for inclusion in the national broadband map. Additionally, PCI has begun to collect actual speed and price information, using the new web site.

The web site is built around open and transparent data-sharing tools. As with the national broadband map, PCI aims to encourage user feedback as a means of helping to improve and promote broadband in Illinois. For example, the site's "eTeam" section encourages citizens to get involved with Broadband Illinois eTeams. These community leadership groups are working to help connect rural residents and others throughout Illinois. The site's "Impact" section is beginning to assemble materials that pertain to broadband adoption.

The image below shows the primary search map that the user is able to use to search for broadband providers at their location. The other image displays locations that have been searched since PCI launched the map in Feburary 2011.





THE APPLICATION PROGRAMMING INTERFACE FOR BROADBAND ILLINOIS DATA

PCI's web site is built around an open source Application Program Interface. This free tool allows software developers to build upon, and add to, the data on the Broadband Illinois website. Documentation for the PCI's API is available at http://developer.broadbandillinois.org.

BROADBANDSTAT METHODOLOGY

BroadbandStat is an online, interactive mapping tool for viewing, analyzing, and validating broadband data. Developed through a partnership with ESRI, the market leader in geographic information system (GIS) software, BroadbandStat is a multi-functional way for local leaders, policymakers, consumers, and technology providers to devise a plan for the expansion and adoption of broadband. The Partnership for a Connected Illinois re-launched BroadbandStat on http://broadbandillinois.org, and is also available under the "Maps" tab.

CONCLUSION

The data submission cycle ending on October 1, 2011, has been the first round that the Partnership for a Connected Illinois has conducted every facet of the data collection process. . Now that PCI has assumed full discretion over this process, it has brought the data "closer to home" for Illinois. PCI has taken major steps in its three-fold mission to collect and publish broadband data, to ensure broadband access throughout the State, and to maximize broadband's impact, and the data has helped drive each of these steps.

APPENDIX

Scoping Broadband Access in Illinois

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i. **Geographic Discussion**
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ii. **Socioeconomic Discussion**
   1. *(Figure 3.4 - Unemployment & Poverty)*
   2. *(Figure 3.5 - Population per square mile)*
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Conclusion

Scoping Broadband Access in Illinois: A Statewide Baseline Inventory for Supply

Introduction

The Partnership for a Connected Illinois Statewide Baseline Inventory for Supply of Broadband will highlight, introduce, and quantify the issues relating to broadband data submitted by providers within Illinois. The purpose of this paper is to reveal some of our current findings at PCI, to drive forward toward the next stages in the work on collecting and publishing broadband data, and to help encourage the construction, promotion and use of higher-capacity broadband networks. Under the U.S. Department of Commerce's State Broadband Initiative, and in collaboration with the Illinois Department of Commerce and Economic Opportunity, PCI is the non-profit entity charged with serving private and public stakeholders throughout Illinois in ensuring that Better Broadband leads to Better Lives.

This inventory will summarize the following research outcomes for the PCI Statewide Baseline Inventory for Supply of Broadband:

- Inventorying and quantifying the state of broadband access, and the advertised speeds of access, in Illinois, according to the best available information;
- Defining and developing metrics against which to evaluate changes in broadband access across the State;
- Introducing the concepts of ranking in assisting the State with assessing how different geographic units (i.e., counties, school districts, etc.) compare against each other relative to broadband supply, which particular reference to advertised speeds and availability.

Assessing the lower-speed and less-served areas of the State is the first step in evaluating broadband supply. In Part I of this study, our research will quantify the percentage of households and geographic that are served (to the best of our knowledge), at particular speeds. Three important points bear emphasis:

1. PCI updates broadband information from providers on a semi-annual basis. Because of the large numbers of carriers providing information, and because of continual updates from providers, there may be errors in this information. As PCI and providers mutually improve our data-collection and validation processes, percentages of the State covered at particular speeds may change.
2. Even if PCI has effectively captured the areas in which providers say they offer service at a particular advertised speed, PCI believes it is essential to verify the claims of services. We need to compare how actual broadband speeds compare to advertised speeds. Indeed, this report highlights some discrepancies between those two measurements.
3. Even if the providers and PCI have accurately represented areas and households that receive broadband service at a particular speed, and verified the actual speeds of such services, the public's understanding and expectation of broadband

capabilities continues to evolve. For many years, service greater than 200 kilobits per second (Kbps) was considered to be "broadband" by the Federal Communications Commission. Now, the FCC and the National Telecommunication and Information Administration define "broadband" as service of 768 Kbps or greater. But it is possible that many in the public do not accept service as that speed as actually representing "broadband" for the purposes of current-generation services – led along the high-performance applications of the future. This is why it is vital to consider service 1 Gigabit per second (Gbps), 100 Megabits per second (Mbps), as well as lesser speeds such as 50, 25, 10, and 6 Mbps.

Results of PCI's research into the supply of broadband and particular speeds will assist the State, and other stakeholders, in understanding the lay of the land relative to supply. Outcomes of this research are to assist broadband stakeholders like eTeams, carriers, and other community action organizations in developing data-driven solutions in promoting adoption/access strategies for increasing broadband deployments.

Part Two of this Baseline Inventory for Supply relates to evaluation and assessment. PCI aims to develop a data-driven culture to assess the impact of broadband on citizens, businesses, and community anchor institutions (CAIs). This research will serve a role to both capture State-wide and local county snapshots of current broadband supply side trends. Using this approach, PCI will be able to assess, score, and benchmark how prepared the State of Illinois is to compete in the digital economy. Simply put, these early scores will serve as a baseline in assessing how broadband deployments change over time. PCI aims to target how geographic broadband coverage changes over time and how these changes impact households, CAIs, and businesses across the State of Illinois. Capturing these changes over time will be critical in evaluating the social and economic benefits of broadband investments in Illinois.

Part Three of the Baseline Inventory for Supply relates to the idea of scoring or ranking targeted geographic units on broadband access. A ranking is a quick and easy way to compare areas against each other relative to set criteria. PCI's goal for this research outcome is to introduce a ranking system for counties relative to each other and the state as a whole on carrier speeds available and geographic coverage. This research introduces broadband stakeholders across the State of Illinois, an early ranking system to evaluate supply side data. In addition, PCI hopes to engage other stakeholders on developing new methodologies or geographic units of measurement (i.e., educational districts, workforce zones, or other regional economic development authorities) that need to be ranked in evaluating the social or economic impacts of broadband.

Part 1: Inventorying and Quantifying Broadband

Speaking at John A. Logan College in Carterville, Illinois Governor Pat Quinn announced the federal government and state investment in the Illinois Broadband Opportunity Partnership – Southern Region, or a $45 million investment in fiber optic broadband infrastructure through an open network built by Clearwave. See http://broadbandillinois.org/Projects/Clearwave.html. Said Quinn: "We have a rare chance…to ensure every rural, underserved, unserved community in our state is connected to world-class information and communication infrastructure." This baseline report will begin by defining the current supply-side status of broadband in Illinois.

With so many variables to consider, there has to be a measurement system established that is able to place a part of the state into one of these categories. In this section we will attempt to define these areas, explain why we removed mobile broadband data for the purpose of this initial study, and explore the three methods of verification that were used in this analysis. This verification process is crucial to ensuring the provider data is represented as accurately as possible.

Defining Broadband Availability at Particular Speeds of Service

For the purpose of this paper, PCI modeled all speed tiers around the groupings defined by the National Telecommunications and Information Administration. The speed tiers are:

- 1 gigabit per second and higher
- 100 megabits per second to 1 gigabit per second
- 50 megabits per second to 100 megabits per second
- 25 megabits per second to 100 megabits per second
- 10 megabits per second to 25 megabits per second
- 6 megabits per second to 10 megabits per second
- 3 megabits per second to 6 megabits per second
- 1.5 megabits per second to 3 megabits per second
- 768 kilobits per second to 1.5 megabits per second
- No broadband service (i.e., internet service is at less than 768 kilobits per second)

Removing Mobile Broadband

Unless specifically noted, the mobile broadband (Technology of Transmission Code 80) data has been removed from the data sets under study for this report. There were a variety of reasons for doing so. In looking at speed test results from all the cellular technologies, it was discovered that the typical real world speeds over a 12-month period were in many instances different than the maximum advertised speeds. It is also known that providers in the cellular technologies do not have different speed tier data plans, which might otherwise skew a reading of speed test results. In other words, all users have equal access to the maximum available cellular speeds offered – unlike, for example, digital subscriber line (DSL) or cable modem service. Another major factor against inclusion of mobile broadband in the same field of analysis are the data caps in place by carriers. These caps generally limit the ability for users to download more than 5 Gigabytes (GB) of data per month, without paying overage charges. This kind of cap can limit the ability of users to access the range of services traditionally associated with broadband.

We made a conscious decision to put mobile broadband in a different category when assessing the broadband supply conditions for the State. It is not well suited for a primary internet connection in the home or business. It does however, play a vital role in the mobility aspect of broadband throughout the State. The net impact of this methodological change can be seen in Figure 1.1. These impact was, however, very diverse geographically. Simply put, some areas of Illinois were significantly affected by the removal of mobile broadband; whereas, other areas of the State were not impacted. The maps and tables below highlight these geographic patterns for summarizing supply side patterns. Table 1.1 shows the results of the Mobile Speed Test. Figure 1.2 shows where these speed tests were taken in the state and Figure 1.3 shows the mobile speed test results by technology type and operating system. Finally, Figure 1.4 shows some of the results from this mobile speed test.

Figure 1.1: Comparison of Broadband Coverage with and without Cellular Data

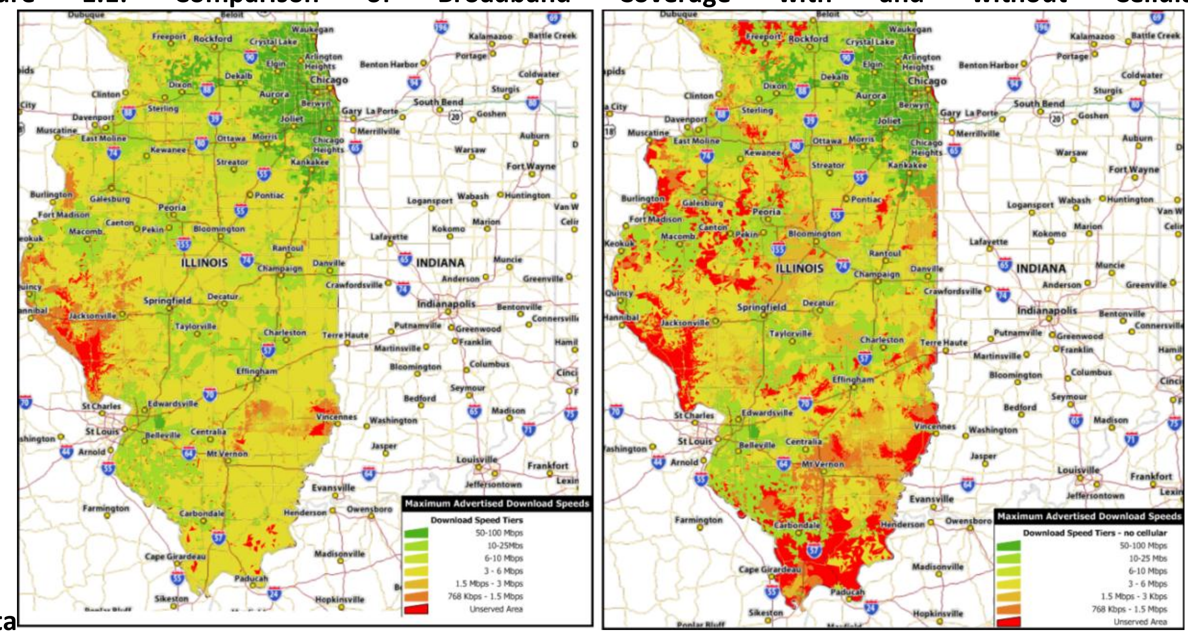


Table 1.1: Mobile Speed Test App Results.

Mobile App Speed Test Data Summaries	Download Average Mbps	**Download Median Mbps**	Download Min Mbps	Download Max Mbps	Upload Average Mbps	**Upload Median Mbps**	Upload Min Mbps	Upload Max Mbps	**Latency Median (in ms)**	Latency minimum (in ms)
Wi-Fi	7.248	**5.445**	1	58.398	2.316	**1.679**	1	37.255	**82**	331
Cellular	1.734	**1.275**	1	42.403	1.435	**0.456**	1	67.5	**189**	-61219
UMTS	1.504	**0.912**	1	15.472	0.595	**0.423**	1	15.472	**161**	18
Edge	0.121	**0.09**	1	4.36	0.497	**0.075**	1	33.75	**390**	46
GPRS	0.068	**0.025**	1	1.498	0.166	**0.026**	2	1.985	**534**	82

Dates Gathered: 3-1-2010 through 3-31-2011
37479 Tests over Wi-Fi = 44.14%
42456 Tests over cellular = 50%
4319 Tests over UMTS = 5.08%
634 Tests over Edge = .75%
34 Test over GPRS = .0004%

84909 records total
39421 test using Android operating system = 46.43%
45501 test using Apple IPhone operating system = 53.59%

Figure 1.2: Map showing the locations of the mobile speed test results.

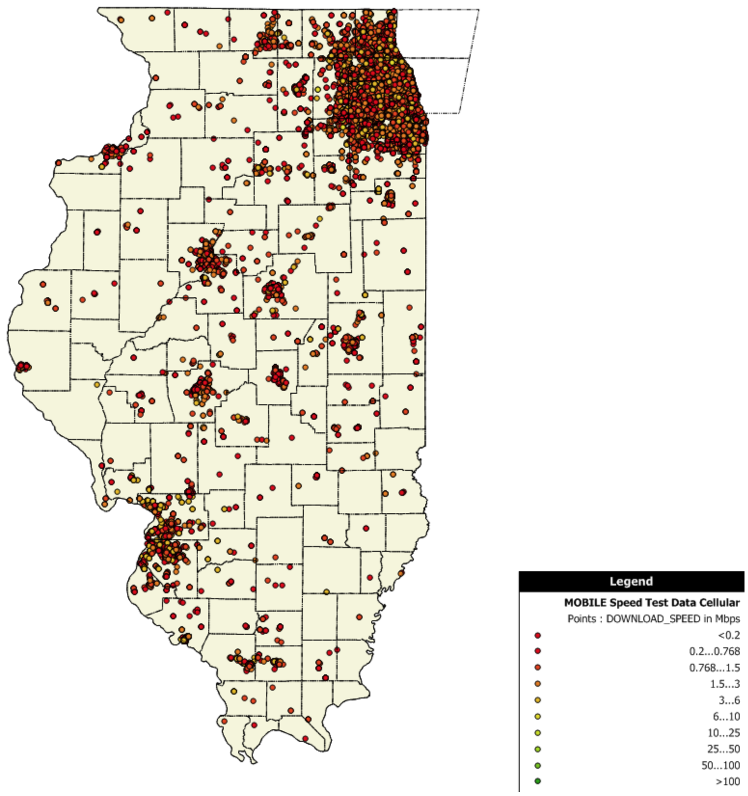
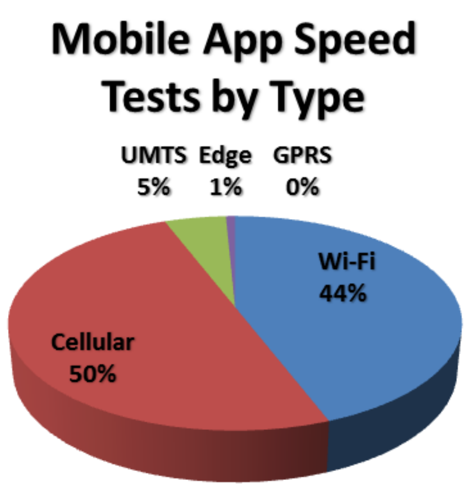


Figure 1.3: Mobile App speed tests by technology type and operating system



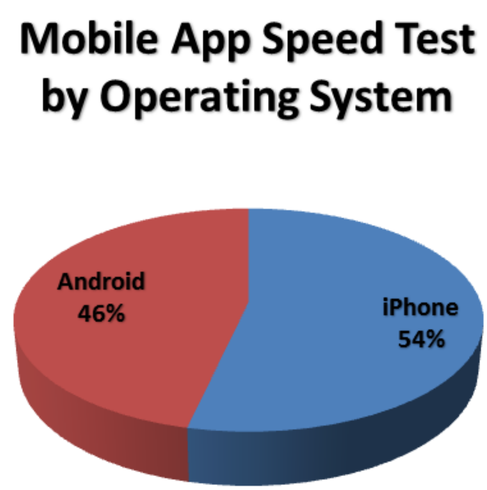
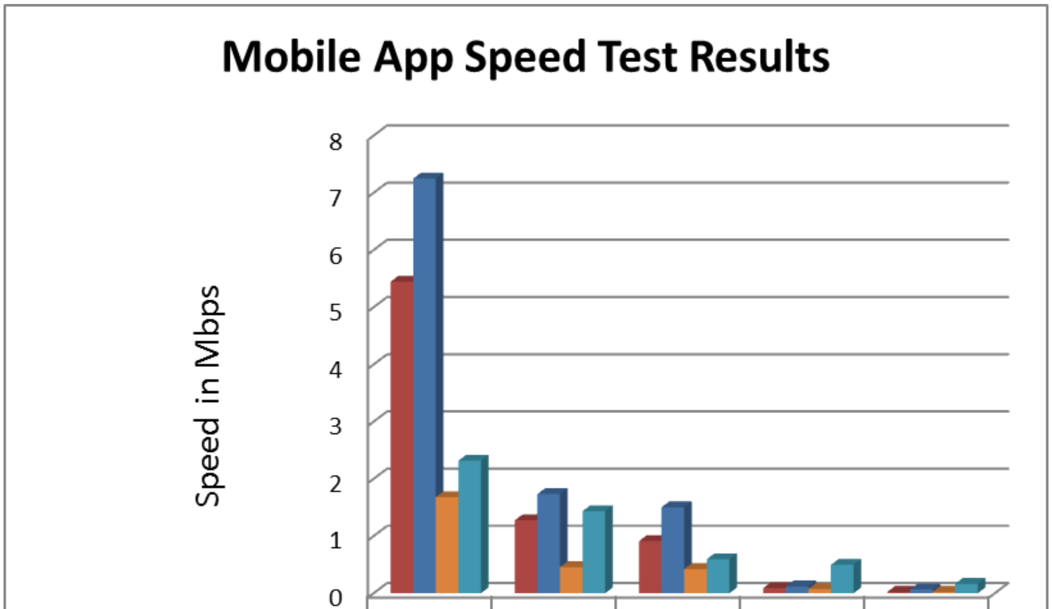


Figure 1.4: Mobile App speed test comparisons.



	Wi-Fi	Cellular	UMTS	Edge	GPRS
Download Median Mbps	5.445	1.275	0.912	0.09	0.025
Download Average Mbps	7.248	1.734	1.504	0.121	0.068
Upload Median Mbps	1.679	0.456	0.423	0.075	0.026
Upload Average Mbps	2.316	1.435	0.595	0.497	0.166

Verification

Using separate data sets outside of the carrier submitted data, PCI has done some basic verification to begin to investigate the accuracy of the carrier maps. Verification is the process of finding other data sources outside of the carrier coverage submissions to indicate that there is some type of verified broadband activity or subscribers. From a national perspective, the broadband availability maps have been met with a certain amount of skepticism. Part of the problem lies in the fact that it has been difficult to check the carrier data against other sources. In this report we have started this process by examining two sets of information. At PCI, we have also worked closely with the providers to ensure their data is represented as accurately as possible.

Speed Test Verification

The first method of verification is user speed test data through the NTIA and FCC's National Broadband Map, which is available at the http://broadbandmap.gov website. Through this website, and through the FCC's http://broadband.gov web site, the federal government solicited street address information with each speed test. They provided PCI with speed test data gathered over a 12-month period. This has been mapped and some limited studies have been conducted. These speed tests were accompanied by mini-surveys which allowed for some analysis. The users were asked to input their street address and the type of internet connection they were using.

In some cases, the outside sources of data can only show broadband activity and nothing more. Other sources show activity and speed, and then some also show an internet protocol address, or IP address, with the other data points. With an IP address, one can generally search to find out which ISP has control of the particular address thus giving you a reasonable assumption that a speed test is for a particular carrier. Some speed tests do not give physical street address data that matches with the IP address information. When that happens, it is impossible to show the data point at the proper location on a map for further study and compare it to carrier maps. The following tables and figures provide a summary of the findings from this speed test verification. Table 1.2 shows a summary of the locations from which this survey was employed as well as the speed test method that was used. Figure 1.5 gives a visual representation of the location in which these speeds tests were taken. Figure 1.6 shows the locations from which the speed test was taken throughout the state. Table 1.3 and Figure 1.7 each show the results of this speed test.

Table 1.2: User Speed Test Summary

Total Tests	**27,807**	
OOKLA Tests	18,559	66.74%
MLAB Tests	9,248	33.26%
Testing From:		
Community Center, library, or school	1,318	4.74%
Home	23,630	84.98%
Large Business	308	1.11%
Medium Business	639	2.30%
Mobile Connection *not the same data as in the mobile app speed test summaries.	293	1.05%
Other	213	0.77%
Small Business	1,406	5.06%

Source: Broadband Speed Test Data 5/12/2010 - 5/01/2011

Figure 1.5: User Speed Test by Location

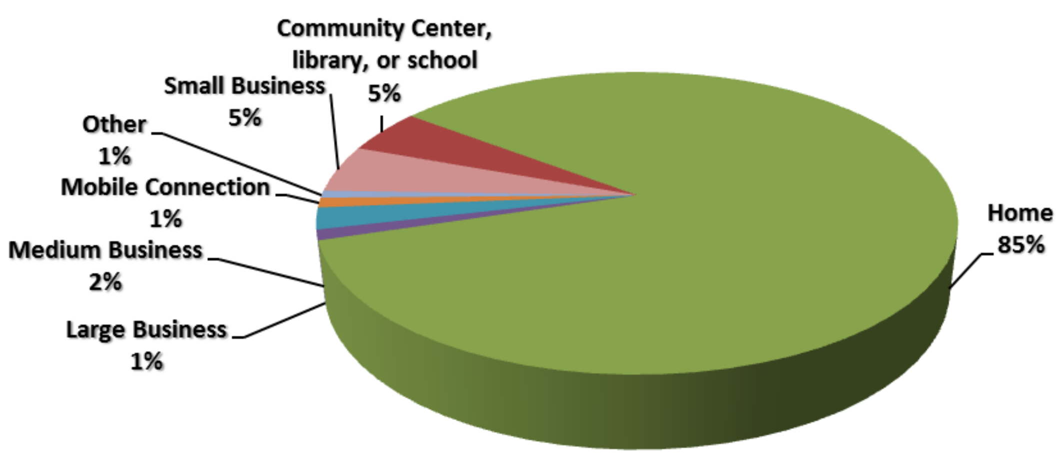


Figure 1.6: Location of Speed Tests

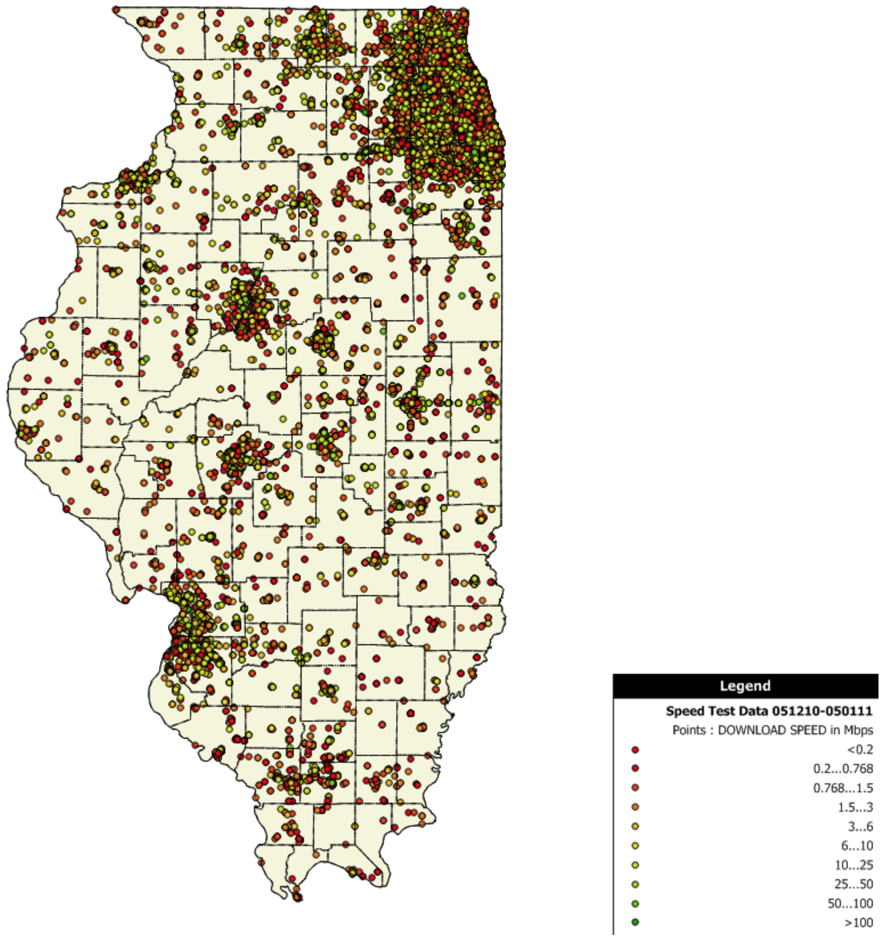
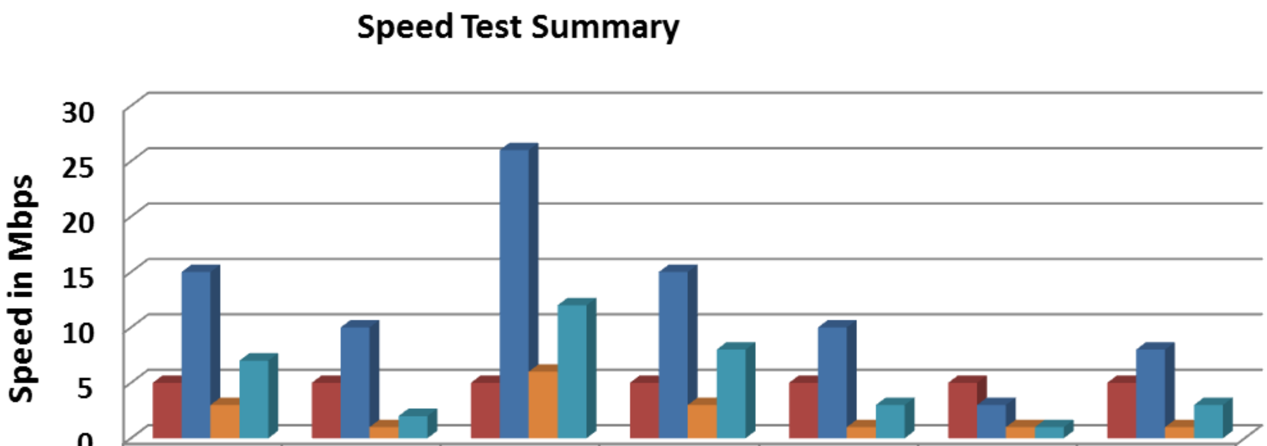


Table 1.3: Speed Test Statistics

Speed Statistics								
Accessing From:	Download Average in Mbps	**Download Median in Mbps**	Download Minimum in Mbps	Download Maximum in Mbps	Upload Average in Mbps	**Upload Median in Mbps**	Upload Minimum in Mbps	Upload Maximum in Mbps
Statewide:	10	**5**	0	702	3	**1**	0	142
Community Center, library, or school	15	**5**	0	195	7	**3**	0	142
Home	10	**5**	0	485	2	**1**	0	97
Large Business	26	**5**	0	174	12	**6**	0	97
Medium Business	15	**5**	0	155	8	**3**	0	96
Small Business	10	**5**	0	702	3	**1**	0	96
Mobile Connection	3	**5**	0	158	1	**1**	0	74
Other	8	**5**	0	95	3	**1**	0	68

Figure 1.7: Speed Test Summary



	Community Center, Library, or School	Home	Large Business	Medium Business	Small Business	Mobile	Other
Download Median in Mbps	5	5	5	5	5	5	5
Download Average in Mbps	15	10	26	15	10	3	8
Upload Median in Mbps	3	1	6	3	1	1	1
Upload Average in Mbps	7	2	12	8	3	1	3

Gadberry Verification

The second set of data was gathered by the Gadberry Company. This information is user-sourced through a variety of methods. The data indicates if there is broadband activity at the street address level and they then incorporate that information at the census block level. We have compared blocks showing coverage as stated by the carriers against the user reported information. There are some areas of the state where there are low or no user reported information.

This company has a product that can show broadband activity at the census block level. The information is sourced from consumers through various means such as online surveys, consumer product registration systems, phone surveys and warranty registrations. They have a master database of more than 118 million occupied households nation-wide, of which over 20 million of the responses had data related specifically to broadband internet use. We have used this data as a source of first pass validation to at least show if there is broadband present in the census blocks the carriers say there is service. This data set cannot address any issues of who the carrier is or what price or speed can be offered. One nice feature of their data set is the flag that indicates 4 different categories if they did not show broadband service in the block. The first and most obvious is that there are no occupied households in the block, the next is that there were enough sample records in the block to have a high confidence that there is no broadband service available, the next category is that there were some responses in the census block but too low a sample rate to be sure there is broadband, and the last category is that there were no address sample points in the block. Following are maps and summaries of this user-sourced validation process.

To get a summary of validation data, a list of unique census blocks that are known to have one or more broadband provider serving the block (minus cellular coverage) was generated. These are the blocks that the carriers state have broadband service. The unique blocks are then compared to the Gadberry data set with these results. Table 1.4 and Figure 1.8 below show the results of this categorization process based on the Gadberry data set. As you can see, in 93.51 percent of census blocks in the State, providers report that they offer broadband, or internet connectivity at speeds of at least 768 Kbps. Approximately 44.19 percent of those census blocks have been verified through the Gadberry data as having broadband, while 24.90 percent of those blocks show there are no households within those blocks. The Gadberry data set did not have user sourced address sampling in 9.03 percent of these blocks. Also, 21.55 percent of these blocks contained too little sampling to make an absolute determination. Figure 1.9 below shows where these 21.55 percent or 73,796 census blocks are throughout the state. Please note that these census blocks with sampling too low for a good determination are interleaved throughout the State's 366,137 census blocks, yielding an image that looks a lot like Swiss cheese.

Table 1.4: Categorization of census blocks based upon Gadberry data set

Total statewide census blocks	366,137	
Total unique blocks covered with some form of broadband as provided by carriers	342,363	93.51%
Total of the unique blocks Gadberry shows has broadband (crowd sourced)	151,280	44.19%
Number of unique blocks with no occupied households	85,238	24.90%
Number of blocks with no user sourced address sampling	30,910	9.03%
high enough sampling for accurate determination (likely does not have Broadband in Use)	1,139	0.33%
some precise address sampling but too low to expect a good determination	73,796	21.55%

Figure 1.8: Gadberry Data Set Verification Results by Census block

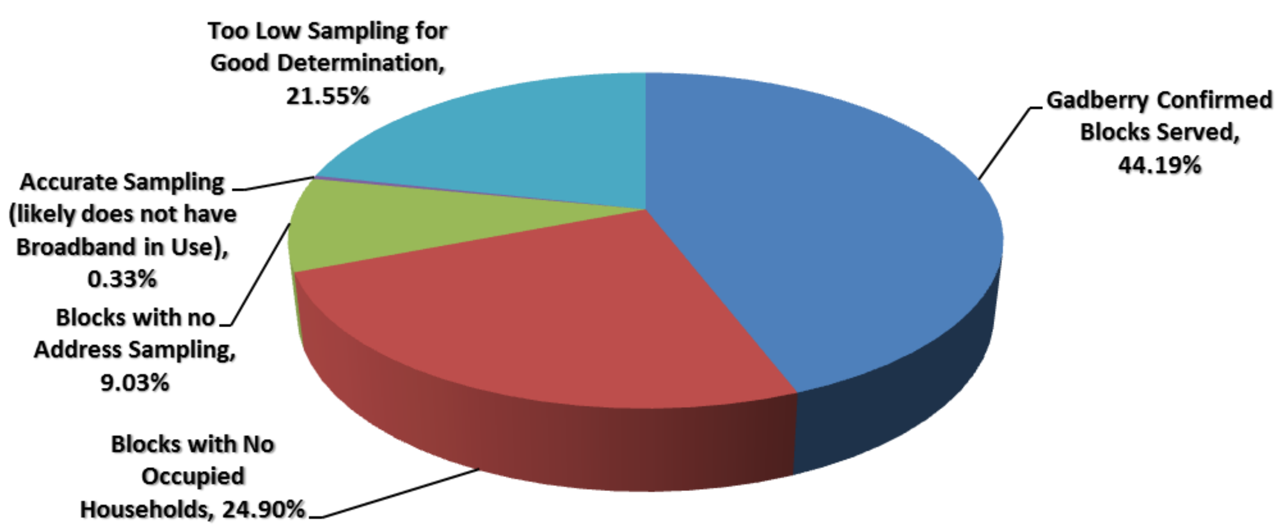
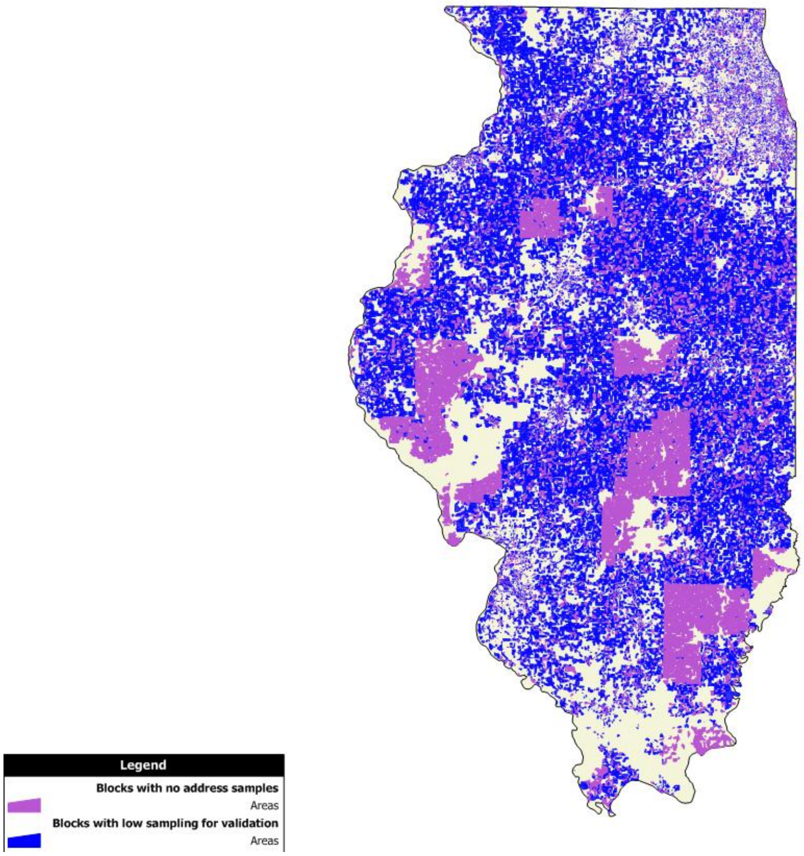


Figure 1.9: Map showing the Gadberry census blocks with either a low or no sample rate.



Provider Verification

Another method of verification is with the broadband providers themselves. PCI has been and continues to be in the process of providing carriers with maps showing the data that PCI currently has on record for each of their particular service areas. These are fully editable maps, and the carriers are encouraged to submit comments, corrections and improvements in the next couple of months. We believe that this verification process will prove to be quite valuable. There may be instances in which providers offering both fiber to the home and DSL service may have inadvertently misrepresented coverage by stating that the same maximum speed is available to its entire DSL area as it is in their fiber footprint. Similar misunderstandings may have occurred with respect to the deployment of the modernized cable infrastructure technology known as DOCSIS 3.0. Hence, it is quite possible that subsequent data updates may change these supply numbers significantly, possibly even lowering the percentages of those higher speed tier availability numbers. PCI is working very closely with the provider community to ensure their data is represented as accurately as possible. Questions about the data process can be addressed to intake@broadbandillinois.org, or to 217-886-4044.

Part 2: Defining and Developing a Supply Baseline

In creating a Statewide Baseline Inventory for Supply of Broadband, it is important to take into consideration the unique landscape of the State of Illinois. There are significant disparities in the percentage of land-area that has access to particular forms of broadband at particular speeds of service.

Mapping Broadband

To develop a statewide master speed tier map, PCI did the following: separate maps were created for each specific *maximum advertised download speed* tier categories for both the wireless (minus mobile broadband) and the wireline technologies. These maps yielded wireless and wireline coverage areas. They were merged to create a master Statewide service area for each individual speed tier. These maps were then laid one over the other, and each of the highest speed tiers were used to trim the lower speed tier coverage areas beneath them. This process produced speed tier maps showing areas uniquely covered by the highest possible advertised speed as stated by all carriers.

Using this unique state map, the area of each speed-tier was calculated and that result divided by the total land area of the state to produce the percentage of land area covered. To calculate the total households passed by each speed tier, the unique polygons were used to select the census block centroid points located within those bounded areas. The number of occupied households for each tier was then tallied. It is important to note that occupied household counts are current as of the end of 2008. This section will show the results of this Statewide analysis based upon total land-area and total household within the certain speed tiers.

Analysis by Land Area & Households Covered

Analysis reveals that Illinois has distinct geographic patterns associated with underserved and un-served areas of Illinois. Using Figure 2.1, the PCI Data Team was able to inventory household counts and speed tier coverage by geographic area as shown in Table 2.1.

Using this information, PCI calculates[1] that zero percent of the State is served by Gigabit or 100 Mbps broadband; that 65 percent of households in the State are served by broadband with advertised speeds of 50 Mbps and higher (for 8 percent of the land area); that 29 percent of households are served by broadband with advertised speeds of 10 Mbps to 50 Mbps (or 26 percent of the land area); that 2 percent of households are served by broadband with advertised speeds of 6 Mbps to 10 Mbps (for 10 percent of the land area); that 3 percent of households are served by broadband with advertised speeds of 3 Mbps to 6 Mbps (for 28 percent of land area); that half a percentage point are served by broadband with advertised speeds of 1.5 Mbps to 3 Mbps (for 6 percent of the land area); and that one-third a percentage point are served by broadband with advertised speeds of 768 Kbps to 1.5 Mbps (for 3 percent of the land area). An additional 1 percent of households are served by internet at non-broadband speeds, e.g. dial-up service (for 19 percent of land area). As Figure 2.1 shows, counties in southern, western, and southeastern Illinois are more at risk for access or meeting national goals for speed.

[1] Each of these calculations are subject to the three important points highlighted in the introduction: (1) ensuring that data from providers is correct and updated; (2) verifying advertised speeds against actual speeds measured by end-users; and (3) understanding public expectations about the need for, and use of, ever-increasing broadband speeds.

Figure 2.1: Statewide broadband coverage by maximum advertised download speed.

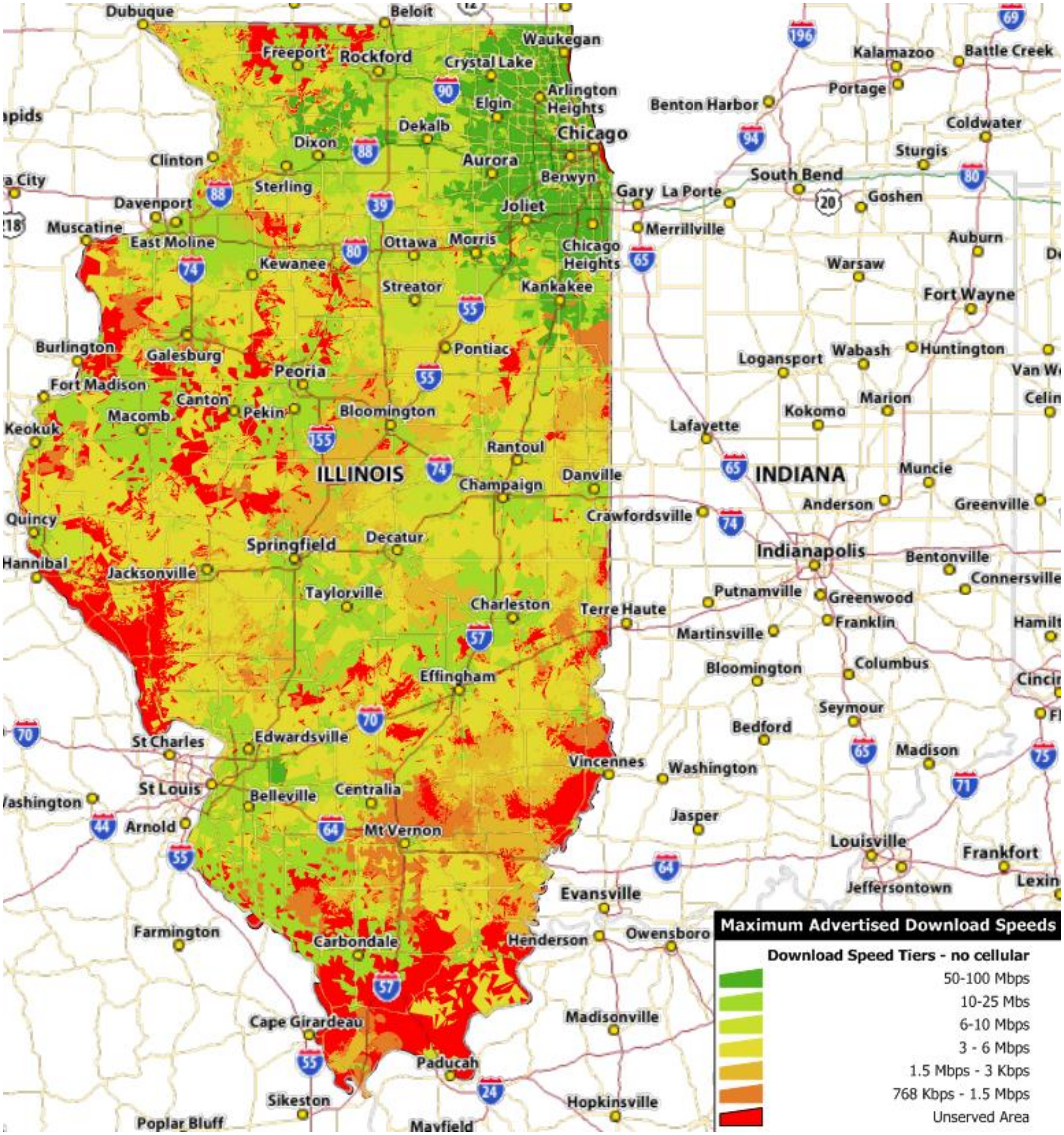


Table 2.1: Speed Tiers by Household Counts and Geographic Coverage

Maximum Advertised Download Speed Tier	Number of Occupied Households with access	Percentage of State Occupied Households Total	Percentage of Land Area Covered by Speed Tier
50-100 mbps	3,161,172	65.15%	7.80%
25-50 mbps	-	0.00%	0.00%
10-25mbs	1,399,699	28.85%	25.78%
6-10 mbps	79,537	1.64%	10.14%
3 - 6 mbps	124,910	2.57%	28.47%
1.5 mbps - 3 mbps	23,703	0.49%	6.41%
768 kbps - 1.5 mbps	14,330	0.30%	2.57%
Total occupied households without access (contained in 18,478 census blocks)	48,471	1.00%	18.83%
Statewide Total Occupied Households	4,851,822		land area statewide 55,593 sq. mi.

Examining speed tiers geographically helps in assessing potential long-term broadband goals for access. What is the implication of having only 7.80 percent of the State of Illinois with access up to 50 to 100 Mbps, as shown in Figure 2.2? Figure 2.3 shows the percentage of households who could access these speeds, this does not show the speed tiers *actually subscribed to*, nor does it show the percentage of households who have broadband internet services.

Figure 2.2: Speed Tiers by Geographic Coverage in Illinois

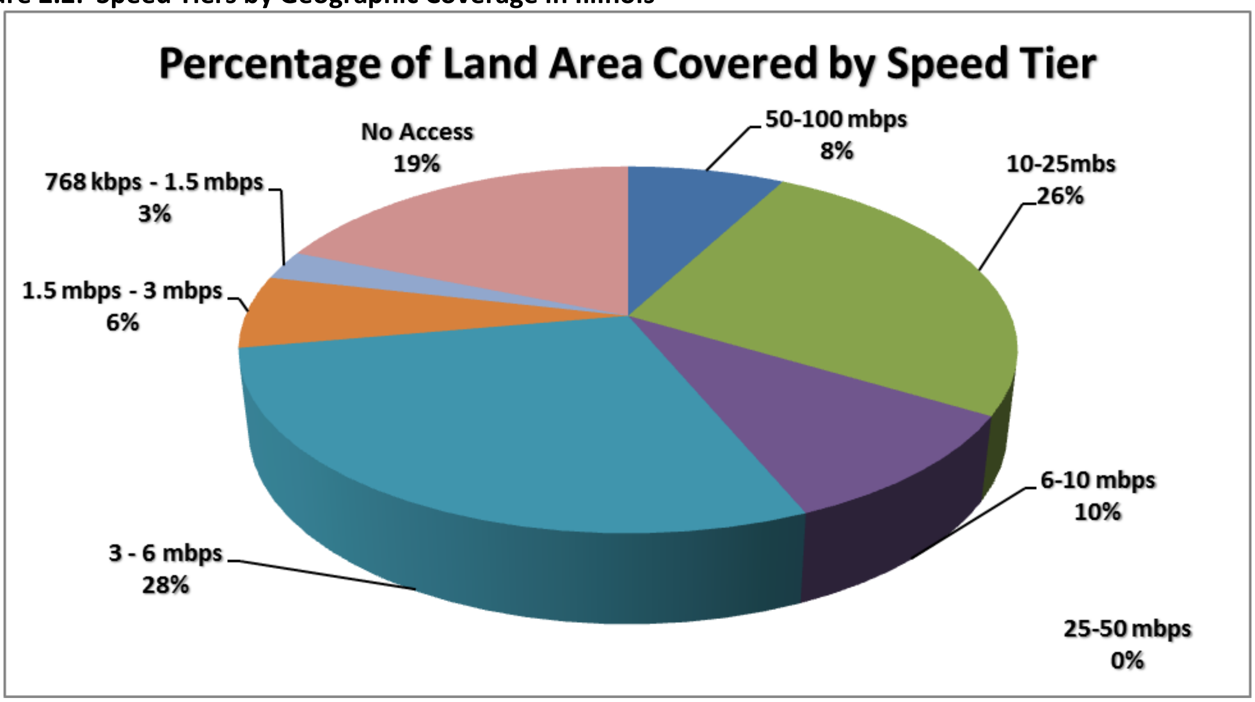
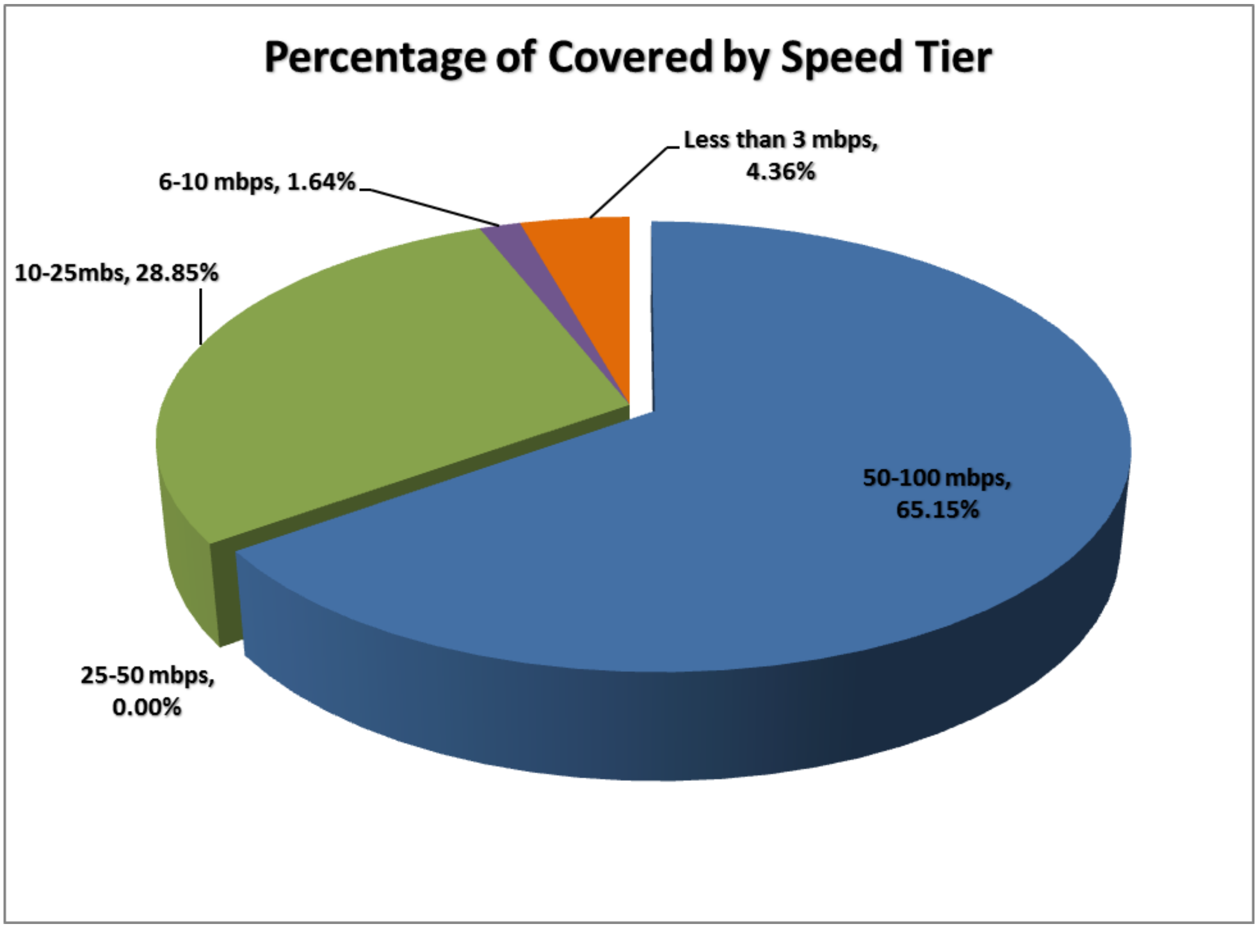


Figure 2.3: Percentage of occupied households with access to particular speed tiers.



This baseline demonstrates that the most significant investment in broadband occurs in areas where population is most dense. Thus, the challenge for Illinois is to ensure that the investment in broadband becomes a priority throughout the entire State so that all citizens receive the benefits of broadband. For example, how can all citizens benefit from advancements in telemedicine or distance learning that requires 25 Mbps or higher connection speeds? Simply put, location matters just as much as the percentages, and this determines what type (and speed) of broadband access any given household, community anchor institutions, or business will have access to. What are the economic development and quality of life issues that are being impacted by the capacity of the current broadband networks within the State? PCI's goal is to assist stakeholders in identifying these disparities in broadband access, and to engage discussions on the economic/cultural impacts on such diverse access to supply in Illinois as well as the realities of improving the infrastructure over time.

Part 3: County Level Rankings

One of the objectives of this report is to develop a ranking system to compare geographic units for broadband access. In a state where the average household income is $82,835 at the high end in Kendall County and $28,370 at the low end in Alexander County, this ranking system based upon broadband connectivity is absolutely essential. In this section, we will take a closer look at the methodology that was used to rank Illinois's 102 counties based upon the level of broadband access within them. We will conclude this discussion with a look at some of the socioeconomic variables that we have found to coincide with high and low levels of broadband connectivity.

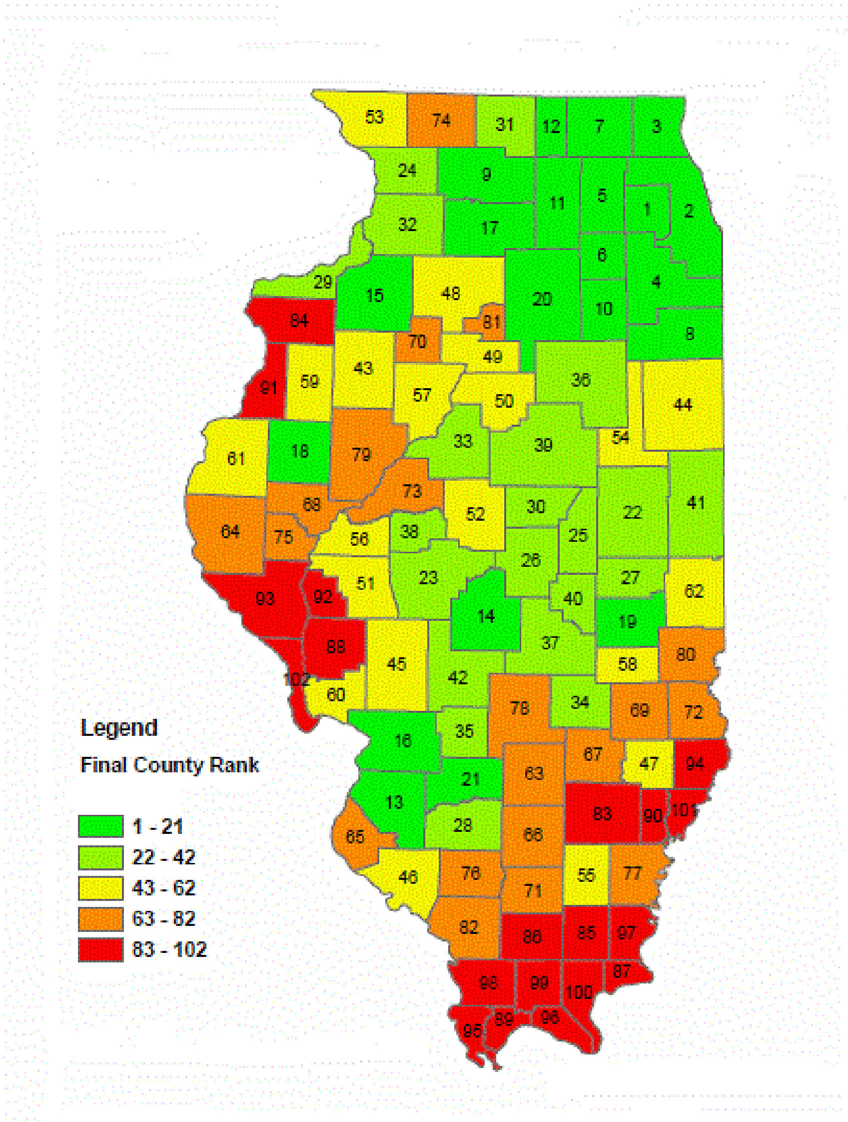
Ranking Methodology by Geographic Coverage and Household Count

PCI's data team targeted counties as an initial focus to demonstrate and produce maps using a ranking system ranging from (1-102). Results indicated dynamic regional patterns across Illinois' 102 counties (Figure 3.1). For this baseline inventory, ranking will be based on speed availability and the ratio of geographic coverage of each speed tier relative to the master geographic unit of study. Using weighted averages between the two variables produces a score, assisting PCI in evaluating counties against each other for broadband availability. In addition, it will assist in developing an index or score to assess an individual county over time for improvements on access.

The geographic unit for the ranking and comparison is the county boundaries. This geographic unit is widely understood and relates to many levels of local government, economic development, and PCI eTeam efforts. Geographic coverage was defined as the maximum advertised download speed, based on NTIA speed tier codes, for all carriers at that speed within a county. These speed tiers were summarized for the percentage of the county's geographic area represented by each speed tier. A weighted average for each speed tier's coverage of the county as a percentage was multiplied by the speed tier value itself. In summarizing a county's overall score, each county's speed tiers weighted averages were summarized resulting in the broadband score. The maximum value for the score would equal a value of nine for a given county. A value of nine would represent a county with 100 percent coverage at the fastest NTIA speed tier. Using these scores, a ranking from 1 to 102 was developed representing all Illinois counties and how they compared against each other relative to the percentage of households covered by NTIA speed tiers.

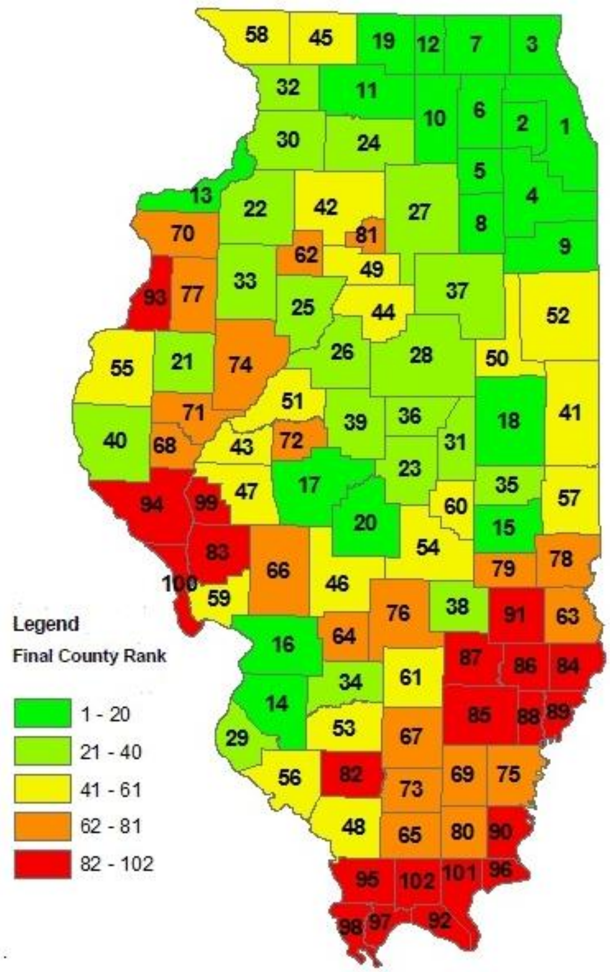
The map in Figure 3.1 indicates geographic trends associated with broadband access and supply. Using this ranking system PCI has established a baseline to evaluate broadband access over time. Using the rank model any given county can assess their broadband access over time using simply metrics linking speed with geographic coverage, and also comparing that to other counties and regarding statewide results. Geographic patterns suggest real strengths in the Chicago metro area as most of the counties rank the highest there. Areas in southern and western Illinois are behind relative to access and speed. Goals and outcomes of this research are to assist broadband stakeholders to visually see these disparities at both state and local levels. At the minimum, each county now has a baseline to evaluate their position (Appendix A) in Illinois relative to broadband access, and can assess over time how they are improving or declining in relation to other counties.

Figure 3.1: County Broadband Access Rank Map Weighted by Percent of Geographic Area Covered by NTIA Speed Tiers



A similar system was used to rank Illinois's 102 counties by household count. As with Figure 3.1, a weighted average for each speed tier's coverage of the county's occupied households as a percentage was multiplied by the speed tier value itself. In summarizing a county's overall score, each county's speed tiers weighted averages are summarized, resulting in the occupied household broadband score. The maximum value for the score would equal a value of nine for a given county. A value of nine would represent a county with 100 percent coverage by household accessibility at the fastest NTIA speed tier. Using these scores, a ranking from 1 to 102 was developed representing all Illinois counties and how they compared against each other relative to the percentage of households covered by NTIA speed tiers. While there are some changes from the previous figure, the overall geographic picture remains the same.

Figure 3.2: County Broadband Rank Map Weighted by Percentage of Households Covered by NTIA Speed Tiers



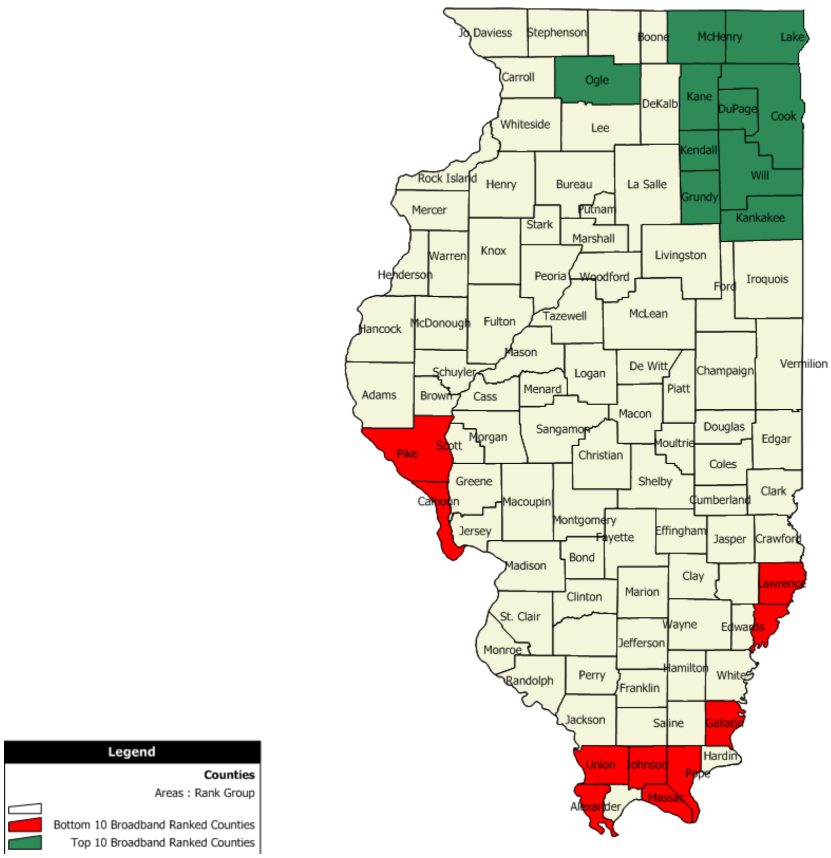
Geographic patterns, socioeconomic factors & broadband deployment

Another goal for this research was to begin exploring local socioeconomic factors shaping broadband deployments. Examining the counties listed in Tables 3.1 (as well as the full list of counties listed in Appendix A), what factors or variables can be empirically connected to counties with higher or lower broadband ranks? Understanding this information will assist PCI and the broader research community in defining at risk populations both geographically and demographically. This information will provide guidance in developing policies targeted in the correct areas and populations for improvements in broadband infrastructure, adoption and access.

Table 3.1: Top 10 & Bottom 10 Broadband Ranked Counties

County	Ranking	2010 Workforce	2010 Unemployed	% RATE	Resident total population 2010	Median household income 2009	People of all ages in poverty - percent 2009	Total number of firms 2007	Land in farms 2007 (acres adjusted)	Land area in square miles 2000	Population per square mile 2010
DUPAGE	1	524,521	43,516	8.3	916,924	$ 73,554	6.7	101,556	7,948	334	2748.5
COOK	2	2,604,300	272,436	10.5	5,194,675	$ 52,516	16	511,023	8,198	946	5493.1
LAKE	3	365,683	38,395	10.5	703,462	$ 76,336	7.6	68,447	34,525	448	1571.8
WILL	4	367,626	38,339	10.4	677,560	$ 72,478	7	53,101	220,851	837	809.6
KANE	5	271,334	27,947	10.3	515,269	$ 66,604	9.4	38,590	192,372	520	990.1
KENDALL	6	60,201	5,914	9.8	114,736	$ 82,835	4.2	8,311	166,872	321	357.9
MCHENRY	7	180,783	17,286	9.6	308,760	$ 74,669	6.6	28,523	215,584	604	511.6
KANKAKEE	8	57,222	7,511	13.1	113,449	$ 49,375	15.1	8,399	385,808	677	167.6
OGLE	9	27,915	3,778	13.5	53,497	$ 52,197	10.9	4,622	366,470	759	70.5
GRUNDY	10	26,784	3,325	12.4	50,063	$ 63,349	6.8	3,673	215,474	420	119.2
PIKE	93	8,780	776	8.8	16,430	$ 38,191	17.1	1,444	389,808	830	19.8
LAWRENCE	94	8,222	785	9.5	16,833	$ 36,587	18.1	1,242	194,035	372	45.3
ALEXANDER	95	2,982	351	11.8	8,238	$ 28,370	29.4	383	47,626	236	34.9
MASSAC	96	7,190	700	9.7	15,429	$ 38,302	16.4	1,395	89,693	239	64.5
GALLATIN	97	2,688	271	10.1	5,589	$ 34,319	19.3	548	185,753	324	17.3
UNION	98	8,351	1,011	12.1	17,808	$ 38,080	20	1,451	122,362	416	42.8
JOHNSON	99	5,229	573	11	12,582	$ 40,497	16.9	713	100,499	345	36.5
POPE	100	1,917	208	10.9	4,470	$ 37,177	18	-	60,809	371	12.1
WABASH	101	6,112	609	10	11,947	$ 42,564	12.7	1,104	114,361	223	53.5
CALHOUN	102	2,524	274	10.9	5,089	$ 44,930	11.3	-	87,938	254	20

Figure 3.3: Top & Bottom 10 Ranked Counties



When looking at the extreme ranges for broadband access, spatial patterns between northern and southern Illinois are revealed in Figure 3.3. However, the more interesting question begins with addressing what are the differences between these counties from a marketing and/or demographic perspective? Looking at local socioeconomic factors relating to economic development, employment, and population density begins to unravel the factors driving broadband markets in Illinois (Tables 3.1 and Figures 3.4 through 3.7).

This information indicates patterns or commonalties for counties with better broadband service. Counties associated with larger populations, high incomes, and greater numbers of businesses attract and get more broadband services. Likewise, smaller rural counties, with lower household incomes, and less businesses do not attract as many broadband services. Knowing these and other variables impacting broadband deployments need to be more fully defined, measured, and empirically validated. This information will assist the broadband research community in assessing what viable markets look like, and also how to reposition underserved or un-served areas to attract new services. It is important to ask the question, *does better broadband access drive these socio-economic factors or is the better broadband access an effect of the socio economic factors?*

Figure 3.4

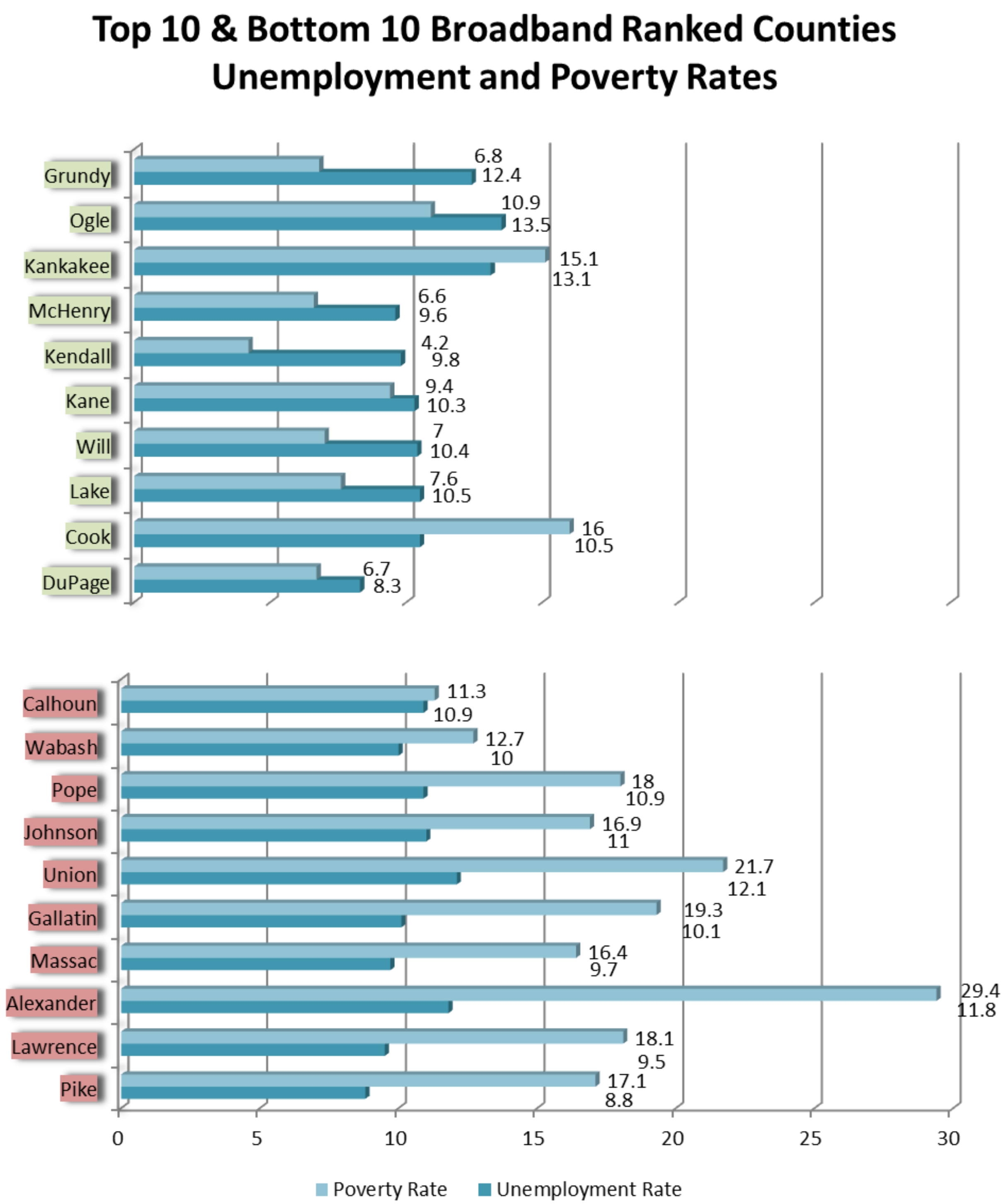

Top 10 & Bottom 10 Broadband Ranked Counties
Unemployment and Poverty Rates
Grundy 6.8 12.4
Ogle 10.9 13.5
Kankakee 15.1 13.1
McHenry 6.6 9.6
Kendall 4.2 9.8
Kane 9.4 10.3
Will 7 10.4
Lake 7.6 10.5
Cook 16 10.5
DuPage 6.7 8.3
Calhoun 11.3 10.9
Wabash 12.7 10
Pope 18 10.9
Johnson 16.9 11
Union 21.7 12.1
Gallatin 19.3 10.1
Massac 16.4 9.7
Alexander 29.4 11.8
Lawrence 18.1 9.5
Pike 17.1 8.8
0 5 10 15 20 25 30
Poverty Rate
Unemployment Rate

Figure 3.5

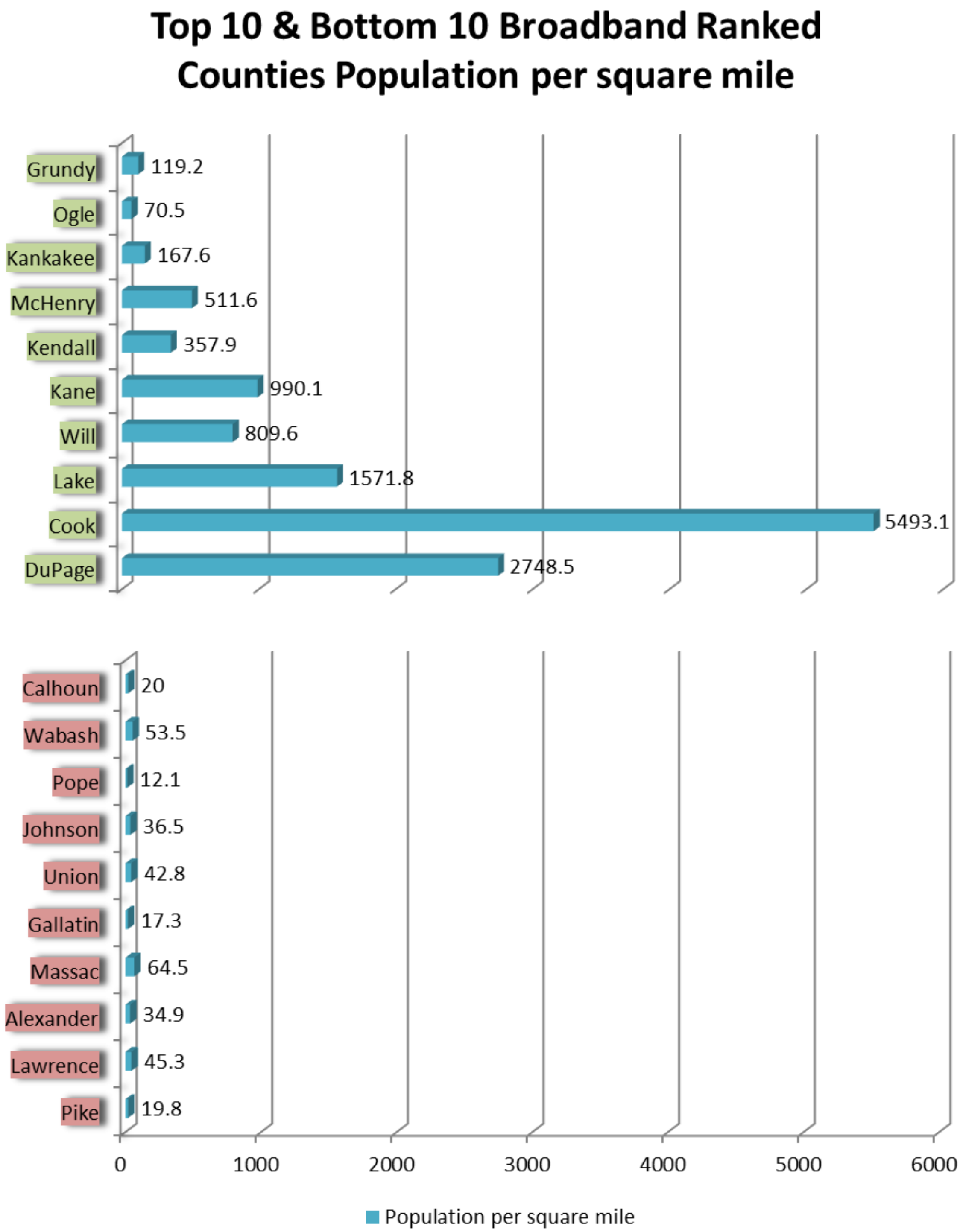

Top 10 & Bottom 10 Broadband Ranked Counties Population per square mile
Grundy
119.2
Ogle
70.5
Kankakee
167.6
McHenry
511.6
Kendall
357.9
Kane
990.1
Will
809.6
Lake
1571.8
Cook
5493.1
DuPage
2748.5
Calhoun
20
Wabash
53.5
Pope
12.1
Johnson
36.5
Union
42.8
Gallatin
17.3
Massac
64.5
Alexander
34.9
Lawrence
45.3
Pike
19.8
0
1000
2000
3000
4000
5000
6000
Population per square mile

Figure 3.6

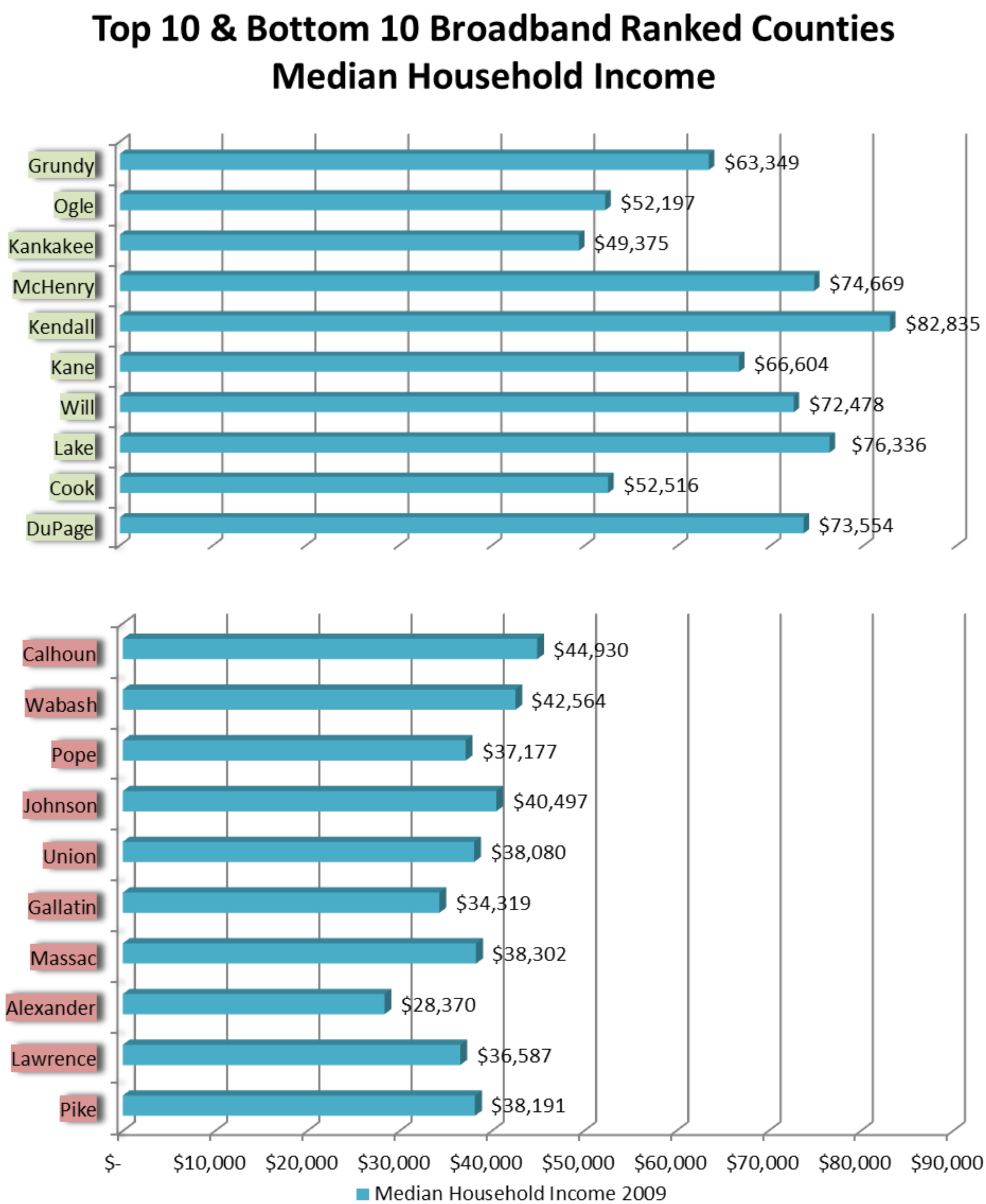
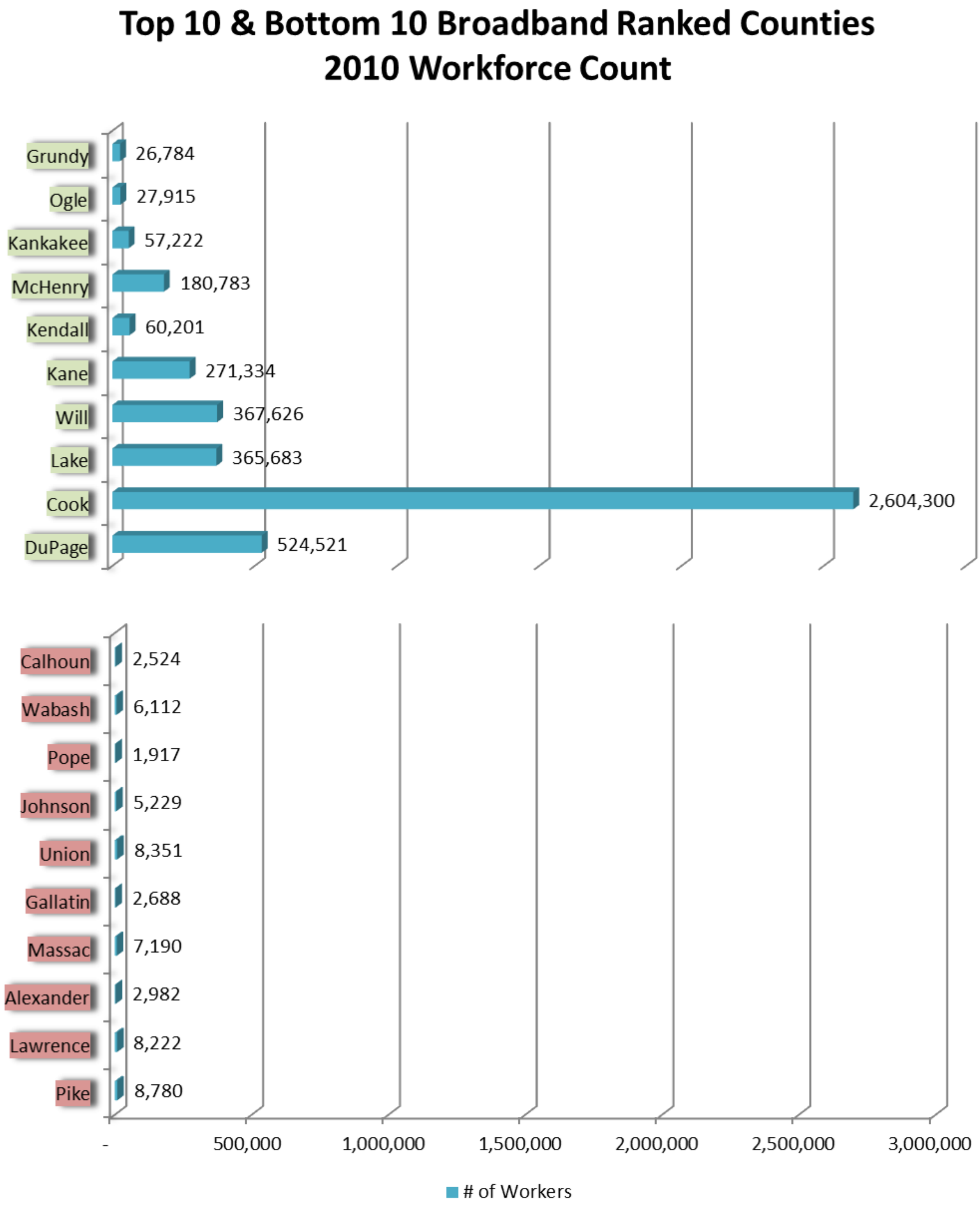

Top 10 & Bottom 10 Broadband Ranked Counties
Median Household Income
Grundy
$63,349
Ogle
$52,197
Kankakee
$49,375
McHenry
$74,669
Kendall
$82,835
Kane
$66,604
Will
$72,478
Lake
$76,336
Cook
$52,516
DuPage
$73,554
Calhoun
$44,930
Wabash
$42,564
Pope
$37,177
Johnson
$40,497
Union
$38,080
Gallatin
$34,319
Massac
$38,302
Alexander
$28,370
Lawrence
$36,587
Pike
$38,191
$-
$10,000
$20,000
$30,000
$40,000
$50,000
$60,000
$70,000
$80,000
$90,000
Median Household Income 2009

Figure 3.7


Top 10 & Bottom 10 Broadband Ranked Counties
2010 Workforce Count
Grundy
26,784
Ogle
27,915
Kankakee
57,222
McHenry
180,783
Kendall
60,201
Kane
271,334
Will
367,626
Lake
365,683
Cook
2,604,300
DuPage
524,521
Calhoun
2,524
Wabash
6,112
Pope
1,917
Johnson
5,229
Union
8,351
Gallatin
2,688
Massac
7,190
Alexander
2,982
Lawrence
8,222
Pike
8,780
-
500,000
1,000,000
1,500,000
2,000,000
2,500,000
3,000,000
# of Workers

Conclusion

This report serves to start a discussion among the Illinois broadband stakeholder community. Simply put, this report poses and introduces some early results on scoping the current broadband access landscape across the State of Illinois. In summary, this study concludes large geographic disparities for speeds across the state. In particular, specific regions in southern and western Illinois have both access and speed deficiencies in relation to State averages. Fiber developments offering speeds of 1 Gigabit per second connectivity have been extremely limited – although that is likely to change with a variety of broadband projects funded by the American Recovery and Reinvestment Act, and by State capital fund dollars. Providers serving Chicago and the Collar counties report broadband at speeds in the 50-100 Mbps range, as do providers serving the Kankakee area, and a few other limited areas. Connectivity in the 10-25 Mbps range appears to be available in most of the cities around the State, including the Quad Cities, Macomb, Peoria, Champaign, Danville, Springfield, Taylorsville, Charleston, Effingham, Metro East and Carbondale. Even these observations need to be qualified by the points stated in the introduction: the constant refinement of broadband information in partnership with the providers, and the need to verify actual speeds against advertised speeds; and in consumers' evolving expectations of adequate speeds of broadband connectivity, particularly for engaging in typical home and business broadband use (and not, for example, applications and uses common mobile broadband users).

How does the State of Illinois leverage and harness the full potential of broadband in economic development, business, and community service with this type of system? This data suggest, at the most basic level, that broadband companies are attracted to the most viable markets for private sector investment and network sustainability. Our data suggest these early markets are defined by issues relating to population patterns, incomes, and business activity. Again, this list is by no means exhaustive; however, it does represent an early attempt to define factors shaping broadband markets.

In summary, this reports looks for feedback on what steps are needed to move broadband research forward in Illinois. PCI's broader mission relates to using data to support and increased access and infrastructure, and enhancing the adoption, use and maximum impact of broadband by private and public sector entities across the State. In this process, PCI aims to capture and measure the social and economic impacts of broadband. PCI's data team is currently exploring external data sets to address these concerns relating to business activity, take rates and pricing information. One of primary goals is to assess in measurable ways how broadband impacts jobs and economic development. These types of stories and measurable impacts will be critical in elevating demand, which in theory; will drive more carriers to produce supply. We look forward to feedback and engagement from other broadband stakeholders in addressing these research questions.

Partnership for a Connected Illinois
August 15, 2011

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Appendix A – County Broadband Access Ranking Chart

County	Rank	2010 Workforce	2010 Unemployed	% Rate	Resident total population 2010	Median household income 2009	People of all ages in poverty 2009	Total number of firms 2007	Land in farms 2007 (acres adjusted)	Land area in Sq. mi. 2000	Pop per square mile 2010
ADAMS	64	38,371	2,846	7.4	67,103	$ 41,582	15.7	5,561	374,133	857	78.3
ALEXANDER	95	2,982	351	11.8	8,238	$ 28,370	29.4	383	47,626	236	34.9
BOND	35	8,636	870	10.1	17,768	$ 45,520	13.7	1,350	224,760	380	46.7
BOONE	12	26,452	4,194	15.9	54,165	$ 60,425	8.9	3,425	137,162	281	192.6
BROWN	75	3,572	181	5.1	6,937	$ 42,134	15.9	373	151,058	306	22.7
BUREAU	48	19,555	2,222	11.4	34,978	$ 47,015	12.8	2,918	478,389	869	40.3
CALHOUN	102	2,524	274	10.9	5,089	$ 44,930	11.3	-	87,938	254	20
CARROLL	24	8,424	954	11.3	15,387	$ 41,578	13.2	1,669	265,153	444	34.6
CASS	56	7,793	607	7.8	13,642	$ 41,828	12.5	1,166	173,543	376	36.3
CHAMPAIGN	22	106,393	9,567	9	201,081	$ 42,101	19.9	13,525	550,481	997	201.7
CHRISTIAN	14	18,266	1,819	10	34,800	$ 43,182	14.7	2,949	449,512	709	49.1
CLARK	80	8,260	1,041	12.6	16,335	$ 43,003	13.4	1,452	238,706	502	32.6
CLAY	67	6,631	805	12.1	13,815	$ 37,055	14.7	732	209,834	469	29.4
CLINTON	21	18,730	1,552	8.3	37,762	$ 53,873	8.4	2,876	268,441	474	79.6
COLES	19	27,941	2,676	9.6	53,873	$ 37,790	19.1	3,872	254,869	508	106
COOK	2	2,604,300	272,436	10.5	5,194,675	$ 52,516	16	511,023	8,198	946	5493.1
CRAWFORD	72	9,789	934	9.5	19,817	$ 40,572	15.2	1,597	205,356	444	44.7
CUMBERLAND	58	5,628	586	10.4	11,048	$ 41,962	11.4	626	144,981	346	31.9
DEKALB	11	60,076	5,831	9.7	105,160	$ 51,087	17	7,815	370,772	634	165.8
DEWITT	30	9,035	796	8.8	16,561	$ 47,820	11.1	1,165	198,680	398	41.7
DOUGLAS	27	10,281	955	9.3	19,980	$ 49,916	8.7	1,871	261,513	417	47.9
DUPAGE	1	524,521	43,516	8.3	916,924	$ 73,554	6.7	101,556	7,948	334	2748.5
EDGAR	62	10,360	1,122	10.8	18,576	$ 40,560	16	1,251	352,535	624	29.8
EDWARDS	90	3,186	292	9.2	6,721	$ 40,030	11.3	500	116,690	222	30.2
EFFINGHAM	34	18,471	1,548	8.4	34,242	$ 47,485	10.2	3,422	242,009	479	71.5
FAYETTE	78	10,562	1,216	11.5	22,140	$ 39,611	20.2	2,194	303,258	716	30.9
FORD	54	7,130	718	10.1	14,081	$ 45,821	9.9	1,500	270,720	486	29
FRANKLIN	71	18,214	2,339	12.8	39,561	$ 32,417	18.8	3,165	207,877	412	96
FULTON	79	18,774	2,188	11.7	37,069	$ 40,694	13.9	2,540	385,302	866	42.8
GALLATIN	97	2,688	271	10.1	5,589	$ 34,319	19.3	548	185,753	324	17.3
GREENE	88	6,976	671	9.6	13,886	$ 39,226	14.3	1,080	273,088	543	25.6
GRUNDY	10	26,784	3,325	12.4	50,063	$ 63,349	6.8	3,673	215,474	420	119.2
HAMILTON	55	4,115	400	9.7	8,457	$ 39,337	14.2	1,013	219,873	435	19.4
HANCOCK	61	9,584	1,104	11.5	19,104	$ 43,774	11.6	2,125	392,898	795	24
HARDIN	87	1,813	210	11.6	4,320	$ 33,367	21.4	446	34,733	178	24.2
HENDERSON	91	3,820	389	10.2	7,331	$ 43,041	12.2	604	170,443	379	19.4
HENRY	15	26,991	2,479	9.2	50,486	$ 50,193	9.8	3,237	489,903	823	61.3
IROQUOIS	44	17,138	1,720	10	29,718	$ 46,419	12.2	2,722	677,803	1,116	26.6
JACKSON	82	32,827	2,579	7.9	60,218	$ 30,899	28.5	4,212	224,414	588	102.4
JASPER	69	5,050	486	9.6	9,698	$ 47,087	11.3	1,127	243,451	494	19.6
JEFFERSON	66	20,760	1,994	9.6	38,827	$ 38,326	18.9	2,846	232,531	571	68
JERSEY	60	11,619	1,093	9.4	22,985	$ 48,573	10	2,278	189,462	369	62.3
JO DAVIESS	53	13,230	1,159	8.8	22,678	$ 47,103	10.5	2,655	281,457	601	37.7
JOHNSON	99	5,229	573	11	12,582	$ 40,497	16.9	713	100,499	345	36.5
KANE	5	271,334	27,947	10.3	515,269	$ 66,604	9.4	38,590	192,372	520	990.1
KANKAKEE	8	57,222	7,511	13.1	113,449	$ 49,375	15.1	8,399	385,808	677	167.6
KENDALL	6	60,201	5,914	9.8	114,736	$ 82,835	4.2	8,311	166,872	321	357.9

County	Rank	2010 Workforce	2010 Unemployed	% Rate	Resident total population 2010	Median household income 2009	People of all ages in poverty 2009	Total number of firms 2007	Land in farms 2007 (acres adjusted)	Land area in Sq. mi. 2000	Pop per square mile 2010
KNOX	43	26,206	2,498	9.5	52,919	$ 40,056	13.2	3,333	362,951	716	73.9
LAKE	3	365,683	38,395	10.5	703,462	$ 76,336	7.6	68,447	34,525	448	1571.8
LASALLE	20	60,381	7,880	13.1	113,924	$ 52,208	12.5	8,452	643,291	1,135	100.4
LAWRENCE	94	8,222	785	9.5	16,833	$ 36,587	18.1	1,242	194,035	372	45.3
LEE	17	18,496	2,034	11	36,031	$ 46,901	10.5	2,448	395,624	725	49.7
LIVINGSTON	36	19,206	1,996	10.4	38,950	$ 50,173	11.2	2,551	628,502	1,044	37.3
LOGAN	52	13,687	1,311	9.6	30,305	$ 45,722	13.8	1,823	320,356	618	49
MACON	26	55,274	6,502	11.8	110,768	$ 44,407	15.1	7,843	290,603	581	190.8
MACOUPIN	45	24,165	2,567	10.6	47,765	$ 44,673	12.1	3,653	394,228	864	55.3
MADISON	16	138,701	13,582	9.8	269,282	$ 50,628	13.1	18,652	312,936	725	371.4
MARION	63	18,341	2,222	12.1	39,437	$ 37,277	19.4	3,236	260,679	572	68.9
MARSHALL	49	7,137	688	9.6	12,640	$ 46,526	10.4	1,057	204,584	386	32.7
MASON	73	7,719	967	12.5	14,666	$ 43,947	12.5	651	273,362	539	27.2
MASSAC	96	7,190	700	9.7	15,429	$ 38,302	16.4	1,395	89,693	239	64.5
MCDONOUGH	18	17,094	1,490	8.7	32,612	$ 36,381	22.6	2,554	307,725	589	55.3
MCHENRY	7	180,783	17,286	9.6	308,760	$ 74,669	6.6	28,523	215,584	604	511.6
MCLEAN	39	93,167	7,201	7.7	169,572	$ 56,471	14.4	12,693	675,984	1,184	143.3
MENARD	38	7,095	557	7.9	12,705	$ 55,260	9.3	1,128	168,594	314	40.4
MERCER	84	8,770	951	10.8	16,434	$ 54,533	9.4	1,344	306,306	561	29.3
MONROE	65	18,528	1,442	7.8	32,957	$ 71,342	5	3,242	178,134	388	84.9
MONTGOMERY	42	13,779	1,800	13.1	30,104	$ 37,458	14.9	2,543	347,765	704	42.8
MORGAN	51	17,750	1,660	9.4	35,547	$ 42,672	14.1	2,795	320,512	569	62.5
MOULTRIE	40	8,046	693	8.6	14,846	$ 45,758	10.8	1,186	167,791	336	44.2
OGLE	9	27,915	3,778	13.5	53,497	$ 52,197	10.9	4,622	366,470	759	70.5
PEORIA	57	98,594	10,610	10.8	186,494	$ 47,330	16.8	13,461	259,204	620	301
PERRY	76	9,514	1,135	11.9	22,350	$ 40,276	17.8	1,445	200,354	441	50.7
PIATT	25	8,952	753	8.4	16,729	$ 58,519	6.7	1,407	267,265	440	38
PIKE	93	8,780	776	8.8	16,430	$ 38,191	17.1	1,444	389,808	830	19.8
POPE	100	1,917	208	10.9	4,470	$ 37,177	18	-	60,809	371	12.1
PULASKI	89	2,870	322	11.2	6,161	$ 32,671	25.1	264	101,189	201	30.7
PUTNAM	81	3,267	393	12	6,006	$ 56,372	8.5	493	62,705	160	37.6
RANDOLPH	46	15,424	1,409	9.1	33,476	$ 43,160	13.3	2,250	252,926	578	57.9
RICHLAND	47	7,388	742	10	16,233	$ 40,037	15.1	1,481	202,860	360	45.1
ROCK ISLAND	29	78,729	7,488	9.5	147,546	$ 48,668	11.2	9,363	178,623	427	345.7
SALINE	85	12,961	1,310	10.1	24,913	$ 35,723	16.6	1,937	117,233	383	65
SANGAMON	23	110,862	8,876	8	197,465	$ 52,581	13.1	17,195	518,153	868	227.4
SCHUYLER	68	4,271	318	7.4	7,544	$ 44,814	13.3	508	207,457	437	17.3
SCOTT	92	2,756	266	9.7	5,355	$ 49,450	10.4	449	135,731	251	21.3
SHELBY	37	11,266	1,146	10.2	22,363	$ 44,956	10.9	1,699	387,288	759	29.5
ST CLAIR	13	124,858	13,666	10.9	270,056	$ 46,368	17.1	17,084	306,533	664	406.8
STARK	70	2,887	313	10.8	5,994	$ 46,211	11.5	-	169,775	288	20.8
STEPHENSON	74	24,641	2,886	11.7	47,711	$ 44,307	13	3,662	337,932	564	84.6
TAZEWELL	33	73,637	7,458	10.1	135,394	$ 53,904	8.3	9,910	329,268	649	208.7
UNION	98	8,351	1,011	12.1	17,808	$ 38,080	20	1,451	122,362	416	42.8
VERMILION	41	37,494	4,547	12.1	81,625	$ 37,167	21.7	5,848	457,375	899	90.8
WABASH	101	6,112	609	10	11,947	$ 42,564	12.7	1,104	114,361	223	53.5
WARREN	59	9,421	794	8.4	17,707	$ 43,296	13.6	1,350	294,907	543	32.6
WASHINGTON	28	8,341	656	7.9	14,716	$ 50,299	9.6	-	353,903	563	26.2

County	Rank	2010 Workforce	2010 Unemployed	% Rate	Resident total population 2010	Median household income 2009	People of all ages in poverty 2009	Total number of firms 2007	Land in farms 2007 (acres adjusted)	Land area in Sq. mi. 2000	Pop per square mile 2010
WAYNE	83	8,192	791	9.7	16,760	$ 40,497	14.6	1,653	333,255	714	23.5
WHITE	77	7,826	682	8.7	14,665	$ 38,905	15.5	1,250	296,989	495	29.6
WHITESIDE	32	30,246	3,280	10.8	58,498	$ 45,359	11.8	4,063	405,333	685	85.4
WILL	4	367,626	38,339	10.4	677,560	$ 72,478	7	53,101	220,851	837	809.6
WILLIAMSON	86	35,622	3,348	9.4	66,357	$ 39,386	18.3	5,889	94,124	423	156.7
WINNEBAGO	31	146,319	22,185	15.2	295,266	$ 44,390	17.7	23,684	183,615	514	574.7
WOODFORD	50	21,478	1,743	8.1	38,664	$ 64,748	6.8	2,365	288,400	528	73.2

About the Authors

<u>About Dr. Mike Rudibaugh</u>
Mike Rudibaugh is the Mapping and Analysis Director for PCI

Dr. Rudibaugh's career started as a faculty member instructing Earth Science and Geographic Information Systems courses at Lake Land College in 1996. He has worked on numerous federal grants relating to STEM education and workforce development issues challenging the American economy. Dr. Rudibaugh holds a B.A. from Eastern Illinois University (Psychology) and a M.A. (1996) and Ph.D. (2006) from Indiana State University in Economic Geography. His dissertation research focused on assessing the impact of location (urban vs. rural) and resulting influence on strategic planning issues impacting community colleges. He currently serves as Director of Mapping and Analysis for the Partnership for a Connected Illinois.

<u>About Brian Webster</u>
Brian Webster is the Telecom Data Coordinator for PCI

Brian Webster Consulting and Wirelessmapping.com were created to fill a need for affordable wireless engineering services for those unable to justify the cost of hiring and maintaining fulltime RF Engineering and mapping staff. Projects are approached with a creative eye, cost-conscious methodology and over 21 years of telecommunications industry experience. The integration of Geographic Information Systems (GIS) helps present complex engineering and demographic information in clear, color diagrams that help the end user make actionable fact based decisions. These capabilities allow demographic data and market analysis information to be included as overlays to engineering diagrams, along with raw data for input to financial and/or analytical models. Brian has been conducting studies and mapping competitive broadband technologies at the census block level for over eight years. This data was used to assist broadband network operators as they work to cover un-served markets. He currently serves as the Telecom Data Coordinator for the Partnership for a Connected Illinois.

OFFICIAL OCTOBER 2011 UPDATE SUBMISSION TO THE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION UNDER THE STATE BROADBAND INITIATIVE GRANT PROGRAM FOR THE STATE OF KANSAS

CONNECT KANSAS®

October 1, 2011

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KANSAS COVER LETTER

October 1, 2011

Ms. Anne W. Neville
SBI Grant Program Director
National Telecommunications and Information Administration
U.S. Department of Commerce
1401 Constitution Avenue, NW Room 4716
Washington, DC 20230

Dear Ms. Neville:

On September 1, 2011, the Kansas Department of Commerce assumed the role of Designated Entity, pursuant to a change in administrative policy within the state of Kansas. Through mutual planning and commitment to success, Connected Nation and the Kansas Department of Commerce have achieved a seamless transition in order to meet the requirements of the October 1 grant deadline. Therefore, Connected Nation is pleased to present this submission on behalf of the new Designated Entity, the Kansas Department of Commerce, and Kansas' State Broadband Initiative (SBI) Grant Program, known as Connect Kansas.

These artifacts should be found to be compliant with the October 1, 2011, deadline for the semi-annual data update and in accordance with the terms of the July 1, 2009, Notice of Funds Availability (NOFA) and all subsequent clarifications pertaining to delivery of State-Level Mapping of Broadband Service Availability. This packet includes:

Inventory of Deliverables, Connect Kansas: October 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing

Appendix A: 4	n/a	Community Anchor Institutions-Narratives
VII.A.1(a)	n/a	Accuracy and Verification Report
n/a	DataPackage.xlsx	Worksheets of Contact Information, Record Count, and Provider Summary Table
n/a	n/a	List of Changes and Corrections to the Dataset
n/a	n/a	Non-Participating Provider Narratives
n/a	n/a	Broadband Provider Roster and Participation Status

In addition, this data update submission should be found to be compliant with the additional program requirements instituted by the National Telecommunications and Information Administration since the time of the April 2011 SBI data submission for the Connect Kansas program. Specifically, these new requirements are:

SBI Data Transfer Model
The submission of the broadband dataset for October 1, 2011, is contained within the SBI Data Transfer Model as released on the Grantee Workspace on June 30, 2011. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information on each provider as possible.

Additional Submission Guidance
This submission also includes a list of changes and corrections made to the dataset between the April 2011 submission and the October 2011 submission. This represents a summary of why data displays and/or supplied speeds, etc. are different from the previous submission. Changes can include upgrades to infrastructure to allow for higher throughput speeds for customers, an expansion of the service area (e.g. additional fixed wireless towers, recently activated DSLAMs, etc.), or a new provider in the marketplace. Corrections can include revisions to speed tier information that was previously reported incorrectly or the addition of a previously existing provider that has not yet been submitted in a semi-annual dataset.

Another addition in this submission is a narrative describing the data and coverage estimation of a non-participating provider. While Connect Kansas continues outreach to all providers prior to each submission period, the need to submit broadband service data for all providers regardless of their participation is evident as the SBI program continues into this fourth round of data submissions. The submission of this estimated broadband service area for a provider that has not supplied data to Connect Kansas is essential in being able to portray a more accurate depiction of the current broadband landscape.

This October 2011 semi-annual data update under the State Broadband Initiative Grant Program continues to demonstrate our dedication to implementing the joint purposes of the Recovery Act and the Broadband Data Improvement Act (BDIA) by gathering comprehensive and accurate state-level broadband mapping data, developing state-level broadband maps, aiding in the development and maintenance of the National Broadband Map, and undertaking statewide initiatives for broadband planning.

Broadband Service Availability — Provider Outreach and Verification

This data update submission under the SBI program includes datasets for 91 percent of the Kansas provider community, or 91 of 100 total providers. There are 90 participating providers and 1 additional non-participating provider whose estimated coverage areas have been submitted. Of the 90 participating providers, 38 supplied an update to their network or coverage area(s), while 48 have reported no change. The remaining 4 represent providers who previously supplied data but were non-responsive in the October 2011 update effort; therefore their previous dataset is being put forward as part of this compilation. A complete roster by provider depicting participation status and contact record is contained herein. Of the 9 providers that are not represented in the attached datasets, 7 have refused to participate in the voluntary program or were non-responsive to multiple contact attempts, and 2 providers are currently in some form of progress toward data submission but were not able to submit coverage areas at the time of this submission.

As the aforementioned roster and attached methodology documentation will attest, it is the collective opinion of the Connect Kansas principals that all commercially reasonable efforts were made to account for 100 percent of the known Kansas broadband provider community, pursuant to this semi-annual data update submission.

Connect Kansas has also continued to perform broadband verification activities through several means. In addition to confirmation of service area(s) by each provider, Connect Kansas conducts field validation efforts. To date, 70 (70 percent) providers have been validated through field verification activities. Additional details on verification activities are contained within the Field Validation Methodology.

The Connect Kansas website, www.connectkansas.org, continues to serve a prominent role in the outreach and data collection effort. This program asset provides a way for the general public to participate in the process by offering interactive tools for users to test their connection speed, submit broadband inquiries, or contact a program representative.

As an indicator of stakeholder penetration, the Connect Kansas website encountered 2,436 unique visits during this reporting period (13,935 total to date for the life of the grant awarded on November 1, 2009). Additionally, this pronounced Web activity netted 15 broadband inquiries over this same reporting period (406 grant inception to date). The website also provides the BroadbandStat application, which allows the consumer to confirm or dispute the coverage represented on the broadband inventory map. These consumer-initiated actions are facilitated through the Connect Kansas website and the Connect Kansas interactive mapping tool (BroadbandStat) that offer the citizens the vehicles to provide information regarding availability in their respective service area, either in affirmation or contest of the reported data represented in the Connect Kansas mapping artifacts. Since the initial data collection and release of corresponding maps, feedback in the form of broadband inquiries has allowed Connected Nation to identify additional areas that are in need of field validation, which is scheduled as soon as possible.

Community Anchor Institutions

Connect Kansas has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBI NOFA Technical Appendix.

In conjunction with the Kansas Department of Commerce, outreach was conducted during this data update reporting period by Connect Kansas to continue identification of existing, centralized sources for CAI connectivity data. Additionally, outreach was coordinated to distribute a CAI survey to institutions throughout the state through multiple methods including a customized online survey available on the Connect Kansas website. During this reporting period Connect Kansas has promoted the importance of broadband connectivity at anchor institutions and encouraged their participation in this data collection process. Connect Kansas will continue to build upon these new relationships over the coming months and utilize its contacts throughout the state to collect data and raise awareness of this project.

From our work in Kansas, as well as other states, we recognize the great value of this data to future collaboration efforts within the state as well as its value to the National Broadband Map. We plan to continue to bring best practices to the Connect Kansas efforts, along with an investment of both human and technical resources required to reach our goal of increasing the data that is secured and reported as part of this process.

The Connect Kansas program exists to improve data on the deployment and adoption of broadband services and to assist in the extension of broadband technology across all regions of the great state of Kansas, as well as the United States through contribution to the National Broadband Map. We look forward to the continuing work ahead.

Respectfully submitted,

Thomas W. Ferree
Chief Operating Officer
Connected Nation, Inc.

Data Acquisition: Kansas Community Anchor Institutions Methodology

In this fourth reporting period of the SBI, Connect Kansas has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBI NOFA Technical Appendix. During this reporting period Connect Kansas has continued to focus efforts on conducting outreach and raising awareness of this important project.

Connect Kansas has continued to identify and process CAI data obtained through an ongoing statewide outreach campaign. Physical address information continues to be augmented through manual sourcing and geocoded by Connect Kansas through ESRI ArcGIS software.

Connect Kansas continues to utilize a customized online survey hosted through SurveyMonkey, with a landing page on the Connect Kansas website that was developed during the first reporting period. This survey, in combination with a customized data-gathering spreadsheet, was distributed to a targeted list of CAI throughout the state. With the transition of the DE status to the Kansas Department of Commerce, Connect Kansas will coordinate the outreach over the next submission with the intention to continue to use these data-gathering tools for future targeted outreach efforts throughout the coming months leading up to the next reporting period. These materials are customized to fit the CAI categories as defined in the SBI NOFA.

The survey can be accessed at this link:
http://www.connectkansas.org/mapping/Community_Anchor_Institution_Data_Collection.php

During this reporting period, Connect Kansas conducted research as part of an ongoing process to identify existing, centralized sources for CAI connectivity data and contact information specifically focusing on the education sector. Again, with the transition of the DE status to the Kansas Department of Commerce, Connect Kansas will continue to direct the efforts to utilize an extensive database of contact information for K-12 schools, healthcare facilities, higher education institutions, and libraries provided by Kan-ed to distribute and promote the online survey and raise awareness of the importance of CAI broadband.

A CAI summary of all processed and submitted data is provided below:

CAI Type	Total	Physical Address	Lat/Long	Technology of Transmission	Download Speed	Upload Speed
K-12	2,148	2,148	2,148	896	1,975	1,976
Libraries	429	429	429	230	326	277
Healthcare	244	244	244	132	196	195
Public Safety	1,678	1,665	1,677	117	113	108
Higher Ed Institutions	104	104	103	77	102	101
Other Government	519	519	519	265	267	266
Other Non-Government	3	3	3	3	3	3
Total	**5,125**	**5,112**	**5,123**	**1,720**	**2,982**	**2,926**

SBI DATA SUBMISSION METHODOLOGY

The submission of the broadband dataset for October 1, 2011, is contained within the SBI Data Transfer Model and additional components as released on the Grantee Workspace on June 30, 2011. Connected Nation has reviewed all literature that relates to the release and use of this data transfer model and recognizes that it does not replace or dictate how data is stored, processed, or displayed for the state, as it is meant primarily as a means to transfer the broadband data from all states and territories and populate the National Broadband Map in a seamless fashion. Guidance from the Technical Mapping Guide, as released on the Grantee Workspace on March 24, 2011, was also followed to ensure the completeness and validity of the submission through completion steps and checklists, completing the DataPackage spreadsheet, uploading broadband datasets into the Data Transfer Model, and checking the dataset using the SBDD_CheckSubmission receipt process.

As part of the ongoing review and analysis process, NTIA has requested further information in the submission of the DataPackage spreadsheet. In addition to the information on providers whose coverage and accompanying attributes are submitted in the SBI Data Transfer Model, information on other providers that are considered to be non-viable is also included in the DataPackage. Providers deemed non-viable that have been excluded from continued outreach may have been eliminated for reasons such as (i) the company offers Internet service but at speeds below the current definition of broadband; (ii) the company was listed in advertisements as a broadband provider, but is actually a network solution or consulting firm, etc.; (iii) the company may build or install network infrastructure, but does not actually provide the broadband service to consumers; and (iv) the company has gone out of business. The submitted DataPackage includes any relevant information that has been obtained through the course of due diligence and/or direct provider outreach, such as a Federal Registration Number (if applicable), the company's URL, the existence of an executed Nondisclosure Agreement, and brief notations regarding the status of the company.

In addition to the methodologies contained herein, as well as the DataPackage.xls containing contact information, the data dictionary, and a provider summary table, the following feature classes are submitted within the SBI Data Transfer Model for the state of Kansas.

Inventory of Deliverables, Connect Kansas: October 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area.
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles.
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address.
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points.

Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing.

The provider data collected by Connected Nation on behalf of the state of Kansas have been formatted per the given specifications and uploaded into the appropriate feature classes of the SBI Data Transfer Model. Wireline availability is contained within census blocks and road segments, wireless availability is contained as polygons of coverage areas, and middle-mile connections and Community Anchor Institutions are contained as point data. All speed data is contained at the census block, road segment, or wireless polygon level of availability. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information as possible.

Connected Nation has continued outreach to satellite providers on their availability, technology, and speed information, but granular coverage is not yet available. Submitted within the wireless feature class are the satellite companies providing service to Kansas as a polygon of the state boundary. Efforts will continue to collect, process, or otherwise create more granular satellite data based on availability analyses and guidance received from NTIA.

Provider Changes and Corrections for October 2011

As requested by the SBI Program Office, a listing of the changes and/or corrections to the datasets between the April 2011 and October 2011 submissions is included in this narrative. This information is presented in this section as well as in the Broadband Provider Log. Changes to the data include expansion of service area(s), activation of new wireless towers, and upgrades to the network to provide higher download speeds to consumers. Corrections to the dataset include the addition of previously existing providers whose coverage has never been submitted, revision of coverage or speed information that was incorrect, and any other items that were misrepresented in the April 2011 dataset.

Changes

- American Broadband Acquisition Corporation (fiber): New provider in the fiber residential market for October 2011 submission.
- AT&T (mobile wireless): Provider greatly expanded mobile territory throughout the state.
- Blue Valley Tele-Communications, Inc. (fiber): Provider expanded fiber territory into two exchanges.
- Clearwire Corporation (mobile wireless): Provider expanded mobile territory.
- Craw-Kan Telephone Cooperative, Inc. (DSL): Provider upgraded infrastructure to higher speeds.
- Craw-Kan Telephone Cooperative, Inc. (fiber): Provider expanded fiber territory into Girard.
- Cunningham Communications, Inc. (fiber): Provider expanded fiber territory into two other exchanges that were previously DSL.
- Eagle Communications, Inc. (fiber): Provider expanded fiber territory.

- Fairpoint Communications, Inc. (DSL): Provider expanded DSL territory in one area in western KS.
- Golden Belt Telephone Association, Inc. (cable): Provider no longer offers cable service in Schoenchen. Increased advertised upload speeds in all the cable towns.
- Golden Belt Telephone Association, Inc. (DSL, fiber): Provider converted some DSL infrastructure to fiber and upgraded infrastructure to higher speeds.
- Home Communications, Inc. (cable): Provider upgraded download and upload speed capabilities.
- Home Communications, Inc. (DSL, fiber): Provider converted DSL infrastructure to fiber in two exchanges.
- JBN Telephone Company, Inc. (fixed wireless): Provider added additional transmission points in 3650 spectrum.
- JBN Telephone Company, Inc. (cable): New platform from provider. May have been in existence during prior submissions, but there is not any confirmation that this was in service previously.
- Knology of Kansas (fixed wireless): After purchase of Sunflower Broadband, provider altered wireless infrastructure to provide slightly more coverage.
- Knology of Kansas (cable): Provider expanded cable territory.
- Knology of Kansas (fiber): New provider in the fiber residential market for October 2011 submission.
- Pioneer Telephone Association, Inc. (cable): Provider upgraded infrastructure to higher speeds.
- Pioneer Telephone Association, Inc. (fiber): New provider offering fiber services for the October 2011 submission.
- Rainbow Telecommunications Association, Inc. (cable, fiber): Reduction in cable coverage as all cable towns in ILEC area are now fiber.
- Rural Telephone Service Company (DSL, fiber): Provider converted some DSL infrastructure to fiber.
- Southern Kansas Telephone Company, Inc. (cable): Provider expanded cable territory north of Clearwater along with changing coverage in Clearwater.
- Southern Kansas Telephone Company, Inc. (DSL): Provider upgraded infrastructure to higher speeds.
- T-Mobile USA, Inc. (mobile wireless): Provider expanded mobile territory in eastern KS. Upgraded speed capabilities with HSPA+ 42.
- United Communications Association, Inc. (mobile wireless): Provider upgraded infrastructure to allow for higher download speeds.
- Valnet Holdings LLC (fixed wireless): Provider added additional transmission points.
- Verizon Communications, Inc. (mobile wireless): Provider expanded mobile territory. Upgraded speeds in 700 MHz spectrum.
- Wheatland Broadband Services (fixed wireless): Provider added an additional transmission point near Sharon Springs.
- Wilson Telephone Company, Inc. (fiber): Provider expanded fiber territory into Lucas exchange.

Corrections

- City of Coffeyville (fixed wireless): New provider for October 2011 submission that was previously gathering data, but had never submitted anything.
- DISH Network Corporation (satellite): Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
- Eagle Communications, Inc. (cable): Maximum advertised speeds in 6 towns were corrected to portray the 9 speed tier.
- Eagle Communications, Inc. (fiber): Provider corrected speeds to speed tier 9.
- Fairpoint Communications, Inc. (DSL): Provider corrected some coverage areas.
- Hughes Network Systems, LLC (satellite): Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
- Southeast Nebraska Communications (DSL): New provider for October 2011 submission that previously refused to participate due to small presence in state.
- Southern Kansas Telephone Company, Inc. (fiber): Provider provided corrections that reduced its fiber territory.
- Stelera Wireless, LLC (mobile wireless): Provider service area is now a real-world propagation unlike prior submissions.
- Stouffer Communications (fixed wireless): New provider for October 2011 submission that was previously unresponsive.
- SwiftLink Communications (fixed wireless): New provider for October 2011 submission that is still unresponsive. Connected Nation estimated coverage for this provider.
- Totah Communications, Inc. (DSL): Maximum upload speed tier was corrected to speed tier 3. Incorrectly reported as speed tier 2 in past submissions.
- Valnet Holdings LLC (fixed wireless): Provider requested d.b.a name change.
- WildBlue Communications, Inc. (satellite): Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
- Windjammer Communications, LLC (cable): New provider for October 2011 submission that was previously unresponsive.

Changes and/or Corrections – Entirely New Dataset Submitted

- AT&T (DSL)
- Cable ONC Inc. (cable)
- CenturyLink (DSL)
- Cequel Communications (cable)
- Comcast Cable Communications, LLC (cable)
- CoxCom Inc. (cable)
- Leap Wireless International, Inc. (mobile wireless): Also of note, provider reduced outskirt coverage around Kansas City.
- Sprint Nextel Corporation (mobile wireless): Also of note, the coverage is very comparable to prior submission besides some minor spectrum 5 differences.

- Time Warner Cable LLC (cable): Also of note, provider upgraded almost entire infrastructure with higher speed capabilities.
- United States Cellular Corporation (mobile wireless): Also of note, there are minor changes throughout coverage area.

KANSAS FIELD VALIDATION METHODOLOGY

Connected Nation focused a portion of its time on specific validation processes such as:

- conducting random spectrum analysis studies throughout the state using an Avcom PSA-37-XP spectrum analyzer;
- conducting mobile speed tests throughout the state using an iPhone, Android (or other smart phone) as well as provider-specific aircards (Sprint 3G/4G, Clearwire et al);
- identifying pre-selected, provider-submitted wireless transmit tower sites and cross-referencing data about that tower against the Federal Communications Commission (FCC) databases such as Antenna Structure Registration and/or the Universal Licensing System;
- cross-referencing Federal Registration Number data against available FCC Form 477 data as well as the FCC **CO**mmission **RE**gistration **S**ystem (CORES);
- validating provider submitted data (for example: latitude/longitude) using a handheld Garmin eTrex Summit GPS unit or GPS enabled software such as Microsoft Streets and Trips;
- locating physical wire-line attributes (such as Remote Terminals, CATV plant, etc.) and comparing them against provider submitted data; and
- conducting on-net and off-net speed tests using the FCC portal at http://www.broadband.gov/qualitytest/about/ or using the Ookla Net Metrics enabled speed test utility located on each of Connected Nation's state specific websites.

Additionally, Connected Nation cross-referenced numerous public documents in order to ensure that all known broadband providers were located and contacted. This included searching membership logs from the trade associations (WISPA, WCAI, PCIA, etc.), the Cable Television Fact Book, Public Utility Commission records, Public Service Commission records, Chamber of Commerce, etc.

To date, Connected Nation's staff conducted on-site validation tests in Kansas on the following providers: Ace Computer; Allegiance Communications; AT&T, Inc.; Atwood Cable Systems, Inc.; Benson Telephone Service; BlueValley Telecommunications, Inc.; BroadBand Wireless (d.b.a. Benkleman Telephone); Cable ONE, Inc.; CenturyLink; City of Chanute; City of Coffeyville; Clearwire Corporation; Columbus Telephone Company; Cox Communications, Inc.; Craw-Kan refccTelephone Cooperative, Inc.; CTC Wireless Internet; Cyber Lodge Wireless; Eagle Communications, Inc.; Elkhart Telephone Company, Inc.; Fairpoint Communications, Inc.; Golden Belt Telephone Association, Inc.; H & B Cable Services, Inc.; Haviland Telephone Company; IdeaTek Systems, Inc.; J.B.N. Telephone Company; JMZ Corporation (d.b.a. Kwikom); Kanola Telephone; Kansas Broadband Internet, Inc.; LaHarpe Telephone Company, Inc.; Lawrence

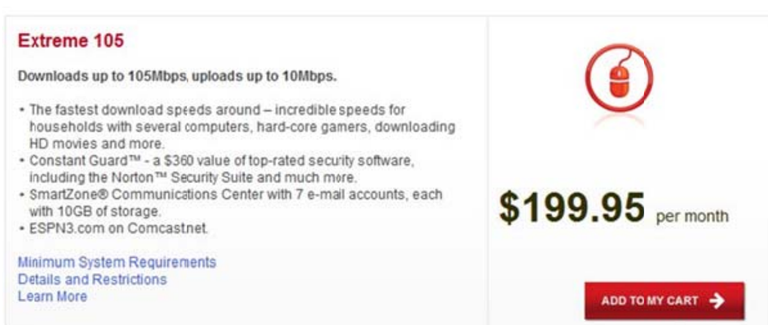
FreeNet; Madison Telephone Company LLC; Mediacom Communications Corporation; Mercury Wireless; Mid-Kansas Cable Services; Midwest Connections, Inc.; Mobill.net; Moundridge Telephone Company, Inc.; Pioneer Telephone Association, Inc.; Pixius Communications LLC; Rainbow Telecommunications Association, Inc.; Rebeltec Communications; Rural Telephone Service Company; S & A Telephone Company, Inc.; S&T Telephone Cooperative Association; SCI Cable, Inc.; Seamlessnet; SKT, Inc.; South Central Telephone Association; Southeast Nebraska Communications; Sprint Nextel Corporation; St. Joe Wireless; Stelera Wireless; Sumner Communications; Sunflower Broadband; SWKO (d.b.a. SouthWest Kansas online); The Computer Generation; Time Warner Cable; Totah Communications, Inc.; Tri-County Telephone Association, Inc.; Tri-Rivers; Twin Valley Communications; U.S. Cellular; United Telephone Association; Valnet LLC; Verizon Communications;, Inc.; Wamego Telecommunications Company, Inc.; Wave Wireless; Wheat State Telephone, Inc.; and Wheatland Electric Cooperative.

From program initiation through this reporting period, Connected Nation has completed in-the-field validation testing against 70 companies (out of a universe of 100 viable providers) totaling 70 percent within the state of Kansas.

Connected Nation has also continued to review provider datasets for accurate speed information, platform listings, and other intricacies that may fall outside of the standard SBI Data Transfer Model parameters. Any providers whose submitted coverage and attributes are anticipated to come into question have been further reviewed and confirmed; details on a case-by-case basis are presented below.

CenturyLink
Issue: DSL platform with maximum advertised download speed in tier 9, higher than expected value range for the technology.
Resolution: Provider representative indicated that tier 9 DSL service is indeed available, but to less than 10% of its customers, which is why it is not widely advertised.

Comcast
Issue: Technology of transmission 41 with maximum advertised download speed in tier 10, higher than expected value range for the technology.
Resolution: Provider website advertises 105 Mbps; screenshot available below. However, additional input from provider on the technology listings and corresponding speed tiers was not received prior to the submission; dataset submitted as-is and work will continue to provide more accurate dataset in April 2012.



Giant Communications
Issue: Technology of transmission 40 with maximum advertised download speed in tier 6, lower than expected value range for the technology.
Resolution: Provider representative indicated that it utilizes both DOCSIS 2.0 and 3.0, with the DOCSIS 3.0 CMTS being backwards compatible and used on speed tier 6 areas.

Haviland Telephone
Issue: Fixed wireless platform with maximum advertised download speed in tier 7, higher than expected value range for the technology.
Resolution: Provider representative confirmed the availability of 12 Mbps service and ensured that it currently has customers subscribing to that speed.

DATA SUBMISSION AND COVERAGE ESTIMATION OF NON-PARTICIPATING PROVIDER

SwiftLink Communications

As part of its ongoing broadband mapping efforts, Connected Nation (CN) has developed a series of processes with the goal of submitting mapping data to NTIA for every known and qualifying broadband provider, regardless of whether the provider has chosen to support and participate in the SBI mapping initiative.

The following narrative provides detail regarding the recent data collection activities related to SwiftLink Communications, a wireless Internet service provider (WISP), located in Falls City, Nebraska, with a service area around Hiawatha, Kansas. The narrative will include information regarding how and where CN obtained publicly available data and the on-the-ground validation techniques that support the underlying data.

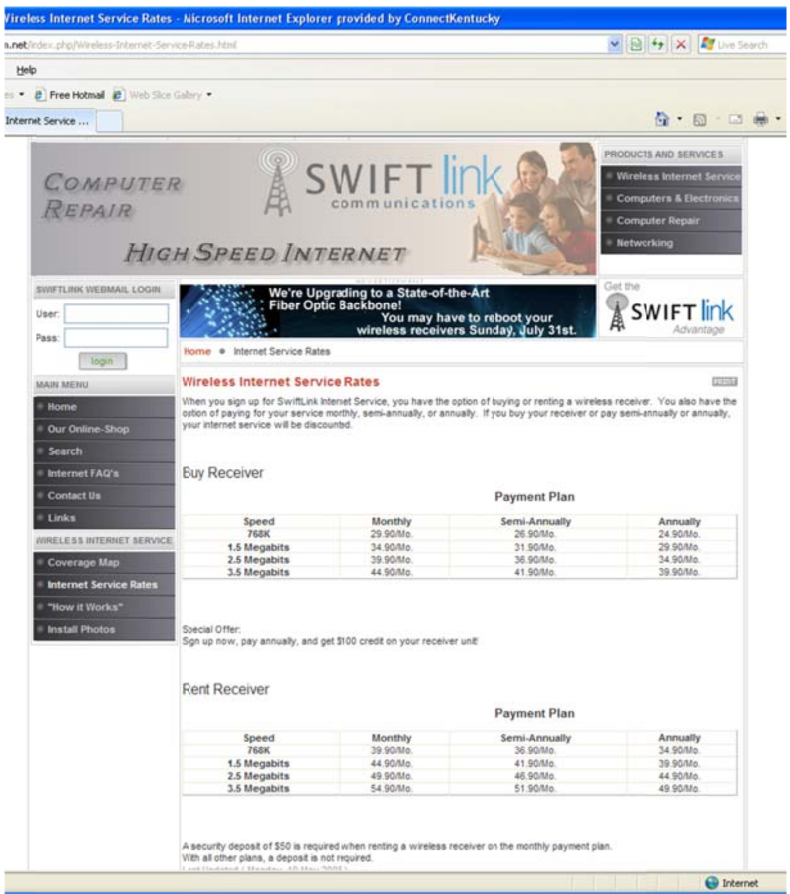
Background
CN staff members have continued trying to obtain the participation of SwiftLink with 9 instances of communication via telephone and e-mail sessions since October 29, 2010, through August 2, 2011. No communication reply was received from a company representative. Additionally, a CN staff member visited the SwiftLink Communications office on August 2, 2011, to discuss the broadband mapping project in person with SwiftLink Communications staff. Staff was aware of the project; however, they were unable to provide relevant data and deferred to a company representative who was not in the office.

The Issue
SwiftLink Communications, by its lack of responsiveness since October 29, 2010, has predicated its unwillingness to participate in the Kansas broadband mapping initiative.

Identification of Provider's Service Plans, Service Area, Legal Name, d.b.a., FRN, and Licensing

CN began building a file based on research information and, as time progressed, enriched the file with information obtained through the public domain. For example, CN reviewed the provider's website (http://www.slinkcom.net) to determine the residential service plans **(Exhibit A)** and the service area **(Exhibit B)** of the provider's wireless network. A search for a Federal Registration Number ("FRN") on the FCC **CO**mmission **RE**gistration **S**ystem ("CORES") system yielded an FRN of 0018595439 **(Exhibit C)** with contact information relative to the owner of the company. Also, to support field validation of wireless access points, the FRN was referenced to the FCC Universal Licensing System (ULS) to identify any licenses the provider may hold which could possibly enhance locating active access points for the service area. This process yielded no licenses in the name of SwiftLink Communications **(Exhibit D)**.

Exhibit A: Service Plans



Wireless Internet Service Rates

When you sign up for SwiftLink Internet Service, you have the option of buying or renting a wireless receiver. You also have the option of paying for your service monthly, semi-annually, or annually. If you buy your receiver or pay semi-annually or annually, your internet service will be discountd.

Buy Receiver

Payment Plan

Speed	Monthly	Semi-Annually	Annually
768K	29.90/Mo.	26.90/Mo.	24.90/Mo.
1.5 Megabits	34.90/Mo.	31.90/Mo.	29.90/Mo.
2.5 Megabits	39.90/Mo.	36.90/Mo.	34.90/Mo.
3.5 Megabits	44.90/Mo.	41.90/Mo.	39.90/Mo.

Special Offer:
Sign up now, pay annually, and get $100 credit on your receiver unit!

Rent Receiver

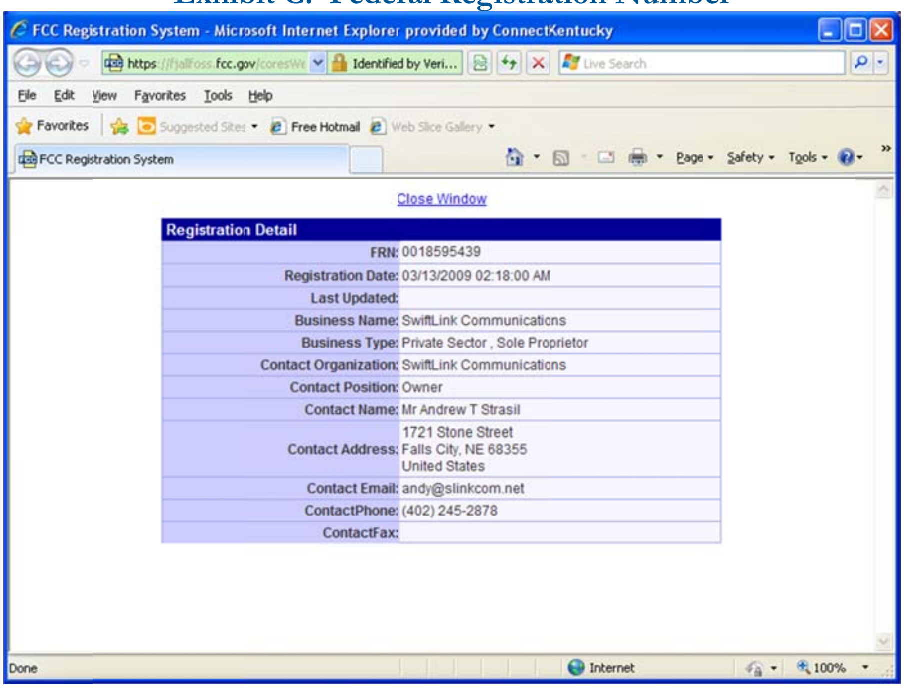
Payment Plan

Speed	Monthly	Semi-Annually	Annually
768K	39.90/Mo.	36.90/Mo.	34.90/Mo.
1.5 Megabits	44.90/Mo.	41.90/Mo.	39.90/Mo.
2.5 Megabits	49.90/Mo.	46.90/Mo.	44.90/Mo.
3.5 Megabits	54.90/Mo.	51.90/Mo.	49.90/Mo.

A security deposit of $50 is required when renting a wireless receiver on the monthly payment plan.
With all other plans, a deposit is not required.

Exhibit B: Service Area

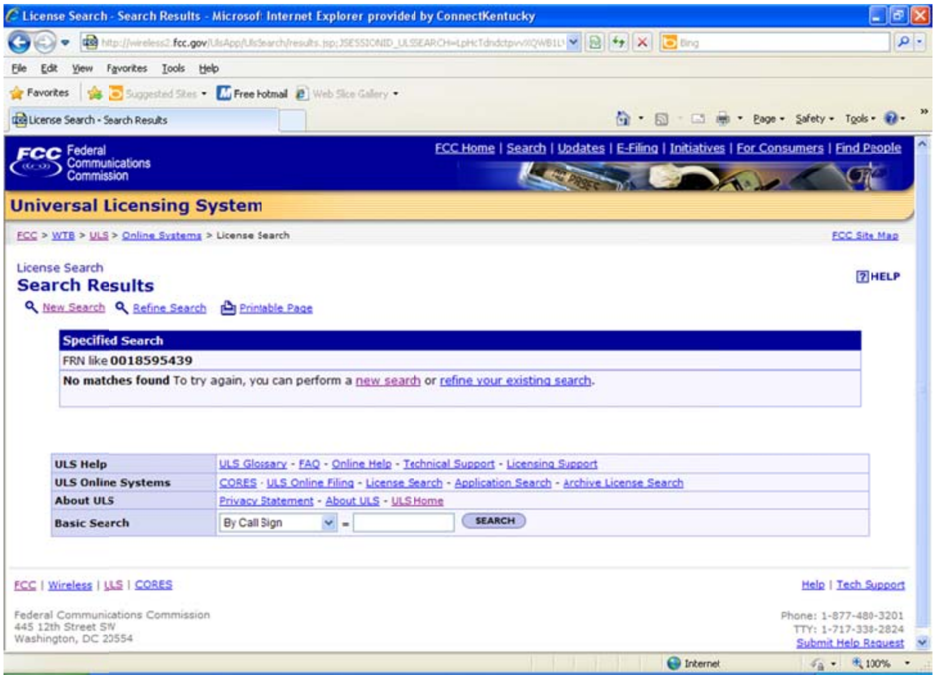
Exhibit C: Federal Registration Number


FCC Registration System - Microsoft Internet Explorer provided by ConnectKentucky

Close Window

Registration Detail	
FRN:	0018595439
Registration Date:	03/13/2009 02:18:00 AM
Last Updated:	
Business Name:	SwiftLink Communications
Business Type:	Private Sector , Sole Proprietor
Contact Organization:	SwiftLink Communications
Contact Position:	Owner
Contact Name:	Mr Andrew T Strasil
Contact Address:	1721 Stone Street Falls City, NE 68355 United States
Contact Email:	andy@slinkcom.net
ContactPhone:	(402) 245-2878
ContactFax:	

Exhibit D: License Reference



<u>Preliminary Identification of Provider's Coverage Area</u>

Connected Nation extracted the SwiftLink Communications service area map from its website. The website service area was utilized to create a Google Earth image overlay **(Exhibit E).** The image overlay was positioned to match the Google Earth base map's roadways, county boundaries, and water bodies. The degree of accuracy of the image overlay was maintained at less than .2 miles (1,058 ft.) to establish a minimum search criteria of a given access point. The provider's service area depiction is represented by polygons as shown in Exhibit B. Using the coordinates determined to be center coordinates, a search ring was created with the image overlay to determine the feasibility of locating the towers to identifying coordinates of the locations. The two locations' center coordinates were geocoded through Google Earth and examined utilizing the zoom option of the aerial imagery. The two transmitting location structures were not identified. This required a means of establishing coordinates for the access point locations. A site validation trip was planned and executed to the area. Both locations were entered into a GPS-enabled version of Microsoft *Streets and Trips* software **(Exhibit F)** to develop a route for the validation process.

Exhibit E: Google Earth - Provider's Service Area Image Overlay

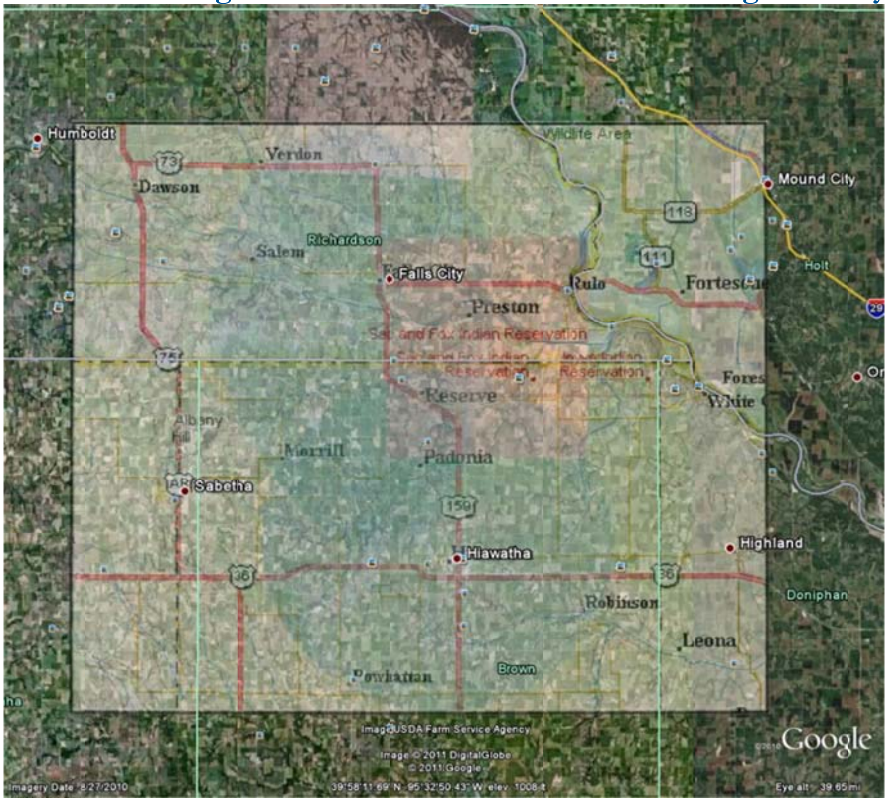
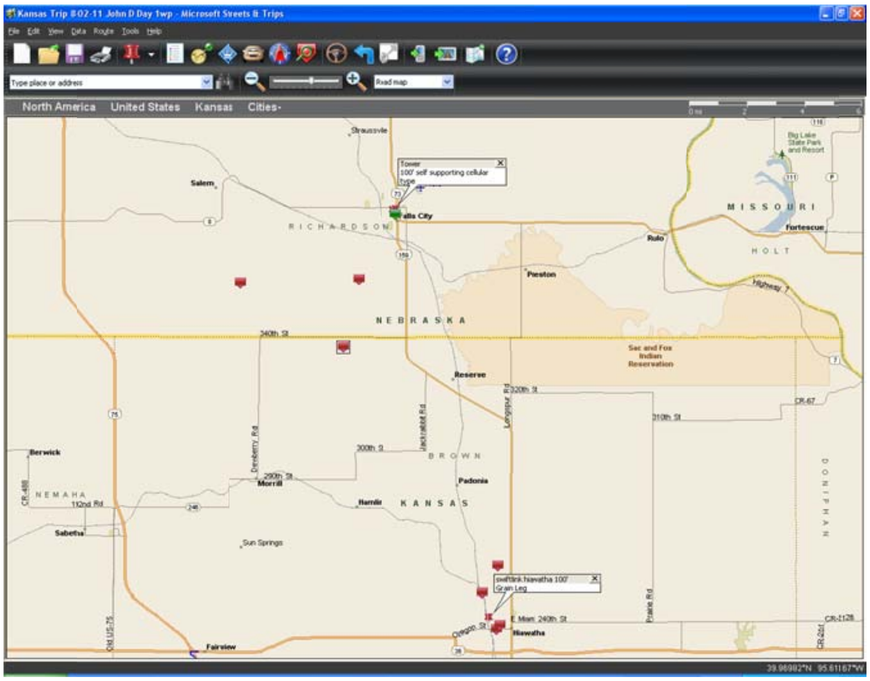


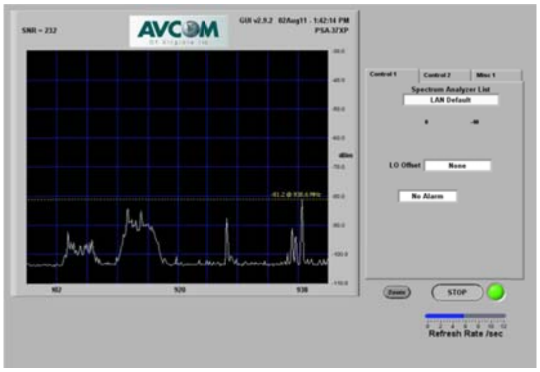
Exhibit F: Validation Points for AP Structures

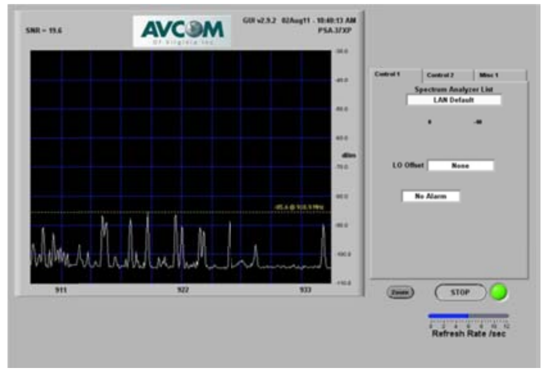


Testing Techniques

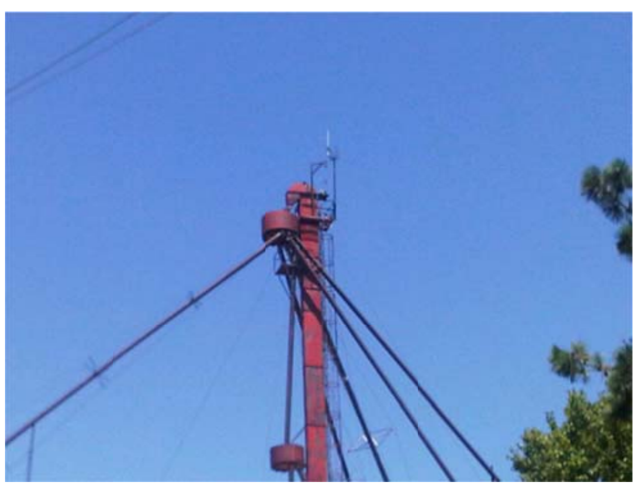
Connected Nation staff developed a site validation route based on data established with the Google Earth image overlay. The CN wireless engineer was equipped with an AVCOM PSA-37XP spectrum analyzer with RF detection from 1 MHz to 6 GHz and an array of antennas tuned specifically for the 900 MHz, 2.4 GHz, 3.65 GHz, and 5 GHz frequency bands **(Exhibit G)**. Each validation point was scrutinized for frequency of operation. A screen image of the operating frequency (or frequencies) was captured; general notes were recorded for each location - approximate antenna height, frequency of operation, antenna type (omni or sectored), and photographs were taken of the access points. See Exhibit G on the following page.

Exhibit G: Field Data for SwiftLink Communications Office/Hub Location





The CN engineer determined that SwiftLink's wireless services are transmitted, at a minimum, on the unlicensed 900 MHz band (see spectrum analyzer screen shots above).



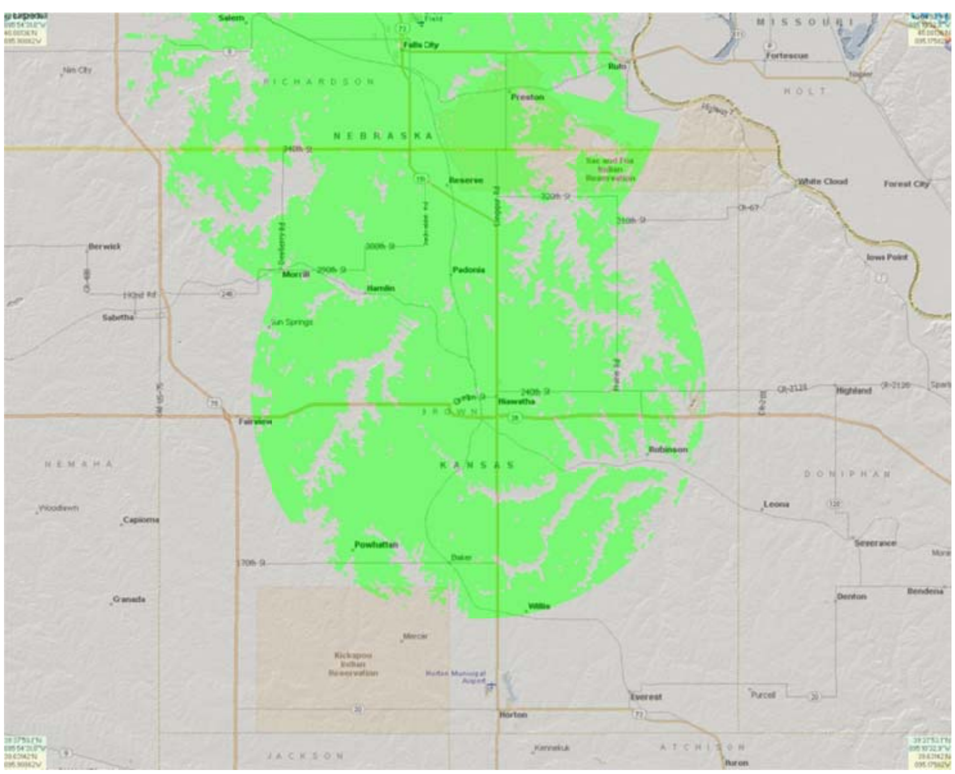
Results and Submission for October 2011

Of the 8 locations visited during the field assessment route, 2 wireless access points were identified and relative information was logged into the SwiftLink Communications field validation notes file **(Exhibit H)**. The field data and the publicly available data were transferred to the Connected Nation Provider Information file. A composite propagation study was completed based on the field data **(Exhibit I)**. Both documents were forwarded to SwiftLink Communications and advised the information will be submitted to Connect Kansas and the NTIA broadband mapping project for processing if there are no discrepancies of the estimated coverage received from the provider within a 48-hour period.

Exhibit H: Field Validation Notes

(N) Lat Decimal	(-)(W) Long Decimal	Peak Freq	Peak Sig Strength	Spectrum Analyzer	Time
40.0625	-95.6042	918	-79	Avcom PSA-37XP	10:40 AM
40.0286	-95.7047	950	-94	Avcom PSA-37XP	11:30 AM

Exhibit I: SwiftLink Communications Composite Coverage



Accuracy and Verification: Provider Validation Methodology

Broadband providers maintain their service area data in many different formats, all in varying levels of complexity and granularity. In order to ensure that the data required by the NTIA is standardized across all providers and that it is as accurate as possible, Connected Nation translates and formats the data that providers are able to supply into a GIS shapefile and produces maps for the provider to review. The resulting map(s) and review process allow for providers to see their service area in a geographic format – for some providers, this is the first time they have seen maps of their broadband service area. Having the mapped service area allows providers to quickly identify any issues that appear in the data representation, whether the issue is in the data translation into a GIS format or from the original data collection and submission. Often data is provided from various sources and through the review and revision process, local engineers who operate the networks and work in the field are able to ensure that the tabular data that has been submitted is accurate and represents the real-world network extent. Any issues in how the service area is represented on the map(s) are remedied by Connected Nation, whether they are additions, removal of service, or any other revisions. Revised maps of service area representations are sent to the provider for review and approval; Connected Nation will revise data and return maps as many times as necessary until the provider is in agreement that the map represents their service area as accurately as possible. Once the review process has been completed and final approval of the data is provided, the data is deemed ready for NTIA submission.

Once the data collection has been aggregated at a statewide level, static maps of statewide and county-level availability are produced and made publicly available. In addition, consumers can visit the interactive online tool, BroadbandStat, to create customized views of broadband service areas and analyze corresponding demographic information. Leveraging broadband service data on various platforms allows for public users, providers, and other stakeholders to review, scrutinize, and provide feedback on the represented data. This feedback becomes a validation method in itself as consumers submit inquiries to Connected Nation either affirming where service is not available or identifying areas where broadband service is shown on the map, but in actuality is not available. This allows for a follow-up to providers regarding revisions to the data as it is represented; it also allows for Connected Nation to identify locations where on-site visits may be necessary to complete field validation of available services. Public feedback on all forms of mapping products serves as a localized validation method for provider-supplied information and allows Connected Nation to resolve inaccuracies as they are identified to ensure that only the highest quality information is provided to stakeholders.

Estimates derived from provider-validated data indicate that approximately 2.24 percent of Kansas households do not have terrestrial fixed broadband service available, and approximately 0.08 percent[1] of Kansas households have neither mobile nor fixed broadband service available.[2]

[1] In accordance with NTIA's definition of available broadband service as specified in the SBI NOFA, this estimate includes both terrestrial fixed *and* mobile broadband service, if the service offers download speeds of at least 768 Kbps and upload speeds greater than 200 Kbps.

[2] Due to the nature of the SBI data collection methodology as defined by the NTIA and based on both census block geographic units and street segment data, the estimates of broadband availability derived from provider-validated data may include an overstatement of the actual number of households with broadband availability. Under the census block-based data collection method, a provider will typically report broadband availability for an entire census block whether

Within rural areas of the state, results derived from provider-validated data indicate that approximately 4.66 percent of rural Kansas households do not have terrestrial fixed broadband service available, and approximately 0.18 percent[3] of rural Kansas households have neither mobile nor fixed broadband service available.[4] Please note that the availability estimates presented are based on Census 2000 household information; these figures will be updated in the near future with Census 2010 household information.

WIRELESS METHODOLOGY

Broadband Service Availability in Provider's Service Area
Wireless Services Not Provided to a Specific Address

Data solicited from a fixed wireless provider to create propagation models include, but are not limited to:

1. The name of the structure
2. Whether the transmitting device is operational or proposed
3. The maximum advertised downstream speed, the maximum advertised upstream speed
4. The typical downstream speed, the typical upstream speed (peak periods for both)
5. The frequency range of spectrum being used (as prescribed by NTIA)
6. The primary population center(s) being served (for geopolitical boundary reference)
7. The physical address of the transmit site (in the event latitude/longitude is unavailable from the provider this allows a quick reference point for geocoding)
8. Latitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
9. Longitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
10. Antenna pattern (e.g. omni-directional, 180°, 120°, 90°, etc.)
11. Azimuth of antenna (e.g. 360° with magnetic declination if known)
12. Approximate transmit radius (in feet, miles, or kilometers)
13. Polarity of transmit antenna (Vertical or Horizontal)
14. Transmit antenna gain (in dBi)
15. Line loss (applicable only to providers using coax, heliax, waveguide or other forms of cabling – excludes power-over-Ethernet devices)
16. Mechanical and/or Electrical beam tilt (if applicable)
17. Equipment Manufacturer (allows easy cross-reference against manufacturer's specification sheet)

its network is present across the whole or only a subset of that census block. This potential overestimation at the census block level can be amplified as the data is aggregated across the entire state.

[3] See footnote 1.

[4] See footnote 2.

18. Power output of the transmitting device (if unknown, FCC standards or manufacturer specifications are applied)
19. AMSL at base of tower site
20. Antenna centerline AGL (height of antenna above ground level measured at the centerline of the actual antenna)
21. Foliage factors (Evergreens/Deciduous and percent of ground cover)
22. Ground Clutter (primarily used in rural areas to account for foliage and in metropolitan areas to account for types and heights of buildings if known)
23. Average gain of receive antenna
24. Receive antenna is estimated at height above average terrain (HAAT) of 6.2 meters/20 feet.
25. Federal Registration Numbers (if applicable) which may allow opportunities to cross-reference and/or obtain additional data from the Federal Communications Commission Universal Licensing System and the **CO**mmission **RE**gistration **S**ystem.

Propagation modeling is an empirical mathematical formulation for the characterization of radio wave propagation as a function of frequency, distance, and other conditions. Propagation software(s) typically use the Irregular Terrain Model (also known as Longley-Rice) of radio propagation for frequencies between 20 MHz and 20 GHz. This model is based on electromagnetic theory and statistical analyses of the combination of terrain features and radio measurements, then predicting the median attenuation of a radio signal as a function of distance and the variability of the signal in time and in space. For metropolitan areas, the software can typically be adjusted to use the Okumura-Hata model which accounts for predicting the behavior of cellular transmissions in areas where buildings are the primary obstructions. The resulting product from either model depicts a graphical illustration of the theoretical propagation characteristics of a selected frequency range based on defined variables (receiver sensitivity of the home/mobile device, foliage factor, and digital elevation terrain input).

After converting propagation models into a geospatial format, additional processing is completed to remove the small pixels representing service present in the resulting dataset. These areas are initially created based on the parameters entered in the software from the provider equipment information, the underlying data parameters of elevation, hillshade, etc., and the limitations of the software itself to display a broadband service area as accurately as possible. Generally, these random pixel striations appear as a result of signal levels reaching the highest elevated points within the prescribed radius. Typically, while this pixilation anomaly shows legitimate areas where signals can be received, these highly elevated points may have exceedingly sparse populations or are entirely void of population. As a result, and congruent to the *Wireless Technology Methodologies and Business Logic* white paper submitted to NTIA on January 20, 2011, all independent pixels representing service that are less than 0.125 square miles in area have been removed from the geospatial representation of each wireless provider.

Broadband Inquiries Methodology

Connected Nation collects consumer feedback in the form of broadband inquiries (BBIs). These inquiries represent any type of communication received from the public regarding broadband service. Once BBIs are received across the state, this information is overlaid with the broadband availability information which was collected through the SBI program. This allows for a real-world comparison of the broadband landscape to the information received from broadband inquiries. Consumers submitting these inbound comments and/or inquiries are able to provide information regarding three categories: 1) residents who do not have broadband but want it; 2) residents who have broadband but want a different provider; and 3) residents who do not have broadband, but the broadband inventory maps indicate that they do.

BBIs are submitted frequently by consumers via the Connect Kansas website. Inquiries often seek help to identify local broadband provider options, or to learn when a specific provider may be able to provide service to that consumer. Consumer comments also provide information which may help modify maps with actual service area information. The primary objectives of Connected Nation regarding these inquiries are 1) to improve the accuracy of the state maps with submitted consumer information and follow-up field research; 2) to provide broadband options to consumers through cooperation with mapped providers and by facilitating new broadband service options; and 3) to map and analyze information from consumers about areas of unmet broadband demand and alternatives to currently mapped services.

New BBIs are assigned to either the GIS department or the Engineering & Technical Services (ETS) team depending on the category entered by the consumer on the website submission form. The GIS or ETS team members respond to each inquiry according to the information requested by the consumer. Many BBIs can be resolved through desktop research; however, if a BBI requires research in the field, the assigned ETS team member conducts such research when performing field validations in the area of the inquiry, or at other such time as is practical and appropriate. GIS and ETS team members respond to and conclude BBIs via telephone contact and/or e-mail communication.

The broadband inquiry process has been implemented in each of the Connected Nation state programs with successful results. Altogether Connected Nation has received over 17,000 broadband inquiries since 2007, allowing the state programs to evaluate each inquiry for broadband demand and data verification. These inquiries are continuously examined against current broadband availability, updated every six months, to determine if previously unserved households have been expanded to and can now receive broadband at their residence. This database of broadband inquiries has also allowed the Connected Nation state programs to aggregate demand in concentrated areas to show providers the exact locations where the population has made it clear that they would purchase broadband if it was made available to them. Providers in the states have responded to this process and have expanded to areas knowing that their investment will be worthwhile. Data verification methods have also proven successful, as the state programs have been able to show those inquiries that indicate the broadband service areas are misrepresented on the map to providers, who then verify where service cannot reach in regard to that residence(s). The broadband coverage in these states has been altered to create a more accurate map based on the inquiries submitted by the public.

During this reporting period, the Connect Kansas project has received a total of 15 inquiries (406 grant inception to date). As more inquiries are submitted to Connect Kansas, a more thorough validation of the broadband landscape can be performed, while also allowing providers to see which areas have a high demand for broadband adoption.

BROADBAND INVENTORY MAPS

The Broadband Inventory Maps are printer-friendly maps that include broadband coverage, cities, and towns, county boundaries, and detailed road information across the state of Kansas. The accuracy of these maps is critical to the future of broadband infrastructure planning in Kansas. The purpose of the maps is two-fold:

- **Data Verification** – Broadband providers and the public should use the map to ensure the current service area is accurately reflected.

- **Broadband Expansion Plans** – Broadband providers can use the inventory maps and unserved household density maps to learn where there are currently unserved areas that are densely populated. These maps can aid providers in identifying potential areas of expansion that could yield a high return on investment.

To date, the Connect Kansas Broadband Inventory Maps have received a total of 11,916 downloads. Of those 11,916 downloads, the Statewide Broadband Inventory Maps received 1,409 downloads, the County Broadband Inventory Maps received 8,245 downloads, and the census block level data received 2,262 downloads.

BROADBANDSTAT METHODOLOGY

BroadbandStat is an online, interactive mapping tool for viewing, analyzing, and validating broadband data. Developed through a partnership with ESRI, the market leader in geographic information system (GIS) software, BroadbandStat is a multi-functional, user-friendly way for local leaders, policymakers, consumers, and technology providers to devise a plan for the expansion and adoption of broadband.

First and foremost, BroadbandStat allows consumers to locate their residence and identify providers that offer broadband Internet service to that location. The interactive platform allows for users to build and evaluate broadband expansion scenarios using a wealth of data, including education and population demographics, broadband availability, and research about the barriers to adoption.

New functionality in BroadbandStat allows the consumer to provide feedback on the broadband data displayed on the interactive map. Through the collection of this feedback, a visual demand for broadband is presented. This visualization allows the Connected Nation state programs the ability to validate the broadband availability for accuracy. If residents within a region state they are without broadband, but the interactive map shows otherwise, this allows Connected Nation to approach the providers within that area in an effort to trim down their coverage to more accurately represent real-world availability on the ground.

The Connect Kansas project launched BroadbandStat on September 23, 2010, and has received a total of 1,507 visits to date, of which 557 occurred this reporting period.

Speed Test Methodology

The 985 speed tests that are represented in the Connect Kansas Speed Test Report during this reporting period (3,003 grant inception to date) are the result of a partnership between Connected Nation and Ookla Net Metrics. Utilizing this relationship increases the level of confidence in the data being collected and provides for a far greater sample size than could be collected by a single testing site.

Ookla owns and operates Speedtest.net, as well as develops and deploys speed tests, such as the Connect Kansas speed test website, for partners around the world. This network of sites that is developed and run on its testing technology provides Ookla with a vast dataset that, due to the variability of geographic information collected across the varying speed test sites, is geocoded utilizing Geo-IP technology. This technology allows for tests to be geocoded to points of aggregation, typically larger nodes across provider networks. While there are hundreds of thousands of tests that have been conducted, the level of aggregation is only sufficient for county-level detail due to the test results being located at these larger nodes and not at an absolute location for each speed test.

In an effort to validate broadband data from the Connect Kansas project, speed test information is collected throughout the state. Speed tests provide speed information on the path taken through all networks (a provider's network as well as additional networks) a local machine must connect to in order to reach the host test. The benefit of this collection of speed information is two-tiered. First, it allows for a comprehensive dataset of speeds, while also providing Connect Kansas with the information on where broadband services are available. Second, unlike theoretical speed information which was received through the data collection process, the use of speed tests provide real-world information on the speeds that currently exist within the state of Kansas.

Broadband Provider Log

Complete	152
Non-Responsive/Refused	10
In Progress	6
Count of Datasets by Status	**168**
Total Unique Providers Represented	**100**

Provider Name	Platform	Status	NDA Execution Date	Notes
American Broadband Acquisition Corporation	Fiber	Data Added to Statewide Inventory	11/20/2009	[SEP-8-11 Brian Dudek] Change: New provider in the fiber residential market for October 2011 submission.
AT&T Communications of Texas, Inc.	DSL	Data Added to Statewide Inventory	12/16/2009	[AUG-26-11 Brian Dudek] Change/Correction: possible service expansion or corrections to previous dataset; entirely new dataset for October 2011 submission.
AT&T Communications of Texas, Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/16/2009	[AUG-19-11 Brian Dudek] Change: Provider greatly expanded mobile territory throughout the state.
Blue Valley Tele-Communications, Inc.	Fiber	Data Added to Statewide Inventory	11/17/2009	[SEP-8-11 Brian Dudek] Change: Provider expanded fiber territory into two exchanges.
Cable ONE Inc.	Cable	Data Added to Statewide Inventory	12/7/2009	[SEP-1-11 Brian Dudek] Change/Correction: possible service expansion or corrections to previous dataset; entirely new dataset for October 2011 submission. Coverage change likely primarily a result of the 2000-2010 census change.
CenturyLink	DSL	Data Added to Statewide Inventory	12/4/2009	[SEP-1-11 Brian Dudek] Change/Correction: possible service expansion or corrections to previous dataset; entirely new dataset for October 2011 submission.
Cequel Communications	Cable	Data Added to Statewide Inventory	12/15/2009	[SEP-1-11 Brian Dudek] Change/Correction: possible service expansion or corrections to previous dataset; entirely new dataset for October 2011 submission. Coverage change likely primarily a result of the 2000-2010 census change.
City of Coffeyville	Fixed Wireless	Data Added to Statewide Inventory		[AUG-24-11 Brian Dudek] Correction: New provider for October 2011 submission that was previously gathering data, but had never submitted anything.
Clearwire Corporation	Mobile Wireless	Data Added to Statewide Inventory	3/17/2011	[SEP-1-11 Brian Dudek] Change: Provider expanded mobile territory.
Comcast Cable Communications, LLC	Cable	Data Added to Statewide Inventory	12/7/2009	[AUG-23-11 Brian Dudek] Change/Correction: possible service expansion or corrections to previous dataset; entirely new dataset for October 2011 submission. Coverage change likely primarily a result of the 2000-2010 census change.
CoxCom Inc.	Cable	Data Added to Statewide Inventory	1/29/2010	[AUG-26-11 Brian Dudek] Change/Correction: possible service expansion or corrections to previous dataset; entirely new dataset for October 2011 submission. Coverage change likely primarily a result of the 2000-2010 census change.
Craw-Kan Telephone Cooperative, Inc.	DSL	Data Added to Statewide Inventory	12/7/2009	[SEP-1-11 Brian Dudek] Change: Provider upgraded infrastructure to higher speeds.
Craw-Kan Telephone Cooperative, Inc.	Fiber	Data Added to Statewide Inventory	12/7/2009	[SEP-1-11 Brian Dudek] Change: Provider expanded fiber territory into Girard.
Cunningham Communications, Inc.	Fiber	Data Added to Statewide Inventory	9/8/2009	[SEP-7-11 Brian Dudek] Change: Provider expanded fiber territory into two other exchanges that were previously DSL.
Eagle Communications, Inc.	Cable	Data Added to Statewide Inventory		[SEP-1-11 Brian Dudek] Correction: Maximum advertised speeds in 6 towns were corrected to portray the 9 speed tier.

Eagle Communications, Inc.	Fiber	Data Added to Statewide Inventory		[SEP-1-11 Brian Dudek] Change/Correction: Provider expanded fiber territory and corrected speeds to speed tier 9.
Fairpoint Communications, Inc.	DSL	Data Added to Statewide Inventory	1/22/2010	[AUG-26-11 Brian Dudek] Change/Correction: Provider expanded DSL territory in one area in western KS and corrected some coverage areas.
Golden Belt Telephone Association, Inc.	Cable	Data Added to Statewide Inventory		[SEP-1-11 Brian Dudek] Change: Provider no longer offers cable service in Schoenchen anymore. Increased advertised upload speeds in all the cable towns.
Golden Belt Telephone Association, Inc.	DSL	Data Added to Statewide Inventory		[SEP-1-11 Brian Dudek] Change: Provider converted some DSL infrastructure to fiber and upgraded infrastructure to higher speeds.
Golden Belt Telephone Association, Inc.	Fiber	Data Added to Statewide Inventory		[SEP-1-11 Brian Dudek] Change: Provider expanded fiber territory.
Home Communications, Inc.	Cable	Data Added to Statewide Inventory	11/5/2009	[SEP-6-11 Brian Dudek] Change: Provider upgraded download and upload speed capabilities.
Home Communications, Inc.	Fiber	Data Added to Statewide Inventory	11/5/2009	[SEP-8-11 Brian Dudek] Change: Provider expanded fiber territory into two exchanges.
Home Communications, Inc.	DSL	Data Added to Statewide Inventory	11/5/2009	[SEP-8-11 Brian Dudek] Change: Provider converted DSL infrastructure in two exchanges to fiber.
JBN Telephone Company, Inc.	Fixed Wireless	Data Added to Statewide Inventory	12/14/2009	[SEP-9-11 Brian Dudek] Change: Provider added additional transmission points in 3650 spectrum.
JBN Telephone Company, Inc.	Cable	Data Added to Statewide Inventory	12/14/2009	[SEP-6-11 Brian Dudek] Change/Correction: New platform from provider. May have been in existence during prior submissions, but there is not any confirmation that this was in service previously.
Knology of Kansas	Fixed Wireless	Data Added to Statewide Inventory	7/13/2011	[AUG-22-11 Brian Dudek] Change: After purchase of Sunflower Broadband, provider altered wireless infrastructure to provide slightly more coverage.
Knology of Kansas	Cable	Data Added to Statewide Inventory	7/13/2011	[AUG-22-11 Brian Dudek] Change: Provider expanded cable territory.
Knology of Kansas	Fiber	Data Added to Statewide Inventory	7/13/2011	[AUG-22-11 Brian Dudek] Change: New provider in the fiber residential market for October 2011 submission.
Leap Wireless International, Inc.	Mobile Wireless	Data Added to Statewide Inventory	4/6/2010	[AUG-19-11 Brian Dudek] Change/Correction: Entire new dataset submitted for October 2011 submission. Reduced outskirt coverage around Kansas City.
Pioneer Telephone Association, Inc.	Cable	Data Added to Statewide Inventory	12/7/2009	[SEP-6-11 Brian Dudek] Change: Provider upgraded infrastructure to higher speeds.
Pioneer Telephone Association, Inc.	Fiber	Data Added to Statewide Inventory	12/7/2009	[SEP-8-11 Brian Dudek] Change: New provider offering fiber services for the October 2011 submission.
Rainbow Telecommunications Association, Inc.	Cable	Data Added to Statewide Inventory	12/9/2009	[SEP-6-11 Brian Dudek] Change: Reduction in cable coverage as all cable towns in ILEC area are now fiber.
Rainbow Telecommunications Association, Inc.	Fiber	Data Added to Statewide Inventory	12/9/2009	[SEP-6-11 Brian Dudek] Change: Provider expanded fiber territory to entire exchange.
Rural Telephone Service Company, Inc.	Fiber	Data Added to Statewide Inventory	11/16/2009	[AUG-16-11 Brian Dudek] Change: Provider expanded fiber territory.
Rural Telephone Service Company, Inc.	DSL	Data Added to Statewide Inventory	11/16/2009	AUG-16-11 Brian Dudek] Change: Provider converted some DSL infrastructure to fiber.
Southeast Nebraska Communications	DSL	Data Added to Statewide Inventory		[SEP-1-11 Brian Dudek] Correction: New provider for October 2011 submission that previously refused to participate due to small presence in state.
Southern Kansas Telephone Company, Inc.	Cable	Data Added to Statewide Inventory	12/31/2009	[SEP-6-11 Brian Dudek] Change: Provider expanded cable territory north of Clearwater along with changing coverage in Clearwater.
Southern Kansas Telephone Company, Inc.	DSL	Data Added to Statewide Inventory	12/31/2009	[SEP-8-11 Brian Dudek] Change: Provider upgraded infrastructure to higher speeds.
Southern Kansas Telephone Company, Inc.	Fiber	Data Added to Statewide Inventory	12/31/2009	[SEP-8-11 Brian Dudek] Correction: Provider provided corrections that reduced their fiber territory.

Sprint Nextel Corporation	Mobile Wireless	Data Added to Statewide Inventory	1/14/2010	[SEP-1-11 Brian Dudek] Change/Correction: possible service expansion or corrections to previous dataset; entirely new dataset for April 2011 submission. Very comparable to prior submission besides some minor spectrum 5 differences.
Stouffer Communications	Fixed Wireless	Data Added to Statewide Inventory	8/17/2011	[SEP-1-11 Brian Dudek] Correction: New provider for October 2011 submission that was previously unresponsive.
T-Mobile USA, Inc.	Mobile Wireless	Data Added to Statewide Inventory	1/8/2010	[SEP-1-11 Brian Dudek] Change: Provider expanded mobile territory eastern KS. Upgraded speed capabilities with HSPA+ 42.
Time Warner Cable LLC	Cable	Data Added to Statewide Inventory	12/21/2009	[SEP-1-11 Brian Dudek] Change/Correction: possible service expansion or corrections to previous dataset; entirely new dataset for October 2011 submission. Coverage change likely primarily a result of the 2000-2010 census change. Provider upgraded almost entire infrastructure with higher speed capabilities.
Totah Communications, Inc.	DSL	Data Added to Statewide Inventory	9/8/2009	[SEP-1-11 Brian Dudek] Correction: Maximum upload speed tier was corrected to speed tier 3. Incorrectly reported as speed tier 2 in past submissions.
United Communications Association, Inc.	Mobile Wireless	Data Added to Statewide Inventory	11/23/2009	[SEP-9-11 Brian Dudek] Change: Provider upgraded infrastructure to allow for higher download speeds.
United States Cellular Corporation	Mobile Wireless	Data Added to Statewide Inventory	2/15/2011	[SEP-1-11 Brian Dudek] Change/Correction: possible service expansion or corrections to previous dataset; entirely new dataset for April 2011 submission. Minor changes throughout coverage area.
Valnet Holdings LLC	Fixed Wireless	Data Added to Statewide Inventory		[SEP-9-11 Brian Dudek] Change/Correction: Provider added additional transmission points and requested DBA name change.
Verizon Communications, Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/14/2009	[SEP-1-11 Brian Dudek] Change: Provider expanded mobile territory. Upgraded speeds in 700 mhz spectrum.
Wheatland Broadband Services	Fixed Wireless	Data Added to Statewide Inventory	6/17/2010	[SEP-1-11 Brian Dudek] Change: Provider added an additional transmission point near Sharon Springs.
Wilson Telephone Company, Inc.	Fiber	Data Added to Statewide Inventory	9/29/2009	[SEP-7-11 Brian Dudek] Change: Provider expanded fiber territory into Lucas exchange.
Windjammer Communications, LLC	Cable	Data Added to Statewide Inventory	11/16/2009	[AUG-15-11 Brian Dudek] Correction: New provider for October 2011 submission that was previously unresponsive.
Level 3 Communications, LLC	Backhaul	Backhaul Provider Only Processing Complete	12/14/2009	
Sprint Nextel Corporation	Backhaul	Backhaul Provider Only Processing Complete	1/14/2010	
Verizon Communications, Inc.	Backhaul	Backhaul Provider Only Processing Complete	12/14/2009	
Zayo Group, LLC	Backhaul	Backhaul Provider Only Processing Complete		
SwiftLink Communications	Fixed Wireless	Estimated Coverage Submitted for Non-Participating Provider		[SEP-1-11 Brian Dudek] Correction: New provider for October 2011 submission that is still unresponsive. Connected Nation estimated coverage for this provider.
Allegiance Communications Holdings, Inc.	Cable	No Update to Provide	2/4/2010	
American Broadband Acquisition Corporation	DSL	No Update to Provide	11/20/2009	
Atwood Cable Systems, Inc.	Cable	No Update to Provide		
Benson Tel Service Inc.	Fixed Wireless	No Update to Provide	12/15/2009	
Blue Valley Tele-Communications, Inc.	Cable	No Update to Provide	11/17/2009	
Blue Valley Tele-Communications, Inc.	Fixed Wireless	No Update to Provide	11/17/2009	
BWTelcom	DSL	No Update to Provide	1/12/2010	
BWTelcom	Fiber	No Update to Provide	1/12/2010	
CenturyLink	Backhaul	No Update to Provide	12/4/2009	
City of Chanute	Fiber	No Update to Provide		
City of Chanute	Backhaul	No Update to Provide		
Columbus Telephone Company	Fiber	No Update to Provide	10/2/2009	
CoxCom Inc.	Backhaul	No Update to Provide	1/29/2010	
Craw-Kan Telephone Cooperative, Inc.	Fixed Wireless	No Update to Provide	12/7/2009	
CTC Wireless Internet	Backhaul	No Update to Provide	11/20/2009	
Cunningham Communications, Inc.	Cable	No Update to Provide	9/8/2009	
Cyber Lodge Internet Services, Inc.	Fixed Wireless	No Update to Provide	1/6/2010	
Diller Telephone Company	DSL	No Update to Provide		

DISH Network Corporation	Satellite	No Update to Provide	1/27/2010	[SEP-16-11 Brian Dudek] Correction: Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
Eagle Communications, Inc.	Backhaul	No Update to Provide		
Eagle Communications, Inc.	Fixed Wireless	No Update to Provide		
Elkhart Telephone Company, Inc.	Backhaul	No Update to Provide	3/23/2010	
Elkhart Telephone Company, Inc.	Fiber	No Update to Provide	3/23/2010	
Elkhart Telephone Company, Inc.	Fixed Wireless	No Update to Provide	3/23/2010	
Fairpoint Communications, Inc.	Fixed Wireless	No Update to Provide	1/22/2010	
Golden Belt Telephone Association, Inc.	Fixed Wireless	No Update to Provide		
Gorham Communications, Inc.	DSL	No Update to Provide	9/30/2009	
Gorham Communications, Inc.	Fiber	No Update to Provide	9/30/2009	
H&B Communications, Inc.	Cable	No Update to Provide	10/13/2009	
H&B Communications, Inc.	DSL	No Update to Provide	10/13/2009	
H&B Communications, Inc.	Fiber	No Update to Provide	10/13/2009	
H&B Communications, Inc.	Fixed Wireless	No Update to Provide	10/13/2009	
Haug Communications, Inc.	Fixed Wireless	No Update to Provide	12/4/2009	
Haviland Telephone Company, Inc.	DSL	No Update to Provide	12/3/2009	
Haviland Telephone Company, Inc.	Fixed Wireless	No Update to Provide	12/3/2009	
Hughes Network Systems, LLC	Satellite	No Update to Provide	2/5/2010	[SEP-16-11 Brian Dudek] Correction: Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
JBN Telephone Company, Inc.	DSL	No Update to Provide	12/14/2009	
Kansas Broadband Internet, Inc.	Fixed Wireless	No Update to Provide	1/15/2010	
Kansas Data Internet, Inc.	Fixed Wireless	No Update to Provide		
KeyOn Communications, Inc.	Fixed Wireless	No Update to Provide	10/15/2009	
LaHarpe Telephone Company, Inc.	Fiber	No Update to Provide	9/28/2009	
Lawrence Freenet	Fixed Wireless	No Update to Provide	10/5/2009	
Madison Telephone Company, LLC	DSL	No Update to Provide	11/17/2009	
MCC Missouri LLC	Cable	No Update to Provide	1/12/2010	
MCC Missouri LLC	Backhaul	No Update to Provide	1/12/2010	
Midwest Mobile Radio	Fixed Wireless	No Update to Provide		
Mokan Dial, Inc.	DSL	No Update to Provide	12/2/2009	
Moundridge Telephone Company, Inc.	DSL	No Update to Provide	10/7/2009	
Mutual Telephone Company	Backhaul	No Update to Provide	12/9/2009	
Mutual Telephone Company	Fiber	No Update to Provide	12/9/2009	
Mutual Telephone Company	Fixed Wireless	No Update to Provide	12/9/2009	
Nautilus Net	Fixed Wireless	No Update to Provide		
North Central Kansas Community Network	Fixed Wireless	No Update to Provide		
Peoples Telecommunications, LLC	DSL	No Update to Provide	12/1/2009	
Pioneer Telephone Association, Inc.	DSL	No Update to Provide	12/7/2009	
Pixius Communications LLC	Fixed Wireless	No Update to Provide		
Rainbow Telecommunications Association, Inc.	Fixed Wireless	No Update to Provide	12/9/2009	
Rebeltec Communications LLC	Fixed Wireless	No Update to Provide		
Rural Telephone Service Company, Inc.	Fixed Wireless	No Update to Provide	11/16/2009	
S&T Telephone Cooperative Association	DSL	No Update to Provide	8/28/2009	
S&T Telephone Cooperative Association	Fiber	No Update to Provide	8/28/2009	
S&T Telephone Cooperative Association	Fixed Wireless	No Update to Provide	8/28/2009	
South Central Telephone Association	Backhaul	No Update to Provide	12/17/2009	
South Central Telephone Association	DSL	No Update to Provide	12/17/2009	
South Central Telephone Association	Fiber	No Update to Provide	12/17/2009	
Stelera Wireless, LLC	Mobile Wireless	No Update to Provide		[SEP-9-11 Brian Dudek] Correction: Provider service area is now a real-world propagation unlike prior submissions.
Sumner Cable TV, Inc.	Cable	No Update to Provide		
Sumner Cable TV, Inc.	Fixed Wireless	No Update to Provide		
Superior iNET	Fixed Wireless	No Update to Provide	1/29/2010	
SWKO, Inc.	Fixed Wireless	No Update to Provide	2/18/2011	
The Computer Generation, Inc.	Fixed Wireless	No Update to Provide	1/8/2010	
Tri-County Telephone Association, Inc.	DSL	No Update to Provide	12/1/2009	
Tri-County Telephone Association, Inc.	Fiber	No Update to Provide	12/1/2009	
Tri-County Telephone Association, Inc.	Fixed Wireless	No Update to Provide	12/1/2009	
Tri-Rivers Internet	Fixed Wireless	No Update to Provide		
Twin Valley Telephone, Inc.	DSL	No Update to Provide	10/12/2009	
Twin Valley Telephone, Inc.	Fiber	No Update to Provide	10/12/2009	
Twin Valley Telephone, Inc.	Fiber	No Update to Provide	10/12/2009	
Twin Valley Telephone, Inc.	Fixed Wireless	No Update to Provide	10/12/2009	
TwinMounds	Fixed Wireless	No Update to Provide		
United Communications Association, Inc.	Cable	No Update to Provide	11/23/2009	
United Communications Association, Inc.	DSL	No Update to Provide	11/23/2009	
United Communications Association, Inc.	Fixed Wireless	No Update to Provide	11/23/2009	
Wamego Telecommunications Company, Inc.	DSL	No Update to Provide	9/29/2009	
Wamego Telecommunications Company, Inc.	Fiber	No Update to Provide	9/29/2009	
Wave Wireless LLC	Fixed Wireless	No Update to Provide	2/19/2010	
Wheat State Telephone, Inc.	DSL	No Update to Provide	12/7/2009	
Wheat State Telephone, Inc.	Fiber	No Update to Provide	12/7/2009	

WildBlue Communications, Inc.	Satellite	No Update to Provide	1/8/2010	[SEP-16-11 Brian Dudek] Correction: Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
Wilson Telephone Company, Inc.	DSL	No Update to Provide	9/29/2009	
Zito Midwest, LLC	Cable	No Update to Provide	2/17/2011	
Cogent Communications, Inc.	Backhaul	No Update Provided - Use Last Submission Data		
IdeaTek Systems, Inc.	Fiber	No Update Provided - Use Last Submission Data	3/4/2010	
KanOkla Telephone Association, Inc.	DSL	No Update Provided - Use Last Submission Data	12/18/2009	
KanOkla Telephone Association, Inc.	Fixed Wireless	No Update Provided - Use Last Submission Data	12/18/2009	
Mercury Wireless, LLC	Fixed Wireless	No Update Provided - Use Last Submission Data	3/25/2010	
JMZ CORPORATION	Fixed Wireless	Provider Gathering Data		
Blue Valley Tele-Communications, Inc.	DSL	Other	11/17/2009	[SEP-16-11 Brian Dudek] Provider indicated that all DSL has been converted to fiber and is now inactive.
Cequel Communications	Backhaul	Other	12/15/2009	[SEP-16-11 Brian Dudek] Data was not received from this provider and was incorrectly reported as no update to provide in the April 2011 submission.
Cunningham Communications, Inc.	DSL	Other	9/8/2009	[SEP-16-11 Brian Dudek] Provider indicated that all DSL has been converted to fiber and is now inactive.
PAETEC Communications, Inc.	DSL	Other		[SEP-08-11 Wes Kerr] Multiple outreach attempts were conducted but no response was received. PAETEC was bought out during the collection phase of this round by Windstream and we intend to be able to include the PAETEC coverage as a part of the Windstream footprint during the next round.
Rainbow Telecommunications Association, Inc.	DSL	Other	12/9/2009	[SEP-8-11 Brian Dudek] Provider indicated all DSL was converted to fiber and is now inactive.
arcplasma.com	Fixed Wireless	Refused to Participate		[JUN-08-11 John Determan]Spoke with ArcPlasma Representative who stated that we've called repeatedly and we don't seem to understand that they are NOT interested in participating and prefer not to be contacted anymore.
WISP-Router, Inc.	Fixed Wireless	Refused to Participate		[MAY-5-11 John Determan] After sending out advance notice e-mail received return e-mail from provider stating "No thanks."
Ace Computers	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between July 1, 2010 and February 18, 2011, 8 additional attempts were made this period.
Midwest Connections, Inc.	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between July 1, 2010 and February 18, 2011, 9 additional attempts were made this period.
SCI Cable, Inc.	Cable	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between July 1, 2010 and February 7, 2011, 8 additional attempts were made this period.
SureWest Communications	Cable	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between July 1, 2010 and February 15, 2011, 8 additional attempts were made this period.

SureWest Communications	Fiber	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between July 1, 2010 and February 15, 2011, 8 additional attempts were made this period.
SureWest Communications	DSL	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between July 1, 2010 and February 15, 2011, 8 additional attempts were made this period.
SureWest Communications	Backhaul	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between July 1, 2010 and February 15, 2011, 8 additional attempts were made this period.
Utopian Wireless Corporation	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between August 9, 2010 and February 15, 2011, 3 additional attempts were made this period.

DATA DEVELOPMENT & VALIDATION METHODOLOGIES
WHITE PAPER

Commonwealth of Kentucky
State Broadband Initiative (SBI)
Broadband Mapping Project

Commonwealth
Office of Technology

NTIA Data Submittal
September 30, 2011

Baker

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Appendices

Introduction

The following sections of this document provide an overview of the process used for the SBI Broadband Mapping data development for the Commonwealth of Kentucky. The following narrative is depicted in Appendix A, Commonwealth of Kentucky SBI Process Workflow, and Appendix B, State Broadband Data Validation Workflow, included at the end of this document.

Broadband Provider Outreach

The following outreach procedure provides the framework for communicating with Broadband Service Providers (Providers). The primary goals of the outreach approach documented herein are to:

- Promote Provider understanding and acceptance of the Broadband Mapping process, results and benefits
- Clarify NTIA Broadband Mapping requirements
- Facilitate data confidentiality agreements as required
- Minimize the submittal of invalid data
- Enhance provider understanding of the semi-annual update process
- Work with Providers to evaluate submittal options to facilitate data submittals

Data Submission Guidelines

Guidelines for the Providers submission of of Broadband Mapping Data are documented in the "Data Submission Guidelines". These Guidelines define technical requirements, submission, specifications, and coordination and documentation activities.

Kentucky Broadband Providers Website

A URL was deployed (http://www.bakergis.com/kyBroadbandProvider/) to communicate and distribute NTIA NOFA requirements to providers along with outreach and data submittal materials including:

- NTIA NOFA and subsequent clarification
- Outreach letters to providers
- Non-Disclosure Agreement
- Quick Start Guides
- Data Submission Guidelines
- Data Transmittal Letter
- Broadband Data Submittal Templates
- TIGER Data
- Data Submittal Assistance Contact Information

Outreach Delivery Vehicles

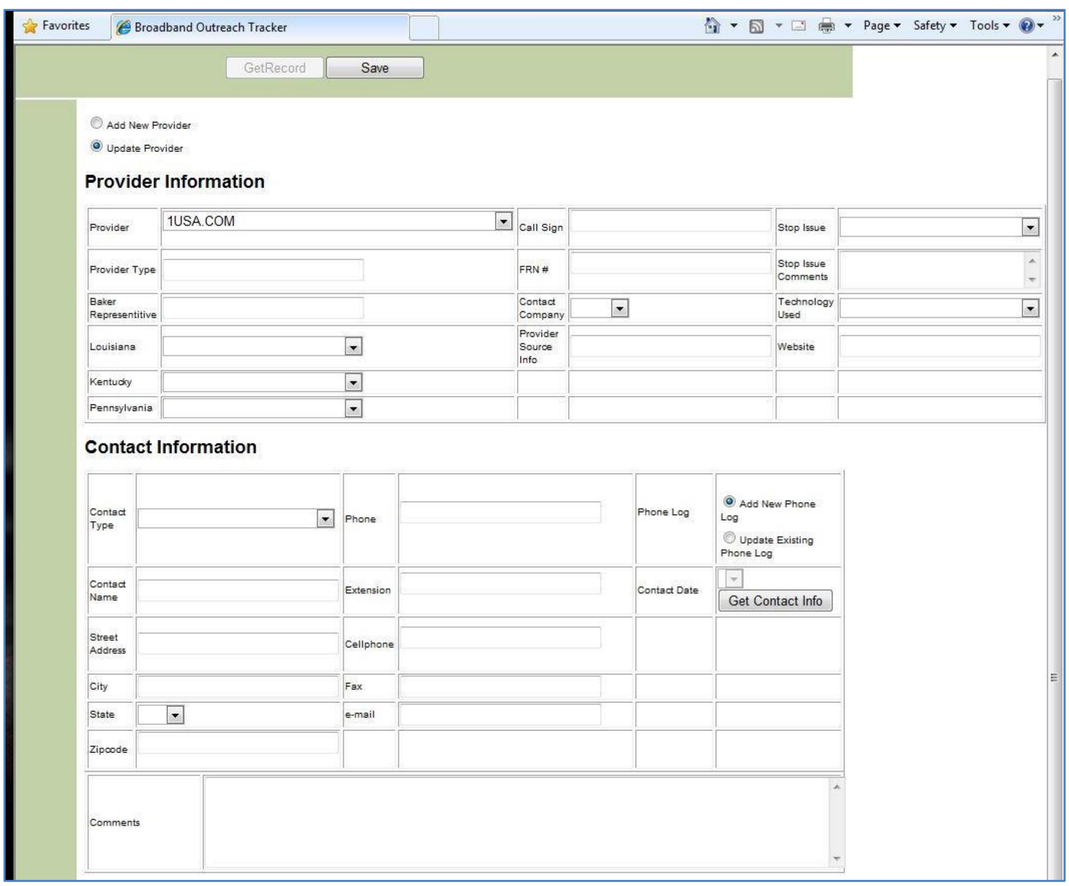
- A State Broadband Mapping Initiative Call for Data letter from the Kentucky Commonwealth Office of Technology (COT) was emailed to all Broadband Service Providers in the Commonwealth. This initial provider contact letter described the program and the role of Michael baker Jr., Inc. (Baker) acting on behalf of the COT for Broadband Data Collection and Mapping.

- Baker distributed a follow-up letter to all Providers describing the data submittal requirements and material and help available to aid with the data submittals.
- Submittal assistance was provided to providers that needed help with data submittals.
- Presentations were conducted with various broadband provider associations to present the data submittal requirements and answer questions.
- Email communication and electronic transfer of data was encouraged to facilitate a faster delivery of data and information.
- A URL was deployed and promoted to distribute outreach material and information concerning the Broadband Mapping Project.
- A secure FTP URL was provided for submittal of broadband data by providers.

Broadband Outreach Tracker Application

The Tracker application (Figure 1) was utilized to collect all correspondence with Providers and feedback on the effectiveness of the outreach activities by tracking items such as:

- The number and content of incoming e-mails and letters submitted from the Providers
- The number and source of comments, questions, and suggestions made by Providers
- The number and source of comments, questions, and suggestions made by attendees at Provider meetings and conference calls
- Provider contact information and data submittal status.



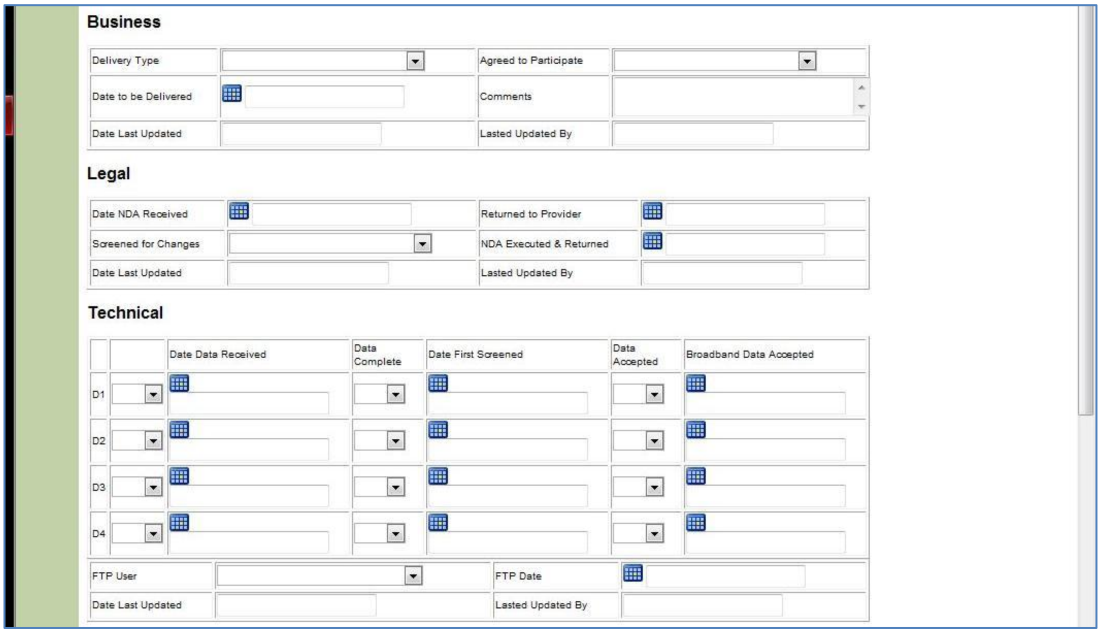


Figure 1 Broadband Outreach Tracker

Provider Submittal Validation

When a data submittal is received from a broadband service provider it is updated in the Broadband Outreach Tracker and run through an initial validation process to assure that it meets the submittal guidelines.

Validation Checklist

The following items are part of this initial data validation process:

- Verify the provider Transmittal Letter is complete and matches submitted data
- Verify the file naming conventions
- Verify each file is machine readable
- Verify data is in the correct GIS or Tabular format/file type
- Verify there are no duplicate records
- Verify each field is populated and no empty or NULL values are present for mandatory fields
- Verify all ID (record number points) are unique within the submittal
- Verify all attribute data is formatted according to the submittal guidelines
- Verify topology for all geospatial submissions
- Verify Metadata for all submissions
- Verify the required contact information is included
- Verify adherence to Data Submittal Guidelines (see http://www.bakergis.com/kyBroadbandProvider/ to access Data Submittal Guidelines)

  Broadband Service Availability (at least one)
  - Individual Street Addresses (Sec 3.1 & 4.1)
  - Census Blocks < 2 sq mi (3.3 & 4.3)
  - Street Segments for Census Blocks > 2 sq mi (3.2 & 4.2)
  - Service Overview (Sec 3.4 & 4.4)
  - Polygonal Boundary Area(s) (Sec 3.8 & 4.8)

Middle-mile Points (Sec 3.5 & 4.5)
Community Anchor Institutions (Sec 3.7 & 4.7)
Last Mile Connection Points (Sec 3.6 & 4.6)
WISP Antennas (Sec 4.9)

Data Usability Determination

The validation results are evaluated by the outreach and aggregation persons to determine the usability of the data. If the data meets the submission specifications, it is forwarded on for data aggregation. If it is determined to be unusable, it is returned to the Broadband Service Provider for resolution. If the data can be manipulated to get it into a usable format, it is manipulated as required, and then forwarded on for data aggregation.

SBI Data Development

Data from the Broadband Service Providers may be submitted in various formats as defined in the Data Submittal Guidelines, or in some cases unspecified formats may be accepted to help facilitate provider participation. Depending on the format of the submitted data, it is processed through one of the following processes to upgrade it to the NTIA SDBB data standards.

2000 to 2010 Census Data Translation

Many providers indicated there were no changes to their previous data submission that was compiled to 2000 census information and they did not have the capacity to upgrade their data to 2010 census information. Therefore, the Broadband Mapping team has translated the April 2011 data for these providers using the workflow shown in Appendix C.

Spatial Data

After validation and any required manipulation of any spatial data submitted by the Broadband Service Providers, it is georeferenced and simply loaded into the appropriate NTIA geodatabase feature class.

Address Data Geocoding

If not already in the standard address point template, the provider tabular address data is first loaded into that template. The data is then exported to a geodatabase table using the ArcGIS Conversion Tools. ArcGIS geocoding tools are then utilized geospatially locate the address points for the tabular records. Interactive address rematching is performed against two additional street centerline datasets as needed to increase geocoding matching results. The NTIA deliverable is the geocoded address point geodatabase table. The geocoded address points are also subsequently aggregated to the census block or road segment feature class for public web map display.

Census Block Aggregation

If not already in the standard census block template, the provider tabular census block data is first loaded into that template. The data is then exported to a geodatabase table using the ArcGIS Conversion Tools. The Provider tabular census block records are then joined to the geodatabase 2010 U.S. Census Block. This join is performed as many times as necessary for multiple Trans Tech values for each Provider/Census Block combination. The NTIA deliverable is the census block geodatabase table.

If the list of census blocks contains blocks > 2 sq. miles then these blocks are used to select all the 2010 U.S. Census TIGER centerlines that intersect those blocks. The Census Block record data is aggregated to each Road Segment within the Census Block. This process is performed as many times as necessary for multiple Trans Tech values for each Provider/Census Block combination.

Road Segment Aggregation

If not already in the standard road segment template, the provider road segment data is first loaded into that template. The data is then exported to a geodatabase table using the ArcGIS Conversion Tools. If the provider submittal included graphic centerline segments, these are migrated into the delivery geodatabase along with the linked attribute records. If the provider submittal was tabular road segment records only, they are then joined to the geodatabase 2010 U.S. Census TIGER centerline feature class. This join is performed as many times as necessary for multiple Trans Tech values for each Provider/Road Segment combination. The NTIA deliverable is the road segment geodatabase table.

If the provider road segment data lie within census blocks <= 2 sq. miles then the road segment data is aggregated to the census block. This process is performed as many times as necessary for multiple Trans Tech values for each Provider/Road Segment combination. The NTIA deliverable is the road segment geodatabase table.

Overview Data Aggregation

Provider Service Availability Areas submitted for entire county areas are loaded into the NTIA geodatabase Overview table. If not already in the standard template, the provider data is first loaded into that template. The data is then exported to a geodatabase table using the ArcGIS Conversion Tools. The Provider Overview records are then joined to the geodatabase 2010 U.S. Census County feature class. This join is performed as many times as necessary for multiple Trans Tech values for each Provider/County Area combination.

Polygonal Boundary Aggregation/Integration

Broadband Service Providers submitting polygonal service area data is handled in two ways. Wireline Provider data is aggregated to the census block feature class for areas where census blocks <= 2 sq. mi., or road segment feature class for areas where census blocks > 2 sq. mi. Wireless Provider Service Availability Areas submitted by polygonal area are simply loaded into the NTIA geodatabase Poly_Bndry feature class.

Wireline Provider

The polygonal data is georeferenced and loaded into the Poly_Bndry feature class. The polygon is then attributed, manually if necessary. Depending on the area, census blocks < or => 2 sq. mi., a selection set of either census blocks or road segments that intersect the polygon boundary is created. The attributed polygon boundary is then joined with census blocks or road segments table to attribute accordingly. This join is performed as many times as necessary for multiple Trans Tech values for each Provider/County Area combination. The NTIA deliverable is the census block or road segment geodatabase table.

Wireless Provider

The polygonal data is georeferenced and loaded into the Poly_Bndry feature class. The polygon is then attributed, manually if necessary. Multiple Poly_Bndry records are created for multiple Trans Tech values for each Provider. The NTIA deliverable is the polygon boundary geodatabase table.

Middle/Last Mile Data Integration

If not already in the standard template, the data is first loaded into that template. The data is then exported to a geodatabase table using the ArcGIS Conversion Tools. The point features are geo-located utilizing the lat/long information provided. The NTIA deliverable is the middle or last mile geodatabase table.

Community Anchor Institution Integration

Broadband Service Providers provided some Community Anchor Institution (CAI) data with the data submittals. But the majority of the data was collected from existing GIS Layers maintained by the COT on their KYGEONET public website. Some of the data was collected by outreaching to CAIs through state agencies and their contacts, and having CAIs complete an online survey at http://www.bakerbb.com/ky_institution_survey/.

Provider CAIs

If not already in the standard template, the data is first loaded into that template. The data is then exported to a geodatabase table using the ArcGIS Conversion Tools. The point features are geo-located utilizing the lat/long information provided. Address data is used to geocode locations only when Lat/Long data is not provided.

Commonwealth CAIs

CAI shapefiles were downloaded from the KYGEONET website. The shapefiles were then exported to the NTIA geodatabase CAI feature class. Various sources for obtaining broadband information for the CAIs were utilized. Various state agencies provided some of the information, i.e.; Council on Post Secondary Education (CPE) provided tabular broadband information for schools and libraries and COT provided tabular broadband information for health departments. A CAI data survey website was also deployed and the URL distributed by various state agencies to the CAI contacts. Data from all of these sources were then aggregated into the CAI geodatabase table for the NTIA deliverable.

Provider Validation

After data development, service availability maps are generated and submitted to the providers to validate their mapping results. This provides a “sign off” on the interpretation of the submitted data and extends the outreach efforts by providing a visual representation of the data to be delivered to the State and the NTIA.

Types of Provider Maps

Provider maps (Figure 2) generally consist of the following types.

Outreach Maps

Often time’s providers will send data which does not contain all the information needed for a NTIA compliant dataset. In such cases, as an aid to the outreach communication, it may be necessary to produce a map to help the provider locate their service area or verify data they have provided. These maps may take many forms, but generally are of two types:

- General Location Maps – these maps are often produced when the provider does not have a list of address or other standard submittal data and needs help defining their service area. A typical map will show counties, major roads, and towns of the general area the provider has stated as their service area. The intent of the map is to give the provider a way to markup or delineate their service area. If a provider has not provided required attribute information such as Technology of Transmission, Speed Data, etc. then it may be necessary to add a visual clue to this data like an information stamp on the map that they can easily fill out. If the provider sends the map back with a service area boundary, this can then be digitized and sent back to the provider for verification.
- Verification of Provider Supplied Boundaries – these maps are produced when the provider has sent service area boundary information which is confusing or otherwise unclear. Often these are produced when providers send CAD maps, hand drawn maps that need digitization, or lists of zip codes or counties served. A typical map will place the interpreted boundary over a location map so the provider can verify the service area. As with the General Location Map, information stamps or other visual clues may be placed on the map.

Initial Verification Maps

Once the provider data has been processed and the census block and road segment feature classes created, an Initial Verification Map is produced to give the provider a visual representation of their service area by census block. These maps enable the provider to verify their service area and make changes if necessary. Initial Verification Maps are produced using a set of standards and produced at the highest resolution necessary to convey the map information to the provider. Initial Verification Maps are also produced for Wireless Polygon areas.

Detailed Verification Maps

Providers who have questions about their service areas may request additional information to help clarify issues. In these cases it may be necessary to create a Detailed Verification Map to highlight the areas in question. Detailed Verification Maps provide the same information as Initial Verification Maps only at a higher resolution. Several maps may be needed to accurately portray an area in question.

Revised Maps

Revised maps take two forms:

- Initial or Detailed Verification Maps which have been annotated or marked-up by the provider
- Outreach produced Initial or Detailed Verification Maps incorporating provider changes

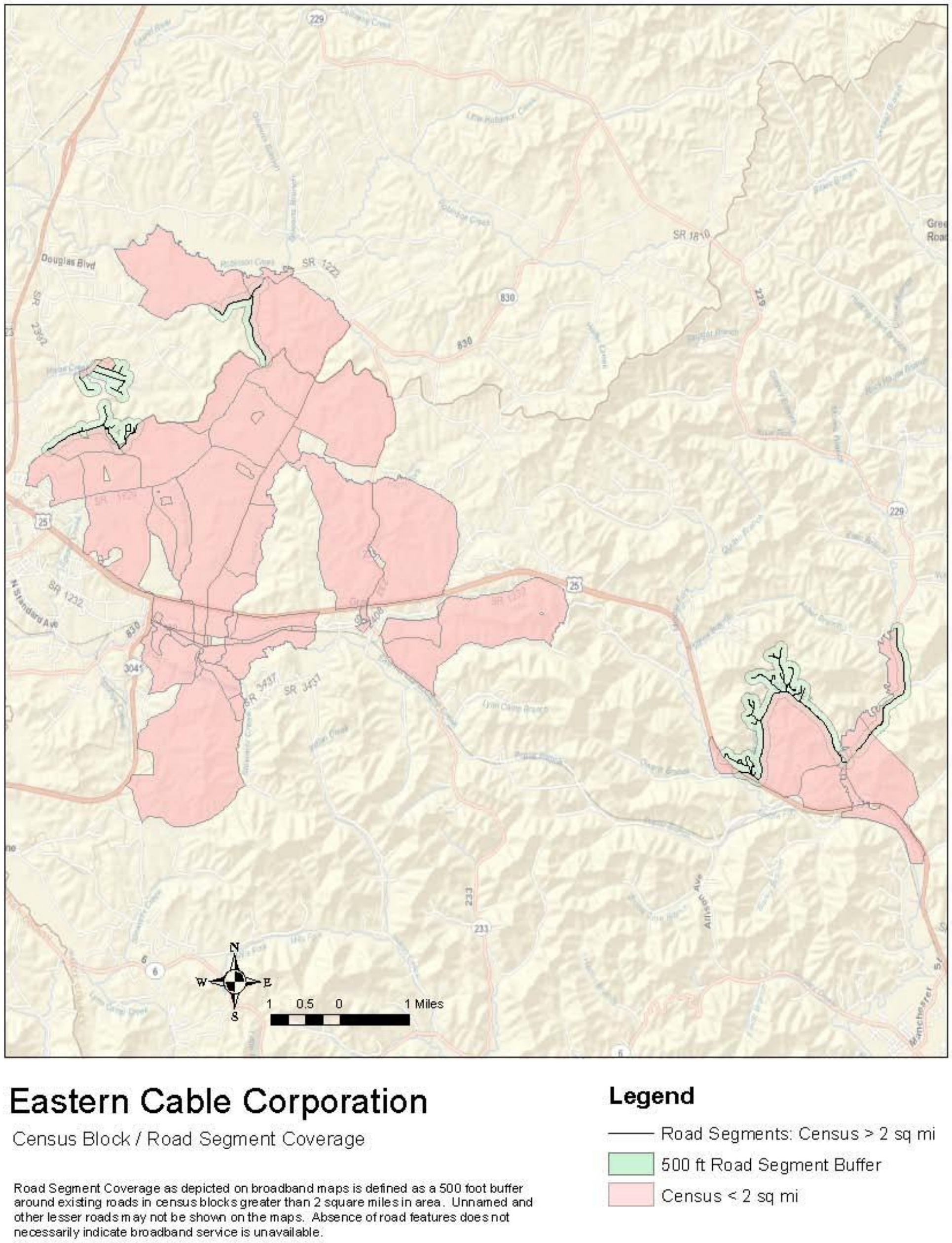


Figure 2 Provider Map

Data Validation

A critical component of the project is the validation of the data submitted by the broadband service providers. Data from various sources, as described in more detail in the following sections, is utilized to develop a level of confidence in the data received from the broadband providers.

Validation Data Set Collection and Development

This validation process employs data sets developed or acquired from different sources as described in the following sections.

Provider Feedback Loop: Maps of completed Provider service areas and data are furnished back to the Providers for confirmation of the processed/aggregated information. Feedback is integrated into the each Provider's dataset.

Strategic Networks Group (SNG) Wireline Market Intelligence Data: Data is extracted from internal and commercial databases defining geographic service areas of telephone and cable companies and locations of central office (CO) switches and areas upgraded with fiber. The geographic areas are overlaid with Census demographic data on housing unit counts and density. The areas are then modified based on standard business practices for conducting service build-out and offering broadband service relative to housing density and other variables, such as distance from CO and other infrastructure elements, type of cable franchise (e.g., Census Place vs. Unincorporated County) This represents the first pass conservative estimate of coverage.

The above methods and data sources are supplemented by other data sources and methodologies, including: 1) connectivity data points acquired from InfoUSA that include ISP and type of connection (e.g., DSL, cable modem, dial-up, wireless, fiber) providing Internet service to specific geo-coded (i.e., by Latitude and Longitude) residential addresses; 2) web-based and telephone research, including address-level service-availability queries of web sites operated by service providers and independent entities. This multi-sourced SNG dataset is used as a validation source for provider service area coverage, Technology of Transmission, and Speed.

American Roamer Wireless Market Intelligence Data: Commercially available dataset used as an independent source to verify information submitted by Providers of wireless broadband service. This dataset is used as a validation source for provider service area coverage.

Strategic Networks Group (SNG) Targeted Online Surveys: Questionnaires (e-mail/web based) have been sent directly to businesses and households, including over-sampling in rural area and those where the above conservative estimate indicates are "unserved" and "underserved" areas. In addition to collecting broadband supply data on type of access, speeds, price, etc. questionnaires gather broadband service demand and usage data from businesses, organizations, and households. Survey responses include geographic coordinates that allow mapping and cross-reference to census blocks or street segments. This dataset is used as a validation source for provider service area coverage, Technology of Transmission, and Speed.

Online Public Survey and Speed Test: A Broadband Mapping Public Survey Site is deployed. Site visitors are requested to provide data on broadband availability, technology, service type (e.g., speed tier) service provider name; monthly prices paid and measured downstream and upstream speeds. In addition to State promotion via press releases to the general public, the State Council on Post Secondary Education (CPE) also promoting participation on this survey to the faculty and student population. This dataset is used as a validation source for provider service area coverage, Technology of Transmission, and Speed.

Prior Broadband Mapping: Statewide coverage areas for Cable, DSL, and Fixed Wireless providers that were aggregated as part of a previous broadband mapping effort for the Commonwealth of Kentucky are used to validate against Provider submitted data. In addition to the service areas, the DSL and Fixed Wireless layers contain general speed information that can be compared against Provider submitted data.

FCC Speed Test: The FCC speed test data includes the IP addresses for each specific speed test conducted. This IP address is queried against a web search engine to determine the Provider assigned to that address and is used as a validation source for provider service coverage and typical speeds.

Field Data Acquisition: Broadband technicians visited a sampling of census block locations to gather broadband data to be used for validation. The following criteria were taken into account when developing the census block sampling dataset:

- urban vs. rural census block characteristic
- censes block grouping
- land vs. water census block characteristic

The overarching mission of the Federal broadband stimulus program is to expand Broadband service to areas that are currently unserved and underserved. Also, the market intelligence validation sources typically represent some rural, but more urban areas. Thus, our field data collection efforts were targeted more towards the rural areas; split 90% rural, 10% urban.

Additionally, a study by Penn State University (Glasmeier 2002) notes that a large number of census block groups typically fit within any given cable or telephone company service areas. Therefore, our field sample was also based on selection of one census block per block group. The selected census block also had greater than 50% land area, versus water. There are a total of 3, 158 census block groups statewide. Using a statistical sample size calculator based upon the number of block groups in the state and +/- 4% margin of error at a 95% confidence level, the sample size is 529 census block locations (Figure 3).

For the 529 census blocks that were visited, 2455 individual wired/wireless data elements were recorded and 3024 pictures were taken at those locations. This field collected dataset is used as a validation source primarily for wireline and wireless technology of transmission and middle mile, and for wireless speed.

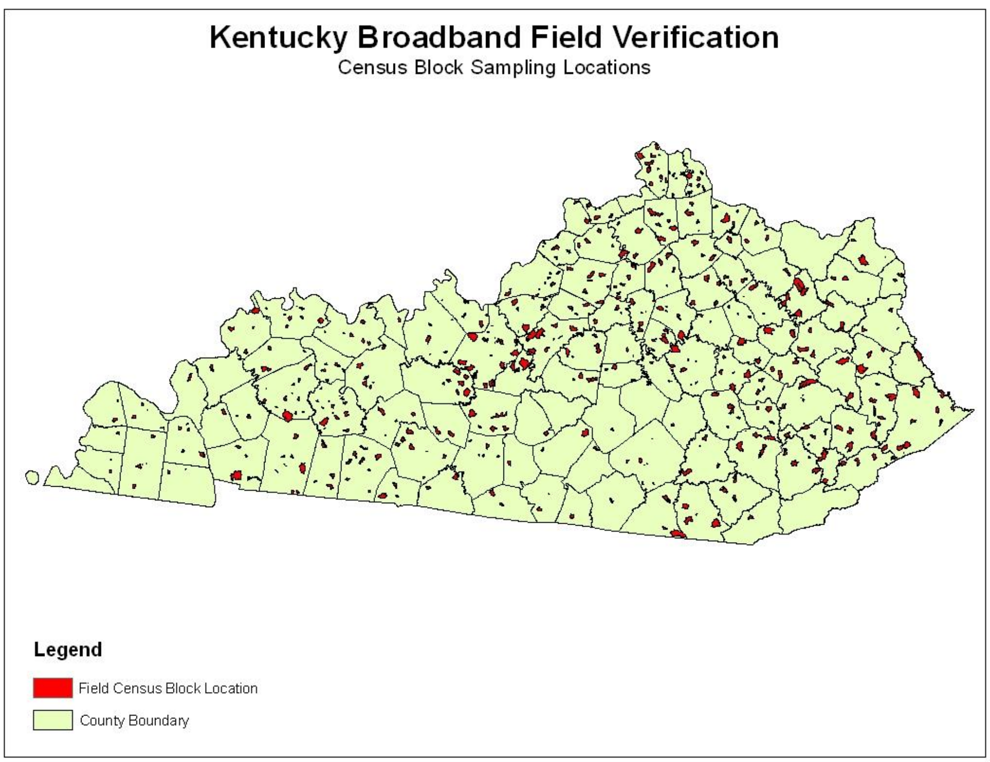


Figure 3 Field Verification Sampling Locations

For each census block in the sample set, broadband technicians collected data using Panasonic Toughbook computers, loaded with MapPoint mapping software, and a customized Microsoft Access data collection form with the ability to automatically import GPS coordinates. The sample census blocks were pre-loaded and directly accessible from MapPoint. Two types of data collection were conducted; infrastructure observation and wireless speed testing; and the results were recorded and linked to the corresponding field location coordinates within the designated sample census block. The information collected by the field broadband technicians includes:

Wireline:

- GPS coordinates
- circuit infrastructure feeding the area (copper, fiber, cable)
- collect site pictures

Wireless:

- GPS coordinates
- internet speed test

This field collected dataset is used as a validation source primarily for wireline and wireless technology of transmission and middle mile, and for wireless speed.

Independent 3rd Party Validation: Murray State University coordinated the efforts of resources at the University of Louisville and the Kentucky Community and Technical College System (validation team) to validate the collection methods and collected data associated with the collection of broadband availability data. This validation data developed from this effort was subsequently integrated into the Statistical Evaluation and Assessment System (SEAS) to verify the data submitted by the broadband providers.

The validation team review included:

a. Validating the list of providers being used by the mapping vendor to make sure all providers are included.
b. Validating the list of state-provided and Census Tiger Data to identify the location of health facilities, schools, libraries, hospitals, universities, public buildings, etc.
c. Reviewing provider outreach methodology being used by the mapping vendor.
d. Reviewing submission options, the Non-Disclosure Agreement and the timeframe for submission.
e. Identifying Business Intelligence data sources to validate provider information.
f. Reviewing mapping vendor's website used to collect comment/survey forms from visitors to validate the broadband coverage in their area.
g. Observing the data collection and data entry process and the ongoing steps in the development of the final products.

Once data was collected, the validation team provided a review that included:

a. Cross checking of data for accuracy
b. Statistically representative and significant samples to validate data, especially in rural and potentially underserved.

Limited field census and telephone surveys were also used to validate data in situations where the data cross checks and statistical samples are not able to validate data provided by the mapping vendor. Faculty and students from campuses of the Kentucky Community and Technical and College System (KCTCS) conducted the field census work to validate local adoption rates. KCTCS has 16 colleges and over 60 campuses to provide state-wide coverage for field census work.

The work performed, and being performed by the validation team can be summarized in four areas: (1) Audit, (2) Selective Surveys, (3) Reconcile Survey and Provider Data, and (4) Field Test to Resolve Discrepancies.

Audit – At the beginning of the project it was decided that the best way to obtain quality data was to make sure that the initial data collection was of the highest quality that it could be. The validation team concentration its initial efforts in working with the mapping vendor to get the best quality data and also the largest quantity of data that could be obtained. Mapping vendor processes were reviewed and suggested improvements provided. Web sites and documents that were to be used for data collection were evaluated and improvements suggested. Provider lists were reviewed and additional vendors or potential vendors were identified by the validation team. Once data collection began, the validation team also worked with the mapping team to increase the amount of data collected. KCTCS provided web survey sites to students and faculty across the state to increase participation. Once the data was collected the validation team worked to identify data anomalies and locations where additional data collection was required.

Selective Surveys – The data audits identified locations where there was insufficient data to make valid conclusions about broadband availability. The validation team used a call center to place selective surveys in the targeted areas within the state. In many cases the insufficient data was the result of the failure of vendors to provide data to the mapping vendor. The selective surveys provide validation of the availability of broadband or the absence of broadband within a specific area. This information allows the mapping vendor to concentrate their efforts to obtain the required data from the appropriate vendor. The call center efforts reached almost 10,000 new households that had not been sampled by other methods. The data indicated that 68.8% had computers, 64.7% has access to the Internet, and 56.7% has broadband access. The new data points were located in rural areas of the state and were focused on areas that had been underrepresented in prior data collection efforts.

Reconcile Survey and Provider Data – The mapping vendor survey data (from web surveys), the provider data, and the selective surveys done by the validation team provide an additional reconciliation of the data. While the importance of knowing where broadband is available is critical, it is just as important to know where broadband is not available. The comparison of the various data sources allow for a high confidence in identifying where broadband is available. Additionally, the data reported on the web surveys and the phone surveys identify pockets of citizens of the Commonwealth that don't have access to broadband. The validation team used the data reported by the providers, the data collected by the mapping vendor, and the validation survey data to identify areas of interest for the field data collection efforts. The focus of the field data collection efforts are areas with no reported service, areas where individuals report no availability, and areas where only mobile wireless has been reported as being available for broadband service.

Field Test to Resolve Discrepancies – The reported territory covered by wired broadband infrastructure is reliable. However, the reported territory covered by wireless broadband infrastructure (especially mobile wireless) is less reliable. Many factors can impact the availability of the wireless signal. We simply have to think about our cell phone usage and the frequency of dropped calls or no service availability. It is relatively easy for a vendor to say they provide service to an entire geographic area. The validation team developed software to check on the level of mobile wireless availability and to make sure it is at broadband speeds. The validation team drove mobile devices around the state collecting signal strength and doing periodic speed test to validate the availability of broadband. The initial focus was on areas reported to have no service and areas that only have mobile broadband reported. Test data was collected to validate the data collection process and identify required equipment.

Provider Data Validation Process

Provider Feedback Loop: Feedback received from the providers is visually inspected and integrated directly into the mapping GIS database.

Service Area Validation Data: The SNG wireline service area data is tabular and contains a separate record for each provider/technology of transmission combination with an associated census block or TIGER road segment, depending on the whether the size of the census block area (=/< or > 2 sq. mi.). This data is exported into an ArcGIS data format. The American Roamer and Prior Mapping service area data is already in and ArcGIS data format. The validation data is then joined to the Provider service area data by census block or TIGER road segment ID. Any database records in the Provider or Validation tables that cannot be joined are output to a separate layer that indicates the areas of discrepancy between the two datasets. The joined tables are then queried to detect any speed discrepancies which are also output to a separate discrepancy layer.

Online Surveys, Field and Independent 3rd Party Validation Data: The Public and Targeted Business/Household survey, field and independent 3rd party validation data are also collected in tabular database format, and represent a specific lat/long spatial location for each record. This data is exported into ArcGIS data format, joined to the provider data, queried to validate pertinent attribution. Again, records not joined and or with detected attribution discrepancies are output to separate GIS layers.

Topology: The ArcGIS Validate Topology Tool is used to flag any topology issues in the broadband data. Flagged issues are reviewed to identify false positives and update true errors as required.

SBI Check Submission: The NTIA-provided SBI Check Submission tool is utilized to validate that the deliverable broadband data is consistent with the business logic rules set forth by the NTIA and a passing receipt is provided with the data submittal to NTIA.

Stakeholder Feedback: The state broadband mapping website includes a feedback function. Comments received from stakeholders are reviewed and used to validate provider data submissions.

Validation and Confidence Level Reporting

To facilitate validation and confidence level reporting, Baker deployed a validation application called Statistical Evaluation and Assessment System (SEAS) which automatically compares the multiple independent validation datasets against the broadband service provider supplied information. The SEAS uses statistical methodologies to report the confidence level in the spatial and attribute accuracy of the information. Appendix B shows the validation workflow.

The SEAS comparison is a three-part validation process:

1. Comparison of the collected validation source against the aggregated broadband provider data.
2. Match percentage calculation for each provider reported in the DataPackage.xls, “Provider Table” tab, “Comments” column.
3. Confidence score calculation displayed on the state broadband website.

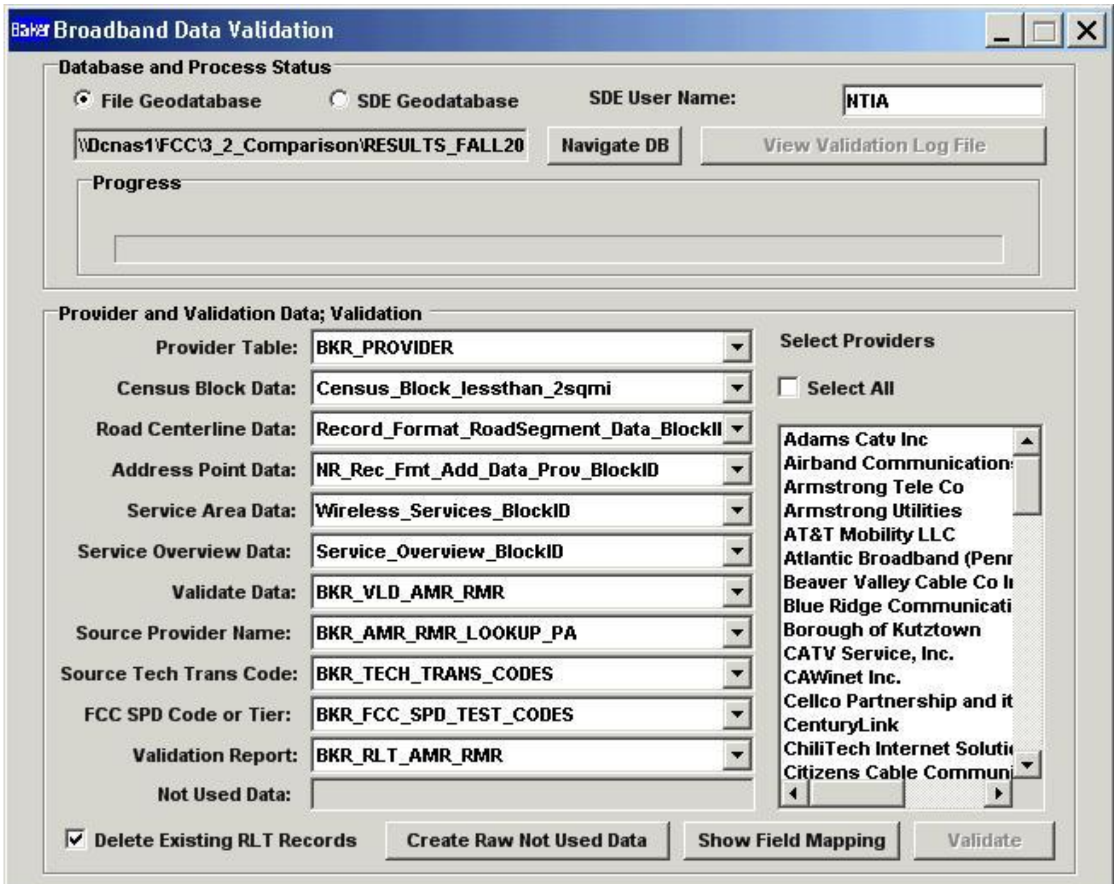


Figure 4 Statistical Evaluation and Assessment System (SEAS)

After completing all validation data source collections, SEAS is used to automatically compare the multiple validation datasets against the aggregated broadband data which came from the providers. Through the SEAS accumulation table, it produces a match percentage per broadband service record based upon the number of matches that record has against each validation source. The matched percentage for each record is the result of the total count of the matched validations for the record divided by the total validation source being compared against the record. A validation confidence rating/score is then assigned on a scale of 1 to 5 based upon the percentage of validation source matches as per the following score results:

- 1 Star   = 0% - 19% Match
- 2 Stars = 20% - 39% Match
- 3 Stars = 40% - 59% Match
- 4 Stars = 60% = 79% Match
- 5 Stars = 80% - 100% Match
- “No Analytics” = No validation source available for that provider

The Commonwealth's public broadband mapping website (www.bakerbb.com/kybroadbandmapping/) is updated with the confidence level results at the record level based upon the queried geographic location and the following is an example of this representation.

Provider Name	Transmission Technology	Max Download Speed	Max Upload Speed	Confidence Score
AT&T Mobility	Mobile Wireless	Greater than or e...	Greater than or e...	★★★☆☆
Verizon	Asymmetric xDSL	Greater than or e...	Greater than or e...	NO ANALYTICS
Comcast	Cable Modem – Other	Greater than or e...	Greater than or e...	★★★★☆

The matched percentage for the records for each provider are summarized and then divided by the total count of the records to create the final matched percentage for the specific provider. These percentages are included in DataPackage.xls on the Provider Table tab in the Comments column.

Low Confidence Provider Feedback

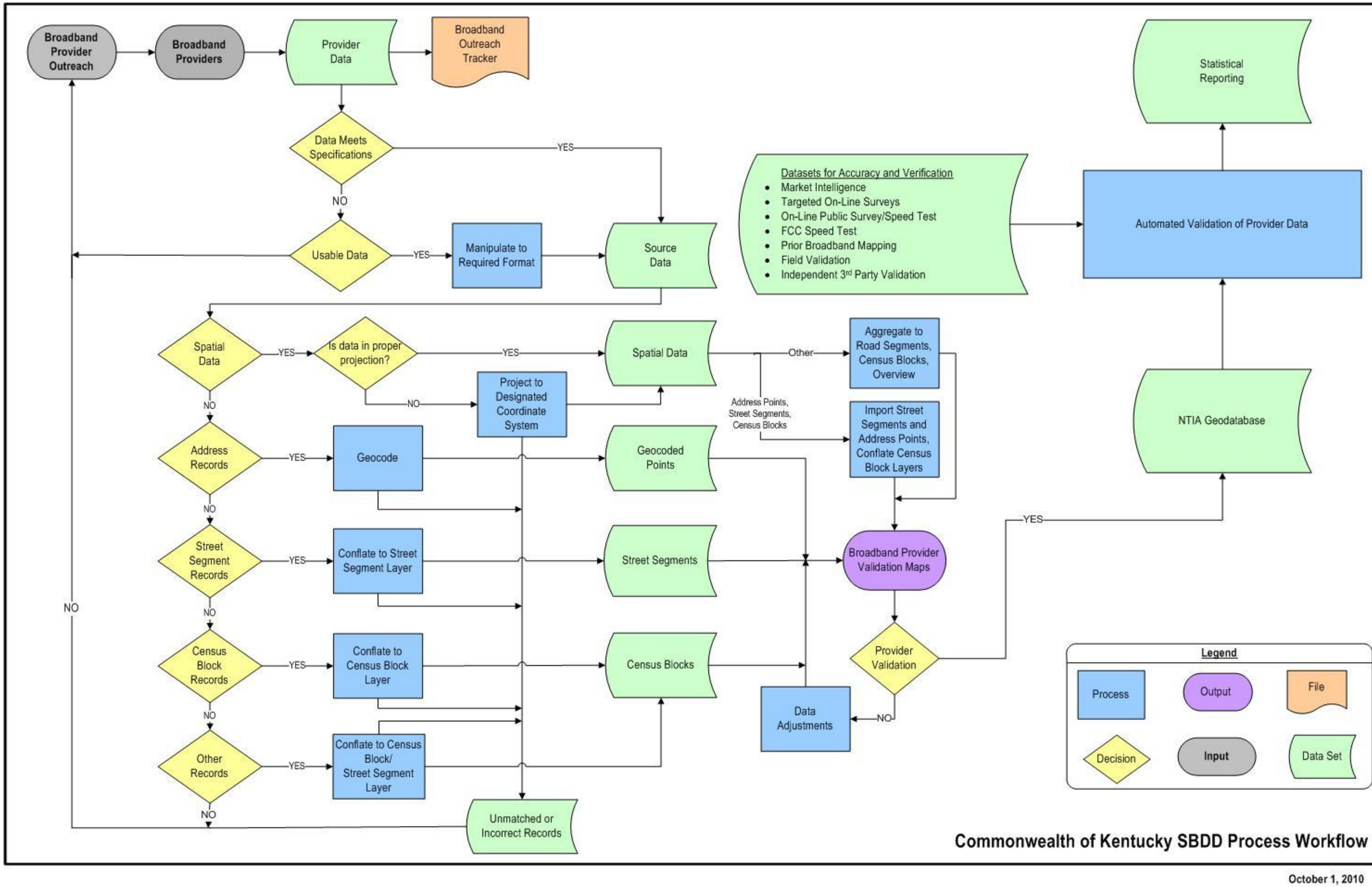
Provider data which is assigned a low confidence (1 or 2 stars) through the SEAS process is communicated back to the provider through a feedback loop. Generally, the low confidence feedback and reconciliation is a continuous refinement process and will occur between update cycles. The goal is to provide this feedback through the Provider Update Portal via a web connection that will be available and rolled out to provider in early 2012.

Changes and Corrections Documentation

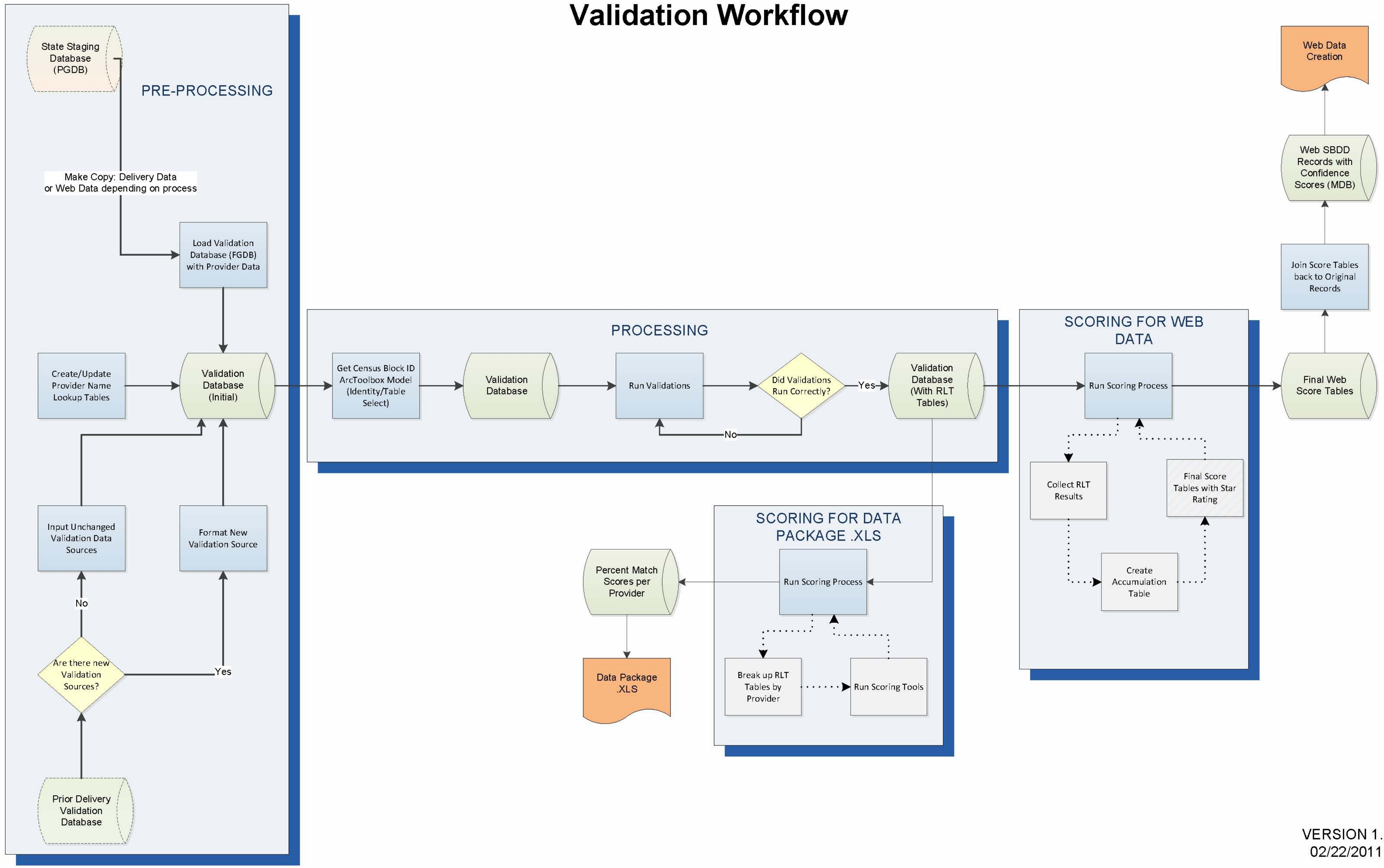
With each NTIA semiannual data submittal, changes and corrections documentation is provided. Significant changes in a provider's status or data, corrections to previously supplied data, providers supplying data for the first time, etc. are specified by Provider name in the Changes and Corrections document.

Future Validation

Audit of Wireless Broadband Availability Reporting: Wireless coverage will be evaluated using a contour calculation tool, with key inputs being transmitter location and, where available, data on spectrum power levels and other relevant transmission factors provided by carriers and/or supplemented by data available from public web sites and other sources. Data will then be input to a contour calculation tool to provide estimates of fixed wireless broadband coverage areas. This dataset is used as a source to determine gaps in provider wireless service area coverage. The Prior Mapping data is also used as a validation source for gap analysis.

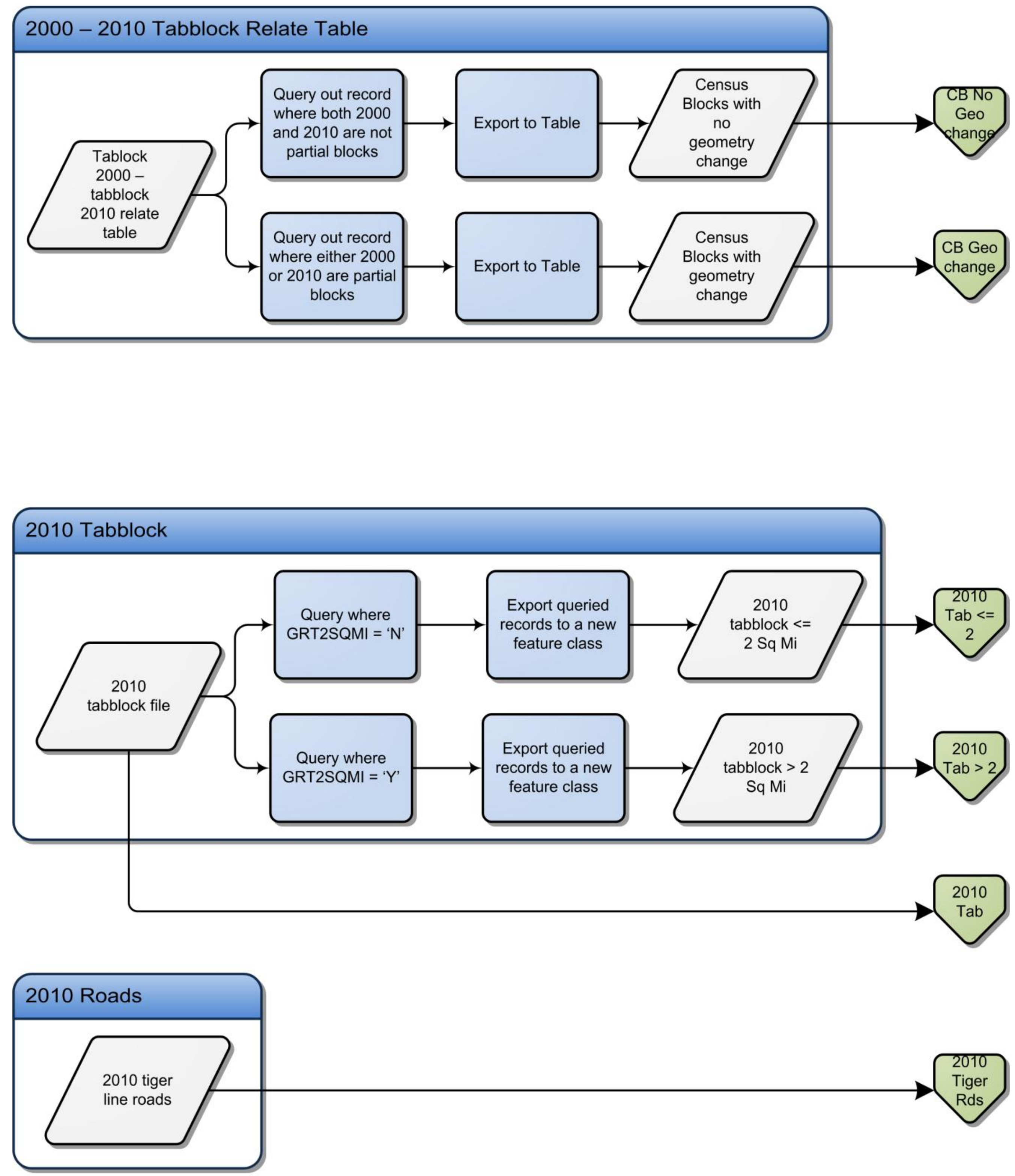

Broadband Provider Outreach
Broadband Providers
Provider Data
Broadband Outreach Tracker
Data Meets Specifications
YES
NO
Usable Data
YES
Manipulate to Required Format
Source Data
NO
Datasets for Accuracy and Verification
Market Intelligence
Targeted On-Line Surveys
On-Line Public Survey/Speed Test
FCC Speed Test
Prior Broadband Mapping
Field Validation
Independent 3rd Party Validation
Automated Validation of Provider Data
Statistical Reporting
Spatial Data
YES
Is data in proper projection?
YES
NO
Project to Designated Coordinate System
Spatial Data
Other
Aggregate to Road Segments, Census Blocks, Overview
Address Points, Street Segments, Census Blocks
Import Street Segments and Address Points, Conflate Census Block Layers
NTIA Geodatabase
Address Records
YES
Geocode
Geocoded Points
Street Segment Records
YES
Conflate to Street Segment Layer
Street Segments
Broadband Provider Validation Maps
YES
Census Block Records
YES
Conflate to Census Block Layer
Census Blocks
Provider Validation
Data Adjustments
NO
Other Records
YES
Conflate to Census Block/ Street Segment Layer
Unmatched or Incorrect Records
Legend
Process
Output
File
Decision
Input
Data Set
Commonwealth of Kentucky SBDD Process Workflow
October 1, 2010

State Broadband Data Validation Workflow



VERSION 1.1
02/22/2011

2000 to 2010 Census Data Translation Workflow



DATA DEVELOPMENT & VALIDATION METHODOLOGIES WHITE PAPER

State of Louisiana
State Broadband Initiative (SBI)
Broadband Mapping Project

NTIA Data Submittal
September 30, 2011

Baker

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Appendices

Introduction

The following sections of this document provide an overview of the process used for the SBI Broadband Mapping data development for the State of Louisiana. The following narrative is depicted in Appendix A, State of Louisiana SBI Process Workflow, and Appendix B, State Broadband Data Validation Workflow, included at the end of this document.

Broadband Provider Outreach

The following outreach provides the framework for communicating with Broadband Service Providers (Providers). The primary goals of the outreach approach documented herein are to:

- Promote Provider understanding and acceptance of the Broadband Mapping process, results and benefits
- Clarify NTIA Broadband Mapping requirements
- Facilitate data confidentiality agreements as required
- Minimize the submittal of invalid data
- Enhance provider understanding of the semi-annual update process
- Work with Providers to evaluate submittal options to facilitate data submittals

Data Submission Guidelines

Guidelines for the Providers submission of of Broadband Mapping Data are documented in the "Data Submission Guidelines". These Guidelines define technical requirements, submission, specifications, and coordination and documentation activities.

Louisiana Broadband Providers Website

A URL was deployed (http://broadband.louisiana.gov/providers.asp) to communicate and distribute NTIA NOFA requirements to providers along with outreach and data submittal materials including:

- NTIA NOFA and subsequent clarification
- Outreach letters to providers
- Non-Disclosure Agreement
- Quick Start Guides
- Data Submission Guidelines
- Data Transmittal Letter
- Broadband Data Submittal Templates
- TIGER Data
- Data Submittal Assistance Contact Information

Outreach Delivery Vehicles

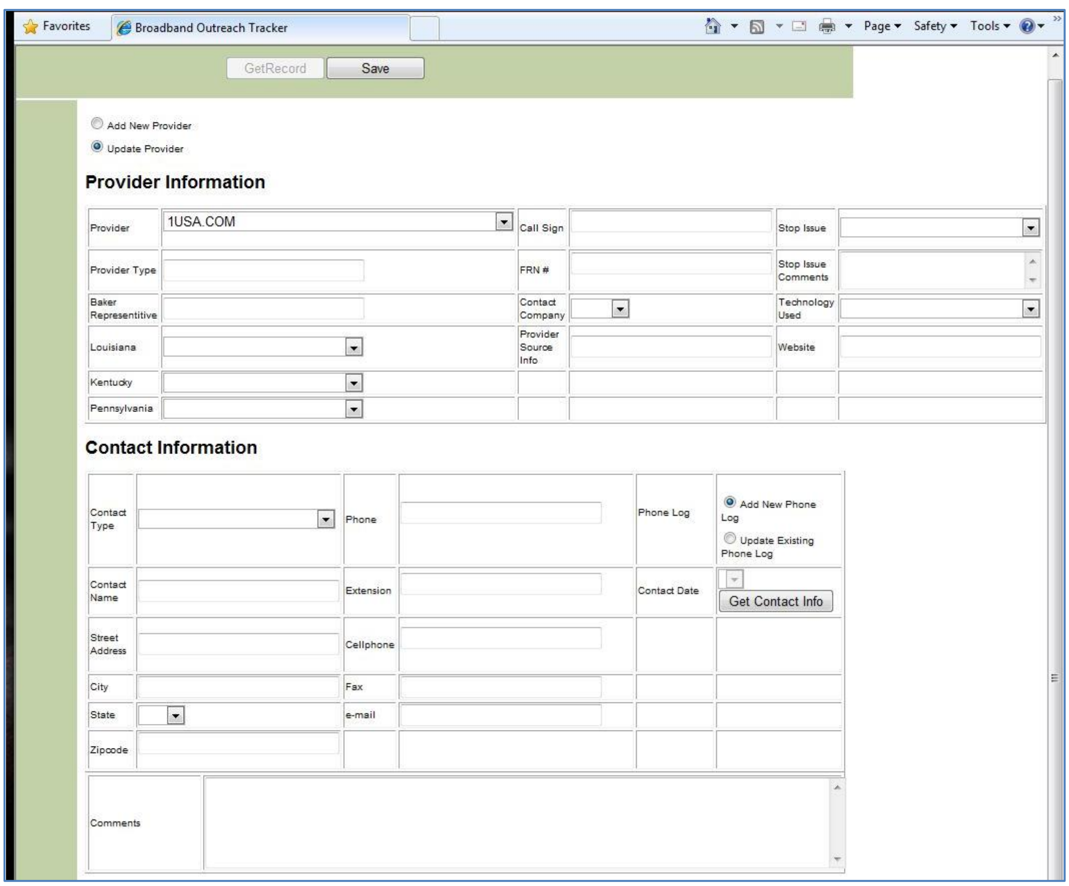
- A State Broadband Mapping Initiative Call for Data letter from the State Office of Information Technology (OIT) was emailed to all Broadband Service Providers in the State. This initial provider contact letter described the program and the role of Michael baker Jr., Inc. (Baker) acting on behalf of the OIT for Broadband Data Collection and Mapping.

- Baker distributed a follow-up letter to all Providers describing the data submittal requirements and material and help available to aid with the data submittals.
- Submittal assistance was provided to providers that needed help with data submittals.
- Presentations were conducted with various broadband provider associations to present the data submittal requirements and answer questions.
- Email communication and electronic transfer of data was encouraged to facilitate a faster delivery of data and information.
- A URL was deployed and promoted to distribute outreach material and information concerning the Broadband Mapping Project.
- A secure FTP URL was provided for submittal of broadband data by providers.

Broadband Outreach Tracker Application

The Tracker application (Figure 1) was utilized to collect all correspondence with Providers and feedback on the effectiveness of the outreach activities by tracking items such as:

- The number and content of incoming e-mails and letters submitted from the Providers
- The number and source of comments, questions, and suggestions made by Providers
- The number and source of comments, questions, and suggestions made by attendees at Provider meetings and conference calls
- Provider contact information and data submittal status.



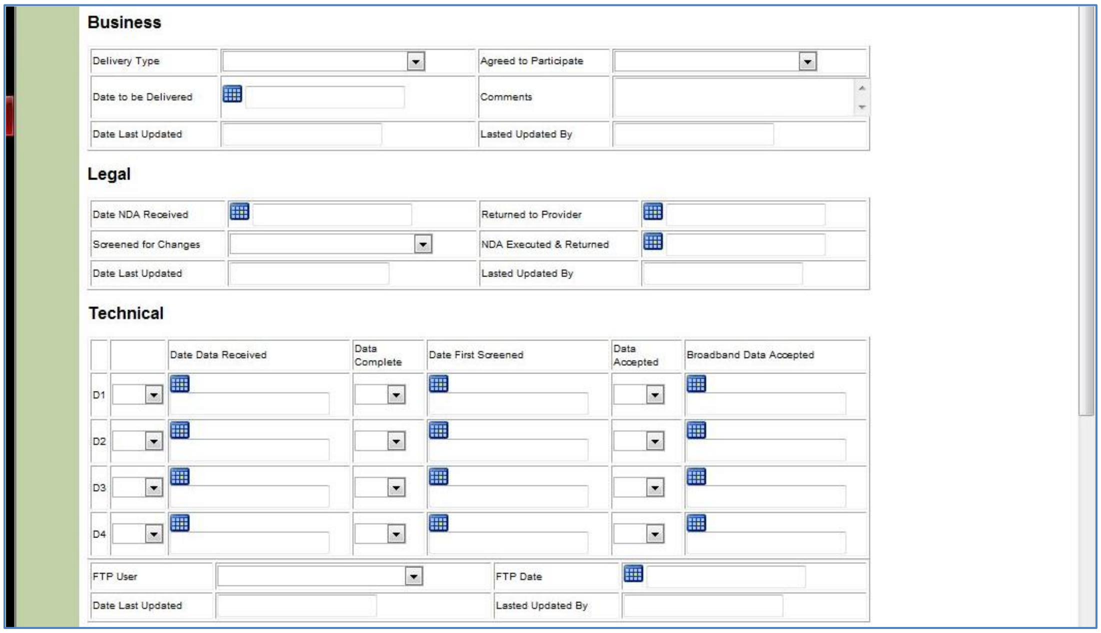


Figure 1 Broadband Outreach Tracker

Provider Submittal Validation

When a data submittal is received from a broadband service provider it is updated in the Broadband Outreach Tracker and run through an initial validation process to assure that it meets the submittal guidelines.

Validation Checklist

The following items are part of this initial data validation process:

- Verify the provider Transmittal Letter is complete and matches submitted data
- Verify the file naming conventions
- Verify each file is machine readable
- Verify data is in the correct GIS or Tabular format/file type
- Verify there are no duplicate records
- Verify each field is populated and no empty or NULL values are present for mandatory fields
- Verify all ID (record number points) are unique within the submittal
- Verify all attribute data is formatted according to the submittal guidelines
- Verify topology for all geospatial submissions
- Verify Metadata for all submissions
- Verify the required contact information is included
- Verify adherence to Data Submittal Guidelines (see http://broadband.louisiana.gov/providers.asp to access Data Submittal Guidelines)

  Broadband Service Availability (at least one)

  - Individual Street Addresses (Sec 3.1 & 4.1)
  - Census Blocks < 2 sq mi (3.3 & 4.3)
  - Street Segments for Census Blocks > 2 sq mi (3.2 & 4.2)
  - Service Overview (Sec 3.4 & 4.4)
  - Polygonal Boundary Area(s) (Sec 3.8 & 4.8)

Middle-mile Points (Sec 3.5 & 4.5)
Community Anchor Institutions (Sec 3.7 & 4.7)
Last Mile Connection Points (Sec 3.6 & 4.6)
WISP Antennas (Sec 4.9)

Data Usability Determination

The validation results are evaluated by the outreach and aggregation persons to determine the usability of the data. If the data meets the submission specifications, it is forwarded on for data aggregation. If it is determined to be unusable, it is returned to the Broadband Service Provider for resolution. If the data can be manipulated to get it into a usable format, it is manipulated as required, and then forwarded on for data aggregation.

SBI Data Development

Data from the Broadband Service Providers may be submitted in various formats as defined in the Data Submittal Guidelines, or in some cases unspecified formats may be accepted to help facilitate provider participation. Depending on the format of the submitted data, it is processed through one of the following processes to upgrade it to the NTIA SBI data standards.

2000 to 2010 Census Data Translation

Many providers indicated there were no changes to their previous data submission that was compiled to 2000 census information and they did not have the capacity to upgrade their data to 2010 census information. Therefore, the Broadband Mapping team has translated the April 2011 data for these providers using the workflow shown in Appendix C.

Spatial Data

After validation and any required manipulation of any spatial data submitted by the Broadband Service Providers, it is georeferenced and simply loaded into the appropriate NTIA geodatabase feature class.

Address Data Geocoding

If not already in the standard address point template, the provider tabular address data is first loaded into that template. The data is then exported to a geodatabase table using the ArcGIS Conversion Tools. ArcGIS geocoding tools are then utilized geospatially locate the address points for the tabular records. Interactive address rematching is performed against two additional street centerline datasets as needed to increase geocoding matching results. The NTIA deliverable is the geocoded address point geodatabase table. The geocoded address points are also subsequently aggregated to the census block or road segment feature class for public web map display.

Census Block Aggregation

If not already in the standard census block template, the provider tabular census block data is first loaded into that template. The data is then exported to a geodatabase table using the ArcGIS Conversion Tools. The Provider tabular census block records are then joined to the geodatabase 2010 U.S. Census Block. This join is performed as many times as necessary for multiple Trans Tech values for each Provider/Census Block combination. The NTIA deliverable is the census block geodatabase table.

If the list of census blocks contains blocks > 2 sq. miles then these blocks are used to select all the 2010 U.S. Census TIGER centerlines that intersect those blocks. The Census Block record data is aggregated to each Road Segment within the Census Block. This process is performed as many times as necessary for multiple Trans Tech values for each Provider/Census Block combination.

Road Segment Aggregation

If not already in the standard road segment template, the provider road segment data is first loaded into that template. The data is then exported to a geodatabase table using the ArcGIS Conversion Tools. If the provider submittal included graphic centerline segments, these are migrated into the delivery geodatabase along with the linked attribute records. If the provider submittal was tabular road segment records only, they are then joined to the geodatabase 2010 U.S. Census TIGER centerline feature class. This join is performed as many times as necessary for multiple Trans Tech values for each Provider/Road Segment combination. The NTIA deliverable is the road segment geodatabase table.

If the provider road segment data lie within census blocks <= 2 sq. miles then the road segment data is aggregated to the census block. This process is performed as many times as necessary for multiple Trans Tech values for each Provider/Road Segment combination. The NTIA deliverable is the road segment geodatabase table.

Overview Data Aggregation

Provider Service Availability Areas submitted for entire county areas are loaded into the NTIA geodatabase Overview table. If not already in the standard template, the provider data is first loaded into that template. The data is then exported to a geodatabase table using the ArcGIS Conversion Tools. The Provider Overview records are then joined to the geodatabase 2010 U.S. Census County feature class. This join is performed as many times as necessary for multiple Trans Tech values for each Provider/County Area combination.

Polygonal Boundary Aggregation/Integration

Broadband Service Providers submitting polygonal service area data is handled in two ways. Wireline Provider data is aggregated to the census block feature class for areas where census blocks <= 2 sq. mi., or road segment feature class for areas where census blocks > 2 sq. mi. Wireless Provider Service Availability Areas submitted by polygonal area are simply loaded into the NTIA geodatabase Poly_Bndry feature class.

Wireline Provider

The polygonal data is georeferenced and loaded into the Poly_Bndry feature class. The polygon is then attributed, manually if necessary. Depending on the area, census blocks < or => 2 sq. mi., a selection set of either census blocks or road segments that intersect the polygon boundary is created. The attributed polygon boundary is then joined with census blocks or road segments table to attribute accordingly. This join is performed as many times as necessary for multiple Trans Tech values for each Provider/County Area combination. The NTIA deliverable is the census block or road segment geodatabase table.

Wireless Provider

The polygonal data is georeferenced and loaded into the Poly_Bndry feature class. The polygon is then attributed, manually if necessary. Multiple Poly_Bndry records are created for multiple Trans Tech values for each Provider. The NTIA deliverable is the polygon boundary geodatabase table.

Middle/Last Mile Data Integration

If not already in the standard template, the data is first loaded into that template. The data is then exported to a geodatabase table using the ArcGIS Conversion Tools. The point features are geo-located utilizing the lat/long information provided. The NTIA deliverable is the middle or last mile geodatabase table.

Community Anchor Institution Integration

Broadband Service Providers provided some Community Anchor Institution (CAI) data with the data submittals. But the majority of the data was collected from existing GIS Layers from previous studies and commercial data packages.

Provider CAIs

If not already in the standard template, the data is first loaded into that template. The data is then exported to a geodatabase table using the ArcGIS Conversion Tools. The point features are geo-located utilizing the lat/long information provided. Address data is used to geocode locations only when Lat/Long data is not provided.

State CAIs

CAI shapefiles were downloaded from the commercial data packages. The shapefiles were then exported to the NTIA geodatabase CAI feature class. Various sources for obtaining broadband information for the CAIs were utilized including previous broadband studies.

Provider Validation

After data development, service availability maps are generated and submitted to the providers to validate their mapping results. This provides a "sign off" on the interpretation of the submitted data and extends the outreach efforts by providing a visual representation of the data to be delivered to the State and the NTIA.

Types of Provider Maps

Provider maps (Figure 2) generally consist of the following types.

Outreach Maps

Often time's providers will send data which does not contain all the information needed for a NTIA compliant dataset. In such cases, as an aid to the outreach communication, it may be necessary to produce a map to help the provider locate their service area or verify data they have provided. These maps may take many forms, but generally are of two types:

- General Location Maps – these maps are often produced when the provider does not have a list of address or other standard submittal data and needs help defining their service area. A typical map will show counties, major roads, and towns of the general area the provider has stated as their service area. The intent of the map is to give the provider a way to markup or delineate their service area. If a provider has not provided required attribute information such as Technology of Transmission, Speed Data, etc. then it may be necessary to add a visual clue to this data like an information stamp on the map that they can easily fill out. If the provider sends the map back with a service area boundary, this can then be digitized and sent back to the provider for verification.

- Verification of Provider Supplied Boundaries – these maps are produced when the provider has sent service area boundary information which is confusing or otherwise unclear. Often these are produced when providers send CAD maps, hand drawn maps that need digitization, or lists of zip codes or counties served. A typical map will place the interpreted boundary over a location map so the provider can verify the service area. As with the General Location Map, information stamps or other visual clues may be placed on the map.

Initial Verification Maps

Once the provider data has been processed and the census block and road segment feature classes created, an Initial Verification Map is produced to give the provider a visual representation of their service area by census block. These maps enable the provider to verify their service area and make changes if necessary. Initial Verification Maps are produced using a set of standards and produced at the highest resolution necessary to convey the map information to the provider. Initial Verification Maps are also produced for Wireless Polygon areas.

Detailed Verification Maps

Providers who have questions about their service areas may request additional information to help clarify issues. In these cases it may be necessary to create a Detailed Verification Map to highlight the areas in question. Detailed Verification Maps provide the same information as Initial Verification Maps only at a higher resolution. Several maps may be needed to accurately portray an area in question.

Revised Maps

Revised maps take two forms:

- Initial or Detailed Verification Maps which have been annotated or marked-up by the provider
- Outreach produced Initial or Detailed Verification Maps incorporating provider changes

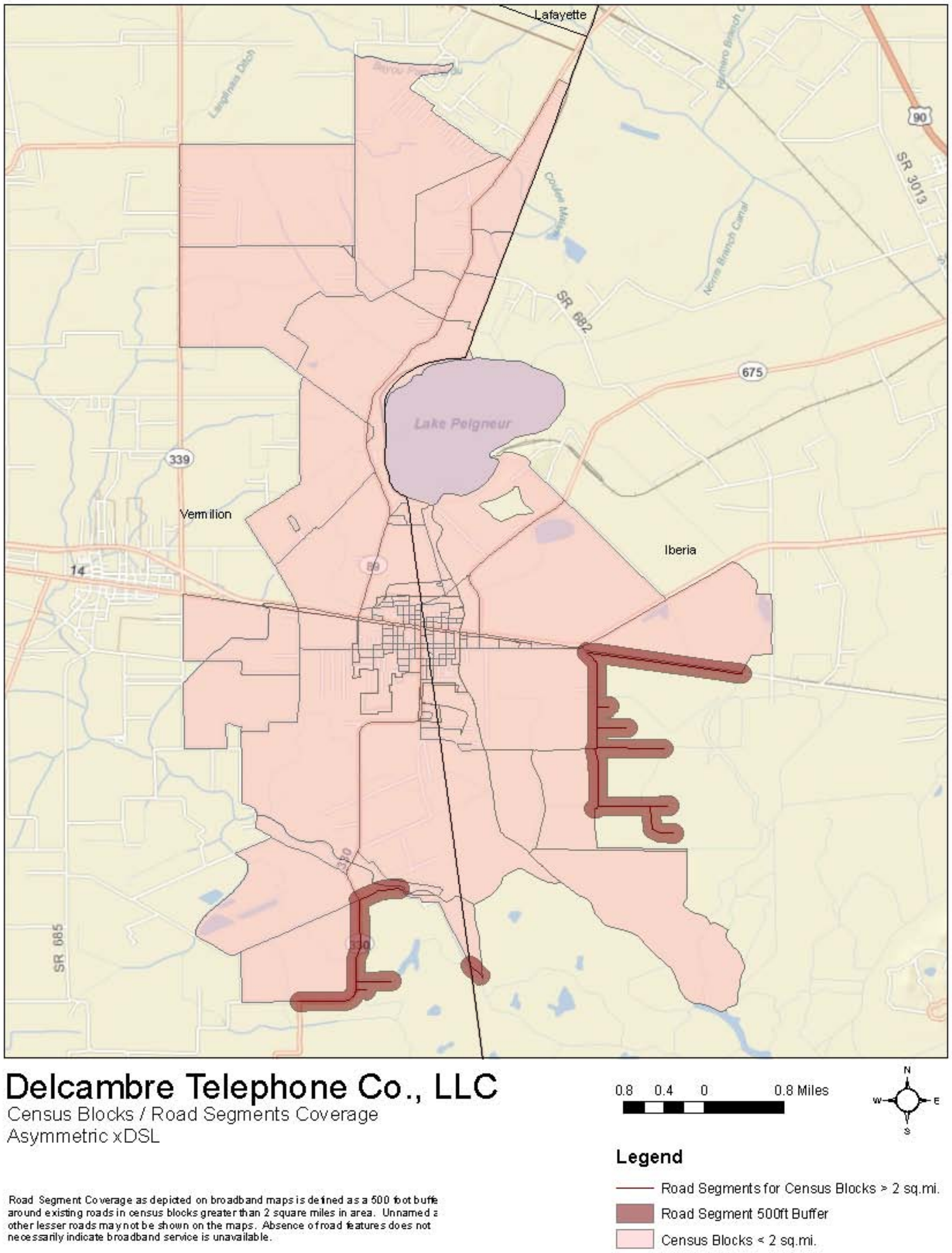


Figure 2 Provider Map

Data Validation

A critical component of the project is the validation of the data submitted by the broadband service providers. Data from various sources, as described in more detail in the following sections, is utilized to develop a level of confidence in the data received from the broadband providers.

Validation Data Set Collection and Development

This validation process employs data sets developed or acquired from different sources as described in the following sections.

Provider Feedback Loop: Maps of completed Provider service areas and data are furnished back to the Providers for confirmation of the processed/aggregated information. Feedback is integrated into the each Provider's dataset.

Strategic Networks Group (SNG) Wireline Market Intelligence Data: Data is extracted from internal and commercial databases defining geographic service areas of telephone and cable companies and locations of central office (CO) switches and areas upgraded with fiber. The geographic areas are overlaid with Census demographic data on housing unit counts and density. The areas are then modified based on standard business practices for conducting service build-out and offering broadband service relative to housing density and other variables, such as distance from CO and other infrastructure elements, type of cable franchise (e.g., Census Place vs. Unincorporated County) This represents the first pass conservative estimate of coverage.

The above methods and data sources are supplemented by other data sources and methodologies, including: 1) connectivity data points acquired from InfoUSA that include ISP and type of connection (e.g., DSL, cable modem, dial-up, wireless, fiber) providing Internet service to specific geo-coded (i.e., by Latitude and Longitude) residential addresses; 2) web-based and telephone research, including address-level service-availability queries of web sites operated by service providers and independent entities. This multi-sourced SNG dataset is used as a validation source for provider service area coverage, Technology of Transmission, and Speed.

American Roamer Wireless Market Intelligence Data: Commercially available dataset used as an independent source to verify information submitted by Providers of wireless broadband service. This dataset is used as a validation source for provider service area coverage.

Strategic Networks Group (SNG) Targeted Online Surveys: Questionnaires (e-mail/web based) have been sent directly to businesses and households, including over-sampling in rural area and those where the above conservative estimate indicates are "unserved" and "underserved" areas. In addition to collecting broadband supply data on type of access, speeds, price, etc. questionnaires gather broadband service demand and usage data from businesses, organizations, and households. Survey responses include geographic coordinates that allow mapping and cross-reference to census blocks or street segments. This dataset is used as a validation source for provider service area coverage, Technology of Transmission, and Speed.

Online Public Survey and Speed Test: A Broadband Mapping Public Survey Site is deployed. Site visitors are requested to provide data on broadband availability, technology, service type (e.g., speed tier) service provider name; monthly prices paid and measured downstream and upstream speeds.

Prior Broadband Mapping: Statewide coverage areas for Cable, DSL, and Fixed Wireless providers that were aggregated as part of a previous broadband mapping effort for the State of Louisiana are used to validate against Provider submitted data. In addition to the service areas, the DSL and Fixed Wireless layers contain general speed information that can be compared against Provider submitted data.

FCC Speed Test: The FCC speed test data includes the IP addresses for each specific speed test conducted. This IP address is queried against a web search engine to determine the Provider assigned to that address and is used as a validation source for provider service coverage and typical speeds.

Field Data Acquisition: Broadband technicians visited a sampling of census block locations to gather broadband data to be used for validation. The following criteria were taken into account when developing the census block sampling dataset:

- urban vs. rural census block characteristic
- censes block grouping
- land vs. water census block characteristic

The overarching mission of the Federal broadband stimulus program is to expand Broadband service to areas that are currently unserved and underserved. Also, the market intelligence validation sources typically represent some rural, but more urban areas. Thus, our field data collection efforts were targeted more towards the rural areas; split 90% rural, 10% urban.

Additionally, a study by Penn State University (Glasmeier 2002) notes that a large number of census block groups typically fit within any given cable or telephone company service areas. Therefore, our field sample was also based on selection of one census block per block group. The selected census block also had greater than 50% land area, versus water. There are a total of 3, 512 census block groups statewide. Using a statistical sample size calculator based upon the number of block groups in the state and +/- 4% margin of error at a 95% confidence level, the sample size is 557 census block locations (Figure 3).

For the 557 census blocks that were visited, 3257 individual wired/wireless data elements were recorded and 3410 pictures were taken at those locations. This field collected dataset is used as a validation source primarily for wireline and wireless technology of transmission and middle mile, and for wireless speed.

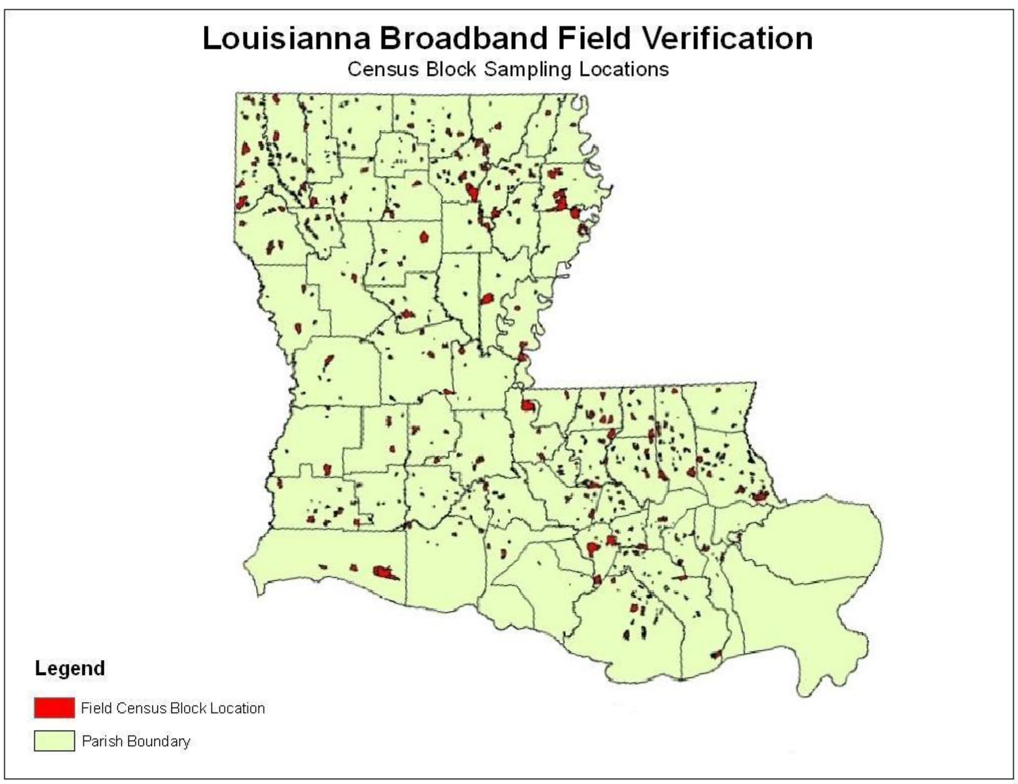


Figure 3 Field Verification Sampling Locations

For each census block in the sample set, broadband technicians collected data using Panasonic Toughbook computers, loaded with MapPoint mapping software, and a customized Microsoft Access data collection form with the ability to automatically import GPS coordinates. The sample census blocks were pre-loaded and directly accessible from MapPoint. Two types of data collection were conducted; infrastructure observation and wireless speed testing; and the results were recorded and linked to the corresponding field location coordinates within the designated sample census block. The information collected by the field broadband technicians includes:

Wireline:

- GPS coordinates
- circuit infrastructure feeding the area (copper, fiber, cable)
- collect site pictures

Wireless:

- GPS coordinates
- internet speed test

This field collected dataset is used as a validation source primarily for wireline and wireless technology of transmission and middle mile, and for wireless speed.

Provider Data Validation Process

Provider Feedback Loop: Feedback received from the providers is visually inspected and integrated directly into the mapping GIS database.

Service Area Validation Data: The SNG wireline service area data is tabular and contains a separate record for each provider/technology of transmission combination with an associated census block or TIGER road segment, depending on the whether the size of the census block area (=/< or > 2 sq. mi.). This data is exported into an ArcGIS data format. The American Roamer and Prior Mapping service area data is already in and ArcGIS data format. The validation data is then joined to the Provider service area data by census block or TIGER road segment ID. Any database records in the Provider or Validation tables that cannot be joined are output to a separate layer that indicates the areas of discrepancy between the two datasets. The joined tables are then queried to detect any speed discrepancies which are also output to a separate discrepancy layer.

Online Surveys and Field Validation Data: The Public and Targeted Business/Household survey and field validation data are also collected in tabular database format, and represent a specific lat/long spatial location for each record. This data is exported into ArcGIS data format, joined to the provider data, queried to validate pertinent attribution. Again, records not joined and or with detected attribution discrepancies are output to separate GIS layers.

Topology: The ArcGIS Validate Topology Tool is used to flag any topology issues in the broadband data. Flagged issues are reviewed to identify false positives and update true errors as required.

SBI Check Submission: The NTIA-provided SBI Check Submission tool is utilized to validate that the deliverable broadband data is consistent with the business logic rules set forth by the NTIA and a passing receipt is provided with the data submittal to NTIA.

Stakeholder Feedback: The state broadband mapping website includes a feedback function. Comments received from stakeholders are reviewed and used to validate provider data submissions.

Validation and Confidence Level Reporting

To facilitate validation and confidence level reporting, Baker deployed a validation application called Statistical Evaluation and Assessment System (SEAS) which automatically compares the multiple independent validation datasets against the broadband service provider supplied information. The SEAS uses statistical methodologies to report the confidence level in the spatial and attribute accuracy of the information. Appendix B shows the validation workflow.

The SEAS comparison is a three-part validation process:

1. Comparison of the collected validation source against the aggregated broadband provider data.
2. Match percentage calculation for each provider reported in the DataPackage.xls, “Provider Table” tab, “Comments” column.
3. Confidence score calculation displayed on the state broadband website.

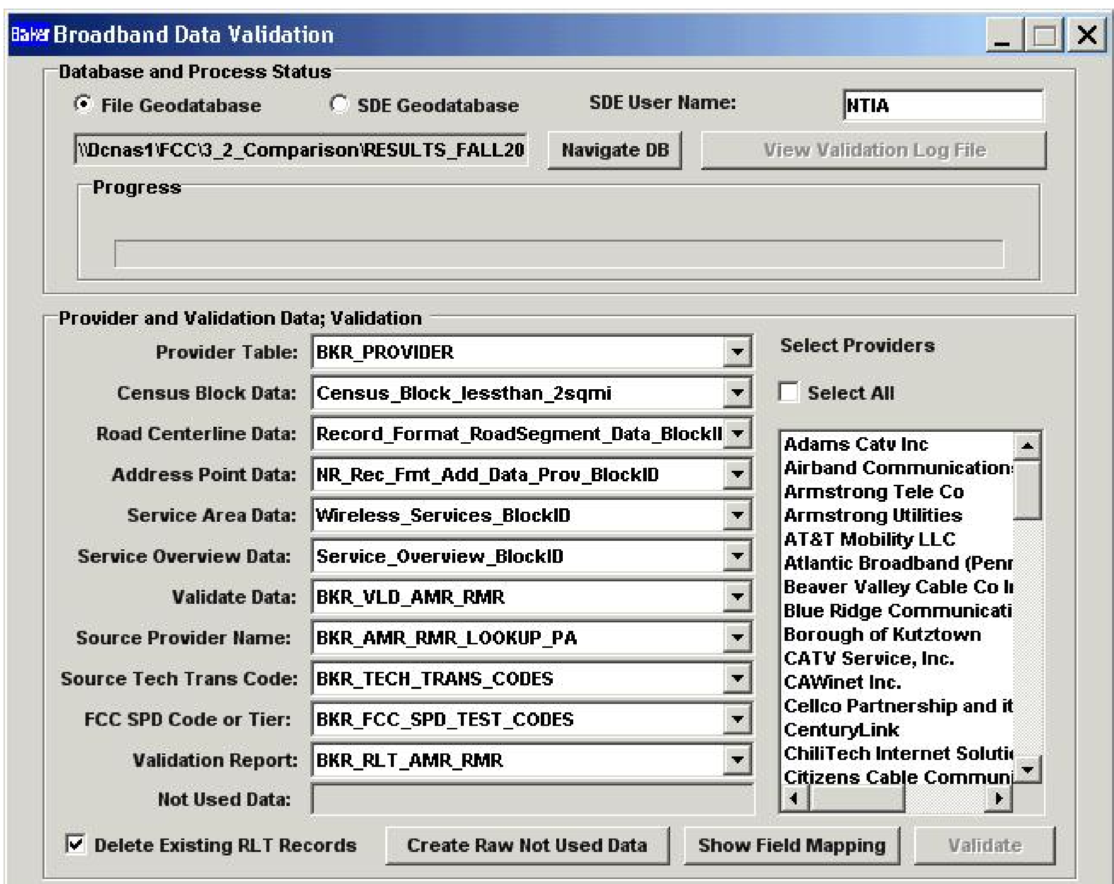
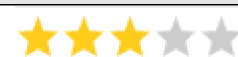


Figure 4 Statistical Evaluation and Assessment System (SEAS)

After completing all validation data source collections, SEAS is used to automatically compare the multiple validation datasets against the aggregated broadband data which came from the providers. Through the SEAS accumulation table, it produces a match percentage per broadband service record based upon the number of matches that record has against each validation source. The matched percentage for each record is the result of the total count of the matched validations for the record divided by the total validation source being compared against the record. A validation confidence rating/score is then assigned on a scale of 1 to 5 based upon the percentage of validation source matches as per the following score results:

- 1 Star = 0% - 19% Match
- 2 Stars = 20% - 39% Match
- 3 Stars = 40% - 59% Match
- 4 Stars = 60% = 79% Match
- 5 Stars = 80% - 100% Match
- "No Analytics" = No validation source available for that provider

The State's public broadband mapping website (http://broadband.louisiana.gov/providers.asp) is updated with the confidence level results at the record level based upon the queried geographic location and the following is an example of this representation.

Provider Name	Transmission Technology	Max Download Speed	Max Upload Speed	Confidence Score
AT&T Mobility	Mobile Wireless	Greater than or e...	Greater than or e...	
Verizon	Asymmetric xDSL	Greater than or e...	Greater than or e...	NO ANALYTICS
Comcast	Cable Modem – Other	Greater than or e...	Greater than or e...	

The matched percentage for the records for each provider are summarized and then divided by the total count of the records to create the final matched percentage for the specific provider. These percentages are included in DataPackage.xls on the Provider Table tab in the Comments column.

Low Confidence Provider Feedback

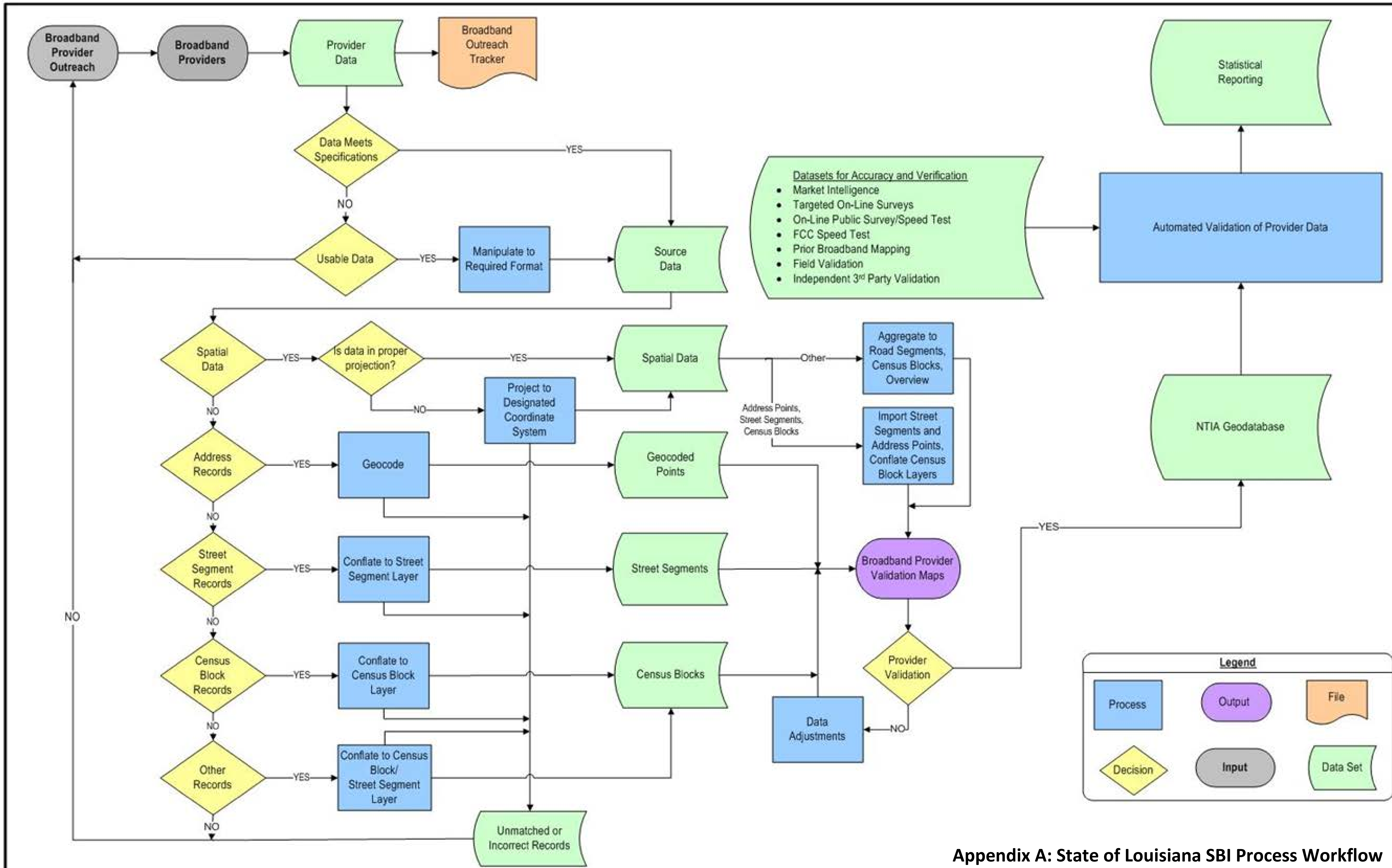
Provider data which is assigned a low confidence (1 or 2 stars) through the SEAS process is communicated back to the provider through a feedback loop. Generally, the low confidence feedback and reconciliation is a continuous refinement process and will occur between update cycles. The goal is to provide this feedback through the Provider Update Portal via a web connection that will be available and rolled out to provider in early 2012.

Changes and Corrections Documentation

With each NTIA semiannual data submittal, changes and corrections documentation is provided. Significant changes in a provider's status or data, corrections to previously supplied data, providers supplying data for the first time, etc. are specified by Provider name in the Changes and Corrections document.

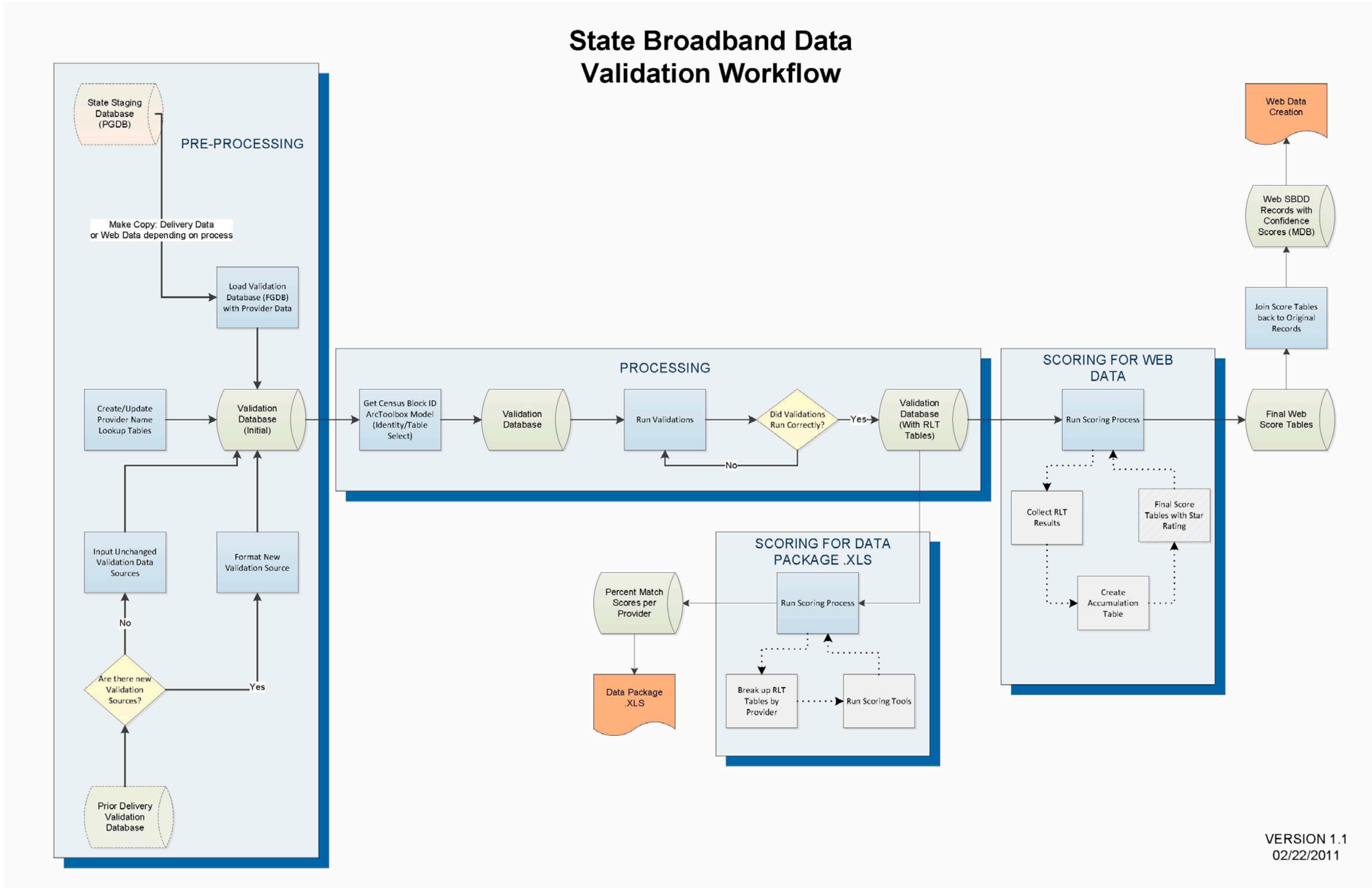
Future Validation

Audit of Wireless Broadband Availability Reporting: Wireless coverage will be evaluated using a contour calculation tool, with key inputs being transmitter location and, where available, data on spectrum power levels and other relevant transmission factors provided by carriers and/or supplemented by data available from public web sites and other sources. Data will then be input to a contour calculation tool to provide estimates of fixed wireless broadband coverage areas. This dataset is used as a source to determine gaps in provider wireless service area coverage. The Prior Mapping data is also used as a validation source for gap analysis.



Appendix A: State of Louisiana SBI Process Workflow

October 1, 2010


State Broadband Data
Validation Workflow
PRE-PROCESSING
State Staging Database (PGDB)
Make Copy: Delivery Data or Web Data depending on process
Load Validation Database (FGDB) with Provider Data
Create/Update Provider Name Lookup Tables
Validation Database (Initial)
Input Unchanged Validation Data Sources
Format New Validation Source
No
Are there new Validation Sources?
Yes
Prior Delivery Validation Database
PROCESSING
Get Census Block ID ArcToolbox Model (Identity/Table Select)
Validation Database
Run Validations
Did Validations Run Correctly?
Yes
No
Validation Database (With RLT Tables)
SCORING FOR DATA PACKAGE .XLS
Run Scoring Process
Percent Match Scores per Provider
Data Package .XLS
Break up RLT Tables by Provider
Run Scoring Tools
SCORING FOR WEB DATA
Run Scoring Process
Collect RLT Results
Final Score Tables with Star Rating
Create Accumulation Table
Final Web Score Tables
Join Score Tables back to Original Records
Web SBDD Records with Confidence Scores (MDB)
Web Data Creation
VERSION 1.1
02/22/2011

Appendix B

Methodologies Used to Create and Validate Broadband Datasets For the October 1, 2011 SBDD Submission

EXECUTIVE SUMMARY

Broadband data for Massachusetts was collected, integrated and verified by the Massachusetts Broadband Institute (MBI), a division of the Massachusetts Technology Collaborative (MTC). This data was prepared for the National Telecommunications and Information Administration (NTIA) as part of the State Broadband Data and Development (SBDD) grant program and will be displayed on the National Broadband Map. This data is current as of June 30, 2011 and will continue to be verified and updated to improve the quality and accuracy of the information to support MBI activities including adoption studies and last mile deployment planning.

About the MBI

The MBI is the central broadband entity for the Commonwealth of Massachusetts, created on August 4, 2008 when Governor Deval Patrick signed Chapter 231 of the Acts of 2008, *An Act Establishing and Funding the Massachusetts Broadband Institute* (the "Broadband Act"). The mission of the MBI is to extend affordable, robust high-speed Internet access to all homes, businesses, schools, libraries, medical facilities, government offices and other public places across our state.

The Broadband Act gives the MBI the authority to invest up to $40 million of state bond funds into broadband infrastructure. This bonding authority is structured as an "incentive fund" intended to stimulate private industry investments that will complement the MBI's public investments. The MBI is investing its funds in long-lived infrastructure assets, such as conduit, fiber-optic cable, and wireless towers, which will lower the cost of entry for broadband providers and make it economically feasible for such firms to provide broadband access service to currently unserved residential, business and institutional customers. For more information about the MBI and its programs and activities, visit the web site at www.massbroadband.org.

Data Summary

Data was acquired from 31 providers and created from the web sites of 2 additional providers of residential and business broadband access in Massachusetts. Data transmission technologies in the datasets include asymmetric and symmetric DSL, other copper wireline, DOCSIS 3.0 and other cable, fiber optic, unlicensed fixed wireless, 3G and 4G mobile wireless and satellite technologies. This information was integrated and submitted to the NTIA in the following four datasets.

Dataset	# Providers	# Records
BB_Service_CensusBlock	18	424,663
BB_Service_RoadSegment	11	8,721
BB_Service_Wireless	14	24
BB_ConnectionPoint_MiddleMile	17	599

Information on broadband services at community anchor institutions (CAIs) were collected by phone, email and web surveys. Approximately 21% of the CAIs participated in the survey, of which 84% subscribe to broadband services.

Dataset	# Institutions	# Records
BB_Service_CAInstitution	4282	4,558

DATA DEVELOPMENT – GENERAL

Data development was performed using ESRI ArcGIS 10.0 software.

Data Integration
Data were received from broadband service providers in varying formats and levels of detail. No two datasets were alike, which required a significant amount of manual review and editing to integrate the information into a common format. Although Excel and Shapefile templates were made available, very few datasets were received in the template formats and attributes were not always provided using the standardized coded values requested. In addition, attribute field names were inconsistent between datasets, contained spaces and special characters or were missing altogether. These differences prevented the use of automated data integration models to format and import data into standardized feature class templates.

All attributes were standardized so that the provider name, doing-business-as name and FCC registration numbers were consistent throughout the datasets and that attributes complied with valid value list (e.g., for technology of transmission, spectrums used, maximum advertised and typical speeds, end user category, etc.).

Geocoding
Unless otherwise specified, address data was geocoded using street addresses and zip codes from NAVTEQ 2008 Q4 streets data, which was developed though a partnership between NAVTEQ and the Massachusetts Office of Geographic Information (MassGIS) for increased geocoding accuracy and success rates for State 911 data.

Data transfer model loading
The final datasets for each provider were appended and loaded into the SBDD transfer schema. Geometry and topology checks were performed a final time and the data were checked for conformance with SBDD database and business rules.

DATA DEVELOPMENT – WIRELINE AVAILABILITY

This section describes the methods used to create the following datasets representing wireline broadband availability (e.g., cable, xDSL, other copper wireline, fiber optic and other unclassified wireline services) by census block and/or road segment:

- BB_Service_CensusBlock and
- BB_Service_RoadSegment

The various wireline broadband availability data formats received include:

1. Non-geographically referenced CAD files containing cable or fiber strands;
2. Geographically referenced Shapefiles containing census block polygons or road segments;
3. Excel spreadsheets or delimited text files containing census block IDs
4. Excel spreadsheets or delimited text files containing individual street addresses;
5. Excel spreadsheets or delimited text files containing street address ranges
6. Written or verbal narratives of service areas; and
7. Excel spreadsheets containing maximum advertised speeds by US Census Bureau core based statistical area (CBSA) and rural statistical area (RSA).

For areas where census blocks are less than or equal to 2 square miles in area, a template containing 2010 census block polygon geography was used. Otherwise, a template containing line geography from 2010 TIGER/Line roads that intersect 2010 census blocks greater than 2 square miles in area. Associated attribute information included provider identification, technology of transmission and upload and download speeds.

Data Integration

The integration methods used, and described below, varied according to the source data format.

1. Integrating CAD strands: Cable strands submitted in CAD format were georeferenced to street centerlines and a 200 foot buffer was created from the strands. 2009 census blocks and 2009 TIGER/Line road segments (in census blocks greater than 2 square miles in area) that intersected the 200 foot buffer were classified as served and associated attribute information from tabular datasets or narratives were populated accordingly. These were later converted to 2010 census blocks and roads, as defined in method 4.

2. Integrating census block and road segment polygons: Data provided in Shapefile format required minor formatting of attribute field names and values to match the common schema.

   (a) The census block vintage (2000 or 2010) was determined by reviewing ID values and attributes were imported into the census block template.

   (b) If vector data was provided from a source other than TIGER/Line roads, a spatial intersection with a 200 foot buffer was performed to transfer attributes to the corresponding TIGER/Line road segments.

3. Integrating tabular data containing census block IDs: Tabular information relating to census blocks referenced either 2009 or 2010 census block data and were joined to the corresponding polygon geometry using the 15 or 16 character FIPS IDs. 2009 census block data were summarized and joined to the 2000 census block polygons using the first 15 characters of the FIPS ID while retaining the maximum advertised and typical speeds and other associated validation and data processing attributes. These were then converted to 2010 census blocks, as defined in method 4.

4. Converting to 2010 census blocks: Census blocks and associated attribute information were converted from 2000 to 2010 census blocks by performing a spatial overlay of the adjusted 2000 census blocks and the new 2010 census blocks. Attribute information was summarized by the 15 character GEO ID (i.e., FIPS ID) and statistics were calculated to carry over the appropriate attribute information (e.g. maximum advertised speeds), which were loaded back into a template containing the 2010 census block geometry.

5. Integrating tabular data containing individual street addresses: Tabular data containing individual street addresses, generally representing subscriber addresses, were geocoded using NAVTEQ 2008 Q4 streets data to generate point locations. 2010 census blocks and 2010 TIGER/Line road segments (in census blocks greater than 2 square miles in area) that intersect a 200 foot buffer of the points were classified as served. Associated attributes were also imported.

6. Integrating tabular data containing street address ranges: (a) If tabular data was based on 2010 TIGER/Line roads and included a TIGER line ID (TLID), the attributes were loaded into a template containing the TIGER/Line geometry by joining the TLIDs.

   (b) If tabular data was not based on TIGER/Line roads or did not have a means for creating a unique ID to link to the TIGER/Line data, the minimum, mean and maximum left and right street addresses were geocoded using NAVTEQ 2008 Q4 streets data to generate point locations. As with the individual street address methodology above, 2010 census blocks and 2010 TIGER/Line road segments (in census blocks greater than 2 square miles in area) that intersect a 200 foot buffer of the points were classified as served. Associated attributes were also imported.

7. Integrating narrative data: (a) Location information provided in narrative form, such as the names of streets served or unserved, were incorporated by classifying the qualifying road segments as served. A spatial intersection was then performed to classify any census blocks with area less than 2 square miles as served.

   (b) Attribute information provided in narrative form generally applied to all records or an easily identifiable subset of records in a dataset and the standardized values were assigned to the appropriate field in batch.

8. Integrating spreadsheets containing speed by CBSA/RSA: The tabular data was joined to corresponding CBSA/RSA polygon geometry using the CBSA/RSA ID. Maximum advertised download and upload speed values were transferred to census block and road segment availability records from the CBSA/RSA polygon they are located within.

Data standardization
All information was imported into to 2010 census blocks and road segments. Records with download speeds below 768 kbps (i.e., that don't qualify as broadband service) were removed from the final dataset.

DATA DEVELOPMENT – WIRELESS AVAILABILITY

This section describes the methods used to create the following dataset representing wireless broadband availability (e.g., fixed and mobile wireless and satellite services) by service area:

- BB_Service_Wireless

The various wireless broadband availability data formats received include:

1. Geographically referenced Shapefiles or MapInfo files containing service area polygons;
2. Geographically referenced KML raster files depicting service areas;
3. Non-geographically referenced PDF and JPG files depicting service area polygons;
4. Hard copy maps with hand-drawn service areas;
5. Excel spreadsheets containing street addresses; and
6. Emails and technical documents containing tower and signal specifications.

Associated attribute information included provider identification, technology of transmission, wireless spectrums used and upload and download speeds. In some cases, attributes were provided in a separate tabular or narrative form or had to be acquired from the provider's web site. If providers offered more than one spectrum, a separate feature was created for each unique provider and spectrum combination.

Data Integration
Data integration methods used, and described below, varied according to the source data format.

1. Integrating service area polygons: Data provided in vector format required minor processing to fix geometry errors and create separate polygons for unique provider and spectrum combinations. Polygons less than 0.125 square miles were removed and the remaining polygons were dissolved to create a single feature for each unique provider and spectrum combination. Attribute field names and values were created, formatted and/or populated from tabular or narrative form to match the standardized template format.

2. Integrating service area raster images: Propagation model outputs provided as KML raster images were imported into the GIS system; however, the geographic reference information was not able to be preserved. The imported raster images were georeferenced in the GIS by matching the intersections of propagation area boundaries and roads in Google Earth. Once georeferenced, the raster images were converted to polygons, then tagged with and aggregated by the associated tower ID and spectrum information to create service areas polygons for each propagation model. Additional associated attribute values were populated from information provided in narrative form.

3. Integrating static maps: The PDF and JPG maps containing wireless access points and service area buffers were georeferenced using known locations, such as road intersections. Service areas were digitized or recreated from buffered points on the georeferenced maps. Individual service areas were tagged with spectrum information and aggregated into a single service area for the provider and spectrum combination. Additional associated attribute values were populated from information provided in narrative form or from providers' web sites and the resulting service area boundaries received confidence score of 1.

4. Integrating hard copy maps: Hard copy maps containing shaded service areas were reproduced by digitizing boundaries based on known map locations, such as road intersections. Associated attribute values were populated from information provided in narrative form and the resulting service area boundaries received confidence score of 1.

5. Using tabular data containing street addresses: Tabular data containing individual street addresses, representing subscriber addresses or addresses where service was determine not to be available, were geocoded using NAVTEQ 2008 Q4 streets data to generate point locations. These locations were compared to service areas and propagation models to verify boundaries.

6. Modeling with tower and signal specifications: Wireless tower and signal specifications (e.g., latitude, longitude, cell site height, cell site frequency and effective radiated power) were used as input parameters in SPLAT! radio frequency signal propagation, loss, and terrain analysis software. Service area boundaries were derived from the received power contours in the resulting propagation models. Additional associated attribute values were populated from information provided in narrative form.

Data standardization

Service area datasets for each provider were clipped to the state boundary and self-intersecting lines were fixed prior to loading into the SBDD transfer schema.

DATA VERIFICATION – WIRELINE AND WIRELESS AVAILABILITY

This section describes the methods used to verify the following datasets representing wireline broadband availability (e.g., cable, xDSL, other copper wireline, fiber optic and other unclassified wireline services) by census block and/or road segment and wireless broadband availability (e.g., fixed and mobile wireless and satellite services) by service area:

- BB_Service_CensusBlock,
- BB_Service_RoadSegment and
- BB_Service_Wireless

Verification of availability data received from providers is essential to determining the accuracy and completeness of the resulting broadband availability maps and is an ongoing process. Methodologies continue to be developed and implemented for data verification and are incorporated into a confidence ranking process. The data verification and confidence ranking methods are described below.

The data verification process employs the following methods, which supply input for the confidence ranking methodology.

1. Cable service area modeling: Cable strand data for incumbent cable providers were acquired as georeferenced MapInfo files from the MA Department of Telecommunications and Cable (DTC) in 93% of the 305 cable-served towns. The strands were imported and a 200 foot buffer was created to approximate the distance from the cable that a structure can receive service without excessive cost or delay. The 200 foot distance was selected based on observed distances between poles and the acceptable distances of structures from cable as defined in cable license agreements. Census blocks and road segments acquired from providers that intersected the resulting service area buffers for that provider were given an increased confidence score.

2. DSL service area modeling: DSL service areas were modeled from known DSL-equipped central office locations, which were geocoded using NAVTEQ 2008 Q4 streets data and refined using aerial photography, street views and bird's-eye views from Google Maps and Bing Maps. A linear network was developed, using a comprehensive roads dataset maintained by the MA Department of Transportation (MassDOT), that encompassed all roadways within 17,800 linear feet of the central office location. A 200 foot buffer of the network was created to define a maximum service distance of 18,000 feet from the central office to the service location, based on input from industry experts, with the same 200 foot distance from pole to structure that was used in the cable model. The resulting service area buffers were cropped at town boundaries except where central offices were known to serve neighboring towns. Census blocks and road segments acquired from providers that intersected the estimated service areas for that provider were given an increased confidence score.

3. Infrastructure field surveys: Targeted field work has been performed to located broadband infrastructure, such as DSL-equipped remote terminals (RTs). As with the central offices, locations were mapped using address and landmark information acquired in the field by geocoding with NAVTEQ 2008 Q4 streets data and refining with aerial photography, street views and bird's-eye views from Google Maps and Bing Maps. Although many DSL-equipped RTs have been located in the field, they have not yet been incorporated into the DSL service area model yet due to the difficulty of predicting the directional nature of services provided from those locations. However, the locations are valuable for visual review areas of DSL coverage claimed by providers that fall outside of modeled service areas to evaluate the likelihood of service from a given RT location. These visual reviews are performed by team consisting of a GIS expert and a DSL technology expert and confidence scores modified accordingly.

4. Public surveys: Broadband subscription information is collected through web-based broadband surveys from the public and from community anchor institutions (see www.massbroadband.org/mapping/survey.html). The surveys are publicized through targeted events and publications and MBI email notifications. Information collected includes location, provider name, transmission technology, price, and speed for homes, businesses, and institutions throughout the state. At this time, the survey data is only used to verify availability by provider name and transmission technology. Census blocks and road segments acquired from providers that are within 200 feet of survey locations are given an increased confidence score. As with the service area models, the 200 foot distance represents the distance at which service can be provided without excessive cost or delay. In the future, speed test results will be summarized by census block to verify typical speed information received from providers as well.

   Responses to the public survey are geocoded through Google Maps and visually refined by the user if desired. Responses to the community anchor institution surveys are linked to existing point locations maintained by the Massachusetts Office of Geographic Information (MassGIS) or affiliated agency. Community anchor institutions that have changed addresses or are not already in the MassGIS datasets are geocoded using NAVTEQ 2008 Q4 streets data and refined using a combination of institution web sites and aerial photography, street views and bird's-eye views from Google Maps and Bing Maps.

   At this time, responses from the FCC's consumer broadband test are not used for data verification, but will be evaluated for inclusion in future data verification phases.

5. Provider web site information: If information acquired by providers – including availability and speed – appeared to be questionable, a search was performed on the provider's web site to confirm it. This was type of verification was only performed when uncertainties arose during visual review of the data. In the future, this type of review may be incorporated into a more structured approach to validate locations that are geographically dispersed throughout a provider's service area.

6. Community cable and DSL feedback: In collaboration with some Regional Planning Agencies (RPAs), availability maps were generated and distributed to carefully selected community representatives, such as local broadband committee members or town officials, with local knowledge of cable and/or DSL services in their town. The community representatives reviewed and mark-up hard copy maps to identify services areas that extend too far or not far enough and to provide the location or address of the last known service location along a road. This was initially implemented through a pilot project for the member communities of two RPAs and will be rolled out to 3 additional RPAs in other low confidence areas, which include the remainder of western Massachusetts and part of central Massachusetts. Confidence scores were be modified based on feedback from the community representatives and DSL service area boundaries were modified in areas with the most knowledgeable representatives.

7. Wireless drive studies: In coordination with local colleges, teams of student volunteers were trained to perform wireless drive studies. The students drove pre-defined routes with intermittent stops to collect wireless signal location and quality information using Android phones operating QoS Solutions' QMapper and QPerf software (see www.qos-solutions.com). The drive studies were performed in the same 5 RPA regions in central and western Massachusetts as the community cable and DSL feedback projects. The drive study results will be overlaid on the wireless providers' service areas and submitted for review by the providers. Further verification or service area boundary modifications may be discussed with providers in areas with anomalous results.

Confidence Ranking

As availability data is verified, the verification status is documented in each individual census block or road segment record or subdivision of a wireless service area. The records are also assigned numeric values from 1 to 5 that represent the level of confidence in the likelihood that service is available at that location. When service availability for a given provider and technology is verified by an alternate source, the confidence value for that location is increased by one, up to a maximum score of 5. A value of 1 represents the lowest confidence in provider data and no corroborating information from alternate sources. A value of 5 represents 3 or more corroborating sources or confirmation through field work. Data of all confidence levels are included in the availability datasets; however, locations that are deemed to be inaccurate as a result of the data verification process may have their confidence value reduced and may be tagged as not part of the service area.

General guidelines of the confidence ranking process are as follows:

- Initial rankings: Data records submitted by providers are given an initial confidence ranking of "1" or "2" depending on the level of ambiguity in the submission method. For example, availability information provided by census block ID, street address or spatial object is given a confidence ranking of 2. Whereas, availability information provided as hand-drawn or narrative estimates may be given a confidence ranking of 1.

- Verification from alternate sources: If availability at a given location is corroborated by an alternate dataset (such as the cable or DSL models, broadband survey responses, cable or DSL service area feedback from community representatives, or wireless drive study data interpolation), the verified location receives a 1 point increase in the confidence score for each corroborating dataset, with a minimum score of 3 and a maximum score of 5.

- Field confirmation: If availability at a given location is confirmed by known service locations identified through field work, it is given a confidence score of 5. Confirmed field locations include known infrastructure, such as DSL-equipped remote terminals, or known service availability acquired in wireless drive studies.

Provider Feedback Loop
All providers that submitted data received a written data submission report that described the format and completeness of the datasets they provided. This report included requests for additional information or alternate formats in the next submission and other data clarifications or corrections needed. Additional feedback was provided by phone or email conversations as needed. In addition, PDF maps of estimated services, based on the census blocks and roads or wireless area boundaries, were provided for verification and/or modification. Information on conflicting alternate data sources may also be provided for comment or challenge. In the future, this process will be standardized and formalized through the development of a web-based provider data portal.

DATA DEVELOPMENT – MIDDLE MILE INTERCONNECTION FACILITIES

This section describes the methods used to create the following dataset representing the location, technology and capacity of facilities that connect a service provider's network to another provider's network or the Internet:

- BB_ConnectionPoint_MiddleMile

Tabular data – including provider identification and facility ownership, capacity and type – were received from providers by street address or latitude and longitude. Latitude and longitude values were used to create point geometry when possible. Otherwise, street address data was geocoded using NAVTEQ 2008 Q4 streets data.

The MBI did not have alternate data sources for the verification of these datasets.

Data standardization
Facility ownership, capacity and type values were standardized to comply with valid value lists. Due to the field type of double used to store latitude and longitude, values with trailing 0's did not meet the 6 digit business rule. However, to preserve the accuracy of the data, these values were not modified to contain 6 digits. Latitude and longitude values received from providers with less than 6 digits were also not modified to prevent misrepresenting the data as more accurate than it really was.

DATA DEVELOPMENT – COMMUNITY ANCHOR INSTITUTION SERVICE SUBSCRIPTIONS

This section describes the methods used to create the following dataset representing the location and broadband service subscription of community anchor institutions throughout the state:

- BB_Service_CAInstitutions

The community anchor institution datasets deemed most relevant to broadband issues in Massachusetts were:

- K-12 schools
- Colleges and universities
- Public libraries
- Hospitals
- Community health centers
- Police and sheriffs
- Career centers
- Town halls

Existing spatial datasets containing community anchor institution names and locations were acquired from state and regional agencies. The attributes were standardized and imported into a template dataset. Missing attributes (e.g., zip codes) were acquired through web searches (e.g., on institution web sites or from the US Postal Service).

Initial data requests were made to state and regional agencies and/or associations to acquire any existing compilations of information on broadband service information at affiliated anchor institutions. Complete or almost complete datasets for career centers, state police and county sheriffs were acquired from the MA Executive Office of Labor and Workforce Development (EOLWD) and MA Executive Office of Public Safety and Security (EOPSS).

For the remainder of the anchor institutions, a campaign was implemented to acquire information through phone, email and web-based surveys from individuals associated with individual anchor institutions that were knowledgeable about its broadband services. Requests were also made through targeted outreach at events and in publications targeted at anchor institutions to increase awareness of broadband issues and participation the broadband survey. Agencies and organizations that assisted in this effort included the MA Department of Secondary and Elementary Education (ESE), MA Board of Library Commissioners (MBLC), MA Chiefs of Police Association (MCOPA), Massachusetts Municipal Association (MMA) and MA Department of Revenue (DOR), Mass League of Community Health Centers (MLCHC) and a CIO group for public and community colleges.

Data standardization

Survey questions were developed to request information that were easily understood and acquired by anchor institution staff. As a result, survey results required additional formatting to standardize the information in accordance with SBDD valid values. This information included broadband subscription status, transmission technology and maximum advertised speeds were collected and standardized to comply with valid value lists. In addition, street addresses for new anchor institutions that were not in the original GIS datasets were geocoded using NAVTEQ

2008 Q4 streets data and refined using visual references such as Google satellite photography and street view imagery.

In some cases, standardized transmission technology attribute values were used by the MBI to track uncertain technology categories. These were converted in the final datasets, as shown below, to comply with SBDD valid values.

MBI Technology Values	SBDD Technology Values
1: Unknown	0: Other
42: Cable - DOCSIS Unknown	41: Cable - DOCSIS Other
72: Fixed Wireless - Unknown	70: Fixed Wireless - Unlicensed

In some cases, transmission technology was corrected to reflect the service known to be offered by the specified provider. For anchor institutions that have more than one broadband connection, only records with the maximum speeds for each transmission technology type were included. For anchor institutions that did not provide broadband information, the broadband service field was set to unknown (BBSERVICE = U).

BROADBAND CHALLENGES IN MASSACHUSETTS

Broadband access differs significantly between the eastern, central and western parts of the state as well as the cape and islands. The majority of "unserved" and "underserved" communities are in western Massachusetts, which represents approximately 1/3 of the land mass in the state. Barriers to broadband access and deployment in this region are primarily due to topography, vegetation and population density. Western Massachusetts, as well as Cape Cod, currently lacks the middle mile infrastructure needed to encourage private sector development of last mile service.

Wireline broadband availability in Massachusetts, particularly in western Massachusetts, is overstated in the current broadband datasets. This is due, in part, to generalizations resulting from census block size and population distribution in rural areas. The MBI is also working with communities to incorporate local knowledge of service availability in our feedback to broadband service providers and flagging census blocks and road segments requiring additional verification.

Wireless broadband availability in Massachusetts is also overstated. The reliability of propagation modeling has been identified as a concern in establishing wireless broadband availability. Although topography is factored into propagation models, vegetation is also a significant barrier to wireless in Massachusetts and makes it difficult to determine if service is really available at a location. In addition, at least one fixed wireless provider is not able to accept new customers within its service area due to limited capacity. Responses to the MBI survey also indicate that typical mobile wireless speeds do not always qualify as broadband.

Information provided by the community anchor institutions also requires additional review and modification. Respondents had difficulty selecting the correct transmission technology (e.g., the provider name frequently did not correspond to the technology) and often did not know the advertised speed of their service.

Maryland Broadband Mapping Initiative
Broadband Availability Map Data
Submission Summary for Fall 2011

September 30, 2011

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Submission Summary

The staff of the Eastern Shore Regional GIS Cooperative (ESRGC) at Salisbury University in Salisbury, Maryland, in its role as primary technical lead for the Maryland Broadband Mapping Initiative, contacted 96 facilities-based broadband service providers (BSPs), received data from 47 providers which represent 49 different companies. An overall summary of the data submission can be described as:

96 potential facilities-based broadband service providers were contacted
30 BSPs did not respond
9 BSPs responded but did not provide data
47 BSPs responded and provided data
2 BSPs responded and agreed to provide data but have not as of September 30, 2011

Of those that provided data,

24 provided addresses
12 provided census block information
9 provided census blocks and road segments
13 provided wireless coverage areas

In addition, 10 of the 49 responsive BSPs provided middle mile infrastructure points

Since our last submission, we gained two participants as Cavalier Telephone LLC (via their new owner, PAETEC Communications, Inc.) rejoined the effort and Mediacom Communications submitted data for the first time.

Data Processing

For a specific discussion of the data processing steps for any particular BSP, please see the individual dataset report for each BSP below. In general, the data processing used to create the Fall 2011 data submission depended on the type of data provided by the BSP.

Census Blocks

To process the served census blocks, one first geocodes the provider-submitted address table (if applicable) to the ArcGIS 10 US Streets Geocode Service. Second, the address points are spatially joined to the Year 2010 census blocks. Next, divide the address points into the different technologies of transmission. Fourth, select those address points that are within the census blocks that are greater than 2 mi^2, exporting them as a separate feature class. Fifth, switch the selected set (thus creating all the address points in blocks that are less than 2 mi^2), and select those blocks. Sixth, import the provider-submitted table of served census blocks and merge with the address-created blocks (if applicable). Finally, export the results. For those providers that delivered data in Year 2000 census blocks, the crosswalk table provided by the US Bureau of the Census was used to transfer the data from the old blocks to the current blocks. The new, 2010 block-based map was then sent to the provider so that they could confirm the spatial representation. Finally, changes were made to any served blocks following the provider review.

Road Segments

To process the served road segments that are within census blocks that are greater than 2 mi^2, we import the table of road segment address ranges provided by the BSP. We then take the TO address values and the FROM address values on both the left and the right side of the segment and concatenate those address numbers with the street name, type, and direction, thus creating a maximum of 4 point addresses per road segment. Those point addresses are then address matched against both the TIGER line file and the Maryland iMap geocoding service. We can then find the street segments in TIGER that are adjacent to the located points. Finally, we select those TIGER lines that intersect the census blocks that are greater than 2 mi^2. The result can be loaded into the SBDD Transfer data model.

Service Addresses

The process for creating the service addresses is the same as the census blocks (above), except that the addresses that fall within the census blocks that are greater than 2 mi^2 are kept as the key feature class.

Middle Mile Infrastructure

Processing the middle mile infrastructure is relatively trivial, in that the providers submit geographic coordinates with the middle mile attributes. Most of the providers, however, do not submit new middle mile data every six months. Therefore, any middle mile infrastructure collected during previous submission periods have been include in the current submission.

Community Anchor Institutions

The creation and verification of the Community Anchor Institution (CAI) Database is the responsibility of the Center for GIS at Towson University (CGIS). For the October 2011 submission, CGIS focused on improving the quality of Maryland's CAI broadband dataset by reaching out to county executives, by supplementing data collected for medical CAIs with data from the Maryland Department of Health and Mental Hygiene, and by removing duplicate data. The following narrative describes the work performed in each area.

In order to improve county-level data, the County Executives of each Maryland county, and Baltimore City, were contacted by letter in June 2011 requesting their cooperation with the

Maryland Broadband Mapping Initiative's effort to build the CAI database. Of the 24 county executives who received the letter, 22 responded by providing a contact to assist in the data collection effort. The CAI information collected to-date was formatted in an Excel spreadsheet for each county. The spreadsheets are organized by tabs representing each of the 7 CAI categories. Hospitals, medical CAIs, and private schools were excluded because they are not county-run entities. The county CAI contacts were asked to review the database entries, and to add, correct, and delete CAIs and their attributes based on their knowledge and available information.

Updated CAI information was returned by 15 counties. Two of the counties (Harford and Howard) misinterpreted the request and provided information related to the Broadband Technology and Opportunities Program (BTOP). All of the data updates received from the counties were reviewed and then integrated into Maryland's master CAI database. The table below summarizes by county the CAI database improvements resulting from this effort (not including hospitals, medical CAIs, and private schools).

	Submitted to county for review			Returned by county			
	# Records	# Records with Broadband Info	% Records with Broadband Info	# Records	# Records with Broadband Info	# Records Broadband Info Updated by County	% Records Broadband Info Updated by County
Allegany	411	62	15%	419	60	7	**2%**
Anne Arundel	305	164	54%	306	238	221	**72%**
Baltimore City	1096	227	21%	*No information received*			*0%*
Baltimore	386	372	96%	385	301	112	**29%**
Calvert	84	69	82%	79	75	23	**29%**
Caroline	38	21	55%	46	46	46	**100%**
Carroll	150	56	37%	151	143	143	**95%**
Cecil	119	36	30%	121	45	12	**10%**
Charles	115	38	33%	116	113	15	**13%**
Dorchester	79	22	28%	*No information received*			*0%*
Frederick	147	81	55%	*No information received*			*0%*
Garrett	151	129	85%	126	114	20	**16%**
Harford	156	71	46%	*No information received*			*0%*
Howard	153	79	52%	*No information received*			*0%*
Kent	26	15	58%	28	27	29	**104%**
Montgomery	464	397	86%	443	392	249	**56%**
Prince George's	436	398	91%	507	434	282	**56%**
Queen Anne's	77	26	34%	164	57	33	**20%**
Somerset	35	20	57%	*No information received*			*0%*
St. Mary's	73	57	78%	68	61	24	**35%**
Talbot	33	10	30%	34	24	17	**50%**
Washington	Did not receive a contact			*Did not receive a contact*			*0%*
Wicomico	54	42	78%	*No information received*			*0%*
Worcester	Did not receive a contact			*Did not receive a contact*			*0%*

Prior to the April 2011 submission, data was purchased from DirectMail.com in order to obtain information about medical CAIs. The purchase totaled 21,996 records. As part of a continuing effort, the data were reviewed for erroneous records and for possible consolidation of records relating to hospitals, labs, and private practice groups. Due to time constraints and file size, the review for the more populous counties was restricted to addresses with five or more healthcare providers/facilities. Review of the largest counties (Montgomery, Prince George's, and Baltimore Counties) was restricted to addresses with ten or more facilities. This effort led to an approximate reduction of over 3,100 records and will continue through the next update cycle.

To further supplement medical CAIs, GIS data was obtained from the Maryland Department of Health and Mental Hygiene's (DHMH) Office of Health Care Quality licensee database for medical facility classes such as assisted living programs, ambulatory surgical facilities, hospices, adult medical day care, physical therapy centers, facilities for developmentally disabled persons, mental health facilities, rehabilitation centers, and other similar entities. The data were reviewed for errors and duplicate records; approximately 500 of the records required geocoding and/or address correction. Additionally, the DHMH data were compared against the purchased and county medical facilities to remove possible duplications from these sources. Overall, more than 6,800 records from DHMH were added to the Maryland's medical CAI database.

In summary, the Maryland broadband CAI database now contains 30,579 records, an increase of 3,620 (13.4%) from the spring 2011 submission. Information regarding the broadband service for 2,843 (9.3%) of those CAIs has been obtained. There were significant percentage increases in the number of CAIs with broadband service information in the library, public safety, post-secondary school, and government CAI categories. Collecting broadband service information for the medical/healthcare CAIs continues to be a significant challenge, as does collecting a complete census of all county-based CAIs

		April 2011 Submission			October 2011 Submission		
	CAI Category	# CAIs with BBSERVICE	Total CAIs	% of CAIs with BBSERVICE	# CAIs with BBSERVICE	Total CAIs	% of CAIs with BBSERVICE
1	School (K-12)	1,482	1,876	79.00%	1,465	1,791	81.80%
2	Library	135	202	66.83%	139	193	72.02%
3	Medical / Healthcare	25	22,118	0.11%	22	25,829	0.09%
4	Public Safety	227	684	33.19%	406	722	56.23%
5	University / College/ Other Post-Secondary	39	82	47.56%	50	91	54.95%
6	Other Community Support - Government	633	1,470	43.06%	692	1,255	55.14%
7	Other Community Support - Non-Government	18	527	3.42%	69	698	9.89%
	Total	**2,559**	**26,959**	**9.49%**	**2,843**	**30,579**	**9.30%**

Data Verification

The ESRGC, in partnership with the Center for GIS at Towson University and as a subcontract to the SBDD grantee in Maryland, the Maryland Broadband Cooperative, conducted a number of verification and validation tests on the provider-submitted broadband availability data. In the event that inconsistencies or errors were found, certain changes are made to the provider-submitted data. These changes are either retention but modification to provider-submitted data or the removal of the provider-submitted data, depending on the type and severity of the error. Given our extensive review and testing of broadband availability information in Maryland, we feel confident that the changes we make are improving the accuracy of the provider's submission. We continue to search for new ways to refine the submitted data and present an ever-increasing accurate portrayal of broadband availability in our state.

In the first phase of data validation, the provider-submitted data is processed for inclusion within the NTIA transfer model. During this processing, several data inconsistencies can be found. They include:

1) Submitted download and upload speeds do not match the values expected for a given technology of transmission
2) Service addresses are located hundreds of miles away from the provider's known service areas
3) Served blocks with technologies and speeds that do not meet the working definition of broadband
4) Addresses/road segments/blocks that have no technology of transmission

For each of these, the initial remedy is to contact the provider for clarification/modification. If that communication is not successful for whatever reason, the data team makes a decision to either modify the data to match expected values or removes the errant data.

In the second phase of data validation, a maximum of fourteen data checks are conducted on each of the provider-submitted broadband availability data, listed below. Different versions of data verification tests were conducted on submissions from wireline broadband providers versus wireless providers, because of the differing submission geometry. Each check will be explained in detail below. The result of each of these tests is an error statistic, cataloged in a data verification report. No changes to the data are made based on these tests.

1) Maximum down/upload speeds reported by provider
2) Typical down/upload speeds reported by provider
3) Typical down/upload speed from 2010 speed test
4) Speed tests match reported typical speeds or are within 1 speed tier
5) Speed tests present within blocks not reported as served by provider
6) Census blocks/coverage area reported to project, but no tract reported directly to FCC

7) Tracts reported directly to FCC, but no census blocks/coverage area reported to project
8) Census blocks/coverage areas versus unserved area locations reported
9) Total number of unserved area locations reported per provider
10) Web search verification
11) Census blocks that are outside providers Cable Franchise Boundary
12) Census blocks that are within another providers Cable Franchise Boundary
13) Census blocks that are outside DSL boundary
14) Wireless broadband presence and speed systematic field sampling

Finally, the third and final phase of data validation is an in-depth discussion of a provider's data submission and the subsequent data tests with the provider via web conference. During this discussion, a detailed review of the submission takes place including an examination of their resulting availability maps. For the Fall 2011 submission, only one of these web conferences has taken place. The length of time between the provider submission and the delivery deadline to the NTIA is not enough to complete all three data validation phases. Our intention is to complete the third phase for most if not all providers during the three months following a data submission, and incorporating what we learn into the following biannual delivery.

Maximum down/upload speeds reported by provider

Facilities-based BSPs are required to provide the maximum downstream and upstream speeds by the NTIA and the NoFA of August 2009. These speeds are dependent upon the technology of transmission the BSP uses to deliver broadband service. Speeds are reported in ordinal categories, or tiers, as defined by the NoFA. They are:

Downstream Speed Tier	Upstream Speed Tier	Corresponding Speed
--	1	Less than or equal to 200 kbps
--	2	Greater than 200 kbps and less than 768 kbps
3	3	Greater than or equal to 768 kbps and less than 1.5 mbps
4	4	Greater than or equal to 1.5 mbps and less than 3 mbps
5	5	Greater than or equal to 3 mbps and less than 6 mbps
6	6	Greater than or equal to 6 mbps and less than 10 mbps
7	7	Greater than or equal to 10 mbps and less than 25 mbps
8	8	Greater than or equal to 25 mbps and less than 50 mbps
9	9	Greater than or equal to 50 mbps and less than 100 mbps
10	10	Greater than or equal to 100 mbps and less than 1 gbps
11	11	Greater than or equal to 1 gbps

For this data check, the maximum downstream/upstream speeds reported from each provider are summarized in a table. These speeds are summarized for census blocks, wireless coverage areas, road segments, and service address points.

For the data submission, 49 providers (100%) reported maximum downstream/upstream speeds for census blocks. The lowest maximum downstream speed Greater than or equal to 768 kbps and less than 1.5 mbps, reported by 12 providers. The highest maximum downstream speed was greater than or equal to 1 gbps, reported by 6 providers The most frequent maximum downstream speed was greater than or equal to 3 mbps and less than 6 mbps, reported by 2 providers.

Typical down/upload speeds reported by provider

BSPs are required to provide the typical downstream and upstream speeds by the NTIA and the NoFA of August 2009. Typical speeds are, per the NoFA, intended to be "the data transfer throughput rate that most subscribers to service at the maximum advertised downstream speed can achieve consistently during expected periods of heavy network usage." These speeds are dependent upon the technology of transmission the BSP uses to deliver broadband service. Speeds are reported in ordinal categories, or tiers, as defined by the NoFA (see table above).

For this data check, the typical downstream/upstream speeds reported from each provider are summarized in a table. These speeds are summarized for census blocks, wireless coverage areas, road segments, and service address points

For the data submission, 20 providers (41%) reported typical downstream/upstream speeds. The lowest typical downstream speed was greater than 768 kbps and less than 1.5 mbps, reported by 3 provider. The highest typical downstream speed was greater than or equal to 1 gbps, reported by 2 providers. The most frequent typical downstream speed of the census blocks was greater than or equal to 3 mbps and less than 6 mbps, reported by 3 providers.

Typical down/upload speed from 2010 mobile speed test
Typical down/upload speed from 2010 computer-based speed test

Beginning in April 2010, the MBBMI team and the FCC (nearly simultaneously) began collecting speed test information from broadband consumers in the state of Maryland. This speed test information included the downstream and upstream speed in kbps, the signal latency, the street address of the tester, the type of connection location (home, work, etc), the connection technology (cable/DSL, fiber optic, satellite/dial-up, or unknown – MBBMI test only), the IP address of the test machine, and the corresponding BSP. The MBBMI contracted with a company named Ookla to create their test; the FCC used both Ookla and an alternative method developed by a company named MLab.

From mid-April 2010 until June 30, 2011, 12,141 speed tests were collected by MBBMI and 26,537 PC-based speed tests were collected by the FCC (the FCC also collected mobile speed tests, see below). Of these, 5,527 MLab-based FCC speed tests were eliminated (to insure consistent speed test results and 11,354 were removed because they did not include a valid address. The FCC and the MBBMI speed tests were then combined and geocoded using their street address. Just over 12% of the addresses could not be resolved, thus a total of 19,162 of speed tests were used in verification processing.

The speed tests associated with each reporting BSP were extracted from the geocoded set. The downstream and upstream speeds were classified according to the NTIA's speed tiers (see table above) and the number of tests in each tier were counted. A table of those results in included in each data validation/verification report. For mobile broadband providers, a distinction was made between the results from mobile speed tests (generated by an iOS or Android app) and the results from computer-based speed tests (generated by a web-based speed test) as those results are likely to be different (due to significant hardware/software differences) even though the network being accessed is the same

For the state of Maryland as a whole, the PC-based speed test results are:

Speed Tier	Number of Downstream Tests	% of Downstream Tests	Number of Upstream Tests	% of Upstream Tests
1	483	2.5%	1,461	7.6%
2	1,541	8.0%	4,720	24.6%
3	1,674	8.7%	1,154	6.0%
4	2,077	10.8%	2,580	13.5%
5	1,713	8.9%	5,895	30.8%
6	2,387	12.5%	1,440	7.5%
7	6,803	35.5%	1,754	9.2%
8	1,959	10.2%	144	0.8%
9	469	2.4%	12	0.1%
10	56	0.3%	2	0.0%

Speed tests match reported typical speeds or are within 1 speed tier

For the 20 providers that submitted typical speeds for their data, a comparison was conducted between the mode (the most frequent value) of the typical download speed tier from the provider area and the FCC/Ookla speed tests. In instances where the most frequent download speed tier from the speed tests matched, or was within one tier of, the typical download speed tier from the provider, the response to this statement is affirmative (6 providers). When the response to this statement is negative (8 providers), there is question about the typical download speeds that have been submitted by the provider.

Speed tests present within blocks not reported as served by provider (error reported as proportion of total blocks submitted)
Number and percentage of mobile speed tests verifying coverage area
Number and percentage of computer-based speed tests verifying coverage area

Using the location of speed tests submitted through the FCC or the MBBMI speed test tools, the team sought to compare the location of broadband availability submitted by BSPs and the location of actual broadband service reported by speed test takers.

For this verification test on wireline provider census block submissions, the number of census blocks served (as determined by the location of a speed test) but were not reported by provider were calculated. That number is then divided by the total number of blocks submitted by the provider, reported as an error percentage.

For the state of Maryland, the maximum number of census blocks shown to be served by speed test data but not reported by a BSP is 492 (for Comcast Cable Communications, LLC , 1% of their total reported blocks). The minimum percentage of served census blocks confirmed by speed test was 0% (8 providers). The maximum percentage was 100% (Cogent and Tata Communications (America) Inc.).

For this verification test on wireless provider coverage area submissions, the following statistics are reported:

1) Confirmation of coverage area served
    - The number/percentage of computer-based speed tests that fall within the BSP's reported coverage area(s).
    - The number/percentage of mobile speed tests that fall within the BSP's reported coverage area(s).
2) Area served, not reported by provider
    - The number/percentage of computer-based speed tests that fall outside the BSP's reported coverage area(s).
    - The number/percentage of mobile speed tests that fall outside the BSP's reported coverage area(s).

For the wireless providers in the state of Maryland, one-half (6 of 14) had computer-based speed tests submitted by users. The maximum number of computer-based speed tests shown to fall within the reported coverage area of a BSP is 67 (for Hughes Communications, Inc., 100% of their computer-based speed tests). Other BSPs that has 100% of their computer-based speed tests fall within their reported coverage were ATTWireless and Wildblue Communications, Inc.. The minimum percentage of computer-based speed tests shown to fall within the reported coverage area of a BSP was 95.2% (Clearwire, 80 tests fell inside). On average, 98.5% of computer-based speed tests fell within the BSP's reported coverage area.

Regarding the number of mobile speed tests that fall within the reported coverage area of a BSP, 50% (7 of 14) of the wireless BSPs had tests and the maximum number came from Verizon Wireless customers, with 9,327 tests within their reported coverage area. Two wireless BSPs had 100% of their mobile speed tests fall within their reported coverage area: Hughes, and Wildblue Communications, Inc.. Cleaerwire was the BSP with the smallest percentage of tests falling within their reported coverage area – 81.5%. On average, 96.4% of mobile speed tests fell within the BSPs reported coverage areas.

Census blocks/coverage area reported to project, but no census tract reported to FCC
Census tracts reported to FCC, but no census blocks/coverage areas reported to project

Another source of data validation was the FCC's Form 477 data as of December 2009. This dataset is collected semi-annually by the FCC from BSPs, both facility-based and not facility-based. The BSPs report the number of residential and business subscribers to their broadband service per census tract. For comparison, the average census tract in Maryland contains 67 census blocks. While the Form 477 data is much coarser than the SBDD-reported data, it still should align spatially.

Therefore, as another verification check, we test the number of census blocks that are reported by wireline BSPs that have no corresponding reported census tract in the BSP's Form 477 data. Similarly, we test the number of tracts from the wireline BSP's Form 477 data that do not have corresponded census blocks reported in this initiative.

For the state of Maryland, the maximum number of census blocks that were reported as served but had no corresponding Form 477 census tract was 5,785 from Covad Communications Company. On average, 451 census blocks (from 25 providers) had no corresponding census tract. The maximum number of census tracts that had no corresponded reported census blocks was 192 from DSLnet Communications, LLC. On average, 24 census tracts (from 25 providers) had no corresponding census blocks.

For wireless BSPs, we tested the number of census tracts that either intersect or do not intersect each reported coverage area. Because it is not possible to tell what portion of the Form 477 reported census tract may receive the wireless service, a simple intersect between served tracts and coverage areas is the only test available from these data sources. For those wireless BSPs reporting to the FCC on Form 477 (8 of 14), 100% of the served census tracts intersected the reported coverage areas.

Census blocks/coverage areas versus unserved area locations reported
Total number of unserved area locations reported per provider

At the MBBMI website (www.mdbroadbandmap.org) and at the FCC website (www.broadband.gov), residents and business owners have the opportunity to report unserved areas. These are locations, specifically addresses, at which the potential broadband customer cannot access broadband service. Those unserved area reports are taken in by the MBBMI team, geocoded according to their address, and are examined for their spatial coincidence with BSP availability coverages. For each wireline provider, the number of census blocks reported as served that contain a unserved area report are calculated, as well as the total number of unserved area reports within a BSPs availability area. For each wireless BSP, the number/percentage of unserved area reports from both the FCC and the MBBMI that fall within and outside the reported coverage area are calculated.

It is important to note that, at the present time, these unserved area reports are unverified. It is possible that broadband service may be available either at the address (but the person reporting the unserved area location was unaware of service availability), or not available at the address because of some unique configuration problem at that address specifically. It is also entirely possible that portions of a census block may be served but other portions may not.

For the state of Maryland, the maximum number of a wireline BSP's available census blocks that contain an unserved area location report is 63 (Verizon Communications, Inc.). The minimum number is 0 (17 providers). The maximum number of unserved area location reports in a wireline BSP's available area is 76 (Verizon Communications, Inc.) There were 5 wireline providers to have only 1 unserved area location report in their areas.

For the state of Maryland, the maximum percentage of unserved area locations reported from the FCC within a wireless BSP's reported coverage area is 98.7% (both are satellite providers). The maximum percentage of unserved area locations reported from the FCC within a non-satellite wireless BSP's reported coverage area is AT&T Wireless at 98.5% (230 of 240). The average percentage of unserved area locations (reported from the FCC) that fall within a wireless BSP's reported coverage area is 48% (116 of 202). For those unserved area locations reported by the MBBMI, the maximum percentage of unserved area locations within a wireless BSP's reported coverage area is 100% (147 of 147), true for each of the satellite wireless providers (HughesNet, StarBand, and Wildblue). The maximum percentage of unserved area locations reported from the MBBMI within a non-satellite wireless BSP's reported coverage area is AT&T Wireless at 96.6% (142 of 147). The average percentage of unserved area locations (reported from the MBBMI) that fall within a wireless BSP's reported coverage area is 44.6% (66 of 147).

Web search verification

Some broadband service providers publish service availability query tools on their corporate websites. The MBBMI team took the opportunity to test the broadband availability areas submitted by the BSPs against the BSP's web-based service availability tools. A systematic sampling grid was created for the entire state of Maryland. A sample point was placed every 4000 meters, then the nearest property address (within at most 1000 m) was chosen. This yielded a grid of 1,472 sample points. In Baltimore City, an additional 24 sample points were added (approximately every 2000 meters) in order to have reasonable sampling density within the small area of the City. This brought the total sample points to 1,496.

For each BSP that had a web-based service availability query tool (11 providers), the sample point grid addresses were used to verify the availability of service (or lack thereof) compared to both the reported service area, the area just outside the stated service area, and a random selection of grid points across the state. The following combinations of reported service vs. queried service were tallied:

1) A census block/coverage area was reported as served and the sample was returned as served
2) A census block/coverage area was reported as served but the sample was returned as unserved
3) A census block was not reported as served (or the location was outside the wireless coverage area) and the sample was returned as not served
4) A census block was not reported as served (or the location was outside the wireless coverage area) but the sample was returned as served

The total number of sample points in categories 2 and 4 are reported as error (of commission and of omission, respectively).

For Comcast and Verizon, all 1,496 sample points were used as those two BSPs offer broadband service in all areas of the state.

For the eleven wireline BSPs in the state of Maryland that have a Internet-based availability tool, the maximum omission error rate was 24.1% reported by Armstrong Cable The minimum omission error rate was 0% and was reported by Charter Communications and Starpower. The average omission error rate was 11.3%. The maximum commission error rate was 35.7% reported by Verizon Maryland. The minimum commission error rate was 0% and was reported by 4 providers. The average commission error rate was 7%. The maximum total error rate was 36% reported by Verizon Maryland The minimum total error rate was 0% reported by 4 providers. The average total error rate was 15.1%.

Census blocks that are outside provider's own Cable Franchise Boundary
Census blocks that are within a different provider's Cable Franchise Boundary

For those BSPs that provide broadband service via cable modem technology, they are (supposedly) constrained to a service area defined by a local (or several local) cable franchise boundar(ies). The MBBMI team obtained the spatial extent of the cable franchise boundaries within the state of Maryland from the Maryland Broadband Cooperative. With these cable franchise boundary areas, a test can be performed to count both the number of served census blocks that fall outside of a provider's designated cable franchise boundary area and the number of served census blocks the fall within a different provider's cable franchise boundary. The first statistic may or may not be an error. If a cable provider is surrounded by an area that has no competing franchises, some expansion beyond the existing franchise boundary is expected. The second test may also not be an error in that franchise boundaries usually refer to cable television service specifically. A provider may be allowed to expand non-television services like broadband into competing areas. It is also possible that the cable franchise boundaries are not up-to-date.

In Maryland, we can test if any of seven providers report blocks outside of their own boundary. The maximum number of blocks that fall outside the cable franchise boundaries is 5,730 reported by Comcast Cable Communications, LLC. This represents 11.9% of their total number of served blocks. The minimum number of "outside" blocks is 8 reported by Easton Utilities, or 1.5% . The average number of blocks that fall outside the cable franchise boundary is 1,471.

Thirteen broadband providers that deliver service via cable modem have the potential of serving blocks contained within someone else's boundary. The maximum number of blocks that fall into someone else's cable franchise boundaries is 2,773 reported by Broadstripe, LLC. This represents 94% of their total number of served blocks. The minimum number of blocks to fall in someone else's boundary is 1 reported by Hotwire Communications, but that represents 100% of their coverage area. The average number of blocks that fall outside the cable franchise boundary is 643

Census blocks that are outside DSL boundary

For those BSPs that provide broadband service via digital subscriber line (DSL) technology, the general area of DSL availability is tracked by several industry groups. The MBBMI team obtained the spatial extent of the DSL availability areas within the state of Maryland from the Maryland Broadband Cooperative. With these DSL availability areas, a test can be performed to count the number of census blocks that fall outside of the DSL availability area. This may indicate an error, although it is possible that the DSL availability boundaries are not up-to-date or correct. There was no metadata concerning currentness or quality included in the DSL availability areas.

In Maryland, 12 providers are eligible for this test. The maximum number of blocks that fall outside the DSL availability areas is 20,257 reported by Verizon Maryland Inc. This represents

26% of their total number of served blocks. The minimum number of "outside" blocks is 0 reported by Tata. The average number of blocks that fall outside the DSL availability area is 3,226.

Wireless broadband presence and speed systematic field sampling

For the wireless coverage areas, many of the other data checks and tests are not appropriate to use. In the summer of 2011, the MBBMI embarked on the second phase of a wireless coverage area verification project. For each of the 1,496 systematic sampling grid points (increased slightly from 2010 to sample more intensively in Baltimore City), a research team visited the sample address with nine phones, two each for Sprint, Verizon Wireless, AT&T, and T-Mobile, measuring both 3G and 4G network presence and speed, as well as one phone to test the Cricket network. Using the FCC/Ookla speed test app, the broadband availability, downstream and upstream speeds, and the GPS location of the test were collected.

After the field sampling was completed, 1,486 grid points with valid samples were used to conduct this test; 10 of the original sample locations were not collected due to a communication error with the field team. Of those, the following combinations of reported service vs. sampled service were tallied:

1) A sample point was in an area reported by the provider as served and the sample was collected as served
2) A sample point was in an area reported by the provider as served but the sample was collected as unserved
3) A sample point was in an area reported by the provider as not served and the sample was collected as not served
4) A sample point was in an area reported by the provider as not served but the sample was collected as served

The total number of sample points in categories 2 and 4 are reported as error (of commission and of omission, respectively). Verifying the 4G network presence proved more challenging. Because the 4G phones will conduct a mobile broadband test on a 3G network if it all that is available, simply noting the presence of a speed test from a 4G phone is not enough to verify that the phone was actually accessing the 4G network. Therefore, in order to isolate those speed tests that were truly taken on the 4G network, we selected those tests that had an average download speed of 2000 kbps or greater. This number was chosen by examining the typical speed results in the known 4G areas of the state, plus consulting published speed comparison studies on numerous popular technology websites.

For the 3G coverage areas in the state of Maryland, T-Mobile had the maximum number of samples that were reported as omitted (sampled as served but not within the coverage area) was 849 and the error rate was 63.6% (849 of 1,334 samples that had registered service). AT&T

Wireless had the minimum number of samples that were reported as omitted (13 or 1.0%). The average omission error rate was 26.3%. Sprint-Nextel had the maximum number of samples that were reported as committed (sampled as not served but within the coverage area) at 263. The commission error rate was 26.9% (977 were tested). Verizon Wireless had the minimum number of samples that were reported as committed (64 or 5.2%). The average commission error rate was 15.5%.

For the 4G coverage areas in the state of Maryland, Verizon Wireless had the maximum number of samples that were reported as omitted (sampled as served but not within the coverage area) was 60 and the error rate was 21.9% (60 of 274 samples that had registered service). AT&T Wireless had the minimum number of samples that were reported as omitted (0). The average omission error rate was 14.0%. AT&T Wireless had the maximum number of samples that were reported as committed (sampled as not served but within the coverage area) at 1,367. The commission error rate was 92% (1,453 were tested). Verizon Wireless had the minimum number of samples that were reported as committed (69 or 24.4%). The average commission error rate was 70.2%. This average rate is so high because most of the tests we took within 4G areas did not return 4G speeds.

Individual Provider Data Summaries

Allied Telecom Group, LLC
DBA: **Allied Telecom Group, LLC**

Data Characteristics

Date of Original Submission:	3/7/2011
Date of Update Submission:	8/26/2011
Currency of Data:	6/30/2011
FRN:	0002154367
Type of data submitted:	Address Table
Census Block Count:	82
Total Matched Address Points Count:	164
Unmatched Address Points:	1
Number of Technology of Transmission Types:	4
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to ESRI US Streets address locator
  - Number matched: 164
  - Number unmatched: 1
- Spatially join matched address points to 2010 census blocks
- Separate addresses by technology of transmission

Census Block Process:

- Join the spatial join result to the 2010 census blocks based on the GEOID10 field for each technology
  - Export results for each technology
  - Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Speed Domains:

- Maximum Advertized and Typical Speeds changed
  - Technology of Transmission 30 – 44 records changed to speed tier 8 to fit domain

Data Verification

Maximum down/upload speeds reported by provider:
Census Blocks

Max Download Category	Count	% of Blocks
10	44	42%
11	28	27%
4	5	5%
7	28	27%

Max Upload Category	Count	% of Blocks
10	44	42%
11	28	27%
4	5	5%
5	28	27%

Typical down/upload speeds reported by provider:
Census Blocks

Typical Download Category	Count	% of Blocks
10	44	42%
11	28	27%
4	5	5%
7	28	27%

Typical Upload Category	Count	% of Blocks
10	44	42%
11	28	27%
4	5	5%
5	28	27%

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
4	1	100%

Speed Test Upload Tier	Count	% of Tests
6	1	100%

Speed tests match reported typical speeds or are within 1 speed tier: No

Speed tests present within blocks not reported as served by provider (error reported as proportion of total blocks submitted): 0/82 (0%)

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: N/A
Number of tracts reported to FCC, but no census blocks reported to project: N/A

Dead zones:
Number of census blocks with dead zones reported via broadband.maryland.gov: 1
Total number of dead zones reported per provider via broadband.maryland.gov: 1

Number of census blocks with dead zones reported via mdbroadbandmap.org: 0
Total number of dead zones reported per provider via mdbroadbandmap.org: 0

Web Search Verification: N/A

Census blocks that are outside DSL boundary: 14/82 (17%)

Antietam Cable Television, Inc.

DBA Name: Antietam Cable Television, Inc

Data Characteristics

Date of Original Submission:	7/29/2010
Date of Update Submission:	2/21/2011
Currency of Data:	12/31/2010
FRN:	0002154367
Type of data submitted:	Addresses
Census Block Count:	2424
Total Matched Address Points Count:	21847
Unmatched Address Points:	37
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to ESRI US Streets address locator
  - Number matched: 21021
  - Number unmatched: 863
- Unmatched address are geocoded to Maryland Property View address locator
  - Number matched: 548
  - Number unmatched: 315
- Unmatched addresses are geocoded to Maryland centerline address locator
  - Number matched: 278
  - Number unmatched: 37
- Merge matched addresses
- Spatially join address points to 2010 census blocks
- Select by location the address points that are completely within a greater than two square mile census block
  - Export as address points to be loaded into the NTIA data model
    - Result: BB_Service_Address
  - Switch the selection and export as points to create census blocks

Census Block Process:

- Join the switched selection (BB_Service_Address) address points to the 2010 census blocks based on the GEOID10 field
  - Export results
  - Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
7	2424	100%

Max Upload Category	Count	% of Blocks
4	2424	100%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	1	1%
3	3	2%
4	33	20%
5	119	71%
6	4	2%
7	7	4%

Speed Test Upload Tier	Count	% of Tests
1	1	1%
2	34	20%
3	122	73%
4	8	5%
6	2	1%

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

Speed tests present within blocks not reported as served by provider (error reported as proportion of total blocks submitted): 2/2424 (<1%)

Form 477Verification:
Number of census blocks reported to project, but no tract reported to FCC: 0
Number of tracts reported to FCC, but no census blocks reported to project: 0

Dead zones:
Number of census blocks with dead zones reported via broadband.maryland.gov: 1
Total number of dead zones reported per provider via broadband.maryland.gov: 1

Number of census blocks with dead zones reported via mdbroadbandmap.org: 1
Total number of dead zones reported per provider via mdbroadbandmap.org: 1

Web Search Verification: 41/2424 (2%) of census blocks were confirmed using online search feature of given provider.

Antietam WebSearch Verification Table	Count	Percentage
Total # of sample points	1496	
Number of sample points with results	123	8%
Result is yes and census block is in served area	41	33%
Result is yes but not in a census block reported as served	21	17%
Result is no and census block is in served area	5	4%
Result is no and census block not served area	56	46%

Census blocks that are outside providers own Cable Franchise Boundary: 743/2424 (31%)

Census blocks that fall within another provider's Cable Franchise Boundary: 58/2424 (2%)

Armstrong Holdings, Inc.

DBA Name: Armstrong Utilities, Inc.

<u>Data Characteristics</u>

Date of Original Submission:	3/31/2010
Date of Update Submission:	8/15/2011
Currency of Data:	6/30/2011
FRN:	0003765617
Type of data submitted:	Census Block Table & Road Segments
Census Block Count:	2592
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	Yes

<u>Data Processing</u>

Census Block Process:

- Join the provided census block table to the 2010 census blocks based on the GEOID10 field
    - Export results
    - Load exported results into the NTIA data model
        - Result: BB_Service_CensusBlock

<u>Data Verification</u>

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
7	2592	100%

Max Upload Category	Count	% of Blocks
5	2592	100%

Road Segments

Max Download Category	Count	% of Road Segments
7	198	100%

Max Upload Category	Count	% of Road Segments
5	198	100%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	8	10%
3	1	1%
4	1	1%
5	15	19%
6	42	54%
7	11	14%

Speed Test Upload Tier	Count	% of Tests
1	2	3%
2	8	10%
3	10	13%
4	57	73%
6	1	1%

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

Speed tests present within blocks not reported as served by provider (error reported as proportion of total blocks submitted): 0/2592 (0%)

Form 477Verification:
Number of census blocks reported to project, but no tract reported to FCC: 92
Number of tracts reported to FCC, but no census blocks reported to project: 1

Dead zones:
Number of census blocks with dead zones reported via broadband.maryland.gov: 6
Total number of dead zones reported per provider via broadband.maryland.gov: 6

Number or census blocks with dead zones reported via mdbroadbandmap.org: 5
Total number of dead zones reported per provider via mdbroadbandmap.org: 6

Web Search Verification: 46/2592 (2%) of census blocks were confirmed using online search feature of given provider

Armstrong WebSearch Verification Table	Count	Percentage
Total # of sample points	1496	
Number of sample points with results	166	11%
Result is yes and census block is in served area	46	28%
Result is yes but not in a census block reported as served	40	24%
Result is no and census block is in served area	0	0%
Result is no and census block not served area	80	48%

Census blocks that are outside providers own Cable Franchise Boundary: 2132/2592 (82%)

Census blocks that fall within another provider's Cable Franchise Boundary: 742/2592 (29%)

AT&T Mobility LLC

DBA Name: AT&T Mobility LLC

Data Characteristics

Date of Original Submission:	3/9/2010
Date of Update Submission:	7/29/2011
Currency of Data:	6/30/2011
FRN:	0004979233
Type of data submitted:	Coverage Area
Census Block Count:	N/A
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Coverage Area Process:

- Repair Geometry on delivered coverage area
- Remove coverage areas less than 0.125 square miles
- Remove coverage area "holes" less than 0.125 square miles
- Load coverage area into the NTIA data model
  - Result: BB_Service_Wireless

Data Verification

Maximum down/upload speeds reported by provider:

Coverage Area

Max Download Category	Count	% of Area
4	1	100%

Max Upload Category	Count	% of Area
3	1	100%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 mobile speed test:

Speed Test Download Tier	Count	% of Tests
0	425	37%
3	331	29%

Speed Test Upload Tier	Count	% of Tests
1	667	58%
2	307	27%

4	331	29%
5	59	5%
6	3	0%
7	6	1%

3	135	12%
4	31	3%
5	7	1%
6	1	0%
7	4	0%
8	3	0%

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

#/% of mobile speed tests verifying coverage area:
Number of mobile speed tests reported inside coverage area: 1150/1155 (99.5%)
Number of mobile speed tests reported outside coverage area: 5/1155 (0.5%)

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	7	70%
3	2	20%
4	1	10%

Speed Test Upload Tier	Count	% of Tests
1	5	50%
2	2	20%
3	3	30%

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

#/% of computer based speed tests verifying coverage area:
Number of mobile speed tests reported inside coverage area: 10/10 (100%)
Number of mobile speed tests reported outside coverage area: 0/10 (0%)

Form 477Verification:
#/% of tracts reported as served to FCC that overlaps with coverage area: 342/342 (100.0%)
#/% of tracts reported as served to FCC but do not intersect coverage area: 0/342 (0%)

Dead zones:
Number of dead zones reported within coverage area via broadband.maryland.gov:
230/240 (95.8%)
Number of dead zones reported within coverage area via mdbroadbandmap.org:
142/147 (96.6%)

Web Search Verification: N/A

Wireless Verification:

ATT Wireless Verification Table - 3G	**Count**	**Percentage**
Total # of sample points	1486	
Number of sample points within coverage area	1453	
Total number of sample points with results	1293	

Verified served AND within reported coverage area (yes,yes)	1280	
Verified served AND found outside reported coverage area (yes,no)	13	1.0%
Verified unserved AND found within reported coverage area (no,yes)	173	11.6%
Verified unserved AND found outside reported coverage area (no,no)	20	
Total error	186	12.5%

ATT Wireless Verification Table - 4G	**Count**	**Percentage**
Total # of sample points	1486	
Number of sample points with expected 4G results	1453	
Total number of sample points with 4G results	86	
Verified 4G AND within reported coverage area (yes,yes)	86	
Verified 4G AND found outside reported coverage area (yes,no)	0	0.0%
Verified not 4G AND found within reported coverage area (no,yes)	1367	92.0%
Verified not 4G AND found outside reported coverage area (no,no)	33	
Total error	1367	94.1%

*4G service defined as average down speed of > 2000 bps

Atlantech Online, Inc.

DBA: **Atlantech Online, Inc.**

Data Characteristics

Date of Original Submission:	3/7/2011
Date of Update Submission:	3/7/2011
Currency of Data:	12/31/2010
FRN:	0018854935
Type of data submitted:	Address Table
Census Block Count:	22
Total Matched Address Points Count:	39
Unmatched Address Points:	0
Number of Technology of Transmission Types:	2
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Census Block Process:

- Geocode address table to ESRI US Streets address locator
    - Number matched: 39
    - Number unmatched: 39
- Spatially join matched address points to 2010 census blocks
- Separate addresses by technology of transmission

Census Block Process:

- Join the spatial join result to the 2010 census blocks based on the GEOID10 field for each technology
    - Export results for each technology
    - Load exported results into the NTIA data model
        - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
11	2	9%
7	20	91%

Max Upload Category	Count	% of Blocks
11	2	9%
7	20	91%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
3	6	14%
4	1	2%
5	20	47%
6	7	16%
7	3	7%
8	3	7%
9	3	7%

Speed Test Upload Tier	Count	% of Tests
2	1	2%
3	10	23%
4	12	28%
5	10	23%
6	2	5%
7	4	9%
8	2	5%
9	2	5%

Speed tests match reported typical speeds or are within 1 speed tier: N/A

Speed tests present within blocks not reported as served by provider (error reported as proportion of total blocks submitted): 9/22 (41%)

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: 0
Number of tracts reported to FCC, but no census blocks reported to project: 84

Dead zones:
Number of census blocks with dead zones reported via broadband.maryland.gov: 1
Total number of dead zones reported per provider via broadband.maryland.gov: 2

Number of census blocks with dead zones reported via mdbroadbandmap.org: 0
Total number of dead zones reported per provider via mdbroadbandmap.org: 0

Web Search Verification: N/A

Atlantic Broadband (Penn), LLC

DBA Name: **Atlantic BroadBand**

Data Characteristics

Date of Original Submission:	3/26/2011
Date of Update Submission:	9/16/2011
Currency of Data:	6/30/2011
FRN:	0009596883
Type of data submitted:	Address Table
Census Block Count:	3870
Total Matched Address Points Count:	63765
Unmatched Address Points:	4183
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to ESRI US Streets address locator
  - Number matched: 59443
  - Number unmatched: 8505
- Unmatched address are geocoded to Maryland Property View address locator
  - Number matched: 3282
  - Number unmatched: 5223
- Unmatched addresses are geocoded to Maryland center line address locator
  - Number matched: 1040
  - Number unmatched: 4183
- Merge matched addresses
- Spatially join address points to 2010 census blocks
- Select by location the address points that are completely within a greater than two square mile census block
  - Export as address points to be loaded into the NTIA data model
    - Result: BB_Service_Address
  - Switch the selection and export as points to create census blocks

Census Block Process:

- Join the switched selection (BB_Service_Address) address points to the 2010 census blocks based on the GEOID10 field
  - Export results Load exported results into the NTIA data model

- Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
7	3870	100%

Max Upload Category	Count	% of Blocks
3	3611	93%
4	259	7%

Typical down/upload speeds reported by provider:

Census Blocks

Typical Download Category	Count	% of Blocks
7	3870	100%

Typical Upload Category	Count	% of Blocks
3	3870	100%

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	31	15%
3	8	4%
4	17	8%
5	104	49%
6	39	18%
7	13	6%
9	1	0%

Speed Test Upload Tier	Count	% of Tests
1	1	0%
2	192	90%
3	17	8%
4	3	1%

Speed tests match reported typical download speeds or are within 1 speed tier: No

Speed tests present within blocks not reported as served by provider (error reported as proportion of total blocks submitted): 10/3870 (< 1%)

Form 477Verification:
Number of census blocks reported to project, but no tract reported to FCC: 128
Number of tracts reported to FCC, but no census blocks reported to project: 5

Dead zones:
Number of census blocks with dead zones reported via broadband.maryland.gov: 2
Total number of dead zones reported per provider via broadband.maryland.gov: 2

Number or census blocks with dead zones reported via mdbroadbandmap.org: 6
Total number of dead zones reported per provider via mdbroadbandmap.org: 6

Web Search Verification: 87/3070 (3%) of census blocks were confirmed using online search feature of given provider

Atlantic Broadband WebSearch Verification Table	Count	Percentage
Total # of sample points	1496	
Number of sample points with results	1496	100%
Result is yes and census block is in served area	87	6%
Result is yes but not in a census block reported as served	116	8%
Result is no and census block is in served area	2	0%
Result is no and census block not served area	1289	86%

Census blocks that are outside providers own Cable Franchise Boundary: 1255/3070 (41%)

Census blocks that fall within another provider's Cable Franchise Boundary: 266/3070 (9%)

Bay Country Communications, Inc.

DBA Name: Bay Country Communications, Inc.

Data Characteristics

Date of Original Submission:	8/9/2010
Date of Update Submission:	9/12/2011
Currency of Data:	6/30/2011
FRN:	0020136552
Type of data submitted:	Census Block Table
Census Block Count:	1841
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Census Block Process:

- Join the provided census block table to the 2010 census blocks based on the 2000 block name field
    - Export results
    - Load exported results into the NTIA data model
        - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
7	1841	100%

Max Upload Category	Count	% of Blocks
7	1841	100%

Typical down/upload speeds reported by provider:

Census Blocks

Typical Download Category	Count	% of Blocks

Typical Upload Category	Count	% of Blocks

4	1841	100%

2	1841	100%

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
3	1	50%
4	1	50%

Speed Test Upload Tier	Count	% of Tests
2	1	50%
3	1	50%

Speed tests match reported typical download speeds or are within 1 speed tier: Yes

Speed tests present within blocks not reported as served by provider (error reported as proportion of total blocks submitted): 0/1841 (0%)

Form 477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: N/A
Number of tracts reported to FCC, but no census blocks reported to project: N/A

Dead zones:
Number of census blocks with dead zones reported via broadband.maryland.gov: 1
Total number of dead zones reported per provider via broadband.maryland.gov: 2

Number of census blocks with dead zones reported via mdbroadbandmap.org: 1
Total number of dead zones reported per provider via mdbroadbandmap.org: 1

Web Search Verification: N/A

Census blocks that are outside providers own Cable Franchise Boundary: N/A

Census blocks that fall within another provider's Cable Franchise Boundary: 1439/1841 (78%)

Believe Wireless, LLC.

DBA: Believe Wireless Broadband

Data Characteristics

Date of Original Submission:	3/1/2011
Date of Update Submission:	9/8/2011
Currency of Data:	6/30/2011
FRN:	9999
Type of data submitted:	Coverage Area
Census Block Count:	N/A
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Coverage Area Process:

- Spectrum not provided
    - Spectrum selected by comparing similar providers and choosing the most likely option
- Use raster analysis to extract coverage area from map
- Repair Geometry on coverage area
- Remove coverage areas less than 0.125 square miles
- Remove coverage area “holes” less than 0.125 square miles
- Simplify Polygon of coverage area
- Load coverage area into the NTIA data model
    - Result: BB_Service_Wireless

Speed Domains:

- Maximum Advertized Speeds changed
    - Reported speeds exceed domain – changed from tier 11 to 6

Data Verification

Maximum down/upload speeds reported by provider:

Coverage Area

Max Download Category	Count	% of Area
6	1	100%

Max Upload Category	Count	% of Area
6	1	100%

Typical down/upload speeds reported by provider:

Coverage Area

Typical Download Category	Count	% of Area
6	1	100%

Typical Upload Category	Count	% of Area
6	1	100%

Typical down/upload speed from 2010 mobile speed test: N/A

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

#/% of mobile speed tests verifying coverage area:
Number of mobile speed tests reported inside coverage area: N/A
Number of mobile speed tests reported outside coverage area: N/A

Form 477Verification:
#/% of tracts reported as served to FCC that overlaps with coverage area: N/A
#/% of tracts reported as served to FCC but do not intersect coverage area: N/A

Dead zones:
Number of dead zones reported within coverage area via broadband.maryland.gov:
15/240 (6.2%)
Number of dead zones reported within coverage area via mdbroadbandmap.org:
6/147 (4%)

Web Search Verification: N/A

Wireless Verification: N/A

Bloosurf

DBA: Bloosurf

Data Characteristics

Date of Original Submission:	2/28/2011
Date of Update Submission:	9/8/2011
Currency of Data:	6/30/2011
FRN:	0019496462
Type of data submitted:	Coverage Area
Census Block Count:	N/A
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Coverage Area Process:

- Digitize coverage area from map
- Repair Geometry on coverage area
- Remove coverage areas less than 0.125 square miles
- Remove coverage area "holes" less than 0.125 square miles
- Load coverage area into the NTIA data model
    - Result: BB_Service_Wireless

Data Verification

Maximum down/upload speeds reported by provider:

Coverage Area

Max Download Category	Count	% of Area
5	1	100%

Max Upload Category	Count	% of Area
3	1	100%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 mobile speed test: N/A

Speed tests match reported typical speeds or are within 1 speed tier: N/A

#/% of mobile speed tests verifying coverage area:
Number of mobile speed tests reported inside coverage area: N/A
Number of mobile speed tests reported outside coverage area: N/A

Form 477Verification:
#/% of tracts reported as served to FCC that overlaps with coverage area: N/A
#/% of tracts reported as served to FCC but do not intersect coverage area: N/A

Dead zones:
Number of dead zones reported within coverage area via broadband.maryland.gov:
5/240 (2%)
Number of dead zones reported within coverage area via mdbroadbandmap.org:
1/147 (0.7)

Web Search Verification: N/A

Wireless Verification: N/A

Broadstripe, LLC

DBA Name: Broadstripe, LLC

Data Characteristics

Date of Original Submission:	4/14/2010
Date of Update Submission:	9/9/2011
Currency of Data:	6/30/2011
FRN:	0003773843
Type of data submitted:	Address Table
Census Block Count:	2949
Total Matched Address Points Count:	107378
Unmatched Address Points:	100
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to ESRI US Streets address locator
  - Number matched: 103647
  - Number unmatched: 840
- Unmatched address are geocoded to Maryland Property View address locator
  - Number matched: 636
  - Number unmatched: 204
- Unmatched address are geocoded to Maryland street centerline address locator
  - Number matched: 636
  - Number unmatched: 204
- Merge matched addresses
- Spatially join address points to 2010 census blocks
- Select by location the address points that are completely within a greater than two square mile census block
  - Export as address points to be loaded into the NTIA data model
    - Result: BB_Service_Address
  - Switch the selection and export as points to create census blocks

Census Block Process:
- Join the switched selection (BB_Service_Address) address points to the 2010 census blocks based on the GEOID10 field
  - Export results Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Data Modification:
- Removed 2 addresses from data set – address out of provider area
  - Milford, MI
  - Cecil County, MD

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
7	2949	100%

Max Upload Category	Count	% of Blocks
4	2949	100%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
3	3	5%
4	1	2%
5	10	18%
6	17	31%
7	20	36%
8	1	2%
9	2	4%
10	1	2%

Speed Test Upload Tier	Count	% of Tests
1	3	5%
2	4	7%
3	5	9%
4	43	78%

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

Speed tests present within blocks not reported as served by provider (error reported as proportion of total blocks submitted): 0/2949 (0%)

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: 8
Number of tracts reported to FCC, but no census blocks reported to project: 0

Dead zones:
Number of census blocks with dead zones reported via broadband.maryland.gov: 1
Total number of dead zones reported per provider via broadband.maryland.gov: 1

Number of census blocks with dead zones reported via mdbroadbandmap.org: 0
Total number of dead zones reported per provider via mdbroadbandmap.org: 0

Web Search Verification: 17/2949 (1%) of census blocks were confirmed using online search feature of given provider

Broadstripe WebSearch Verification Table	Count	Percentage
Total # of sample points	1496	
Number of sample points with results	85	6%
Result is yes and census block is in served area	17	20%
Result is yes but not in a census block reported as served	15	18%
Result is no and census block is in served area	0	0%
Result is no and census block not served area	53	62%

Census blocks that are outside providers own Cable Franchise Boundary: 1255/2949 (43%)

Census blocks that fall within another provider's Cable Franchise Boundary: 266/2949 (9%)

Broadview Networks Holdings, Inc.

DBA Name: Broadview Networks Holdings, Inc.

Data Characteristics

Date of Original Submission:	2/24/2010
Date of Update Submission:	9/9/2011
Currency of Data:	6/30/2011
FRN:	0010296853
Type of data submitted:	Address Table
Census Block Count:	600
Total Matched Address Points Count:	797
Unmatched Address Points:	10
Number of Technology of Transmission Types:	3
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to ESRI US Streets address locator
  - Number matched: 786
  - Number unmatched: 23
- Unmatched address are geocoded to Maryland Property View address locator
  - Number matched: 12
  - Number unmatched: 11
- Unmatched address are geocoded to Maryland street centerline address locator
  - Number matched: 1
  - Number unmatched: 10
- Merge matched addresses
- Spatially join address points to 2010 census blocks
- Separate and export the address points according to technology of transmission

Census Block Process:

- Join the address points to the 2010 census blocks based on the GEOID10 field
  - Export results for each technology of transmission
  - Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Data Modification:

- Dropped 32 blocks reported by provider that do not meet broadband speeds

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
3	20	3%
4	496	81%
5	84	14%
6	11	2%

Max Upload Category	Count	% of Blocks
2	37	6%
3	33	5%
4	459	75%
5	72	12%
6	10	2%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
3	1	100%

Speed Test Upload Tier	Count	% of Tests
3	1	100%

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

Speed tests present within blocks not reported as served by provider (error reported as proportion of total blocks submitted): 2/600 (<1%)

Form 477Verification:
Number of census blocks reported to project, but no tract reported to FCC: 45
Number of tracts reported to FCC, but no census blocks reported to project: 54

Dead zones:
Number of census blocks with dead zones reported via broadband.maryland.gov: 0
Total number of dead zones reported per provider via broadband.maryland.gov: 0

Number of census blocks with dead zones reported via mdbroadbandmap.org: 1
Total number of dead zones reported per provider via mdbroadbandmap.org: 1

Web Search Verification: N/A

Census blocks that are outside DSL boundary: 111/600 (19%)

Brookwood Ventures LLC

DBA Name: Brookwood Ventures LLC

Data Characteristics

Date of Original Submission:	3/12/2010
Date of Update Submission:	9/9/2011
Currency of Data:	6/30/2011
FRN:	0010296853
Type of data submitted:	Coverage Area
Census Block Count:	N/A
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Coverage Area Process:

- Repair Geometry on delivered coverage area
- Perform Topology on coverage area
  - Rule: Coverage area should not overlap
  - Load coverage area into the NTIA data model
    - Result: BB_Service_Wireless

Data Verification

Maximum down/upload speeds reported by provider:

Coverage Area

Max Download Category	Count	% of Area
5	1	100%

Max Upload Category	Count	% of Area
3	1	100%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 mobile speed test: N/A

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

#/% of mobile speed tests verifying coverage area:
Number of mobile speed tests reported inside coverage area: N/A
Number of mobile speed tests reported outside coverage area: N/A

Form 477Verification:
#/% of tracts reported as served to FCC that overlaps with coverage area: 2/2
#/% of tracts reported as served to FCC but do not intersect coverage area: 0/2

Dead zones:
Number of dead zones reported within coverage area via broadband.maryland.gov:
1/240 (0.4%)
Number of dead zones reported within coverage area via mdbroadbandmap.org:
0/147 (0%)

Web Search Verification: N/A

Wireless Verification: N/A

Cavalier Telephone Mid-Atlantic, LLC

DBA Name: Cavalier Telephone Mid-Atlantic, LLC

Data Characteristics

Date of Original Submission:	3/10/2010
Date of Update Submission:	9/2/2011
Currency of Data:	6/30/2011
FRN:	0015799133
Type of data submitted:	Census Block Table, Middle Mile
Census Block Count:	6858 Unique
Total Matched Address Points Count:	10263
Unmatched Address Points:	34
Number of Technology of Transmission Types:	2
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	Yes
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to ESRI US Streets address locator
  - Number matched: 10212
  - Number unmatched: 85
- Unmatched address are geocoded to Maryland Property View address locator
  - Number matched: 42
  - Number unmatched: 43
- Unmatched addresses are geocoded to Maryland center line address locator
  - Number matched: 9
  - Number unmatched: 34
- Merge matched addresses
- Spatially join address points to 2010 census blocks
- Separate and export the address points according to technology of transmission

Census Block Process:

- Join the address points to the 2010 census blocks based on the GEOID10 field
  - Export results for each technology of transmission
  - Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Data Modification:

- 6342 blocks with technology of transmission 10 exceed domain speed
    - changed to MAXADUP speed tier 7

Data Verification

Maximum down/upload speeds reported by provider:

Coverage Area

Max Download Category	Count	% of Area
8	7015	100%

Max Upload Category	Count	% of Area
8	7015	100%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	36	23%
3	23	14%
4	31	19%
5	37	23%
6	22	14%
7	7	4%
8	2	1%
10	1	1%

Speed Test Upload Tier	Count	% of Tests
1	14	9%
2	98	62%
3	38	24%
4	1	1%
5	3	2%
6	2	1%
7	3	2%

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

Speed tests present within blocks not reported as served by provider (error reported as proportion of total blocks submitted): 16/6856 (< 1%)

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: 60
Number of tracts reported to FCC, but no census blocks reported to project: 79

Dead zones:
Number of census blocks with dead zones reported via broadband.maryland.gov: 9
Total number of dead zones reported per provider via broadband.maryland.gov: 13

Number of census blocks with dead zones reported via mdbroadbandmap.org: 4
Total number of dead zones reported per provider via mdbroadbandmap.org: 4

Web Search Verification: 20/6856 (1%) of census blocks were confirmed using online search feature of given provider

Cavalier WebSearch Verification Table	Count	Percentage
Total # of sample points	1496	
Number of sample points with results	432	29%
Result is yes and census block is in served area	20	5%
Result is yes but not in a census block reported as served	47	11%
Result is no and census block is in served area	26	6%
Result is no and census block not served area	339	78%

Census blocks that are outside DSL boundary: 263/6856 (4%)

Cellco Partnership and its Affiliated Entities

DBA Name: Verizon Wireless

Data Characteristics

Date of Original Submission:	3/8/2010
Date of Update Submission:	7/29/2011
Currency of Data:	6/30/2011
FRN:	0003290673
Type of data submitted:	Coverage Area
Census Block Count:	N/A
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Incomplete
Provided Max Typical Upload Speed:	Incomplete
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Coverage Area Process:

- Repair Geometry on delivered coverage area
- Remove coverage areas less than 0.125 square miles
- Remove coverage area “holes” less than 0.125 square miles
- Load coverage area into the NTIA data model
    - Result: BB_Service_Wireless

Data Verification

Maximum down/upload speeds reported by provider:

Coverage Area

Max Download Category	Count	% of Area
5	3	100%
6	1	100%

Max Upload Category	Count	% of Area
4	3	100%
5	1	100%

Typical down/upload speeds reported by provider:

Coverage Area

Typical Download Category	Count	% of Area
NULL	1	100%
3	3	100%

Typical Upload Category	Count	% of Area
NULL	1	100%
2	3	100%

Typical down/upload speed from 2010 mobile speed test:

Speed Test Download Tier	Count	% of Tests
0	597	6%
3	553	6%
4	1108	12%
5	1180	13%
6	1599	17%
7	4127	44%
8	162	2%
10	1	0%

Speed Test Upload Tier	Count	% of Tests
1	353	4%
2	1395	15%
3	460	5%
4	1321	14%
5	2768	30%
6	1218	13%
7	1803	19%
8	9	0%

Speed tests match reported typical download speeds or are within 1 speed tier: No

#/% of mobile speed tests verifying coverage area:
Number of mobile speed tests reported inside coverage area: 9198/9327 (98.6%)
Number of mobile speed tests reported outside coverage area: 129/9327 (1.4%)

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	225	57%
3	122	31%
4	45	11%
5	1	0%

Speed Test Upload Tier	Count	% of Tests
1	120	31%
2	270	69%
3	2	1%
4	1	0%

Speed tests match reported typical download speeds or are within 1 speed tier: No

#/% of computer based speed tests verifying coverage area:
Number of computer based speed tests reported inside coverage area: 385/393 (98%)
Number of computer based speed tests reported outside coverage area: 8/393 (2%)

Form 477 Verification:
#/% of tracts reported as served to FCC that overlaps with coverage area: N/A
#/% of tracts reported as served to FCC but do not intersect coverage area: N/A

Dead zones:
Number of dead zones reported within coverage area via broadband.maryland.gov:
203/240 (84.6%)
Number of dead zones reported within coverage area via mdbroadbandmap.org:
134/147 (91%)

Web Search Verification: N/A

Wireless Verification:

Verizon Wireless Verification Table - 3G	Count	Percentage
Total # of sample points	1486	
Number of sample points within coverage area	1225	
Total number of sample points with results	1334	
Verified served AND within reported coverage area (yes,yes)	1161	
Verified served AND found outside reported coverage area (yes,no)	173	13.0%
Verified unserved AND found within reported coverage area (no,yes)	64	5.2%
Verified unserved AND found outside reported coverage area (no,no)	88	
Total error	237	15.9%

*for three different spectrums the results were identical

Verizon Wireless Verification Table - 4G	Count	Percentage
Total # of sample points	1486	
Number of sample points with expected 4G results	283	
Total number of sample points with 4G results	274	
Verified 4G AND within reported coverage area (yes,yes)	214	
Verified 4G AND found outside reported coverage area (yes,no)	60	21.9%
Verified not 4G AND found within reported coverage area (no,yes)	69	24.4%
Verified not 4G AND found outside reported coverage area (no,no)	1143	
Total error	129	8.7%

*4G service defined as average down speed of > 2000 bps

Charter Communications Inc

DBA Name: **Charter Communications Inc**

Data Characteristics

Date of Original Submission:	3/31/2010
Date of Update Submission:	7/21/2011
Currency of Data:	7/31/2011
FRN:	0017179383
Type of data submitted:	Census Block Table, Road Segments
Census Block Count:	421
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	Yes

Data Processing

Census Block Process:

- Join the provided census block table to the 2010 census blocks based on the 2000 block name field
    - Export results
    - Load exported results into the NTIA data model
        - Result: BB_Service_CensusBlock

Road Segment Process:

- Road segments are 2009 geometry
- Join road segments to TigerLine by TLID
    - Export results
    - Load exported results into the NTIA data model
        - Result: BB_Service_RoadSegment

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
6	421	100%

Max Upload Category	Count	% of Blocks
3	421	100%

Road Segments

Max Download Category	Count	% of Road Segments
6	49	100%

Max Upload Category	Count	% of Road Segments
3	49	100%

Typical down/upload speeds reported by provider:

Census Blocks

Typical Download Category	Count	% of Blocks
6	421	100%

Typical Upload Category	Count	% of Blocks
3	421	100%

Road Segments

Typical Download Category	Count	% of Road Segments
6	49	100%

Typical Upload Category	Count	% of Road Segments
3	49	100%

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
4	3	50%
5	2	33%
7	1	17%

Speed Test Upload Tier	Count	% of Tests
2	3	50%
3	3	50%

Speed tests match reported typical download speeds or are within 1 speed tier: No

Speed tests present within blocks not reported as served by provider (error reported as proportion of total blocks submitted): 0/421 (0%)

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: 0
Number of tracts reported to FCC, but no census blocks reported to project: 0

Dead zones:
Number of census blocks with dead zones reported via broadband.maryland.gov: 0
Total number of dead zones reported per provider via broadband.maryland.gov: 0

Number of census blocks with dead zones reported via mdbroadbandmap.org: 0

Total number of dead zones reported per provider via mdbroadbandmap.org: 0

Web Search Verification: 2/421 (1%) of census blocks were confirmed using online search feature of given provider

Charter WebSearch Verification Table	Count	Percentage
Total # of sample points	1496	
Number of sample points with results	55	4%
Result is yes and census block is in served area	2	4%
Result is yes but not in a census block reported as served	0	0%
Result is no and census block is in served area	3	5%
Result is no and census block not served area	50	91%

Census blocks that are outside providers own Cable Franchise Boundary: 208/421 (49%)

Census blocks that fall within another provider's Cable Franchise Boundary: 0/421 (0%)

Clearwire Corporation

DBA Name: Clearwire Corporation

Data Characteristics

Date of Original Submission:	3/5/2010
Date of Update Submission:	9/9/2011
Currency of Data:	9/2/2011
FRN:	0017775628
Type of data submitted:	Coverage Area
Census Block Count:	N/A
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Coverage Area Process:

- Repair Geometry on delivered coverage area
- Remove coverage areas less than 0.125 square miles
- Remove coverage area “holes” less than 0.125 square miles
- Load coverage area into the NTIA data model
    - Result: BB_Service_Wireless

Data Verification

Maximum down/upload speeds reported by provider:

Coverage Area

Max Download Category	Count	% of Area
5	1	100%

Max Upload Category	Count	% of Area
4	1	100%

Typical down/upload speeds reported by provider:

Coverage Area

Typical Download Category	Count	% of Area
5	1	100%

Typical Upload Category	Count	% of Area
4	1	100%

Typical down/upload speed from 2010 mobile speed test:

Speed Test Download Tier	Count	% of Tests
0	36	14%
3	83	31%
4	91	34%
5	48	18%
6	5	2%
7	2	1%

Speed Test Upload Tier	Count	% of Tests
1	15	6%
2	106	40%
3	142	54%
7	2	1%

Speed tests match reported typical download speeds or are within 1 speed tier: Yes

#/% of mobile speed tests verifying coverage area:
Number of mobile speed tests reported inside coverage area: 216/265 (81.5%)
Number of mobile speed tests reported outside coverage area: 49/265 (18.5%)

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	7	8%
3	11	13%
4	19	23%
5	35	42%
6	10	12%
7	2	2%

Speed Test Upload Tier	Count	% of Tests
1	2	2%
2	22	26%
3	60	71%

Speed tests match reported typical download speeds or are within 1 speed tier: Yes

#/% of computer based speed tests verifying coverage area:
Number of computer based speed tests reported inside coverage area: 80/84 (95.2%)
Number of computer based speed tests reported outside coverage area: 4/84 (4.8%)

Form 477Verification:
#/% of tracts reported as served to FCC that overlaps with coverage area: N/A
#/% of tracts reported as served to FCC but do not intersect coverage area: N/A

Dead zones:
Number of dead zones reported within coverage area via broadband.maryland.gov:
39/240 (16.2%)
Number of dead zones reported within coverage area via mdbroadbandmap.org:
6/147 (4%)

Web Search Verification: N/A

Wireless Verification: N/A

Cogent Communications Group

DBA Name: Cogent Communications Group

Data Characteristics

Date of Original Submission:	2/1/2010
Date of Update Submission:	7/7/2011
Currency of Data:	Janu6/30/2011
FRN:	0019066034
Type of data submitted:	Address Table, Middle Mile
Census Block Count:	3
Total Matched Address Points Count:	3
Unmatched Address Points:	3
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	Yes
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to ESRI US streets address locator
  - Number matched: 3
  - Number unmatched: 0
- Spatially join address points to 2010 census blocks

Census Block Process:

- Join the address points to the 2010 census blocks based on the GEOID10 field
  - Export results
  - Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:

Max Download Category	Count	% of Blocks
11	3	100%

Max Upload Category	Count	% of Blocks
11	3	100%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	1	8%
3	2	15%
4	1	8%
6	8	62%
8	1	8%

Speed Test Upload Tier	Count	% of Tests
2	1	8%
3	2	15%
6	7	54%
7	3	23%

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

Speed tests present within blocks not reported as served by provider (error reported as proportion of total blocks submitted): 8/3 (> 100%)

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: 3
Number of tracts reported to FCC, but no census blocks reported to project: 3

Dead zones:
Number of census blocks with dead zones reported via broadband.maryland.gov: 0
Total number of dead zones reported per provider via broadband.maryland.gov: 0

Number of census blocks with dead zones reported via mdbroadbandmap.org: 0
Total number of dead zones reported per provider via mdbroadbandmap.org: 0

Web Search Verification: N/A

Comcast Corporation

DBA Name: Comcast Cable Communications, LLC

Data Characteristics

Date of Original Submission:	1/19/2010
Date of Update Submission:	9/7/2011
Currency of Data:	6/30/2011
FRN:	0004441663
Type of data submitted:	Census Block Table, Road Segments
Census Block Count:	48720
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	2
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	Yes

Data Processing

Census Block Process:

- Join the census block table to the 2010 census blocks based on the GEOID10 field
    - Export results for each technology of transmission
    - Load exported results into the NTIA data model
        - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
9	48720	100%

Max Upload Category	Count	% of Blocks
7	48720	100%

Road Segments

Max Download Category	Count	% of Blocks
9	736	100%

Max Upload Category	Count	% of Blocks
7	736	100%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	63	1%
3	144	3%
4	117	2%
5	450	8%
6	734	13%
7	3737	66%
8	372	7%
9	41	1%
10	13	0%

Speed Test Upload Tier	Count	% of Tests
1	36	1%
2	183	3%
3	292	5%
4	1101	19%
5	3841	68%
6	192	3%
7	26	0%

Speed tests match reported typical download speeds or are within 1 speed tier: Yes

Speed tests present within blocks not reported as served by provider (error reported as proportion of total blocks submitted): 492/48720 (1%)

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: 146
Number of tracts reported to FCC, but no census blocks reported to project: 0

Dead zones:
Number of census blocks with dead zones reported via broadband.maryland.gov: 71
Total number of dead zones reported per provider via broadband.maryland.gov: 102

Number of census blocks with dead zones reported via mdbroadbandmap.org: 32
Total number of dead zones reported per provider via mdbroadbandmap.org: 41

Web Search Verification: 440/48720 (1%) of census blocks were confirmed using online search feature of given provider

Comcast WebSearch Verification Table	**Count**	**Percentage**
Total # of sample points	1496	
Number of sample points with results	835	56%
Result is yes and census block is in served area	440	53%
Result is yes but not in a census block reported as served	63	8%
Result is no and census block is in served area	137	16%
Result is no and census block not served area	194	23%

Census blocks that are outside providers own Cable Franchise Boundary: 5730/48720 (12%)
Census blocks that fall within another provider's Cable Franchise Boundary: 263/48720 (1%)

DIECA Communications, Inc.

DBA: Covad Communication Company

Data Characteristics

Date of Original Submission:	2/1/2010
Date of Update Submission:	8/6/2011
Currency of Data:	12/31/2011
FRN:	0003753753
Type of data submitted:	Census Block Table, Road Segments
Census Block Count:	71956
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	3
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	Yes
Provided Road Segments for census blocks greater than 2 sq miles:	Yes

Data Processing

Census Block Process:

- Join the census block table to the 2010 census blocks based on the GEOID10 field
  - Export results for each technology of transmission
  - Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Data Modification:

- 9141 features Typical Downstream Speed changed to speed tier 3

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
3	10192	6%
4	28162	17%
5	73822	46%
6	30213	19%
7	19030	12%

Max Upload Category	Count	% of Blocks
2	15085	9%
3	41992	26%
4	19796	12%
5	69943	43%
7	14603	9%

Road Segments

Max Download Category	Count	% of Road Segments
3	51	3%
4	241	12%
5	1543	78%
6	112	6%
7	22	1%

Max Upload Category	Count	% of Road Segments
2	88	4%
3	147	7%
4	169	9%
5	1543	78%
7	22	1%

Typical down/upload speeds reported by provider:

Census Blocks

Typical Download Category	Count	% of Blocks
2	9141	6%
3	10520	7%
4	38120	24%
5	83373	52%
6	4116	3%
7	16149	10%

Typical Upload Category	Count	% of Blocks
2	51662	9%
3	6518	26%
4	34241	12%
5	54395	43%
7	14603	9%

Road Segments

Typical Download Category	Count	% of Road Segments
2	7	0%
3	116	6%
4	193	10%
5	1631	83%
7	22	1%

Typical Upload Category	Count	% of Road Segments
2	191	4%
3	44	7%
4	193	9%
5	1519	78%
7	22	1%

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	9	11%
3	42	51%
4	23	28%
5	4	5%
6	2	2%
7	3	4%

Speed Test Upload Tier	Count	% of Tests
1	22	27%
2	33	40%
3	17	20%
4	8	10%
5	3	4%

Speed tests match reported typical speeds or are within 1 speed tier: No

Speed tests present within blocks not reported as served by provider (error reported as proportion of total blocks submitted): 0/71956 (0%)

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: 5785
Number of tracts reported to FCC, but no census blocks reported to project: 0

Dead zones:
Number of census blocks with dead zones reported via broadband.maryland.gov: 57
Total number of dead zones reported per provider via broadband.maryland.gov: 72

Number of census blocks with dead zones reported via mdbroadbandmap.org: 20
Total number of dead zones reported per provider via mdbroadbandmap.org: 28

Web Search Verification: N/A

Census blocks that are outside DSL boundary: 17913/71956 (25%)

DSLnet Communications, LLC

DBA Name: DSLnet Communications, LLC

Data Characteristics

Date of Original Submission:	3/11/2010
Date of Update Submission:	8/30/2011
Currency of Data:	6/30/2011
FRN:	0004324857
Type of data submitted:	Address Table
Census Block Count:	171
Total Matched Address Points Count:	595
Unmatched Address Points:	6
Number of Technology of Transmission Types:	2
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to ESRI US Streets address locator
  - Number matched: 592
  - Number unmatched: 9
- Unmatched address are geocoded to Maryland Property View address locator
  - Number matched: 1
  - Number unmatched: 8
- Unmatched address are geocoded to Maryland centerline address locator
  - Number matched: 2
  - Number unmatched: 6
- Merge matched addresses
- Spatially join address points to 2010 census blocks
- Separate and export the address points according to technology of transmission
- Select by location the address points that are completely within a greater than two square mile census block
  - Export as address points to be loaded into the NTIA data model
    - Result: BB_Service_Address
  - Switch the selection and export as points to create census blocks

Census Block Process:

- Join the switched selection (BB_Service_Address) address points to the 2010 census blocks based on the GEOID10 field
  - Export results for each technology of transmission
  - Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Data Modification:

- Removed 301 addresses from provider submission that do not meet broadband speeds
- Removed 1 address from provider submission reported with no technology of transmission

<u>Data Verification</u>

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
3	104	61%
4	67	39%

Max Upload Category	Count	% of Blocks
3	104	61%
4	67	39%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test: N/A

Speed tests match reported typical speeds or are within 1 speed tier: N/A

Speed tests present within blocks not reported as served by provider (error reported as proportion of total blocks submitted): N/A

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: N/A
Number of tracts reported to FCC, but no census blocks reported to project: N/A

Dead zones:
Number of census blocks with dead zones reported via broadband.maryland.gov: 0
Total number of dead zones reported per provider via broadband.maryland.gov: 0

Number of census blocks with dead zones reported via mdbroadbandmap.org: 0
Total number of dead zones reported per provider via mdbroadbandmap.org: 0

Web Search Verification: N/A

Census blocks that are outside DSL boundary: 6/171 (4%)

DSLnet, Inc

DBA: **DSLnet, Inc**

Data Characteristics

Date of Original Submission:	3/11/2010
Date of Update Submission:	8/30/2011
Currency of Data:	6/30/2011
FRN:	0015321136
Type of data submitted:	Addresses
Census Block Count:	30
Total Matched Address Points Count:	63
Unmatched Address Points:	0
Number of Technology of Transmission Types:	2
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to ESRI US Streets address locator
    - Number matched: 63
    - Number unmatched: 0
- Spatially join address points to 2010 census blocks
- Separate and export the address points according to technology of transmission

Census Block Process:

- Join the address points to the 2010 census blocks based on the GEOID10 field
    - Export results for each technology of transmission
    - Load exported results into the NTIA data model
        - Result: BB_Service_CensusBlock

Data Modification:

- Removed 31 addresses from provider submission that do not meet broadband speeds

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
3	13	42%
4	17	55%
8	1	3%

Max Upload Category	Count	% of Blocks
3	13	42%
4	17	55%
8	1	3%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test: N/A

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

Speed tests present within blocks not reported as served by provider (error reported as proportion of total blocks submitted): N/A

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: 0
Number of tracts reported to FCC, but no census blocks reported to project: 192

Dead zones:
Number of census blocks with dead zones reported via broadband.maryland.gov: 0
Total number of dead zones reported per provider via broadband.maryland.gov: 0

Number of census blocks with dead zones reported via mdbroadbandmap.org: 0
Total number of dead zones reported per provider via mdbroadbandmap.org: 0

Web Search Verification: N/A

Census blocks that are outside DSL boundary: 11/30 (37%)

Easton Utilities Commission

DBA Name: Easton Utilities Commission

Data Characteristics

Date of Original Submission:	2/5/2010
Date of Update Submission:	2/23/2011
Currency of Data:	12/31/2011
FRN:	0003793726
Type of data submitted:	Address Table
Census Block Count:	530
Total Matched Address Points Count:	4687
Unmatched Address Points:	3
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to ESRI address locator
  - Number matched: 4316
  - Number unmatched: 374
- Unmatched address are geocoded to MDPV address locator
  - Number matched: 367
  - Number unmatched: 7
- Unmatched address are geocoded to Maryland street centerline address locator
  - Number matched: 4
  - Number unmatched: 3
- Merge matched addresses
- Spatially join address points to 2000 census blocks
- Select by location the address points that are completely within a greater than two square mile census block
  - Export as address points to be loaded into the NTIA data model
    - Result: BB_Service_Address
  - Switch the selection and export as points to create census blocks

Census Block Process:

- Join the switched selection (BB_Service_Address) address points to the 2000 census blocks based on the BLK2000 field
  - Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Data Modification:

- 258 blocks with Technology of Transmission 41 Maximum Advertised Up speed does not fit domain - changed to speed tier 2

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
3	275	52%
5	255	48%

Max Upload Category	Count	% of Blocks
1	258	49%
2	243	46%
3	24	5%
4	5	1%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	4	4%
3	11	11%
4	9	9%
5	57	56%
6	19	19%
7	1	1%

Speed Test Upload Tier	Count	% of Tests
1	12	12%
2	57	56%
3	29	29%
4	2	2%
6	1	1%

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

Speed tests present within blocks not reported as served by provider (error reported as proportion of total blocks submitted): 0/530 (0%)

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: 7
Number of tracts reported to FCC, but no census blocks reported to project: 0

Dead zones:
Number of census blocks with dead zones reported via broadband.maryland.gov: 0
Total number of dead zones reported per provider via broadband.maryland.gov: 0

Number of census blocks with dead zones reported via mdbroadbandmap.org: 0
Total number of dead zones reported per provider via mdbroadbandmap.org: 0

Web Search Verification: N/A

Census blocks that are outside providers own Cable Franchise Boundary: 8/530 (2%)

Census blocks that fall within another provider's Cable Franchise Boundary: 3/530 (1%)

FiberLight LLC

DBA Name: FiberLight LLC

Data Characteristics

Date of Original Submission:	3/31/2010
Date of Update Submission:	3/31/2010
Currency of Data:	3/31/2010
FRN:	0014117139
Type of data submitted:	Census Block Table
Census Block Count:	1128
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Census Block Process:

- Join census block table to the 2010 census blocks based on the GEOID10 field
  - Export results
  - Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
10	1128	100%

Max Upload Category	Count	% of Blocks
10	1128	100%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test: N/A

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

%/# of census blocks verified by 2010 computer based speed tests: N/A

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: N/A
Number of tracts reported to FCC, but no census blocks reported to project: N/A

Dead zones:
Number of census blocks with dead zones reported via broadband.maryland.gov: 0
Total number of dead zones reported per provider via broadband.maryland.gov: 0

Number of census blocks with dead zones reported via mdbroadbandmap.org: 0
Total number of dead zones reported per provider via mdbroadbandmap.org: 0

Web Search Verification: N/A

Freedom Wireless Broadband, LLC

DBA Name: Freedom Wireless Broadband, LLC

Data Characteristics

Date of Original Submission:	1/28/2010
Date of Update Submission:	8/25/2011
Currency of Data:	Dece6/30/2011
FRN:	0018643155
Type of data submitted:	Coverage Area
Census Block Count:	N/A
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Coverage Area Process:

- Repair Geometry on delivered coverage area
- Load coverage area into the NTIA data model
  - o Result: BB_Service_Wireless

Data Verification

Maximum down/upload speeds reported by provider:

Coverage Area

Max Download Category	Count	% of Area
4	1	100%

Max Upload Category	Count	% of Area
4	1	100%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 <u>mobile speed test</u>: N/A

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

#/% of mobile speed tests verifying coverage area:
Number of mobile speed tests reported inside coverage area: N/A

Number of mobile speed tests reported outside coverage area: N/A

Form 477 Verification:
#/% of tracts reported as served to FCC that overlaps with coverage area: 13/13
#/% of tracts reported as served to FCC but do not intersect coverage area: 0/13

Dead zones:
Number of dead zones reported within coverage area via broadband.maryland.gov:
15/240 (6.2%)
Number of dead zones reported within coverage area via mdbroadbandmap.org:
4/147 (2.7%)

Web Search Verification: N/A

Wireless Verification: N/A

Gans Communications, LP
DBA: MetroCast Communications

Data Characteristics

Date of Original Submission:	3/5/2010
Date of Update Submission:	9/9/2011
Currency of Data:	6/30/2011
FRN:	0016642761
Type of data submitted:	Census Block Table, Road Segments
Census Block Count:	2467
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	Yes

Data Processing

Census Block Process:
- Join the census block table to the 2010 census blocks based on the GEOID10 field
  - Export results
  - Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Road Segment Process:
- Road segments are 2009 geometry
- Join road segments to TigerLine by TLID
  - Export results
  - Load exported results into the NTIA data model
    - Result: BB_Service_RoadSegment

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
7	2467	100%

Max Upload Category	Count	% of Blocks
4	2467	100%

Road Segments

Max Download Category	Count	% of Segments
7	800	100%

Max Upload Category	Count	% of Segments
4	800	100%

Typical down/upload speeds reported by provider:

Census Blocks

Typical Download Category	Count	% of Blocks
6	2467	100%

Typical Upload Category	Count	% of Blocks
2	2467	100%

Road Segments

Typical Download Category	Count	% of Segments
7	800	100%

Typical Upload Category	Count	% of Segments
2	800	100%

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
3	3	7%
4	9	20%
5	10	22%
6	21	47%
7	2	4%

Speed Test Upload Tier	Count	% of Tests
1	18	40%
2	24	53%
3	2	4%
4	1	2%

Speed tests match reported typical download speeds or are within 1 speed tier: Yes

Speed tests present within blocks not reported as served by provider (error reported as proportion of total blocks submitted): 1/2467 (< 1%)

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: N/A
Number of tracts reported to FCC, but no census blocks reported to project: N/A

Dead zones:
Number of census blocks with dead zones reported via broadband.maryland.gov: 6
Total number of dead zones reported per provider via broadband.maryland.gov: 7
Number of census blocks with dead zones reported via mdbroadbandmap.org: 6
Total number of dead zones reported per provider via mdbroadbandmap.org: 7

Web Search Verification: 36/2467 (2%) of census blocks were confirmed using online search feature of given provider

MetroCast Web Search Verification Table	Count	Percentage
Total # of sample points	1496	
Number of sample points with results	107	7%
Result is yes and census block is in served area	36	34%
Result is yes but not in a census block reported as served	20	19%
Result is no and census block is in served area	1	1%
Result is no and census block not served area	50	47%

Census blocks that are outside providers own Cable Franchise Boundary: N/A

Census blocks that fall within another provider's Cable Franchise Boundary: 1094/2467 (44%)

HNS License Sub, LLC
DBA: Hughes Communications, Inc.

Data Characteristics

Date of Original Submission:	2/2/2010
Date of Update Submission:	2/2/2010
Currency of Data:	7/31/2010
FRN:	0018483073
Type of data submitted:	Coverage Area
Census Block Count:	N/A
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Coverage Area Process:
- Repair Geometry on delivered coverage area
- Perform Topology on coverage area
  - Rule: Coverage area should not overlap
  - Load coverage area into the NTIA data model
    - Result: BB_Service_Wireless

Data Verification

Maximum down/upload speeds reported by provider:

Coverage Area

Max Download Category	Count	% of Area
5	1	100%

Max Upload Category	Count	% of Area
2	1	100%

Typical down/upload speeds reported by provider:

Typical Download Category	Count	% of Area
3	1	100%

Typical Upload Category	Count	% of Area
2	1	100%

Typical down/upload speed from 2010 mobile speed test:

Speed Test Download Tier	Count	% of Tests
0	23	70%
3	8	24%
4	1	3%
5	1	3%

Speed Test Upload Tier	Count	% of Tests
1	10	30%
2	10	30%
4	5	15%
5	6	18%
7	2	6%

Speed tests match reported typical download speeds or are within 1 speed tier: No

#/% of computer based speed tests verifying coverage area:
Number of computer based speed tests reported inside coverage area: 33/33 (100%)
Number of computer based speed tests reported outside coverage area: 0/33 (0%)

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	9	13%
3	34	51%
6	8	12%
7	10	15%
8	5	7%
9	1	1%

Speed Test Upload Tier	Count	% of Tests
1	18	27%
2	27	40%
3	2	3%
4	3	4%
5	4	6%
6	8	12%
7	4	6%
8	1	1%

Speed tests match reported typical download speeds or are within 1 speed tier: No

#/% of computer based speed tests verifying coverage area:
Number of mobile speed tests reported inside coverage area: 67/67 (100%)
Number of mobile speed tests reported outside coverage area: 0/67 (0%)

Form477 Verification:
#/% of tracts reported as served to FCC that overlaps with coverage area: 295/295
#/% of tracts reported as served to FCC but do not intersect coverage area: 0/295

Dead zones:
Number of dead zones reported within coverage area via broadband.maryland.gov:
237/240 (98.7%)
Number of dead zones reported within coverage area via mdbroadbandmap.org:
147/147 (100%)

Web Search Verification: N/A
Wireless Verification: N/A

Hotwire Communications, Ltd

DBA Name: Hotwire Communications, Ltd

Data Characteristics

Date of Original Submission:	2/19/2010
Date of Update Submission:	8/30/2011
Currency of Data:	6/30/2011
FRN:	0009846494
Type of data submitted:	Addresses
Census Block Count:	1
Total Matched Address Points Count:	1
Unmatched Address Points:	0
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to ESRI US Streets address locator
  - Number matched: 1
  - Number unmatched: 0
- Spatially join address points to 2010 census blocks

Census Block Process:

- Join the address points to the 2000 census blocks based on the GEOID10 field
  - Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
5	1	100%

Max Upload Category	Count	% of Blocks
3	1	100%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test: N/A

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

Speed tests present within blocks not reported as served by provider (error reported as proportion of total blocks submitted): N/A

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: 1
Number of tracts reported to FCC, but no census blocks reported to project: 1

Dead zones:
Number of census blocks with dead zones reported via broadband.maryland.gov: 0
Total number of dead zones reported per provider via broadband.maryland.gov: 0

Number of census blocks with dead zones reported via mdbroadbandmap.org: 0
Total number of dead zones reported per provider via mdbroadbandmap.org: 0

Web Search Verification: N/A

Census blocks that are outside providers own Cable Franchise Boundary: N/A

Census blocks that fall within another provider's Cable Franchise Boundary: 1

Leap Wireless International, Inc

DBA: **Cricket Communications**

Data Characteristics

Date of Original Submission:	3/17/2010
Date of Update Submission:	8/12/2010
Currency of Data:	8/3/2010
FRN:	0002963528
Type of data submitted:	Coverage Area
Census Block Count:	N/A
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Coverage Area Process:

- Repair Geometry on delivered coverage area
- Remove coverage areas less than 0.125 square miles
- Remove coverage area "holes" less than 0.125 square miles
- Load coverage area into the NTIA data model
    - Result: BB_Service_Wireless

Data Verification

Maximum down/upload speeds reported by provider:

Coverage Area

Max Download Category	Count	% of Area
3	1	100%

Max Upload Category	Count	% of Area
2	1	100%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 mobile speed test: N/A

Speed tests match reported typical speeds or are within 1 speed tier: N/A

#/% of mobile speed tests verifying coverage area:
Number of mobile speed tests reported inside coverage area: N/A
Number of mobile speed tests reported outside coverage area: N/A

Form 477 Verification:
#/% of tracts reported as served to FCC that overlaps with coverage area: N/A
#/% of tracts reported as served to FCC but do not intersect coverage area: N/A

Dead zones:
Number of dead zones reported within coverage area via broadband.maryland.gov:
83/240 (34.5%)
Number of dead zones reported within coverage area via mdbroadbandmap.org:
34/147 (23%)

Web Search Verification: N/A

Wireless Verification:

Cricket Wireless Verification Table - 3G	Count	Percentage
Total # of sample points	1486	
Number of sample points within coverage area	446	
Total number of sample points with results	489	
Verified served AND within reported coverage area (yes,yes)	356	
Verified served AND found outside reported coverage area (yes,no)	133	27.2%
Verified unserved AND found within reported coverage area (no,yes)	90	20.2%
Verified unserved AND found outside reported coverage area (no,no)	907	
Total error	223	15.0%

Level 3 Communications, LLC

DBA Name: **Level 3 Communications, LLC**

Data Characteristics

Date of Original Submission:	1/18/2010
Date of Update Submission:	8/22/2011
Currency of Data:	6/30/2011
FRN:	0003723822
Type of data submitted:	Address Table
Census Block Count:	170
Total Matched Address Points Count:	210
Unmatched Address Points:	5
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	Yes
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to ESRI US Steets address locator
    - Number matched: 196
    - Number unmatched: 19
- Unmatched address are geocoded to Maryland Property View address locator
    - Number matched: 9
    - Number unmatched: 10
- Unmatched address are geocoded to Maryland centerline address locator
    - Number matched: 5
    - Number unmatched: 5
- Merge matched addresses
- Spatially join address points to 2010 census blocks
- Select by location the address points that are completely within a greater than two square mile census block
    - Export as address points to be loaded into the NTIA data model
        - Result: BB_Service_Address
    - Switch the selection and export as points to create census blocks

Census Block Process:

- Join the switched selection (BB_Service_Address) address points to the 2010 census blocks based on the GEOID10 field
    - Export results Load exported results into the NTIA data model
        - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
11	170	100%

Max Upload Category	Count	% of Blocks
11	170	100%

Typical down/upload speeds reported by provider:

Census Blocks

Typical Download Category	Count	% of Blocks
11	129	100%

Typical Upload Category	Count	% of Blocks
11	129	100%

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	39	37%
3	21	20%
4	7	7%
5	7	7%
6	5	5%
7	10	10%
8	12	11%
9	3	3%
10	1	1%

Speed Test Upload Tier	Count	% of Tests
1	20	19%
2	28	27%
3	20	19%
4	11	10%
5	3	3%
6	13	12%
7	7	7%
8	3	3%

Speed tests match reported typical download speeds or are within 1 speed tier: No

Speed tests present within blocks not reported as served by provider (error reported as proportion of total blocks submitted): 56/170 (33%)

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: 79
Number of tracts reported to FCC, but no census blocks reported to project: 48

Dead zones:
Number of census blocks with dead zones reported via broadband.maryland.gov: 1
Total number of dead zones reported per provider via broadband.maryland.gov: 2

Number of census blocks with dead zones reported via mdbroadbandmap.org: 0
Total number of dead zones reported per provider via mdbroadbandmap.org: 0

Web Search Verification: N/A

Mediacom Communications

DBA: Mediacom Maryland LLC

Data Characteristics

Date of Original Submission:	8/4/2011
Date of Update Submission:	N/A
Currency of Data:	7/30/2011
FRN:	0003572633
Type of data submitted:	Census Block Table
Census Block Count:	537
Total Matched Address Points Count:	11420
Unmatched Address Points:	253
Number of Technology of Transmission Types:	2
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to ESRI US Streets address locator
  - Number matched: 10941
  - Number unmatched: 732
- Unmatched address are geocoded to Maryland Property View address locator
  - Number matched: 442
  - Number unmatched: 290
- Unmatched addresses are geocoded to Maryland center line address locator
  - Number matched: 37
  - Number unmatched: 253
- Merge matched addresses
- Spatially join address points to 2010 census blocks

Census Block Process:

- Join the address points to the 2010 census blocks based on the GEOID10 field
  - Export results Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Data Modification:

- Removed 1 address from provider submission – out of service area bounds

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
8	1074	100%

Max Upload Category	Count	% of Blocks
4	1074	100%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
4	8	20%
5	4	10%
6	10	25%
7	18	45%

Speed Test Upload Tier	Count	% of Tests
2	4	10%
3	28	70%
4	6	15%
5	2	5%

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

Speed tests present within blocks not reported as served by provider (error reported as proportion of total blocks submitted): 0/537 (0%)

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: 2
Number of tracts reported to FCC, but no census blocks reported to project: 0

Dead zones:
Number of census blocks with dead zones reported via broadband.maryland.gov: 3
Total number of dead zones reported per provider via broadband.maryland.gov: 5
Number of census blocks with dead zones reported via mdbroadbandmap.org: 1
Total number of dead zones reported per provider via mdbroadbandmap.org: 1

Web Search Verification: 20/537 (4%) of census blocks were confirmed using online search feature of given provider

Mediacom WebSearch Verification Table	**Count**	**Percentage**
Total # of sample points	1496	
Number of sample points with results	85	6%
Result is yes and coverage area is in served area	13	15%
Result is yes but not in a coverage area reported as served	15	18%
Result is no and coverage area is in served area	3	4%
Result is no and coverage area is not in served area	54	64%

Census blocks that are outside providers own Cable Franchise Boundary: 231
Census blocks that fall within another provider's Cable Franchise Boundary: 69

MegaPath, Inc.

DBA Name: MegaPath

Data Characteristics

Date of Original Submission:	3/11/2010
Date of Update Submission:	8/30/2011
Currency of Data:	6/30/2011
FRN:	0018105601
Type of data submitted:	Address Table
Census Block Count:	68
Total Matched Address Points Count:	85
Unmatched Address Points:	1
Number of Technology of Transmission Types:	2
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to ESRI US Streets address locator
  - Number matched: 82
  - Number unmatched: 2
- Unmatched address are geocoded to Maryland Property View address locator
  - Number matched: 2
  - Number unmatched: 2
- Unmatched addresses are geocoded to Maryland center line address locator
  - Number matched: 1
  - Number unmatched: 1
- Merge matched addresses
- Spatially join address points to 2000 census blocks
- Separate and export the address points according to technology of transmission
- Select by location the address points that are completely within a greater than two square mile census block
  - Export as address points to be loaded into the NTIA data model
    - Result: BB_Service_Address
  - Switch the selection and export as points to create census blocks

Census Block Process:

- Join the switched selection (BB_Service_Address) address points to the 2010 census blocks based on the GEOID10 field
  - Export results for each technology of transmission
  - Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Data Modification:

- Removed 12 addresses from provider submission for not having a Maximum Advertised Upload Speed
- 30 census blocks with Technology of Transmission 20 speed changed to tier 3 to fit domain

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
3	65	94%
4	3	4%
5	1	1%

Max Upload Category	Count	% of Blocks
2	28	41%
3	41	59%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	5	63%
3	2	25%
10	1	13%

Speed Test Upload Tier	Count	% of Tests
1	2	25%
2	4	50%
3	1	13%

Speed tests match reported typical speeds or are within 1 speed tier: N/A

Speed tests present within blocks not reported as served by provider (error reported as proportion of total blocks submitted): 6/68 (9%)

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: N/A
Number of tracts reported to FCC, but no census blocks reported to project: N/A

Dead zones:
Number of census blocks with dead zones reported via broadband.maryland.gov: 0
Total number of dead zones reported per provider via broadband.maryland.gov: 0

Number of census blocks with dead zones reported via mdbroadbandmap.org: 0
Total number of dead zones reported per provider via mdbroadbandmap.org: 0

Web Search Verification: N/A

Census blocks that are outside DSL boundary: 1/68 (1%)

Mountain Communications, LLC
DBA: ProCom

Data Characteristics

Date of Original Submission:	5/31/2010
Date of Update Submission:	5/31/2010
Currency of Data:	5/31/2010
FRN:	0008039323
Type of data submitted:	Census Block Table, Road Segments
Census Block Count:	161
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	Yes

Data Processing

Census Block Process:

- Join the census block table to the 2010 census blocks based on the GEOID10 field
  - Export results
  - Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Road Segment Process:

- Road segments are 2009 geometry
- Join road segments to TigerLine by TLID
  - Export results
  - Load exported results into the NTIA data model
    - Result: BB_Service_RoadSegment

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
10	161	100%

Max Upload Category	Count	% of Blocks
10	161	100%

Road Segments

Max Download Category	Count	% of Blocks
10	95	100%

Max Upload Category	Count	% of Blocks
10	161	100%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test: N/A

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

Speed tests present within blocks not reported as served by provider (error reported as proportion of total blocks submitted): N/A

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: N/A
Number of tracts reported to FCC, but no census blocks reported to project: N/A

Dead zones:
Number of census blocks with dead zones reported via broadband.maryland.gov: 0
Total number of dead zones reported per provider via broadband.maryland.gov: 0

Number of census blocks with dead zones reported via mdbroadbandmap.org: 0
Total number of dead zones reported per provider via mdbroadbandmap.org: 0

Web Search Verification: N/A

Neon Connect, Inc

DBA: Sidera Networks

Data Characteristics

Date of Original Submission:	3/5/2010
Date of Update Submission:	3/1/2011
Currency of Data:	December 2010
FRN:	0005052741
Type of data submitted:	Address Table
Census Block Count:	1
Total Matched Address Points Count:	2
Unmatched Address Points:	0
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	Yes
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to ESRI US Streeds address locator
  - Number matched: 2
  - Number unmatched: 0
- Spatially join address points to 2010 census blocks

Census Block Process:

- Join the address points to the 2000 census blocks based on the GEOID10 field
  - Export results
  - Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:

Max Download Category	Count	% of Blocks
7	1	100%

Max Upload Category	Count	% of Blocks
7	1	100%

Typical down/upload speeds reported by provider:

Typical Download Category	Count	% of Blocks

Typical Upload Category	Count	% of Blocks

7	1	100%			7	1	100%

Typical down/upload speed from 2010 computer based speed test: N/A

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

Speed tests present within blocks not reported as served by provider (error reported as proportion of total blocks submitted): N/A

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: N/A
Number of tracts reported to FCC, but no census blocks reported to project: N/A

Dead zones:
Number of census blocks with dead zones reported via broadband.maryland.gov: 0
Total number of dead zones reported per provider via broadband.maryland.gov: 0

Number of census blocks with dead zones reported via mdbroadbandmap.org: 0
Total number of dead zones reported per provider via mdbroadbandmap.org: 0

Web Search Verification: N/A

New Edge Holding Company

DBA Name: New Edge Network, Inc

Data Characteristics

Date of Original Submission:	1/22/2010
Date of Update Submission:	8/31/2011
Currency of Data:	7/1/2011
FRN:	0003720471
Type of data submitted:	Address Table
Census Block Count:	275
Total Matched Address Points Count:	371
Unmatched Address Points:	0
Number of Technology of Transmission Types:	3
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to ESRI address locator
  - Number matched: 335
  - Number unmatched: 2
- Unmatched address are geocoded to MDPV address locator
  - Number matched: 1
  - Number unmatched: 1
- Unmatched address are geocoded to Maryland street centerline address locator
  - Number matched: 1
  - Number unmatched: 1
- Merge matched addresses
- Spatially join address points to 2000 census blocks
- Separate and export the address points according to technology of transmission Select by location the address points that are completely within a greater than two square mile census block
  - Export as address points to be loaded into the NTIA data model
    - Result: BB_Service_Address
  - Switch the selection and export as points to create census blocks

Census Block Process:

- Join the switched selection (BB_Service_Address) address points to the 2000 census blocks based on the BLK2000 field
  - Export results (for each technology of transmission)
  - Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
3	58	19%
4	216	72%
5	20	7%
6	3	1%
7	1	0%

Max Upload Category	Count	% of Blocks
2	167	56%
3	83	28%
4	47	16%
7	1	0%

Typical down/upload speeds reported by provider:

Census Blocks

Typical Download Category	Count	% of Blocks
3	58	19%
4	216	72%
5	20	7%
6	3	1%
7	1	0%

Typical Upload Category	Count	% of Blocks
2	167	56%
3	83	28%
4	47	16%
7	1	0%

Typical down/upload speed from 2010 computer based speed test: N/A

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

Speed tests present within blocks not reported as served by provider (error reported as proportion of total blocks submitted): N/A

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: 74
Number of tracts reported to FCC, but no census blocks reported to project: 39

Dead zones:
Number of census blocks with dead zones reported via broadband.maryland.gov: 0
Total number of dead zones reported per provider via broadband.maryland.gov: 0

Number of census blocks with dead zones reported via mdbroadbandmap.org: 0

Total number of dead zones reported per provider via mdbroadbandmap.org: 0

Web Search Verification: N/A

Census blocks that are outside DSL boundary: 45/275 (16%)

One Communications

DBA: **One Communications**

Data Characteristics

Date of Original Submission:	3/8/2011
Date of Update Submission:	9/1/2011
Currency of Data:	6/30/2011
FRN:	0015337702
Type of data submitted:	Address Table
Census Block Count:	148
Total Matched Address Points Count:	161
Unmatched Address Points:	8
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to ESRI US Streets address locator
  - Number matched: 156
  - Number unmatched: 13
- Unmatched addresses are geocoded to Maryland Property View address locator
  - Number matched: 4
  - Number unmatched: 9
- Unmatched addresses are geocoded to Maryland centerline address locator
  - Number matched: 1
  - Number unmatched: 8
- Spatially join address points to 2010 census blocks

Census Block Process:

- Join the switched address points to the 2000 census blocks based on the GEOID10 field
  - Export results
  - Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
4	94	64%
5	45	30%
6	7	5%
7	2	1%

Max Upload Category	Count	% of Blocks
4	94	64%
5	45	30%
6	7	5%
7	2	1%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	1	17%
3	2	33%
4	1	17%
7	1	17%
8	1	17%

Speed Test Upload Tier	Count	% of Tests
3	3	50%
4	1	17%
5	1	17%
6	1	17%

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

Speed tests present within blocks not reported as served by provider (error reported as proportion of total blocks submitted): 6/148 (4%)

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: N/A
Number of tracts reported to FCC, but no census blocks reported to project: N/A

Dead zones:
Number of census blocks with dead zones reported via broadband.maryland.gov: 0
Total number of dead zones reported per provider via broadband.maryland.gov: 0

Number of census blocks with dead zones reported via mdbroadbandmap.org: 0
Total number of dead zones reported per provider via mdbroadbandmap.org: 0

Web Search Verification: N/A

Census blocks that are outside DSL boundary: 33/148 (22%)

PAETEC Communications, Inc.

DBA Name: PAETEC Communications, Inc.

Data Characteristics

Date of Original Submission:	2/28/2011
Date of Update Submission:	2/28/2011
Currency of Data:	12/31/2011
FRN:	0011017795
Type of data submitted:	Address Table
Census Block Count:	301
Total Matched Address Points Count:	373
Unmatched Address Points:	4
Number of Technology of Transmission Types:	2
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to ESRI US Streets address locator
  - Number matched: 359
  - Number unmatched: 18
- Unmatched address are geocoded to Maryland Property View address locator
  - Number matched: 9
  - Number unmatched: 9
- Unmatched address are geocoded to Maryland centerline address locator
  - Number matched: 5
  - Number unmatched: 4
- Merge matched addresses
- Spatially join address points to 2010 census blocks
- Separate and export the address points according to technology of tranmission

Census Block Process:

- Join the address points to the 2010 census blocks based on the GEOID10 field
  - Export results
  - Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Data Modification:

- 52 blocks with Technology of Transmission 30 exceed Maximum Advertised Down and Maximum Advertised Up speed domain (delivered as tier 11)
    - Changed to speed tier 8 to fit domain

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
11	315	100%

Max Upload Category	Count	% of Blocks
11	315	100%

Typical down/upload speeds reported by provider:

Census Blocks

Typical Download Category	Count	% of Blocks
3	92	29%
4	223	71%

Typical Upload Category	Count	% of Blocks
3	92	29%
4	223	71%

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	3	7%
3	21	49%
4	11	26%
5	5	12%
8	3	7%

Speed Test Upload Tier	Count	% of Tests
2	6	14%
3	20	47%
4	9	21%
5	6	14%
6	1	2%
7	1	2%

Speed tests match reported typical download speeds or are within 1 speed tier: Yes

Speed tests present within blocks not reported as served by provider (error reported as proportion of total blocks submitted): 20/301 (7%)

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: 17
Number of tracts reported to FCC, but no census blocks reported to project: 74

Dead zones:
Number of census blocks with dead zones reported via broadband.maryland.gov: 0
Total number of dead zones reported per provider via broadband.maryland.gov: 0

Number of census blocks with dead zones reported via mdbroadbandmap.org: 0
Total number of dead zones reported per provider via mdbroadbandmap.org: 0

Web Search Verification: N/A

QCOL, Inc.

DBA Name: QCOL

Data Characteristics

Date of Original Submission:	5/31/2010
Date of Update Submission:	2/28/2011
Currency of Data:	12/31/2010
FRN:	0019663095
Type of data submitted:	Census Block Table, Road Segments
Census Block Count:	308
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	2
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	Yes

Data Processing

Census Block Process:

- Join the census block table to the 2010 census blocks based on the BLK2000 field
  - Export results for each technology of transmission
  - Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Road Segment Process:

- Road segments are 2009 geometry
- Join road segments to TigerLine by TLID
  - Export results
  - Load exported results into the NTIA data model
    - Result: BB_Service_RoadSegment

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
10	205	55%

Max Upload Category	Count	% of Blocks
10	205	55%

6	167	45%		6	167	45%

Road Segments

Max Download Category	Count	% of Segments		Max Upload Category	Count	% of Segments
10	27	56%		10	27	56%
6	21	44%		6	21	44%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests		Speed Test Upload Tier	Count	% of Tests
4	1	25%		2	1	25%
5	2	50%		3	2	50%
6	1	25%		5	1	25%

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

Speed tests present within blocks not reported as served by provider (error reported as proportion of total blocks submitted): 1/308 (< 1%)

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: N/A
Number of tracts reported to FCC, but no census blocks reported to project: N/A

Dead zones:
Number of census blocks with dead zones reported via broadband.maryland.gov: 2
Total number of dead zones reported per provider via broadband.maryland.gov: 2

Number of census blocks with dead zones reported via mdbroadbandmap.org: 0
Total number of dead zones reported per provider via mdbroadbandmap.org: 0

Web Search Verification: N/A

Census blocks that are outside providers own Cable Franchise Boundary: N/A

Census blocks that fall within another provider's Cable Franchise Boundary: 272/308 (88%)

Shenandoah Telecommunications

DBA: **Shentel Converged Services, Inc**

Data Characteristics

Date of Original Submission:	5/31/2010
Date of Update Submission:	8/19/2011
Currency of Data:	7/31/2011
FRN:	0013962170
Type of data submitted:	Census Blocks, Road Segments
Census Block Count:	582
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Census Block Process:

- Join the census block table to the 2010 census blocks based on the GEOID10 field
    - Load exported results into the NTIA data model
        - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
6	582	100%

Max Upload Category	Count	% of Blocks
2	582	100%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	1	2%
3	1	2%
4	7	14%
5	13	25%
7	3	6%
8	6	12%
9	9	18%
10	11	22%

Speed Test Upload Tier	Count	% of Tests
1	2	4%
2	9	18%
3	18	35%
4	22	43%

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

Speed tests present within blocks not reported as served by provider (error reported as proportion of total blocks submitted): 6/582 (1%)

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: 582
Number of tracts reported to FCC, but no census blocks reported to project: 1

Dead zones:
Number of census blocks with dead zones reported via broadband.maryland.gov: 0
Total number of dead zones reported per provider via broadband.maryland.gov: 0

Number of census blocks with dead zones reported via mdbroadbandmap.org: 0
Total number of dead zones reported per provider via mdbroadbandmap.org: 0

Web Search Verification: N/A

Sprint Nextel Corporation

DBA Name: Sprint Nextel Corporation

Data Characteristics

Date of Original Submission:	2/18/2010
Date of Update Submission:	8/30/2011
Currency of Data:	6/30/2011
FRN:	0003774593
Type of data submitted:	Coverage Area
Census Block Count:	N/A
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	Yes
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Coverage Area Process:

- Repair Geometry on delivered coverage area
- Remove coverage areas less than 0.125 square miles
- Remove coverage area “holes” less than 0.125 square miles
- Load coverage area into the NTIA data model
  - o Result: BB_Service_Wireless

Data Verification

Maximum down/upload speeds reported by provider:

Coverage Area

Max Download Category	Count	% of Area
3	1	100%
5	1	100%

Max Upload Category	Count	% of Area
2	1	100%
3	1	100%

Typical down/upload speeds reported by provider:

Coverage Area

Typical Download Category	Count	% of Area
3	1	100%

Typical Upload Category	Count	% of Area
2	1	100%

5	1	100%

3	1	100%

Typical down/upload speed from 2010 mobile speed test:

Speed Test Download Tier	Count	% of Tests
0	3252	44%
3	1339	18%
4	1332	18%
5	1311	18%
6	145	2%
7	28	0%

Speed Test Upload Tier	Count	% of Tests
1	1863	25%
2	3323	45%
3	2025	27%
4	95	1%
5	48	1%
6	8	0%
7	21	0%
8	24	0%

Speed tests match reported typical download speeds or are within 1 speed tier: No

#/% of mobile speed tests verifying coverage area:
Number of mobile speed tests reported inside coverage area: 7217/7407 (97.4%)
Number of mobile speed tests reported outside coverage area: 190/7407 (2.6%)

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	342	57%
3	229	38%
4	18	3%
5	4	1%
6	2	0%

Speed Test Upload Tier	Count	% of Tests
1	206	35%
2	376	63%
3	9	2%
4	1	0%
5	2	0%
6	1	0%

Speed tests match reported typical download speeds or are within 1 speed tier: No

#/% of computer based speed tests verifying coverage area:
Number of computer based speed tests reported inside coverage area: 581/595 (97.6%)
Number of computer based speed tests reported outside coverage area: 14/595 (2.4%)

Form 477Verification:
#/% of tracts reported as served to FCC that overlaps with coverage area: 71/71
#/% of tracts reported as served to FCC but do not intersect coverage area: 0/71

Dead zones:
Number of dead zones reported within coverage area via broadband.maryland.gov:
187/240 (78%)
Number of dead zones reported within coverage area via mdbroadbandmap.org:
108/147 (73.5%)

Web Search Verification: N/A

Wireless Verification:

Sprint Wireless Verification Table - 3G	**Count**	**Percentage**
Total # of sample points	1486	
Number of sample points within coverage area	977	
Total number of sample points with results	975	
Verified served AND within reported coverage area (yes,yes)	714	
Verified served AND found outside reported coverage area (yes,no)	261	26.8%
Verified unserved AND found within reported coverage area (no,yes)	263	26.9%
Verified unserved AND found outside reported coverage area (no,no)	248	
Total error	524	35.3%

Sprint Wireless Verification Table - 4G	**Count**	**Percentage**
Total # of sample points	1486	
Number of sample points with expected 4G results	136	
Total number of sample points with 4G results	16	
Verified 4G AND within reported coverage area (yes,yes)	10	
Verified 4G AND found outside reported coverage area (yes,no)	6	37.5%
Verified not 4G AND found within reported coverage area (no,yes)	126	92.6%
Verified not 4G AND found outside reported coverage area (no,no)	1344	
Total error	132	8.9%

*4G service defined as average down speed of > 2000 bps

StarBand Communications Inc.

DBA Name: **StarBand Communications Inc.**

Data Characteristics

Date of Original Submission:	1/26/2010
Date of Update Submission:	7/12/2011
Currency of Data:	6/30/2011
FRN:	0005087457
Type of data submitted:	Coverage
Census Block Count:	N/A
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	Yes
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Coverage Area Process:

- Repair Geometry on delivered coverage area
- Perform Topology on coverage area
    - Rule: Coverage area should not overlap
    - Load coverage area into the NTIA data model
        - Result: BB_Service_Wireless

Speed Domains:

- Typical Upstream speed < 2
    - Calculated Typical Upstream speed to 2

Data Verification

Maximum down/upload speeds reported by provider:

Coverage Area

Max Download Category	Count	% of Area
3	1	100%

Max Upload Category	Count	% of Area
2	1	100%

Typical down/upload speeds reported by provider:

Coverage Area

Typical Download Category	Count	% of Area
3	1	100%

Typical Upload Category	Count	% of Area
2	1	100%

Typical down/upload speed from 2010 mobile speed test: N/A

Speed tests match reported typical speeds or are within 1 speed tier: N/A

# of mobile speed tests verifying coverage area:
Number of mobile speed tests reported inside coverage area: N/A
Number of mobile speed tests reported outside coverage area: N/A

Form 477Verification:
#/% of tracts reported as served to FCC that overlaps with coverage area: 34/34 (100.0%)
#/% of tracts reported as served to FCC but do not intersect coverage area: 0/34 (0%)

Dead zones:
Number of dead zones reported within coverage area via broadband.maryland.gov:
237/240 (98.75)
Number of dead zones reported within coverage area via broadband.maryland.gov:
147/147 (100.0%)

Web Search Verification: N/A

Wireless Verification: N/A

Starpower Communications, LLC
DBA Name: RCN & RCN Business Solutions

Data Characteristics

Date of Original Submission:	3/5/2010
Date of Update Submission:	9/8/2011
Currency of Data:	6/30/2011
FRN:	0003735016
Type of data submitted:	Address Table
Census Block Count:	1381
Total Matched Address Points Count:	6986
Unmatched Address Points:	76
Number of Technology of Transmission Types:	2
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	Yes
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:
- Geocode address table to ESRI US Streets address locator
  - Number matched: 6958
  - Number unmatched: 77
- Unmatched address are geocoded to Maryland street centerline address locator
  - Number matched: 1
  - Number unmatched: 76
- Merge matched addresses
- Spatially join address points to 2010 census blocks

Census Block Process:
- Join the address points to the 2010 census blocks based on the GEOID10 field
  - Export results
  - Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
4	3	0%
5	158	11%
6	1	0%
7	804	58%
8	414	30%
9	3	0%

Max Upload Category	Count	% of Blocks
2	161	12%
3	15	1%
4	1196	86%
5	8	1%
6	2	0%
7	1	0%

Typical down/upload speeds reported by provider:

Census Blocks

Typical Download Category	Count	% of Blocks
4	3	0%
5	158	11%
6	1	0%
7	804	58%
8	414	30%
9	3	0%

Typical Upload Category	Count	% of Blocks
2	161	12%
3	15	1%
4	1196	86%
5	8	1%
6	2	0%
7	1	0%

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	13	8%
4	12	7%
5	36	22%
6	43	26%
7	59	36%
8	1	1%
10	1	1%

Speed Test Upload Tier	Count	% of Tests
1	3	2%
2	104	63%
3	7	4%
4	44	27%
5	7	4%

Speed tests match reported typical download speeds or are within 1 speed tier: Yes

Error reported as proportion of total blocks submitted: 6/1381 (< 1%)

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: 2
Number of tracts reported to FCC, but no census blocks reported to project: 4

Dead zones:
Number of census blocks with dead zones reported via broadband.maryland.gov: 1

Total number of dead zones reported per provider via broadband.maryland.gov: 2

Number of census blocks with dead zones reported via mdbroadbandmap.org: 0
Total number of dead zones reported per provider via mdbroadbandmap.org: 0

Web Search Verification: 4/1381 (0.3%) of census blocks were confirmed using online search feature of given provider

Starpower WebSearch Verification Table	**Count**	**Percentage**
Total # of sample points	1496	
Number of sample points with results	55	4%
Result is yes and census block is in served area	4	7%
Result is yes but not in a census block reported as served	0	0%
Result is no and census block is in served area	0	0%
Result is no and census block not served area	51	93%

Census blocks that are outside providers own Cable Franchise Boundary: N/A

Census blocks that fall within another provider's Cable Franchise Boundary: 1379/1381 (99%)

Tata Communications (America) Inc.

DBA Name: Tata Communications (America) Inc.

Data Characteristics

Date of Original Submission:	2/1/2010
Date of Update Submission:	9/9/2011
Currency of Data:	6/30/2011
FRN:	0009480302
Type of data submitted:	Address Table
Census Block Count:	1
Total Matched Address Points Count:	1
Unmatched Address Points:	0
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to ESRI US Streets address locator
  - Number matched: 1
  - Number unmatched: 0
- Spatially join address points to 2010 census blocks

Census Block Process:

- Join the address points to the 2000 census blocks based on the GEOID10 field
  - Export results
  - Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
4	1	100%

Max Upload Category	Count	% of Blocks
4	1	100%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	1	100%

Speed Test Upload Tier	Count	% of Tests
2	1	100%

Speed tests match reported typical downloaded speeds or are within 1 speed tier: N/A

Speed tests present within blocks not reported as served by provider (error reported as proportion of total blocks submitted): 1/1 (100%)

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: 0
Number of tracts reported to FCC, but no census blocks reported to project: 0

Dead zones:
Number of census blocks with dead zones reported via broadband.maryland.gov: 0
Total number of dead zones reported per provider via broadband.maryland.gov: 0

Number of census blocks with dead zones reported via mdbroadbandmap.org: 0
Total number of dead zones reported per provider via mdbroadbandmap.org: 0

Web Search Verification: N/A

Census blocks that are outside DSL boundary: 0/1 (0%)

T-Mobile USA, Inc.

DBA Name: T-Mobile USA, Inc.

Data Characteristics

Date of Original Submission:	2/25/2010
Date of Update Submission:	8/24/2011
Currency of Data:	6/30/2011
FRN:	0006945950
Type of data submitted:	Coverage Area
Census Block Count:	N/A
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	Yes
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Coverage Area Process:

- Repair Geometry on delivered coverage area
- Remove coverage areas less than 0.125 square miles
- Remove coverage area "holes" less than 0.125 square miles
- Load coverage area into the NTIA data model
    - Result: BB_Service_Wireless

Data Verification

Maximum down/upload speeds reported by provider:

Coverage Area

Max Download Category	Count	% of Area
4	1	100%
6	1	100%
7	1	100%

Max Upload Category	Count	% of Area
2	1	100%
4	2	100%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 mobile speed test:

Speed Test Download Tier	Count	% of Tests
0	3019	36%
3	1599	19%
4	2034	24%
5	1466	18%
6	156	2%
7	31	0%

Speed Test Upload Tier	Count	% of Tests
1	1229	15%
2	3597	43%
3	2538	31%
4	848	10%
5	51	1%
6	15	0%
7	20	0%
8	7	0%

Speed tests match reported typical speeds or are within 1 speed tier: No

#/% of computer based speed tests verifying coverage area:
Number of mobile speed tests reported inside coverage area: 8138/8305 (98%)
Number of mobile speed tests reported outside coverage area: 167/8305 (2%)

Form477 Verification:
#/% of tracts reported as served to FCC that overlaps with coverage area: N/A
#/% of tracts reported as served to FCC but do not intersect coverage area: N/A

Dead zones:
Number of dead zones reported within coverage area via broadband.maryland.gov:
121/240 (50.4%)
Number of dead zones reported within coverage area via mdbroadbandmap.org:
42/147 (28.6%)

Web Search Verification: N/A

Wireless Verification:

TMobile Wireless Verification Table - 3G	**Count**	**Percentage**
Total # of sample points	1486	
Number of sample points within coverage area	560	
Total number of sample points with results	1334	
Verified served AND within reported coverage area (yes,yes)	485	
Verified served AND found outside reported coverage area (yes,no)	849	63.6%
Verified unserved AND found within reported coverage area (no,yes)	75	13.4%
Verified unserved AND found outside reported coverage area (no,no)	77	
Total error	924	62.2%

TMobile Wireless Verification Table - 4G (Speed 6-10)	Count	Percentage
Total # of sample points	1486	
Number of sample points with expected 4G results	402	
Total number of sample points with 4G results	120	
Verified 4G AND within reported coverage area (yes,yes)	116	
Verified 4G AND found outside reported coverage area (yes,no)	4	3.3%
Verified not 4G AND found within reported coverage area (no,yes)	286	71.1%
Verified not 4G AND found outside reported coverage area (no,no)	1080	
Total error	290	19.5%

*4G service defined as average down speed of > 2000 bps

TMobile Wireless Verification Table - 4G (Speed 10-25)	Count	Percentage
Total # of sample points	1486	
Number of sample points with expected 4G results	382	
Total number of sample points with 4G results	120	
Verified 4G AND within reported coverage area (yes,yes)	111	
Verified 4G AND found outside reported coverage area (yes,no)	9	7.5%
Verified not 4G AND found within reported coverage area (no,yes)	271	70.9%
Verified not 4G AND found outside reported coverage area (no,no)	1095	
Total error	280	18.8%

*4G service defined as average down speed of > 2000 bps

TWTelecom of Maryland, LLC

DBA Name: TWTelecom of Maryland, LLC

Data Characteristics

Date of Original Submission:	1/30/2010
Date of Update Submission:	9/2/2011
Currency of Data:	6/30/2011
FRN:	0017348202
Type of data submitted:	Address table
Census Block Count:	55
Total Matched Address Points Count:	69
Unmatched Address Points:	0
Number of Technology of Transmission Types:	2
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	Yes
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to ESRI US Streets address locator
  - Number matched: 67
  - Number unmatched: 2
- Unmatched address are geocoded to Maryland Property View address locator
  - Number matched: 2
  - Number unmatched: 0
- Merge matched addresses
- Spatially join address points to 2010 census blocks
- Separate and export the address points according to technology of transmission

Census Block Process:

- Join the address points to the 2010 census blocks based on the GEOID10 field
  - Export results for each technology of transmission
  - Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Data Modification:

- Removed 26 records from provider data – do not meet broadband speeds

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
3	13	22%
4	16	28%
5	5	9%
6	3	5%
7	9	16%
8	4	7%
9	2	3%
10	3	5%
11	3	5%

Max Upload Category	Count	% of Blocks
3	13	22%
4	16	28%
5	5	9%
6	3	5%
7	9	16%
8	4	7%
9	2	3%
10	3	5%
11	3	5%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	6	40%
3	1	7%
4	3	20%
5	3	20%
7	2	13%

Speed Test Upload Tier	Count	% of Tests
1	5	33%
2	1	7%
3	1	7%
4	3	20%
5	5	33%

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

Speed tests present within blocks not reported as served by provider (error reported as proportion of total blocks submitted): 6/55 (11%)

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: 13
Number of tracts reported to FCC, but no census blocks reported to project: 11

Dead zones:
Number of census blocks with dead zones reported via broadband.maryland.gov: 0
Total number of dead zones reported per provider via broadband.maryland.gov: 0

Number of census blocks with dead zones reported via mdbroadbandmap.org: 0
Total number of dead zones reported per provider via mdbroadbandmap.org: 0

Web Search Verification: N/A

Vector Data Systems LLC

DBA Name: Vector Data Systems LLC

Data Characteristics

Date of Original Submission:	February 2010
Date of Update Submission:	8/30/2011
Currency of Data:	6/30/2011
FRN:	0017306663
Type of data submitted:	Coverage Area
Census Block Count:	N/A
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Coverage Area Process:

- Repair Geometry on delivered coverage area
- Remove coverage areas less than 0.125 square miles
- Remove coverage area “holes” less than 0.125 square miles
- Load coverage area into the NTIA data model
  - Result: BB_Service_Wireless

Data Verification

Maximum down/upload speeds reported by provider:

Coverage Area

Max Download Category	Count	% of Area
5	1	100%

Max Upload Category	Count	% of Area
5	1	100%

Typical down/upload speeds reported by provider:

Coverage Area

Typical Download Category	Count	% of Area
5	1	100%

Typical Upload Category	Count	% of Area
4	1	100%

Typical down/upload speed from 2010 mobile speed test: N/A

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

#/% of mobile speed tests verifying coverage area:
Number of mobile speed tests reported inside coverage area: N/A
Number of mobile speed tests reported outside coverage area: N/A

Form 477Verification:
#/% of tracts reported as served to FCC that overlaps with coverage area: 5/5 (100.0%)
#/% of tracts reported as served to FCC but do not intersect coverage area: 0/5 (0%)

Dead zones:
Number of dead zones reported within coverage area via broadband.maryland.gov:
4/240 (1.7%)
Number of dead zones reported within coverage area via mdbroadbandmap.org:
0/147 (0%)

Web Search Verification: N/A

Wireless Verification: N/A

Verizon Communications Inc

DBA: Verizon Maryland Inc

Data Characteristics

Date of Original Submission:	2/15/2010
Date of Update Submission:	9/2/2011
Currency of Data:	6/30/2011
FRN:	0002166825
Type of data submitted:	Census Block Table, Road Segments
Census Block Count:	76768
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	2
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	Yes
Provided Road Segments for census blocks greater than 2 sq miles:	Yes

Data Processing

Census Block Process:

- Join the census block table to 2010 census blocks based on the GEOID10 field
    - Export results for each technology of transmission
    - Load exported results into the NTIA data model
        - Result: BB_Service_CensusBlock

Road Segment Process:

- Join road segments to TigerLine by TLID
    - Export results
    - Load exported results into the NTIA data model
        - Result: BB_Service_RoadSegment

Data Modification:

- 5 blocks with Technology of Transmission 10 exceed Maximum Advertised Download speed
    - Changed to speed tier 8

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
4	12188	13%
5	37049	39%
6	12508	13%
9	32281	34%

Max Upload Category	Count	% of Blocks
2	12188	13%
3	49557	53%
7	32281	34%

Road Segments

Max Download Category	Count	% of Segments
4	1275	32%
5	1544	39%
6	111	3%
9	1069	27%

Max Upload Category	Count	% of Segments
2	1275	32%
3	1655	41%
7	1069	27%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	571	8%
3	526	8%
4	1364	20%
5	391	6%
6	692	10%
7	2199	32%
8	1130	16%
9	37	1%
10	21	0%

Speed Test Upload Tier	Count	% of Tests
1	589	8%
2	2060	30%
3	56	1%
4	882	13%
5	1437	21%
6	624	9%
7	1186	17%
8	96	1%
9	1	0%

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

Speed tests present within blocks not reported as served by provider (error reported as proportion of total blocks submitted): 30/76768 (< 1%)

Form 477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: 4229
Number of tracts reported to FCC, but no census blocks reported to project: 0

Dead zones:
Number of census blocks with dead zones reported via broadband.maryland.gov: 104
Total number of dead zones reported per provider via broadband.maryland.gov: 129

Number of census blocks with dead zones reported via mdbroadbandmap.org: 63
Total number of dead zones reported per provider via mdbroadbandmap.org: 76

Web Search Verification: 479/76768 (1%) of census blocks were confirmed using online search feature of given provider

VerizonMD WebSearch Verification Table	Count	Percentage
Total # of sample points	1496	
Number of sample points with results	1435	96%
Result is yes and census block is in served area	479	33%
Result is yes but not in a census block reported as served	39	3%
Result is no and census block is in served area	513	36%
Result is no and census block not served area	402	28%

Census blocks that are outside DSL boundary: 20257/76768 (26 %)

Wildblue Communications, Inc

DBA Name: Wildblue Communications, Inc

Data Characteristics

Date of Original Submission:	4/21/2010
Date of Update Submission:	7/20/2011
Currency of Data:	6/30/2011
FRN:	0007843766
Type of data submitted:	Coverage Area
Census Block Count:	N/A
Total Matched Address Points Count:	N/A
Unmatched Address Points:	N/A
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Coverage Area Process:

- Repair Geometry on delivered coverage area
- Perform Topology on coverage area
  - Rule: Coverage area should not overlap
  - Load coverage area into the NTIA data model
    - Result: BB_Service_Wireless

Data Modification:

- Typical Downstream Speed < 3
  - Calculated Typical Downstream Speed to 3
- Typical Upstream Speed < 2
  - Calculated Typical Upstream Speed to 2

Data Verification

Maximum down/upload speeds reported by provider:

Coverage Area

Max Download Category	Count	% of Area
4	1	100%

Max Upload Category	Count	% of Area
2	1	100%

Typical down/upload speeds reported by provider:

Coverage Area

Typical Download Category	Count	% of Area
3	1	100%

Typical Upload Category	Count	% of Area
2	1	100%

Typical down/upload speed from 2010 <u>mobile speed test</u>:

Speed Test Download Tier	Count	% of Tests
0	4	50%
3	4	50%

Speed Test Upload Tier	Count	% of Tests
1	8	100%

Speed tests match reported typical download speeds or are within 1 speed tier: Yes

#/% of mobile speed tests verifying coverage area:
Number of mobile speed tests reported inside coverage area: 8/8 (100%)
Number of mobile speed tests reported outside coverage area: 0/0 (0%)

Typical down/upload speed from 2010 <u>computer based speed test:</u>

Speed Test Download Tier	Count	% of Tests
0	31	60%
3	14	27%
4	7	13%

Speed Test Upload Tier	Count	% of Tests
1	52	100%

Speed tests match reported typical download speeds or are within 1 speed tier: No

#/% of computer based speed tests verifying coverage area:
Number of mobile speed tests reported inside coverage area: 52/52 (100%)
Number of mobile speed tests reported outside coverage area: 0/52 (0%)

Form 477Verification:
#/% of tracts reported as served to FCC that overlaps with coverage area: 214/214 (100%)
#/% of tracts reported as served to FCC but do not intersect coverage area: 0/214 (0%)

Dead zones:
Number of dead zones reported within coverage area via broadband.maryland.gov:
237/240 (98.5%)
Number of dead zones reported within coverage area via mdbroadbandmap.org:
147/147 (100%)

Web Search Verification: N/A

Wireless Verification: N/A

XO Holdings, Inc

DBA Name: XO Communications, LLC

Data Characteristics

Date of Original Submission:	2/1/2010
Date of Update Submission:	9/9/2011
Currency of Data:	6/30/2011
FRN:	0006275945
Type of data submitted:	Address Table
Census Block Count:	322
Total Matched Address Points Count:	354
Unmatched Address Points:	0
Number of Technology of Transmission Types:	3
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	No
Provided Max Typical Upload Speed:	No
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to ESRI US Streets address locator
  - Number matched: 354
  - Number unmatched: 0
- Spatially join address points to 2010 census blocks
- Separate and export the address points according to technology of transmission

Census Block Process:

- Join the address points to the 2010 census blocks based on the GEOID10 field
  - Export results for each technology of transmission
  - Load exported results into the NTIA data model
    - Result: BB_Service_CensusBlock

Data Modification:

- 27 addresses do not meet broadband speeds – dropped from submission
- 3 blocks with Technology of Transmission 10 exceed domain speeds for Maximum Advertised Download and Maximum Advertised Upload
  - Changed to speed tier 8

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
3	30	9%
4	193	60%
5	48	15%
6	13	4%
7	29	9%
8	7	2%
10	3	1%

Max Upload Category	Count	% of Blocks
2	7	2%
3	28	9%
4	188	58%
5	48	15%
6	13	4%
7	29	9%
8	7	2%
10	3	1%

Typical down/upload speeds reported by provider: N/A

Typical down/upload speed from 2010 computer based speed test:

Speed Test Download Tier	Count	% of Tests
0	22	31%
3	17	24%
4	16	23%
5	5	7%
6	5	7%
7	1	1%
8	4	6%

Speed Test Upload Tier	Count	% of Tests
1	2	3%
2	26	37%
3	20	29%
4	6	9%
5	7	10%
6	3	4%
7	6	9%

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

Speed tests present within blocks not reported as served by provider (error reported as proportion of total blocks submitted): 36/322 (11%)

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: 18
Number of tracts reported to FCC, but no census blocks reported to project: 8

Dead zones:
Number of census blocks with dead zones reported via broadband.maryland.gov: 3
Total number of dead zones reported per provider via broadband.maryland.gov: 3
Number of census blocks with dead zones reported via mdbroadbandmap.org: 1
Total number of dead zones reported per provider via mdbroadbandmap.org: 1

Web Search Verification: N/A

Census blocks that are outside DSL boundary: 59/322 (18%)

Zayo Bandwidth LLC

DBA Name: Zayo Bandwidth LLC

Data Characteristics

Date of Original Submission:	1/13/2011
Date of Update Submission:	9/7/2011
Currency of Data:	6/30/2011
FRN:	0019133826
Type of data submitted:	Address Table
Census Block Count:	2
Total Matched Address Points Count:	2
Unmatched Address Points:	0
Number of Technology of Transmission Types:	1
Provided Max Advertised Download Speed:	Complete
Provided Max Advertised Upload Speed:	Complete
Provided Max Typical Download Speed:	Complete
Provided Max Typical Upload Speed:	Complete
Provided Middle Mile:	No
Provided Road Segments for census blocks greater than 2 sq miles:	No

Data Processing

Address Table Process:

- Geocode address table to ESRI US Streets address locator
    - Number matched: 2
    - Number unmatched: 0
- Spatially join address points to 2010 census blocks

Census Block Process:

- Join the address points to the 2010 census blocks based on the GEOID10 field
    - Export results Load exported results into the NTIA data model
        - Result: BB_Service_CensusBlock

Data Verification

Maximum down/upload speeds reported by provider:

Census Blocks

Max Download Category	Count	% of Blocks
7	1	50%
8	1	50%

Max Upload Category	Count	% of Blocks
7	1	50%
8	1	50%

Typical down/upload speeds reported by provider:

Census Blocks

Typical Download Category	Count	% of Blocks
7	1	50%
8	1	50%

Typical Upload Category	Count	% of Blocks
7	1	50%
8	1	50%

Typical down/upload speed from 2010 computer based speed test: N/A

Speed tests match reported typical download speeds or are within 1 speed tier: N/A

Speed tests present within blocks not reported as served by provider (error reported as proportion of total blocks submitted): N/A

Form477 Verification:
Number of census blocks reported to project, but no tract reported to FCC: 2
Number of tracts reported to FCC, but no census blocks reported to project: 1

Dead zones:
Number of census blocks with dead zones reported via broadband.maryland.gov: 0
Total number of dead zones reported per provider via broadband.maryland.gov: 0

Number of census blocks with dead zones reported via mdbroadbandmap.org: 0
Total number of dead zones reported per provider via mdbroadbandmap.org: 0

Web Search Verification: N/A

Maine SBDD Data Submittal to NTIA

Technical Whitepaper

4th Data Delivery

October 1, 2011

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1 Introduction

As an NTIA State Broadband Data and Development (SBDD) grant recipient, the State of Maine is undertaking a statewide project to inventory and map broadband services for inclusion in both national and state broadband maps. The SBDD grantee project team for Maine consists of the ConnectME Authority (ConnectME), the Maine Office of GIS (MEGIS), and the James W. Sewall Company (Sewall). The team is collecting broadband service availability data, including speeds and types of technology, as well as information on Community Anchor Institution (CAI) locations across the entire state. The collected service data undergoes geospatial processing and verification steps before it is loaded into Maine's broadband geodatabase. This geodatabase is used to satisfy NTIA's bi-annual submission requirements as well as support the ConnectME Authority's statewide initiatives and programs.

This whitepaper describes the deliverable datasets, the data collection process and the verification process.

2 Data Description

The Maine team is providing spatial data representing provider coverage in the state as well as information on validation and verification processes. Files provided are as follows:

Filename	Description
ME_SBDD_2011_10_01.gdb	Folder containing SBDD transfer file geodatabase
ME_DataPackage_2011_10_01.xlsx	DataPackage file
ME_2011_10_01.txt	Data Submission Receipt file
ME_Methodology_2011_10_01.pdf	Methodology Paper file
ReadMe_ME_2011_10_01.txt	ReadMe file
ME_2011_10_01_Changes_and_Corrections.doc	Document listing changes and corrections since April 2011 submission to NTIA

3 Provider Participation

There were fifty-four potential providers identified in Maine, of which four were found not to serve any addresses in Maine and were therefore not included in this analysis.

The Maine team has utilized data from 70% of the companies operating in the state and expects to receive data from another 6% in the future for a combined total of 76% cooperation. Two firms (4%) would not provide data, and another 20% were simply not responsive to our attempts to communicate.

Company Response	*Number*	*% of Total Companies*
Provided data	35	70%
Will provide data	3	6%
Will not provide data	2	4%
Non-responsive	10	20%
TOTAL	50	100%

Of the thirty-five companies who have submitted data, thirty (86%) own the infrastructure used to provide internet services to residential and business customers, two (6%) resell internet service, one (3%) does both, and two (6%) provide middle mile and internet backhaul services only.

Information on the providers is included on the ‘ProviderTable’ spreadsheet in the file **datapackage.xls** included as part of the submission to NTIA.

4 Data Collection and Integration

4.1 Provider Outreach and Data Gathering

Mapping broadband coverages across the State begins by identifying potential providers and contacting them to determine service capabilities and level of participation. If a provider offers broadband level Internet service in Maine, the provider will be invited to participate in the project. After executing a non-disclosure agreement (NDA), the provider submits data showing where services are offered, technology of transmission used, and maximum advertised downstream and upstream speeds. The project team has developed a step by step process that has been captured by the high-level workflow shown in ***Figure 1***. Starting with contacting a service provider, the workflow allows a user to determine whether a provider should be included and if so what types of service are offered.

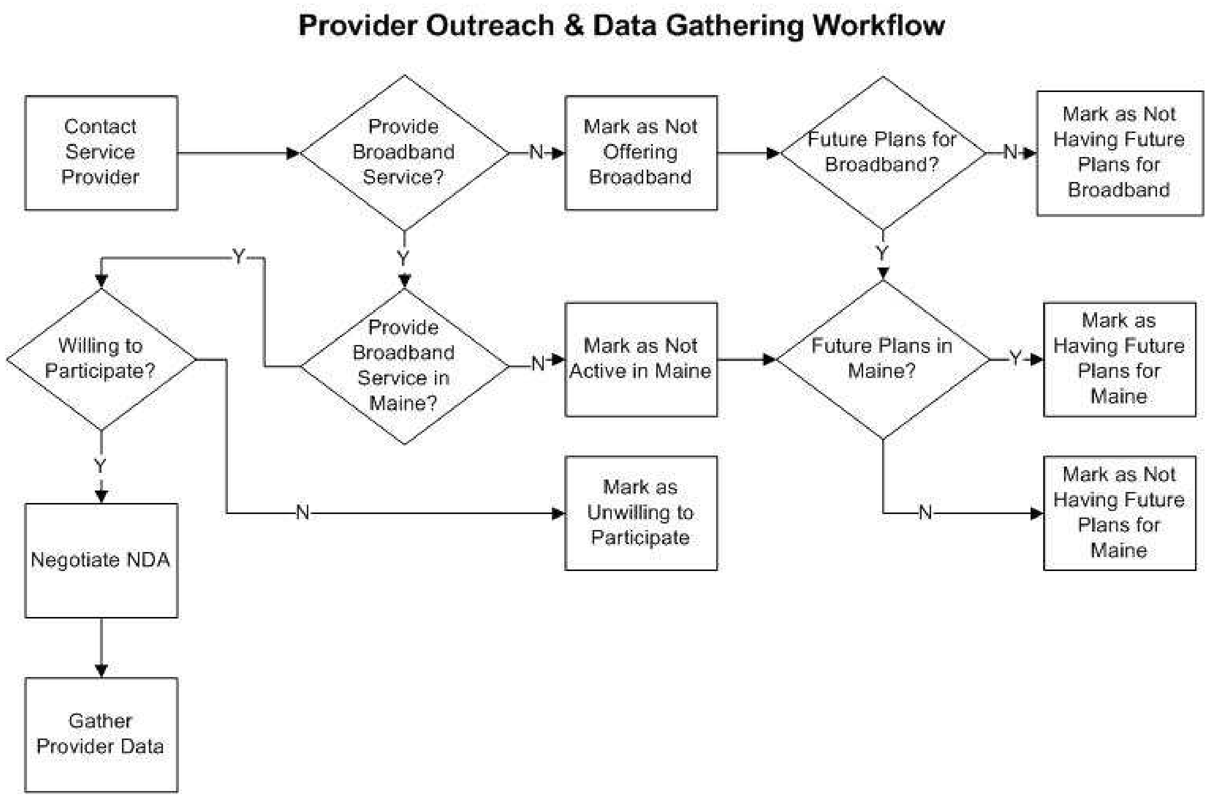


Figure 1 - Provider Outreach and Data Gathering Workflow

The task of reaching out to the provider community and gathering service data has five main tasks: Research Service Providers, Execute NDA, Gather Provider Data, Assess Provider Data, and Categorize Data for Production.

4.1.1 Research Service Providers

The Maine project team has established a service provider contact database, which contains contact information for all of the potential broadband service providers in the state. The initial set of providers was obtained from state and industry lists as well as Internet research. Ongoing management of the list is required because new providers begin offering services that qualify as broadband and changes occur to existing provider companies through mergers or acquisitions.

Sewall initially contacts each provider by phone and introduces the project. One purpose for the initial contact is to identify the individual at the provider company with whom the team should be working. In some instances, especially for larger companies it may take multiple attempts before the appropriate person is reached.

Another purpose is to determine if the company's services meet the requirements for inclusion in the project. If a company offers broadband level service in Maine then the next step is to determine the type(s) of service being offered, whether the service offerings are as an end-user provider or as a middle mile/back haul provider, and whether the company owns facilities or re-sells services using another carrier's network. Data from back haul carriers and resellers are included in the project.

A third purpose behind the initial contact is to confirm that the provider wants to participate in project and is willing to submit data that represents its service offerings and coverages. Provider companies who elect to participate are invited to execute an NDA to protect those data items considered to be confidential or proprietary. If a provider company does not want to participate, Sewall may look for assistance from the ConnectME Authority and the NTIA SBDD project team to encourage participation.

4.1.2 Execute Non-Disclosure Agreement (NDA)

The process of executing an NDA starts with sending a letter of introduction along with an NDA template and a copy of a ConnectME Protective Order. **Appendix A** contains a sample letter. The NDA template was drafted by the Maine law firm, Rudman & Winchell, based on confidentiality guidelines presented by NTIA and can be found in **Appendix B**. A copy of the ConnectME Protective Order signed on 21 December 2009 at the request of many of the service providers is in **Appendix C**.

Changes to the NDA template are negotiated with individual companies as needed. Once finalized, the NDA is signed by the provider company, Sewall, and the ConnectME Authority before the data gathering process begins.

4.1.3 Gather Provider Data

More often than not after an NDA has been executed, a different individual at a provider company is identified as the primary contact for data submittals. Once the contact is confirmed, a data submittal information sheet prepared by the project team is sent to the contact. The data submittal sheet identifies the data items desired and has definitions from the SBDD NOFA. The items requested include:

- FRN or provider FCC Registration Number
- Location and extents of service coverage
- Technology of service
- Speeds of service including maximum advertised downstream & upstream speeds and typical downstream & upstream speeds
- Tower and transmitter locations and transmission attributes (for fixed wireless service)
- Middle mile and back haul connection points
- Customer service locations (for wired and fixed wireless service)
- Failed service locations (for wired and fixed wireless service)
- Service to Community Anchor Institutions

After sending the data submittal information Sewall follows up with the provider contact to review the requested data items and discuss potential formats for submitting data. The team is cognizant of the wide range of environments operated by the provider companies and recognizes the need to accommodate submissions in many different formats including tabular (CSV, Excel, DBF), GIS (ESRI shapefile, ESRI geodatabase, MapInfo, Google KML/KMZ, CAD (AutoCAD, Microstation), and hardcopy. The team also understands that many of the smaller providers in Maine are handicapped by a lack of resources in trying to comply with the project's data submission requirements. Some of the issues facing these providers include small staff sizes, lack of mapping technical expertise, and proprietary digital systems. Sewall lends technical assistance and expertise as needed.

Sewall has deployed a web-based GeoPortal site to accommodate all digital data transfers related to the broadband mapping project. Additional details pertaining to this site can be found in **Section 5.6.1**.

4.1.4 Assess Provider Data

After data has been submitted by a provider, Sewall catalogues it and assesses the data files to see if all of the requested items were provided and what data types were received. Sewall also verifies the locations and spatial definitions for the data items and checks for missing attribute information. Any questions generated are sent to the provider for clarification. It is common for the initial submission to need multiple iterations of data exchanges and feedback before the submission is completed.

Once an initial set of broadband service data is in place, follow-up rounds of data gathering will incorporate modifications to existing service coverages, service types, or service speeds. Later submittals by a provider could consist of an entire set of data records or may only contain updates since the previous submission. Sewall's integration processes are equipped with GIS and database tools to fold newer versions of provider records into the existing baseline. The team anticipates that further development and refinement of these processes and tools will be made as more update submissions are received.

4.1.5 Categorize Data for Production

When data from a provider has been received and assessed, production processes are needed to integrate the data into the project database. **Section 4** of this paper describes the various workflows to turn the submitted data into the SBDD data transfer model features and attributes.

4.2 Community Anchor Outreach and Data Gathering

Community Anchor Institutions (CAI), as defined by NTIA NOFA category codes, consist of the following:

Category 1: School – K through 12
Category 2: Library
Category 3: Medical/Healthcare
Category 4: Public Safety
Category 5: University, College, Other post secondary
Category 6: Other community support – government
Category 7: Other community support – non-governmental

The three primary steps with the CAI are data gathering, data processing and attribution.

4.2.1 Data Gathering

Several data sources were utilized to represent all CAI categories across the state.

State of Maine, Office of Geographic Information Systems (MEGIS)

ARMORIES
CEMA (County Emergency Management Agency)
COLLEGES
FIRE
HOSPITAL
HAS (Hospital Service Areas)
MEAIR (Airports)
POLICE
REDCROSS
RESCUE
SCHLIB (Schools & Libraries)

NAVTEQ-NAVSTREETS (Points of Interest)

NAVTEQ-COMMSVC
NAVTEQ-EDUINSTS
NAVTEQ-HOSPITAL

NAVTEQ-TRANSHUBS

State of Maine, Office of Information Technology – State Facilities

State Facilities File

Maine Department of Health & Human Services (DHHS) – Maine Care Services

Hospitals
Clinics/Rehab/Nursing
Schools
Pharmacies
Home Care
Counseling/Psychologists
Shared Living
Mental Health
School Departments
Health related businesses

Maine School and Library Network (MSLN)

K-12 schools
Public libraries

Maine's Research & Education Network (MaineREN)

Universities and colleges

Service Provider Data

CAI data submitted by provider companies

4.2.2 Data Processing

The data processing task involved an in-depth cleaning and sorting of all CAI source records. Data is initially sorted as spatial (e.g., GIS layer) and non-spatial (e.g., table) data. The spatial data consisted of points and generally needed minimal formatting before loading into a personal geodatabase. The non-spatial data required some initial format revisions to prepare the data for geocoding to generate spatial geometry. The following descriptions associated with ***Figure 2*** below outline the overall workflow and processes involved.

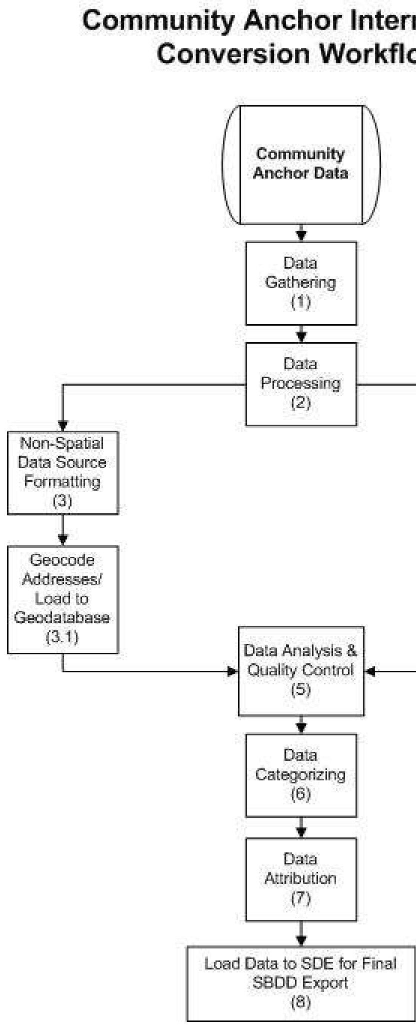


Figure 2 - Community Anchor Internal Workflow

(1) Data Gathering

Data gathering involves acquiring source data involving the seven categories defined by NTIA NOFA. Data may originate from several sources including state, county, town, outreach programs, service providers and more. Records are documented for metadata and given a level of confidence reflecting the data source, spatial accuracy and processing enhancements.

(2) Data Processing

The data processing phase separates the data sources into two types: flat file (non-spatial) and spatial. A flat file refers to data or a table that contains 1 record per line, generally in the format of an .xls spreadsheet or .dbf table. Without spatial coordinate values to translate to points, this type of data must be geocoded in ArcGIS. Spatial data contains pre-defined coordinate values or is already in a format containing spatial geometry with a defined projection and can be imported directly.

(3) Non-Spatial Data Source Formatting
Non-spatial data files are scrubbed to ensure that all necessary fields are present and are formatted to run through the geocoding process.

(3.1) Geocode Addresses/Load to Geodatabase
Using the geocoding tool in ArcGIS, an address locator file must first be setup. The address locator file maps out the ConnectME street centerline fields and is used as a reference for the non-spatial data during the geocoding process. The non-spatial data is saved as a .csv file. Shown below is a typical record formatted to geocode.

Name	Address1	City	State	Zip
Healthworks	10 Bangor	Bangor	ME	04401

In this example, the geocoding process will reference or match this address record to the ConnectME street address locator and place a point at this location in the map layer. All records in the source file are processed at once. Points are generated, based on how matching parameters or set. Points are then loaded into personal geodatabase for final scrubbing and quality acceptance.

Name	Address1	City	State	Latitude	Longitude
Healthworks	10 Bangor St	Bangor	ME	46.1252	-67.8422

(4) Spatial Data Source Formatting
Spatial data sources are received as flat files with spatial coordinate values or reside in a GIS layer as points. Each source type is processed differently.

Flat files with coordinate values:

- Prepare field name formats
- Prepare coordinate values in decimal degrees
- Add X,Y data into ArcGIS, generating the point locations on the fly
- Output to personal geodatabase for final scrubbing and quality acceptance

Point files:

- Export file to shapefile format if necessary
- Project file to state coordinate system (UTM NAD83 Zone19 Meters) for compatibility with other data layers
- Output to personal geodatabase for final scrubbing and quality acceptance

(4.1) Load Spatial Data to Geodatabase
All spatial data types (point files) are loaded into a personal geodatabase for final scrubbing and quality acceptance.

(5) Data Analysis and Quality Control
A final analysis is completed on all points loaded in the personal geodatabase to identify any issues. The table below indicates the primary types of issues, the means to detect them, and the resulting solution.

Issue ⇒	***Identification*** ⇒	***Result***
Duplicate Points	Selection by location/imagery review	Delete incorrect record
Unmatched geocoded records	Google Maps review	Matched record
Inaccurate CAI locations	Imagery review	Modify point location
Unsuitable CAI	-	Delete record

(6) Data Categorizing
Once the CAI records have gone through the data analysis and quality control, the records are given a category value of 1 to 7, as discussed in the introduction.

(7) Data Attribution
CAI attributes are the most difficult to acquire at the data gathering stage and are typically acquired through additional steps, including contacting each CAI. The required attributes are:

- Broadband Service
- Technology of Transmission
- Advertised Downstream and Upstream Speeds

The project team has completed the initial round of contacting each CAI to collect the above information. The task was completed by assembling a call center group assigned to contacting each CAI to establish a primary contact and address verification followed by exercising an on-line survey aimed to provide feedback to the items listed above. Completed surveys were compiled through the use of SurveyMonkey.com and final survey output (.csv) was prepped and values were loaded into the CAI database to populate attributes.

Additional sources and surveys have been utilized to populate the database including MSLN (Maine School and Library Network), NCES (National Center for Education Statistics), the Maine Fiber Company as part of its Three-Ring Binder project, and state agency listings provided by the chief technical officer. The project team will continue to compile CAI data utilizing all the above resources and research additional data sources and methodologies to populate these attributes.

(8) Load Data to SDE for Final SBDD Export
CAI data is loaded from the personal geodatabase to the SDE environment for final export to SBDD format.

4.3 Data Analysis and Conversion

Data is analyzed and converted with different processes, depending on its type and characteristics.

4.3.1 Fixed Wired Transmission

Fixed wired service provider companies in the state of Maine range from small to large businesses and utilize several distinct types of technology to deploy broadband service. In order to accommodate the varied inputs, Sewall has developed a flexible and comprehensive workflow to incorporate provider information into a state broadband map developed by Sewall in conjunction with the ConnectME Authority.

The ConnectME model depicts broadband service provider coverage at the street segment level. The model uses a street centerline as the spatial component of the coverage, and a related table stores provider specific information for street segments. Sewall developed production tools to accommodate the incorporation of service provider data into this ConnectME model and instill quality control into the process.

The steps in the process for analyzing and converting Fixed Wired Transmission data are outlined in ***Figure 3*** and described below.

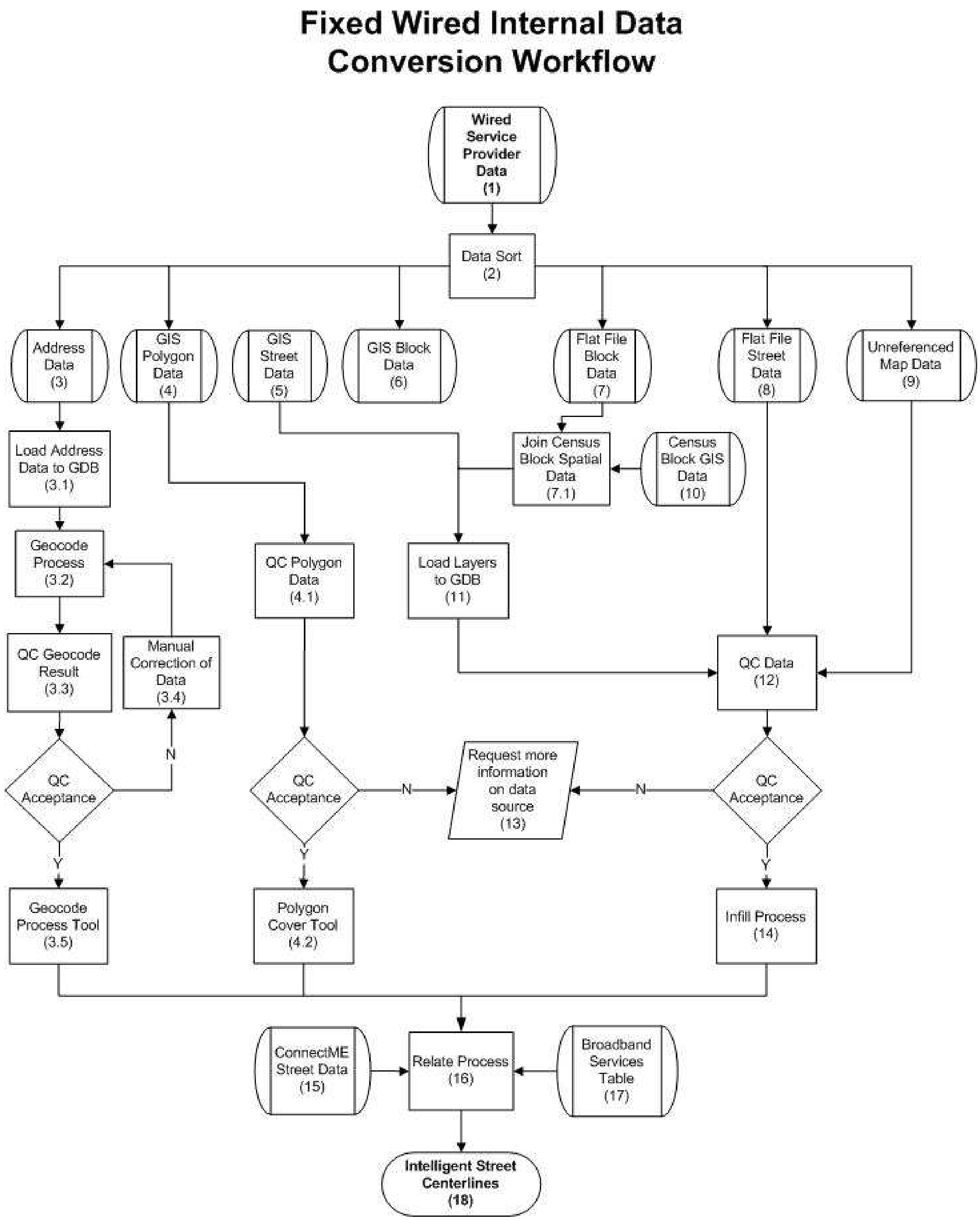


Figure 3 - Data Flow for Fixed Wired Transmission Providers

(1) Wired Service Provider Data

The data bin is the storage location for wired broadband service provider data gathered by Sewall.

(2) Data Sort
The data sort phase immediately follows the data collection process. Analysts sort the wired data by provider and by data characteristics. The wired data can consist of address data, predefined coverage data, flat file coverage data and unreferenced maps. Individual workflows have been developed by Sewall for the various data formats.

(3) Address Data
The address data bin is reserved for service provider data that is at the address level. Examples of address data formats received are spreadsheet and text file format.

(3.1) Load Address Data to Geodatabase
Address data is formatted to meet the ArcGIS geocoder standards and loaded into the geodatabase for processing. The formatting of the address data will include ensuring fields with the full street address and town name are populated in the dataset.

(3.2) Geocode Process
Formatted address data is geocoded using the ConnectME street centerline dataset. The address locator style used in this process is the ArcGIS US Streets with Zone. For this process, the city fields of the ConnectME street dataset are utilized in the zone component of the locator.

(3.3) QC Geocode Result
Analysts review the address data geocode result for the following:

- Overall geocode hit rate
- Town geocode hit rates
- Data anomalies

If address data fails any of these checks the data will not pass QC acceptance.

(3.4) Manual Correction of Data
Address data that has not passed the QC acceptance is evaluated for corrections necessary for the data to pass QC acceptance. Corrections to town names and updates to street names are commonly required to match the naming conventions in the ConnectME roads dataset.

(3.5) Geocode Process Tool
Sewall has developed an ArcGIS tool named Geocode Process Tool that translates the accepted geocoded address data into tabular address range records related to the accompanying ConnectME street centerlines. This tool is shown in ***Figure 4*** below.

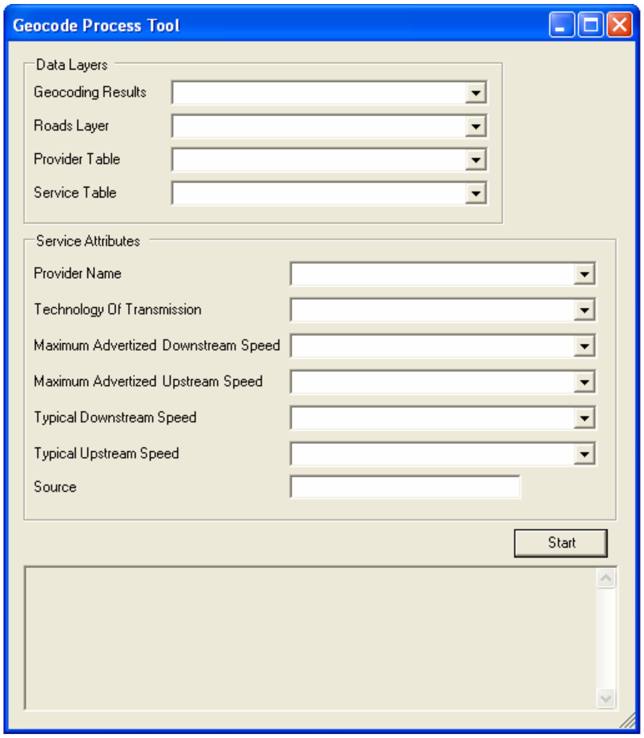


Figure 4 - Geocode Process Tool
Data Layers:(1) Geocoding Results - geocoded layer of address data (2) Roads Layer - ConnectME roads data layer (3) Provider Table - table of provider specific information (4) Service Table - broadband service output table where the service provider street address ranges are stored.
Service Attributes: The first six values are necessary to populate fields in the deliverable. Source is used to designate that the records created are from the Geocode Process Tool.

In ArcMap the user specifies which layers in the map correspond with the data layer inputs for the tool as well as the service provider service attributes that correspond with the geocode address point layer. Once the information is set the user clicks 'Start' and the process begins.

Each geocoded address point within the geocode layer has as an attribute the street segment that the address was geocoded to. Using this street link, the tool can locate all of the geocoded address points assigned to a given street segment and build a modified street range of broadband service for the street segment. The tool then creates a record in the Broadband Service table that contains a link to the street segment in the ConnectME street feature class and populates the record with the derived broadband service street segment range and specified service provider information. This process is repeated for each unique street segment listed in the geocoded address point layer.

(4) GIS Polygon Data
The GIS polygon data bin is for service provider data that represents a coverage area of broadband availability and is delivered in a GIS format.

(4.1) QC Polygon Data

Datasets from the GIS polygon data bin are reviewed by an analyst. The QC routine ensures that the data has spatial integrity and includes the necessary attribution for inclusion to the state broadband project.

(4.2) Polygon Cover Tool

Sewall has developed an ArcGIS tool named Polygon Cover that converts service provider coverage area polygons into street segment related tabular records. Each tabular record created by the tool incorporates the service provider broadband specification information as well as modified street ranges representing provider street coverage.

This tool was initially created by Sewall for use on the fixed wireless viewshed datasets but was incorporated into the wired workflow for service providers that provided polygon regions of service coverage.

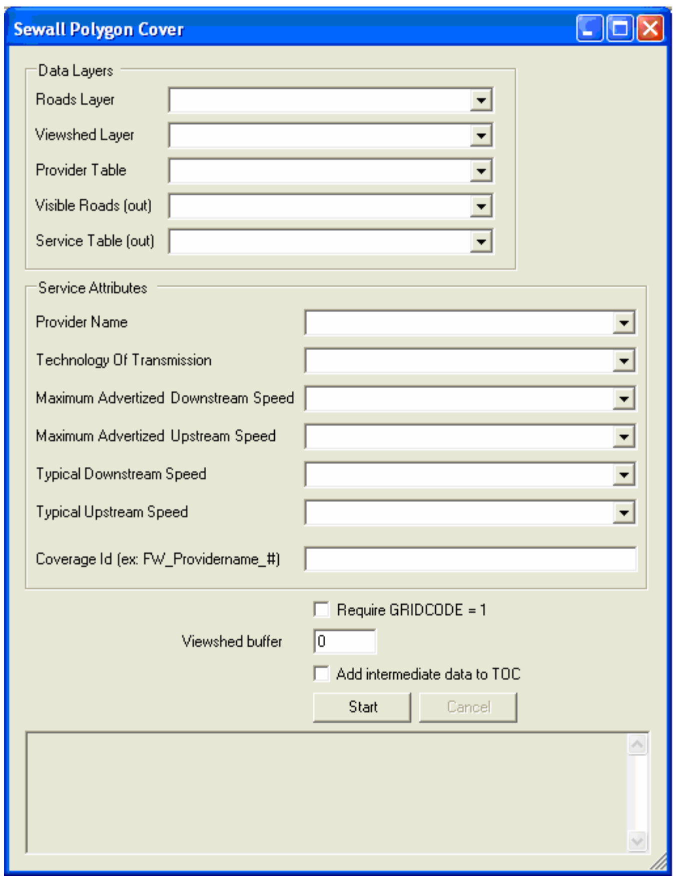


Figure 5 - Polygon Cover Tool

Data Layers: (1) Roads Layer - ConnectME street centerline data layer with address ranges (2) Viewshed Layer - viewshed layer used in delineating visible polygons for clipping road segments. For wired providers this would be the polygon layer that depicts a provider's coverage area. (3) Provider Table - internal processing flag (4) Visible Roads (out) - output feature class that stores the clipped road segment geometry (5) Service Table (out) - output table that the extracted address ranges populate.
Service Attributes: The first seven values are necessary to populate fields in the deliverable.
Require GRIDCODE = 1: Toggle is unchecked when running a wired broadband provider dataset that is represented as a coverage area.

In ArcMap the user specifies which layers in the map correspond with the data layer inputs for the tool as well as setting the service attributes for the service provider polygon layer. While running the Polygon Cover tool for fixed wired service regions analysts ensure the Require GRIDCODE = 1 toggle is unchecked. Since this tool was initially created for use with a viewshed polygon output, the tool will not run on a non-viewshed layer unless this toggle is unchecked. Once the information is set the user clicks ‘Start’ and the process begins.

The tool selects street segments from the input Roads layer that intersect the input polygon coverage and exports the street segments to a separate working file. These streets are then clipped to the polygon coverage. Next the tool runs a length ratio process that assigns each street segment a fractional value based on the clipped and original lengths. The tool then populates modified street range attributes based on the length ratio of a segment and the original street range of a segment. These modified street range values represent the broadband service street range of the provider. For each street segment the tool also creates a record in the Broadband Service table that contains a link to the original street segment in the ConnectME street feature class and populates the record with the modified broadband service street segment range and specified service provider information.

(5) GIS Street Data
The GIS street data bin is for wired broadband provider data at the street segment level that is delivered in a GIS format.

(6) GIS Block Data
The GIS block data bin is for provider data that is delivered at the census block level in a GIS format.

(7) Flat File Block Data
Census block service data delivered in a flat file format is stored in the flat file block data bin. Examples of flat file data are spreadsheets, text files and database files.

(7.1) Join Census Block Spatial Data
Flat file block provider coverage information is joined to a spatial census block layer using the full census block id value. Blocks with provider information joined are exported creating a spatial representation of the provider’s census block broadband coverage.

(8) Flat File Street Data
The flat file street data bin is where provider data is stored when Sewall receives street level information in a format that cannot be associated spatially. Examples of files types delivered in a flat file format are spreadsheet, database and text file.

(9) Unreferenced Map Data
Provider data that cannot be referenced in ArcGIS are stored in the unreferenced map data bin. Examples of this type include paper maps and PDF documents.

(10) Census Block GIS Data
This data is Census 2010 block data in GIS format for the state of Maine that has been downloaded from the US Census website.

(11) Load Layers to GDB
Provider GIS data is loaded into the Sewall SDE geodatabase. A feature class is created for each provider's dataset. Sewall workflow tracking attributes are added to the feature classes.

(12) QC Data
Datasets are sent to a Sewall analyst for QC. The QC routine is to ensure that the data includes the necessary information for inclusion to the state broadband project. Provider data is cross-referenced with information on broadband availability that has been gathered from other sources. The QC of datasets with spatial data includes additional QC routines to ensure spatial integrity.

(13) Request more information on data source
Broadband provider data that does not meet the QC acceptance criteria Sewall initiates a request order to the provider for additional information. This request includes a detailed listing of the deficiencies found in the data as well as inquiries regarding spatial inaccuracies and anomalies discovered in the analysis.

(14) Infill Process
Sewall developed a tool named Infill to interact with the ConnectME street segments and populate related tabular records for fixed wired service provider availability. The Infill Tool allows a user to configure a specific set of service provider parameters, select ConnectME street segments, and then view and edit the related broadband availability information in the Broadband Services table that corresponds with the configured attributes. This tool is used to input fixed wired broadband availability data that Sewall received as census block, street or unreferenced map data. The majority of fixed wired service provider datasets utilize the Infill Tool for processing. A screenshot of the configuration dialog box is shown as Figure 6 below.

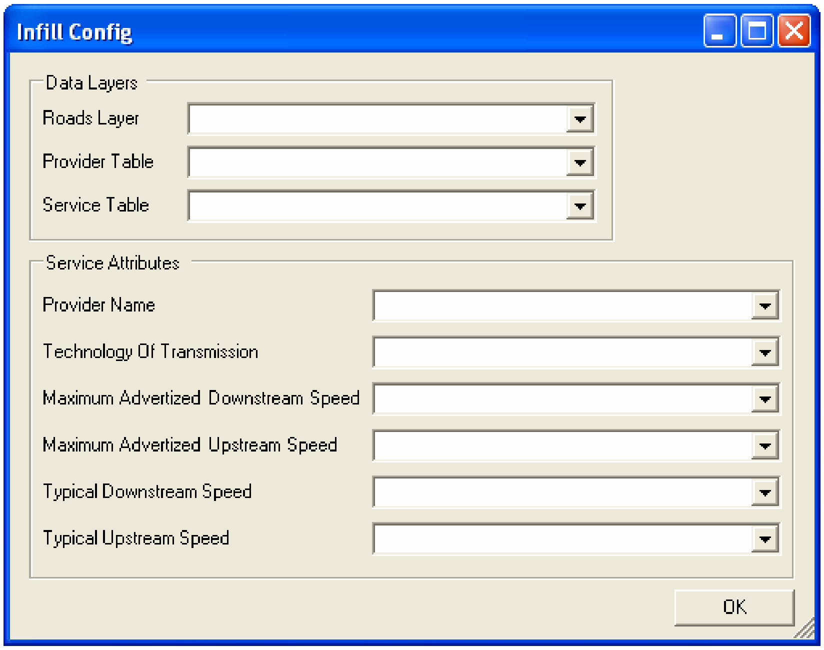


Figure 6 - Infill Tool Configuration
Data Layers: (1) Roads Layer: ConnectME roads data layer (2) Provider Table: Internal processing flag (3) Service Table: Broadband Service output table where the service provider street address ranges are stored. Service Attributes: These fields are necessary to populate fields in the deliverable.

The first time a user uses the Infill tool in an ArcMap session, the ‘Infill Config’ screen appears. The user enters the input data layers and the attributes for the service provider dataset that the tool will utilize during processing.

Once the Infill Config screen has been set a user selects one or more ConnectME road segments. Using the unique primary key values of the selected streets and the specified provider name and technology of transmission the tool searches the Broadband Services table for existing matching tabular records. If matches are found from this search, the tool reports the information in the Infill window. For selected street segments where no match was found in the Broadband Services table, the tool populates the Infill window with street segment road name and street range attributes representing potential broadband service ranges for the provider on the selected streets. These street range attributes can be updated in the Infill window based on provider sources. This Infill tool window is shown as ***Figure 7***.

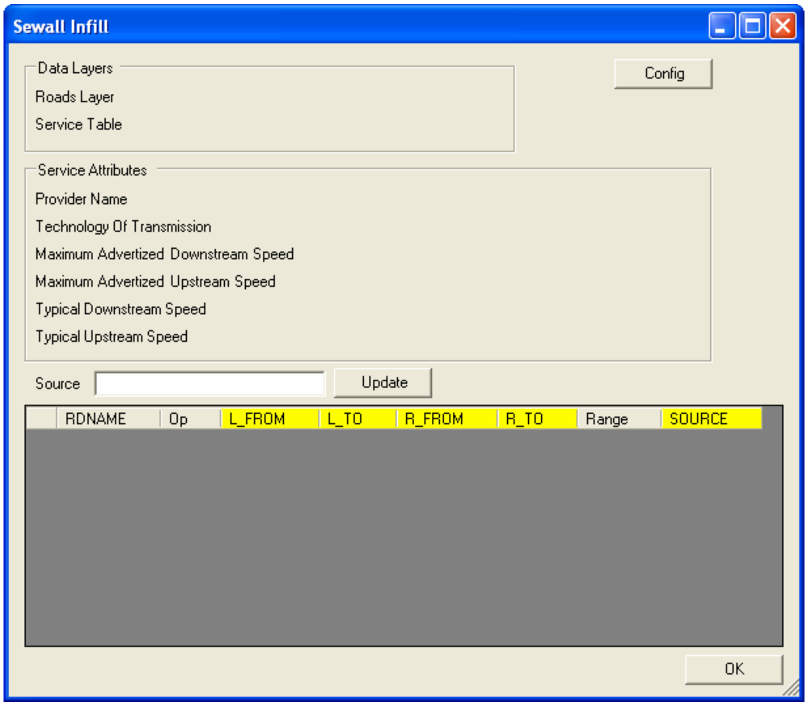


Figure 7 - Infill Tool
Data Layers: (1) Roads Layer: ConnectME roads data layer (2) Service Table: Broadband Service output table where the service provider street address ranges are stored
*Config: Opens the Infill Config window (**Figure 6**)*
Service Attributes: These fields are necessary to populate fields in the deliverable.
Source: Internal flag for source of service availability
Update: Updates selected tabular records SOURCE field to the value entered in the Source field
Tabular Record Attributes: (1) RDNAME: Name of ConnectME road segment (2) Op: Operation being performed {INSERT-new tabular record, UPDATE-update existing tabular record, DELETE-delete tabular record} (3) L_FROM: "Left from" broadband address range of ConnectME road segment (4) L_TO: "Left to" broadband address value of ConnectME road segment (5) R_FROM: "Right from" broadband address value of ConnectME road segment (6) R_TO: "Right to" broadband address value of ConnectME road segment (7) Range: Reports either "full" or "partial" and is a comparison for each tabular record of the broadband provider street range to the accompanying ConnectME street range (8) SOURCE: Internal process flag.

Once the user has reviewed the values, pressing 'OK' will perform the operations listed in the Op field.

(15) ConnectME Street Data

The ConnectME street data bin contains the street centerline dataset used in the geocode and street relate processes. The Maine Office of GIS E-911 street centerline file was used to create the base street segments and gives the project the most accurate street centerline file for the State of Maine. The NAVTEQ street centerline dataset NAVSTREETS was utilized to infill street segments in areas where gaps were assessed in the MEGIS E-911 file.

(16) Relate Process

Through the use of Sewall developed tools the data gathered for fixed wired broadband service providers gets stored in the Broadband Services table as availability street ranges associated with street centerline segments. Each record in the Broadband Services table is associated by a foreign key/primary key relationship with a street segment in the ConnectME street centerline dataset. This relationship allows for clean and easy access to street level availability of service providers.

(17) Broadband Services Table
The Broadband Services geodatabase table was developed by Sewall to store broadband service provider information and street range coverage. NTIA requirements and formats were utilized when creating the fields to ensure the records stored in the Broadband Service table are compatible with the SBDD data model.

(18) Intelligent Street Centerlines
The output from the fixed wired workflow is a comprehensive intelligent street centerline network comprised of street centerlines and related service availability tabular records.

4.3.2 Fixed Wireless Transmission

The initial stage of mapping terrestrial fixed wireless service territories depends on the quality of the data received. To process any service footprint of a particular transmitter, the initial resources acquired during the data collection phase of the project are critical.

Terrestrial Fixed Wireless technology is clouded by many variables that determine the overall performance of each transmitter signal. Inaccurate data pertaining to location, height of a transmitter, horizontal and vertical limitations, signal range and many more factors present potential obstacles to producing an accurate representation of any transmitter's service footprint. Some of these factors have not been considered during the mapping process due to lack of data needed for modeling them. For example, while a 10-meter DEM is used to represent the surface terrain, we have not incorporated obstructions on the surface such as trees and other man-made obstacles that could influence a transmitter's propagation model.

The data collection process and subsequent conversion workflow is designed to accommodate a variety of data sources received from the service providers and production tools have been developed to build efficiencies and quality control into the workflow. When received by the service providers, supplemental data is used throughout the conversion workflow to help verify the mapping results. However, a larger scale verification process is described in **Section 5**.

The data conversion process for fixed wireless transmission is represented by ***Figure 8*** and described below.

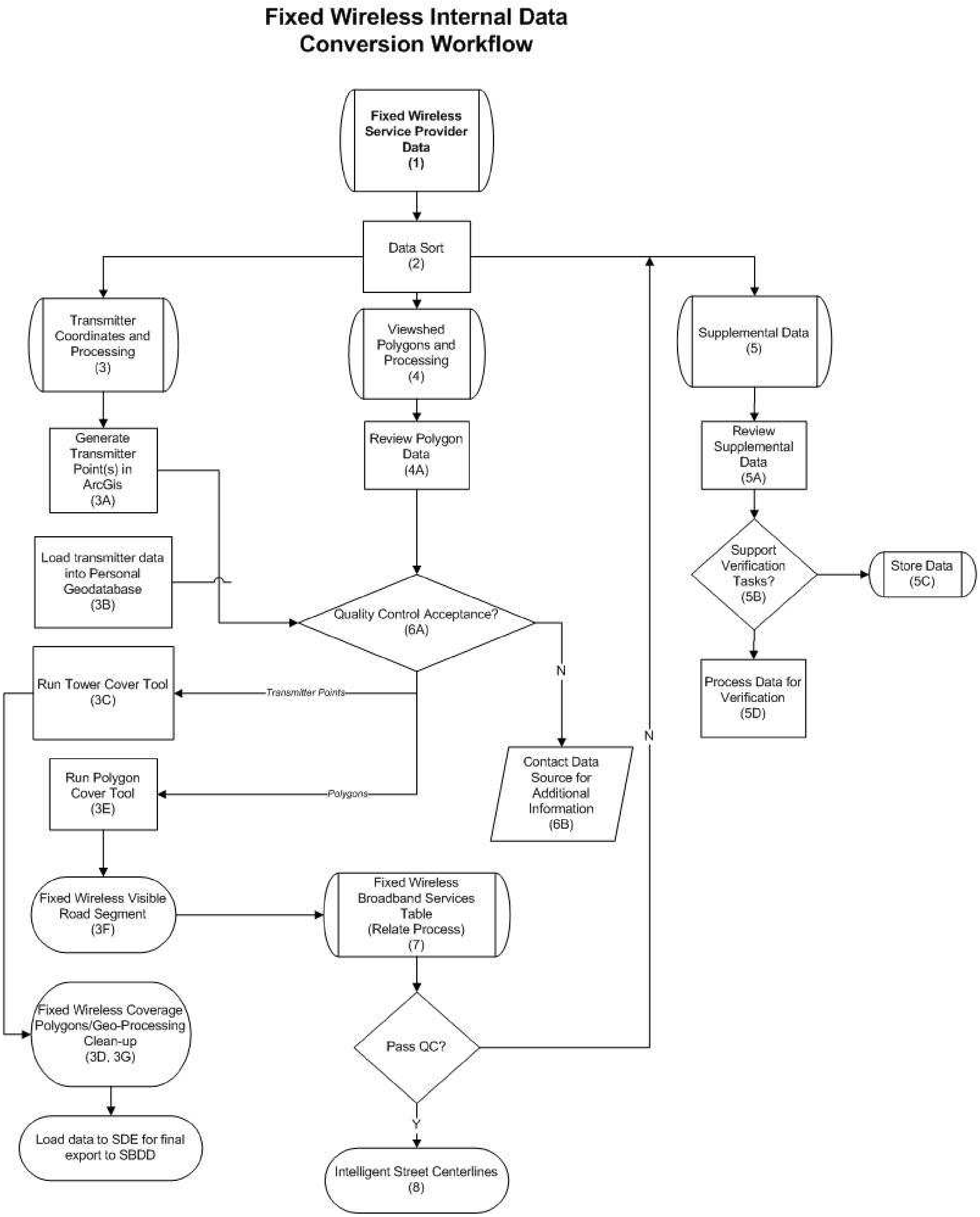


Figure 8 - Fixed Wireless Internal Conversion Workflow

(1) Fixed Wireless Service Provider Data

Service provider data gathered during the data collection phase. Data is cataloged in separate folders by provider and managed according to task and technology of transmission.

(2) Data Sort
The data sort phase of production immediately follows the data collection process. During this task, a thorough review of the service provider data determines the type of data received. Fixed wireless data generally consists of three types: transmitter coordinates and attributes, pre-defined polygons and attributes, and supplemental data. Each type of data follows unique internal processing steps.

(3) Transmitter Coordinates and Processing
Transmitter coordinate data is essentially the raw data necessary to generate a viewshed for each transmitter. In order to be processed, the transmitter source data must have certain required fields such as latitude and longitude, spot (ground elevation), equipment height at the transmitting and receiving ends, horizontal and vertical limitations, and range of transmission. The content of the transmitter data is carefully reviewed for completeness and overall consistency prior to the next step. Once completed, the data is imported into ArcGIS for continued processing and quality control.

(3B) Load Transmitter Data into Personal Geodatabase
Using the newly scrubbed .csv file, transmitter points are created in ArcGIS and the transmitter location points are displayed. A final comparison against supplemental data is performed to ensure the transmitter locations are in the correct locations. Supplemental data includes such layers as imagery, political boundaries, and road centerlines.

(3C) Run Tower Cover Tool
This tool was designed and developed by Sewall to batch process 1 or more transmitter point viewsheds. A screenshot of the tool is shown below as ***Figure 9***.

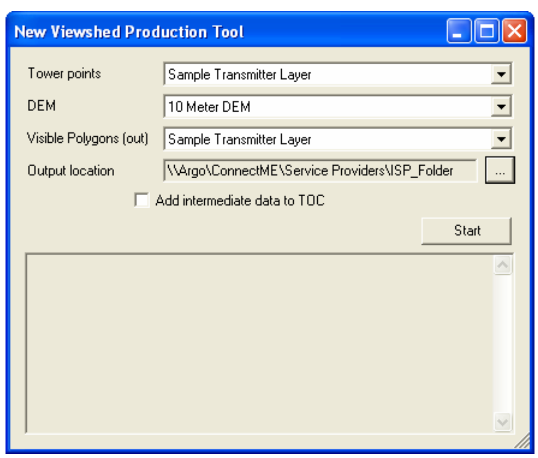


Figure 9 - Tower Cover Tool (Viewshed Production)
Tower Points: The data layer containing records of all transmitters that need a viewshed generated. Originally received from ISP and pre-processed by Sewall for format compatibility.
DEM: 10-meter digital elevation model obtained from MEGIS as the primary surface model for generating the viewshed
Visible Polygons (out): Visible polygons (only) output to an SDE layer
Output location: Location of output to personal geodatabase workspace to be used for additional processing.

(3D) Fixed Wireless Coverage Polygons
The Tower Cover Tool generates raster data sets depicting the visible and non-visible surfaces representing each transmitter. As a final output, the tool extracts the visible components of the raster data and outputs to polygon vector layers stored in the SDE environment as supplemental reference data.

(3E) Run Sewall Polygon Cover Tool
This tool was designed and developed by Sewall to facilitate several production steps.

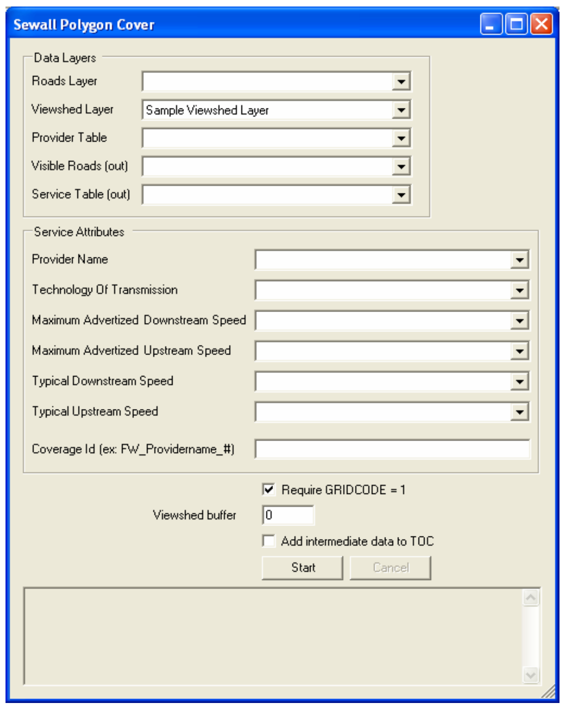


Figure 10 - Polygon Cover Tool
Data Layers: (1) Roads Layer - ConnectME Street data layer with address ranges (2)Viewshed Layer - viewshed layer used toe delineate visible polygons for clipping road segments (3)Provider Table - internal processing flag (4) Visible Roads (out) - output feature class that stores the clipped road segment geometry (5) Service Table (out) - output table that the extracted address ranges populate.
Service Attributes: These fields are populated, if data is available, to meet NTIA NOFA requirements.

(3F) Fixed Wireless Visible Road Segments
The Polygon Cover Tool clips road segments that are within visible polygon viewsheds and writes them out to a polyline vector layer stored in the SDE environment as supplemental reference data.

(3G) Fixed Wireless Geo-Processing Clean-up
The fixed wireless polygons or propagation models generated for each provider step through several geo-processing routines to check for and eliminate the following conditions:

- Single pixels less than 0.125 square miles
- Holes inside the polygons less than 0.125 square miles

In each case, all identified polygons are removed and dissolved to create multipart polygons by provider, technology, speed and spectrum. Each provider's propagation model differs in size and complexity due to the number of transmitters and their individual parameters that determine each view shed. Because the geometries are manipulated through many geo-processing procedures, multiple cycles of validation are run to ensure the geometries are in tact and repair routines are run if necessary. Once all propagation models meet internal quality control standards, the geometry is loaded to SDE and stored for final export to the SBDD deliverable format.

(4) Viewshed Polygons and Processing
Although not as common, another source of data received from the service providers is a polygon dataset that has already been generated to represent visible service territory of transmitters. Service providers or third party vendors will frequently run their own propagation models to be used for broadband mapping. Polygon formats include ESRI shapefiles, MapInfo files, Google .kml files, and raster files. Each format requires a thorough review to determine the subsequent processing steps.

(4A) Review Polygon Data
Although each format listed is unique, the data eventually runs through the Polygon Cover tool so that the address ranges within the polygons can be clipped out. Each format is carefully inspected for content, spatial characteristics and accuracy. The general workflow for each format is as follows:

- Shapefile: Review content > Edits > Project > QC > Load for processing > Run Sewall Polygon Cover Tool
- MapInfo: Review content > Translate to ESRI shapefile > Edits > Project > QC > Load for processing > Run Sewall Polygon Cover Tool
- Google .kml: Review content > Translate to ESRI shapefile > Edits > Project > QC > Load for processing > Run Sewall Polygon Cover Tool
- Raster: Review content > Translate raster to polygon > Edits > Project > QC > Load for processing > Run Sewall Polygon Cover Tool

(5) Supplemental Data
Supplemental data received by service providers is generally used for verification to support internal processing results. It is not used as a data source to generate transmitter locations or viewsheds. Supplementary data includes, but is not limited to, failed service locations, customer service locations, hard copy plots, PDF files, and other digital reference files. In most circumstances, the data can be used for cross-referencing.

(5A) Review Supplemental Data
Each format is unique and so are the processing steps that are necessary to prepare the data for use.

- Failed Service Locations: Provides an excellent source for cross-referencing to viewshed polygons (visible and non-visible) but must have complete address in order to geocode location of address.
- Customer Service Locations: Provides an excellent source for cross-referencing to the viewshed polygons (visible and non-visible) but must have a complete address in order to geocode location of address.
- Hard copy plots: May be used for verification purposes if the content of the material is applicable.
- PDF files: May be used for verification purposes if the data content is applicable.
- Other data sources: All sources are reviewed for potential use.

(5B) Support Verification Tasks
Supplemental data sources are reviewed to determine if they hold any value to the project workflow. Value added data will be stored and utilized as needed to support internal processing.

(5C) Store Data
Data received from service providers that does not have any given value to the project is organized and stored under the service provider folder.

(5D) Process Data for Verification Tasks
Supplemental data sources are scrubbed for compatibility and processed.

(6) Quality Control Acceptance
Quality control procedures are implemented at each of the three production stages depending on the data (transmitter coordinates, viewshed polygons, or supplemental data). Because the service provider data is received in numerous formats, styles, and content, much of the initial QC is completed during the data collection stage. When data is received from a service provider, an initial review is done to determine what is received and what is outstanding. This cycle of communication with the providers continues until all the necessary data is either received or clearly understood that it will not be received. Throughout the data collection process, Sewall keeps an inventory of receivables.

(6A) Contact Data Source for Additional Information
During the data collection phase of the project, questions or clarifications may have been overlooked, or items may present road blocks at some point later during the processing. If an internal quality review does not resolve an issue, the service provider is contacted for additional information or clarification.

(7) Fixed Wireless Broadband Services Table (Relate Process)
The Polygon Cover Tool has two outputs; both generated using the visible polygons created by the Tower Cover Tool: (1) road segments, and (2) calculated address ranges. While the visible road segments are not part of the NTIA deliverable, they are stored as a reference file named CONNECTME.FW_VISIBLE_ROAD_SEGMENTS.

(8) Intelligent Street Centerlines
The output from the fixed wireless workflow is a comprehensive intelligent street centerline network comprised of street centerlines and related service availability tabular records.

4.3.3 Mobile/Satellite Transmission

Wireless broadband technology consists of all facilities-based providers of wireless broadband service that is not address specific. For the State of Maine, this includes terrestrial mobile wireless and satellite broadband service. Mapping mobile wireless and satellite coverage requires less processing than other technologies that are address-based, such as wired and fixed wireless service. Data consists of polygons generated by the providers or third party vendors, representing areas where broadband service is offered. As shown in the workflow below, the data received from providers is sorted, processed and loaded into a geodatabase. Minimal steps are required to process this data, but established internal workflows are taken to ensure that proper protocols and quality assurance are met. The primary steps of the internal workflow are shown in ***Figure 11*** and described below.

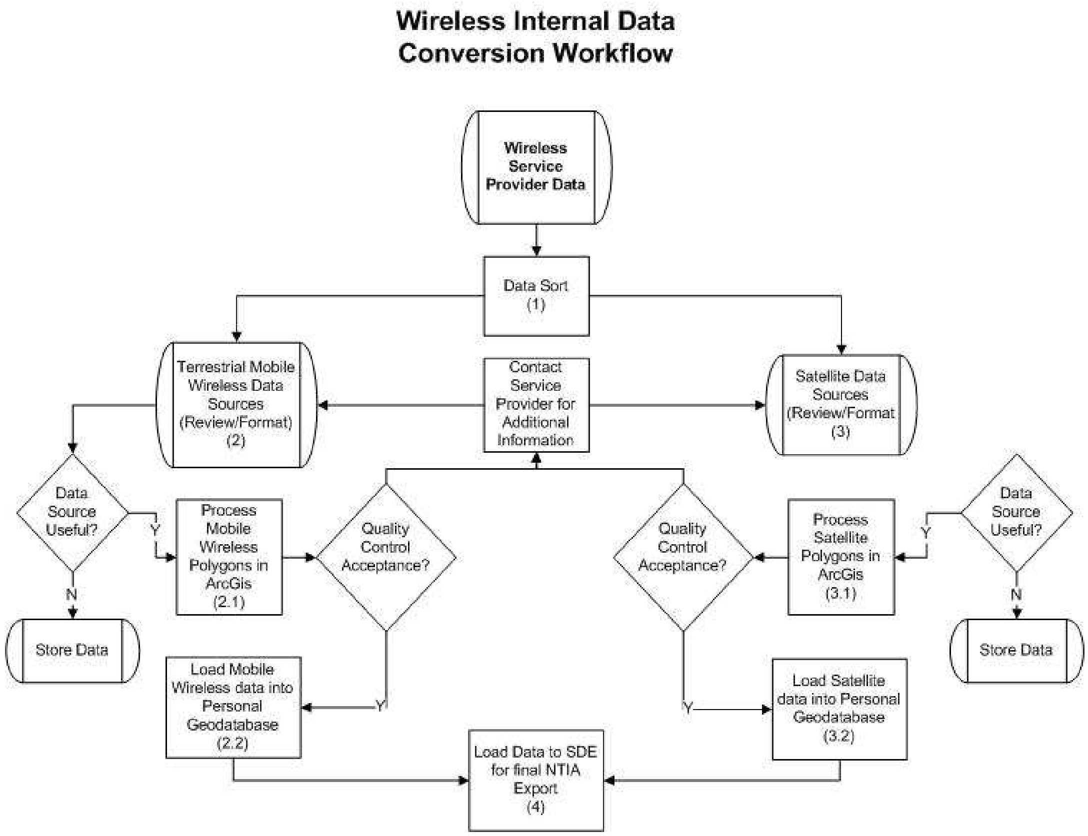


Figure 11 - Wireless Internal Conversion Data Workflow

(1) Data Sort
Upon receiving data from a mobile or satellite service provider, Sewall initially sorts and stores the data by technology - terrestrial or satellite.

(2) Terrestrial Mobile Wireless Data Sources (Review)
After the data is sorted, an initial data analysis is performed to determine if the data received appears to be intact spatially and is accompanied by the proper attribution required for adherence to the SBDD data model. Follow-up with the service provider continues until all necessary information is acquired.

(2.1) Process Mobile Wireless Polygons in ArcGIS
After determining that the data has value, the polygons are projected into the proper coordinate system to complement the internal workflow. Depending on the source data, additional data processing routines may be necessary before loading the data into the geodatabase.

(2.2) Load Mobile Wireless data into Personal Geodatabase
Although the primary quality control procedures are completed during the verification process, initial acceptance testing to ensure the data is spatially valid is performed by cross-referencing to additional data sources such as aerial imagery or information taken from the service provider website. Discrepancies are documented for use in subsequent verification processes. Once quality checks are complete, the data is loaded into a personal geodatabase

(3) Satellite Data Sources (Review)
When all the spatial and attribute information is received, the satellite data follows the same internal workflow as mobile wireless data (Steps 2, 2.1 and 2.2).

(4) Load Data to SDE for final SBDD Export
Mobile wireless and satellite data is loaded to SDE environment for final export to SBDD format.

4.3.4 Middle Mile Locations

Middle Mile and Internet Backhaul Connection Points are defined by NTIA as "interconnection points that typically enable relatively fast data rates, are built to handle substantial capacities, and may be service-quality assured." At this stage of the mapping, middle mile data has been the most difficult to obtain from service providers during the data collection process. Service provider networks can include as little as one middle mile location such as a backhaul connection point or as many as dozens, operating as interconnection points within a fixed wireless network reaching out to end users. Furthermore, some service providers may offer middle mile connection points only as a service, such as a splice into a fiber line to support a lateral to a central office or business.

Regardless of the technical framework, all middle mile locations that meet the NTIA definition are captured in a point feature class with additional attribution including the ownership of the facility, serving facility capacity and serving facility type.

The outline of workflow is shown as ***Figure 12***. The description of each step follows.

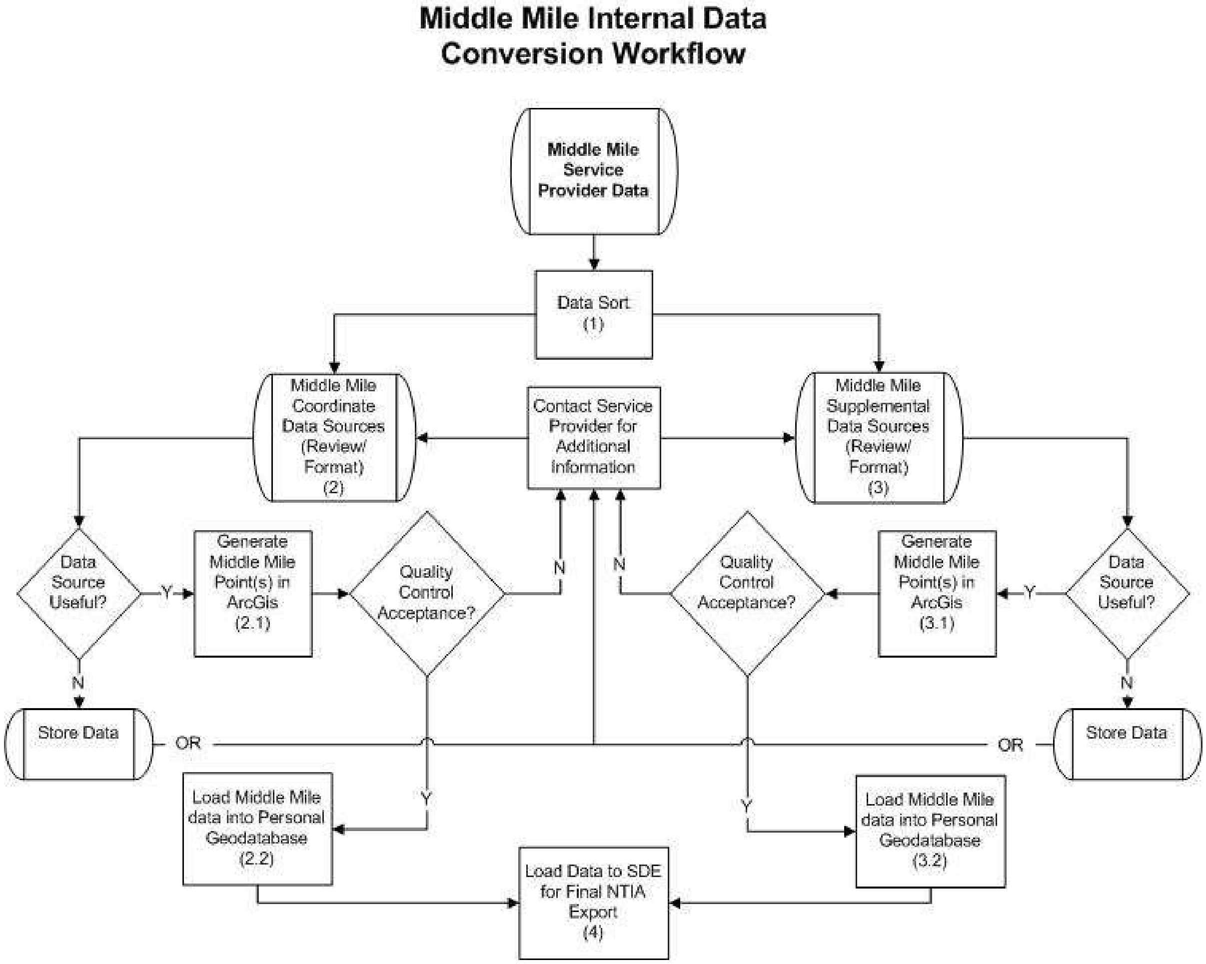


Figure 12 - Middle Mile Internal Data Conversion Workflow

(1) Data Sort

The initial data sort separates the data and distinguishes formats more compatible to the database model, such as middle-mile coordinate values listed in a spreadsheet or ESRI shapefiles. Data received in compatible formats require minimal processing steps. Supplemental data sources generally require additional processing steps. Examples may include the conversion of .kml files to ESRI shapefiles or polyline files that require points to be added at splice or lateral connections.

(2) Middle Mile Coordinate Data Sources Review

Sewall reviews the data to ensure that the information is a valid input. If so, the data is reformatted and loaded into in ArcGIS. Sources deemed as invalid are stored, or the service provider is contacted for additional information if necessary.

(2.1) Generate Middle Mile Points in ArcGIS

Points are loaded into ArcGIS. Sewall analysts run acceptance procedures to verify data translation to ArcGIS and spatial accuracy and completeness using supplemental data sources provided such as addresses, imagery or descriptive information about the point locations. In addition to the point geometry, all attribution carried over in the translation is confirmed.

Conflicts or questions are referred back to the service provider for further clarification if necessary.

(2.2) Load Middle Mile Data into Personal Geodatabase
Middle-Mile data is loaded to a personal geodatabase. Additional data received by the service providers or revisions will cycle through the same process and be stored in the personal geodatabase prior to loading to the SDE environment for final export.

(3) Middle-Mile Supplemental Data Sources (Review)
Supplemental data sources may involve additional processing during this step in order to proceed. Some of the more common supplemental data sources include, but are not limited to, the following:

- Google .kml files
- .jpg images showing middle-mile locations
- AutoCAD point or polyline files
- e-mails with descriptions of locations
- Other miscellaneous information

Once the data has been fully reviewed and normalized, the remaining steps follow the same internal workflow as coordinate data sources (Steps 2.1 and 2.2).

(4) Load Data to SDE for final SBDD Export
Middle mile data is loaded from the personal geodatabase to the SDE environment for final export to SBDD format.

4.3.5 Service Overview

Broadband service providers that participate in the state broadband mapping project have been asked to provide broadband service territory footprints at the address, street, census block or county level. The service overview dataset contains the information that has been delivered at the county level.

The workflow developed by Sewall integrates the gathered data from broadband service providers into a consistent spatial format that is stored in a geodatabase designed to be compatible with the SBDD deliverable.

The service overview workflow is described below and depicted in ***Figure 13***.

Service Overview Workflow

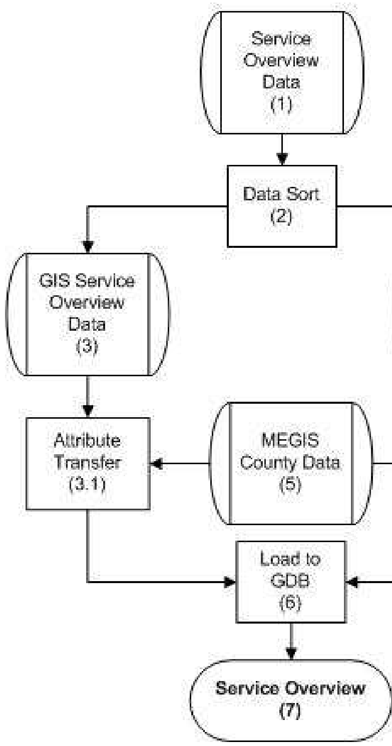


Figure 13 - Service Overview Workflow

(1) Service Overview Data
The Service overview data bin is the storage location for service overview specific broadband service provider data gathered by Sewall. Sewall specifies what information is necessary for this deliverable and what formats are acceptable when contacting each provider during the data gathering phase of the project.

(2) Data Sort
The service overview data is sorted into categories by data type.

(3) GIS Service Overview Data
The GIS data bin is used to store provider data that has been delivered to Sewall with service overview attribution and is in the requested GIS format.

(3.1) Attribute Transfer
Attributes contained in the GIS data are sent through an attribute transfer process that populates county data from the MEGIS County data. This step ensures that there is one consistent spatial dataset utilized as a basemap in the service overview.

(4) Flat File Service Overview Data
The flat file data bin is used to store provider data that has been delivered to Sewall with service overview information in a flat file format.

(4.1) Join
Using county name information provided in the flat files the MEGIS county data is joined to the flat files. The joined dataset is exported and stored in the GIS service Overview data bin.

(5) MEGIS County Data
The shapefile cnty24p.shp was downloaded from the MEGIS website (megis.maine.gov) and utilized for county spatial representation of the service overview dataset during the workflow.

(6) Load to Geodatabase
Once the service overview data has been processed, the data is reviewed for content and accuracy and then loaded to the ConnectME production database.

(7) Service Overview
The output of the service overview workflow is a polygon dataset that is compatible with the SBDD data model.

5 Validation

The verification process is used to ensure that the data delivered is in fact valid and current. Methods used by the Maine teams to validate coverage areas include field tests of mobile devices, responses to surveys sent to residents and businesses, comparison with third-party datasets both private and governmental, and results compiled from a speed test website established specifically for this purpose.

Once the data has been collected, processed and verified, the results are statistically analyzed and plotted atop the original provider data coverages in GIS. Any ‘holes’ or inconsistencies in the data from the service provider are reported to the provider in a feedback loop to ensure all parties involved are aware of the potential issues with the broadband service in an area.

5.1 Field Tests for Mobile Coverage

Mobile coverage consists of data from providers who offer mobile broadband services to consumers through devices such as smartphones or mobile laptop aircards. Common providers of this type of broadband service in Maine are AT&T, Verizon Wireless, and Sprint.

In order to verify the existence of wired and fixed wireless coverage in an area, direct access to the provider’s service is needed. Logistically this would be difficult because transmission receivers, accounts and other equipment would have been required for each of the providers. Instead, the project team opted to gather information through other means, so field tests were only conducted to validate mobile coverage.

Mobile coverage data is received by Sewall from the service providers in the form of GIS polygon files. After these files have been reviewed and properly projected (see **Section 4.3** for details), they can be analyzed in the verification process. The mobile coverage file is compared against the State of Maine boundary file in a GIS application in order to assess the size and location of the coverage area with respect to the State.

5.1.1 Methodology

The methodology developed by the ConnectME Authority to verify mobile coverage in Maine is to select a series of points throughout a provider’s coverage and have field crews run tests at these predetermined locations. A minimum of 37 points per coverage area are needed in order for the statistical analysis on the field data to be valid.

To select the points for field verification, a 28-square-mile grid was created in GIS and layered with the provider’s coverage area, the E911 road layer and the state boundaries. One point was placed per grid block within the provider’s coverage network. Each point was placed on a road, usually at road intersections for ease of access by the field crew. Once all the points were placed, the points were divided into groups for distribution to field crew personnel.

The points were assigned attributes of point ID, latitude and longitude. The attribute table was then exported to an Excel file for further editing. The columns: field connect, upload speed, download speed and notes were added to the spreadsheet. The field connect column holds values to describe whether the field crew was able to log on to the provider's network., speeds collected from the state website at that location are stored in the upload speed and download speed columns. The spreadsheet was loaded onto the field laptops for data entry.

Crews utilized Microsoft Streets & Trips to assist in navigating to each of the field points across the state. The software, which was loaded on each of the field laptops, has a GPS component that could track and direct field crews. The spreadsheet used for data entry was also loaded into the software so the points could be plotted based on given coordinates. The field crews could properly identify each of the points based on the Point Name attribute.

The program turned each of the points into a "stop." The start and ending points of the trip were also added, allowing the software to calculate an optimized route to reduce driving time and mileage. After optimization, the software also provided driving directions, which were saved and loaded onto the field laptops.

Mobile broadband aircards from each of the mobile service providers were purchased outright directly from the providers. This eliminated the need for a service contract so that the aircards can be deactivated after the verification process without a contract cancellation fee. Service providers activated the mobile aircards with a month-to-month data package of 5GB.

Aircards from each of the providers were then loaded onto the field crew laptops. The software from the aircards was installed, aircard functionality was checked, and any updates were installed prior to crews leaving the office.

Each time verification tasks are performed, the points are visited by a field crews who are equipped with a field laptop enabled with the mobile broadband aircard of the corresponding service provider and proper navigation information. The field crews drive to each of the points, log onto the service provider's network and navigate via Internet Explorer to an internet speed test website created by the James W. Sewall Company specifically for the ConnectME Broadband Mapping Project.

For each test point, the point number, service provider and date are entered into the internet speed test website (e.g., Test_745_verizon_20100521) and a test is executed. Results are recorded both in the speed test database (automatically) and in the spreadsheet. Once all of the points are completed, crews return to the office and spreadsheets are combined. Data columns are filled in with corresponding broadband upload and download speeds for sites with connectivity.

Data points are then plotted on maps to view where broadband coverage is full strength or where it is lacking. If there are large 'holes' in the coverage areas, the points are revisited to ensure that readings were accurate and not subject to user or equipment error.

The merged field spreadsheets are then handed off to a statistician for the statistical analysis of the data.

5.1.2 Statistical Analysis

Large data sets are often expressed best in terms of summary statistics. It is often easier to look at commonly defined statistics (stats) to get a quick overview of what the data describes, than to look at all the raw data.

In analyzing this data, we chose statistics using the following criteria:

- Commonly used and understood
- Fit the data (data type) in question
- Had practical application to the reader in understanding what the data was describing

We believe that the statistics presented can be beneficial in several ways:

- Description/Summary: they consolidate many data observations into a few summary stats that can be quickly compared
- Quantification: they describe which portion of the data falls within or outside of the limits of acceptable criteria
- Reliability/Prediction: in some cases, they attest to the reliability of the data collection

The following statistics were used:

- Number of samples (n): number of data points in the sample
- Average (xbar): arithmetic mean or the mean value of a set of integers, terms, or quantities, expressed as their sum divided by their number.
- Standard Deviation (sd): used as a measure of the dispersion or variation in a distribution, equal to the square root of the arithmetic mean of the squares of the deviations from the arithmetic mean.
- Percentages (%): a proportion or share in relation to a whole; a part; a fraction or ratio with 100 understood as the denominator (e.g., 0.98 equals a percentage of 98).
- Hypothesis testing: statistical process used when trying to determine if it is reasonable to conclude that the entire population possesses a certain characteristic by the analysis of a sample.

Explanation of choices made:

- Quantitative statistics were only applied on sample data that fell within the published service area of the provider in question. This was possible because the area was "bounded" by the geographic area described in the "service area." Outside the service area there is no bound (limit), so these same statistics would not be reliable as used with our methodology.

- Assumed a normal distribution because this is the most common and typical distribution type for this type of data, and we had no evidence to counter this assumption.
- Chose sample statistics because we were not dealing with the whole population (almost unlimited sample points possible).
- Chose hypothesis testing because we wanted to have the most valid predictor of the population parameters given the variability of our sample data.
- Chose student's T-distribution when sample size was equal to or less than 30 (n=<30) and Z-test when populations were above 30 (n>30).
- Used one-tailed tests because we were interested in the area above the curve from a single lower parameter (criteria of minimum speed).

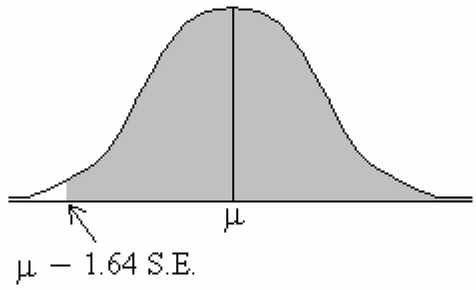
Data was sorted to yield only those sample points that fell within the published service area of the provider in question.

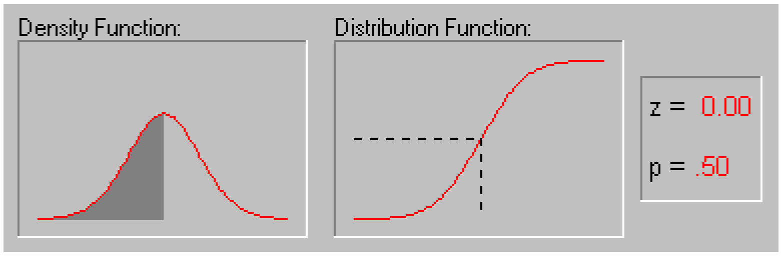
Then the following information was calculated:

- n = number of total sample points
- Degrees of Freedom (df) = n-1
- Selection of t-distribution (df < 30) or standard normal curve (df >= 30)
- Percent of points where connection was established
- Percent of points where both tested upload and download speeds were equal to or greater than (=>) broadband speeds (200 and 768 kb/sec respectively).
- Percent of points where either the upload or download speed was equal to or greater than (=>) broadband speed, but not both.
- Percent of points where neither the tested upload or download speeds was equal to or greater than (=>) broadband speeds.

Using all data points within the designated service provider coverage that registered an upload speed during the test, the following were calculated:

- Average # of points where a connection was made that had an upload speed equal or greater than broadband minimums.
- Average upload speed (xbar/upload)
- Standard deviation of the sample (SD/upload)
- Statistical prediction of percent of points that would meet minimum 3G upload speed in subsequent samplings (using one-tailed t-test or z-score, depending on df) – see schematic below





Using all data points within the designated service provider coverage that registered a download speed during the test, the following were calculated:

- Average # of points where a connection was made that had a download speed equal or greater than broadband minimums.
- Average download speed (xbar/download)
- Standard deviation of the sample (SD/download)
- Statistical prediction of percent of points that would meet minimum 3G upload speed in subsequent samplings (using one-tailed t-test or z-score, depending on df) – see schematic above.

5.2 Surveys

The project team is surveying residents and businesses in Maine utilizing a questionnaire about their current internet connections. The ConnectME Authority has opted begin the verification of residential broadband service with a pilot survey.

5.2.1 Pilot Residential Survey

According to the 2000 Census, there are approximately 518,000 households in Maine, of which 10,000 were included with the pilot survey. Residential addresses were purchased from InfoUSA for the mailing as 2,500 addresses in each of four geographic areas: Maine North, Maine South, Maine East, and Maine West. Addresses were selected at random by InfoUSA from the provided GIS polygons constituting adjacent census blocks in each area containing approximately 5000 households.

The survey questionnaire is comprised of 10 questions and takes about two minutes to complete. A copy is included in **Appendix E**.

The survey identifies the consumer by the physical address, which is geocoded against a street centerline file in GIS to create a point file. The data associated with each address (e.g., transmission type and provider) is analyzed by layering the consumer information with the coverage data provided by the service provider. Sewall can analyze the layers to verify if each service provider does cover the areas represented by the data it submitted. In addition, if an area shown to have no service by a provider appears in the consumer survey, the provider in question can be contacted to confirm and provide updated coverage information.

There is also an online version of the survey that people can access by navigating to a link indicated on the delivered hardcopy of the questionnaire. The electronic version, once completed, directs the person to the ConnectME internet speed test website, which reports the upload and download speeds of the user's internet connection. The speeds are recorded in a database that tracks entered physical address and speed test results for future analysis (see Section 5.4.1 for further details).

The logistics for a statewide survey are being addressed. Sewall expects to begin implementation by December 2011.

5.3 Third Party Data

The Maine team has acquired data from American Roamer and from the FCC. These datasets will be used to validate the mapped coverage for each provider through spatial analysis.

5.3.1 American Roamer data

Maine acquired the American Roamer data, which includes coverages for Sprint, Verizon Wireless, AT&T and T-Mobile. The data consists of polygon shapefiles, which Sewall could overlay with the coverages received from the providers. For each provider, the area in common and the area covered only by one dataset were determined from geospatial analysis. Differences are used for analysis and refinement of the service territory.

5.3.2 FCC Form 477 aggregate data

The FCC has provided SBDD grantees and their teams access to the FCC Form 477 aggregate data. This data contains information on service providers in Maine at an aggregate or granularity higher than the SBDD data, but is useful for checking the list of providers and their locations at Census Track level.

The project team has recently developed a tool that compares the records in the Form 477 aggregate data to the provider data in the SBDD project database. The tool lists out by Census Track each provider that includes the tract in the Form 477 filing. Each provider that has service data that falls within the tract is considered a match. Using this data, the team has been able to find potential providers that were not previously included in the study, as well using the tract locations as a cross-reference to where each provider has service. The team has plans to further enhance the tool to provide a set of results centric to each provider.

5.4 Crowd Sourced Data

5.4.1 Speed test results

For the SBDD project, the ConnectME Authority has implemented an online speed test tool. The website was developed by Ookla Net Metrics and was brought online on January 13, 2010. To date, over 12,200 tests have been recorded. The speed test stores downstream and upstream speeds as well as the user's address and ISP. The results from the speed test tool are scrubbed and geocoded. The information will be used to help verify service coverages and service speeds for wired, fixed wireless, and satellite providers.

5.4.2 FCC Consumer Broadband Test (CBT) data

The Consumer Broadband Test data provided by the FCC consists of three datasets: Speed Test records, Mobile Broadband Speed Test records, and Broadband Dead Zone Report records. The project team plans to incorporate the FCC speed test records along with those records captured by the ConnectME speed test tool. However, the name of the service provider is not included with data, so a method for mapping the IP address in these records to the appropriate provider must be developed.

The dead zone reports are used to identify locations reported to be without coverage. The addresses from these records are geocoded and then are cross-referenced with service provider coverages in the areas.

5.5 Service Locations / Failed Service Locations

Service providers are encouraged to submit service locations and/or failed service locations to help validate extents of service coverage. The service addresses and failed service addresses are geocoded and the data is analyzed with the coverage data submitted by the service provider. This validation step will continue throughout the project as the team continues to receive these locations as part of the providers' data submittals.

5.6 Feedback Loop

Once broadband service territories are mapped, Sewall generates maps for each provider company representing the status of data at the time of the mapping. This gives each service provider the opportunity to validate its broadband service footprint and provide feedback to the Sewall project team. ***Figure 14*** below represents a fixed wired validation map where a provider company's broadband service (DSL) foot print is symbolized in red. Depending on the size of a service footprint and map density, additional information, such as road names, may be represented.

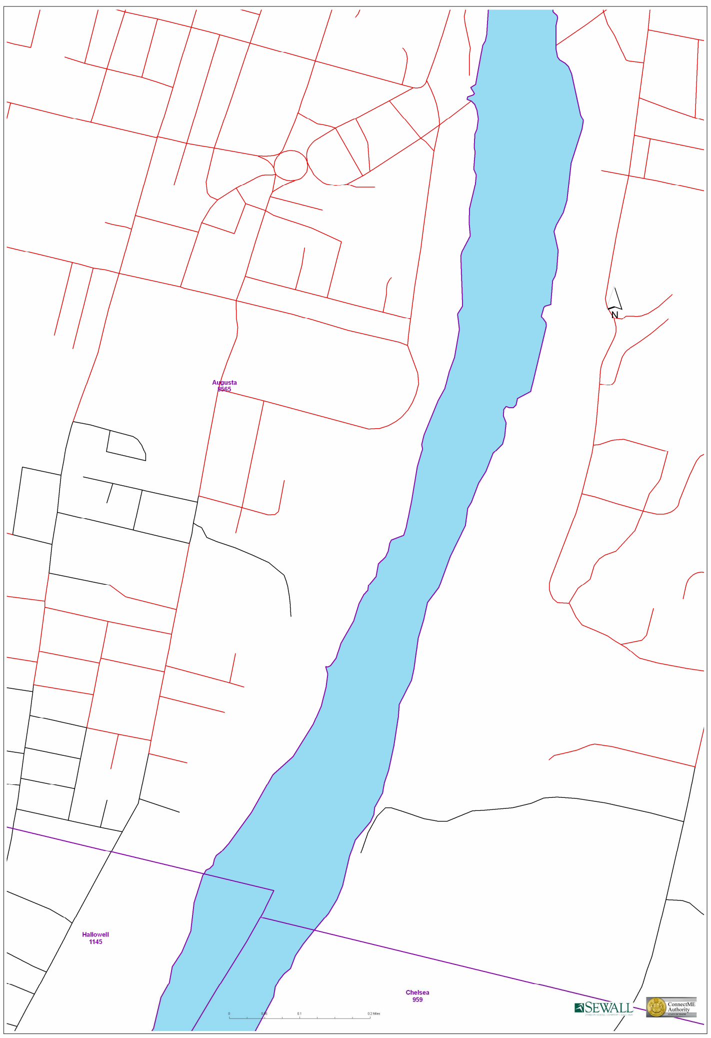


Figure 14 - Fixed Wired Validation Map

Sewall forwards the maps of the service territory, along with any anomalies noted from the third-party and crowd-sourced data analysis to each service provider. Sewall communicates regularly with each provider to ensure that the mapping is as comprehensive and correct as possible.

Sewall also generates maps for mobile service providers showing the coverage and service levels according to FCC and NTIA standards. ***Figure 15*** below represents a sample validation map show FCC-defined levels of service. Town lines and town names are shown.

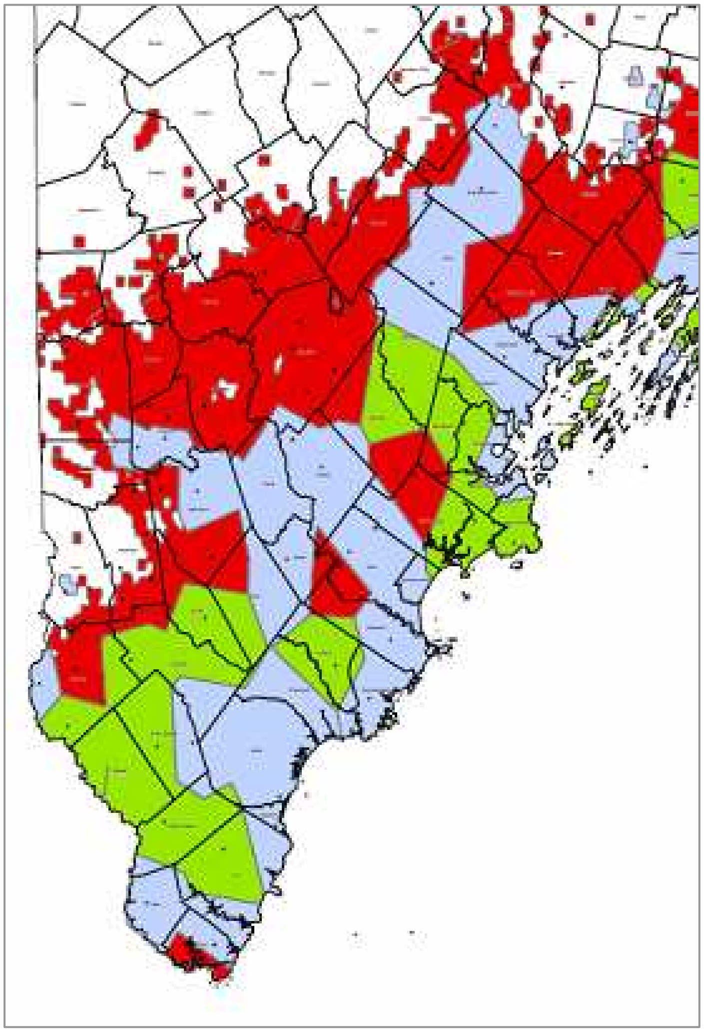


Figure 15 - Mobile Validation Map

5.6.1 GeoPortal Transfer Site

In August 2011 Sewall deployed a web-based GeoPortal site to manage all data transfers related to the ConnectME Authority Broadband Mapping Project, see ***Figure 16***. Each broadband service provider has a secure password-authenticated account set up which allows designated users to upload and download digital data. All users receive an e-mail notification when their account is set up.

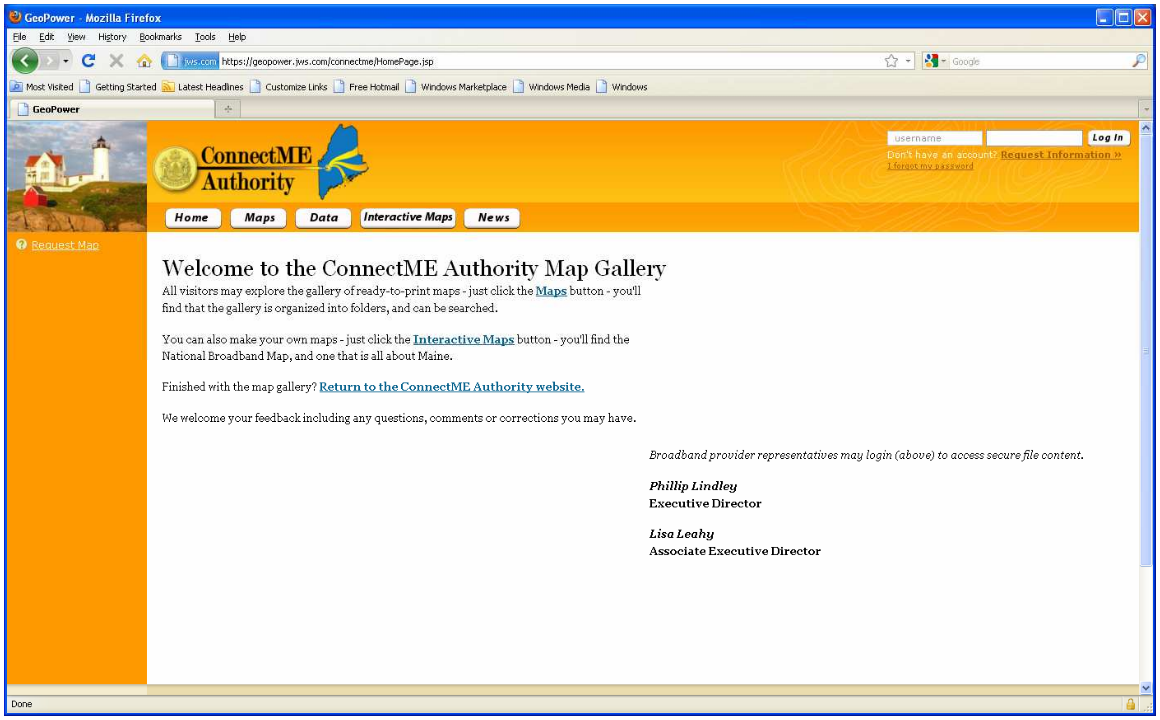


Figure 16 – Screenshot of GeoPortal web site

Data exchanges between Sewall and the service providers will include, but not be limited to, data round submissions, validation maps and other miscellaneous correspondence. In addition to data transfers, the GeoPortal will also be used by the general public for viewing the static maps posted in the map gallery. Currently the map gallery contains statewide maps representing FCC speed tier coverages, broadband service availability for Maine house and senate legislative districts and grant overview maps depicting awarded ConnectME Authority grant applications throughout the state.

6 Data Delivery

Service provider data that has been processed to the Sewall production model needs to be transferred to the SBDD data model for delivery. In order to accomplish this Sewall has developed a process by which the Sewall production datasets are exported to the current SBDD data model structure.

The Sewall production model was designed with the NTIA delivery model in mind and, in as many cases as possible, the production model utilizes the NTIA delivery defined attribute definitions and domain values. Through the use of this design philosophy, Sewall has mitigated the pitfalls for exporting to the SBDD data model.

To facilitate the transfer of data stored in the Sewall production model to the SBDD model for delivery Sewall has developed an ArcCatalog tool named State Broadband Data Export. This tool reads a source geodatabase set of features and writes to a destination geodatabase set of features. A screenshot of the tool dialog box is shown in ***Figure 17***.

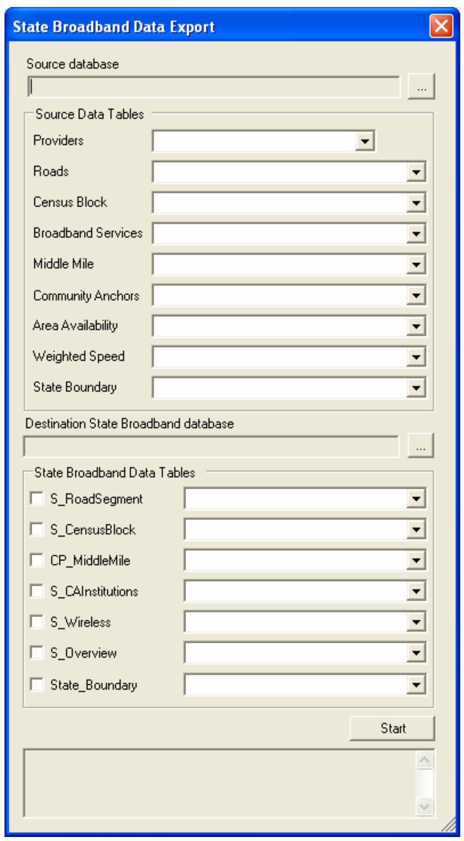


Figure 17 - State Broadband Data Export Tool
Source database: Sewall production geodatabase location.
Source Data Tables: (1) Providers - Geodatabase table with list of provider specific information (2) Roads - ConnectME street centerline feature class (3) Census Block - Census 2010 block geodatabase feature class (4) Broadband Services - Geodatabase table containing broadband provider characteristics and street ranges linked to ConnectME street centerline segments (5) Middle Mile - Geodatabase point feature class containing broadband service provider middle mile locations (6) Community Anchors - Geodatabase point feature class

containing community anchor institution locations (7) Area Availability - Geodatabase polygon feature class containing mobile wireless and satellite broadband provider coverage (8)Weighted Speed - Geodatabase polygon feature class service overview data (9) State Boundary - Geodatabase polygon feature class portraying the Maine state boundary.
Destination State Broadband database: SBDD geodatabase location.
State Broadband Data Tables: These are the required SBDD deliverables.

On launching the ArcCatalog tool, the user selects the source and destination geodatabases for the transfer process. The source geodatabase is the Sewall internal production model, and the destination geodatabase is the empty SBDD model. Next the user matches the items listed in the Source Data Tables section to the production model features. Once complete, the user checks which deliverables the tool will export in the State Broadband Data Tables section. Clicking 'Start' will begin the export process.

The road segment and census block exports are performed simultaneously in the State Broadband Data Export Tool with road segments being reported in census blocks greater than 2 square miles and census blocks being reported in areas up to 2 square miles. The tool reads the service provider data stored in the Sewall production geodatabase and performs an analysis through which the deliverables are extracted. The analysis process by which the tool extracts the road segments and census block data is outlined in the whitepaper entitled "Misalignment between Census Blocks & Maine E911 Streets: Technical Whitepaper," dated 30 September 2011. This paper is included in **Appendix D**. The switch from 2000 Census Blocks to 2010 Census Blocks for the October 1st 2011 delivery caused the team to re-evaluate the export process as the 2010 Census Blocks were reported to be a closer match to the Maine E911 street dataset. The finding of that study revealed that the 2010 Census Blocks still had spatial misalignments with the Maine street dataset and the conclusions of the study in **Appendix D** are still valid.

Once the census block data has been exported it is run through a QC routine. As the census blocks are created from broadband data at the street level and there is a spatial misalignment between the two datasets erroneous data can be created through the export process. The exported census block data is checked against the baseline broadband street dataset for inconsistencies.

Middle mile and community anchor institution data are stored as point features in the Sewall production model and are extracted utilizing a standard export routine. The datasets are reprojected from the production UTM projection to the SBDD WGS84 projection and LAT/LON attributes are populated. Once complete, the points are loaded into the destination feature classes of the SBDD geodatabase.

Wireless, service overview and state boundary data are stored as polygon features in the Sewall production model and a standard export routine extracts these to the SBDD features. The datasets are reprojected from the production UTM projection to the SBDD WGS84 projection as features are loaded.

Address data that has been collected is stored as point features in the Sewall production model and exported to the SBDD geodatabase using standard export routines within ArcGIS.

During the export process features with front-end business rule violations get reported. The report is than reviewed by a Sewall analyst, and necessary corrections are made to the base datasets. This reporting mechanism ensures the data delivered in the SBDD geodatabase is as complete and accurate as the provided data sources allow.

Once the SBDD transfer file geodatabase has been created and its content validated, the geodatabase files are included in the data submittal zip file along with the other submittal files including ‘datapackage.xls,’ schema modifications report, data verification summaries, and this technical whitepaper.

Appendix A - Sample Letter to Service Providers

[date]

Sewall
P.O. Box 433
136 Center St.
Old Town, ME 04468
207-827-4456

[address]
[address]
[address]
[address]

Dear Mr. [name]:

The National Telecommunications and Information Administration (NTIA) of the U. S. Department of Commerce has been charged by Congress under the American Recovery and Reinvestment Act of 2009 and the Broadband Data Improvement Act (BDIA) to develop and maintain a comprehensive, interactive, and searchable nationwide inventory map of existing broadband service capability and availability in the United States that depicts the geographic extent to which broadband service is deployed and available from a commercial or public provider throughout each state (the Program).

The ConnectME Authority (the Authority) is responsible for developing and maintaining these data for the State of Maine and for serving as the conduit for this information to the NTIA. The Authority has contracted with James W. Sewall Company of Old Town, Maine, to undertake the initial mapping and to consult with the Authority on how best to update and maintain these data going forward.

We are writing to insure that you are familiar with this Program and to invite your collaboration in teaming with us in this important, statewide initiative. (See the URL's provided at the end of this letter for further information.) Indeed, your organization's collaboration is essential to the Program's success, and we thank you in advance for your participation.

To comply with the Program, the NTIA requires each state to provide structured data that includes:

- the availability of broadband service at the address level;
- advertised and "expected actual" speeds of broadband service;
- the technology used to deliver broadband service;
- location and capability of critical broadband related infrastructure (this data will not be publicly displayed on the national broadband map);
- the spectrum used by wireless broadband service providers.

We expect that the publicly searchable national broadband map and database will contain:

- geographic areas in which broadband service is available;
- the technologies used to provide broadband service in such areas;
- the speed at which broadband service is available in such areas;
- broadband service availability at public schools, libraries, hospitals, colleges, and all public buildings used by the state or municipalities.
- other economic or demographic data that may enable Federal efforts to provide usable and searchable data on a variety of issues pertinent to the public interest.

We recognize that some of the data we will ask you to provide is proprietary. Consequently, we include a Protective Order authorized by the ConnectME Authority and an accompanying non-disclosure agreement (NDA) for your review and execution. Please note, however, that the NTIA requires that this NDA may not restrict the Authority from providing all data collected to the NTIA or restrict the NTIA's use of such data as contemplated under this Program, including sharing such data with the FCC or other federal agencies. Furthermore, the NTIA prohibits the Authority or Sewall from agreeing to a more restrictive definition of Confidential Information than that adopted by the NTIA. Currently, as required under the BDIA, the NTIA identifies Confidential Information as any information, including trade secrets, or commercial or financial information, submitted under the Program that:

- identifies the location, type and technical specification of infrastructure owned, leased or used by a specific broadband service provider; or
- explicitly identifies a broadband service provider in relation to its specific service area or at a specific service location.

Confidential Information will not be made publicly available pursuant to the limits set forth in the BDIA except as required by applicable law or judicial or administrative action or proceeding, including Freedom of Information Act requirements. From the BDIA (§ 106(h)): "Notwithstanding any provision of Federal or State law to the contrary, an eligible entity shall treat any matter that is a trade secret, commercial or financial information, or privileged or confidential, as a record not subject to public disclosure except as otherwise mutually agreed to by the broadband service provider and the eligible entity." Sewall was chosen to lead this task in part because of its long history of handling confidential information for a variety of industries. Finally, should your organization apply for a Broadband Technology Opportunities Program (BTOP) grant to support the deployment of broadband infrastructure in unserved and underserved areas, enhance broadband capacity at public computer centers or to encourage sustainable adoption of broadband service, the NTIA requires that you participate in this mapping Program.

The NTIA has set a very aggressive Program schedule, with many deliverables due by November 2009 and all initial deliverables due in March 2010. Consequently, a representative from the Sewall team will be contacting you soon to discuss any questions you may have and to facilitate completion of the NDA and your participation. If we should be in communication with others in your organization concerning either the NDA or the data transfers, please inform the Sewall representative as soon as possible. Thank you again and we look forward to working with you.

Sincerely,

Phillip W. Lindley, Executive Director ConnectME Authority	James H. Page, CEO James W. Sewall Company

URLs for:
www.maine.gov/connectme www.ntia.doc.gov/press/2009/BTOP_mappingtotals_090909.html

Appendix B - ConnectME Authority Protective Order

STATE OF MAINE December 21, 2009

CONNECTME AUTHORITY PROTECTIVE ORDER
(Proprietary Business Information)

Pursuant to 35-A M.R.S.A. § 9207(1) and Rule Chapter 101, § 4, the ConnectME Authority (Authority) may designate information as confidential to protect the legitimate competitive or proprietary interests of communications service providers and mobile communications service providers. The Authority may designate information as confidential only to the minimum extent necessary to protect such legitimate competitive or proprietary interests. Information designated as confidential is not a public record under 1 M.R.S.A. § 402(3).

The Authority is currently conducting a Broadband Mapping and Inventory Project with the services of a private contractor, James Sewall Company (Sewall). Sewall is required to obtain data from service providers (Provider) by the Authority and the National Telecommunications and Information Administration (NTIA) pursuant to the Broadband Data Improvement Act (BDIA) and the NTIA Notice of Funds Availability (NOFA). The NTIA requires that the Authority agree to comply with confidentiality requirements in section 106(h)(2) of the BDIA.

It is anticipated that providers submitting data to Sewall or the Authority may have a need to provide information considered to be confidential, in that the information provided may involve commercially sensitive and/or proprietary information regarding information that identifies (i) the location, type, and technical specifications of infrastructure owned, leased, or used by providers or (ii) explicitly identifies providers in relation to their specific service area or at a specific service location (collectively, the “Confidential Information”). The Authority has determined that such Confidential Information is generally not disclosed publicly, and that the public disclosure of such Confidential Information without restriction would cause competitive harm to the applicant or provider.

Accordingly, the following terms shall apply unless and until modified by the Authority or a court of competent jurisdiction:

1. Data submitted to Sewall or the Authority falling within the above definition of Confidential Information, as well as any data submitted to Sewall or the Authority pursuant to the Non-Disclosure Agreement set forth in Attachment A , (collectively, “Designated Confidential Information”) shall be deemed to be competitively sensitive and/or proprietary in nature and such Designated Confidential Information shall be and remain exempt from public disclosure pursuant to the terms of this Protective Order and the articles referenced therein.

2. All Designated Confidential Information shall be and remain exempt from public disclosure pursuant to the terms of this Protective Order, unless removed from the coverage of this Protective Order as provided below or otherwise by a court of competent jurisdiction. No persons provided access to any Designated Confidential Information by reason of this Protective Order shall use such information for any purpose other than the purposes designated by the Authority. Every person provided access to Designated Confidential Information shall use his or her best efforts to keep the Designated Confidential Information secure and shall not publicly disclose it or accord public access to it to any person not authorized by the terms of this Protective Order.

3. Any person or the Authority may challenge the designation of any document or other information as Designated Confidential Information. The Authority will provide reasonable prior notice to the applicant or provider and an opportunity for hearing prior to ruling on any such challenge. In considering any such challenge, the usual burdens of proof and production shall apply and no additional presumption shall be given as a result of the prior acceptance by the Authority of material as Designated Confidential Information. In the event the Authority should rule over the objections of the person providing the Designated Confidential Information that any information should no longer be subject to the terms of this Protective Order, such information shall not be publicly disclosed until the later of five (5) business days after the Authority so orders

or, if the person files within such five day period an appeal or request for stay of such order, the date upon which such appeal or request for stay is decided; provided, however, that said periods may be extended in accordance with any stay ordered by the Authority or a reviewing court. Upon the entry of a final unappealed decision by the Authority or a reviewing court granting public disclosure, the terms of this Protective Order shall cease to bind any person with respect to the information that the order granting disclosure shall have expressly and clearly removed from the coverage of this Protective Order.

4. Any person provided access to Designated Confidential Information shall review and be bound by the terms of this Protective Order. Prior to obtaining access to any Designated Confidential Information, such person shall sign an acknowledgment of his or her obligation to abide by the terms of this Protective Order in the Non-Disclosure Agreement (NDA) attached hereto as Attachment A.

5. Unless modified by the Authority or a court of competent jurisdiction, access to Designated Confidential Information shall be limited to Authority Staff, Sewall, any independent consultants or experts retained by the Authority, the National Telecommunications and Information Administration, and those designated persons, who have signed the NDA.

6. No copies of Designated Confidential Information shall be circulated to persons other than those authorized under paragraph 5 of this Protective Order. Persons authorized under paragraph 5 hereof also may take such notes as may be necessary. Such notes shall be treated as Designated Confidential Information.

7. The restrictions upon, and obligations accruing to, persons who become subject to the terms of this Protective Order shall not apply to any Designated Confidential Information submitted in accordance with this Protective Order if the Authority rules, after reasonable notice to the applicant or provider and an opportunity for hearing, that such Designated Confidential Information was publicly known at the time it was furnished or has since become publicly known.

8. Where reference to Designated Confidential Information is required in any Authority document, such reference shall be by citation of title or attachment number only or by some other non-confidential description to the extent possible.

9. Designated Confidential Information furnished to the Authority pursuant to this Protective Order shall remain in the possession of the Authority, under seal, and subject to the terms of this Protective Order, until the Authority or a court of competent jurisdiction shall otherwise order.

10. The terms of this Protective Order may be modified on motion of any person or on the Authority's own motion upon reasonable prior notice to the applicant or provider and an opportunity for hearing.

BY ORDER OF THE CONNECTME AUTHORITY

Phillip Lindley, Executive Director

ATTACHMENT A [Non-Disclosure Agreement]

Appendix C - Template for Non-Disclosure Agreement

NON-DISCLOSURE AGREEMENT

THIS AGREEMENT is made this ________ day of _________________, 20___, by and between ____, a ________________________________ having a principal place of business at ____ ("PROVIDER") and ConnectME Authority, a body corporate and politic and a public instrumentality of the State of Maine established pursuant to 35-A M.R.S.A. § 9203 (the "AUTHORITY") and James W. Sewall Company, a corporation organized under the laws of the State of Maine and having a principal place of business at 136 Center Street, Old Town, Maine 04419 ("SEWALL") (AUTHORITY and SEWALL individually or collectively referred to as "RECIPIENTS") (PROVIDER AND RECIPIENTS collectively referred to as the "Parties").

Recitals

WHEREAS, the National Telecommunications and Information Administration (the "NTIA") of the United States Department of Commerce has been charged by Congress under the America Recovery and Reinvestment Act of 2009 (the "ARRA") and the Broadband Data Improvement Act (the "BDIA") to develop and maintain a comprehensive, interactive, and searchable nationwide inventory map of existing broadband service capability and availability in the United States that depicts the geographic extent to which broadband service is deployed and available from a commercial or public provider throughout each state (the "Data"); and

WHEREAS, the AUTHORITY is responsible for developing and maintaining the Data for the State of Maine and for serving as a conduit for the Data to the NTIA; and

WHEREAS, SEWALL is contracted by the AUTHORITY to undertake the initial mapping and to consult with the AUTHORITY on how best to update and maintain the Data going forward; and

WHEREAS, the PROVIDER has trade secrets and commercial or financial information relating to the location, type, and technical specifications of infrastructure owned, leased, or used by PROVIDER, which is included in the Data (the "PROVIDER Information"); and

WHEREAS, the PROVIDER has agreed to provide PROVIDER Information to SEWALL and/or the AUTHORITY pursuant to the requirements of the ARRA and the BDIA for use by the NTIA.

NOW THEREFORE, for and in consideration of the mutual promises and covenants contained herein, and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the Parties agree as follows:

1. As requested in writing by PROVIDER, RECIPIENTS agree to hold in absolute and strict confidence and shall not disclose or reveal in any manner or form to any entity other than the NTIA any PROVIDER Information identified as confidential that identifies (i) the location, type, and technical specifications of infrastructure owned, leased, or used by PROVIDER or (ii) explicitly identifies PROVIDER in relation to its specific service area or at a specific service location (collectively, the "Confidential Information"), whether such disclosure was made orally, in writing, or in any other form, without prior written permission from PROVIDER.

Notwithstanding the foregoing, Confidential Information shall not include the following:

(a) information that now is or hereinafter becomes publicly known or available otherwise than through unauthorized disclosure by RECIPIENTS;
(b) information that was in RECIPIENTS' possession at the time of disclosure and was not acquired, directly or indirectly, from PROVIDER;
(c) information that RECIPIENTS received in good faith from a third party who is not under a similar restriction of confidentiality and having a right to disclose the Confidential Information; or
(d) information that is required to be disclosed pursuant to applicable law or judicial or administrative action or proceeding, including the Freedom of Information Act requirements.

2. RECIPIENTS agree not to use for any purpose the Confidential Information except as provided for under the ARRA and the BDIA, without prior written permission from PROVIDER.

3. This Agreement shall be governed by the laws of the State of Maine and applicable federal law, except for the State of Maine's conflict-of-laws provisions, as applicable. The Parties to this Agreement each specifically consent to jurisdiction in Maine in connection with any dispute between the Parties arising out of this Agreement or pertaining to the subject matter hereof, with venue being in a court of competent jurisdiction located in Penobscot or Kennebec County, Maine, United States of America.

4. This Agreement shall inure to the benefit of and be binding on the Parties and their respective successors and assigns.

5. This Agreement constitutes the complete and exclusive agreement of the Parties hereto with respect to the matters set forth herein. The terms of this Agreement may not be modified or amended except by an instrument in writing signed by each of the Parties hereto.

6. This Agreement shall be construed without regard to any presumption or other rule requiring construction against the drafting Party.

7. This Agreement may be executed in counterparts and each Party hereto may execute each such counterpart, each of which when executed and delivered shall be deemed to be an original and both of which counterparts taken together shall constitute but one and

the same instrument. This Agreement shall become binding when all counterparts taken together shall have been executed and delivered by all Parties. Execution and delivery of this Agreement may be made by facsimile transmission, and each Party agrees that the delivery of the Agreement by facsimile shall have the same force and effect as delivery of original signatures and that each Party may use such facsimile signatures as evidence of the execution and delivery of the Agreement by all Parties to the same extent that an original signature could be used.

IN WITNESS WHEREOF, the Parties have executed this Agreement the day and year first above written.

WITNESSED BY:	PROVIDER
______________________________	By: ______________________________
	Title: ______________________________
	ConnectME Authority
______________________________	By: ______________________________
	Title: ______________________________
	James W. Sewall Company
______________________________	By: ______________________________
	Title: ______________________________

Appendix D - White Paper: Maine-SBDD Census Block-Street Segment Misalignment

Misalignment between Census Blocks & Maine E911 Streets

Technical Whitepaper

30 September 2011

Introduction

Importing broadband service provider data into the State Broadband Data Development (SBDD) Map Data Transfer Model at the census block versus street segment level has created challenges for the grantees. For the State of Maine one of the challenges involves the spatial misalignment between the Census Block polygon geometries and Maine's street centerline dataset.

In order to better understand the challenge that Maine is encountering it is necessary to review how the State is collecting and maintaining broadband service provider data.

As a result of Maine's geographic population distribution, mapping broadband service at a census block level does not satisfy the State's requirements for statewide broadband tracking and development. Instead of utilizing the hybrid census block-street centerline model outlined in the SBDD NOFA, the State is collecting service provider coverages at a street level for wired and fixed wired technologies. The State has developed a relational model to best represent the one-to-many relationship between a street segment and its broadband service provider coverages.

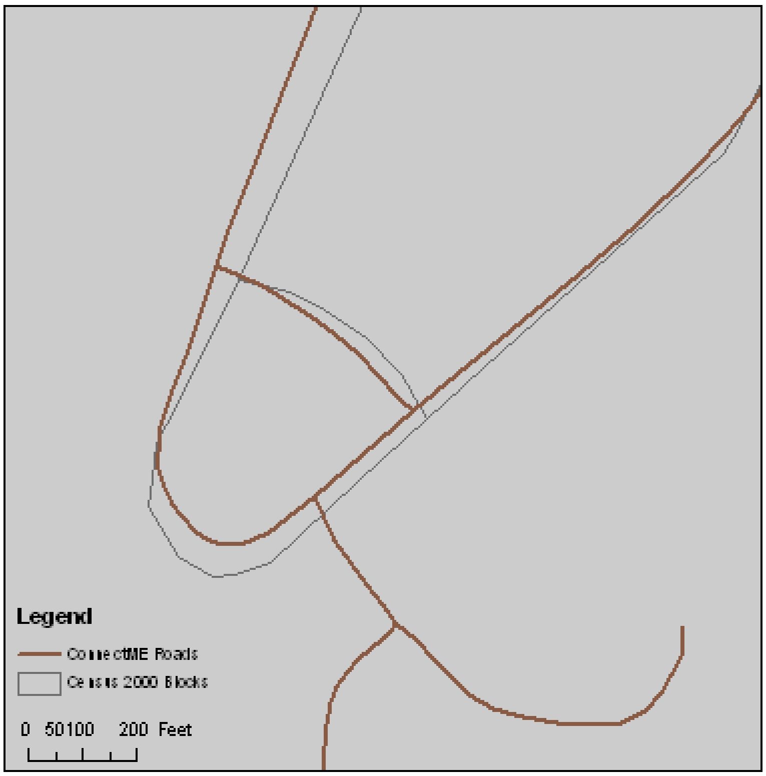
The street segment data that the State is utilizing is based primarily on the State's E911 street centerline GIS layer with additional street coverage added from a 3rd party dataset for those towns not yet participating in the E911 project. For information on the broadband service providers, a database table was developed based on the required attribution descriptions outlined in the NOFA.

With the data structure in place the challenge of importing this data into the transfer model can be discussed along with the State's proposed solution to minimize its impact of the misalignment on the broadband data processing.

The Challenge

Census Block geometry is spatially misaligned with the Maine's street centerlines.

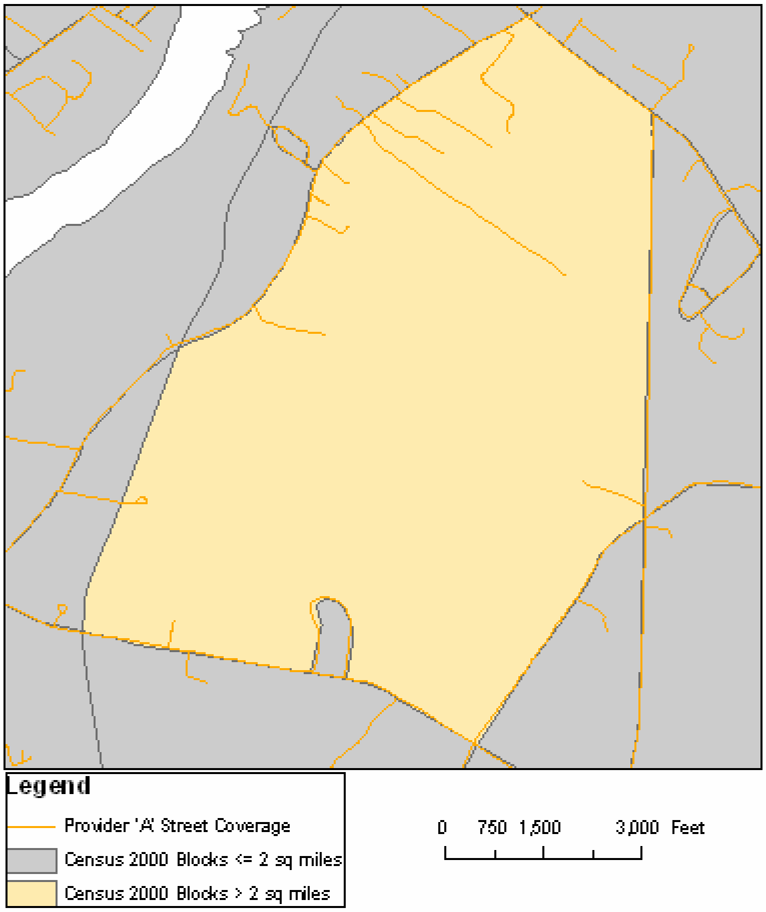
Examples described herein reference 2000 Census Block data and reflect examples found in both 2000 and 2010 Census Block datasets.



As shown in the above screen capture the typical misalignment between these two datasets is between 50 and 100 feet.

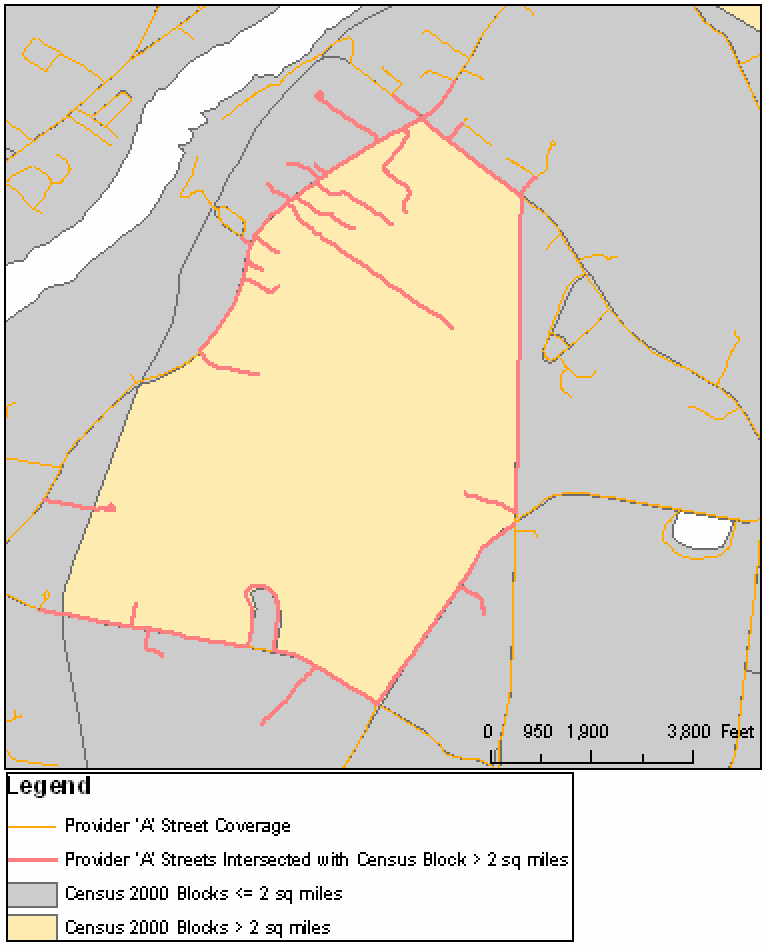
Since Maine is storing all broadband service providers' information as records associated with street centerlines this misalignment causes considerable challenges when trying to accurately export this information into the new SBDD data transfer model. The misalignment is great enough that utilizing basic intersect methodology is not enough to provide NTIA with a highly accurate representation of broadband coverage in Maine.

Example: Basic Intersect



The above screen capture shows an example of a 2000 Census Block that is greater than 2 square miles and Provider 'A' street coverage data that is to be reported.

Performing an intersect between the greater than 2 square mile census block and the street network for Provider 'A' results in the highlighted streets being reported.

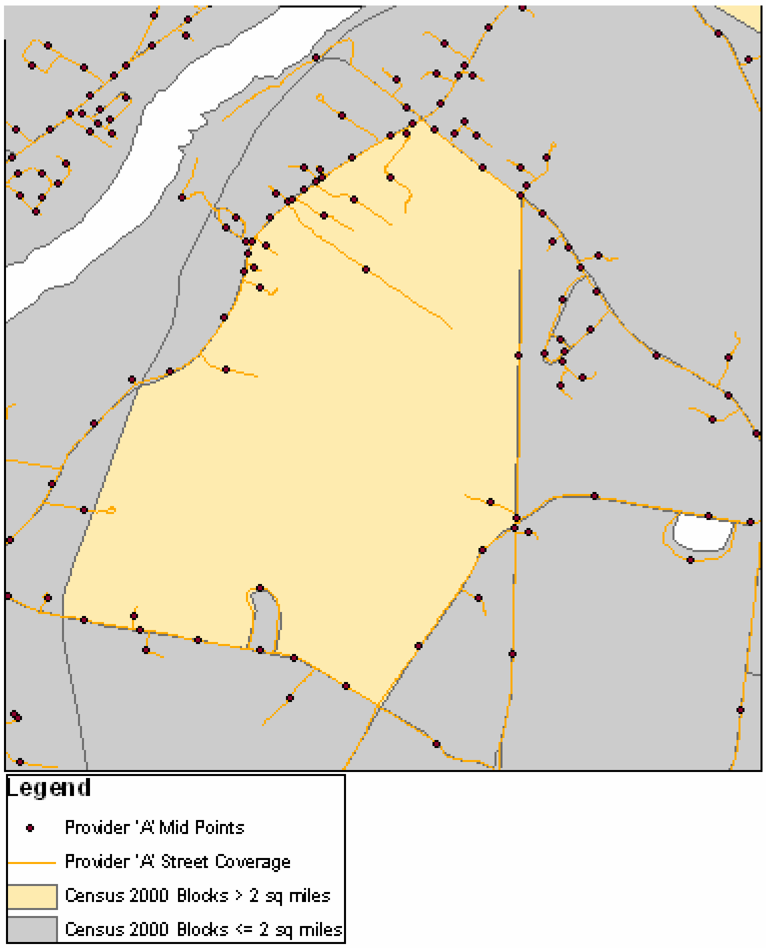


It is clear from the screen capture that several extra streets where selected and a few streets were missed by using the intersection method.

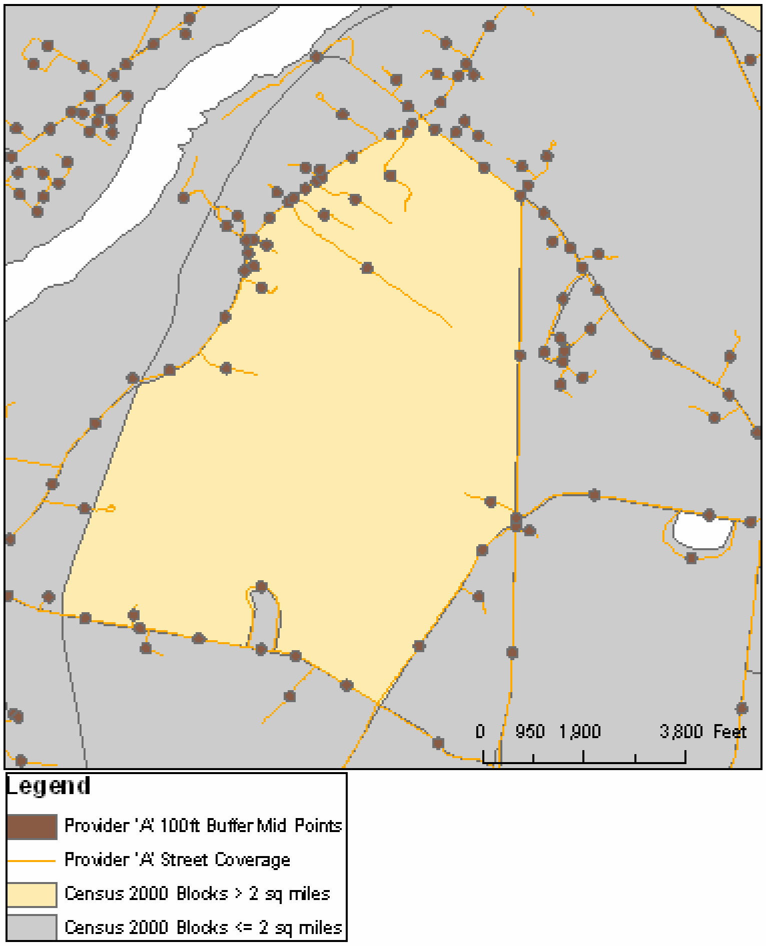
Proposed Technical Solution

The solution to this challenge is a multi-step process that needs to be run on each street segment with intelligent analysis employed to minimize errant representation of broadband service in census blocks greater that 2 square miles.

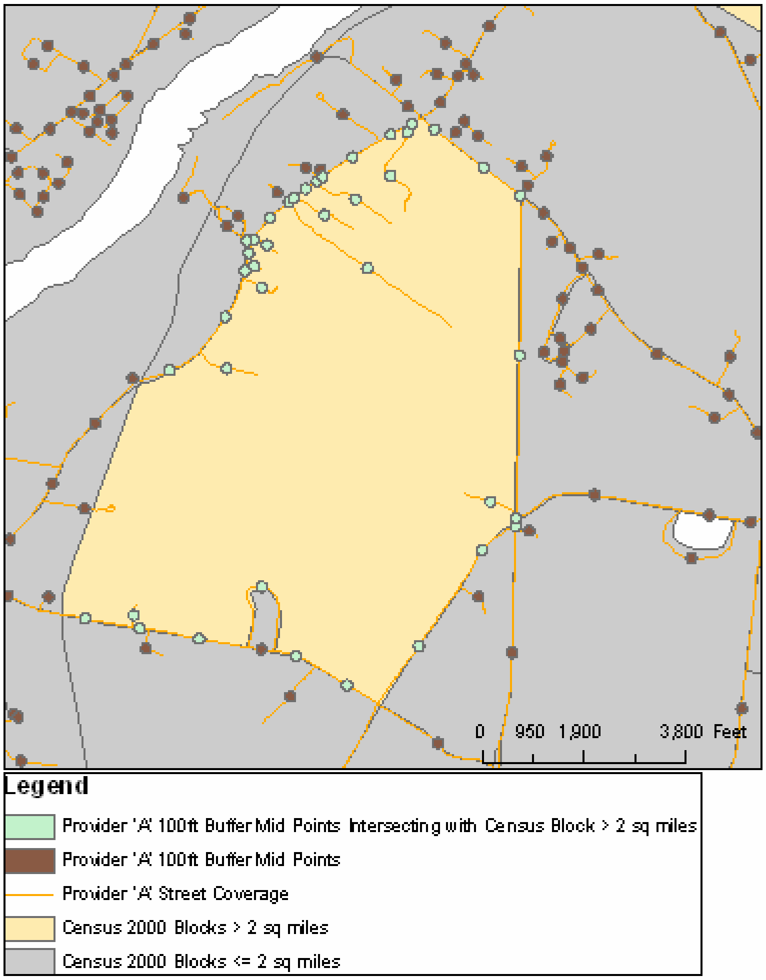
The first step is to create mid points of the street centerlines for Provider 'A'.



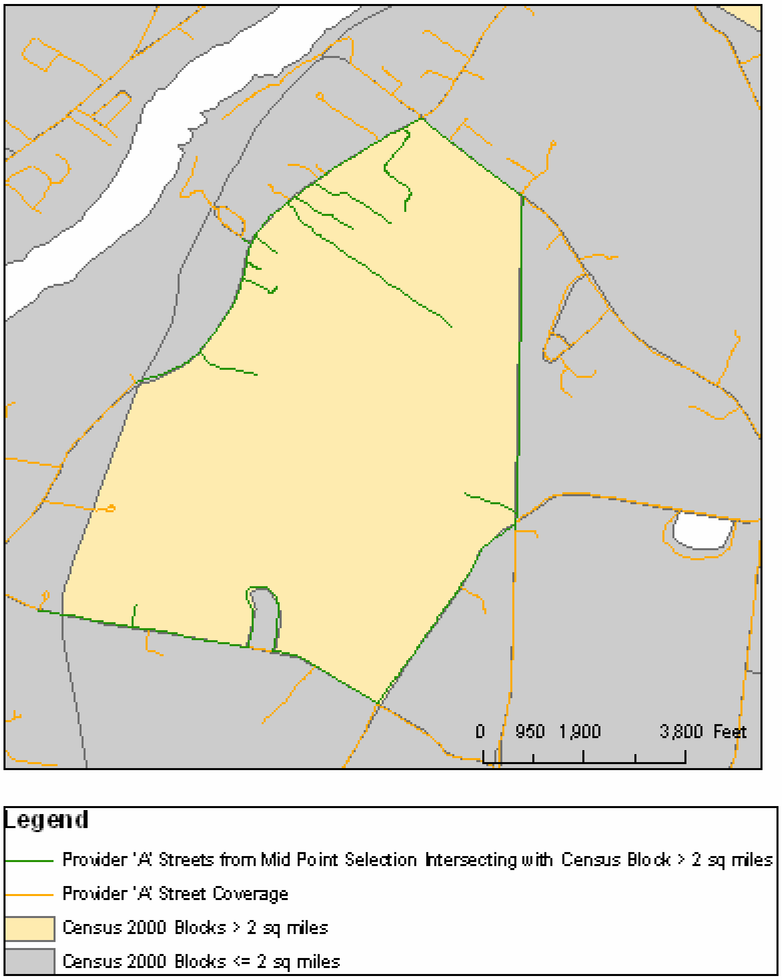
The next step is to create a buffer around the mid points using a distance to compensate for the misalignment in the census blocks. The distance found to have the best return for this process was determined to be 100 feet.



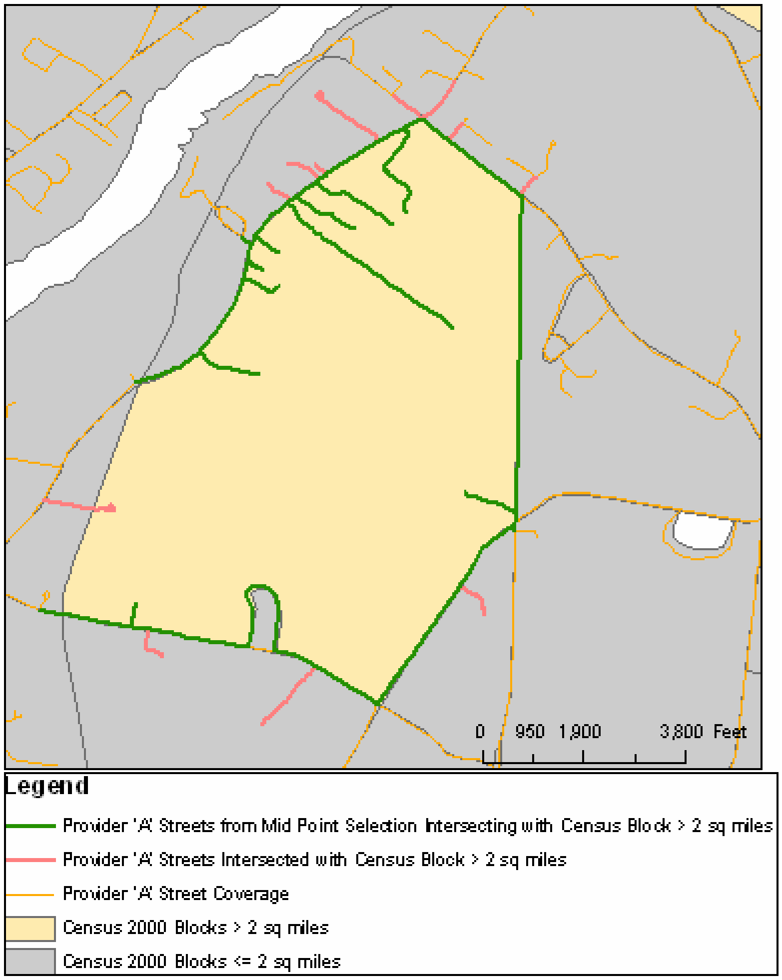
Selecting the buffered mid points that intersect the greater than 2 square miles census block returns the following results:



The selected buffered mid points relate back to the following street selection:

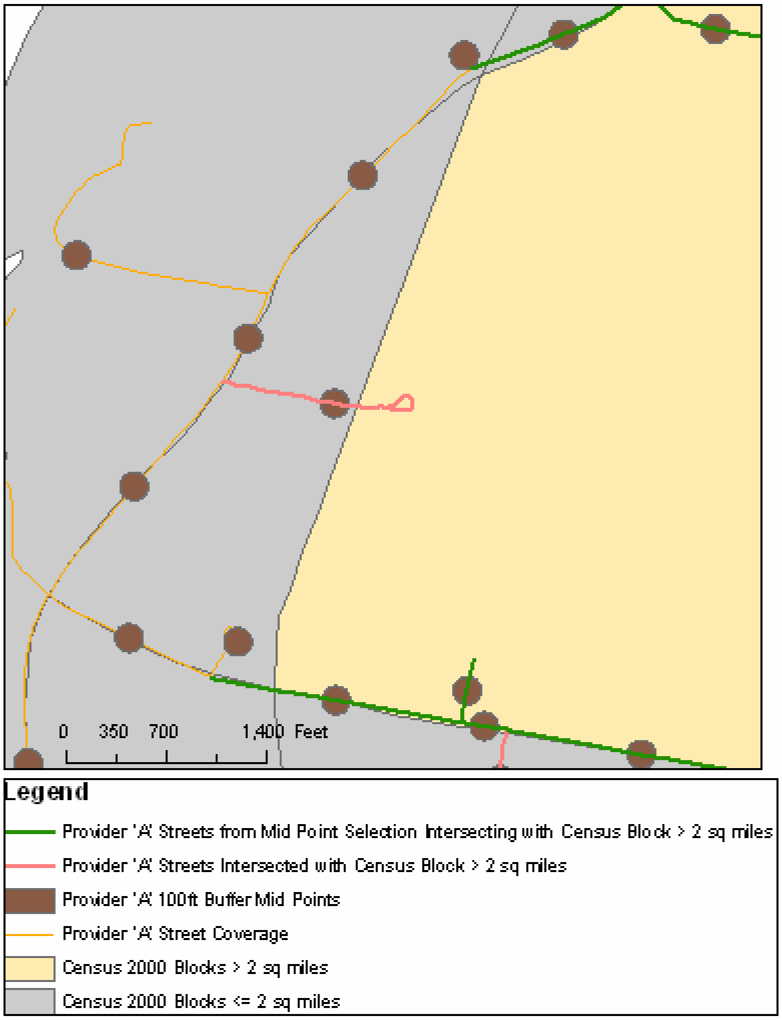


Compare this selection to the original intersection process selection:



The result of the mid point buffering process is a much better representation of streets contained within the greater than 2 square miles census block. A large number of the erroneous streets initially marked as included in the census block have been dropped providing a much improved report.

Taking a look at the left hand side of the map there is a street that intersects the census block but is not reported in the mid point buffering process. A closer look reveals why.

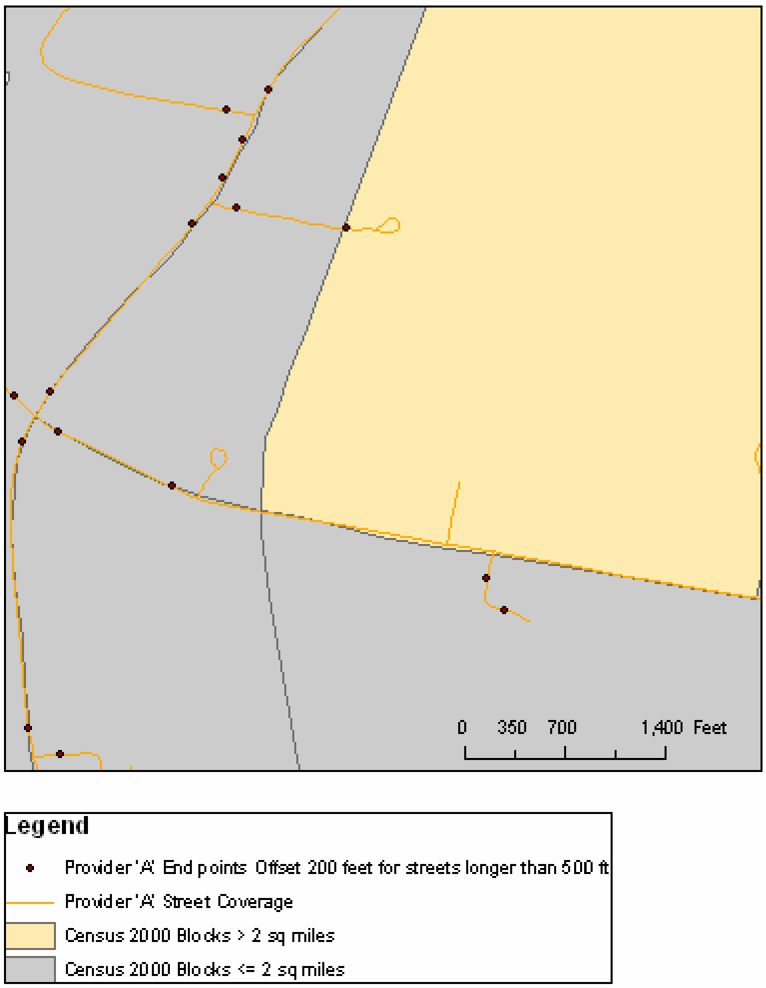


The street in question is relatively long in length and has a midpoint that is located outside of the greater than 2 square miles census block resulting in it not being reported.

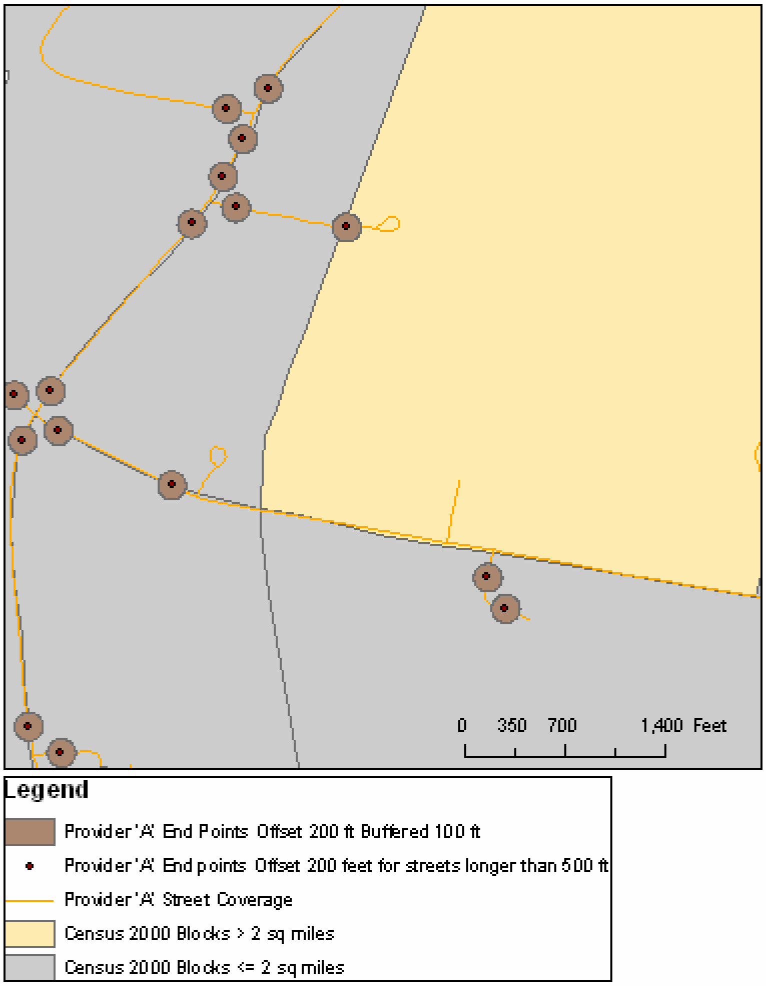
Building onto what has been performed already an additional automation check can locate and incorporate these long streets into the dataset.

The Proposed Solution: Additional Intelligence

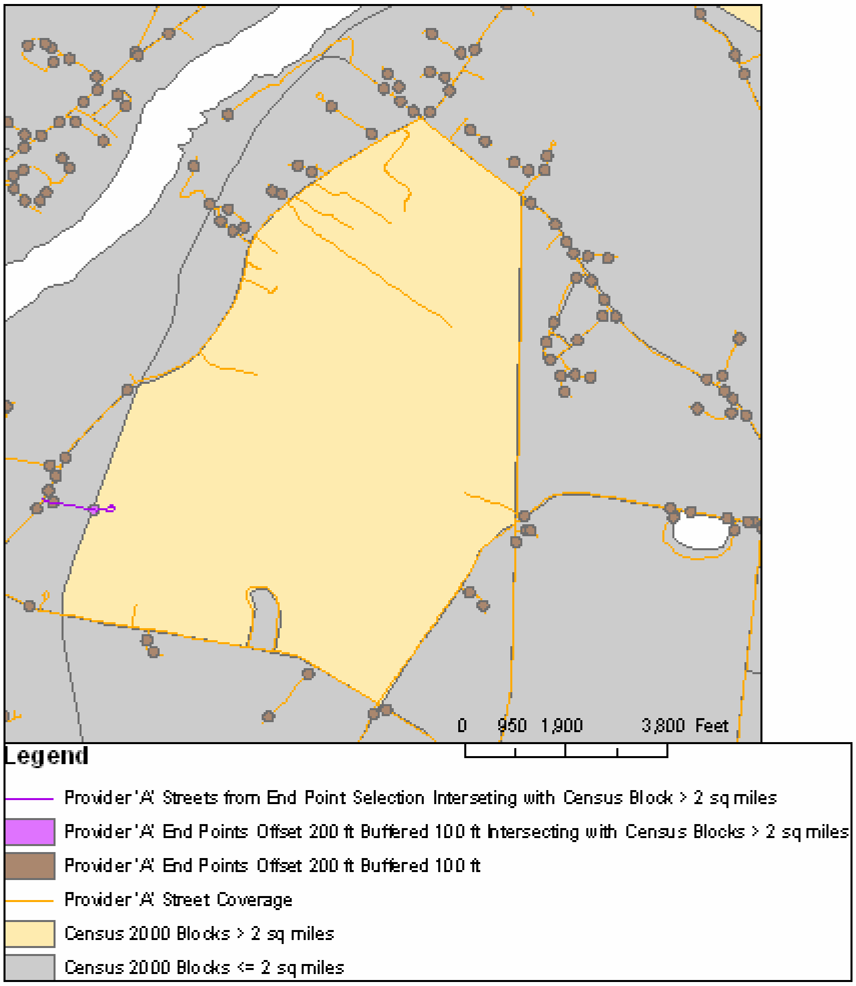
The first step in this additional iteration is to select streets that have not been flagged as being contained within a census block greater than 2 square miles and are longer than 500 feet. Then create points that are offset 200 feet from each end of the selected streets.



Next these 200 feet offset points are buffered 100 feet:

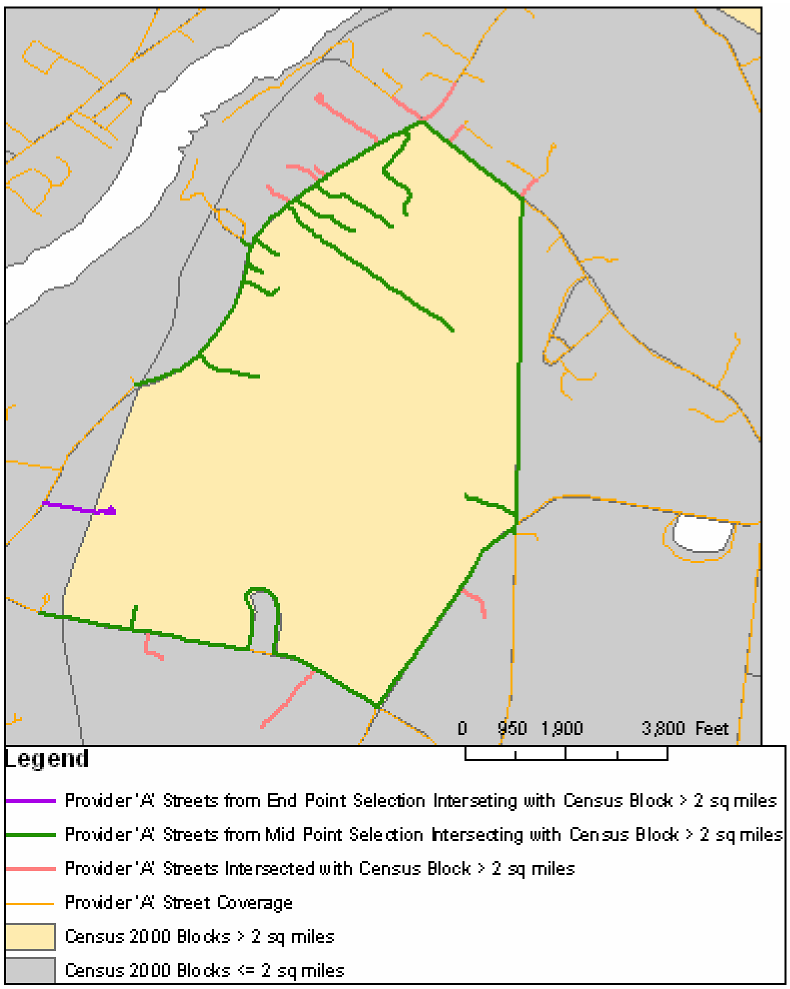


Then by selecting the buffers that intersect the greater than 2 square miles census block and selecting the associated streets, the process results in the following:



The Results

The screen capture below shows the streets reported using the two step process in comparison to the basic intersect method of reporting street segments.



The following table shows the results of the processes for Provider 'A' for this particular census block:

Method	Missed Streets	Extra Streets	%Error
Basic Intersect Process	2	11	35.14
MID Point Process	1	2	8.11
MID and END Point Process	0	2	5.41

The proposed solution gives a much better representation of the data set and minimizes the errors induced by using a basic intersection process.

Summary

The SBDD data submission requirements involving census blocks and street segments have created a challenge for the grantees to accurately represent broadband service provider information. In particular the State of Maine has a significant offset between the 2010 Census Block geometries and the corresponding street centerlines that the State is utilizing to map broadband availability data. A basic spatial intersect method has proven to be highly inaccurate in identifying street centerline data in census blocks greater than 2 square miles.

Through analysis the State has found that using a two step process using mid-point and offset end point buffering provides improved results for street centerlines in the greater than 2 square mile census blocks. The State expects this methodology to improve the accuracy of street segment determination by approximately 50% for these regions. Unless instructed otherwise by the NTIA project team, the State intends to utilize this two step process to develop the SBDD deliverables for street centerlines in census blocks greater than 2 square miles.

Appendix E – Residential Survey Letter

ConnectME Authority

State of Maine Internet Service Questionnaire

This survey is PREPAID to return to the State of Maine! It is only 10 questions long and will take less than 2 minutes to complete. The information is confidential. The data will only be used for the purpose of verifying where high speed internet is and is not offered across the State of Maine. More information about this initiative is provided at the end of the survey.

Thank you in advance for you participation.

If you have access to the internet and wish to complete this survey electronically, you may do so at:
http://www.surveymonkey.com/s/JBLNRHX

1. Please enter your physical home address if it is different than your mailing address:
   Street Address ____________________
   City ____________ State ________ Zip Code ____________

2. Do you currently subscribe to internet service? Yes No
   If No, please proceed to Question 7, otherwise continue to question 3.

3. What form of internet service do you purchase?
   a. Dialup Service b. DSL or Higher Wired Service c. High Speed Cable
   d. Satellite e. Fixed Antennae Wireless
   f. Mobile Wireless (Mobile Laptop Card, Smartphone, or similar device)

4. Who is your internet service provider? ____________________

5. Does this provider meet the level of advertised internet speed for the plan you subscribe?
   Yes No I Don't Know

6. Have you ever purchased internet service from a different provider at this address? Yes No
   If YES, please list the name of the previous provider(s)? ____________________

7. If you do not currently have internet service, have you attempted, in the past, to acquire service at this address but were unable to locate a providing company? Yes No N/A

8. In the past, has an internet provider tested access to the internet at this address? Yes No I Don't Know
   If YES, please list the name of the service provider? ____________________

9. Was the internet connection test successful? Yes No I Don't Know N/A

10. If you do not subscribe to high speed internet, but it IS available, what is the reason you do not subscribe?
    a. No interest b. Price of service c. Limitations of the service
    d. Need a different option to fit my internet hardware needs e. N/A
    f. Other ____________________

Thank you for taking the time to help shape the future development of broadband service in Maine!

Please fold the survey so the prepaid return label is on the outside and drop it into the nearest mailbox.

More Information about this initiative…
In 2007, the Maine State Legislature created the ConnectME Authority with the mission to promote the development of high speed internet communications systems in the un-served and underserved regions of the state. To fulfill this mission we are seeking your assistance in providing valuable information about the availability and use of high speed internet, otherwise known as broadband, at your location.

The ConnectME Authority has established a website where you can perform a test of internet speed for your location. If you are interested in running a test of your internet speed, please visit http://connectmespeedtest.maine.gov and follow the instructions provided. Access to this site does require a device capable of running flash applications such as a laptop or desktop computer. The test tool is not currently supported by smart phone devices.

To learn more about this project please visit our websites:
http://www.maine.gov/connectme/mapping/BroadbandMappingProject.htm
http://www.sewall.com/projects/project_connectme.php

Appendix F – Mobile Provider Feedback Letter

Welcome Mobile Providers!
Thank you for your participation in the State of Maine's Broadband Mapping Project. As part of our contract/delivery to the National Telecommunications and Information Administration (NTIA) and to the State of Maine we are initiating mobile coverage verification feedback. In your geoportal account you will find two maps of your company's coverage area in Maine.

How did we come up with these maps?
Each time we receive a coverage shapefile from a mobile provider we first overlay the current coverage with the previous round's coverage to find changes in the service area. When an area has a change of service we place a point at a road intersection, based on the E911 roads layer, within the new coverage. Field crews visit each of the points and perform an internet speed test using a mobile aircard from that specific carrier. All point data is analyzed back at the office to determine whether the test point qualifies as having reached broadband speeds. These points are then projected on to maps and the data is extrapolated based on a Thiessen Model to show the internet speed coverages. Two different National Standards are presented: FCC Standards and NTIA Standards.

FCC Standards
FCC Standards break internet speeds into categories called "Tiers"
First Generation
First Generation speed is defined as between 200kbps to 768kbps, symmetrical. This means both upload and download need to be between 200 and 768 to qualify. Any speed (upload or download) less than 200kbps qualifies as "Less than First Generation" regardless of the reciprocating speed (e.g., if you have an upload speed of 120kbps and a download speed of 706kbps the category is still "Less than First Generation" because both speeds were not equal to or greater than 200kbps.

Tier 1
Tier 1 speed is defined as between 768.1kbps to 1.5Mbps, symmetrical. This means both upload and download need to be between 768.1kbps and 1.5Mbps to qualify. Any speed (upload or download) less than 768.1kbps qualifies as "First Generation" regardless of the reciprocating speed (e.g., if you have an upload speed of 767kbps and a download speed of 1.3Mbps the category is still "First Generation" because both speeds were not equal to or greater than 768.1kbps.

Tier 2
Tier 2 speed is defined as between 1.51Mbps to 3Mbps, symmetrical. This means both upload and download need to be between 1.51kbps and 3Mbps to qualify. Any speed (upload or download) less than 1.51kbps qualifies as "Tier 1" regardless of the reciprocating speed (e.g., if you have an upload speed of 1.4Mbps and a download speed of 2.78Mbps the category is still "Tier 1" because both speeds were not equal to or greater than 1.51Mbps.

NTIA Standards

Broadband service is defined as a minimum of 200kbps upload and 768kbps download. Both speeds, upload and download, have to reach 200kbps and 768kbps respectively or they do not qualify as broadband. (e.g.,if you have an upload speed of 240kbps and a download of 766kbps, the speed test does not qualify as broadband). If a speed test reached broadband speed in only the upload or the download, but not both, then the speed test was deemed as "Inconsistent Broadband". If neither upload nor download reached broadband speeds the speed test was deemed "No Broadband". If the speed test could not be performed because of a lack of internet service completely then the test was deemed "No Connect".

In the future we will be working with individual mobile providers regarding discrepancies in coverage based on our verification findings. We welcome any questions or feedback you may have regarding this project. Thank you again for your participation and look forward to working with you in the future.

Sincerely,

Sewall Broadband Mapping Team

OFFICIAL OCTOBER 2011 UPDATE SUBMISSION TO THE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION UNDER THE STATE BROADBAND INITIATIVE GRANT PROGRAM FOR THE STATE OF MICHIGAN

CONNECT Michigan®

October 1, 2011

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MICHIGAN COVER LETTER

October 1, 2011

Ms. Anne W. Neville
SBI Grant Program Director
National Telecommunications and Information Administration
U.S. Department of Commerce
1401 Constitution Avenue, NW Room 4716
Washington, DC 20230

Dear Ms. Neville:

As the State Broadband Designated Entity, in partnership with the Michigan Public Service Commission, please accept this submission from Connected Nation on behalf of the state of Michigan's State Broadband Initiative (SBI) Grant Program, known as Connect Michigan.

These artifacts should be found to be compliant with the October 1, 2011, deadline for the semi-annual data update and in accordance with the terms of the July 1, 2009, Notice of Funds Availability (NOFA) and all subsequent clarifications pertaining to delivery of State-Level Mapping of Broadband Service Availability. This packet includes:

Inventory of Deliverables, Connect Michigan: October 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing
Appendix A: 4	n/a	Community Anchor Institutions-Narratives
VII.A.1(a)	n/a	Accuracy and Verification Report

n/a	DataPackage.xlsx	Worksheets of Contact Information, Record Count, and Provider Summary Table
n/a	n/a	List of Changes and Corrections to the Dataset
n/a	n/a	Non-Participating Provider Narratives
n/a	n/a	Broadband Provider Roster and Participation Status

In addition, this data update submission should be found to be compliant with the additional program requirements instituted by the National Telecommunications and Information Administration since the time of the April 2011 SBI data submission for the Connect Michigan program. Specifically, these new requirements are:

SBI Data Transfer Model
The submission of the broadband dataset for October 1, 2011, is contained within the SBI Data Transfer Model as released on the Grantee Workspace on June 30, 2011. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information on each provider as possible.

Additional Submission Guidance
This submission also includes a list of changes and corrections made to the dataset between the April 2011 submission and the October 2011 submission. This represents a summary of why data displays and/or supplied speeds, etc. are different from the previous submission. Changes can include upgrades to infrastructure to allow for higher throughput speeds for customers, an expansion of the service area (e.g. additional fixed wireless towers, recently activated DSLAMs, etc.), or a new provider in the marketplace. Corrections can include revisions to speed tier information that was previously reported incorrectly or the addition of a previously existing provider that has not yet been submitted in a semi-annual dataset.

This October 2011 semi-annual data update under the State Broadband Initiative Grant Program continues to demonstrate our dedication to implementing the joint purposes of the Recovery Act and the Broadband Data Improvement Act (BDIA) by gathering comprehensive and accurate state-level broadband mapping data, developing state-level broadband maps, aiding in the development and maintenance of the National Broadband Map, and undertaking statewide initiatives for broadband planning.

Broadband Service Availability — Provider Outreach and Verification

This data update submission under the SBI program includes datasets for approximately 84.44 percent of the Michigan provider community, or 114 of 135 total providers. Of the 114 participating providers, 40 supplied an update to their network or coverage area(s), while 58 have reported no change. The remaining 16 represent providers who previously supplied data but were non-responsive in the October 2011 update effort; therefore their previous dataset is being put forward as part of this compilation. A complete roster by provider depicting participation status and contact record is contained herein. The 21 providers that are not represented in the attached datasets have refused to participate in the voluntary program or were non-responsive to multiple contact attempts.

As the aforementioned roster and attached methodology documentation will attest, it is the collective opinion of the Connect Michigan principals that all commercially reasonable efforts were made to account for 100 percent of the known Michigan broadband provider community, pursuant to this semi-annual data update submission.

Connect Michigan has also continued to perform broadband verification activities through several means. In addition to confirmation of service area(s) by each provider, Connect Michigan conducts field validation efforts. To date, 75 (55.56 percent) providers have been validated through field verification activities. Additional details on verification activities are contained within the Field Validation Methodology.

The Connect Michigan website, www.connectmi.org, continues to serve a prominent role in the outreach and data collection effort. This program asset provides a way for the general public to participate in the process by offering interactive tools for users to test their connection speed, submit broadband inquiries, or contact a program representative.

As an indicator of stakeholder penetration, the Connect Michigan website encountered 6,608 unique visits during this reporting period (22,131 total to date for the life of the grant awarded on Deceer 20, 2009). Additionally, this pronounced Web activity netted 176 broadband inquiries over this same reporting period (1,185 grant inception to date). The website also provides the BroadbandStat application, which allows the consumer to confirm or dispute the coverage represented on the broadband inventory map. These consumer-initiated actions are facilitated through the Connect Michigan website and the Connect Michigan interactive mapping tool (BroadbandStat) that offer the citizens the vehicles to provide information regarding availability in their respective service area, either in affirmation or contest of the reported data represented in the Connect Michigan mapping artifacts. Since the initial data collection and release of corresponding maps, feedback in the form of broadband inquiries has allowed Connected Nation to identify additional areas that are in need of field validation, which is scheduled as soon as possible.

Community Anchor Institutions

Connect Michigan has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBI NOFA Technical Appendix.

In conjunction with the Michigan Public Service Commission outreach was conducted during this data update reporting period by Connect Michigan to continue identification of existing, centralized sources for CAI connectivity data. Connect Michigan has worked with the Michigan Department of Education to secure a distribution list for approximately 5,000 schools throughout the state. Additionally, outreach was coordinated to distribute a CAI survey to additional institutions throughout the state through multiple methods including a customized online survey available on the Connect Michigan website. During this reporting period Connect Michigan has developed a number of new relationships with statewide associations to promote the importance of broadband connectivity at anchor institutions and participation in this data collection process. Connect

Michigan will continue to build upon these new relationships over the coming months and utilize its contacts throughout the state to collect data and raise awareness of this project.

During this reporting period a Connect Michigan CAI newsletter has been drafted to assist with outreach and highlight education grants within the state awarded as part of the FCC's Learning-On-The-Go Program. From our work in Michigan, as well as other states, we recognize the great value of this data to future collaboration efforts within the state as well as its value to the National Broadband Map. We plan to continue to bring best practices to the Connect Michigan efforts, along with an investment of both human and technical resources required to reach our goal of increasing the data that is secured and reported as part of this process.

The Connect Michigan program exists to improve data on the deployment and adoption of broadband services and to assist in the extension of broadband technology across all regions of the great state of Michigan, as well as the United States through contribution to the National Broadband Map. We look forward to the continuing work ahead.

Respectfully submitted,

Thomas W. Ferree
Chief Operating Officer
Connected Nation, Inc.

DATA ACQUISITION: MICHIGAN COMMUNITY ANCHOR INSTITUTIONS METHODOLOGY

In this fourth reporting period of the SBI, Connect Michigan, working in close coordination with the Michigan Public Service Commission, has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBI NOFA Technical Appendix. During this reporting period Connect Michigan has continued to focus efforts on conducting outreach and raising awareness of this important project.

Connect Michigan has continued to identify and process CAI data obtained through an ongoing statewide outreach campaign. Physical address information continues to be augmented through manual sourcing and geocoded by Connect Michigan through ESRI ArcGIS software.

Connect Michigan continues to utilize a customized online survey hosted through SurveyMonkey, with a landing page on the Connect Michigan website that was developed during the first reporting period. This survey, in combination with a customized data-gathering spreadsheet, was distributed to a targeted list of CAI throughout the state. Connect Michigan will continue to use these data-gathering tools for future targeted outreach efforts throughout the coming months leading up to the next reporting period. These materials are customized to fit the CAI categories as defined in the SBI NOFA.

The survey can be accessed at this link using the following password:
http://connectmi.org/mapping/Community_Anchor_Institution_Data_Collection.php
Password: CAI_MI_9124

Connect Michigan and the Michigan Public Service Commission have worked closely together during this reporting period to conduct research as part of an ongoing process to identify existing, centralized sources for CAI connectivity data. The Michigan Department of Education provided an extensive contact database for all public schools within the state and Connect Michigan distributed a customized CAI survey to this list. Follow-up will continue over the next reporting period to continue to collect data from this important CAI sector. Additionally, the State Library of Michigan is updating the data it previously provided and Connect Michigan will provide the updated data for the April 2012 submission.

In tandem with these efforts to identify existing data, Connect Michigan continues to identify key CAI contacts in an effort to distribute and promote the online survey and raise awareness of the importance of CAI broadband connectivity. Connect Michigan has focused efforts on identifying new contacts within the Healthcare and Education sectors and will continue to follow-up with all contacts who have previously contributed to the CAI data collection efforts.

Connect Michigan has an ongoing mission to educate CAI throughout the state on the importance of participating in the project. Participation by these institutions will raise awareness about the importance of broadband connectivity and the need to report the requested data for inclusion on the National Broadband Map. During this reporting period Connect Michigan developed and distributed a CAI newsletter to CAI contacts throughout the state across all CAI sectors. This newsletter highlights Michigan schools participating in the FCC's Learning-On-The-Go-Program and encourages institutions to share their data by participating in the CAI online survey. This newsletter will continue to be utilized for outreach, be made available on the CAI page of the Connect Michigan website, and be updated over the next reporting period.

The greatest challenge with collecting this data continues to be the difficulty in securing CAI broadband connectivity data. Connect Michigan is overcoming this challenge through new relationships that are being formed, our work with the Michigan Public Service Commission, and the recent release of a CAI newsletter in the state. Connect Michigan expects noted progress to occur over the coming months leading up to the April 2012 submission.

A CAI summary of all processed and submitted data is provided below:

CAI Type	Total	Physical Address	Lat/Long	Technology of Transmission	Download Speed	Upload Speed
K-12	4,605	4,605	4,605	330	305	306
Libraries	2,269	2,269	2,268	828	849	36
Healthcare	263	263	263	3	3	3
Public Safety	958	958	957	18	17	17
Higher Ed Institutions	146	146	146	35	34	34
Other Government	89	89	89	25	22	22
Other Non-Government	512	512	512	5	5	5
Total	**8,842**	**8,842**	**8,840**	**1,244**	**1,235**	**423**

SBI Data Submission Methodology

The submission of the broadband dataset for October 1, 2011, is contained within the SBI Data Transfer Model and additional components as released on the Grantee Workspace on June 30, 2011. Connected Nation has reviewed all literature that relates to the release and use of this data transfer model and recognizes that it does not replace or dictate how data is stored, processed, or displayed for the state, as it is meant primarily as a means to transfer the broadband data from all states and territories and populate the National Broadband Map in a seamless fashion. Guidance from the Technical Mapping Guide, as released on the Grantee Workspace on March 24, 2011, was also followed to ensure the completeness and validity of the submission through completion steps and checklists, completing the DataPackage spreadsheet, uploading broadband datasets into the Data Transfer Model, and checking the dataset using the SBDD_CheckSubmission receipt process.

As part of the ongoing review and analysis process, NTIA has requested further information in the submission of the DataPackage spreadsheet. In addition to the information on providers whose coverage and accompanying attributes are submitted in the SBI Data Transfer Model, information on other providers that are considered to be non-viable is also included in the DataPackage. Providers deemed non-viable that have been excluded from continued outreach may have been eliminated for reasons such as (i) the company offers Internet service but at speeds below the current definition of broadband; (ii) the company was listed in advertisements as a broadband provider, but is actually a network solution or consulting firm, etc.; (iii) the company may build or install network infrastructure, but does not actually provide the broadband service to consumers;

and (iv) the company has gone out of business. The submitted DataPackage includes any relevant information that has been obtained through the course of due diligence and/or direct provider outreach, such as a Federal Registration Number (if applicable), the company's URL, the existence of an executed Nondisclosure Agreement, and brief notations regarding the status of the company.

In addition to the methodologies contained herein, as well as the DataPackage.xls containing contact information, the data dictionary, and a provider summary table, the following feature classes are submitted within the SBI Data Transfer Model for the state of Michigan.

Inventory of Deliverables, Connect Michigan: October 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area.
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles.
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address.
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points.
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing.

The provider data collected by Connected Nation on behalf of the state of Michigan have been formatted per the given specifications and uploaded into the appropriate feature classes of the SBI Data Transfer Model. Wireline availability is contained within census blocks and road segments, wireless availability is contained as polygons of coverage areas, and middle-mile connections and Community Anchor Institutions are contained as point data. All speed data is contained at the census block, road segment, or wireless polygon level of availability. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information as possible.

Connected Nation has continued outreach to satellite providers on their availability, technology, and speed information, but granular coverage is not yet available. Submitted within the wireless feature class are the satellite companies providing service to Michigan as a polygon of the state boundary. Efforts will continue to collect, process, or otherwise create more granular satellite data based on availability analyses and guidance received from NTIA.

PROVIDER CHANGES AND CORRECTIONS FOR OCTOBER 2011

As requested by the SBI Program Office, a listing of the changes and/or corrections to the datasets between the April 2011 and October 2011 submissions is included in this narrative. This information is presented in this section as well as in the Broadband Provider Log. Changes to the data include expansion of service area(s), activation of new wireless towers, and upgrades to the network to provide higher download speeds to consumers. Corrections to the dataset include the addition of previously existing providers whose coverage has never been submitted, revision of coverage or speed information that was incorrect, and any other items that were misrepresented in the April 2011 dataset.

Changes

- Air Advantage, LLC (fixed wireless): New fixed wireless towers in operation.
- AIRGRANT.COM, INC. (fixed wireless): New fixed wireless provider in the market.
- AT&T Inc. (mobile wireless): Network expansion to include more of central/western Michigan, with additional coverage in Marquette (upper peninsula).
- Baraga Telephone Company (fiber): Network expansion to include additional FTTH areas and provider upgrade infrastructure to provide speed tier 9 in most FTTH areas.
- Bloomington Telephone Company, Inc. (DSL): Provider upgraded infrastructure and can now offer speed tier 6 download speeds.
- Crystal Automation Systems, Inc. (fixed wireless): New fixed wireless towers in operation.
- D&P Communications, Inc. (fixed wireless): Provider launched new fixed wireless platform with 3 towers.
- Farmers Mutual Telephone Company of Chapin, Inc. (DSL): Provider changed name from “Farmers Mutual Telephone Company” to "Farmers Mutual Telephone Company of Chapin, Inc."
- Fast-Air Internet, Inc. (fixed wireless): New fixed wireless provider in the market.
- FNW, LLC (fixed wireless): New fixed wireless towers in operation.
- Frontier Communications Corporation (DSL): Network expansion to include several new Central Offices and Remote Terminals.
- Hiawatha Communications, Inc. (DSL): Network expansion (new Remote Terminals).
- I-2000, Inc. (DSL): Network expansion (added additional DSLAM locations).
- I-2000, Inc. (fixed wireless): Provider deactivated 7 fixed wireless tower sites.
- Iron Bay Computer & Design (fixed wireless): Provider decommissioned 3 tower sites.
- PAETEC Communications, Inc. (DSL): PAETEC purchased Talk America/Cavalier Telephone. Submitted Cavalier Tel. coverage based on April 2011 data.
- Parish Communications (cable): Provider upgraded infrastructure and can now offer speed tier 6 download speeds in select areas, and speed tier 4 in other areas.
- SonicNet, Inc. (fixed wireless): New fixed wireless provider in the market.
- Springcom, Inc. (cable): Provider upgraded infrastructure and can now offer tier 6 download speeds.
- The Computer Care Company, Inc. (fixed wireless): New fixed wireless towers in operation.
- The Computer Care Company, Inc. (DSL): Network expansion (new Central Office).

- Waldron Communication Company (fixed wireless): Provider upgraded tower infrastructure (raised transmit antenna heights), therefore propagations were recreated.
- Waldron Communication Company (DSL): Provider upgraded infrastructure and can now offer speed tier 3 upload speeds.
- Xyotek, LLC (fixed wireless): New fixed wireless provider in the market.

Corrections

- Air Advantage, LLC (fixed wireless): Corrected speeds (all 3650-3700 MHz towers should be speed tier 6 download and all unlicensed towers should be speed tier 4 download).
- Baraga Telephone Company (DSL): Fixed some alignment issues within its coverage area and changed speeds to match DSL-only, per the advertised speeds listed on its website.
- Block Communications, Inc. (cable): Provider corrected speed offerings to what is available to the general public (tier 7 download speeds) and updated d.b.a.name to "Buckeye CableSystem."
- Broadstripe LLC (cable): Incorrectly reported DOCSIS 3.0 as technology type; changed to "Cable Modem – Other."
- DISH Network Corporation (satellite): Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
- DMCI Broadband, LLC (fixed wireless): Changed speed tier 7 to speed tier 6 on some towers to reflect the residential speed packages offered (provider accidentally reported business speeds).
- FNW, LLC (fixed wireless): Corrected speeds (all towers should be speed tier 4 download).
- Great Lakes Satellite Group (fixed wireless): Great Lakes Satellite Group was previously non-responsive, but it provided data this round.
- Hughes Network Systems, LLC (satellite): Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
- Springcom, Inc. (cable): Corrected some coverage that was misaligned, per field audit.
- Tucker Communications, Inc. (fixed wireless): Recreated 900 MHz signal propagation to decrease/refine coverage area.
- West Michigan Broadband, LLC (fixed wireless): West Michigan Broadband was previously non-responsive, but it provided data this round.
- WideOpenWest Michigan, LLC (cable): WideOpenWest Michigan, LLC previously refused to participate, but it provided data this round.
- WildBlue Communications, Inc. (satellite): Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.

Changes and/or Corrections – Entirely New Dataset Submitted

- AT&T Inc. (DSL)
- CenturyLink (DSL)
- Charter Communications, Inc. (cable)
- Clearwire Corporation (mobile wireless)
- Comcast Cable Communications, LLC (cable)
- Leap Wireless International, Inc. (mobile wireless)
- Sprint Nextel Corporation (mobile wireless)
- T-Mobile USA, Inc. (mobile wireless)
- TDS Telecommunications Corporation (DSL)
- Time Warner Cable LLC (cable)
- United States Cellular Corporation (mobile wireless)
- Verizon North Inc. (mobile wireless)

MICHIGAN FIELD VALIDATION METHODOLOGY

Connected Nation focused a portion of its time on specific validation processes such as:

- conducting random spectrum analysis studies throughout the state using an Avcom PSA-37-XP spectrum analyzer;
- conducting mobile speed tests throughout the state using an iPhone, Android (or other smart phone) as well as provider-specific aircards (Sprint 3G/4G, Clearwire et al);
- identifying pre-selected, provider-submitted wireless transmit tower sites and cross-referencing data about that tower against the Federal Communications Commission (FCC) databases such as Antenna Structure Registration and/or the Universal Licensing System;
- cross-referencing Federal Registration Number data against available FCC Form 477 data as well as the FCC **CO**mmission **RE**gistration **S**ystem (CORES);
- validating provider submitted data (for example: latitude/longitude) using a handheld Garmin eTrex Summit GPS unit or GPS enabled software such as Microsoft Streets and Trips;
- locating physical wire-line attributes (such as Remote Terminals, CATV plant, etc.) and comparing them against provider submitted data; and
- conducting on-net and off-net speed tests using the FCC portal at http://www.broadband.gov/qualitytest/about/ or using the Ookla Net Metrics enabled speed test utility located on each of Connected Nation's state specific websites.

Additionally, Connected Nation cross-referenced numerous public documents in order to ensure that all known broadband providers were located and contacted. This included searching membership logs from the trade associations (WISPA, WCAI, PCIA, etc.), the Cable Television Fact Book, Public Utility Commission records, Public Service Commission records, Chamber of Commerce, etc.

To date, Connected Nation's staff conducted on-site validation tests in Michigan on the following providers: 123Net; 2125 Cable Company LLC (d.b.a. Sunrise Communications); ACD Net; Ace Telephone Company of Michigan, Inc.; Agri-Valley Communications, Inc.; AIRGRANT; Allendale Telephone Company; Arialink; AT&T, Inc.; Azulstar, Inc.; Baraga Telephone; Barry County Telephone; Bloomingdale Communications, Inc.; Boardman River Communications LLC; Broadstripe; Cable America Michigan LLC; Camp Communications Services, Inc.; Carr Communications; Cassair; CenturyLink; Charter Communications; Cherry Capital Connections LLC; Clearwire Corporation; COLI, Inc.; Comcast Cable Communications LLC; Custom Software, Inc.; D & P Communications, Inc.; DMCI Broadband LLC; Drenthe Telephone Company; FreedomNet Solutions; Frontier Communications Corporation; Hiawatha Telephone (d.b.a. Jamadots, Chippewa County Telephone); Hidden Lake Wireless; I-2000, Inc.; Interlink Computers Technology, Inc.; Iron Bay Computer and Design; ISP Management; KEPS Technologies, Inc.; Leap Wireless International, Inc.; Lighthouse Computers; Merit Network; MetaLINK Technologies, Inc.; Michigan Cable Partners; Michwave Technologies, Inc.; Microtech Services, Inc.; Mutual Data Services; NCATS; Nodin Communications; Ogden Communications, Inc.; Parish Communications; Pasty.Net, Inc.; Peninsula Fiber Network LLC; Peninsula Telephone Company; Pigeon Telephone; Reliable Internet; Sister Lakes Cable TV; Small Business Solutions Group (d.b.a. RuralReach.Com); SpeedNet LLC; Sprint Nextel Corporation; T2 Communications LLC; TalkAmerica, Inc.; TC3Net; TDS Telecommunications Corporation; The ISERV Company; T-Mobile; Town & Country CATV; Tucker Communications; Upper Peninsula Telephone (d.b.a. LIPC, Alphacomm.net); Verizon North, Inc.; Waldron Telephone Company; West Michigan Broadband; Winn Telephone Company; Wireless Technology Solutions; Wyandotte Municipal Services; and Xyotek.

From program initiation through this reporting period, Connected Nation has completed in-the-field validation testing against 75 companies (out of a universe of 135 viable providers) totaling 55.56 percent within the state of Michigan.

Connected Nation has also continued to review provider datasets for accurate speed information, platform listings, and other intricacies that may fall outside of the standard SBI Data Transfer Model parameters. Any providers whose submitted coverage and attributes are anticipated to come into question have been further reviewed and confirmed; details on a case-by-case basis are presented below.

Comcast
Issues: 1) Technology of transmission 40 with maximum advertised download speed in tier 7, lower than expected value range for the technology; and 2) technology of transmission 41 with maximum advertised download speed in tier 9, higher than expected value range for the technology.
Resolution: Input from provider on the technology listings and corresponding speed tiers was not received prior to the submission; dataset submitted as-is and work will continue to provide more accurate dataset in April 2012.

ACCURACY AND VERIFICATION: PROVIDER VALIDATION METHODOLOGY

Broadband providers maintain their service area data in many different formats, all in varying levels of complexity and granularity. In order to ensure that the data required by the NTIA is standardized across all providers and that it is as accurate as possible, Connected Nation translates and formats the data that providers are able to supply into a GIS shapefile and produces maps for the provider to review. The resulting map(s) and review process allow for providers to see their service area in a geographic format – for some providers, this is the first time they have seen maps of their broadband service area. Having the mapped service area allows providers to quickly identify any issues that appear in the data representation, whether the issue is in the data translation into a GIS format or from the original data collection and submission. Often data is provided from various sources and through the review and revision process, local engineers who operate the networks and work in the field are able to ensure that the tabular data that has been submitted is accurate and represents the real-world network extent. Any issues in how the service area is represented on the map(s) are remedied by Connected Nation, whether they are additions, removal of service, or any other revisions. Revised maps of service area representations are sent to the provider for review and approval; Connected Nation will revise data and return maps as many times as necessary until the provider is in agreement that the map represents their service area as accurately as possible. Once the review process has been completed and final approval of the data is provided, the data is deemed ready for NTIA submission.

Once the data collection has been aggregated at a statewide level, static maps of statewide and county-level availability are produced and made publicly available. In addition, consumers can visit the interactive online tool, BroadbandStat, to create customized views of broadband service areas and analyze corresponding demographic information. Leveraging broadband service data on various platforms allows for public users, providers, and other stakeholders to review, scrutinize, and provide feedback on the represented data. This feedback becomes a validation method in itself as consumers submit inquiries to Connected Nation either affirming where service is not available or identifying areas where broadband service is shown on the map, but in actuality is not available. This allows for a follow-up to providers regarding revisions to the data as it is represented; it also allows for Connected Nation to identify locations where on-site visits may be necessary to complete field validation of available services. Public feedback on all forms of mapping products serves as a localized validation method for provider-supplied information and allows Connected Nation to resolve inaccuracies as they are identified to ensure that only the highest quality information is provided to stakeholders.

Estimates derived from provider-validated data indicate that approximately 2.95 percent of Michigan households do not have terrestrial fixed broadband service available, and approximately 0.21 percent[1] of Michigan households have neither mobile nor fixed broadband service available.[2]

[1] In accordance with NTIA's definition of available broadband service as specified in the SBI NOFA, this estimate includes both terrestrial fixed *and* mobile broadband service, if the service offers download speeds of at least 768 Kbps and upload speeds greater than 200 Kbps.

[2] Due to the nature of the SBI data collection methodology as defined by the NTIA and based on both census block geographic units and street segment data, the estimates of broadband availability derived from provider-validated data may include an overstatement of the actual number of households with broadband availability. Under the census block-based data collection method, a provider will typically report broadband availability for an entire census block whether its network is present across the whole or only a subset of that census block. This potential overestimation at the census block level can be amplified as the data is aggregated across the entire state.

Within rural areas of the state, results derived from provider-validated data indicate that approximately 5.88 percent of rural Michigan households do not have terrestrial fixed broadband service available, and approximately 0.44 percent[3] of rural Michigan households have neither mobile nor fixed broadband service available.[4] Please note that the availability estimates presented are based on Census 2000 household information; these figures will be updated in the near future with Census 2010 household information.

WIRELESS METHODOLOGY

Broadband Service Availability in Provider's Service Area
Wireless Services Not Provided to a Specific Address

Data solicited from a fixed wireless provider to create propagation models include, but are not limited to:

1. The name of the structure
2. Whether the transmitting device is operational or proposed
3. The maximum advertised downstream speed, the maximum advertised upstream speed
4. The typical downstream speed, the typical upstream speed (peak periods for both)
5. The frequency range of spectrum being used (as prescribed by NTIA)
6. The primary population center(s) being served (for geopolitical boundary reference)
7. The physical address of the transmit site (in the event latitude/longitude is unavailable from the provider this allows a quick reference point for geocoding)
8. Latitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
9. Longitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
10. Antenna pattern (e.g. omni-directional, 180°, 120°, 90°, etc.)
11. Azimuth of antenna (e.g. 360° with magnetic declination if known)
12. Approximate transmit radius (in feet, miles, or kilometers)
13. Polarity of transmit antenna (Vertical or Horizontal)
14. Transmit antenna gain (in dBi)
15. Line loss (applicable only to providers using coax, heliax, waveguide or other forms of cabling – excludes power-over-Ethernet devices)
16. Mechanical and/or Electrical beam tilt (if applicable)
17. Equipment Manufacturer (allows easy cross-reference against manufacturer's specification sheet)
18. Power output of the transmitting device (if unknown, FCC standards or manufacturer specifications are applied)

[3] See footnote 1.
[4] See footnote 2.

19. AMSL at base of tower site
20. Antenna centerline AGL (height of antenna above ground level measured at the centerline of the actual antenna)
21. Foliage factors (Evergreens/Deciduous and percent of ground cover)
22. Ground Clutter (primarily used in rural areas to account for foliage and in metropolitan areas to account for types and heights of buildings if known)
23. Average gain of receive antenna
24. Receive antenna is estimated at height above average terrain (HAAT) of 6.2 meters/20 feet
25. Federal Registration Numbers (if applicable) which may allow opportunities to cross-reference and/or obtain additional data from the Federal Communications Commission Universal Licensing System and the **CO**mmission **RE**gistration **S**ystem

Propagation modeling is an empirical mathematical formulation for the characterization of radio wave propagation as a function of frequency, distance, and other conditions. Propagation software(s) typically use the Irregular Terrain Model (also known as Longley-Rice) of radio propagation for frequencies between 20 MHz and 20 GHz. This model is based on electromagnetic theory and statistical analyses of the combination of terrain features and radio measurements, then predicting the median attenuation of a radio signal as a function of distance and the variability of the signal in time and in space. For metropolitan areas, the software can typically be adjusted to use the Okumura-Hata model which accounts for predicting the behavior of cellular transmissions in areas where buildings are the primary obstructions. The resulting product from either model depicts a graphical illustration of the theoretical propagation characteristics of a selected frequency range based on defined variables (receiver sensitivity of the home/mobile device, foliage factor, and digital elevation terrain input).

After converting propagation models into a geospatial format, additional processing is completed to remove the small pixels representing service present in the resulting dataset. These areas are initially created based on the parameters entered in the software from the provider equipment information, the underlying data parameters of elevation, hillshade, etc., and the limitations of the software itself to display a broadband service area as accurately as possible. Generally, these random pixel striations appear as a result of signal levels reaching the highest elevated points within the prescribed radius. Typically, while this pixilation anomaly shows legitimate areas where signals can be received, these highly elevated points may have exceedingly sparse populations or are entirely void of population. As a result, and congruent to the *Wireless Technology Methodologies and Business Logic* white paper submitted to NTIA on January 20, 2011, all independent pixels representing service that are less than 0.125 square miles in area have been removed from the geospatial representation of each wireless provider.

Broadband Inquiries Methodology

Connected Nation collects consumer feedback in the form of broadband inquiries (BBIs). These inquiries represent any type of communication received from the public regarding broadband service. Once BBIs are received across the state, this information is overlaid with the broadband availability information which was collected through the SBI program. This allows for a real-world comparison of the broadband landscape to the information received from broadband inquiries. Consumers submitting these inbound comments and/or inquiries are able to provide information regarding three categories: 1) residents who do not have broadband but want it; 2) residents who have broadband but want a different provider; and 3) residents who do not have broadband, but the broadband inventory maps indicate that they do.

BBIs are submitted frequently by consumers via the Connect Michigan website. Inquiries often seek help to identify local broadband provider options, or to learn when a specific provider may be able to provide service to that consumer. Consumer comments also provide information which may help modify maps with actual service area information. The primary objectives of Connected Nation regarding these inquiries are 1) to improve the accuracy of the state maps with submitted consumer information and follow-up field research; 2) to provide broadband options to consumers through cooperation with mapped providers and by facilitating new broadband service options; and 3) to map and analyze information from consumers about areas of unmet broadband demand and alternatives to currently mapped services.

New BBIs are assigned to either the GIS department or the Engineering & Technical Services (ETS) team depending on the category entered by the consumer on the website submission form. The GIS or ETS team members respond to each inquiry according to the information requested by the consumer. Many BBIs can be resolved through desktop research; however, if a BBI requires research in the field, the assigned ETS team member conducts such research when performing field validations in the area of the inquiry, or at other such time as is practical and appropriate. GIS and ETS team members respond to and conclude BBIs via telephone contact and/or e-mail communication.

The broadband inquiry process has been implemented in each of the Connected Nation state programs with successful results. Altogether Connected Nation has received over 17,000 broadband inquiries since 2007, allowing the state programs to evaluate each inquiry for broadband demand and data verification. These inquiries are continuously examined against current broadband availability, updated every six months, to determine if previously unserved households have been expanded to and can now receive broadband at their residence. This database of broadband inquiries has also allowed the Connected Nation state programs to aggregate demand in concentrated areas to show providers the exact locations where the population has made it clear that they would purchase broadband if it was made available to them. Providers in the states have responded to this process and have expanded to areas knowing that their investment will be worthwhile. Data verification methods have also proven successful, as the state programs have been able to show those inquiries that indicate the broadband service areas are misrepresented on the map to providers, who then verify where service cannot reach in regard to that residence(s). The broadband coverage in these states has been altered to create a more accurate map based on the inquiries submitted by the public.

During this reporting period, the Connect Michigan project has received a total of 176 inquiries (1,185 grant inception to date). As more inquiries are submitted to Connect Michigan, a more thorough validation of the broadband landscape can be performed, while also allowing providers to see which areas have a high demand for broadband adoption.

BROADBANDSTAT METHODOLOGY

BroadbandStat is an online, interactive mapping tool for viewing, analyzing, and validating broadband data. Developed through a partnership with ESRI, the market leader in geographic information system (GIS) software, BroadbandStat is a multi-functional, user-friendly way for local leaders, policymakers, consumers, and technology providers to devise a plan for the expansion and adoption of broadband.

First and foremost, BroadbandStat allows consumers to locate their residence and identify providers that offer broadband Internet service to that location. The interactive platform allows for users to build and evaluate broadband expansion scenarios using a wealth of data, including education and population demographics, broadband availability, and research about the barriers to adoption.

New functionality in BroadbandStat allows the consumer to provide feedback on the broadband data displayed on the interactive map. Through the collection of this feedback, a visual demand for broadband is presented. This visualization allows the Connected Nation state programs the ability to validate the broadband availability for accuracy. If residents within a region state they are without broadband, but the interactive map shows otherwise, this allows Connected Nation to approach the providers within that area in an effort to trim down their coverage to more accurately represent real-world availability on the ground.

The Connect Michigan project launched BroadbandStat on May 20, 2010, and has received a total of 6,461 visits to date, of which 1,670 occurred this reporting period.

SPEED TEST METHODOLOGY

The 4,531 speed tests that are represented in the Connect Michigan Speed Test Report during this reporting period (8,489 grant inception to date) are the result of a partnership between Connected Nation and Ookla Net Metrics. Utilizing this relationship increases the level of confidence in the data being collected and provides for a far greater sample size than could be collected by a single testing site.

Ookla owns and operates Speedtest.net, as well as develops and deploys speed tests, such as the Connect Michigan speed test website, for partners around the world. This network of sites that is developed and run on its testing technology provides Ookla with a vast dataset that, due to the variability of geographic information collected across the varying speed test sites, is geocoded utilizing Geo-IP technology. This technology allows for tests to be geocoded to points of aggregation, typically larger nodes across provider networks. While there are hundreds of thousands of tests that have been conducted, the level of aggregation is only sufficient for county-level detail due to the test results being located at these larger nodes and not at an absolute location for each speed test.

In an effort to validate broadband data from the Connect Michigan project, speed test information is collected throughout the state. Speed tests provide speed information on the path taken through all networks (a provider's network as well as additional networks) a local machine must connect to in order to reach the host test. The benefit of this collection of speed information is two-tiered. First, it allows for a comprehensive dataset of speeds, while also providing Connect Michigan with the information on where broadband services are available. Second, unlike theoretical speed information which was received through the data collection process, the use of speed tests provide real-world information on the speeds that currently exist within the state of Michigan.

Broadband Provider Log

Complete	163
Non-Responsive/Refused	22
In Progress	2
Count of Datasets by Status	**187**
Total Unique Providers Represented	**136**

Provider Name	Platform	Status	NDA Execution Date	Notes
Air Advantage, LLC	Fixed Wireless	Data Added to Statewide Inventory	3/15/2010	[AUG-24-11 Sarah Finne] Change and Correction: New fixed wireless towers in operation and corrected speeds (all 3650-3700 MHz towers should be speed tier 6 download and all Unlicensed towers should be speed tier 4 download).
AIRGRANT.COM, INC.	Fixed Wireless	Data Added to Statewide Inventory		[AUG-18-11 Sarah Finne] Change: New fixed wireless provider in the market.
AT&T Inc.	DSL	Data Added to Statewide Inventory	12/16/2009	[AUG-23-11 Sarah Finne] Change and/or Correction: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
AT&T Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/16/2009	[AUG-15-11 Sarah Finne] Change: Network expansion to include more of central/western Michigan, with additional coverage in Marquette (upper peninsula).
Baraga Telephone Company	DSL	Data Added to Statewide Inventory	1/14/2010	[SEP-16-11 Sarah Finne] Correction: Fixed some alignment issues within their coverage area and changed speeds to match DSL-only, per the advertised speeds listed on their website.
Baraga Telephone Company	Fiber	Data Added to Statewide Inventory	1/14/2010	[SEP-16-11 Sarah Finne] Change: Network expansion to include additional FTTH areas and provider upgrade infrastructure to provide speed tier 9 in most FTTH areas.
Block Communications, Inc.	Cable	Data Added to Statewide Inventory	4/12/2010	[SEP-16-11 Sarah Finne] Correction: Provider corrected speed offerings to what is available to the general public (tier 7 download speeds) and updated DBA name to "Buckeye CableSystem."
Bloomingdale Telephone Company, Inc.	DSL	Data Added to Statewide Inventory	1/25/2010	[SEP-16-11 Sarah Finne] Change: Provider upgraded infrastructure and can now offer speed tier 6 download speeds.
CenturyLink	DSL	Data Added to Statewide Inventory	12/4/2009	[AUG-17-11 Sarah Finne] Change and/or Correction: possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Charter Communications, Inc.	Cable	Data Added to Statewide Inventory	12/15/2009	[AUG-16-11 Sarah Finne] Change and/or Correction: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Clearwire Corporation	Mobile Wireless	Data Added to Statewide Inventory	3/17/2011	[AUG-16-11 Sarah Finne] Change and/or Correction: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Comcast Cable Communications, LLC	Cable	Data Added to Statewide Inventory	12/7/2009	[AUG-26-11 Sarah Finne] Change and/or Correction: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Crystal Automation Systems, Inc.	Fixed Wireless	Data Added to Statewide Inventory	6/25/2010	[AUG-24-11 Sarah Finne] Change: New fixed wireless towers in operation.
D&P Communications, Inc.	Fixed Wireless	Data Added to Statewide Inventory	3/8/2011	[AUG-24-11 Sarah Finne] Change: Provider launched new fixed wireless platform with 3 towers.
Farmers Mutual Telephone Company of Chapin, Inc.	DSL	Data Added to Statewide Inventory	10/26/2010	[SEP-16-11 Sarah Finne] Change: Provider changed name from "Farmers Mutual Telephone Company" to "Farmers Mutual Telephone Company of Chapin, Inc."
Fast-Air Internet, Inc.	Fixed Wireless	Data Added to Statewide Inventory		[AUG-18-11 Sarah Finne] Change: New fixed wireless provider in the market.
FNW, LLC	Fixed Wireless	Data Added to Statewide Inventory	2/12/2010	[AUG-24-11 Sarah Finne] Change and Correction: New fixed wireless towers in operation and corrected speeds (all towers should be speed tier 4 download).
Frontier Communications Corporation	DSL	Data Added to Statewide Inventory	1/22/2010	[AUG-18-11 Sarah Finne] Change: Network expansion to include several new Central Offices and Remote Terminals.
Great Lakes Satellite Group	Fixed Wireless	Data Added to Statewide Inventory		[SEP-16-11 Sarah Finne] Correction: Great Lakes Satellite Group was previously non-responsive, but they provided data this round.
Hiawatha Communications, Inc.	DSL	Data Added to Statewide Inventory	2/2/2010	[AUG-08-11 Sarah Finne] Change: Network expansion (new Remote Terminals).
I-2000, Inc.	DSL	Data Added to Statewide Inventory	3/7/2011	[AUG-22-11 Sarah Finne] Change: Network expansion (added additional DSLAM locations).
I-2000, Inc.	Fixed Wireless	Data Added to Statewide Inventory	3/7/2011	[AUG-24-11 Sarah Finne] Change: Provider deactivated 7 fixed wireless tower sites.
Iron Bay Computer & Design	Fixed Wireless	Data Added to Statewide Inventory	1/14/2010	[SEP-16-11 Sarah Finne] Change: Provider decommissioned 3 tower sites.
Leap Wireless International, Inc.	Mobile Wireless	Data Added to Statewide Inventory	4/5/2010	[AUG-22-11 Sarah Finne] Change and/or Correction: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Parish Communications	Cable	Data Added to Statewide Inventory	7/1/2010	[SEP-16-11 Sarah Finne] Change: Provider upgraded infrastructure and can now offer speed tier 6 download speeds in select areas, and speed tier 4 in other areas.
SonicNet, Inc.	Fixed Wireless	Data Added to Statewide Inventory	8/4/2011	[AUG-24-11 Sarah Finne] Change: New fixed wireless provider in the market.

Springcom, Inc.	Cable	Data Added to Statewide Inventory	2/25/2010	[SEP-16-11 Sarah Finne] Change and Correction: Corrected some coverage that was mis-aligned, per field audit, and provider upgraded infrastructure and can now offer tier 6 download speeds.
Sprint Nextel Corporation	Mobile Wireless	Data Added to Statewide Inventory	1/14/2010	[AUG-16-11 Sarah Finne] Change and/or Correction: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
T-Mobile USA, Inc.	Mobile Wireless	Data Added to Statewide Inventory	1/8/2010	[AUG-16-11 Sarah Finne] Change and/or Correction: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
TDS Telecommunications Corporation	DSL	Data Added to Statewide Inventory	1/27/2010	[AUG-16-11 Sarah Finne] Change and/or Correction: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
The Computer Care Company, Inc.	DSL	Data Added to Statewide Inventory	3/8/2011	[AUG-08-11 Sarah Finne] Change: Network expansion (new Central Office).
The Computer Care Company, Inc.	Fixed Wireless	Data Added to Statewide Inventory	3/8/2011	[AUG-08-11 Sarah Finne] Change: New fixed wireless towers in operation.
Time Warner Cable LLC	Cable	Data Added to Statewide Inventory	12/21/2009	[AUG-16-11 Sarah Finne] Change and/or Correction: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Tucker Communications, Inc.	Fixed Wireless	Data Added to Statewide Inventory	2/17/2011	[AUG-08-11 Sarah Finne] Correction: Recreated 900 MHz signal propagation to decrease/refine coverage area.
United States Cellular Corporation	Mobile Wireless	Data Added to Statewide Inventory	2/15/2011	[AUG-16-11 Sarah Finne] Change and/or Correction: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Verizon North Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/14/2009	[AUG-16-11 Sarah Finne] Change and/or Correction: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Waldron Communication Company	Fixed Wireless	Data Added to Statewide Inventory	1/12/2010	[SEP-16-11 Sarah Finne] Change: Provider upgraded tower infrastructure (raised transmit antenna heights), therefore propagations were recreated.
Waldron Communication Company	DSL	Data Added to Statewide Inventory	1/12/2010	[SEP-16-11 Sarah Finne] Change: Provider upgraded infrastructure and can now offer speed tier 3 upload speeds.
West Michigan Broadband, LLC	Fixed Wireless	Data Added to Statewide Inventory		[AUG-29-11 Sarah Finne] Correction: West Michigan Broadband was previously non-responsive, but they provided data this round.
WideOpenWest Michigan, LLC	Cable	Data Added to Statewide Inventory		[SEP-16-11 Sarah Finne] Correction: WideOpenWest Michigan, LLC previously refused to participate, but they provided data this round.
Xyotek, LLC	Fixed Wireless	Data Added to Statewide Inventory		[AUG-24-11 Sarah Finne] Change: New fixed wireless provider in the market.
AT&T Inc.	Backhaul	Backhaul Provider Only Processing Complete	12/16/2009	
Charter Communications, Inc.	Backhaul	Backhaul Provider Only Processing Complete	12/15/2009	
Level 3 Communications, LLC	Backhaul	Backhaul Provider Only Processing Complete	12/14/2009	
MegaPath Inc.	Backhaul	Backhaul Provider Only Processing Complete	2/15/2010	
Sprint Nextel Corporation	Backhaul	Backhaul Provider Only Processing Complete	1/14/2010	
T-Mobile USA, Inc.	Backhaul	Backhaul Provider Only Processing Complete	1/8/2010	
TDS Telecommunications Corporation	Backhaul	Backhaul Provider Only Processing Complete	1/27/2010	
Windstream Communications	Backhaul	Backhaul Provider Only Processing Complete		
Zayo Bandwidth, LLC	Backhaul	Backhaul Provider Only Processing Complete		
2125 Cable Company, LLC	Cable	No Update to Provide	3/22/2010	
Ace Telephone Company of Michigan Inc.	DSL	No Update to Provide	1/12/2010	
Agri-Valley Communications, Inc.	Backhaul	No Update to Provide	1/22/2010	
Agri-Valley Communications, Inc.	Fixed Wireless	No Update to Provide	1/22/2010	
Agri-Valley Communications, Inc.	DSL	No Update to Provide	1/22/2010	
Agri-Valley Communications, Inc.	Mobile Wireless	No Update to Provide	1/22/2010	
Allband Communications Cooperative	Fiber	No Update to Provide	2/2/2010	
Allendale Telephone Company	DSL	No Update to Provide	2/4/2010	
Allendale Telephone Company	Fiber	No Update to Provide	2/4/2010	
Azulstar, Inc.	Fixed Wireless	No Update to Provide	1/27/2010	
Barry County Telephone Company	DSL	No Update to Provide		
Barry County Telephone Company	Fiber	No Update to Provide		
Barry County Telephone Company	Fixed Wireless	No Update to Provide		
Blanchard Telephone Association, Inc.	DSL	No Update to Provide	6/17/2010	
Blanchard Telephone Association, Inc.	Backhaul	No Update to Provide	6/17/2010	
Bloomingdale Telephone Company, Inc.	Fixed Wireless	No Update to Provide	1/25/2010	
Bloomingdale Telephone Company, Inc.	Fiber	No Update to Provide	1/25/2010	
Bright House Networks, LLC	Cable	No Update to Provide	4/26/2010	
Broadstripe LLC	Cable	No Update to Provide	3/5/2010	[SEP-12-11 Sarah Finne] Correction: Incorrectly reported DOCSIS 3.0 as technology type; changed to "Cable Modem - Other."
Cable America Michigan, LLC	Cable	No Update to Provide	3/9/2011	
Camp Communication Services, Inc.	Fixed Wireless	No Update to Provide		
Carr Communications, Inc.	DSL	No Update to Provide	1/15/2010	
CCI Systems, Inc.	Cable	No Update to Provide	6/29/2010	
CenturyLink	Backhaul	No Update to Provide	12/4/2009	
City of Norway	Cable	No Update to Provide	3/14/2011	
Climax Telephone Company	Backhaul	No Update to Provide	1/14/2010	
Climax Telephone Company	DSL	No Update to Provide	1/14/2010	
Coldwater Board of Public Utilities	Cable	No Update to Provide	3/1/2010	
Crystal Automation Systems, Inc	Backhaul	No Update to Provide	6/25/2010	
Custom Software Inc.	DSL	No Update to Provide	2/3/2010	
D&P Communications, Inc.	Cable	No Update to Provide	3/8/2011	
D&P Communications, Inc.	Fiber	No Update to Provide	3/8/2011	
Daystarr Communications, LLC	Backhaul	No Update to Provide		
Daystarr Communications, LLC	DSL	No Update to Provide		
Daystarr Communications, LLC	Fiber	No Update to Provide		

DISH Network Corporation	Satellite	No Update to Provide	1/27/2010	[SEP-16-11 Sarah Finne] Correction: Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
DMCI Broadband, LLC	Fixed Wireless	No Update to Provide	2/3/2010	[SEP-16-11 Sarah Finne] Correction: Changed speed tier 7 to speed tier 6 on some towers to reflect the residential speed packages offered (provider accidentally reported business speeds).
Endless Journey, Inc.	Fixed Wireless	No Update to Provide		
Frontier Communications Corporation	Backhaul	No Update to Provide	1/22/2010	
Great Lakes Comnet, Inc.	Backhaul	No Update to Provide		
Great Lakes Internet, Inc.	Fixed Wireless	No Update to Provide	3/11/2010	
Hiawatha Communications, Inc.	DSL	No Update to Provide	2/2/2010	
Hiawatha Communications, Inc.	DSL	No Update to Provide	2/2/2010	
Hiawatha Communications, Inc.	Fiber	No Update to Provide	2/2/2010	
Hiawatha Communications, Inc.	DSL	No Update to Provide	2/2/2010	
Hidden Lake Wireless, Inc.	Fixed Wireless	No Update to Provide	3/12/2010	
Hughes Network Systems, LLC	Satellite	No Update to Provide	2/5/2010	[SEP-16-11 Sarah Finne] Correction: Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
Interlink Computers Technology, Inc.	Fixed Wireless	No Update to Provide	3/12/2010	
Iron River Cooperative TV Antenna Corp	Cable	No Update to Provide	7/27/2010	
ISP Management, Inc.	Fixed Wireless	No Update to Provide	3/22/2010	
Kaltelco, LLC	DSL	No Update to Provide	3/5/2010	
Lennon Telephone Company	DSL	No Update to Provide	1/25/2010	
Lennon Telephone Company	Cable	No Update to Provide	1/25/2010	
Ligonier Telephone Company, Inc.	Fixed Wireless	No Update to Provide	3/31/2010	
Mercury Network Corporation	Backhaul	No Update to Provide	3/9/2011	
Mercury Network Corporation	Fixed Wireless	No Update to Provide	3/9/2011	
Merit Network, Inc.	Backhaul	No Update to Provide	6/21/2010	
MetaLINK Technologies, Inc.	Fixed Wireless	No Update to Provide	3/22/2010	
Michigan Cable Partners Inc.	Cable	No Update to Provide	6/18/2010	
Michwave Technologies, Inc.	Fixed Wireless	No Update to Provide	3/12/2010	
Newaygo County Advanced Technology Services	Fixed Wireless	No Update to Provide		
Niagara Telephone Company	Backhaul	No Update to Provide	1/22/2010	
Niagara Telephone Company	DSL	No Update to Provide	1/22/2010	
Northside TV Corporation	Cable	No Update to Provide		
Ogden Communications, Inc.	DSL	No Update to Provide	1/19/2010	
Ogden Communications, Inc.	Fixed Wireless	No Update to Provide	1/19/2010	
One Communications Corporation	Backhaul	No Update to Provide	3/18/2010	
Peninsula Fiber Network, LLC	Backhaul	No Update to Provide	1/14/2010	
Sand Creek Communications Company	DSL	No Update to Provide	3/2/2010	
Sand Creek Communications Company	Backhaul	No Update to Provide	3/2/2010	
Sister Lakes Cable TV	Cable	No Update to Provide		
Small Business Solutions Group L.L.C.	Fixed Wireless	No Update to Provide	7/20/2010	
SpeedNet, LLC	Fixed Wireless	No Update to Provide	1/7/2010	
SpeedNet, LLC	Backhaul	No Update to Provide	1/7/2010	
Springcom, Inc.	DSL	No Update to Provide	2/25/2010	
Summit Digital Holdings, Inc.	Cable	No Update to Provide		
Summit Digital Holdings, Inc.	Fixed Wireless	No Update to Provide		
T2 Communications, LLC	Backhaul	No Update to Provide	3/10/2010	
T2 Communications, LLC	Fiber	No Update to Provide	3/10/2010	
The Computer Care Company, Inc.	Backhaul	No Update to Provide	3/8/2011	
The Iserv Company, LLC	Backhaul	No Update to Provide	6/21/2010	
The Iserv Company, LLC	DSL	No Update to Provide	6/21/2010	
The Iserv Company, LLC	DSL	No Update to Provide	6/21/2010	
The Iserv Company, LLC	Fiber	No Update to Provide	6/21/2010	
Town & Country Cable and Telecommunications, LLC	Cable	No Update to Provide	6/18/2010	
Upper Peninsula Telephone Company	DSL	No Update to Provide	1/11/2010	
US Signal Company, LLC	Backhaul	No Update to Provide	2/25/2010	
Verizon North Inc.	Backhaul	No Update to Provide	12/14/2009	
Westphalia Telephone Company	DSL	No Update to Provide	1/20/2010	
WildBlue Communications, Inc.	Satellite	No Update to Provide	1/8/2010	[SEP-16-11 Sarah Finne] Correction: Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
Winn Telephone Company	DSL	No Update to Provide	6/28/2010	
Winn Telephone Company	Fiber	No Update to Provide	6/28/2010	
Winn Telephone Company	Fixed Wireless	No Update to Provide	6/28/2010	
Wyandotte Municipal Services	Cable	No Update to Provide	3/23/2010	
XO Communications, LLC	Backhaul	No Update to Provide	2/12/2010	
BigTube Wireless, LLC	Fixed Wireless	No Update Provided - Use Last Submission Data	6/17/2010	
Boardman River Communications, LLC	Cable	No Update Provided - Use Last Submission Data	2/10/2010	
Cherry Capital Connection, LLC	Fixed Wireless	No Update Provided - Use Last Submission Data	12/28/2009	
CMS Internet LLC	Fixed Wireless	No Update Provided - Use Last Submission Data	3/11/2010	
Cogent Communications, Inc.	Backhaul	No Update Provided - Use Last Submission Data		
COLI, Inc.	Fixed Wireless	No Update Provided - Use Last Submission Data		
CSInet Internet Access Corp.	Fixed Wireless	No Update Provided - Use Last Submission Data	3/31/2010	
Drenthe Telephone Company	DSL	No Update Provided - Use Last Submission Data	2/4/2010	
Fourway Computer Products, Inc.	Fixed Wireless	No Update Provided - Use Last Submission Data		
Ideal Wireless, Inc.	Fixed Wireless	No Update Provided - Use Last Submission Data		
Invisalink Wireless Enterprises LLC	Fixed Wireless	No Update Provided - Use Last Submission Data	4/13/2010	

KEPS Technologies, Inc.	Fixed Wireless	No Update Provided - Use Last Submission Data		
KEPS Technologies, Inc.	DSL	No Update Provided - Use Last Submission Data		
Lighthouse Computers, Inc.	Fixed Wireless	No Update Provided - Use Last Submission Data	2/17/2011	
Nodin Communications, LLC	Fixed Wireless	No Update Provided - Use Last Submission Data	4/22/2010	
PAETEC Communications, Inc.	DSL	No Update Provided - Use Last Submission Data		[SEP-16-11 Sarah Finne] Change: PAETEC purchased Talk America/Cavalier Telephone. Submitted Cavalier Tel. coverage based on April 2011 data.
PAETEC Communications, Inc.	Backhaul	No Update Provided - Use Last Submission Data		
Pasty.Net, Inc.	Fixed Wireless	No Update Provided - Use Last Submission Data	1/6/2010	
Endless Journey, Inc.	DSL	Solicited Initial Data		[SEP-16-11 Sarah Finne] Provider hasn't had time to gather DSL data.
PAETEC Communications, Inc.	DSL	Other		[SEP-08-11 Wes Kerr] Multiple outreach attempts were conducted but no response was received. PAETEC was bought out during the collection phase of this round by Windstream and we intend to be able to include the PAETEC coverage as a part of the Windstream footprint during the next round.
Dreamscape Communications	Fixed Wireless	Refused to Participate		[MAY-26-11 Terry Holmes] Found this company through a WISPA listserv e-mail and located an active website. Called listed phone number and spoke with company representative who confirmed they are an active WISP, but would not provide his name and stated he was not interested then hung up the phone. E-mailed NDA and data collection spreadsheet to support@dreamscp.com.
M3 Wireless	Fixed Wireless	Refused to Participate		[JUN-28-11 Terry Holmes] Spoke with company representative. They have no interest in the program and refuse to participate.
Banyan OnLine Services, LLC.	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between June 4, 2010 and February 15, 2011, 7 additional attempts were made this period.
Bitwise Wireless, LLC	Fixed Wireless	Non-Responsive to Multiple Attempts		7 contact attempts were made between May 24, 2011 and August 8, 2011.
Boardman River Communications, LLC	Fixed Wireless	Non-Responsive to Multiple Attempts	2/10/2010	In addition to multiple contact attempts made between July 23, 2010 and February 15, 2011, 6 additional attempts were made this period.
DSTech	Fixed Wireless	Non-Responsive to Multiple Attempts		4 contact attempts were made between May 24, 2011 and July 29, 2011.
Global Crossing Telecommunications, Inc.	Backhaul	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between July 1, 2010 and February 17, 2011, 3 additional attempts were made this period.
Hi-Tech SMR Communications	Fixed Wireless	Non-Responsive to Multiple Attempts		5 contact attempts were made between May 24, 2011 and August 8, 2011.
Internet 123, Inc.	Fixed Wireless	Non-Responsive to Multiple Attempts		6 contact attempts were made between May 24, 2011 and August 9, 2011.
Lewiston Communications	Cable	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between July 1, 2010 and February 15, 2011, 6 additional attempts were made this period.
M55 WiFi Wireless Internet Service	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between July 1, 2010 and February 15, 2011, 5 additional attempts were made this period.
Microtech Services, Inc.	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between July 1, 2010 and February 14, 2011, 5 additional attempts were made this period.
Mutual Data Services, Inc.	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between July 1, 2010 and February 14, 2011, 5 additional attempts were made this period.
Network Computers, LLC	Fixed Wireless	Non-Responsive to Multiple Attempts		Initial contact was made on July 28, 2010, but they did not have any active wireless broadband at that time. During this perioed, 5 contact attempts were made between June 6, 2011 and August 9, 2011.

OFFICIAL OCTOBER 2011 UPDATE SUBMISSION TO THE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION UNDER THE STATE BROADBAND INITIATIVE GRANT PROGRAM FOR THE STATE OF MINNESOTA

October 1, 2011

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MINNESOTA COVER LETTER

October 1, 2011

Ms. Anne W. Neville
SBI Grant Program Director
National Telecommunications and Information Administration
U.S. Department of Commerce
1401 Constitution Avenue, NW Room 4716
Washington, DC 20230

Dear Ms. Neville:

As the State Broadband Designated Entity, in partnership with the Minnesota Department of Commerce, please accept this submission from Connected Nation on behalf of the state of Minnesota's State Broadband Initiative (SBI) Grant Program, known as Connect Minnesota.

These artifacts should be found to be compliant with the October 1, 2011, deadline for the semi-annual data update and in accordance with the terms of the July 1, 2009, Notice of Funds Availability (NOFA) and all subsequent clarifications pertaining to delivery of state-level mapping of broadband service availability. This packet includes:

Inventory of Deliverables, Connect Minnesota: October 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing
Appendix A: 4	n/a	Community Anchor Institutions-Narratives
VII.A.1(a)	n/a	Accuracy and Verification Report

n/a	DataPackage.xlsx	Worksheets of Contact Information, Record Count, and Provider Summary Table
n/a	n/a	List of Changes and Corrections to the Dataset
n/a	n/a	Non-Participating Provider Narratives
n/a	n/a	Broadband Provider Roster and Participation Status

In addition, this data update submission should be found to be compliant with the additional program requirements instituted by the National Telecommunications and Information Administration since the time of the April 2011 SBI data submission for the Connect Minnesota program. Specifically, these new requirements are:

SBI Data Transfer Model
The submission of the broadband dataset for October 1, 2011, is contained within the SBI Data Transfer Model as released on the Grantee Workspace on June 30, 2011. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information on each provider as possible.

Additional Submission Guidance
This submission also includes a list of changes and corrections made to the dataset between the April 2011 submission and the October 2011 submission. This represents a summary of why data displays and/or supplied speeds, etc. are different from the previous submission. Changes can include upgrades to infrastructure to allow for higher throughput speeds for customers, an expansion of the service area (e.g. additional fixed wireless towers, recently activated DSLAMs, etc.), or a new provider in the marketplace. Corrections can include revisions to speed tier information that was previously reported incorrectly or the addition of a previously existing provider that has not yet been submitted in a semi-annual dataset.

Another addition in this submission is a narrative describing the data and coverage estimation of a non-participating provider. While Connect Minnesota continues outreach to all providers prior to each submission period, the need to submit broadband service data for all providers regardless of their participation is evident as the SBI program continues into this fourth round of data submissions. The submission of this estimated broadband service areas for a provider that has not supplied data to Connect Minnesota is essential in being able to portray a more accurate depiction of the current broadband landscape.

This October 2011 semi-annual data update under the State Broadband Initiative Grant Program continues to demonstrate our dedication to implementing the joint purposes of the Recovery Act and the Broadband Data Improvement Act (BDIA) by gathering comprehensive and accurate state-level broadband mapping data, developing state-level broadband maps, aiding in the development and maintenance of the National Broadband Map, and undertaking statewide initiatives for broadband planning.

Broadband Service Availability — Provider Outreach and Verification

This data update submission under the SBI program includes datasets for approximately 90.83 percent of the Minnesota provider community, or 109 of 120 total providers. There are 108 participating providers and one additional non-participating provider whose estimated coverage areas have been submitted. Of the 108 participating providers, 46 supplied an update to their network or coverage area(s), while 60 have reported no change. The remaining 2 represent providers who previously supplied data but were non-responsive in the October 2011 update effort; therefore their previous dataset is being put forward as part of this compilation. A complete roster by provider depicting participation status and contact record is contained herein. Of the 11 providers that are not represented in the attached datasets, 9 have refused to participate in the voluntary program or were non-responsive to multiple contact attempts, and 2 providers are currently in some form of progress toward data submission but were not able to submit coverage areas at the time of this submission.

As the aforementioned roster and attached methodology documentation will attest, it is the collective opinion of the Connect Minnesota principals that all commercially reasonable efforts were made to account for 100 percent of the known Minnesota broadband provider community, pursuant to this semi-annual data update submission.

Connect Minnesota has also continued to perform broadband verification activities through several means. In addition to confirmation of service area(s) by each provider, Connect Minnesota conducts field validation efforts. To date, 62 (51.67 percent) providers have been validated through field verification activities. Additional details on verification activities are contained within the Field Validation Methodology.

The Connect Minnesota website, www.connectmn.org, continues to serve a prominent role in the outreach and data collection effort. This program asset provides a way for the general public to participate in the process by offering interactive tools for users to test their connection speed, submit broadband inquiries, or contact a program representative.

As an indicator of stakeholder penetration, the Connect Minnesota website encountered 3,230 unique visits during this reporting period (14,071 total to date for the life of the grant awarded on December 20, 2009). Additionally, this pronounced Web activity netted 15 broadband inquiries over this same reporting period (115 grant inception to date). The website also provides the BroadbandStat application, which allows the consumer to confirm or dispute the coverage represented on the broadband inventory map. These consumer-initiated actions are facilitated through the Connect Minnesota website and the Connect Minnesota interactive mapping tool (BroadbandStat) that offer the citizens the vehicles to provide information regarding availability in their respective service area, either in affirmation or contest of the reported data represented in the Connect Minnesota mapping artifacts. Since the initial data collection and release of corresponding maps, feedback in the form of broadband inquiries has allowed Connected Nation to identify additional areas that are in need of field validation, which is scheduled as soon as possible.

Community Anchor Institutions

Connect Minnesota has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBI NOFA Technical Appendix.

In conjunction with the Minnesota Department of Commerce, outreach was conducted during this data update reporting period by Connect Minnesota to continue identification of existing, centralized sources for CAI connectivity data. Connect Minnesota has specifically focused efforts during this reporting period on a joint education and library-specific survey that was distributed by the Minnesota Department of Education. This survey was part of its bi-yearly efforts to gather connectivity data from these types of institutions within the state of Minnesota and was made possible through close coordination with the Department and Connect Minnesota. Additionally, a CAI survey continues to be made available for all institutions on the Connect Minnesota website. During this reporting period Connect Minnesota has developed a number of new relationships with statewide associations such as Minnesota Department of Education to promote the importance of broadband connectivity at anchor institutions and participation in this data collection process. Connect Minnesota will continue to build upon these new relationships over the coming months and utilize its contacts throughout the state to collect data and raise awareness of this project.

During this reporting period a Connect Minnesota CAI newsletter has been drafted to assist with outreach and highlight the LqP Computer Commuter, a mobile computer lab and classroom. From our work in Minnesota, as well as other states, we recognize the great value of this data to future collaboration efforts within the state as well as its value to the National Broadband Map. We plan to continue to bring best practices to the Connect Minnesota efforts, along with an investment of both human and technical resources required to reach our goal of increasing the data that is secured and reported as part of this process.

The Connect Minnesota program exists to improve data on the deployment and adoption of broadband services and to assist in the extension of broadband technology across all regions of the great state of Minnesota, as well as the United States through contribution to the National Broadband Map. We look forward to the continuing work ahead.

Respectfully submitted,

Thomas W. Ferree
Chief Operating Officer
Connected Nation, Inc.

DATA ACQUISITION: MINNESOTA COMMUNITY ANCHOR INSTITUTIONS METHODOLOGY

In this fourth reporting period of the SBI, Connect Minnesota, working in close coordination with the state of Minnesota, has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBI NOFA Technical Appendix. During this reporting period Connect Minnesota has continued to focus efforts on conducting outreach and raising awareness of this important project.

Connect Minnesota has continued to identify and process CAI data obtained through an ongoing statewide outreach campaign. Physical address information continues to be augmented through manual sourcing and geocoded by Connect Minnesota through ESRI ArcGIS software.

Connect Minnesota continues to utilize a customized online survey hosted through SurveyMonkey, with a landing page on the Connect Minnesota website that was developed during the first reporting period. This survey, in combination with a customized data-gathering spreadsheet, was distributed to a targeted list of CAI throughout the state. Connect Minnesota will continue to use these data-gathering tools for future targeted outreach efforts throughout the coming months leading up to the next reporting period. These materials are customized to fit the CAI categories as defined in the SBI NOFA.

The survey can be accessed at this link using the following password:
http://connectmn.org/mapping/Community_Anchor_Institution_Data_Collection.php
Password: CAI_MN_7611

Connect Minnesota and the Minnesota Department of Commerce have worked closely together during this reporting period to conduct research as part of an ongoing process to identify existing, centralized sources for CAI connectivity data. Efforts have been focused during this reporting period on the education sector and developing a strong relationship with the Minnesota Department of Education. Connect Minnesota coordinated with the Department of Education to include questions from our CAI survey in an existing survey that was distributed to all school districts across the state. The survey resulted in a high response rate and the data is being reported during this submission. Connect Minnesota will conduct follow-up over the upcoming submission period to schools that did respond to the survey and continue to coordinate with the Department of Education on future surveys and projects.

In tandem with these efforts to identify existing data, Connect Minnesota continues to identify key CAI contacts in an effort to distribute and promote the online survey and raise awareness of the importance of CAI broadband connectivity. Connect Minnesota is prioritizing outreach to key contacts within the library, healthcare, and public safety sectors over the next reporting period and will be developing further relationships with these groups to gather data and assist with the work of the upcoming Minnesota Broadband Task Force that is being formed by the current Governor of Minnesota.

Connect Minnesota has an ongoing mission to educate CAI throughout the state on the importance of participating in the project. Participation by these institutions will raise awareness about the importance of broadband connectivity and the need to report the requested data for inclusion on the

National Broadband Map. During this reporting period Connect Minnesota developed and distributed a CAI newsletter to CAI contacts throughout the state across all CAI sectors. This newsletter highlights the Lac qui Parle County Commuter Computer and encourages institutions to share their data by participating in the CAI online survey. This newsletter will continue to be utilized for outreach, will be made available on the CAI page of the Connect Minnesota website, and it will be updated over the next reporting period.

The greatest challenge with collecting this data continues to be the difficulty in securing CAI broadband connectivity data. Connect Minnesota is overcoming this challenge through new relationships that are being formed specifically this reporting period with the Minnesota Department of Education and the recent release of a CAI newsletter in the state. Connect Minnesota expects noted progress to continue to occur over the coming months leading up to the April 2012 submission. The Minnesota Department of Commerce will continue to be briefed on the current CAI data and provided information so it can assist with outreach and promotion within the state.

A CAI summary of all processed and submitted data is provided below:

CAI Type	Total	Physical Address	Lat/Long	Technology of Transmission	Download Speed	Upload Speed
K-12	3,685	3,685	3,685	538	468	115
Libraries	1,018	1,018	1,017	10	10	9
Healthcare	207	207	207	58	57	57
Public Safety	1,541	1,541	1,541	4	4	4
Higher Ed Institutions	182	182	182	0	0	0
Other Government	124	124	123	22	22	22
Other Non-Government	110	110	109	6	5	5
Total	**6,867**	**6,867**	**6,864**	**638**	**566**	**212**

SBI Data Submission Methodology

The submission of the broadband dataset for October 1, 2011, is contained within the SBI Data Transfer Model and additional components as released on the Grantee Workspace on June 30, 2011. Connected Nation has reviewed all literature that relates to the release and use of this data transfer model and recognizes that it does not replace or dictate how data is stored, processed, or displayed for the state, as it is meant primarily as a means to transfer the broadband data from all states and territories and populate the National Broadband Map in a seamless fashion. Guidance from the Technical Mapping Guide, as released on the Grantee Workspace on March 24, 2011, was also followed to ensure the completeness and validity of the submission through completion steps and checklists, completing the DataPackage spreadsheet, uploading broadband datasets into the Data Transfer Model, and checking the dataset using the SBDD_CheckSubmission receipt process.

As part of the ongoing review and analysis process, NTIA has requested further information in the submission of the DataPackage spreadsheet. In addition to the information on providers whose coverage and accompanying attributes are submitted in the SBI Data Transfer Model, information on other providers that are considered to be non-viable is also included in the DataPackage. Providers deemed non-viable that have been excluded from continued outreach may have been eliminated for reasons such as (i) the company offers Internet service but at speeds below the current definition of broadband; (ii) the company was listed in advertisements as a broadband provider, but is actually a network solution or consulting firm, etc.; (iii) the company may build or install network infrastructure, but does not actually provide the broadband service to consumers; and (iv) the company has gone out of business. The submitted DataPackage includes any relevant information that has been obtained through the course of due diligence and/or direct provider outreach, such as a Federal Registration Number (if applicable), the company's URL, the existence of an executed Nondisclosure Agreement, and brief notations regarding the status of the company.

In addition to the methodologies contained herein, as well as the DataPackage.xls containing contact information, the data dictionary, and a provider summary table, the following feature classes are submitted within the SBI Data Transfer Model for the state of Minnesota.

Inventory of Deliverables, Connect Minnesota: October 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area.
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles.
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address.
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points.
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing.

The provider data collected by Connected Nation on behalf of the state of Minnesota have been formatted per the given specifications and uploaded into the appropriate feature classes of the SBI Data Transfer Model. Wireline availability is contained within census blocks and road segments, wireless availability is contained as polygons of coverage areas, and middle-mile connections and Community Anchor Institutions are contained as point data. All speed data is contained at the census block, road segment, or wireless polygon level of availability. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information as possible.

Connected Nation has continued outreach to satellite providers on their availability, technology, and speed information, but granular coverage is not yet available. Submitted within the wireless feature class are the satellite companies providing service to Minnesota as a polygon of the state boundary. Efforts will continue to collect, process, or otherwise create more granular satellite data based on availability analyses and guidance received from NTIA.

PROVIDER CHANGES AND CORRECTIONS FOR OCTOBER 2011

As requested by the SBI Program Office, a listing of the changes and/or corrections to the datasets between the April 2011 and October 2011 submissions is included in this narrative. This information is presented in this section as well as in the Broadband Provider Log. Changes to the data include expansion of service area(s), activation of new wireless towers, and upgrades to the network to provide higher download speeds to consumers. Corrections to the dataset include the addition of previously existing providers whose coverage has never been submitted, revision of coverage or speed information that was incorrect, and any other items that were misrepresented in the April 2011 dataset.

Changes

- AirLink Broadband, LLC. (fixed wireless): New provider in service for October 2011 submission.
- Arrowhead Communications Corporation (DSL): Provider updated upload speed capabilities.
- AT&T Corp, Inc. (mobile wireless): Provider expanded mobile territory throughout the state.
- Benton Cooperative Telephone Company (cable): Provider indicated they also have a CLEC operation in Milaca.
- Broadband Corp (fixed wireless): Recreated propagations due to additions and deletions for unlicensed and licensed area.
- Clearwire Corporation (mobile wireless): Provider pulled back on prior coverage north of Anoka.
- Crosslake Telephone Company (DSL, fiber): Provider converted some DSL infrastructure to fiber.
- Eagle Valley Telephone Company (DSL): Provider upgraded speed capabilities.
- Farmers Mutual Telephone Company (fiber): Provider upgraded speed capabilities.
- Federated Telephone Cooperative (fiber): Provider upgraded speed capabilities.
- Felton Telephone Company (DSL): Provider upgraded speed capabilities.
- Frontier Communications of Minnesota, Inc. (DSL): Provider expanded DSL territory by adding additional CO/RT's.
- Garden Valley Telephone Company (DSL, fiber): Provider converted some DSL infrastructure in two exchanges to fiber.
- Granada Telephone Company (DSL): Provider upgraded speed capabilities.
- Hickory Tech Corporation (DSL): Provider upgraded some infrastructure to higher speeds.
- Hutchinson Telecommunications, Inc. (fixed wireless): Provider upgraded speed capabilities.
- KeyOn Communications (fixed wireless): New provider in service for October 2011 submission.
- Loretel Systems, Inc. (DSL): Provider upgraded speed capabilities.
- Manchester-Hartland Telephone Company (fiber): Provider upgraded speed capabilities.
- Minnesota Valley TV Improvement Corporation (fixed wireless): Provider added additional transmission points.

- Northfield WiFi LLC (fixed wireless): Provider added additional transmission points.
- Park Region Mutual Telephone Company (fiber): Provider upgraded infrastructure in Ottertail Telcom region to speed tier 9.
- Pine Island Telephone Company (DSL): Provider upgraded speed capabilities.
- Red River Rural Telephone Association (DSL): Provider expanded DSL territory into Traverse and Wilkin Counties.
- Savage Communications (cable): Provider expanded cable territory by acquiring properties in Bovey and Coleraine from Jaguar Communications.
- Scott Rice Telephone Co. (DSL): Provider upgraded speed capabilities.
- Sheehan Gas (fixed wireless): Provider upgraded speed capabilities.
- Sleepy Eye Telephone Company (DSL): Provider upgraded speed capabilities.
- Sprint Nextel Corporation (mobile wireless): Provider expanded mobile territory into a few areas.
- T-Mobile USA, Inc. (mobile wireless): Provider expanded mobile territory further in east and southeast MN. Upgraded speed capabilities with HSPA+ 42.
- Verizon Communications, Inc. (mobile wireless): Provider expanded mobile territory further in south MN. Upgraded speeds in 700 MHz spectrum.
- Windstream Communications (DSL): Provider submitted entirely new data in the form of 2010 census blocks for their Lakedale Telephone acquisition only. Entel Communications and Lakedale Link not included. Windstream indicated that these two operations should be changed to the Windstream provider name, dba, and FRN.
- Windstream Communications (fixed wireless): Windstream indicated that the acquired fixed wireless operations from Lakedale should be changed to the Windstream provider name, dba, and FRN.

Corrections

- Arrowhead Communications Corporation (DSL): Provider corrected coverage from a received broadband inquiry.
- CitEscape, LLC (fixed wireless): Corrected 3650 MHz maximum advertised download speeds to speed tier 7 from previously submitted 8.
- City of Chaska (fixed wireless): New provider for October 2011 submission that is still unresponsive. Connected Nation estimated coverage for this provider.
- Clear Choice Communications (fixed wireless): Provider service area is now a real-world propagation unlike prior submission. Cut to licensed border.
- Clearwire Corporation (fixed wireless): Provider service area is now a real-world propagation unlike prior submissions.
- Consolidated Telephone Company (fiber): Nisswa and Baxter coverage was added back. Coverage was inadvertently removed in the April submission and was not caught by the provider.
- DISH Network Corporation (satellite): Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
- Fibernet Monticello (fiber): New provider for October 2011 submission that was previously unresponsive.

- Frontier Communications of Minnesota, Inc. (DSL): Provider modified coverage throughout where incorrect CO/RT coordinates were given in the past that went unnoticed.
- Gardonville Cooperative Telephone Association (fixed wireless): Provider service area is now a real-world propagation unlike prior submissions.
- Hughes Network Systems, LLC (satellite): Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
- Knology of the Plains, Inc. (cable): New provider for October 2011 submission that previously refused to participate.
- Jaguar Communications (fixed wireless): Provider service area is now a real-world propagation unlike prior submissions.
- Minnesota Valley TV Improvement Corporation (cable): New provider platform for October 2011 submission, which was previously unknown.
- Park Region Mutual Telephone Company (DSL): Provider reported DSL speeds incorrectly in Ottertail Telcom region. Reduced speed tiers.
- Paul Bunyan Rural Telephone Cooperative (DSL, fiber): Provider coverage added in the Red Lake exchange. Although available, this coverage was not provided in the past submission.
- Sjoberg's Inc. (cable): Provider indicated that maximum upload speed tier needed to be lowered to 3.
- WildBlue Communications, Inc. (satellite): Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.

Changes and/or Corrections – Entirely New Dataset Submitted

- Cable ONE Inc. (cable)
- CenturyLink (DSL): Also of note, CenturyLink acquired Qwest Corporation.
- Charter Communications (cable)
- Comcast Cable Communications, LLC (cable)
- Midcontinent Communications (cable): Also of note, provider upgraded speed capabilities in its DOCSIS 3.0 cable regions.
- TDS Telecommunications Corporation (DSL, fiber)

MINNESOTA FIELD VALIDATION METHODOLOGY

Connected Nation focused a portion of its time on specific validation processes such as:

- conducting random spectrum analysis studies throughout the state using an Avcom PSA-37-XP spectrum analyzer;
- conducting mobile speed tests throughout the state using an iPhone, Android (or other smart phone) as well as provider-specific aircards (Sprint 3G/4G, Clearwire et al);

- identifying pre-selected, provider-submitted wireless transmit tower sites and cross-referencing data about that tower against the Federal Communications Commission (FCC) databases such as Antenna Structure Registration and/or the Universal Licensing System;
- cross-referencing Federal Registration Number data against available FCC Form 477 data as well as the FCC **CO**mmission **RE**gistration **S**ystem (CORES);
- validating provider submitted data (for example: latitude/longitude) using a handheld Garmin eTrex Summit GPS unit or GPS enabled software such as Microsoft Streets and Trips;
- locating physical wire-line attributes (such as Remote Terminals, CATV plant, etc.) and comparing them against provider submitted data; and
- conducting on-net and off-net speed tests using the FCC portal at http://www.broadband.gov/qualitytest/about/ or using the Ookla Net Metrics enabled speed test utility located on each of Connected Nation's state specific websites.

Additionally, Connected Nation cross-referenced numerous public documents in order to ensure that all known broadband providers were located and contacted. This included searching membership logs from the trade associations (WISPA, WCAI, PCIA, etc.), the Cable Television Fact Book, Public Utility Commission records, Public Service Commission records, Chamber of Commerce, etc.

To date, Connected Nation's staff conducted on-site validation tests in Minnesota on the following providers: Albany Mutual Telephone Association; Alliance Communications; Arvig Communications Systems; AT&T, Inc.; Barnesville Municipal Telephone; Benton Cooperative Telephone Company; Bradco-WISP, Inc.; CenturyLink; Charter Communications; Chaska.Net; Christensen Communications Company; CitiScape Communications; Clear Choice; Clearwire Corporation; Cloudnet, Inc.; Comcast Cable Communications LLC; CTC Telecom; diversiCOM; Enterpoint; Evertek Enterprises LLC; Farmers Mutual Telephone; Frontier Communications Corporation; Garden Valley Telephone Company; Gardonville Cooperative Telephone Association; Genesis Wireless; Halsted Telephone; Harmony Telephone Company; Info Link Wireless, Inc.; Invisimax; Jaguar Communications; Lakedale LINK; Lonsdale Telephone; Loterel Systems, Inc.; Mable Cooperative Telephone Company; Maple Leaf Networks; Midcontinent Communications; Min-Kota Wireless; Minnesota Valley Telephone Company; Minnesota Valley TV Improvement Corporation; New Ulm Telecom, Inc.; Northfield Wireless; Otter Tail Telecom; Polar Telcom, Inc.; Qwest Corporation; Red River Rural Telephone Association; Ridge Runner Internet Service, Inc.; River Valley Telecommunications Cooperative; SCI Cable; Scott Rice Telephone; Sioux Valley Wireless; Sleepy Eye Telephone Company; Spring Grove Cooperative Telephone Company; Sprint Nextel Corporation; TDS Telecommunications Corporation; T-Mobile USA, Inc.; U.S. Internet (d.b.a. USI Wireless); Upsala Cooperative Telephone Company; US Cable Corporation; VAL-ED Joint Venture; Verizon Communications, Inc.; and Winnebago Cooperative Telephone Association.

From program initiation through this reporting period, Connected Nation has completed in-the-field validation testing against 62 companies (out of a universe of 120 viable providers) totaling 51.67 percent within the state of Minnesota.

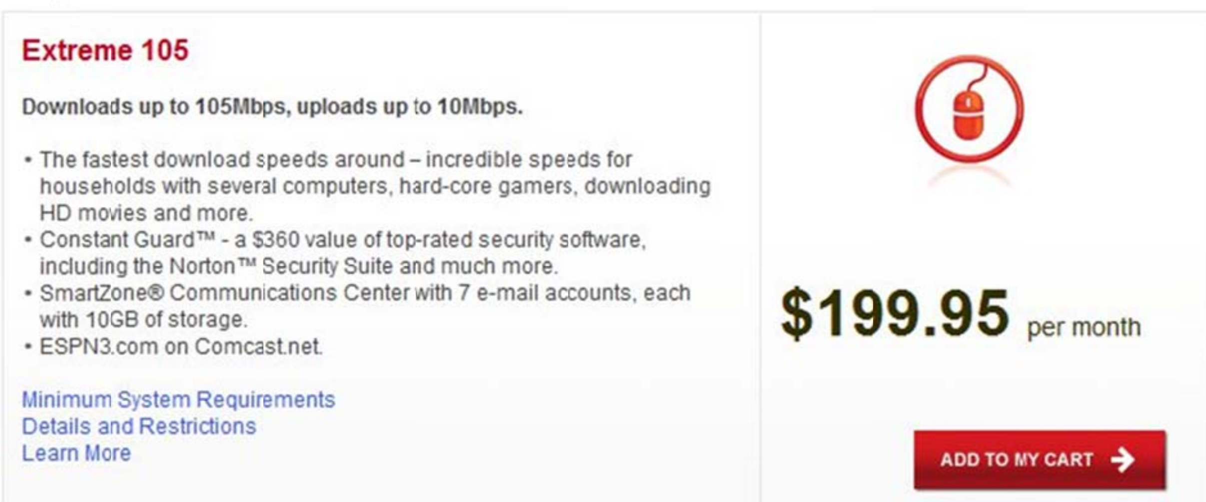
Connected Nation has also continued to review provider datasets for accurate speed information, platform listings, and other intricacies that may fall outside of the standard SBI Data Transfer Model parameters. Any providers whose submitted coverage and attributes are anticipated to come into question have been further reviewed and confirmed; details on a case-by-case basis are presented below.

Broadband Corp
Issue: Fixed wireless platform with maximum advertised download speed in tier 7, higher than expected value range for the technology.
Resolution: The equipment being used for the 3650 MHz spectrum allows for 14 Mbps speeds.

Charter
Issue: Technology of transmission 41 with maximum advertised download speed in tier 8, higher than expected value range for the technology.
Resolution: Provider representative confirmed that speed tier 8 is available without the use of DOCSIS 3.0 technology.

CitEscape
Issue: Fixed wireless platform with maximum advertised download speeds in tiers 7, higher than expected value range for the technology.
Resolution: The documentation on the equipment being used indicates that 16.5 Mbps is achievable speed depending on the settings.

Comcast
Issue: Technology of transmission 41 with maximum advertised download speed in tier 10, higher than expected value for the technology.
Resolution: Provider website advertises 105 Mbps; screenshot available below. However, additional input from provider on the technology listings and corresponding speed tiers was not received prior to the submission; dataset submitted as-is and work will continue to provide more accurate dataset in April 2012.



Crosslake Communications
Issue: Technology of transmission 40 with maximum advertised download speed in tier 7, lower than expected value for the technology.

Resolution: Provider representative indicated that DOCSIS 3.0 has been installed, but speeds across their service area have not been bumped up yet. That will occur after the connectivity to fiber backbone is complete and middle-mile bandwidth is increased.

Home Telephone – Southern Cablevision
Issue: Technology of transmission 40 with maximum advertised download speed in tier 7, lower than expected value for the technology.
Resolution: Provider representative indicated DOCSIS 3.0 is used in its service area, but customer modems are mostly still on 1.1 or 2.0, leading to the lower speed being reported.

Invisimax
Issue: Fixed wireless platform with maximum advertised download speed in tier 7, higher than expected value range for the technology.
Resolution: The equipment being used allows for 14 Mbps speeds.

Midcontinent Communications
Issues: 1) Cable platform with maximum advertised download speed in tier 10, higher than expected value for the technology; and 2) technology of transmission 41 with maximum advertised download speed in tier 8, higher than expected value range for the technology.
Resolution: Provider's website advertises 100 Mbps; screenshot available below. For the technology issue, documentation on the equipment in use allows for speeds in tier 8 without use of DOCSIS 3.0.

Top Internet Speeds for Midcontinent Customers
Posted: 07/15/2011 11:34 AM (MidcoNet Xstream)

By Jon Pederson, Vice President of Technology for Midcontinent Communications

We have been making some technology improvements designed to enhance our broadband capacity. MidcoNet Xstream Wideband is a shift in technology, allowing Midcontinent Communications to deliver up to 100 Mbps downloads and 15 Mbps uploads–speeds unmatched in the three-state area we serve. Our goal is to deploy advanced technologies to ensure an outstanding customer experience now and well into the future.

Current customers will receive an automatic boost in Internet speeds at no additional cost.

MidcoNet Xstream® Wideband 3.0 will offer up to 100 Mbps downloads and 15 Mbps uploads
MidcoNet Xstream® Wideband 2.0 will offer up to 50 Mbps downloads and 10 Mbps uploads
MidcoNet Xstream® Wideband 1.0 will offer up to 30 Mbps downloads and 5 Mbps uploads

Northfield WiFi
Issue: Fixed wireless platform with maximum advertised download speed in tier 7, higher than expected value range for the technology.
Resolution: Provider representative confirmed that higher speeds are available on their fixed wireless network.

Val-ED Joint Venture
Issue: Fixed wireless platform with maximum advertised download speed in tier 7, higher than expected value range for the technology.
Resolution: The equipment being used allows for 14 Mbps speeds.

DATA SUBMISSION AND COVERAGE ESTIMATION OF NON-PARTICIPATING PROVIDER

chaska.net

As part of its ongoing broadband mapping efforts, Connected Nation (CN) has developed a series of processes with the goal of submitting mapping data to NTIA for every known and qualifying broadband provider, regardless of whether the provider has chosen to support and participate in the SBDD mapping initiative.

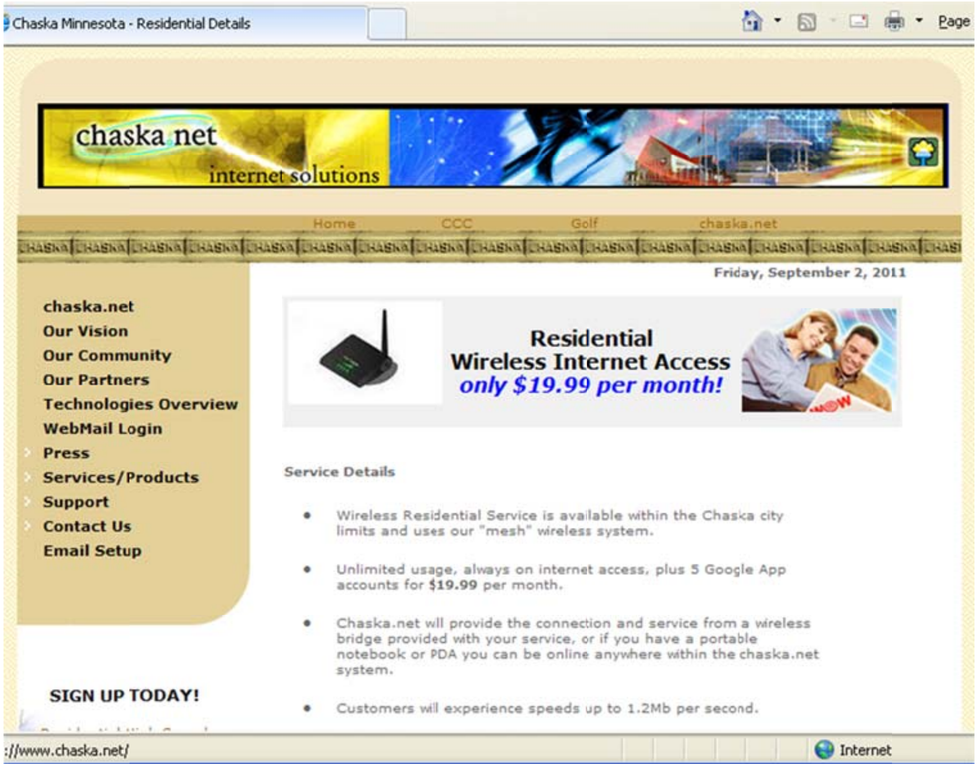
The following narrative provides detail regarding the recent data collection activities related to chaska.net, a wireless Internet service provider (WISP), located in Chaska, Minnesota. Owned by the City of Chaska, the network is actually an unlicensed, metro-mesh network that provides service to the residents and businesses of Chaska, as well as some surrounding areas. The narrative will include information regarding how and where CN obtained publicly available data and the on-the-ground validation techniques that support the underlying data.

Background
CN staff members have continued trying to obtain the participation of the provider with 11 instances of communication via telephone and e-mail sessions since August 4, 2010, through August 12, 2011. Only one communication reply was received from a company representative on June 29, 2011, with a response indicating it is willing to participate, however no time could be allocated for this project. Additionally, a CN staff member visited the chaska.net office on November 2, 2010, to discuss the broadband mapping project in person with chaska.net staff, but necessary staff was not available to discuss the project.

The Issue
By its lack of data submission since August 4, 2010, chaska.net has predicated its unwillingness to participate in the Connect Minnesota broadband mapping initiative.

Identification of Provider's Service Plans, Service Area, Legal Name, d.b.a., FRN, and Licensing
CN began building a file based on research information and, as time progressed, enriched the file with information obtained through the public domain. For example, CN reviewed the provider's website (http://www.chaskamn.com/internet-solutions/) to determine the residential service plans **(Exhibit A)** and the service area **(Exhibit B)** of the provider's wireless network. A search for a Federal Registration Number ("FRN") on the FCC **CO**mmission **RE**gistration **S**ystem ("CORES") system yielded an FRN of 0002606630 **(Exhibit C)** with contact information relative to the owner of the company. Also, to support field validation of access points, the FRN was referenced to the FCC Universal Licensing System (ULS) to identify any licenses the provider may hold which could possibly enhance locating active access points for the service area. This process yielded one active License: KRX-344 **(Exhibit D)**, Radio Service: Public Safety License with Mobile applications. It is licensed to the City of Chaska and not affiliated with the chaska.net business venture.

Exhibit A: Service Plans



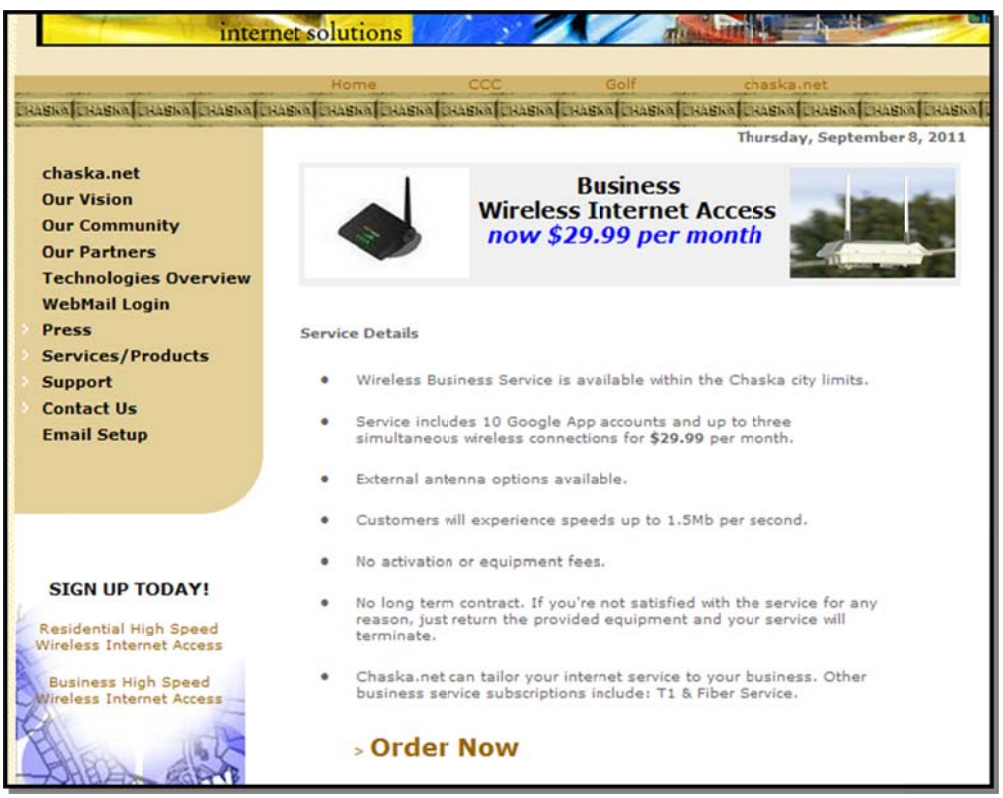


Exhibit B: Service Area

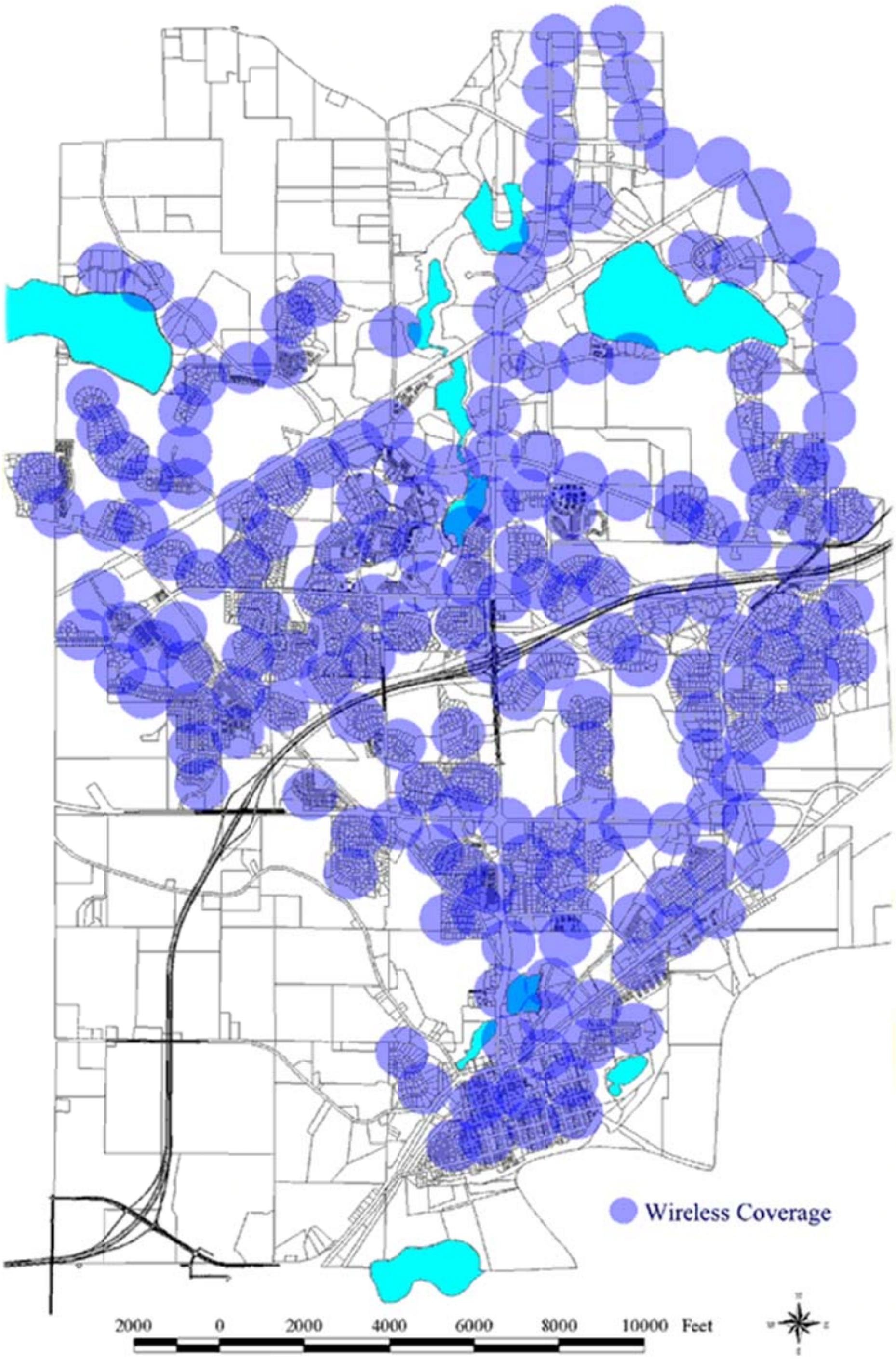
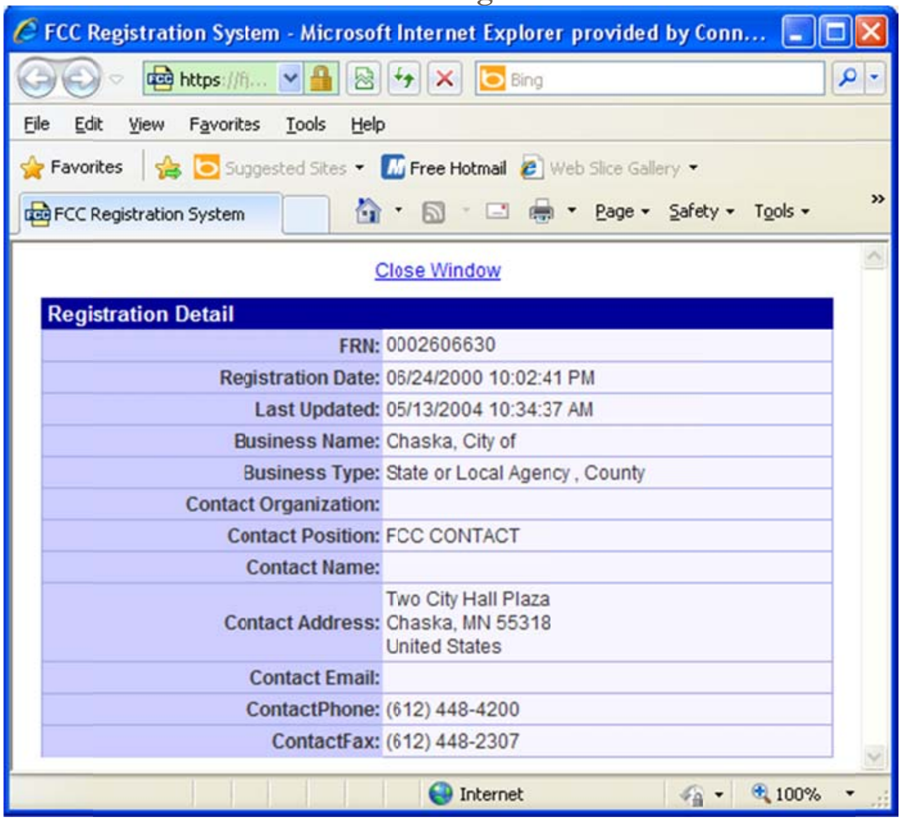


Exhibit C: Federal Registration Number



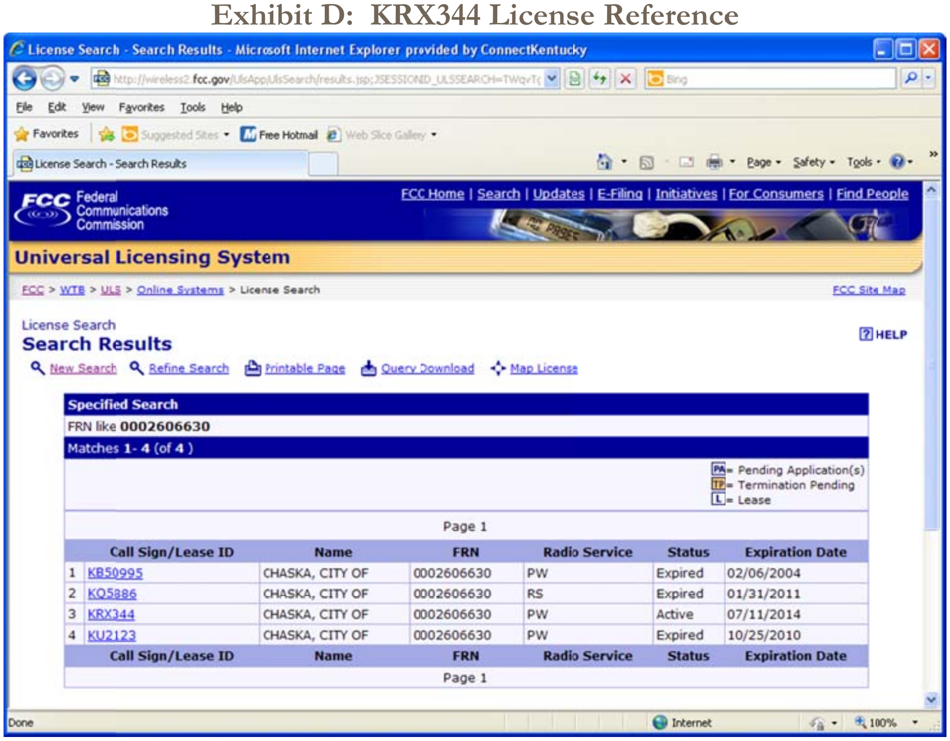
FCC Registration System - Microsoft Internet Explorer provided by Conn...

Close Window

Registration Detail

FRN:	0002606630
Registration Date:	06/24/2000 10:02:41 PM
Last Updated:	05/13/2004 10:34:37 AM
Business Name:	Chaska, City of
Business Type:	State or Local Agency , County
Contact Organization:	
Contact Position:	FCC CONTACT
Contact Name:	
Contact Address:	Two City Hall Plaza Chaska, MN 55318 United States
Contact Email:	
ContactPhone:	(612) 448-4200
ContactFax:	(612) 448-2307

Exhibit D: KRX344 License Reference



License Search - Search Results - Microsoft Internet Explorer provided by ConnectKentucky

Universal Licensing System

FCC > WTB > ULS > Online Systems > License Search

License Search

Search Results

New Search | Refine Search | Printable Page | Query Download | Map License

Specified Search

FRN like **0002606630**

Matches **1 - 4** (of **4**)

PA = Pending Application(s)
TP = Termination Pending
L = Lease

Page 1

	Call Sign/Lease ID	Name	FRN	Radio Service	Status	Expiration Date
1	KB50995	CHASKA, CITY OF	0002606630	PW	Expired	02/06/2004
2	KQ5886	CHASKA, CITY OF	0002606630	RS	Expired	01/31/2011
3	KRX344	CHASKA, CITY OF	0002606630	PW	Active	07/11/2014
4	KU2123	CHASKA, CITY OF	0002606630	PW	Expired	10/25/2010

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Preliminary Identification of Provider's Coverage Area

Connected Nation extracted the chaska.net service area polygon (Exhibit B) from its website. The website service area was utilized to create a Google Earth image overlay **(Exhibit E).** The image overlay was positioned to match the Google Earth base map's roadways, county boundaries, and water bodies. The degree of accuracy of the image overlay was maintained at less than .2 mile (1058 ft.) to establish a minimum search criteria of a given access point. By estimating the coordinates for each polygon, search rings were created with the image overlay to determine the most probable locations for the transmit sites and/or structures. The estimated center coordinates were geocoded into Google Earth and examined utilizing the zoom option of the aerial imagery. This established the means of determining coordinates for the access point locations. A CN engineer then conducted an on-site field verification, and validation trip to the targeted areas to verify the theorems, related to transmit frequencies, locations, and device types. One hundred sixty-four (164) locations were entered into a GPS-enabled version of Microsoft's *Streets and Trips* software **(Exhibit F)** to develop a route for the validation process.

Exhibit E: Google Earth – chaska.net's Service Area Image Overlay

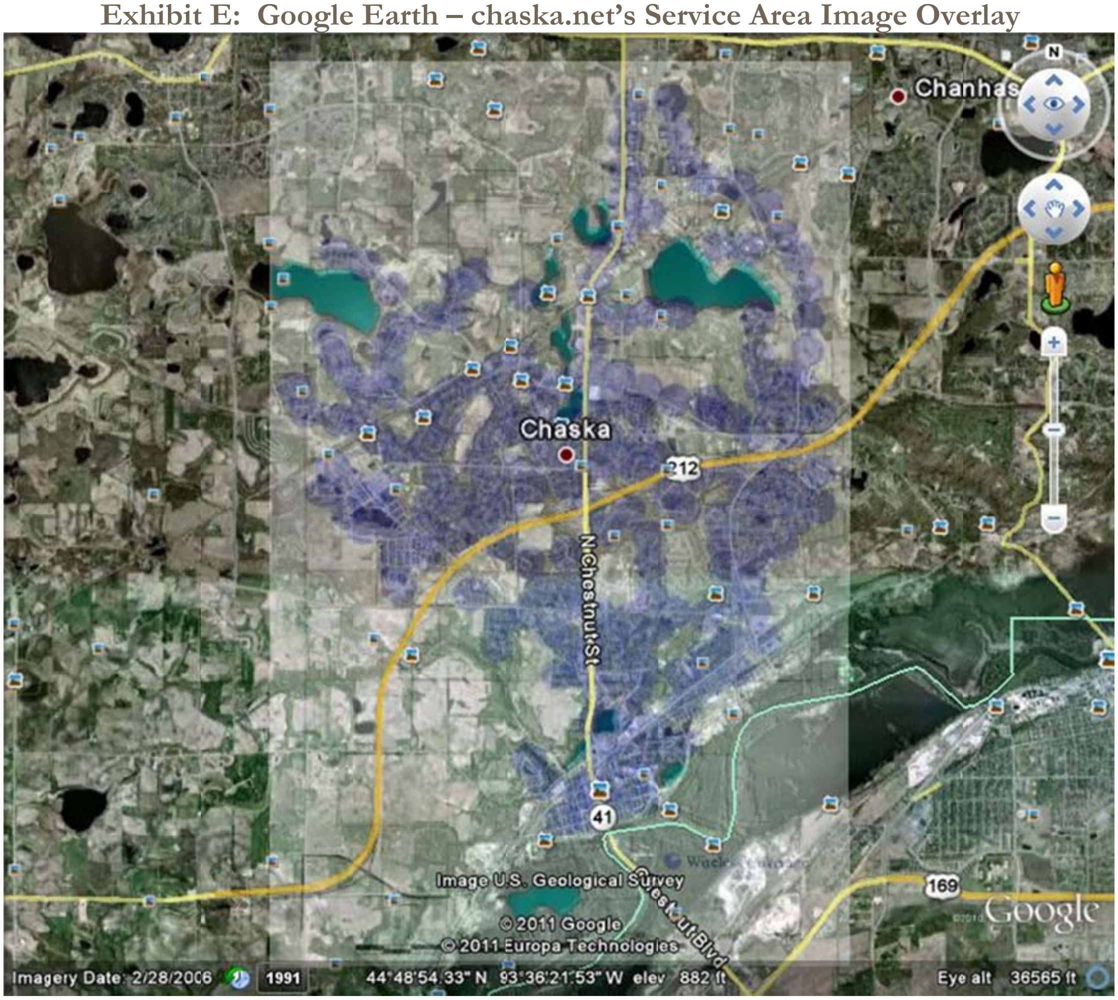
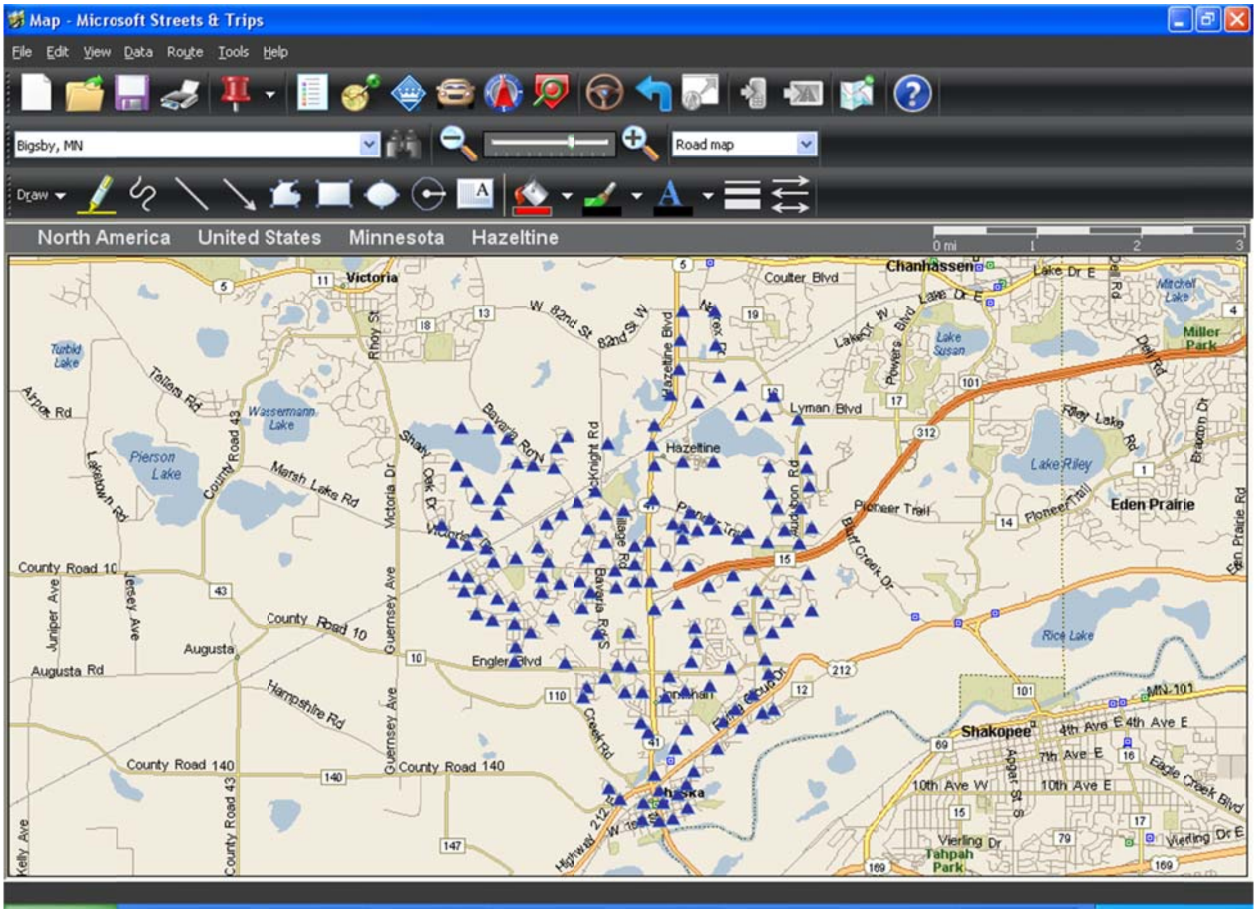


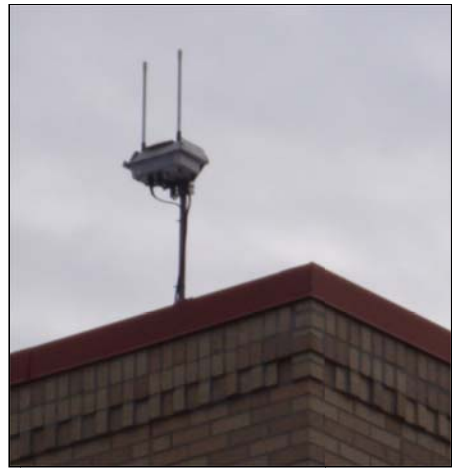
Exhibit F: Validation Points for AP Structures



<u>Testing Techniques</u>

At this juncture, a Connected Nation engineer developed a site test route based on the estimated coordinates for the center of each polygon. The CN wireless engineer was equipped with an AVCOM PSA-37XP spectrum analyzer with RF detection from 1 MHz to 6 GHz and an array of antennas tuned specifically for the 900 MHz, 2.4 GHz, 3.65 GHz, and 5 GHz frequency bands **(see tabular chart contained within Exhibit G)**. Numerous validation points were scrutinized for frequency of operation, general notes were recorded for each location including approximate antenna height, frequency of operation, antenna type (omni or sectored), and exact coordinates, and digital photographs were taken of the wireless access points as each was discovered throughout the process.

Exhibit G: Field Data for chaska.net Office/Hub Location



Unit name	DL	UL	Latitude(°	Longitude	Elevation(	Frequency	Ant Height	Ant Type
Chaskanet1	1.2 Mbps	1.2 Mbps	44.7847	-93.6039	222	2400	15	Omni
2	1.2 Mbps	1.2 Mbps	44.78453	-93.6006	219	2400	15	Omni
3	1.2 Mbps	1.2 Mbps	44.78497	-93.5977	217	2400	15	Omni
4	1.2 Mbps	1.2 Mbps	44.78646	-93.595	220	2400	15	Omni
5	1.2 Mbps	1.2 Mbps	44.78708	-93.6037	222	2400	15	Omni
6	1.2 Mbps	1.2 Mbps	44.78717	-93.5997	223.5	2400	15	Omni
7	1.2 Mbps	1.2 Mbps	44.7884	-93.5969	220.8	2400	15	Omni
8	1.2 Mbps	1.2 Mbps	44.78963	-93.5951	221	2400	15	Omni


CASCADE DR
TUPELO
STOP

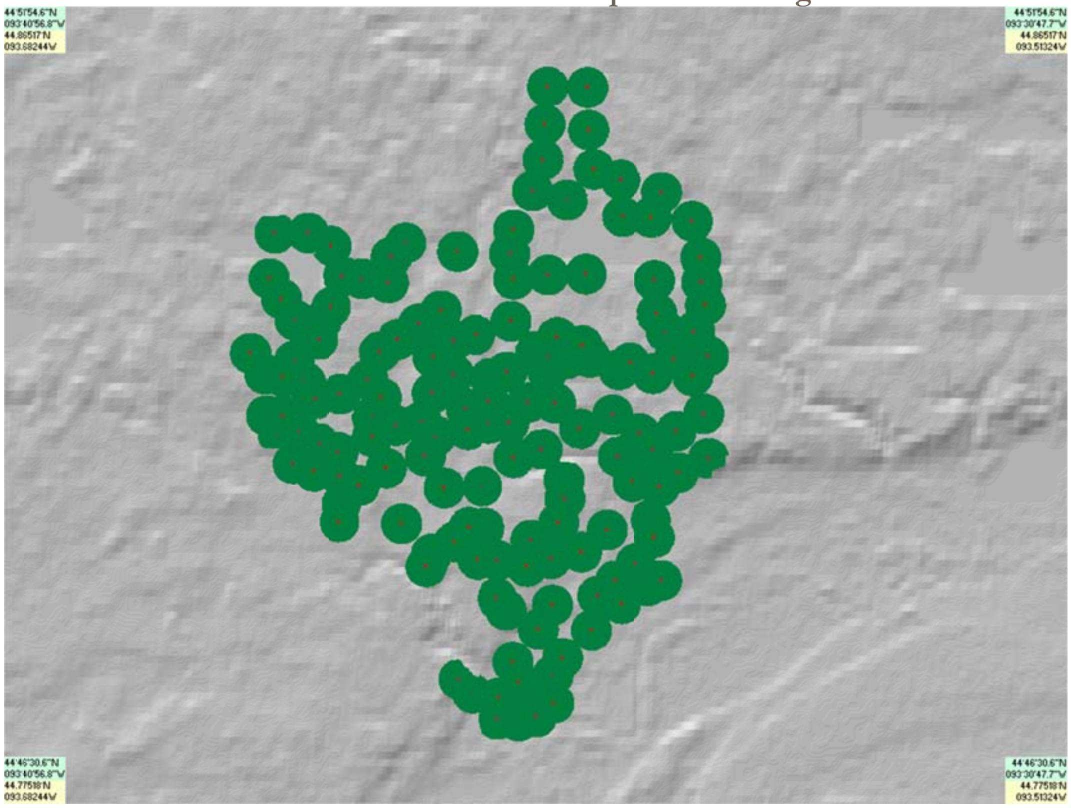
Results and Submission for October 2011

Of the locations visited during the validation point route, 15 access points were identified and relative information was logged into the chaska.net data form and field validation notes file **(Exhibit H)**. The extensive field analysis and the publicly available data were transferred to the Connected Nation Provider Information file and a composite propagation study was completed, which yielded the propagation representation shapefiles **(Exhibit I)**. The CN developed propagation shapefiles and supporting documentation were e-mailed to chaska.net on August 22, 2011, with a request for confirmation or comment; it was advised that, unless someone from chaska.net contested the findings, this information would be submitted to the NTIA during the October 2011 mapping cycle.

Exhibit H: Field Validation Notes

Platform Type		Test Data		Visual Confirmation
Type	Presence Confirmed	Type	Pass or Fail?	Type
Fixed Wireless	Yes	Visual	Pass	Pole Mounted Equip
Fixed Wireless	Yes	Visual	Pass	Pole Mounted Equip
Fixed Wireless	Yes	Visual	Pass	Pole Mounted Equip
Fixed Wireless	Yes	Visual	Pass	Pole Mounted Equip
Fixed Wireless	Yes	Visual	Pass	Pole Mounted Equip
Fixed Wireless	Yes	Visual	Pass	Pole Mounted Equip
Fixed Wireless	Yes	Visual	Pass	Pole Mounted Equip
Fixed Wireless	Yes	Visual	Pass	Pole Mounted Equip
Fixed Wireless	Yes	Visual	Pass	Pole Mounted Equip
Fixed Wireless	Yes	Visual	Pass	Pole Mounted Equip
Fixed Wireless	Yes	Visual	Pass	Pole Mounted Equip
Fixed Wireless	Yes	Visual	Pass	Pole Mounted Equip

Exhibit I: chaska.net Composite Coverage



ACCURACY AND VERIFICATION: PROVIDER VALIDATION METHODOLOGY

Broadband providers maintain their service area data in many different formats, all in varying levels of complexity and granularity. In order to ensure that the data required by the NTIA is standardized across all providers and that it is as accurate as possible, Connected Nation translates and formats the data that providers are able to supply into a GIS shapefile and produces maps for the provider to review. The resulting map(s) and review process allow for providers to see their service area in a geographic format – for some providers, this is the first time they have seen maps of their broadband service area. Having the mapped service area allows providers to quickly identify any issues that appear in the data representation, whether the issue is in the data translation into a GIS format or from the original data collection and submission. Often data is provided from various sources and through the review and revision process, local engineers who operate the networks and work in the field are able to ensure that the tabular data that has been submitted is accurate and represents the real-world network extent. Any issues in how the service area is represented on the map(s) are remedied by Connected Nation, whether they are additions, removal of service, or any other revisions. Revised maps of service area representations are sent to the provider for review and approval; Connected Nation will revise data and return maps as many times as necessary until the provider is in agreement that the map represents their service area as accurately as possible. Once the review process has been completed and final approval of the data is provided, the data is deemed ready for NTIA submission.

Once the data collection has been aggregated at a statewide level, static maps of statewide and county-level availability are produced and made publicly available. In addition, consumers can visit the interactive online tool, BroadbandStat, to create customized views of broadband service areas and analyze corresponding demographic information. Leveraging broadband service data on various platforms allows for public users, providers, and other stakeholders to review, scrutinize, and provide feedback on the represented data. This feedback becomes a validation method in itself as consumers submit inquiries to Connected Nation either affirming where service is not available or identifying areas where broadband service is shown on the map, but in actuality is not available. This allows for a follow-up to providers regarding revisions to the data as it is represented; it also allows for Connected Nation to identify locations where on-site visits may be necessary to complete field validation of available services. Public feedback on all forms of mapping products serves as a localized validation method for provider-supplied information and allows Connected Nation to resolve inaccuracies as they are identified to ensure that only the highest quality information is provided to stakeholders.

Estimates derived from provider-validated data indicate that approximately 3.17 percent of Minnesota households do not have terrestrial fixed broadband service available, and approximately 0.13 percent[1] of Minnesota households have neither mobile nor fixed broadband service available.[2]

Within rural areas of the state, results derived from provider-validated data indicate that approximately 6.13 percent of rural Minnesota households do not have terrestrial fixed broadband service available, and approximately 0.14 percent[3] of rural Minnesota households have neither mobile nor fixed broadband service available.[4] Please note that the availability estimates presented are based on Census 2000 household information; these figures will be updated in the near future with Census 2010 household information.

Wireless Methodology

Broadband Service Availability in Provider's Service Area
Wireless Services Not Provided to a Specific Address

Data solicited from a fixed wireless provider to create propagation models include, but are not limited to:

1. The name of the structure
2. Whether the transmitting device is operational or proposed

[1] In accordance with NTIA's definition of available broadband service as specified in the SBI NOFA, this estimate includes both terrestrial fixed *and* mobile broadband service, if the service offers download speeds of at least 768 Kbps and upload speeds greater than 200 Kbps.

[2] Due to the nature of the SBI data collection methodology as defined by the NTIA and based on both census block geographic units and street segment data, the estimates of broadband availability derived from provider-validated data may include an overstatement of the actual number of households with broadband availability. Under the census block-based data collection method, a provider will typically report broadband availability for an entire census block whether its network is present across the whole or only a subset of that census block. This potential overestimation at the census block level can be amplified as the data is aggregated across the entire state.

[3] See footnote 1.

[4] See footnote 2.

3. The maximum advertised downstream speed, the maximum advertised upstream speed
4. The typical downstream speed, the typical upstream speed (peak periods for both)
5. The frequency range of spectrum being used (as prescribed by NTIA)
6. The primary population center(s) being served (for geopolitical boundary reference)
7. The physical address of the transmit site (in the event latitude/longitude is unavailable from the provider this allows a quick reference point for geocoding)
8. Latitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
9. Longitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
10. Antenna pattern (e.g. omni-directional, 180°, 120°, 90°, etc.)
11. Azimuth of antenna (e.g. 360° with magnetic declination if known)
12. Approximate transmit radius (in feet, miles, or kilometers)
13. Polarity of transmit antenna (Vertical or Horizontal)
14. Transmit antenna gain (in dBi)
15. Line loss (applicable only to providers using coax, heliax, waveguide or other forms of cabling – excludes power-over-Ethernet devices)
16. Mechanical and/or Electrical beam tilt (if applicable)
17. Equipment Manufacturer (allows easy cross-reference against manufacturer's specification sheet)
18. Power output of the transmitting device (if unknown, FCC standards or manufacturer specifications are applied)
19. AMSL at base of tower site
20. Antenna centerline AGL (height of antenna above ground level measured at the centerline of the actual antenna)
21. Foliage factors (Evergreens/Deciduous and percent of ground cover)
22. Ground Clutter (primarily used in rural areas to account for foliage and in metropolitan areas to account for types and heights of buildings if known)
23. Average gain of receive antenna
24. Receive antenna is estimated at height above average terrain (HAAT) of 6.2 meters/20 feet
25. Federal Registration Numbers (if applicable) which may allow opportunities to cross-reference and/or obtain additional data from the Federal Communications Commission Universal Licensing System and the **CO**mmission **RE**gistration **S**ystem

Propagation modeling is an empirical mathematical formulation for the characterization of radio wave propagation as a function of frequency, distance, and other conditions. Propagation software(s) typically use the Irregular Terrain Model (also known as Longley-Rice) of radio propagation for frequencies between 20 MHz and 20 GHz. This model is based on electromagnetic theory and statistical analyses of the combination of terrain features and radio measurements, then predicting the median attenuation of a radio signal as a function of distance and the variability of the signal in time and in space. For metropolitan areas, the software can typically be adjusted to use the Okumura-Hata model which accounts for predicting the behavior of cellular transmissions in areas where buildings are the primary obstructions. The resulting product from either model depicts a graphical illustration of the theoretical propagation characteristics of a selected frequency range based on defined variables (receiver sensitivity of the home/mobile device, foliage factor, and digital elevation terrain input).

After converting propagation models into a geospatial format, additional processing is completed to remove the small pixels representing service present in the resulting dataset. These areas are initially created based on the parameters entered in the software from the provider equipment information, the underlying data parameters of elevation, hillshade, etc., and the limitations of the software itself to display a broadband service area as accurately as possible. Generally, these random pixel striations appear as a result of signal levels reaching the highest elevated points within the prescribed radius. Typically, while this pixilation anomaly shows legitimate areas where signals can be received, these highly elevated points may have exceedingly sparse populations or are entirely void of population. As a result, and congruent to the *Wireless Technology Methodologies and Business Logic* white paper submitted to NTIA on January 20, 2011, all independent pixels representing service that are less than 0.125 square miles in area have been removed from the geospatial representation of each wireless provider.

Broadband Inquiries Methodology

Connected Nation collects consumer feedback in the form of broadband inquiries (BBIs). These inquiries represent any type of communication received from the public regarding broadband service. Once BBIs are received across the state, this information is overlaid with the broadband availability information which was collected through the SBI program. This allows for a real-world comparison of the broadband landscape to the information received from broadband inquiries. Consumers submitting these inbound comments and/or inquiries are able to provide information regarding three categories: 1) residents who do not have broadband but want it; 2) residents who have broadband but want a different provider; and 3) residents who do not have broadband, but the broadband inventory maps indicate that they do.

BBIs are submitted frequently by consumers via the Connect Minnesota website. Inquiries often seek help to identify local broadband provider options, or to learn when a specific provider may be able to provide service to that consumer. Consumer comments also provide information which may help modify maps with actual service area information. The primary objectives of Connected Nation regarding these inquiries are 1) to improve the accuracy of the state maps with submitted consumer information and follow-up field research; 2) to provide broadband options to consumers through cooperation with mapped providers and by facilitating new broadband service options; and 3) to map and analyze information from consumers about areas of unmet broadband demand and alternatives to currently mapped services.

New BBIs are assigned to either the GIS department or the Engineering & Technical Services (ETS) team depending on the category entered by the consumer on the website submission form. The GIS or ETS team members respond to each inquiry according to the information requested by the consumer. Many BBIs can be resolved through desktop research; however, if a BBI requires research in the field, the assigned ETS team member conducts such research when performing field validations in the area of the inquiry, or at other such time as is practical and appropriate. GIS and

ETS team members respond to and conclude BBIs via telephone contact and/or e-mail communication.

The broadband inquiry process has been implemented in each of the Connected Nation state programs with successful results. Altogether Connected Nation has received over 17,000 broadband inquiries since 2007, allowing the state programs to evaluate each inquiry for broadband demand and data verification. These inquiries are continuously examined against current broadband availability, updated every six months, to determine if previously unserved households have been expanded to and can now receive broadband at their residence. This database of broadband inquiries has also allowed the Connected Nation state programs to aggregate demand in concentrated areas to show providers the exact locations where the population has made it clear that they would purchase broadband if it was made available to them. Providers in the states have responded to this process and have expanded to areas knowing that their investment will be worthwhile. Data verification methods have also proven successful, as the state programs have been able to show those inquiries that indicate the broadband service areas are misrepresented on the map to providers, who then verify where service cannot reach in regard to that residence(s). The broadband coverage in these states has been altered to create a more accurate map based on the inquiries submitted by the public.

During this reporting period, the Connect Minnesota project has received a total of 15 inquiries (115 grant inception to date). As more inquiries are submitted to Connect Minnesota, a more thorough validation of the broadband landscape can be performed, while also allowing providers to see which areas have a high demand for broadband adoption.

BroadbandStat Methodology

BroadbandStat is an online, interactive mapping tool for viewing, analyzing, and validating broadband data. Developed through a partnership with ESRI, the market leader in geographic information system (GIS) software, BroadbandStat is a multi-functional, user-friendly way for local leaders, policymakers, consumers, and technology providers to devise a plan for the expansion and adoption of broadband.

First and foremost, BroadbandStat allows consumers to locate their residence and identify providers that offer broadband Internet service to that location. The interactive platform allows for users to build and evaluate broadband expansion scenarios using a wealth of data, including education and population demographics, broadband availability, and research about the barriers to adoption.

New functionality in BroadbandStat allows the consumer to provide feedback on the broadband data displayed on the interactive map. Through the collection of this feedback, a visual demand for broadband is presented. This visualization allows the Connected Nation state programs the ability to validate the broadband availability for accuracy. If residents within a region state they are without broadband, but the interactive map shows otherwise, this allows Connected Nation to approach the providers within that area in an effort to trim down their coverage to more accurately represent real-world availability on the ground.

The Connect Minnesota project launched BroadbandStat on May 21, 2010, and has received a total of 3,100 visits to date, of which 768 occurred this reporting period.

SPEED TEST METHODOLOGY

The 2,330 speed tests that are represented in the Connect Minnesota Speed Test Report during this reporting period (8,182 grant inception to date) are the result of a partnership between Connected Nation and Ookla Net Metrics. Utilizing this relationship increases the level of confidence in the data being collected and provides for a far greater sample size than could be collected by a single testing site.

Ookla owns and operates Speedtest.net, as well as develops and deploys speed tests, such as the Connect Minnesota speed test website, for partners around the world. This network of sites that is developed and run on its testing technology provides Ookla with a vast dataset that, due to the variability of geographic information collected across the varying speed test sites, is geocoded utilizing Geo-IP technology. This technology allows for tests to be geocoded to points of aggregation, typically larger nodes across provider networks. While there are hundreds of thousands of tests that have been conducted, the level of aggregation is only sufficient for county-level detail due to the test results being located at these larger nodes and not at an absolute location for each speed test.

In an effort to validate broadband data from the Connect Minnesota project, speed test information is collected throughout the state. Speed tests provide speed information on the path taken through all networks (a provider's network as well as additional networks) a local machine must connect to in order to reach the host test. The benefit of this collection of speed information is two-tiered. First, it allows for a comprehensive dataset of speeds, while also providing Connect Minnesota with the information on where broadband services are available. Second, unlike theoretical speed information which was received through the data collection process, the use of speed tests provide real-world information on the speeds that currently exist within the state of Minnesota.

Broadband Provider Log

Complete	171
Non-Responsive/Refused	10
In Progress	6
Count of Datasets by Status	**187**
Total Unique Providers Represented	**120**

Provider Name	**Platform**	**Status**	**NDA Execution Date**	**Notes**
AirLink Broadband, LLC	Fixed Wireless	Data Added to Statewide Inventory		[SEP-12-11 Brian Dudek] Change: New provider in service for October 2011 submission.
Arrowhead Communications Corporation	DSL	Data Added to Statewide Inventory	4/14/2010	[SEP-12-11 Brian Dudek] Change/Correction: Provider upgraded upload speed capabilities and corrected coverage from a received broadband inquiry.
AT&T Corp, Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/16/2009	[SEP-12-11 Brian Dudek] Change: Provider expanded mobile territory throughout the state.
Benton Cooperative Telephone Company	Cable	Data Added to Statewide Inventory	6/16/2010	[SEP-12-11 Brian Dudek] Change: Provider indicated they also have a CLEC operation in Milaca.
Broadband Corp	Fixed Wireless	Data Added to Statewide Inventory	5/11/2010	[SEP-12-11 Brian Dudek] Change: Recreated propagations due to additions and deletions for unlicensed and licensed area.
Cable ONE Inc.	Cable	Data Added to Statewide Inventory	12/7/2009	[SEP-12-11 Brian Dudek] Change/Correction: possible service expansion or corrections to previous dataset; entirely new dataset for October 2011 submission. Coverage change likely a result of the 2000-2010 census change.
CenturyLink	DSL	Data Added to Statewide Inventory	12/4/2009	[SEP-12-11 Brian Dudek] Change/Correction: possible service expansion or corrections to previous dataset; entirely new dataset for October 2011 submission. Provider expanded DSL territory by acquiring Qwest Corporation.
Charter Communications, Inc.	Cable	Data Added to Statewide Inventory	12/15/2009	[SEP-12-11 Brian Dudek] Change/Correction: possible service expansion or corrections to previous dataset; entirely new dataset for October 2011 submission. Coverage change likely primarily a result of the 2000-2010 census change.
CitEscape, LLC	Fixed Wireless	Data Added to Statewide Inventory	1/25/2010	[AUG-30-11 Brian Dudek] Correction: Corrected 3650 MHz maximum advertised download speeds to speed tier 7 from previously submitted 8.
Clearwire Corporation	Mobile Wireless	Data Added to Statewide Inventory	3/3/2010	[SEP-12-11 Brian Dudek] Change: Provider pulled back on prior coverage north of Anoka.
Comcast Cable Communications, LLC	Cable	Data Added to Statewide Inventory	12/7/2009	[SEP-12-11 Brian Dudek] Change/Correction: possible service expansion or corrections to previous dataset; entirely new dataset for October 2011 submission. Coverage change likely primarily a result of the 2000-2010 census change.
Consolidated Telephone Company	Fiber	Data Added to Statewide Inventory		[SEP-12-11 Brian Dudek] Correction: Nisswa and Baxter coverage was added back. Coverage was inadvertently removed in the April submission and was not caught by the provider.
Crosslake Telephone Company	DSL	Data Added to Statewide Inventory	6/16/2010	[SEP-12-11 Brian Dudek] Change: Provider converted some DSL infrastructure to fiber.

Crosslake Telephone Company	Fiber	Data Added to Statewide Inventory	6/16/2010	[SEP-12-11 Brian Dudek] Change: Provider expanded fiber territory.
Eagle Valley Telephone Company	DSL	Data Added to Statewide Inventory	4/14/2010	[SEP-12-11 Brian Dudek] Change: Provider upgraded speed capabilities.
Farmers Mutual Telephone Company	Fiber	Data Added to Statewide Inventory	4/1/2010	[SEP-12-11 Brian Dudek] Change: Provider upgraded speed capabilities.
Federated Telephone Cooperative	Fiber	Data Added to Statewide Inventory	4/1/2010	[SEP-12-11 Brian Dudek] Change: Provider upgraded speed capabilities.
Felton Telephone Company	DSL	Data Added to Statewide Inventory	4/14/2010	[SEP-12-11 Brian Dudek] Change: Provider upgraded speed capabilities.
Fibernet Monticello	Fiber	Data Added to Statewide Inventory		[SEP-12-11 Brian Dudek] Correction: New provider for October 2011 submission that was previously unresponsive.
Frontier Communications of Minnesota, Inc.	DSL	Data Added to Statewide Inventory	1/22/2010	[AUG-17-11 Brian Dudek] Change/Correction: Provider expanded DSL territory by adding additional CO/RT's. Modified coverage throughout where incorrect CO/RT coordinates were given in the past that went unnoticed.
Garden Valley Telephone Company	DSL	Data Added to Statewide Inventory	2/17/2010	[SEP-12-11 Brian Dudek] Change: Provider converted some DSL infrastructure in two exchanges to fiber.
Garden Valley Telephone Company	Fiber	Data Added to Statewide Inventory	2/17/2010	[SEP-12-11 Brian Dudek] Change: Provider expanded fiber territory into two exchanges.
Granada Telephone Company	DSL	Data Added to Statewide Inventory	4/14/2010	[SEP-12-11 Brian Dudek] Change: Provider upgraded speed capabilities.
Hickory Tech Corporation	DSL	Data Added to Statewide Inventory		[AUG-15-11 Brian Dudek] Change: Provider upgraded some infrastructure to higher speeds.
Hutchinson Telecommunications, Inc.	Fixed Wireless	Data Added to Statewide Inventory	4/14/2010	[SEP-12-11 Brian Dudek] Change: Provider upgraded speed capabilities.
KeyOn Communications, Inc.	Fixed Wireless	Data Added to Statewide Inventory		[SEP-12-11 Brian Dudek] Change: New provider in service for October 2011 submission.
Knology of the Plains, Inc.	Cable	Data Added to Statewide Inventory	7/13/2011	[AUG-22-11 Brian Dudek] Correction: New provider for October 2011 submission that previously refused to participate.
Loretel Systems, Inc.	DSL	Data Added to Statewide Inventory	4/14/2010	[SEP-12-11 Brian Dudek] Change: Provider upgraded speed capabilities.
Manchester-Hartland Telephone Company	Fiber	Data Added to Statewide Inventory	4/14/2010	[SEP-12-11 Brian Dudek] Change: Provider upgraded speed capabilities.
Midcontinent Communications	Cable	Data Added to Statewide Inventory	12/9/2009	[SEP-12-11 Brian Dudek] Change/Correction: possible service expansion or corrections to previous dataset; entirely new dataset for October 2011 submission. Coverage change likely primarily a result of the 2000-2010 census change. Provider upgraded speed capabilities in their DOCSIS 3.0 cable regions.
Minnesota Valley TV Improvement Corporation	Cable	Data Added to Statewide Inventory	4/13/2010	[AUG-30-11 Brian Dudek] Correction: New provider platform for October 2011 submission, that was previously unknown.
Minnesota Valley TV Improvement Corporation	Fixed Wireless	Data Added to Statewide Inventory	4/13/2010	[SEP-12-11 Brian Dudek] Change: Provider added additional transmission points.
NorthfieldWiFi LLC	Fixed Wireless	Data Added to Statewide Inventory	2/4/2011	[SEP-12-11 Brian Dudek] Change: Provider added additional transmission points.
Park Region Mutual Telephone Company	DSL	Data Added to Statewide Inventory	3/18/2010	[SEP-12-11 Brian Dudek] Correction: Provider reported DSL speeds incorrectly in Ottertail Telcom region. Reduced speed tiers.
Park Region Mutual Telephone Company	Fiber	Data Added to Statewide Inventory	3/18/2010	[SEP-12-11 Brian Dudek] Change: Provider upgraded infrastructure in Ottertail Telcom region to speed tier 9.

Paul Bunyan Rural Telephone Cooperative	DSL	Data Added to Statewide Inventory	6/24/2010	[SEP-12-11 Brian Dudek] Correction: Provider coverage added in the Red Lake exchange. Although available, this coverage was not provided in the past submission.
Paul Bunyan Rural Telephone Cooperative	Fiber	Data Added to Statewide Inventory	6/24/2010	[SEP-12-11 Brian Dudek] Correction: Provider coverage added in the Red Lake exchange. Although available, this coverage was not provided in the past submission.
Pine Island Telephone Company	DSL	Data Added to Statewide Inventory	4/14/2010	[SEP-12-11 Brian Dudek] Change: Provider upgraded speed capabilities.
Red River Rural Telephone Association	DSL	Data Added to Statewide Inventory	3/17/2010	[SEP-12-11 Brian Dudek] Change: Provider expanded DSL territory into Traverse and Wilkin Counties.
Savage Communications Inc.	Cable	Data Added to Statewide Inventory	2/19/2010	[SEP-12-11 Brian Dudek] Change: Provider expanded cable territory by acquiring properties in Bovey and Coleraine from Jaguar Communications.
Scott Rice Telephone Co.	DSL	Data Added to Statewide Inventory	2/15/2010	[SEP-12-11 Brian Dudek] Change: Provider upgraded speed capabilities.
Sheehan Gas	Fixed Wireless	Data Added to Statewide Inventory		[SEP-12-11 Brian Dudek] Change: Provider upgraded speed capabilities.
Sjoberg's Inc.	Cable	Data Added to Statewide Inventory	12/21/2009	[SEP-12-11 Brian Dudek] Correction: Provider indicated that maximum upload speed tier needed to be lowered to 3.
Sleepy Eye Telephone Company	DSL	Data Added to Statewide Inventory	4/14/2010	[SEP-12-11 Brian Dudek] Change: Provider upgraded speed capabilities.
Sprint Nextel Corporation	Mobile Wireless	Data Added to Statewide Inventory	1/14/2010	[SEP-12-11 Brian Dudek] Change: Provider expanded mobile territory into a few areas.
T-Mobile USA, Inc.	Mobile Wireless	Data Added to Statewide Inventory	1/8/2010	[SEP-12-11 Brian Dudek] Change: Provider expanded mobile territory further in east and southeast MN. Upgraded speed capabilities with HSPA+ 42.
TDS Telecommunications Corporation	DSL	Data Added to Statewide Inventory	1/27/2010	[SEP-12-11 Brian Dudek] Change/Correction: possible service expansion or corrections to previous dataset; entirely new dataset for October 2011 submission. Coverage change likely primarily a result of the 2000-2010 census change.
TDS Telecommunications Corporation	Fiber	Data Added to Statewide Inventory	1/27/2010	[SEP-12-11 Brian Dudek] Change/Correction: possible service expansion or corrections to previous dataset; entirely new dataset for October 2011 submission. Coverage change likely primarily a result of the 2000-2010 census change.
Verizon Communications, Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/14/2009	[SEP-12-11 Brian Dudek] Change: Provider expanded mobile territory further in south MN. Upgraded speeds in 700 MHz spectrum.
Windstream Communications	Fixed Wireless	Data Added to Statewide Inventory		[SEP-12-11 Brian Dudek] Change: Windstream indicated that the acquired fixed wireless operations from Lakedale should be changed to the Windstream provider name, dba, and FRN.
Windstream Communications	DSL	Data Added to Statewide Inventory		[SEP-09-11 Brian Dudek] Change: Provider submitted entirely new data in the form of 2010 census blocks for their Lakedale Telephone acquisition only. Entel Communications and Lakedale Link not included. Windstream indicated that these two operations should be changed to the Windstream provider name, dba, and FRN.
CenturyLink	Backhaul	Backhaul Provider Only Processing Complete	12/4/2009	
Level 3 Communications, LLC	Backhaul	Backhaul Provider Only Processing Complete	12/14/2009	
Savage Communications Inc.	Backhaul	Backhaul Provider Only Processing Complete	2/19/2010	
T-Mobile USA, Inc.	Backhaul	Backhaul Provider Only Processing Complete	1/8/2010	

Windstream Communications	Backhaul	Backhaul Provider Only Processing Complete		
Zayo Group, LLC	Backhaul	Backhaul Provider Only Processing Complete		
City of Chaska	Fixed Wireless	Estimated Coverage Submitted for Non-Participating Provider		[SEP-1-11 Brian Dudek] Correction: New provider for October 2011 submission that is still unresponsive. Connected Nation estimated coverage for this provider.
360networks	Backhaul	No Update to Provide	1/19/2010	
Ace Telephone Association	Backhaul	No Update to Provide	8/3/2010	
Ace Telephone Association	DSL	No Update to Provide	8/3/2010	
Alliance Communications Cooperative, Inc.	Backhaul	No Update to Provide		
Alliance Communications Cooperative, Inc.	DSL	No Update to Provide		
Alliance Communications Cooperative, Inc.	Fiber	No Update to Provide		
Arvig Communication Systems	DSL	No Update to Provide	2/2/2011	
Arvig Communication Systems	Fiber	No Update to Provide	2/2/2011	
Arvig Communication Systems	Fixed Wireless	No Update to Provide	2/2/2011	
AT&T Corp, Inc.	Backhaul	No Update to Provide	12/16/2009	
Barnesville Municipal Telephone	DSL	No Update to Provide	3/4/2010	
Benton Cooperative Telephone Company	DSL	No Update to Provide	6/16/2010	
Benton Cooperative Telephone Company	Fiber	No Update to Provide	6/16/2010	
Benton Cooperative Telephone Company	Cable	No Update to Provide	6/16/2010	
Benton Cooperative Telephone Company	Mobile Wireless	No Update to Provide	6/16/2010	[JUL-7-11 Brian Dudek] According to provider representative, service area is derived from a real-world wireless propagation and the south/southwest coverage border is the licensed border for the associated spectrum band. Will not serve outside it.
Blue Earth Valley Telephone Company	Cable	No Update to Provide	6/16/2010	
Blue Earth Valley Telephone Company	DSL	No Update to Provide	6/16/2010	
Blue Earth Valley Telephone Company	Fiber	No Update to Provide	6/16/2010	
Bradco-Wisp, Inc.	Fixed Wireless	No Update to Provide		
Christensen Communications Company	Backhaul	No Update to Provide	2/2/2010	
Christensen Communications Company	DSL	No Update to Provide	2/2/2010	
City of Windom	Fiber	No Update to Provide		
Clara City Telephone Company	DSL	No Update to Provide	2/5/2010	
Clear Choice Communications	Fixed Wireless	No Update to Provide		[SEP-7-11 Brian Dudek] Correction: Provider service area is now a real-world propagation unlike prior submission. Cut to licensed border.
Clearwire Corporation	Fixed Wireless	No Update to Provide	3/3/2010	[SEP-7-11 Brian Dudek] Correction: Provider service area is now a real-world propagation unlike prior submissions.
Consolidated Telephone Company	DSL	No Update to Provide		
Consolidated Telephone Company	Fixed Wireless	No Update to Provide		
Crosslake Telephone Company	Cable	No Update to Provide	6/16/2010	
DISH Network Corporation	Satellite	No Update to Provide	1/27/2010	[SEP-16-11 Brian Dudek] Correction: Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
diversiCOM	DSL	No Update to Provide	4/20/2010	
diversiCOM	Cable	No Update to Provide	4/20/2010	
diversiCOM	Fixed Wireless	No Update to Provide	4/20/2010	
diversiCOM	Fiber	No Update to Provide	4/20/2010	
Emily Cooperative Telephone Company	DSL	No Update to Provide	6/24/2010	
Emily Cooperative Telephone Company	Fiber	No Update to Provide	6/24/2010	
Enterpoint Wireless	Fixed Wireless	No Update to Provide		
Evertek Enterprises, Inc.	Fixed Wireless	No Update to Provide	6/17/2010	
Farmers Mutual Telephone Company	Fixed Wireless	No Update to Provide	4/1/2010	
Federated Telephone Cooperative	Fixed Wireless	No Update to Provide	4/1/2010	
Frontier Communications of Minnesota, Inc.	Backhaul	No Update to Provide	1/22/2010	
FTTH Communications	Fiber	No Update to Provide		
Gardonville Cooperative Telephone Association	DSL	No Update to Provide	2/23/2010	
Gardonville Cooperative Telephone Association	Fiber	No Update to Provide	2/23/2010	
Gardonville Cooperative Telephone Association	Fixed Wireless	No Update to Provide	2/23/2010	[SEP-7-11 Brian Dudek] Correction: Provider service area is now a real-world propagation unlike prior submissions.
Genesis Wireless	Fixed Wireless	No Update to Provide		
Halstad Telephone Company	DSL	No Update to Provide	6/16/2010	
Halstad Telephone Company	Fixed Wireless	No Update to Provide	6/16/2010	
Harmony Telephone Company	Fiber	No Update to Provide	1/12/2010	
Hiawatha Broadband Comunications, Inc.	Fiber	No Update to Provide	3/8/2010	
Hiawatha Broadband Comunications, Inc.	Cable	No Update to Provide	3/8/2010	
HomeTown Solutions LLC	Fiber	No Update to Provide	4/1/2010	

Hughes Network Systems, LLC	Satellite	No Update to Provide	2/5/2010	[SEP-16-11 Brian Dudek] Correction: Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
Hutchinson Telecommunications, Inc.	DSL	No Update to Provide	4/14/2010	
Info Link Wireless, Inc.	Fixed Wireless	No Update to Provide	4/19/2010	
Interstate Telecommunications Cooperative, Inc.	DSL	No Update to Provide	2/10/2010	
Interstate Telecommunications Cooperative, Inc.	Fiber	No Update to Provide	2/10/2010	
InvisiMax, Inc.	Fixed Wireless	No Update to Provide		
Jaguar Communications	DSL	No Update to Provide	4/12/2010	
Jaguar Communications	Fiber	No Update to Provide	4/12/2010	
Jaguar Communications	Fixed Wireless	No Update to Provide	4/12/2010	[SEP-7-11 Brian Dudek] Correction: Provider service area is now a real-world propagation unlike prior submissions.
Johnson Telephone Company	DSL	No Update to Provide		
Kasson & Mantorville Telephone Company	DSL	No Update to Provide	6/30/2010	
Lonsdale Telephone Company, Inc.	DSL	No Update to Provide		
Lonsdale Telephone Company, Inc.	Fiber	No Update to Provide		
Mabel Cooperative Telephone Company	DSL	No Update to Provide	4/7/2010	
Mediacom Communications Corporation	Backhaul	No Update to Provide	1/12/2010	
Mediacom Communications Corporation	Cable	No Update to Provide	1/12/2010	
MegaPath Inc.	Backhaul	No Update to Provide	2/15/2010	
Midcontinent Communications	Backhaul	No Update to Provide	12/9/2009	
Minnesota Valley Telephone Company	DSL	No Update to Provide	4/29/2010	
New Ulm Telecom Inc.	DSL	No Update to Provide	2/25/2010	
Polar Telcom, Inc.	DSL	No Update to Provide	2/11/2010	
Red River Rural Telephone Association	Fixed Wireless	No Update to Provide	3/17/2010	
Red River Rural Telephone Association	Fiber	No Update to Provide	3/17/2010	
River Valley Telephone Coop.	Fixed Wireless	No Update to Provide	4/28/2010	
Rothsay Telephone Company Inc.	DSL	No Update to Provide	2/18/2010	
Runestone Telecom Association	DSL	No Update to Provide	4/14/2010	
Runestone Telecom Association	Fiber	No Update to Provide	4/14/2010	
Sacred Heart Telephone Company	DSL	No Update to Provide	2/5/2010	
Scott Rice Telephone Co.	Fiber	No Update to Provide	2/15/2010	
Sioux Valley Wireless	Fixed Wireless	No Update to Provide	4/21/2010	
Southern Cablevision, Inc.	Cable	No Update to Provide	3/30/2010	
Spring Grove Cooperative Telephone Co.	Fiber	No Update to Provide	1/12/2010	
Sprint Nextel Corporation	Backhaul	No Update to Provide	1/14/2010	
Starbuck Telephone Company	DSL	No Update to Provide	2/5/2010	
Starpoint Communications, Inc.	Fixed Wireless	No Update to Provide	2/18/2011	
TDS Telecommunications Corporation	Backhaul	No Update to Provide	1/27/2010	
tw telecom of minnesota llc	Backhaul	No Update to Provide	4/20/2010	
Upsala Cooperative Telephone Association	DSL	No Update to Provide		
Upsala Cooperative Telephone Association	Fiber	No Update to Provide		
US Cable Corporation	Cable	No Update to Provide	5/20/2010	
US Internet of Minnetoka	Fixed Wireless	No Update to Provide		[JUL-5-11 Brian Dudek] According to provider representative, service area is derived from a real-world wireless propagation and is cut to the allowed service boundary. It is a city funded project and the provider is required to only provide within this service boundary.
VAL-ED Joint Venture, LLP	DSL	No Update to Provide	4/21/2010	
VAL-ED Joint Venture, LLP	Fixed Wireless	No Update to Provide	4/21/2010	
Verizon Communications, Inc.	Backhaul	No Update to Provide	12/14/2009	
West Central Telephone Association	DSL	No Update to Provide	2/18/2010	
West Central Telephone Association	Fiber	No Update to Provide	2/18/2010	
Western Telephone Company	DSL	No Update to Provide	4/14/2010	
Wikstrom Telephone Company	DSL	No Update to Provide	4/12/2010	
Wikstrom Telephone Company	Fixed Wireless	No Update to Provide	4/12/2010	
WildBlue Communications, Inc.	Satellite	No Update to Provide	1/8/2010	[SEP-16-11 Brian Dudek] Correction: Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
Winnebago Cooperative Telecom Association	Backhaul	No Update to Provide	6/17/2010	
Winnebago Cooperative Telecom Association	DSL	No Update to Provide	6/17/2010	
Winnebago Cooperative Telecom Association	Fiber	No Update to Provide	6/17/2010	
Winnebago Cooperative Telecom Association	Fixed Wireless	No Update to Provide	6/17/2010	
Wolverton Telephone Company	DSL	No Update to Provide	6/22/2010	
Woodstock Telephone Company	DSL	No Update to Provide	2/18/2010	
Woodstock Telephone Company	Fiber	No Update to Provide	2/18/2010	
XO Communications, LLC	Backhaul	No Update to Provide	2/12/2010	
Zumbrota Telephone Company	DSL	No Update to Provide	2/5/2010	
Albany Mutual Telephone Association	DSL	No Update Provided - Use Last Submission Data	3/4/2010	

Albany Mutual Telephone Association	Fiber	No Update Provided - Use Last Submission Data	3/4/2010	
Cogent Communications, Inc.	Backhaul	No Update Provided - Use Last Submission Data		
Knology of the Plains, Inc.	Backhaul	Provider Gathering Data	7/13/2011	
Superior Broadband	Backhaul	Provider Gathering Data		
Arvig Communication Systems	Cable	Other	2/2/2011	[SEP-14-11 Brian Dudek] Cable properties are reported under Arvig Communications subsidiary company Home Telephone, dba Southern Cablevision.
Jaguar Communications	Cable	Other	4/12/2010	[SEP-15-11 Brian Dudek] Data is now submitted under Savage Communications as they have acquired Jaguar Communications' original cable properties.
Manchester-Hartland Telephone Company	DSL	Other	4/14/2010	[SEP-15-11 Brian Dudek] Provider indicated DSL is now inactive.
PAETEC Communications, Inc.	DSL	Other		[SEP-08-11 Wes Kerr] Multiple outreach attempts were conducted but no response was received. PAETEC was bought out during the collection phase of this round by Windstream and we intend to be able to include the PAETEC coverage as a part of the Windstream footprint during the next round.
A Better Wireless, NISP, LLC	Fixed Wireless	Refused to Participate		[AUG-15-11 James Tull] While attempting to solicit data in accordance with the NOFA and the Clarification, a representative of A Better Wireless stated that they refused to participate because they disputed data already reflected on the map. This person further agreed to provide e-mail details of these stated discrepancies but never did. Subsequent attempts at contact have all been unsuccessful. We will continue to attempt to gain A Better Wireless' participation in Minnesota's broadband mapping project.
Ideaone Telecom Group, LLC	DSL	Refused to Participate		[JUL-19-11 James Tull] After speaking with a receptionist and leaving several messages to no avail, received an e-mail stating, "We are not interested in completing the survey you are requesting. We have limited customers in Minnesota."
Ideaone Telecom Group, LLC	Fixed Wireless	Refused to Participate		[JUL-19-11 James Tull] After speaking with a receptionist and leaving several messages to no avail, received an e-mail stating, "We are not interested in completing the survey you are requesting. We have limited customers in Minnesota."
Nextera Communications	DSL	Refused to Participate		[JUL-29-11 John Determan] In addition to multiple contact attempts made between May 5, 2009 and April 28, 2011, multiple attempts were made during this submission period; however after discussions with executive management, Nextera is not prepared to commit the resources needed for a project of this magnitude and therefore fefused to participate.
Access Broadband	Fixed Wireless	Non-Responsive to Multiple Attempts		8 contact attempts were made between May 24, 2011 and August 24, 2011.
City of Detroit Lakes	Fixed Wireless	Non-Responsive to Multiple Attempts	5/10/2010	In addition to multiple contact attempts made between June 22, 2010 and February 24, 2011, 9 additional attempts were made this period.
Global Crossing Telecommunications, Inc.	Backhaul	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between July 1, 2010 and February 17, 2011, 3 additional attempts were made this period.

Reliance Globalcom Services, Inc.	Backhaul	Non-Responsive to Multiple Attempts		In addition to contact attempts made between November 18, 2010 and February 3, 2011, 3 additional attempts were made this period.
Ridge Runner Internet Services Inc.	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between April 6, 2010 and February 15, 2011, 5 additional attempts were made this period.
Utopian Wireless Corporation	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between August 9, 2010 and January 4, 2011, 4 additional attempts were made this period.

Submitted to:

National Telecommunications and Information Administration

Data Collection and Processing

Missouri
Broadband Data and Development

Submitted by:

October 1, 2011

Table of Contents

1 Introduction

This document provides background for the data collection and processing phases of the Missouri Broadband Data and Development Project. It covers the initial processing of data to meet specific requirements defined by the National Telecommunications and Information Administration (NTIA), governed by the Notice of Funds Availability (NOFA) first published in volume 74, number 129, at page 32545 of the Federal Register and subsequently clarified in volume 74, number 154, at page 40569 of the Federal Register. It also covers the quality control aspects of the project, including back lab, field, and independent verification.

2 Non-Disclosure Agreement Development Process

The State Parties to the Non-Disclosure Agreement (NDA) process include the State of Missouri, the University of Missouri, GeoDecisions, and CBG Communications. Each party, along with the individual broadband service provider, is a signatory of each NDA.

A standard NDA was developed using an initial template provided by CBG, existing templates from providers, and was subsequently edited with inputs from all state parties. This NDA was then vetted with representatives from the Missouri broadband provider community in order to develop a data sharing document that reflected the concerns of both the state and industry.

The state drafted, signed, and distributed an initial letter to providers; including data collection guidelines and a draft of the standard NDA (see Attachment A). This letter was initially sent to 129 providers initially in late March 2010. Most partners to the NDA signed this initial NDA as provided. Some providers have asked for some changes to this NDA which then require legal review by all 5 parties to the agreement. These negotiations have taken some time to complete for individual providers.

We have also found that having a signed NDA does not ensure the State that data will be forthcoming as we have at least five providers with signed NDAs that we have not received data for. These are still being pursued.

3 Identifying Providers

The state parties used multiple methodologies to: a) identify broadband providers potentially offering service in the State of Missouri, and b) to acquire contact information for each of the providers.

Identification of providers began by accessing the FCC's Form 477 publically available data.
This data provides the Holding Company Name, the FCC Registration number (FRN), and the filing company name of all broadband providers in the state that completed the Form 477. We began with this information and performed research tasks, including internet research of each of the companies to obtain a high-level contact within the company, as well as their phone and e-mail contact information. If some of this information was not obtainable via Internet research, CBG made initial contact with the company, primarily through phone, to further explore the most pertinent contact.

In addition, we performed research of various websites to determine if there are providers that had not filed a Form 477 with the FCC that should be included in the data collection process. We researched these companies again for the best contact information through various public records including, but not limited to, Missouri Public Service Commission databases, State Telecommunications Industry Association memberships, FCC Cable TV Community Unit and Physical System ID databases, FCC telephone company databases, business licenses, state and local tax records, etc., as well as various state, local and other departments and agencies, including Division of Corporations, Division of Revenue, Local Franchise Authorities, Chambers of Commerce, etc.

We also continue to identify additional potential providers during our field verification processes. This list of potential providers is comprised of business names advertised (signage/trucks etc.), labeled infrastructure observed, or are mentioned by Missouri citizens through an interview.

As new providers are identified, the contact information is given to MU for delivery of initial contact letters to identified providers. These documents are mailed out by MU via e-mail, in order to expedite the process, and through the USPS as a formal notification. Based on input from providers in other states, these documents were sent by the State in order to show the importance that the State places on the project. All correspondence with the providers, including clarification of the NDA or Data Request, data formatting issues, and data submission by the providers, was then handled by GeoDecisions and CBG personnel unless the provider required interaction with state personnel (ie. negotiation of NDA).

Due to the initial timeframe for completion (May 31, 2010) for Missouri's first version of the statewide map of broadband provision, the providers were requested to return the signed NDAs within five (5) business days of receipt and submit their data, in as usable a format as possible, by April 15, 2010.

The state parties performed follow-up with the providers on an as-needed basis. This included making contact with a provider if we did not hear from them after sending out the NDA and Data Request, following up to receive initial data sets, clarification regarding data sets, etc. Contact with the providers included phone calls, voicemail, and e-mail. In the case where a provider did not respond after numerous attempts, we also followed up with USPS mail as well as through their affiliated associations.

A spreadsheet was utilized to keep track of all contact information that was developed and contacts that were made to ensure the accuracy of each provider's pertinent contacts for the statewide project. These have been maintained as contacts and personnel change within the provider's industry.

4 Requested Data Format

The overarching goal of the data collection was to satisfy the requirements of the State Broadband Data and Development (SBDD) grant program, which is governed by the Notice of Funds Availability (NOFA) first published in volume 74, number 129, at page 32545 of the Federal Register and subsequently clarified in volume 74, number 154, at page 40569 of the Federal Register. Both the NOFA and subsequent discussions with the NTIA have indicated that time is of the essence, and strict deadlines are in place for the delivery of data to the NTIA. As such, timely, accurate data collection was of primary concern. GeoDecisions requested that broadband providers submit data in a timely manner in whatever format the information was currently available to eliminate the lag that can be expected with the providers attempting to meet NOFA formatting compliance themselves; however, it was determined that many national providers, having gone through this process in other states, could deliver NOFA compliant data as part of their data submittal.

To assist in the NDA execution process and to further facilitate the timely delivery of data from the providers, GeoDecisions and CBG reviewed the State's NOFA cover letter. The cover letter provided background on the project and the contacts to project team members from the State, GeoDecisions, and CBG. The cover letter stressed the incredibly short initial project timeline and specified the requirement to collect this data on an ongoing basis – every 6 months.

In addition to the cover letter, GeoDecisions and CBG developed a separate attachment to the NDAs. This *Data Collection Guidelines* was reviewed by the State and provided further background and project goals associated with Missouri's State Broadband Data and Development project. The document also specified the guidelines to which the project would abide. The *Data Collection Guidelines* informed providers of the intended use of the data that they would be submitting. The intended uses included delivery of NOFA-compliant data to the NTIA, data dictionary, the intention of generating static maps, as well as the creation of a Missouri-specific interactive broadband mapping website. Finally, the *Data Collection Guidelines* specified the NOFA data and format standards that were required of the State for delivery to the NTIA.

GeoDecisions also developed a provider data request spreadsheet template document that was distributed upon request and allowed the providers to enter NOFA compliant data as they chose to do so. It included mock-up sample data as reference for their own data entry. GeoDecisions, under the guidance of the State, also developed a preliminary Missouri-centric web site that displayed census blocks, census tracts, counties, and major roads in order to assist providers in correlating their service areas to census blocks. Providers could access this site and zoom, pan and print census block maps as needed.

Spatial data was requested from the providers in the following hierarchy of data format preferences.

1) Shapefiles or Geodatabase (personal or file)
2) CAD files with embedded attributes included
3) Text-based data (MS Access, spreadsheets, comma-delimited files, etc.)
4) Paper maps
5) Any method in which the provider could readily submit the required data

5 Data Processing

Because of the variety of ways providers could submit their data, one of the major challenges of this project was to consolidate and then integrate this data into a common model. For each provider, the work was divided into three main steps:

1. Capture the supplied data into a provider-specific staging geodatabase

2. Process and QA features in the provider's staging geodatabase
3. Move the data from the provider's staging geodatabase into the final deliverable geodatabase model.
4. Final QA of all features and associated attribute data.

The first step was the most involved and time consuming. Regardless of the type of data provided, the base-level data (the 2010 census blocks, the 2010 TIGER street segments, and the county boundaries), all came from a single source, so are therefore consistent across all providers. A number of different processes were developed for loading the staging geodatabase, depending on the type and form of data supplied. Each process was extensively documented through a process checklist to ensure accuracy and consistency. A description of these different processes used to load data into the provider specific staging geodatabase follows:

<u>Availability Area</u>
If a provider supplied their availability area as a single boundary or multiple boundaries drawn on a paper map or image file, those area(s) were geo-referenced and digitized into a shape file. If the boundary was provided as a CAD drawing or arose from another GIS system, it was also converted to a shape file format. Some wireless providers defined their area of availability as their wireless coverage area. This may be a supplied boundary, but it may also have been defined using the location of the wireless tower, the angle of coverage, and the coverage distance. This would result in a sector of a circle, which was then used as the availability area.

Once a shape file of the boundary was created, interpreted, and available, all census blocks intersecting that boundary were collected. Those census blocks less than two square miles were assembled into one feature class. For census blocks greater than two square miles, all street segments that overlapped both the census blocks and the availability area were collected into another feature class. Along with the availability area, the providers were also to supply the technology of transmission and speed information. These attributes were assigned to either the census blocks or street segments. Additional provider information including Name, DBA, and FRN, were also added as attributes.

<u>Census Blocks</u>
Some providers submitted a list of census blocks for their area of availability, along with technology of transmission and speed information specified for each census block. In these cases, the census block polygon was selected for each listed census block. If the census block's area was less than two square miles, it was added to the census block feature class and the technology of transmission and speed information were assigned from the provided list. If the census block's area was greater than two square miles, all street segments that overlapped it were added to the street segment feature class and the technology of transmission and speed information were assigned from the associated census block on the list.

The 2010 census block dataset was used for our data processing however a few providers submitted data using 2000 or 2009 vintage census blocks. When a provider submitted in a vintage other than 2010, the 2010 census blocks for the corresponding availability area were coded for that provider. Thus the true coverage of the census blocks were maintained and consistent with the provider's list but represented in the 2010 block structure.

Address Information
If a list of addresses was provided as the availability area, the first step was to obtain the coordinates of these addresses. When geocoded successfully, this resulted in a point for each address located. The census blocks intersecting all the points were collected. If the block's area was greater than two square miles it was treated separately. If a census block contained address locations with different technologies of transmission, the census block was duplicated, and a distinct technology of transmission assigned to each duplicated census block. For different locations in a census block with the same technology of transmission, the maximum value for each speed was obtained and that maximum assigned to the census block.

If the geocoded point lay within a census block with an area greater than two square miles, the nearest street segment was located and the technology of transmission and speed assigned to that segment. As with census blocks, if there were several locations with different technologies of transmission along the same street segment, the street segment was duplicated and each segment assigned a different technology of transmission. The speed assigned to that segment was the maximum speed for all locations along the segment sharing that segment's technology of transmission.

Wireless Boundary
In most cases, wireless providers supplied a boundary, either in electronic format or as a paper map. These were converted to a shape file either by digitizing or by performing a data conversion as appropriate. Some providers supplied tower locations, the angle of coverage, and the distance. In these cases the wireless boundary was constructed from this. Finally, some providers defined their wireless boundary using an exchange boundary or as an aggregate of their customers. Although these boundaries may not accurately represent the wireless availability area, they were initially included in the dataset in order for the providers to submit feedback and more accurately specify boundaries of availability in future iterations.

Middle Mile Points
If middle mile points were supplied on a hardcopy or image file map, the point was digitized. Usually these points were provided with latitude and longitude, so it was a simple matter to add them to the feature class. The elevation data was not always supplied due to the provider not having this information available, but when it was, it was often given as feet above sea level. The model requires elevation to be feet above (or below) grade. In these cases, a digital terrain model was used to obtain the ground elevation at the middle mile structure location, which was subtracted from the height above sea level to obtain the height above grade.

The above processes were used to capture the provider-supplied data into provider-specific individual staging geodatabases using the common National States Geographic information Council (NSGIC) data model suggested for use by the NTIA. Once this was completed, the data could be updated or modified and Quality Checked (QC) using the same processes regardless of how it was originally submitted.

One such process was the creation of overview areas. The census blocks and street segments for a provider were collected and grouped by technology of transmission. County boundaries that overlapped each of these groups were then collected. The technology of transmission of all census blocks and street segments for the group was then assigned to the county. *The assignment of maximum speed within the group to the county has been discontinued per NTIA's request.*

At this point the dataset for a particular provider was complete. An extensive QC checklist was used to examine the dataset, verify consistency, and ensure that it matched the data submitted by the provider. Once the dataset was passed the quality check, the features were appended into final database model along with all data from other completed providers. Both the *Validate Topology* and *Validate Features* ESRI tools were run, any corrections necessary were made, and the Tools were re-run until they processed without error. As individual provider data sets were appended into the master database and again when all data sets were appended, the NTIA supplied 'SBDD Check Submission' tool was also run against the data. Any errors detected were corrected and the tool re-run. A final manual QC review was performed to ensure that all the provider data is present and consistent. This was then followed by a final run of the SBDD Check Submission tool against the master data model to determine if any further corrections / changes were necessary.

Public Data Sources

The University of Missouri (UM) was in charge of the process to obtain and compile cable strand maps, as well as maps of service / coverage areas obtained from the service provider's public offices directly or from their Web sites and advertising materials. This was particularly true in cases where no other authoritative source was available for the given provider. Websites were collected and inventoried through the use of a 'surveymonkey' instrument to standardize and assemble the database from the webcrawling activities. All files and maps found through the webcrawling were then either imported, scanned, or screen-captured to create a digital representation or image of the associated service area. These files were then georeferenced to a common Missouri base map. The spatial transformation methodology used was determined by the image type, confidence in a real representation, and scale of source materials. In addition, maps of telephone company exchange areas and cable franchise areas from their respective associations were digitized and attributed to provide additional points of reference as well. These files were then held as elements of independent validation for the GeoDecision/CBG files created from Provider sources.

Community Anchor Institutions

The University of Missouri (UM) was lead on the development of the Community Anchor Institution database. Many elements of the Community Anchor Points were initially compiled by the UM in coordination with the Department of Public Safety (SEMA and OHS) providing a starting point for this data collection. The list of Anchor Institutions inventoried and monitored in this project include: Police, Fire, Hospitals, EOC, PSAPs, Municipal Courthouses, Libraries, K-12, Higher Education, Extension Offices, Correctional Facilities, Government Buildings, Community Centers, County Courthouses, and Armories.

The community anchor attribute information was gathered by the University through phone calling and site visits by UM students and staff. These efforts were coordinated with respective state agencies / associations with jurisdiction over these sites. For example, the State Fire Marshall's Office sent out a memo under their letterhead informing their constituency of the inventory and assessment so that the student callers and those conducting site visits would be received positively. UM also used their ongoing local data review, validation, and verification processes in partnership with Regional Planning Councils, Regional Homeland Security Oversight Committees, and associated local governments to assemble and verify data for some counties within Missouri. This process of data development had already been deployed in some areas of Missouri in association with the development and review of public safety structure-based information and has proven to work well.

6 Data Accuracy – Back Lab Verification Methods

Throughout the project, GeoDecisions and CBG performed numerous verification tasks to determine the level of accuracy of the information gathered from the broadband providers in the State. The initial verification methods were called back lab verification tasks by the NTIA. Unlike the field verification processes (described below), these tasks were performed in a lab or office setting. Each of the following GeoDecisions/CBG back lab processes was utilized to validate the data collected from some or all of the providers:

After the data from a given provider was captured into the geodatabase, the mapped data was then compared against information gleaned from various sources. The FCC had documentation that was used such as the Form 320 (Basic Signal Leakage Performance Report), which is filled out by cable television providers on an annual basis, and Cable TV Community Unit and Physical System databases. These information databases provided high-level information of geographic areas served by cable TV and other broadband providers. This information alerted our team to areas not included in gathered data from a broadband provider.

Additional sources of information utilized during the back lab verification process included franchise and exchange boundaries, cable strand maps, media prints, as well as business and taxation licenses. These sources varied in value to the project, depending on the level of information gathered and maintained by local franchising authorities and state agencies such as the PSC. Telecommunications associations were also queried for information regarding providers and system boundaries or areas of the state where specific providers offer service.

The above processes primarily relate to wireline broadband providers. For wireless broadband providers, we compared information gathered from the providers against FCC and FAA tower databases and private tower databases, as needed.

Independent Validation and Assessment: The UM also performed similar verification tasks as listed above to determine the level of accuracy and confidence in the information delivered by GeoDecisions/CBG as assembled from the broadband providers in the State. Again, these verification methods were called back lab verification tasks by the NTIA as these tasks were performed in a lab or office setting.

In addition to the above, the UM back lab processes took the assembled public sourced data for all providers (where this type of information could be found) and intersected it with the supplied GeoDecisions / CBG provider service areas. As well, Ookla site data, survey data, and presence/absence data assembled were also used to assess these data. From these data, additional analyses were performed to create measures of agreement, confidence indexes, spatial confidence indexes, and to visualize patterns of service and gaps in service.

These gaps and patterns of service are currently being examined to determine common threads for the State of Missouri across socio-economic, demographic, density of CAI, and other measurable elements of this mapping. We hope to use these data to inform the Regional Technology Planning Teams of opportunities and impediments.

The results of the independent assessment and validation were then combined with findings from GeoDecisions/CBG to form a report that then was delivered back to the provider to initiate the 'provider feedback' element (see Section 19 of this report) of the assessment and to validate/verify the assessments of these data and their extents by both UM and GeoDecisions/CBG with the respective provider.

7 Development/Implementation of a field verification guide and checklist

Prior to beginning field verification activities, CBG Communications, Inc. (CBG) developed a field verification guide for use by each member of the field verification team. The guide included systematic instructions and a checklist related to verification of each broadband system and service type. The guide and checklist were drafted, reviewed and finalized prior to the beginning of field verification activities.

As we continue to move forward with each submission, our field verification efforts continue to advance. Provider data is used to determine higher success areas having overlapping or common areas as well as including providers not able to be thoroughly verified from prior rounds. Those areas are the initial focus, medium priority areas are determined using similar stepped-down criteria. Lower priority areas are for providers thoroughly verified in past rounds but current data is needed. This also includes locations in between the higher and medium priority areas. Provider data is loaded on laptops or Garmin units for use by field verification personnel.

8 Field verification team training

To ensure uniformity of the team's approach to field verification, field team training was held immediately prior to the beginning of field verification activities. Training was conducted for GeoDecisions, CBG, and University students and staff. The training covered all field verification activities, including:

- Use of the guide, instructions and checklist
- Understanding of each system and service types
- Understanding of coverage characteristics
- Understanding of service attributes, including system technology type, upstream and downstream connection speeds, and other attributes required (by the NTIA) to be documented and verified
- Use of the equipment needed for field verification activities
- Proper documentation of field verification activities

The office tutorial lasted ½ day. An additional field-based ½ day session was utilized for actual demonstration of field verification activities.

9 Team Assignments

Two person teams were utilized the next 2 days after office and field training in order to work together and become more comfortable with the process. Eventually, field verification team members were expected to perform field verification activities on their own, with the exception of University student teams, who continued to participate in pairs of two for safety and security reasons. The State was divided into five (5) large areas encompassing Northwest, Northeast, Southwest, Southeast and Central Missouri. The contractor assembled ten (10) team members, and assigned two for each area. Initially the UM team assembled eight (8) team members to form four (4) teams, and assigned them to certain counties and particular census blocks within those counties. In subsequent iterations the UM team assembled 6 team members to form two (2) 2-3 person teams that reviewed targeted areas within counties and larger census blocks. As well, these teams conducted the surveys and interaction at the Missouri State Fair and other regional fairs as discussed in Section 13 of this report.

Each team member was provided an official-looking ID card and a letter of certification on Missouri State letterhead in order to mitigate findings early-on that residents were suspicious of individuals asking unsolicited questions. These two items proved very effective in minimizing these concerns.

10 Verifying Coverage

Broadband system coverage was verified by sampling whether services were available at various locations shown on the providers' system coverage maps randomly chosen from all of the census blocks that are at the ends of the providers' systems. The random sample was developed separately by the UM and contractor teams.

The contractor team initially verified availability by looking for a mixture of large and small providers across the state, being sure to hit each of the 19 Regions which would form the basis for the Regional Technology Planning Teams involved in the state broadband planning process. Efforts were made to locate and verify all providers that had submitted data. Verifying the large providers, especially, in each of these regions was a priority. Each contractor team member collected field gathered data in an MS Access database. The data included: Lat/Lon of verification point, provider name, technology type, speed test results if available, customer comments and notes from team member. All data was compiled and used to not only validate provider submitted data as mapped, but for providing feedback to the providers.

As a cross check, the UM team sampled a selection of counties, looking for more detailed coverage in a subset of the state's counties.

As we continue to move forward with each submission, our field verification efforts, as with all other aspects of the project, continue to advance. Providers are now categorized from prior verification rounds as unverified, high, medium or low priority. Unverified are new providers or one not able to be verified in previous attempts. High are providers with minimal verification in previous attempts. Medium are providers fairly thoroughly verified in previous verification and low are providers heavily verified in prior verification. Provider data is also used to determine highest provider concentration areas having overlapping or common areas. Those areas are the initial focus for unverified and high priority providers. Medium and lower priority providers and areas are secondary and my include locations between the unverified and high priority areas. Provider data is loaded on laptops or Garmin units for use by field verification personnel.

11 Ookla Speed Test Web Site

As part of the field verification process, State residents and businesses interviewed or visited were given a card briefly explaining the project and directed them to the State's designed speed test website. These cards were broadly distributed at the State Fair and other regional fairs as well. This has led to more responses on the Speed Test. This project specific Ookla speed test web site was set up to collect information on providers, users, as well as the upstream and downstream speeds associated with their broadband connection.

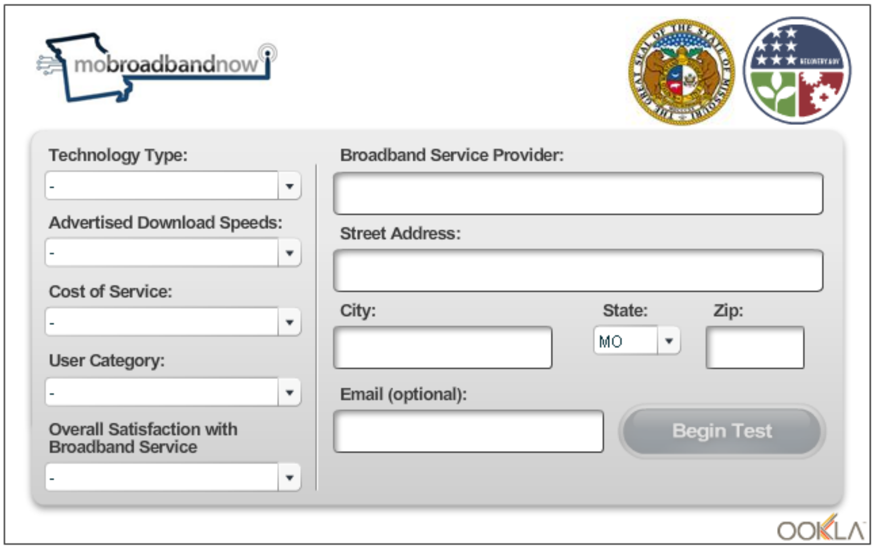


Figure 1: Depiction of Ookla Speed Test Site

12 Equipment Utilized for Field Verification Activities

Each team member carried the following equipment in order to perform field verification activities for the various types of services:

a. Laptop with Wi-Fi capability and provider GIS data installed
b. Cellular 3G/4G and WiMAX aircards (independent card for each provider) for use with laptop
c. Binoculars

d. GPS for verifying and documenting exact locations
e. Hardcopy forms and electronic database for documenting verification data
f. Cell phone with 3G or 4G used in lieu of laptop for certain types of wireless broadband services
g. Digital recorder for aural field notes, as needed
h. Identification documents (business cards, State or other ID badges, letter from the State acknowledging that the team member is part of the verification team, for those with questions)
i. Car chargers and/or DC to AC Inverters for equipment chargers
j. Census block maps (boundary details shown) and other maps as needed
k. Garmin GPS unit.
l. Postcards advertising the Ookla web site for distribution, as shown below

Figure 2: Postcards Distributed to Residents

13 Other Verification Methods

In addition to utilizing the above mentioned equipment and the methodologies listed below for verifying coverage and characteristics, team members entered into discussions with residents in the various areas. Residents were asked questions such as: Do they currently have broadband service?, Who their provider is?, If they know what speeds they could achieve, and if they knew of other provider's services being available in the area. This information needed to be confirmed by multiple residents before being considered accurate. Residents often did not know what their service level was nor what their speed of service was. Questions such as how much were they paying for the service led to a better understanding of their service level. Residents were encouraged to visit the Ookla speed test site to assist in gathering actual speed data. To date, nearly 6500 results have been received.

Missouri State Fair: In order to collect a large amount of information from Missouri residents for verification, the Broadband Mapping Team (BB Team) visited the Missouri State Fair in Sedalia, Missouri. The 2010 Missouri State Fair had an estimated attendance of over 330,000 people. With such a high attendance, it was determined that this event would be useful for data collection. For the 2011 Missouri State Fair, attendance exceeded that of the previous year, estimated at 330,000 to 350,000 attendees. The BB Team had two locations at the fair. The first was in the Mizzou Central Building in the MO-AG Theater organized by the College of Agriculture, Food and Natural Resources. This was the main location for the BB Team, where an informational slide show continuously played and signage was displayed throughout the booth area. At this location, Missouri residents were asked to fill out a survey regarding their internet service. A total of 699 surveys were completed at the 2011 Missouri State Fair, an increase of 117 surveys from the previous year, and were later geocoded to be used as verification and validation for UMs independent assessments.

The second BB Team location was on the lawn outside of the MO-AG Theater, where a Mizzou Tent was assembled daily and tables were set displaying a large Missouri map divided into four quadrants. Each of the four quadrants represented different regions of Missouri, northwest, northeast, southwest and southeast. At this station, Missouri residents were able to physically place a colored pin on their home location. The color of the pins was used to differentiate whether or not broadband was available. A total of 320 pins were placed by Missouri residents, denoting presence or absence of broadband. The 2010 Missouri State Fair pin total was 880, a difference of 560 pins down from the previous year due to severe weather that occurred two out of the four days the team was present at the fair.

In addition to the 2011 Missouri State Fair, the BB Team also visited three regional fairs and an extra state fair, the Boone County Regional Fair, Phelps County Regional Fair, the Shelby County Regional Fair and the Southeast Missouri District Fair in the city of Cape Girardeau. The three regional fairs, all located near the University, were chosen specifically to increase the amount of broadband data for the Mid-Missouri region. The Southeast Missouri District Fair was selected because the 2010 Missouri State Fair results displayed little or no data in the southeast Missouri region. In total, 1053 surveys were completed and approximately 390 pins were placed during this verification phase.

At all of the fairs, the broadband speed test cards for the Missouri Ookla site were handed out to residents after filling out a survey or placing a pin on one of the four maps. The BB Team also distributed drinking cups, refrigerator magnets, and pens with the State Broadband speedtest site on them.

In terms of verifying provider coverage, the state and regional fairs have provided valuable data that could not have been otherwise obtained. The color-coded push pin maps have been converted to point-based shape files. Combined with additional information collected from the fair attendees while interacting with the push pin maps, the resulting shape file has provided a statewide, grassroots survey of internet service provider, type of internet service (broadband, dial-up, etc.), technology of transmission, subscribed speed, and customer satisfaction. This data has been used in the verification process as a visual comparison to census block provider footprints. The results, so far, have been very positive and the fair points have displayed a high spatial correlation with the census blocks. More data collection will be required before this verification method can be formalized, but the results are very promising.

14 Verifying Wireline Broadband Coverage Characteristics

Using the specified random sampling technique, field team members searched for the physical endpoints of cable systems, telephone/DSL and fiber optic infrastructure and noted when additional infrastructure was not seen moving outward from the core either in an aerial (overhead) or underground manner. These areas were targeted for discussions with residents and to perform speed tests. Observations and findings were documented accordingly.

15 Wireless Broadband Coverage

Verification team members reviewed the provider's information and looked for network availability near the antenna site or in the middle of the provider's service area to confirm network and test equipment compatibility. Using the specified random sampling technique, the team member tested with pertinent gear to determine when service could and couldn't be achieved by the laptop, cell phone, or other wireless broadband-enabled device. These locations were documented accordingly.

16 Upstream and Downstream Connection Speeds for Wireline Providers

The field verification team member:

a. *For cable modem* – Upstream and downstream connection speeds were verified using the Ookla speed test at locations within the providers' coverage area using the specified random sampling technique. An already installed cable modem connection was utilized, as available. These included both preselected points with arrangements made for testing (such as at local libraries or at public facilities utilizing cable modem service) and at randomly chosen business and homeowner locations where the business or homeowner consented to test the service. Findings were documented accordingly on electronic or paper forms. In addition, the speed test was documented via the Ookla site.

b. *For DSL connection speed testing* –The same procedures were used as for cable modem testing. Findings were documented accordingly on paper or electronic forms.

c. *For fiber optic connection speeds* – For services to homes and small businesses the same procedures were used as above for cable modem and DSL. For higher speed services to larger businesses, institutional network connections, enterprise/wide area network connections, etc., the team member worked with the business or institutions' IT group to perform connection speed testing. If actual testing could not be performed, team members attempted to gain existing end user documentation tests and performance documentation related to speeds of the network. Findings were documented accordingly on paper or electronic reports.

17 Wireless Broadband Service Connection Speed Testing

For cellular broadband 3G and 4G testing – A provider specific air card was needed in order to enable the laptop to access the Ookla speed test to determine the speed of connection. Some service providers provided air cards to conduct this testing. All teams also used both personal and corporate cards to assist in the testing. The speed of connection was tested at randomly selected points beginning close to the providers' tower/antenna infrastructure, at a mid-point and then at the ends of the verified coverage area. Findings were documented accordingly on paper or electronic reports. Documentation was uploaded daily by the team members to ensure timely and uniform oversight and modifications of the processes.

The MU BB team also conducted a more detailed test of fixed mobile wireless coverage areas throughout Boone County using high-speed wireless broadband air cards. For wireless broadband testing purposes, the top five providers, AT&T, US Cellular, T-Mobile, Sprint/Virgin Mobile and Verizon were tested to understand how mobile broadband varies in different locations by collecting information such as: signal strength, speed, as well as the latitude and longitude coordinates of where the test was performed.

To gather upload and download speed information for each air card, the team members used the MOBroadbandNow Speed Test website on Ookla. During the speed testing it was not uncommon that the speeds varied at a specific point for each air card, therefore the air card was tested a total of three times for analysis and comparison. The signal strength was determined by how many "bars" were displayed for each provider. The bars would vary depending on if the team was in a mobile coverage area or not. The latitude and longitude coordinates were recorded using a GPS unit. The speed, signal strength, and coordinates were tested and recorded in ½ mile increments along selected urban and/or rural routes throughout Boone County.

Additional air card testing and verification was completed over this past May-July in various counties such as: Howard, Callaway, Cooper, Moniteau, Cole, Morgan, Miller and Camden using specific provider footprints. For this testing method, random locations were chosen within the provider footprint and air cards were tested to see how each provider varied in strength and signal.

18 Coordination of Contractor and State Parties' Field Verification

The state and contractor utilized the process in the diagrams below to coordinate field verification activities:

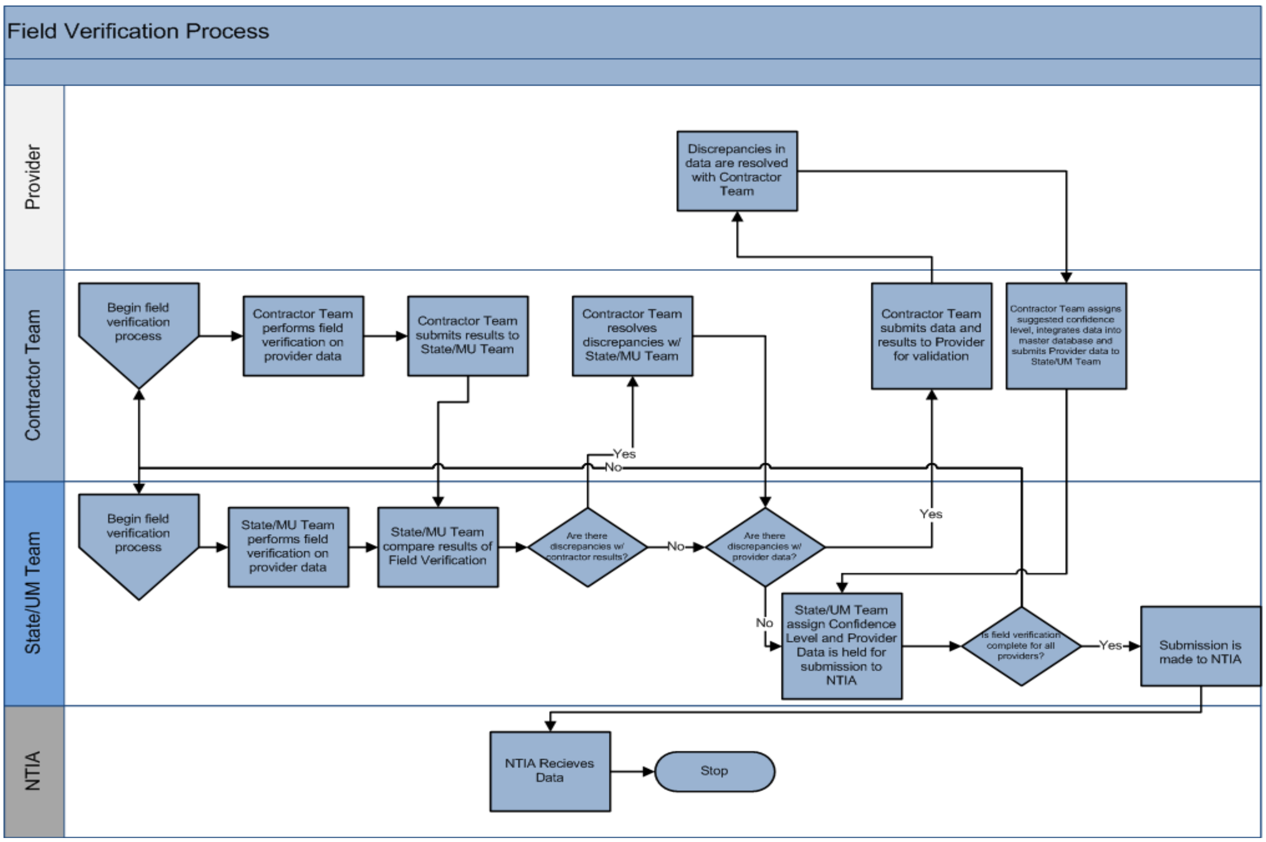


Figure 3: Field Verification Coordination Process

19 Provider Feedback Reporting

Upon completion of the provider submitted data, feedback information was supplied to each of the 91 providers that had submitted data. This feedback was presented in the following forms:

1. A detailed Data Review Report in MS Word format,
2. All provider attribute data exported into MS Excel format, and
3. Multiple Overview, Wired and Wireless GIS exported image files in pdf format.

This information would allow each provider to review our validation findings, as well as check their submitted data as depicted in the GIS data model, both in a graphical and tabular form.

The Data Review Report detailed the usability and completeness of their submitted data as well as an estimate of our confidence in their submitted data based on field verification efforts and back lab verification steps as detailed above. The report also requested feedback on the accuracy of how we characterized their availability areas, technologies, speeds etc. Based on the provider's feedback, the data was adjusted and refined accordingly.

Field verification and back lab verification processes and procedures were utilized, as available and as needed, to ensure the highest level of confidence that the information gleaned from the providers was as accurate as possible. During this process, GeoDecisions contacted providers when we found instances that appeared to conflict with the information they initially provided and worked with the providers to adjust the maps accordingly.

20 Statistics

File Type	Number of Records
Total Records in all Files	**717,930**
Census Block < 2 sq. miles	518,849
Address-Level	Not Required
Street Segment	190,678
Wireless Shape File	63
BB Service Overview	587
Community Anchor Institution	6,917
Middle Mile	835
State Boundary	1
Metadata Provided for Geospatial Data	YES
Number of ISP's Provided in Submission	101

Providers Completed	101
Pending Additional Data	15
Non-Responsive/Refused	22
Researching	56
Non-Facilities Based	84
Out of Business	8
TOTAL	286

Provider Name	Status	FRN	NDA Execution Date	Notes/Comments
Adams Networks	Data Included in Missouri State Submission	0011616356	5/18/2010	No updates submitted in third data call response.
Alma Communications Company	Data Included in Missouri State Submission	0007196207	5/18/2010	No updates submitted in third data call response.
Alsat Wireless	Data Included in Missouri State Submission	0021067509	8/3/11	New provider from Data Call 4
Holway Telephone Company	Data Included in Missouri State Submission	0004746863	4/5/2010	Forth data call updates included.
KLM Telephone Company	Data Included in Missouri State Submission	0003772274	4/5/2010	Forth data call updates included.
N. W. Communications	Data Included in Missouri State Submission	0003772290	4/5/2010	Forth data call updates included.
American Fiber Systems, Inc. – Zayo Group	Data Included in Missouri State Submission	0006651202	4/27/2010	Forth data call updates included.
AT&T Corp.	Data Included in Missouri State Submission	0004496774	4/7/2010	Forth data call updates included.
AT&T Mobility, LLC.	Data Included in Missouri State Submission	0004979233	4/7/2010	Forth data call updates included.
AT&T Southwest	Data Included in Missouri State Submission	0016657918	4/7/2010	Forth data call updates included.
Bay's Internet	Data Included in Missouri State Submission	0018912576	Not Req'd by Provider	No updates submitted in forth data call response.
Big River Telephone, LLC	Data Included in Missouri State Submission	0018520320	Not Req'd by Provider	Forth data call updates included.
BlueBird Network, LLC.	Data Included in Missouri State Submission	0018995944	Not Req'd by Provider	New provider from Data Call 4
Boycom Cablevision, Inc.	Data Included in Missouri State Submission	0007630791	Not Req'd by Provider	New provider from Data Call 4
Boycom Cablevision, Inc. – Partel Broadband Telecom Inc.	Data Included in Missouri State Submission	0020795449	Not Req'd by Provider	New provider from Data Call 4
Cable One, Inc.	Data Included in Missouri State Submission	0003474327	4/5/2010	Forth data call updates included.
Cable America Missouri, LLC	Data Included in Missouri State Submission	0015466766	6/10/2010	No updates submitted in forth data call response.
Carthage Water & Electric	Data Included in Missouri State Submission	0007147143	Not Req'd by Provider	No updates submitted in forth data call response.
Suddenlink Communications – Cebridge	Data Included in Missouri State Submission	0014367650	6/12/2010	Forth data call updates included.
Suddenlink Communications – Friendship Cable	Data Included in Missouri State Submission	0004999025	6/12/2010	Forth data call updates included.
Suddenlink Communications – Cequel III Communications II	Data Included in Missouri State Submission	0009725870	6/12/2010	Forth data call updates included.
CenturyLink	Data Included in Missouri State Submission	0018626853	4/20/2010	Forth data call updates included.
Chariton Valley Telephone Corporation	Data Included in Missouri State Submission	0002549392	5/26/2010	Forth data call updates included.
Chariton Valley Telecom Corporation	Data Included in Missouri State Submission	0008437147	5/26/2010	Forth data call updates included.
Charter Communications	Data Included in Missouri State Submission	0017179383	6/10/2010	Forth data call updates included.
Citizens Telephone Company of Higginsville Missouri	Data Included in Missouri State Submission	0002504298	4/5/2010	No updates submitted in forth data call response.
LiNKCity	Data Included in Missouri State Submission	0016051450	Not Req'd by Provider	No updates submitted in forth data call response.
City Utilities Springfield (SpringNet)	Data Included in Missouri State Submission	0004759411	3/23/2011	No updates submitted in forth data call response.
Cogent Communications, Inc.	Data Included in Missouri State Submission	0019898303	Not Req'd by Provider	No updates submitted in forth data call response.
Comcast	Data Included in Missouri State Submission	0004441663	5/27/2010	Forth data call updates included.
Covad Communications Company	Data Included in Missouri State Submission	0003753753	5/18/2010	Forth data call updates included.
Craw-Kan Telephone	Data Included in Missouri State Submission	0002334225	4/5/2010	No updates submitted in forth data call response.
T-Mobile	Data Included in Missouri State Submission	0006945950	5/4/2010	Forth data call updates included.
Ellington Telephone Company	Data Included in Missouri State Submission	0003741956	4/5/2010	No updates submitted in forth data call response.
FairPoint Communications Missouri, Inc.	Data Included in Missouri State Submission	0014710388	9/1/2010	Forth data call updates included.
ExOp of Missouri Inc.	Data Included in Missouri State Submission	0004969697	9/1/2010	New provider from Data Call 4
Farber Telephone Company	Data Included in Missouri State Submission	0003748043	4/5/2010	No updates submitted in forth data call response.
BPS Telephone Company	Data Included in Missouri State Submission	0003730835	4/5/2010	Forth data call updates included.
BPS Networks	Data Included in Missouri State Submission	0016026965	4/5/2010	Forth data call updates included.
Brown Dog Networks	Data Included in Missouri State Submission	0009254095	Not Req'd by Provider	New provider from Data Call 4
Fidelity Cablevision, Inc	Data Included in Missouri State Submission	0000013326	4/5/2010	Forth data call updates included.
Fidelity Communications Services I, Inc.	Data Included in Missouri State Submission	0004351722	4/5/2010	Forth data call updates included.
Fidelity Telephone Company	Data Included in Missouri State Submission	0002550309	4/5/2010	Forth data call updates included.
Granby Telephone Company	Data Included in Missouri State Submission	0005061189	4/5/2010	Forth data call updates included.
Grand River Mutual Telephone Corp.	Data Included in Missouri State Submission	0002505519	4/7/2010	Forth data call updates included.
Green Hills Technologies	Data Included in Missouri State Submission	0003736246	4/5/2010	Forth data call updates included.
Green Hills Telephone ILEC	Data Included in Missouri State Submission	0003736238	4/5/2010	No updates submitted in forth data call response.
Green Hills Telecommunications Services	Data Included in Missouri State Submission	0003736253	4/5/2010	No updates submitted in forth data call response.
Hughes Network Systems, LLC	Data Included in Missouri State Submission	0017434911	Not Req'd by Provider	No updates submitted in forth data call response.
KC Coyote – Isotech	Data Included in Missouri State Submission	0014669097	Not Req'd by Provider	New provider from Data Call 4
KTIS (Kingdom Telephone Company)	Data Included in Missouri State Submission	0002212314	4/5/2010	Forth data call updates included.
Cricket Communications, Inc. (Leap Wireless International)	Data Included in Missouri State Submission	0002963528	4/20/2010	Forth data call updates included.
Le-Ru Telephone Co.	Data Included in Missouri State Submission	0002490472	4/7/2010	No updates submitted in forth data call response.
Level 3 Communications, LLC	Data Included in Missouri State Submission	0003723822	4/27/2010	Forth data call updates included.
LTO Communications, LLC	Data Included in Missouri State Submission	0019008036	Not Req'd by Provider	No updates submitted in forth data call response.
Mark Twain Communications Company	Data Included in Missouri State Submission	0002531879	4/5/2010	No updates submitted in forth data call response.
Mark Twain Rural Telephone Co	Data Included in Missouri State Submission	0002549228	4/5/2010	No updates submitted in forth data call response.
McDonald County Telephone Co	Data Included in Missouri State Submission	0002504058	4/5/2010	Forth data call updates included.
MCC Missouri LLC (Mediacom)	Data Included in Missouri State Submission	0005184247	9/1/2010	No updates submitted in forth data call response.
Mid States Services, LLC.	Data Included in Missouri State Submission	0018511303	5/26/2010	Forth data call updates included.
MyChoice Network LLC	Data Included in Missouri State Submission	0000000000	Not Req'd by Provider	New provider from Data Call 4 / FRN not provided.
New Florence Telephone Company, Inc.	Data Included in Missouri State Submission	0004374047	4/5/2010	Forth data call updates included.
Northeast Missouri Rural Telephone Company	Data Included in Missouri State Submission	0004337044	4/20/2010	No updates submitted in forth data call response.
Northwest Missouri Cellular	Data Included in Missouri State Submission	0002534618	Not Req'd by Provider	No updates submitted in forth data call response.
Oregon Farmers Mutual Telephone Company	Data Included in Missouri State Submission	0003733847	4/5/2010	Forth data call updates included.
New Wave Communications	Data Included in Missouri State Submission	0001202938	Not Req'd by Provider	No updates submitted in forth data call response.
Iland Internet Services	Data Included in Missouri State Submission	0017606898	Not Req'd by Provider	Forth data call updates included.
Mid Missouri Telephone Co.	Data Included in Missouri State Submission	0002509040	4/5/2010	No updates submitted in forth data call response.
Ozark Computers	Data Included in Missouri State Submission	0018658179	Not Req'd by Provider	Forth data call updates included.
Peace Valley Telephone Co., Inc.	Data Included in Missouri State Submission	0018539742	4/5/2010	No updates submitted in forth data call response.
Poplar Bluff, City of	Data Included in Missouri State Submission	0002514529	Not Req'd by Provider	No updates submitted in forth data call response.
ProTronics Technologies, Inc.	Data Included in Missouri State Submission	0010790061	Not Req'd by Provider	New provider from Data Call 4
Radio Wire, Inc.	Data Included in Missouri State Submission	0018912626	Not Req'd by Provider	No updates submitted in forth data call response.
Ralls Technologies (Ralls County Electric Cooperative)	Data Included in Missouri State Submission	0018539916	Not Req'd by Provider	New provider from Data Call 4
Midwest Data Center – Subsidiary of Rock Port Telephone	Data Included in Missouri State Submission	0004362505	4/7/2010	No updates submitted in forth data call response.
Rock Port Cablevision	Data Included in Missouri State Submission	0004362505	4/7/2010	New provider from Data Call 4

Goodman Telephone Company, Inc.	Data Included in Missouri State Submission	0004269775	4/12/2010	No updates submitted in forth data call response.
Ozark Telephone Company	Data Included in Missouri State Submission	0004269817	4/12/2010	No updates submitted in forth data call response.
Seneca Telephone Company	Data Included in Missouri State Submission	0004269809	4/12/2010	No updates submitted in forth data call response.
Sho-Me Technologies, LLC	Data Included in Missouri State Submission	0008875890	Not Req'd by Provider	No updates submitted in forth data call response.
Sprint Nextel Corporation	Data Included in Missouri State Submission	0003774593	6/11/2010	Forth data call updates included.
StarBand Communications Inc.	Data Included in Missouri State Submission	0005087457	4/5/2010	No updates submitted in forth data call response.
Steelville Telephone Exchange Inc	Data Included in Missouri State Submission	0002549665	4/5/2010	Forth data call updates included.
Miller Telephone Company	Data Included in Missouri State Submission	0004269528	4/5/2010	Forth data call updates included.
TDS Telecommunications Corporation – Stoutland	Data Included in Missouri State Submission	0002502243	4/26/2010	Forth data call updates included.
TDS Telecommunications Corporation – New London	Data Included in Missouri State Submission	0002529733	4/26/2010	Forth data call updates included.
TDS Telecommunications Corporation – Orchard Farm	Data Included in Missouri State Submission	0003767340	4/26/2010	Forth data call updates included.
Time Warner Cable	Data Included in Missouri State Submission	0013430244	6/21/2010	Forth data call updates included.
Total Highspeed Internet Service	Data Included in Missouri State Submission	0017633405	Not Req'd by Provider	New provider from Data Call 4
Townes Tele-Comm, Inc. – Choctaw Telephone Company	Data Included in Missouri State Submission	0004928792	Not Req'd by Provider	Forth data call updates included.
Townes Tele-Comm, Inc. – MoKan Dial, Inc.	Data Included in Missouri State Submission	0004928750	Not Req'd by Provider	Forth data call updates included.
Tw telecom	Data Included in Missouri State Submission	0017348061	4/27/2010	No updates submitted in forth data call response.
United Services, Inc. (United Sky Wireless)	Data Included in Missouri State Submission	0016087876	4/5/2010	No updates submitted in forth data call response.
Verizon Wireless – Cellco Partnership	Data Included in Missouri State Submission	0003290673	5/26/2010	Forth data call updates included.
WildBlue Communications, Inc.	Data Included in Missouri State Submission	0007843766	5/4/2010	No updates submitted in forth data call response.
Windjammer Communications LLC	Data Included in Missouri State Submission	0017915182	Not Req'd by Provider	No updates submitted in forth data call response.
Windstream Corporation	Data Included in Missouri State Submission	0014400220	6/10/2010	No updates submitted in forth data call response.
YHTI	Data Included in Missouri State Submission	0014205504	4/5/2010	Forth data call updates included.
Lathrop Telephone Company	Data Included in Missouri State Submission	0003737376	4/7/2010	Forth data call updates included.
NPG Cable, Inc. (St. Joseph Cablevision)	Data Included in Missouri State Submission	0002508687	Not Req'd by Provider	Forth data call updates included.
United States Cellular Corporation	Data Included in Missouri State Submission	0004372322	8/21/2010	Forth data call updates included.
KC Web Internet Services, LLC	Compiling Data – No Data Submitted	0011513751	Not Req'd by Provider	No source data received to date.
KEI Internet Service	Compiling Data – No Data Submitted	0000000000	Not Req'd by Provider	No source data received to date.
Wisper ISP, INC	Compiling Data – No Data Submitted	0016278970	Not Req'd by Provider	No source data received to date.
AccuBak Data Systems, Inc.	Data Compiled But Not Submitted By Provider	0018543744	Not Req'd by Provider	Owner still having trouble seeing the benefit to submitting data.
Ritter Cable Corporation	NDA Fully Executed – No Data Submitted	0014054449	4/20/2010	No source data received to date.
IAMO Telephone Company	NDA Fully Executed – No Data Submitted	0014067565	4/7/2010	No source data received to date.
SureWest Kansas, LLC – Everest Midwest LLC	NDA Fully Executed – No Data Submitted	0004069035	4/12/2010	No source data received to date.
Blue Mule Wireless	Data Not Submitted By Provider	0000000000	Not Req'd by Provider	No source data received to date.
TA Highspeed	Data Not Submitted By Provider	0000000000	Not Req'd by Provider	No source data received to date.
Tower Internet	Data Not Submitted By Provider	0000000000	Not Req'd by Provider	No source data received to date.
US Cable of Coastal-Texas, L.P.	Data Not Submitted By Provider	0000000000	Not Req'd by Provider	No source data received to date.
Crystal Broadband	Data Not Submitted By Provider	0000000000	Not Req'd by Provider	No source data received to date.
Socket Telecom, LLC	Working Toward Signed NDA	0008515595	NA	Reseller currently. Becoming facilities based provider
Haug Communications, Inc.	Working Toward Signed NDA	0004711735		NDA Sent – Speeds currently below Broadband.
Finally Broadband, LLC.	Working Toward Signed NDA			Not fully operational as of 8/31/11
Iowa Telecommunications Services, Inc.	Non-Responsive	0003911385		
Mo-Ark Communications – (Wasp Wireless)	Non-Responsive	0004376919		NDA Sent
CorpraNet	Non-Responsive			NDA Sent
Cox Communications	Non-Responsive			NDA Sent
True Broadband Networks	Non-Responsive			No answer at phone numbers and e-mails kick-back
Enventis Telecom Inc.	Non-Responsive	0008394322		NDA Sent
Dexter Broadband	Non-Responsive		NA	Phones disconnected and e-mails are unanswered
St Joe Wireless	Non-Responsive	0002545929		Attempting to make initial contact.
First Cable of MO (Mississippi Valley)	Non-Responsive			
Galactic Broadband	Non-Responsive			No contact information found
SES Americom	Non-Responsive			Attempting to make initial contact.
Verizon Business Global LLC dba Verizon Business	Non-Responsive	0010856284		Submitted data with wireless company only.
Momentum	Non-Responsive			
Mid Missouri Broadband & Cable LLC	Non-Responsive			
St Louis Broadband	Refused to participate at this time			Does not see benefit
Birch Telecom of Missouri, Inc.	Refused to Participate	0003732294	NA	Refuse to sign NDA or participate
Ionex Communications, Inc.	Refused to Participate	0005027453	NA	Refuse to sign NDA or participate - Birch Communications
Pixius Communications	Refused to Participate	0010480176	NA	Refuse to sign NDA or participate at this time
Poplar Bluff Internet, Inc (SEMO)	Refused to Participate	0013662408	NA	Refuse to sign NDA or participate at this time
Semo Communications Inc.	Refused to Participate	0003788775	NA	Poplar Bluff Internet - refuse to sign NDA or participate at this time
NuVox, Inc.	Researching - Acquired By Windstream	0004319414	6/10/2010	No source data received to date.
Stouffer Communications	Researching - Included as Granby Telephone	0005061189		
CenturyTel Fiber Co. II, LLC dba LightCore, a CenturyTel Co	Researching Included in CenturyLink submission	0008612293	4/20/2010	
Falcon Cablevision	Researching Acquired By Charter Comm		NA	Data included in Charter submission.
New Cingular Wireless Services, Inc.	Researching – Purchased by AT&T	0003766532	4/7/2010	Included in AT&T submissions
City Light Gas & Water Office – City of Kennett	Researching To Determine If Broadband Provider			
City of Marshall	Researching To Determine If Broadband Provider			
Fidelity Communication Services II, Inc.	Researching To Determine If Broadband Provider	0005918503	4/5/2010	Researching inclusion with other Fidelity Provider submissions.
Fidelity Networks, Inc.	Researching To Determine If Broadband Provider	0004312963	4/5/2010	Researching inclusion with other Fidelity Provider submissions.
Excel Telecommunications – SureWest	Researching To Determine If Broadband Provider		4/12/2010	
TDS Metrocom	Researching To Determine If Broadband Provider		4/26/2010	Researching inclusion with other TDS Provider submissions.
TDS Missouri	Researching To Determine If Broadband Provider		4/26/2010	Researching inclusion with other TDS Provider submissions.
Telephone and Data Systems	Researching To Determine If Broadband Provider		4/26/2010	Researching inclusion with other TDS Provider submissions.
Aurora Communications, Inc.	Researching To Determine If Broadband Provider	0015696180	4/5/2010	Researching inclusion with other YHTI Provider submissions.
Full Stream Wireless	Researching To Determine If Broadband Provider			
Broadview Networks Holdings, Inc.	Researching To Determine If Broadband Provider	0010296853		
Broadwing Communications, LLC	Researching To Determine If Broadband Provider	0008599706	4/27/2010	Researching inclusion with other Level 3 Provider submission
WilTel Communications, LLC.	Researching To Determine If Broadband Provider	0003716511	4/27/2010	Researching inclusion with other Level 3 Provider submission
AT&T Services, Inc.	Researching To Determine If Broadband Provider	0008644056	4/7/2010	Researching inclusion with other AT&T Provider submission.

Advanced Digital LLC	Researching To Determine If Broadband Provider			
BMU Internet	Researching To Determine If Broadband Provider			
Co-Mo Electric	Researching To Determine If Broadband Provider			
Computer Magic Internet LLC	Researching To Determine If Broadband Provider			
DNG Electronics	Researching To Determine If Broadband Provider			
Extreme	Researching To Determine If Broadband Provider			
Green City Electric Utility	Researching To Determine If Broadband Provider			
Human Span	Researching To Determine If Broadband Provider			
Insight Cable	Researching To Determine If Broadband Provider			
Jaguar Technologies Inc (JagTec)	Researching To Determine If Broadband Provider			
Jobe Internet Services	Researching To Determine If Broadband Provider			
Keno Telephone	Researching To Determine If Broadband Provider			
LocalNet	Researching To Determine If Broadband Provider			
MCM System Wireless	Researching To Determine If Broadband Provider			
MHE Net	Researching To Determine If Broadband Provider			
Midwest Internet Technologies (MITI)	Researching To Determine If Broadband Provider			
Midwest Telecommunications	Researching To Determine If Broadband Provider			
Mist Valley	Researching To Determine If Broadband Provider			
Momentum	Researching To Determine If Broadband Provider			
MoreNet	Researching To Determine If Broadband Provider			
NetZero	Researching To Determine If Broadband Provider			
North Missouri Internet Services	Researching To Determine If Broadband Provider			
Optimum Cablevision	Researching To Determine If Broadband Provider	0003301363		
Pacific Wireless Internet	Researching To Determine If Broadband Provider	0018044297		
PIP Internet	Researching To Determine If Broadband Provider			
Primary Networks	Researching To Determine If Broadband Provider			
Regis	Researching To Determine If Broadband Provider			
Sikeston Internet	Researching To Determine If Broadband Provider	0018375808		
Suddenlink Communications - Cequel Communications	Researching To Determine If Broadband Provider	0015784663	6/12/2010	
Superior Cable	Researching To Determine If Broadband Provider			
Tri-Lakes Internet	Researching To Determine If Broadband Provider			
Turbo Net	Researching To Determine If Broadband Provider			
Utopian Wireless Corporation	Researching To Determine If Broadband Provider			
United Electric	Researching To Determine If Broadband Provider			
Vaughn's Computer Central	Researching To Determine If Broadband Provider	0019846674		
Wave Internet Technologies LLC	Researching To Determine If Broadband Provider	0020090023		
Access US	Not Facilities Based			
Board of Municipal Utilities	Not Facilities Based	0016073389		Discontinued offering service
McLeodUSA Telecommunications Services, Inc. (PaeTec)	Not Facilities Based	0003716073	NA	
XO Communications, LLC	Not Facilities Based	0006275945	NA	
Telnet Worldwide	Not Facilities Based		NA	
Terre Star	Not Facilities Based		NA	
TMC Communications	Not Facilities Based		NA	
TracFone	Not Facilities Based		NA	
Sofnet	Not Facilities Based		NA	
Clear Communications, Inc.	Not Facilities Based			Equipment seller
Superfone Inc.	Not Facilities Based	0008402202		
Tritel	Not Facilities Based		NA	
Missouri Broadband	Not Facilities Based		NA	
Mobilcom Pittsburg, Inc.	Not Facilities Based	0002324465	NA	
PneumaTek	Not Facilities Based		NA	Not responding to email
City of Newburg	Not Facilities Based		NA	
Qwest Communications Company, LLC	Not Facilities Based	0003605953	NA	
South Holt Cablevision	Not Facilities Based		NA	Offer Internet through Oregon Farmers Mutual Telephone Co
ADC	Not Facilities Based		NA	
Adva Optical Networking North America, Inc.	Not Facilities Based		NA	
AFL Communications	Not Facilities Based		NA	
Aircell	Not Facilities Based		NA	
Airdis Telecom	Not Facilities Based		NA	
Airespring, Inc.	Not Facilities Based	0006875322	NA	
ANPI	Not Facilities Based		NA	
Arch Communications	Not Facilities Based		NA	
Atlantis Holdings LLC	Not Facilities Based	0018587402	NA	
Bluegrass Cellular	Not Facilities Based		NA	
Boost Mobile	Not Facilities Based		NA	
Broadband National	Not Facilities Based		NA	
BullsEye Telecom, Inc.	Not Facilities Based	0004350930	NA	
Cellular one	Not Facilities Based		NA	
CHR Solutions	Not Facilities Based		NA	
Charles Industries	Not Facilities Based		NA	
Chillicothe Municipal Utilities	Not Facilities Based	0004192225	NA	
City of Newburg	Not Facilities Based		NA	
Cooperative Communications, Inc.	Not Facilities Based		NA	
Curt's Custom Cable	Not Facilities Based		NA	
DeSoto ISP	Not Facilities Based		NA	
Digital Landing	Not Facilities Based		NA	
DirecTV	Not Facilities Based		NA	
DSL,net, Inc. (Megapath)	Not Facilities Based	0004324851	NA	
Earthlink	Not Facilities Based		NA	

Extel	Not Facilities Based		NA	
Freedom Communications	Not Facilities Based		NA	
GlobalNet	Not Facilities Based		NA	
Golden State Cellular	Not Facilities Based		NA	
Granite Telecommunications	Not Facilities Based		NA	
Illinois Valley Cellular	Not Facilities Based		NA	
Innovative Systems	Not Facilities Based		NA	
Interglobe Communications, Inc.	Not Facilities Based	0005156229	NA	
Inter-Linc	Not Facilities Based		NA	
Jitterbug	Not Facilities Based		NA	
LightEdge Solutions, Inc.	Not Facilities Based	0015546443	NA	
Logix Communications	Not Facilities Based		NA	
Metropolitan Telecommunications Holding Company	Not Facilities Based	0009806019	NA	
Mid America Computer Corporation	Not Facilities Based		NA	
Mohave Wireless	Not Facilities Based		NA	
Netlogic, Inc.	Not Facilities Based	0006825954	NA	
New Edge Holding Company	Not Facilities Based	0003720471	NA	
Nex-Tech Wireless	Not Facilities Based		NA	
Nortel Solutions	Not Facilities Based		NA	
Open Range	Not Facilities Based		NA	
OFS	Not Facilities Based		NA	
Pacific Wireless	Not Facilities Based		NA	
Preferred Long Distance	Not Facilities Based		NA	
Protel	Not Facilities Based		NA	
Pulse Broadband	Not Facilities Based		NA	Reseller for Ralls Tech.
Ralls Technologies, LLC	Not Facilities Based	0018539916	NA	Becoming facilities based in the near future
SkyTerra Communications	Not Facilities Based		NA	
SkyWay USA	Not Facilities Based		NA	
Spirit Telecom	Not Facilities Based		NA	
Stutler Technologies Corp	Not Facilities Based		NA	
Tablerock Net	Not Facilities Based		NA	
TCO Network, Inc.	Not Facilities Based		NA	
TCS Telecom, Inc.	Not Facilities Based		NA	
Telefonica Data Corp SA	Not Facilities Based	0018547828	NA	
Tellabs	Not Facilities Based		NA	
Toast.Net	Not Facilities Based		NA	
Tranquility Internet	Not Facilities Based		NA	
Video Direct	Not Facilities Based		NA	
Vonage	Not Facilities Based		NA	
Zone Telecom, Inc.	Not Facilities Based		NA	
WestLink	Not Facilities Based		NA	
Aero-Surf Wireless Internet	Out of Business			Appear to be out of business
Almega Cable	Out of Business		Not Req'd by Provider	Phone number no longer in service. Out of business?
Longview Cable and Data, LLC.	Out of Business	0013948609	NA	Sold off Assets
Total Wireless Communications	Out of Business	0018726729	Not Req'd by Provider	Acquired by Total Highspeed Internet Services
Missouri Network Alliance	Out of Business	0015540669	Not Req'd by Provider	Acquired by BlueBird Network
Worldcom Broadband Solutions	Out of Business		NA	
Global Crossing Telecommunications, Inc.	Out of Business	0002850519	NA	
Sikeston Board of Municipal Utilities	Out of Business	0016073389	NA	

Attachment A

NONDISCLOSURE AGREEMENT

THIS NONDISCLOSURE AGREEMENT ("Agreement"), dated and effective as of _________________, 2010, is made by and among the Parties to this Agreement, which are ___________________________________including its affiliates (collectively referred to hereinafter as "the Company"), and the State of Missouri, Office of Administration ("OA"), The Curators of the University of Missouri on behalf of the University of Missouri - Columbia ("MU"), GeoDecisions, a Division of Gannett Fleming, Inc. ("GeoDecisions"), and CBG Communications, Inc. ("CBG") (collectively referred to hereinafter as "the State Parties," except where otherwise indicated.)

WHEREAS:

I. The National Telecommunications and Information Administration (NTIA) has made available a grant program to fund broadband mapping known as the State Broadband Data and Development (SBDD) grant program, which is governed by the Notice of Funds Availability (NOFA) first published in volume 74, number 129, at page 32545 of the Federal Register and subsequently clarified in volume 74, number 154, at page 40569 of the Federal Register, both of which are incorporated fully herein; and

II. Both OA and MU have partnered with the mapping entities, GeoDecisions and CBG, to implement the SBDD grant program; and

III. The Company possesses confidential and proprietary information necessary to such implementation and acknowledges that it desires to share certain of that information with the State Parties and with the NTIA; and

IV. When the Company shares that information with the State Parties, the confidential and limited use conditions of this Agreement shall apply; and

V. Missouri law allows governmental entities to close records that: 1) relate to scientific and technological innovations in which the owner has a proprietary interest pursuant to §610.021(15); and 2) fall within the definition of "trade secret" pursuant to the Uniform Trade Secrets Act, §417.450, RSMo.; and 3) have been submitted to an institution of higher education in connection with a proposal to license intellectual property or perform sponsored research and which contains sales projections or other business plan information the disclosure of which may endanger the competitiveness of a business, §610.021(22) ; and

NOW THEREFORE, the Parties agree as follows:

TERMS:

a) "Confidential Information" shall be defined in identical terms to the SBDD NOFA and any subsequent SBDD NOFA Clarification(s).

b) All Confidential Information received by the State Parties from the Company may be used as follows:

i) The State Parties may use the Company's information to derive maps, interactive websites and tabular data representations of the Company's broadband coverage area, network information, coverage attributes, and such other uses as may be required to implement the SBDD, referred to as the State Parties' Work Product; and

ii) The State Parties may, at a given location, estimate broadband coverage and identify broadband providers within the associated census block or estimated area, including Company, if applicable; and

iii) That State Parties may provide the NTIA with any such State Works as may be reasonably required by the terms and conditions as outlined in any applicable NOFA. The Company acknowledges that such provision may likely result in the disclosure of Confidential Information to governmental authorities and that, once such disclosures are made by the State Parties as required by a Project, the State Parties

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Figure 4: Standard NDA pg 1

are fully released from any liability for the actions of the third party governmental authority regarding the disclosure, sharing or use of such Confidential Information; and,

iv) The State Parties may use the Confidential Information in any other way to the extent such use is consistent with this Agreement and the SBDD program, that does not result in disclosing it, and

v) The Company waives any claims of ownership to the State Parties' Work Products.

c) Per the terms of this Agreement, the State Parties will protect Confidential Information provided to it from any use, distribution or disclosure pursuant to §610.021 (14), (15) and (22) and §417.450, RSMo, except as permitted herein.

d) Confidential Information provided to Recipient in written or other tangible or electronic form shall be marked by Company with a confidential and proprietary notice prior to receipt by the State Parties.

e) Parties acknowledge that any discrepancy between the SBDD NOFA and the terms provided for herein shall be resolved in favor of the SBDD NOFA. Nothing contained herein shall be construed to limit the State Parties' reporting and data sharing obligations under the SBDD NOFA, including sharing of Company's Confidential Information with NTIA pursuant to the terms of the SBDD NOFA and Clarification.

f) The State Parties may provide Confidential Information only to those employees, consultants, independent contractors and agents who:

i) Have a substantive need to know such Confidential Information in connection with the State Parties' Work Product;

ii) Have been advised of the confidential and proprietary nature of such Confidential Information; and

iii) Have agreed in writing prior to disclosure to protect from unauthorized disclosure all confidential and proprietary information to which they have access in the course of their participation in the creation of the State Parties' Work Product in accordance with all the terms of this Agreement.

g) Confidential Information does not include information the State Parties lawfully obtain from any source other than Company, provided that such source lawfully disclosed such information.

h) If the State Parties are required to provide Confidential Information to any court, government agency or third party pursuant to written court order, subpoena, Missouri Sunshine Law request, or other process of law, they must provide the Company with prompt written notice of such requirement or request and cooperate with the Company to protect against or limit the scope of the disclosure.

i) All Confidential Information remains at all times the Company's property. Any State Party Recipient may make tangible or electronic copies and notes of Confidential Information only as necessary for use as authorized herein. All such copies or notes must be marked with the same confidential and proprietary notice as appears on the original. All such copies will be destroyed when the State Parties' Work Product is fully completed and finally approved, and all originals shall be either destroyed or returned to the Company, at the Company's option.

j) The State Parties may publicly identify the Company as a contributing broadband service provider, provided no information covered by this Agreement is revealed. No license for use, beyond that provided for herein, under any trademark, patent, copyright, trade secret or other intellectual property right is either granted or implied by disclosure of Confidential Information to the State Parties.

k) If and to the extent any provision of this Agreement is held invalid or unenforceable, all other provisions of this Agreement shall remain in full force and effect to the fullest extent permitted by law.

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Figure 5: Standard NDA pg 2

l) This Agreement is binding upon and inures to the benefit of the Parties and their heirs, executors, legal and personal representatives, successors and assigns, as the case may be.

m) This Agreement is the entire agreement between the Parties hereunder and may not be modified or amended except by a written instrument signed by all Parties. Each Party has read this Agreement, understands it and agrees to be bound by its terms and conditions. There are no understandings or representations with respect to the subject matter hereof, express or implied, that are not stated herein. This Agreement may be executed in counterparts, and signatures exchanged by facsimile or other electronic means are effective for all purposes hereunder to the same extent as original signatures.

n) This Agreement shall be governed, construed, and enforced in accordance with the laws of the State of Missouri, without regard to its principles of conflict of law.

IN WITNESS WHEREOF, the Parties have read and agreed to this Nondisclosure Agreement as evidenced by the signatures of the Parties' authorized representatives below:

Company:

By: ______________________________
(Authorized Signature)

Name: ______________________________

Title: ______________________________

GeoDecisions, a Division of Gannett Fleming, Inc.:

By: ______________________________
(Authorized Signature)

Name: ______________________________

Title: ______________________________

State of Missouri, Office of Administration, Information Technology and Services Division:

By: ______________________________
(Authorized Signature)

Name: ______________________________

Title: ______________________________

The Curators of the University of Missouri:

By: ______________________________
(Authorized Signature)

Name: ______________________________

Title: ______________________________

CBG Communications, Inc:

By: ______________________________
(Authorized Signature)

Name: ______________________________

Title: ______________________________

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Figure 6: Standard NDA pg 3

Commonwealth of the Northern Mariana Islands

Broadband Mapping Project:

Product Release White Paper

Contact Name Manager:	Ivan A. Blanco
Contact Phone Number:	(670) 664-3023
Contact E-mail:	**director.csd@commerce.gov.mp**
Submitted By:	Kristin Rousseau
Contact E-mail:	**kristin.rousseau@broadmap.com**

Product Specification:	Fall 2011 NTIA Data Model
Product/Process:	NTIA—October 1, 2011 Data Deliverable
Dataset Submission QC:	NTIA—SBDD_CheckSubmission.py

Table of Contents

OVERVIEW

This white paper highlights the **Submission Summary** for this deliverable, as well as describes the **Data Gathering**, **Data Integration**, **Data Validation and Verification** and **Quality Control** processes used to create the Broadband Mapping Project's October 1, 2011 data submission. To support varying levels of technical and program knowledge, both a **high-level summary** and a **detailed process review** are supplied.

SUBMISSION SUMMARY

PROVIDER DETAILS

PROVIDER PARTICIPATION

- Providers Included
    - Docomo Pacific
    - IT& E
    - MCV

- New Providers Since Last Data Submission
    - MCV

- Non-Responsive/Non-Cooperative Providers
    - None

- Other Provider Comments
    - iConnect
        - Currently not a broadband service provider; however they are researching further on entering the Terrestrial Fixed Wireless market
    - GTA
        - Working towards becoming a reseller provider in this area

COVERAGE AREA CHANGES

- Coverage Footprint Reductions/Map Refinement –
    - No refinement was required for this data submission

- Coverage Footprint Expansion –
    - IT&E expanded for TT-10 and in Middle Mile

DATA CORRECTIONS

- There were no data corrections required for this data submission

SUBMISSION RECEIPT RESULTS

- Attached are the results from the NTIA data submission receipt quality script.

MP_2011_10_01.txt

- Error Report
  - All items flagged by the submission receipt output listed below were verified as correct entries within the data submission.

    - Field Check: FAILED MiddleMile_LONGITUDE has 23 UNEXPECTED VALUES for query: LONGITUDE Is Null OR (LONGITUDE < -170 OR LONGITUDE > -60)

    - Field Check: FAILED CensusBlock_STATEFIPS has 1084 UNEXPECTED VALUES for query: STATEFIPS IS NULL OR STATEFIPS = '' OR STATEFIPS = ' ' OR STATEFIPS <> '0'

    - Field Check: FAILED Overview_STATECOUNTYFIPS has 3 UNEXPECTED VALUES for query: STATECOUNTYFIPS IS NULL OR (STATECOUNTYFIPS NOT LIKE '0%') OR (CHAR_LENGTH(STATECOUNTYFIPS) <> 5)

  - The following error highlights a broadband provider, Docomo Pacific, which contains speeds that are below the specified broadband requirement. The team decided to keep the coverage area in as it's the only footprint for Docomo Pacific.

    - Field Check: FAILED Wireless_SpeedNotBB has 1 UNEXPECTED VALUES for query: MAXADDOWN = '1' OR MAXADDOWN = '2' OR MAXADUP = '1'

COMMUNITY ANCHOR INSTITUION (CAI) DETIALS

OVERALL STATISTICS

Community Anchor Institution - Categories	Overall Count	Broadband Subscriber	Trans Tech	Advertised Speed Down	Advertised Speed Up
Category 1 - School K through 12	19	0	0	0	0
Category 2 - Library	3	0	0	0	0
Category 3 - Medical/Healthcare	3	0	0	0	0
Category 4 - Public Safety	0	0	0	0	0
Category 5 - Universities/Colleges	1	0	0	0	0
Category 6 - Other: Government	7	0	0	0	0
Category 7 - Other: Non-Government	11	0	0	0	0
Total	**44**	**0**	**0**	**0**	**0**

CAI CHANGES

- The only change for this data submission was the inclusion of the CAIID extracted from the three databases communicated by NTIA. They are as follows:
  - For K-12 institutions (CAI type 1) please add the NCES ID CCD ID value found here: **http://nces.ed.gov/ccd/bat/**
  - For Higher Education (CAI type 5) please add the NCES IPEDS ID value found here: **http://nces.ed.gov/ipeds/datacenter/**
  - For Libraries (CAI type 2) please. Combine (do not add) "FSCSKey" and "FSCs_SEQ" from the "puout08av2000" file and place them here: **http://harvester.census.gov/imls/data/pls/index.asp** (FYI the LIBID is your state's unique ID for libraries)

HIGH-LEVEL SUMMARY

DATA GATHERING

BROADBAND SERVICE AREAS, MIDDLE MILE AGGREGATION POINTS AND BROADBAND SERVICE OVERVIEW

The collection of Broadband Service Areas, Middle Mile Aggregation Points and Broadband Service Overview information is handled through the following Provider Outreach Process:

- Build and maintain an inventory of Broadband providers through research and State inputs.
- Update provider material that describes the data requirements and logistics for data transfer.
- Update Non-Disclosure Agreement (NDA) for use in project, where applicable.
- Maintain multiple protocols for the provider to submit data, including Secure File Transfer Protocol (SFTP) technology when desired.
- Conduct one-on-one informational discussions with each provider to communicate the following:
    - Requirements of this project;
    - Broadband data required to support the product data model;
    - Submission protocols available;
    - Capability to validate how the supplied data is aggregated.
- Download/receive provider data.
- Establish a repeatable process with provider. Maintain provider communication, transaction and data handling records throughout the project (dates contacted, data received, etc.).

COMMUNITY ANCHOR INSTITUTION (CAI)

The collection of CAI information is handled through the following CAI Collection Process:

- Collect and maintain inventory of CAIs through data mining, research and State inputs.
- Maintain web-based CAI portal for institutions to add or confirm attribution, location and enter broadband-specific information.
- Upload web-based data to Core Database for standardization.
- Perform internal cleansing, such as removing duplicate records, identifying gaps in broadband attribution and verifying category.
- Geocode CAI locations.
- Translate Core Database data to deliverable-ready format.
- Continue engagement with non-responsive institutions.

DATA INTEGRATION PROCESS

The data integration and processing mechanisms currently used allow for multiple types of inputs and result in a standardized output that meets the NTIA deliverable requirements. This flexible process supports data model changes and project-requested enhancements.

- Receive inputs from providers via submission protocols; upload into Sourcing Database and catalog with provider information.
- Review provider-supplied data for completeness and for potential discrepancies that require resolution prior to processing and flag as necessary.
- Categorize input into data-type category (addresses, block lists, paper maps, etc.).
- Standardize input based on data type within Staging Database.
- Create Compact Polygons (CP)—(internal methodology for generating area-based feature for coverage in Staging Database).
- Apply broadband attribution to CP; apply metadata to CP.
- Perform quality analysis of the CP against the source supplied to identify any completeness or accuracy issues.
- Request additional information from the provider if elements of coverage are missing or contain discrepancies. This is a second manual quality check to ensure data is complete.
    - Process coverage area to build the required NTIA data model layers.
- Process CAI data input into internal standardized format, as discussed above in the **Community Anchor Institution (CAI) subsection**, based on NTIA and State-level requirements.

DATA VALIDATION AND VERIFICATION

Following the creation of the product, process steps within Data Validation and Verification occur. To ensure the data collected and processed is as accurate and comprehensive as possible, provider validation and internal verification activities are employed. After the initial mapping of providers' coverage areas and serviceability claims, additional reviews are performed using the methods described in the subsections below (**Third-Party Data Verification**, **Broadband Provider Validation**, **Confidence Values**).

THIRD-PARTY DATA VERIFICATION

The coverage is visually and programmatically compared against third-party data. Pitney Bowes and American Roamer data are used in cases where a coverage area is questionable. All anomalies identified during this analysis are reviewed with the providers.

BROADBAND PROVIDER VALIDATION—PROVIDER PORTAL APPLICATION

Providers are trained on and requested to use a secure interactive web application to review their current coverage area(s) and supporting broadband attribution and validate their data or submit change requests to update their data. All provider change requests go through the **Data Integration Process** and are reviewed with the provider to complete validation.

CONFIDENCE VALUES

All verification, validation and manual quality review results are tracked by provider/technology type and stored and maintained within a **Validation table**. A confidence value is assigned, based on internal assessments of the collected information, to highlight the provider coverage areas and/or attributions that would benefit from further investigation and/or enhancements.

QUALITY CONTROL

Following collection, processing and analysis of the provider and CAI data, the product is checked manually and algorithmically against the NTIA data model. Some of the items included within these checks are:

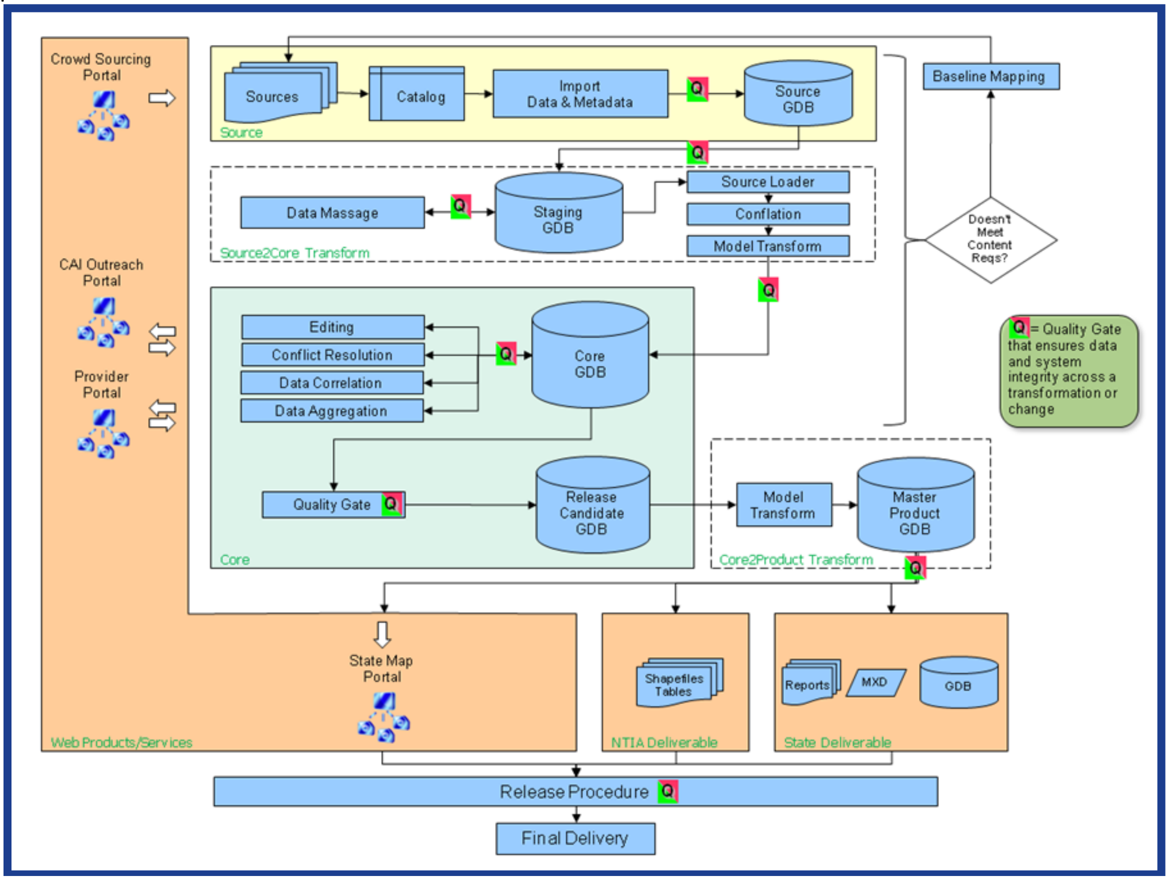
- Format correctness;
- Table and field structure;
- Valid values, including default values, where applicable;
- Geographic extent and topology errors.

Prior to data submission, another quality control script supplied by NTIA is run. This script, SBDD_CheckSubmission.py, creates an output in text form that is required to be submitted along with the final deliverable. All errors must come up clean, unless otherwise specified by NTIA. Exceptions to the script as noted by NTIA on the SBDD Workspace on 03/25/11 can be found at the following link: **https://sbdd-granteeworkspace.pbworks.com/w/page/38218329/CheckSubmissionExceptions**

- Longitude values for States outside the lower 48 (any table);
- CAI results for Transtech, MaxAdUp, MaxAdDown if BBService is "No" or "Unknown";
- Overview MaxAdDown, MaxAdUp if 100% of record-level data has MaxAdDown or MaxAdUp populated.

DETAILED PROCESS REVIEW

A detailed review of the data collection, integration and quality control points within the broadband data gathering and mapping process are discussed in the subsections that follow. In addition, a diagram showing the overall process can be seen below.



PROVIDER OUTREACH

For the October 2011 data submission, an e-mail notification was sent to all providers with supporting deliverable dates. The providers mainly used the Provider Portal web application to submit changes to and/or validate their current coverage area(s).

In support of the data collection effort, providers that did not timely respond to the outreach were contacted by phone.

OUTREACH MATERIALS

The original provider packet sent via e-mail to the providers included the following documents and files:

- Letter from the State inviting them to participate in the program;
- Copy of the Non-Disclosure Agreement (NDA);
- Copy of the Mapping NOFA from the NTIA;
- Copy of the NOFA Clarification from the NTIA;
- Broadband service address example file in CSV format;
- Word document describing service address example file;
- Broadband service block example file in CSV format;
- Word document describing service block example file;
- Broadband service street example file in CSV format;
- Word document describing service street example file;
- Broadband subscriber example file in CSV format;
- Word document describing subscriber example file;
- Broadband wireless coverage area sample shapefile;
- Word document describing wireless coverage area sample shapefile;
- Instructions for downloading, installing and using the WinSCP SFTP application.

OUTREACH PROCESS

The provider outreach process is comprised of the following general steps:

- Send the provider package and introduction letter to the main point of contact for the provider.
- Follow up with e-mail and telephone to verify that the main point of contact is correct.
- If necessary, discuss the NDA further and resolve any redlines.
- Once the correct primary contact is established, set up a telephone call, if necessary, to learn more about the provider's offerings and direct them to the appropriate outreach materials.
- If providers are unable to be contacted (non-responsive) or indicate that they are not interested in participating (non-cooperative), mark them as such on the provider tracking sheet. These providers will be escalated to the State for further action.
- As the providers are collecting the required data, provide instructions on downloading, installing and using the WinSCP SFTP application, if required.
- Arrange with the providers to transfer the data in whatever way they are comfortable: some providers will find regular email acceptable; others will want to use the SFTP application.
- After data is received and reviewed, it may be necessary to contact a provider for clarification or to address incomplete datasets. In the interest of building and maintaining relationships, care is given not to push the provider but to work with it to obtain accurate data in the best possible format.

DATA COLLECTION

DATA TRANSFER PROCEDURES

There are three primary ways data is collected from providers. These are:

- Secure FTP (SFTP) using the WinSCP application;
- Regular e-mail;
- Mail.

INITIAL DATA REVIEW AND QUALITY ASSURANCE

The initial data review and quality assurance process consists of the following general steps:

1) Access the data from the SFTP site or e-mail.
    a. If e-mailed, place copy of original dataset in the appropriate provider folder on the SFTP site.
2) Place copy of raw data on local computer in a working directory.
3) Review data and determine course of action based on type of data received.
4) Ensure data is complete and contact provider to address any gaps.

NOTE:
The goal is to get as many providers as possible to provide subscriber address data in the correct format. Obviously, this will not be possible with all providers so we will continue to have to process various types of provider-supplied data.

DATA INGESTION

DATA INGESTION OVERVIEW

The following subsections outline the process steps taken based on the type of input supplied by the data provider:

- **Point Data**:
    - Subscriber location;
    - DSLAM location;
    - Central Office location;
    - Broadcast Tower location.
- **Linear Data**:
    - TIGER® street segments.
- **Polygonal Data**:
    - Census Blocks;
    - Coverage Area.

Overall, the process is geared toward taking the provider data supplied and creating polygon shapes to append to the bb_cov feature class. The bb_cov feature class is the interim dataset that is then processed using the makeDeliverable.py Python script to create the MapConnect™ data layers that will be delivered to the State and, ultimately, to the NTIA. Detailed instructions used in this process can be found in the subsections below.

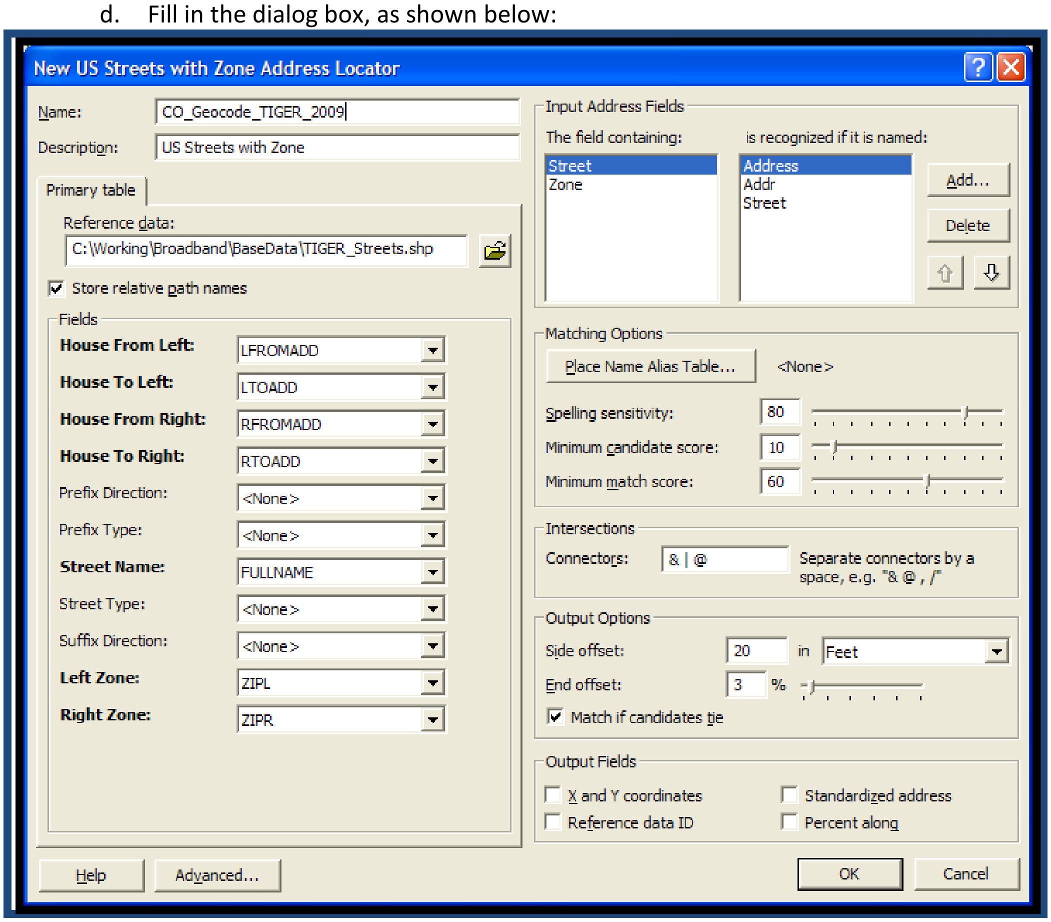
SUBSCRIBER LOCATION—ADDRESS DATA

In the event that the data provider supplies subscriber address data, the steps are as follows:

1) First, convert the address data to a clean Excel spreadsheet in an appropriate address data format.
    a. Usually, this has the following columns: street address (number, pre-directional, pre-modifier, street name, street type, post-directional and post-modifier concatenated), city, state, ZIP.
2) Configure the ArcGIS® geocoding tool to use the TIGER® 2009 streets dataset.
    a. In ArcCatalog®, create a new Address Locater by right-clicking in the white space of the appropriate directory and selecting **New>Address Locater** from the dropdown menu.
    b. Select **US Streets with Zone** and click **OK**.

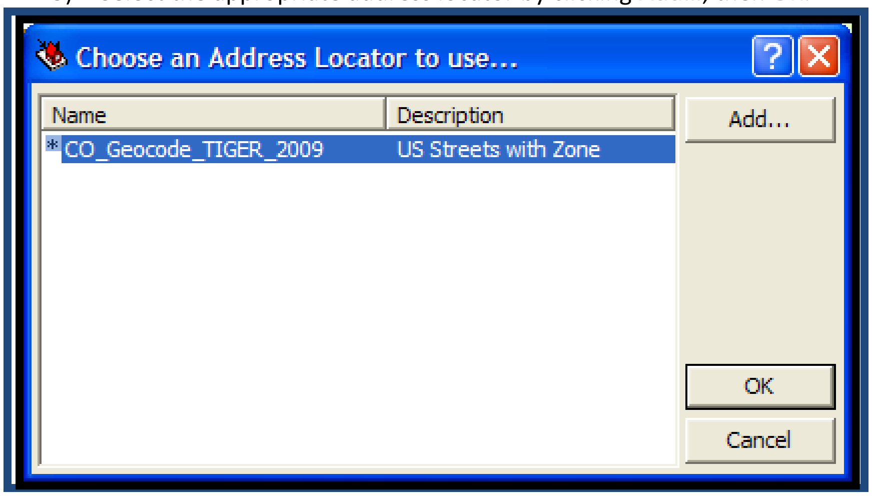
> **NOTE:**
> It is likely that multiple Address Locators will have to be set up to handle the variety of provider address data received.

    c. Navigate to the **TIGER Streets 2009 file** and click **OK**.
    d. Fill in the dialog box, as shown below:

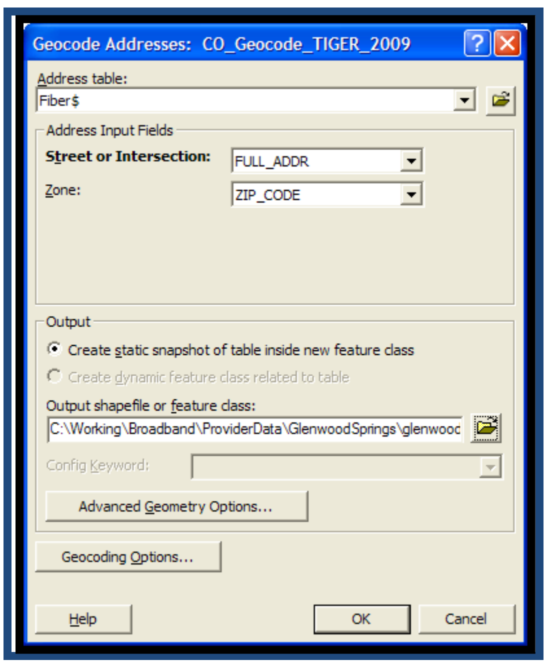


e. Click **OK**.

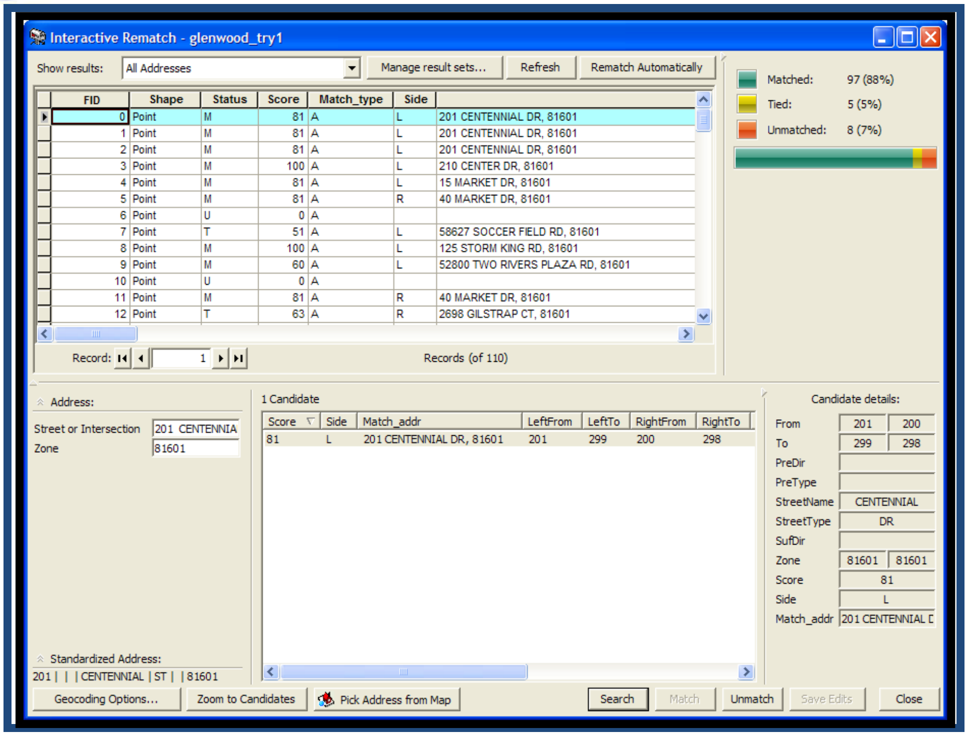
3) Open ArcMap® and add the Excel spreadsheet with the address information.
4) Right-click on the Excel spreadsheet and select **Geocode Addresses** from the dropdown menu.
5) Select the appropriate address locator by clicking **Add…**, then **OK**.



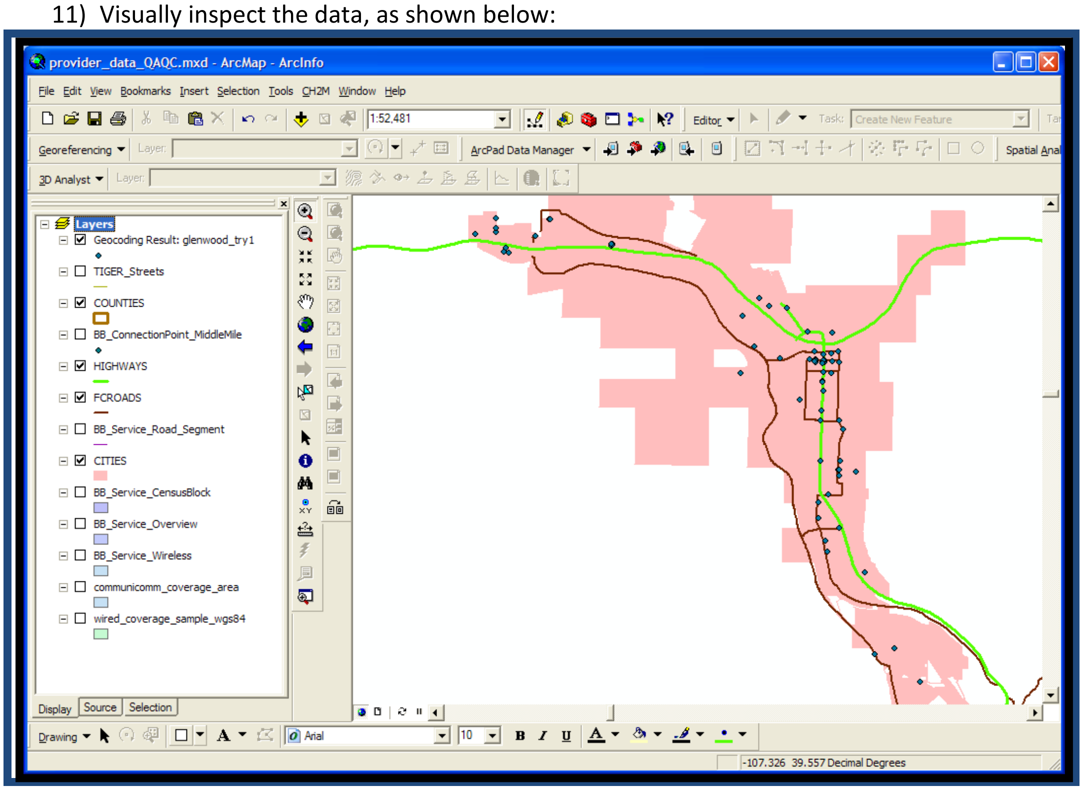
6) Fill out the **Geocode Addresses** dialog box, as shown below:



7) Geocode the list in batch mode using the geocode service set up in **Step 2** above, accepting all the default parameters.
8) Review results. See example below.



9) Adjust geocoding parameters accordingly and repeat batch to resolve issues.
10) Manually geocode unmatched addresses until target hit rate achieved, generally 90%.
11) Visually inspect the data, as shown below:



12) Follow the steps detailed in **Subscriber Location—GIS Data** below.

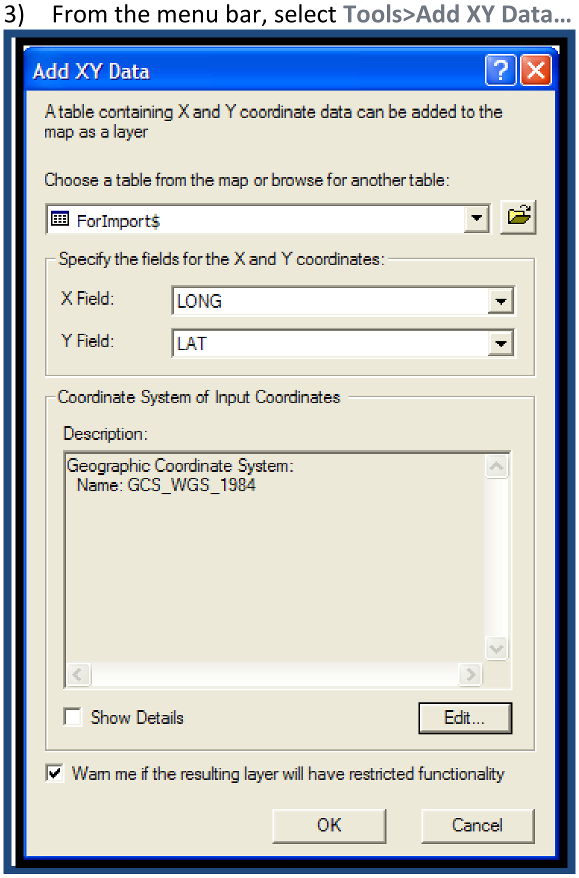
SUBSCRIBER LOCATION—XY DATA

If the provider supplies a list of subscriber data with accompanying XY data such as latitude and longitude, the steps are as follows:

1) Refine the format in Excel so that the data can be opened easily using ArcMap®.
   a. Remove all font color, highlighting, cell colors and borders, clean up column headers and make certain there are no merged cells.
   b. Make certain that XY locations are in decimal degrees.
      (i.) To convert from degrees, minutes, seconds (39º 26' 45.67") to decimal degrees, use the following formula: DD + (MM/60) + (SS.SSS/3600).

NOTE:
If XY locations from some other coordinate system are provided, you can use those in the process below but you must know what the coordinate system is.

2) Open the Excel worksheet in ArcMap®.
3) From the menu bar, select **Tools>Add XY Data…**

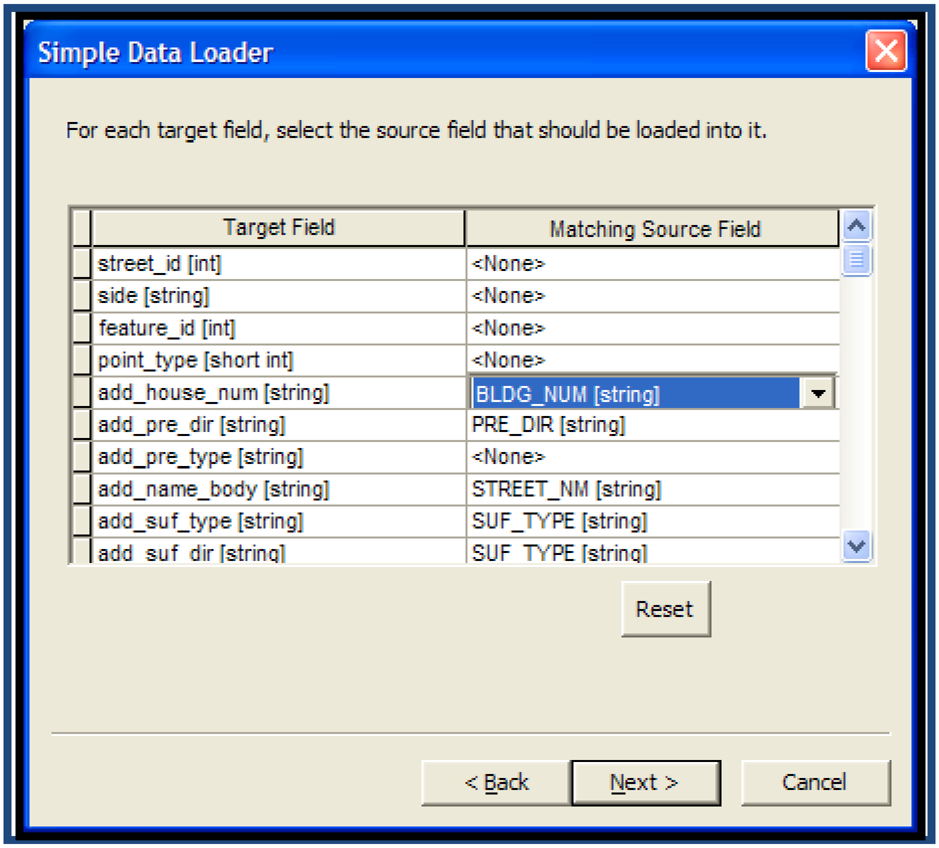


4) Supply the appropriate fields for the X and Y coordinates, choose the appropriate coordinate system and click **OK**.
5) Results are an event layer, not a true spatial layer. Export the data by right-clicking the event layer and selecting **Data>Export Data…** from the dropdown menu.
6) Follow the steps detailed in **Subscriber Location—GIS Data below**.

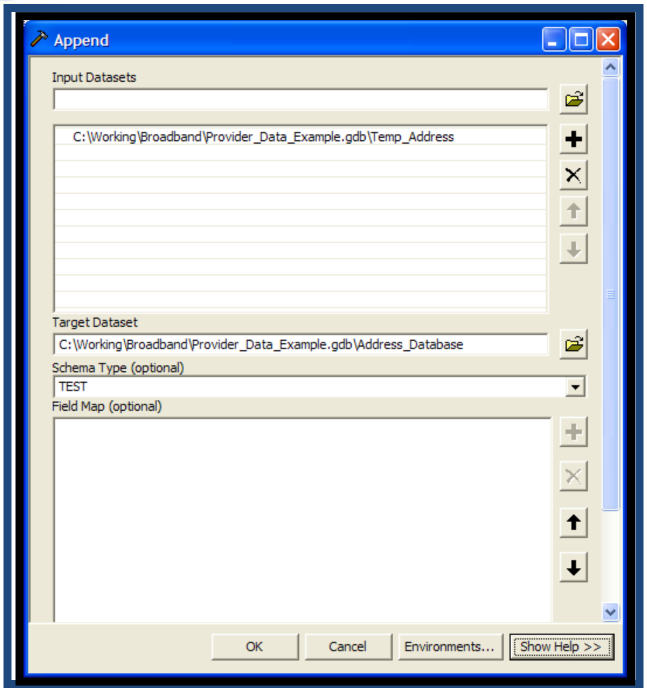
SUBSCRIBER LOCATION—GIS DATA

If the provider supplies subscriber location in GIS format, the only process step is to load that data into the appropriate data schema and it will be ready for processing.

1) First, load the data into the Point Address database schema (please see Appendix D for an example of the Point Address database schema.) using an empty feature class in that schema.
2) In ArcCatalog®, right-click on the empty feature class and select **Load** from the dropdown menu.
3) Navigate to the provider address GIS dataset and then map the attribute fields accordingly, as shown below:



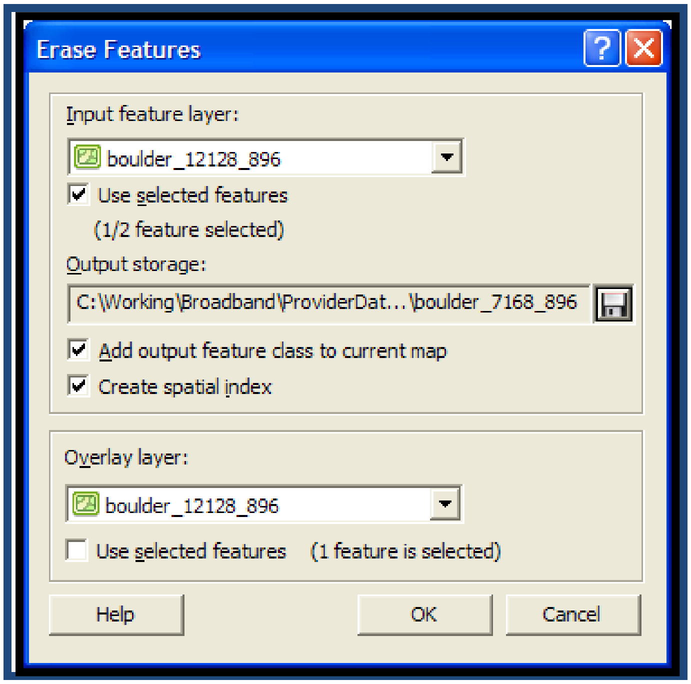
4) Once you have successfully loaded the provider address data into the temporary database with the correct schema, you now will append that data to the overall Point Address database.
5) In ArcToolbox®, use the **Append** command (**Data Management Tools>General> Append***)* to add the features into the overall Point Address database, as shown below:



6) Since the data is already in the Point Address database schema, there is no need to alter the Field Map in the Append tool.
7) After appending, calculate metadata reflecting geometry source and representation values.
8) Break provider-specific points into separate county feature classes and perform the following steps per county feature class:
   a. <u>Within ArcGIS®</u>:
      (i.) Summarize download and upload speeds [first,last] to determine all speeds available for county.
         (1) This will save as a DBF table. Keep track of location for future reference.
      (ii.) Buffer county address point featureclass to 150’.
         (1) During buffer command, dissolve on ad_down; ad_up; provider; dba; frn; tt; all metadata fields; stctyfips. Save as…. county_fastestdown_fastestup.
         (2) Example using Qwest data: boulder_40128_20128, where boulder=county; 40128=ad_down; 20128=ad_up.

NOTE:
These attribute fields are specific to the Point Address database.

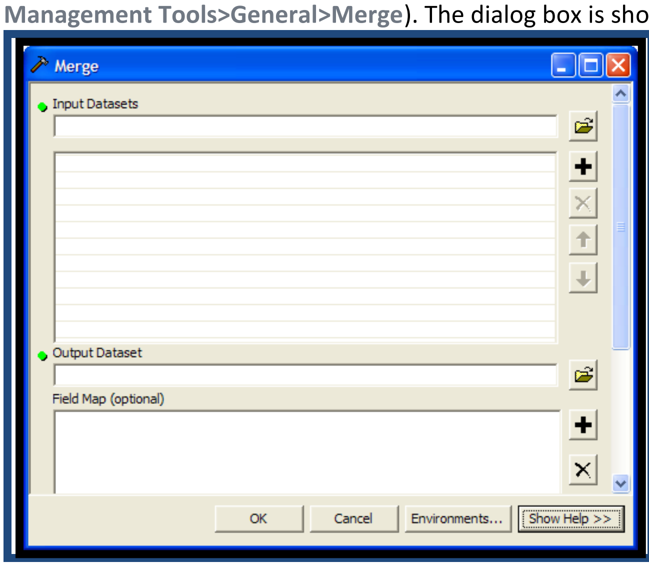
      (iii.) Select the features that represent the lowest speeds.
   b. <u>Using XtoolsPro (</u>***http://www.xtoolspro.com/***):
      (i.) In the XTools Pro toolbar, select **XTools Pro>Layer Operations>Erase Features.**
      (ii.) Use the same feature class for Input and Overlay.
      (iii.) Check **Use selected features** on the **Input** feature, as shown below.
      (iv.) Repeat and erase slowest speeds one speed at a time. Save each new feature class as the next slowest speed, using the same naming convention as shown in **a.(ii.)(1)** above. A general example is shown below:



c. <u>Return to ArcGIS®</u>:

(i.) Edit/delete speeds from the attribution table of each feature class, so each remaining feature class has only one speed value.

(ii.) Merge individual speed feature classes using the **Merge** command in ArcToolbox® (**Data Management Tools>General>Merge**). The dialog box is shown below:



(iii.) Merge individual county feature classes using the **Merge** command in ArcToolbox (**Data Management Tools>General>Merge**).

(iv.) Since the county files are all in the same schema, DO NOT alter the Field Map portion of the command interface.

(v.) When all the county files are merged into one dataset, use the **Append** command in ArcToolbox® *(***Data Management Tools>General>Append**) to add the features to the bb_cov interim dataset. Use the **Field Map** portion of the **Append** tool to map the appropriate field values to their corresponding fields in the bb_cov feature class.

DSLAM OR CENTRAL OFFICE LOCATION—ADDRESS DATA

In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office address data, the steps are as follows:

1) Follow the process for geocoding points in **Subscriber Location—Address Data** above.
2) Follow the steps detailed in **DSLAM or Central Office Location—GIS Data** below.

DSLAM OR CENTRAL OFFICE LOCATION—XY DATA

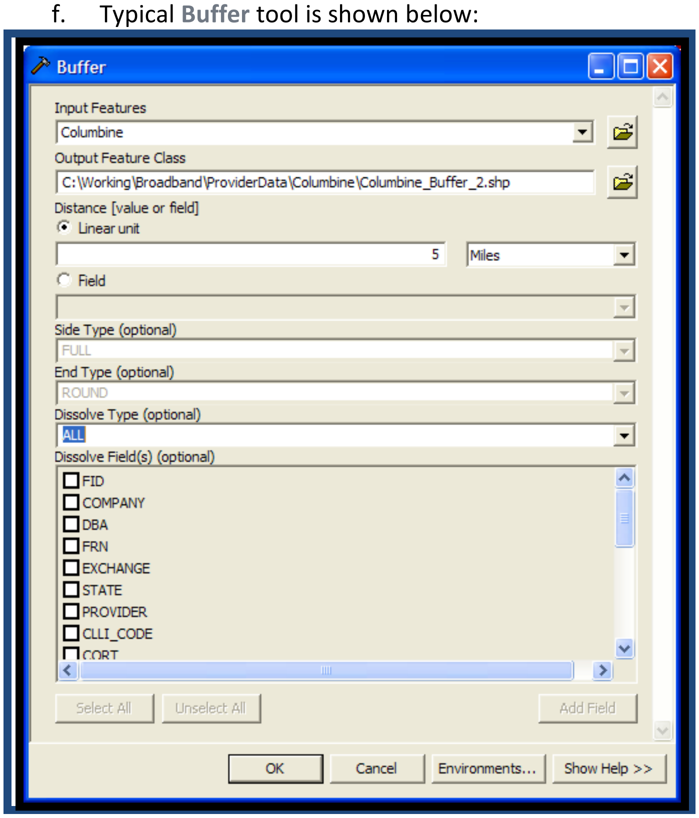
In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office XY data, the steps are as follows:

1) Follow the process for creating points from XY data in **Subscriber Location—XY Data** above.
2) Follow the steps detailed in **DSLAM or Central Office Location—GIS Data** below.

DSLAM OR CENTRAL OFFICE LOCATION—GIS DATA

In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office GIS data, the steps are as follows:

1) Buffer the DSLAM/Central Office points feature class.
    a. Add the point feature class to ArcMap®.
    b. Open the ArcToolbox® and go to **Analysis Tools>Proximity>Buffer**.
    c. Set the buffer distance to 5 miles.
    d. Set the dissolve type to **ALL**.
    e. Name the output feature class.
    f. Typical **Buffer** tool is shown below:



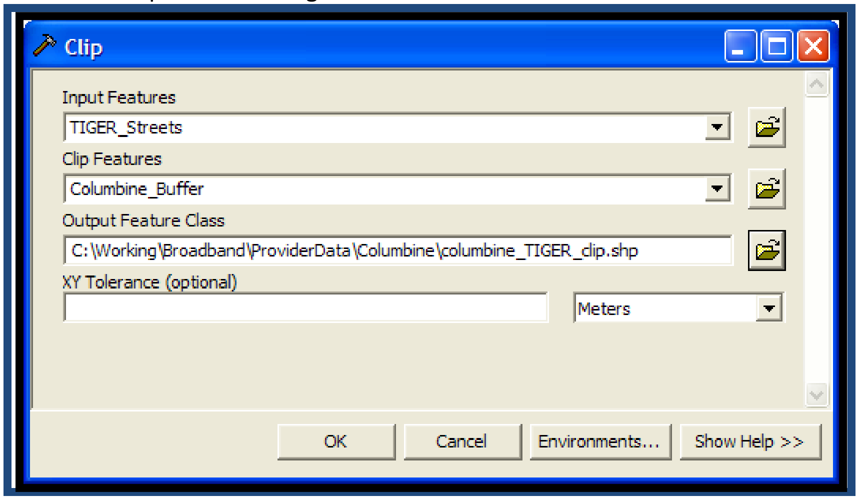
    g. Click **OK**.

2) Use the resulting buffer feature class to clip the TIGER® street layer:

   a. Add TIGER® street layer to ArcMap®.

   b. Open the ArcToolbox® and go to **Analysis Tools>Extract>Clip**.

   c. Complete the dialog box as shown below:



   d. Click **OK**.

3) Using ArcCatalog® and within the file geodatabase:

   a. Right-click and create a new Feature Dataset.

      (i.) For the Feature Dataset settings:

         (1) Name the feature dataset accordingly.

         (2) Select horizontal coordinate system by importing the coordinate system associated with the clipped TIGER® street layer by selecting **Import** and navigating to the location of that feature class.

         (3) No vertical coordinate system needed.

         (4) Leave all x,y,z,m values at default.

         (5) Click **Finish**.

4) Import previously created street feature class into new **Feature Dataset**.

5) Right-click **Feature Dataset** and create new Network Dataset—accept all default setting for the Network Dataset.

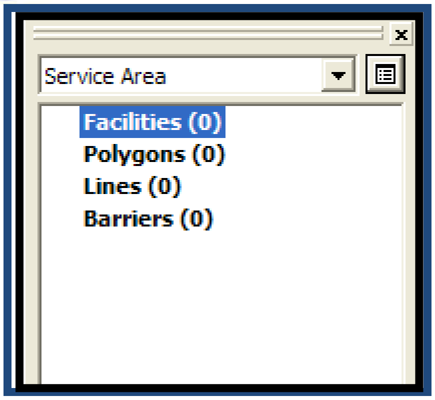
NOTE:
The Network Analyst extension must be turned on.

6) In ArcMap® turn on the **Network Analyst Toolbar** by going to **View>Toolbars>Network Analyst**.

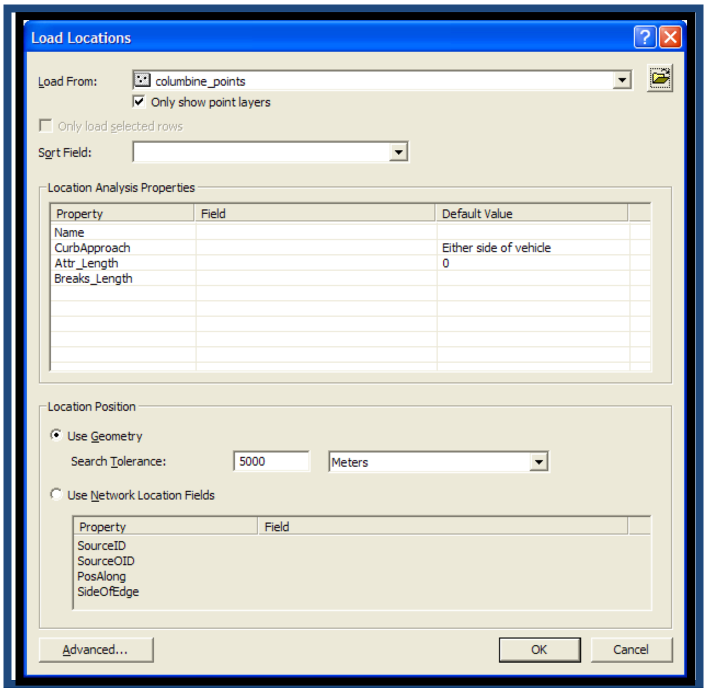
7) Add the Network Dataset created in **Step 5** to ArcMap.

8) Using the **Network Analyst Toolbar** dropdown, create **New Service Area**.

9) Open the **Network Analyst Window** by selecting the button. See below.



10) Right-click **Facilities** layer, select **Load Locations** and navigate to the DSLAM/Central Office facilities feature class.



11) Click **OK**.

12) Click the **Service Area Properties** button .

13) For the following tabs, change the following properties:

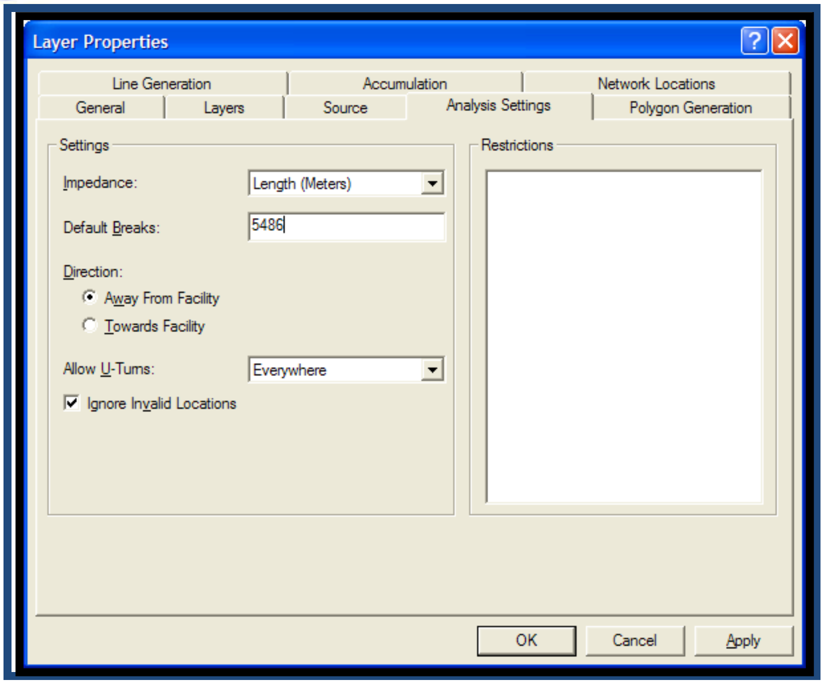
a. **Polygon Generation** tab:

(i.) Select **Merge by break value**.

(ii.) Also disable the **Trim Polygons** option.

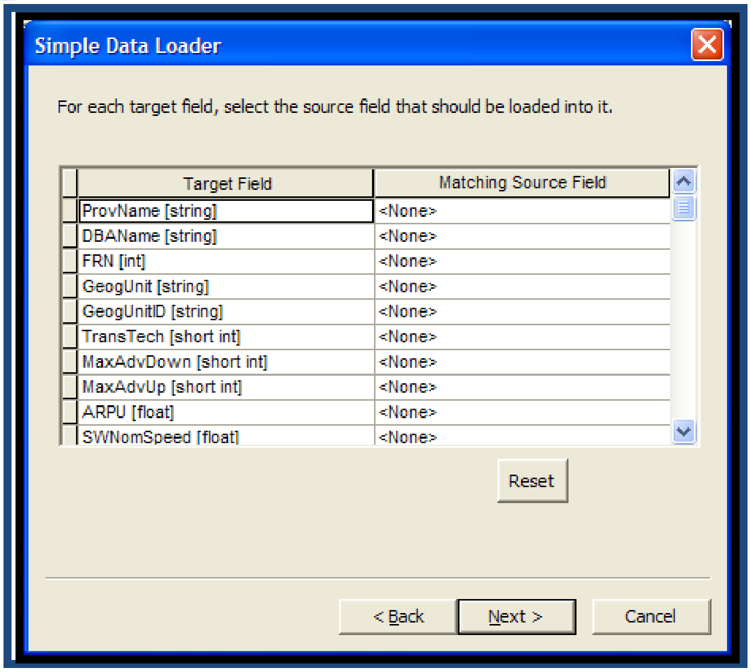
b. **Analysis Settings** tab—using and converting the specified DSLAM buffer distance from feet to meters—input buffer distance value in meters into the **Default Breaks** location.

(i.) Generally, 18,000 feet (5486 meters) from DSLAM or Central Office location is used as the buffer distance. See below.



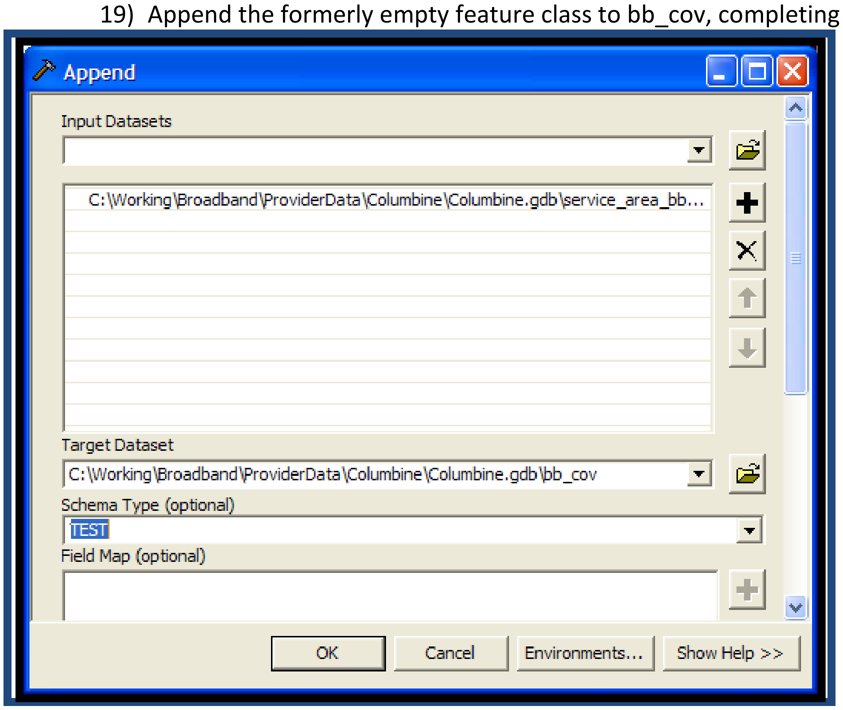
c. Click **OK**.

14) On the **Network Analyst Toolbar**, click the **Solve** button to create service area polygons.
15) Right-click on the created service area polygon in the layer list, and select **Data>Export Data** from the dropdown list.
16) Export to a feature class in the file geodatabase you created earlier.
17) In ArcCatalog®, create an empty feature class with the schema of the bb_cov feature class and load the feature class created in **Step 16** into it.
    a. Right-click on the empty feature class, select **Load>Load Data** from the dropdown menu and navigate to the location of the service area feature class.
    b. Click the **Add** button, then click **Next**.
    c. Accept the defaults and click **Next**.
    d. DO NOT attempt to map any fields, as shown below:



e. Click **Next**, then **Next** again, then **Finish**.

18) In ArcToolbox®, go to **Data Management Tools>General>Append**.
19) Append the formerly empty feature class to bb_cov, completing the dialog box, as shown below:



20) Leave the **Schema Type** as TEST.
21) Click **OK**.
22) In ArcMap®, open bb_cov for editing and manually input associated attribution.

BROADCAST TOWER LOCATION—ADDRESS DATA

In the event that the provider supplies wireless broadcast tower location address data, the steps are as follows:

1) Follow the process for geocoding points in **Subscriber Location—Address Data** above.
2) Follow the steps detailed in **Broadcast Tower Location—GIS Data** below.

BROADCAST TOWER LOCATION—XY DATA

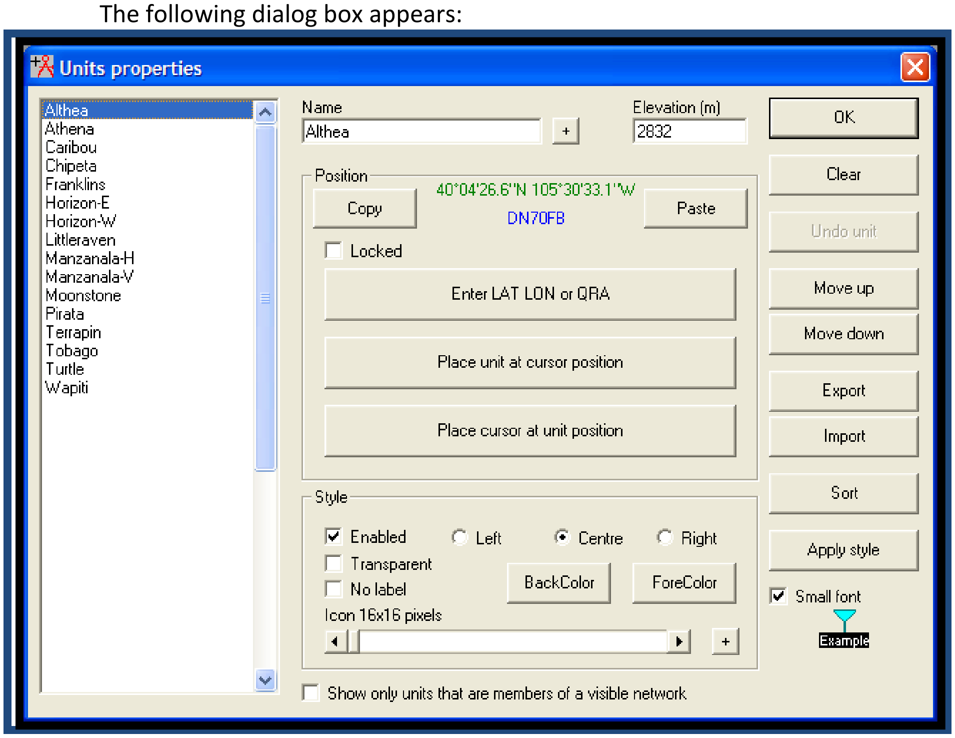
In the event that the provider supplies wireless broadcast tower location XY data, the steps are as follows:

1) Follow the process for creating points from XY data in **Subscriber Location—XY Data** above.
2) Follow the steps detailed in **Broadcast Tower Location—GIS Data** below.

BROADCAST TOWER LOCATION—GIS DATA

In the event that the provider supplies wireless broadcast tower location GIS data, the steps are as follows:

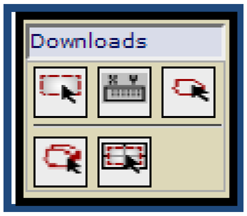
1) Download the required software (Radio Mobile) from the website: **http://www.cplus.org/rmw/english1.html**
2) Install the software according to the standard directions, found here: **http://www.cplus.org/rmw/download/download.php?S=1**
3) Open the application.
4) Load the broadcast tower location and elevation information by selecting **File>Unit properties**. The following dialog box appears:



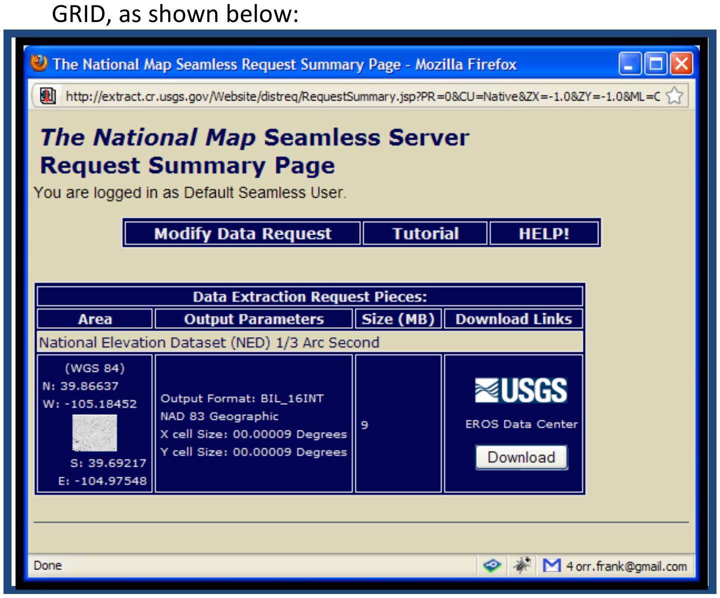
5) Add the information for all the towers supplied by the WISP data provider, including the elevation. If provider does not supply elevation, this information can be obtained from Google Earth.
   a. If available, use the **Import** button to import a Google Earth KML of the tower locations.
6) Go to the National Map Seamless Server (**http://seamless.usgs.gov/**) and download elevation data sufficient to contain the tower locations.

a. At least the 1/3” NED data is needed. Select this by clicking the **Download** button in the upper right of the website and checking the box next to **1/3“ NED**.

b. Zoom to the area of interest and use the **Download** tools to define the area to download:

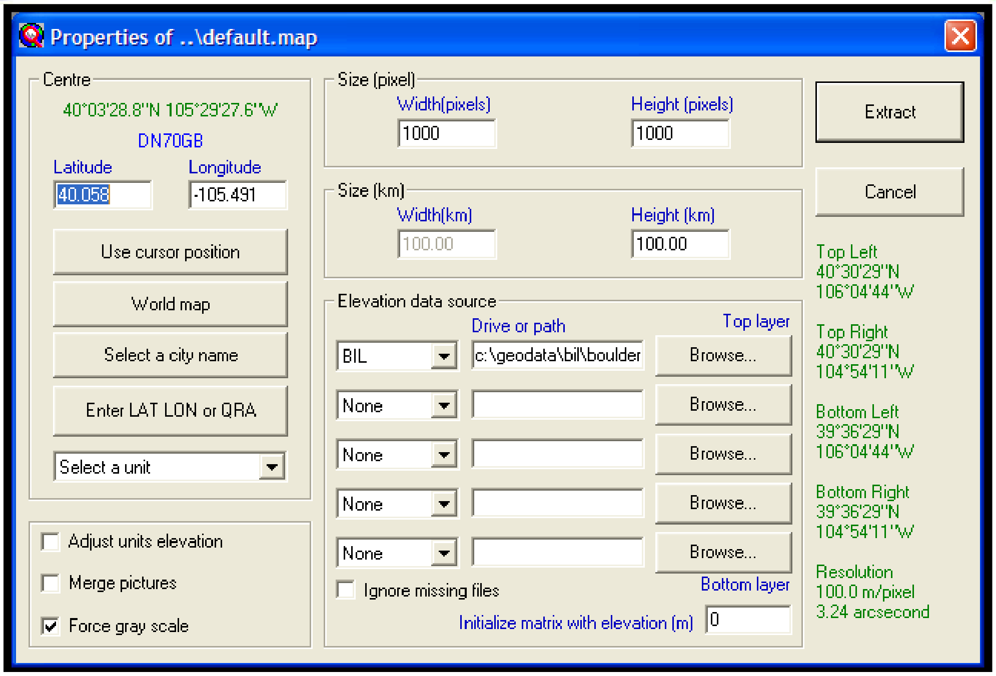


c. Click the **Modify Data Request** button to request the data in BIL_16INT format, not ESRI GRID, as shown below:

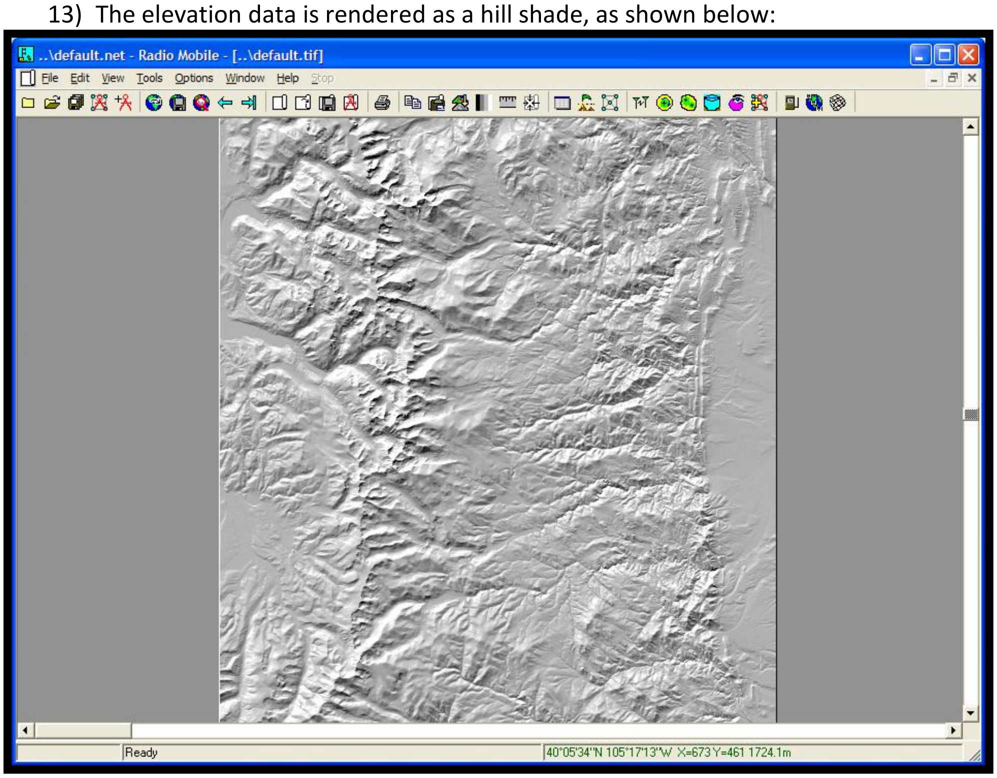


d. Download the data and unzip it.

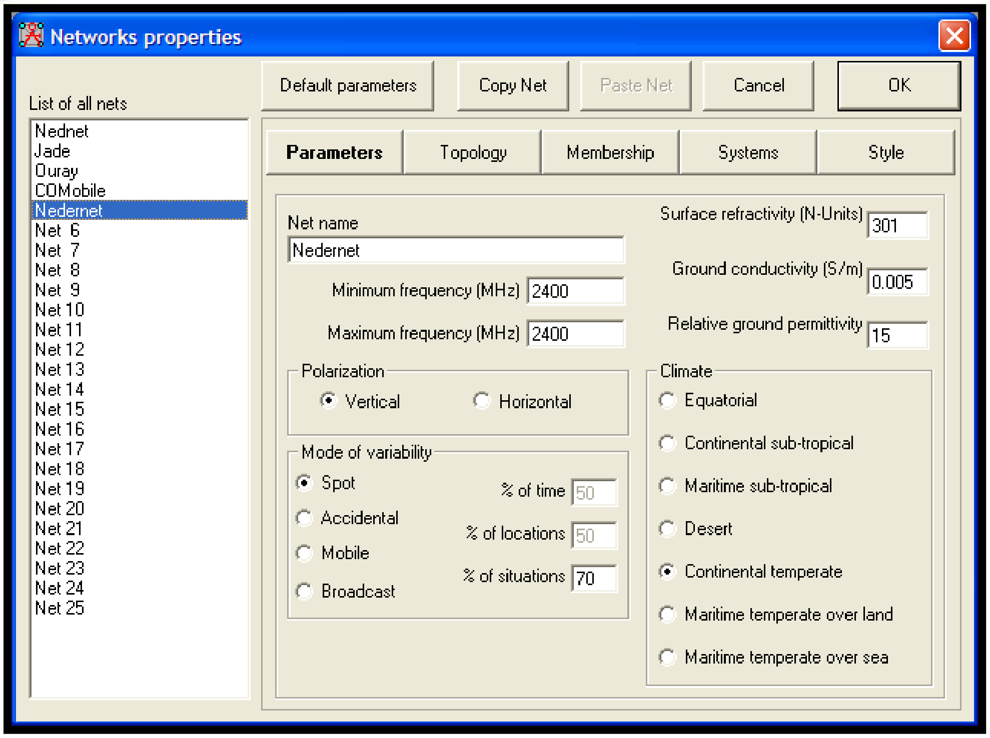
7) Select **File>Map Properties** to define the map.
8) Enter a latitude and longitude in the center of the tower locations.
9) Set the size (in pixels) and the size (in kilometers) of the map.
10) Set the directory path leading to the BIL elevation data just downloaded.
11) The dialog box is shown below:



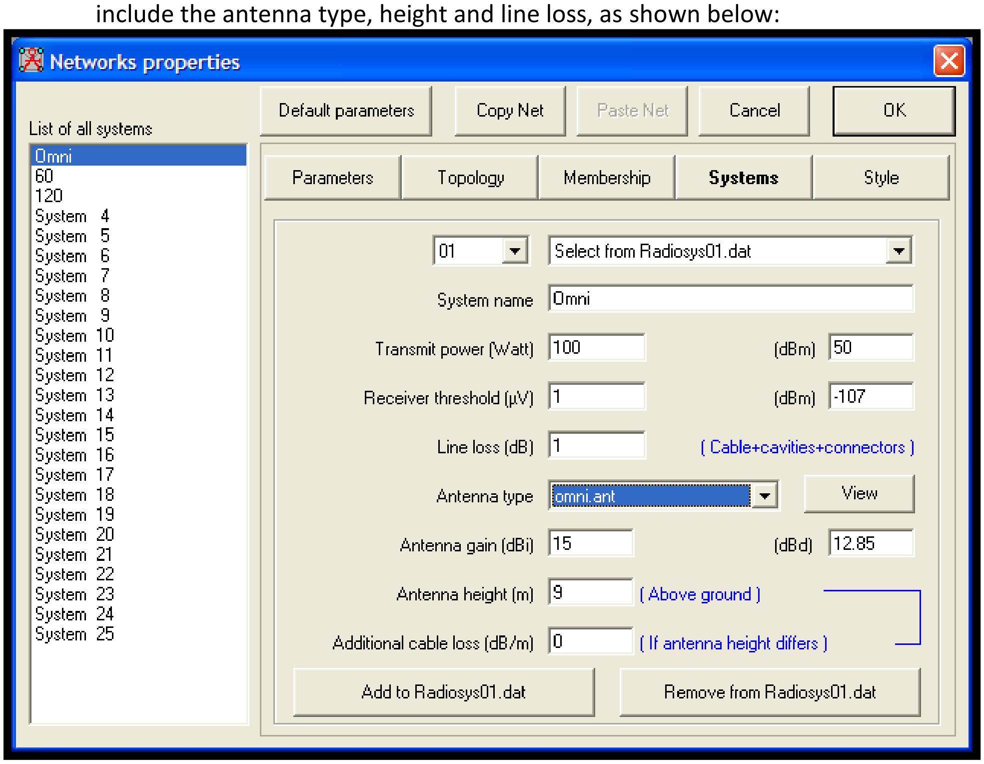
12) Click **Extract**.
13) The elevation data is rendered as a hill shade, as shown below:



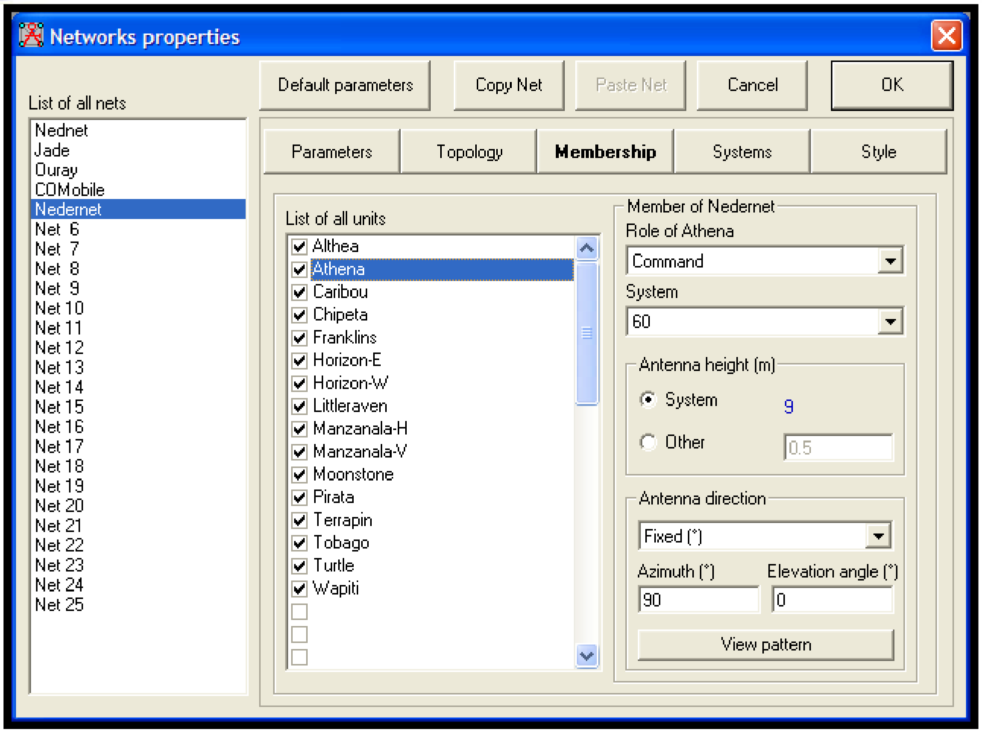
14) Select **File>Network properties** from the main menu.
15) Create a new network and enter in the frequency range under the **Parameters** tab, as shown below:



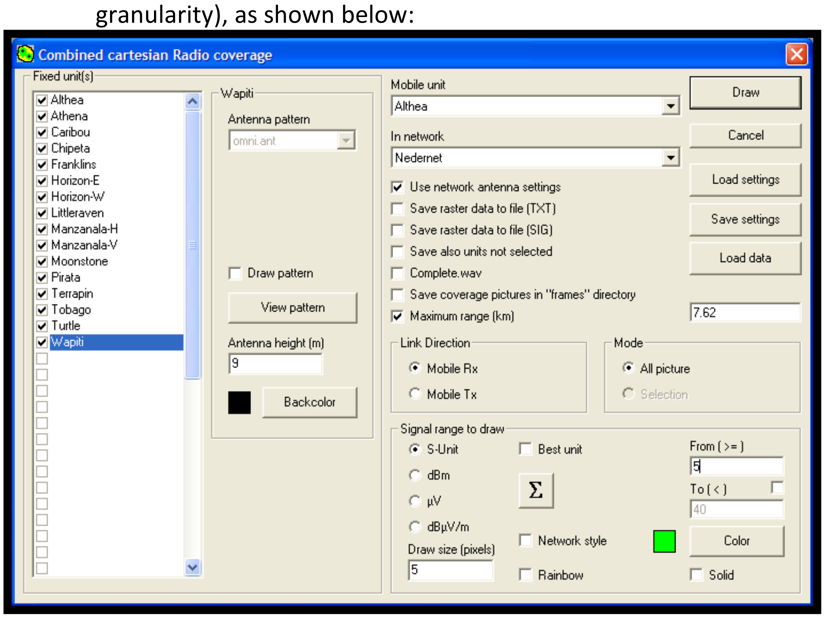
16) Leave all the other values as they appear, and select the **Systems** tab.
17) Create enough systems to cover all the varieties of equipment in the provider network. This will include the antenna type, height and line loss, as shown below:



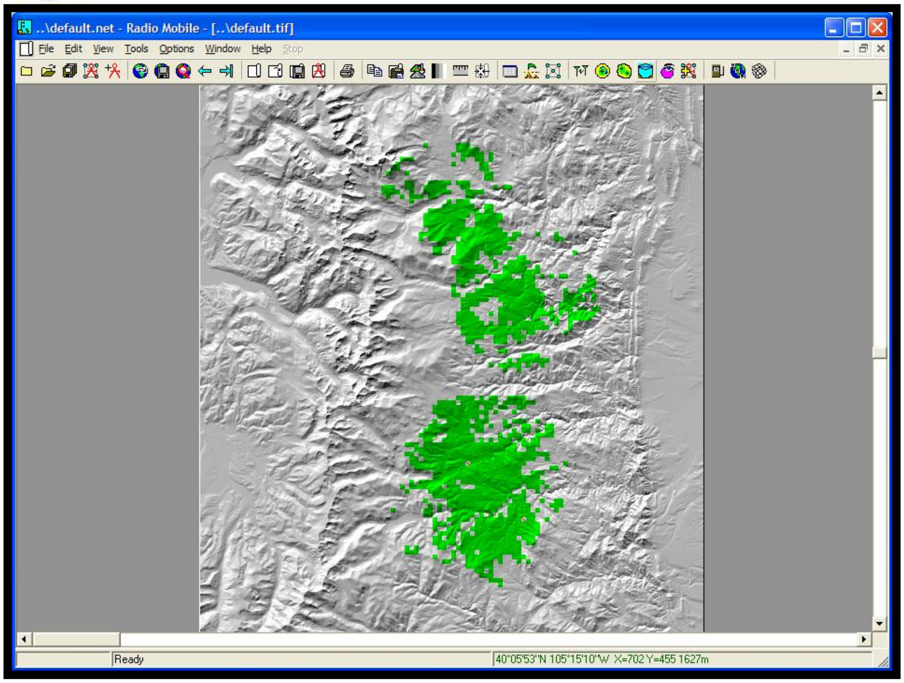
18) Now click on the **Membership** tab, and assign the individual towers to their respective systems, providing the azimuth for non-omnidirectional antennas, as shown below:



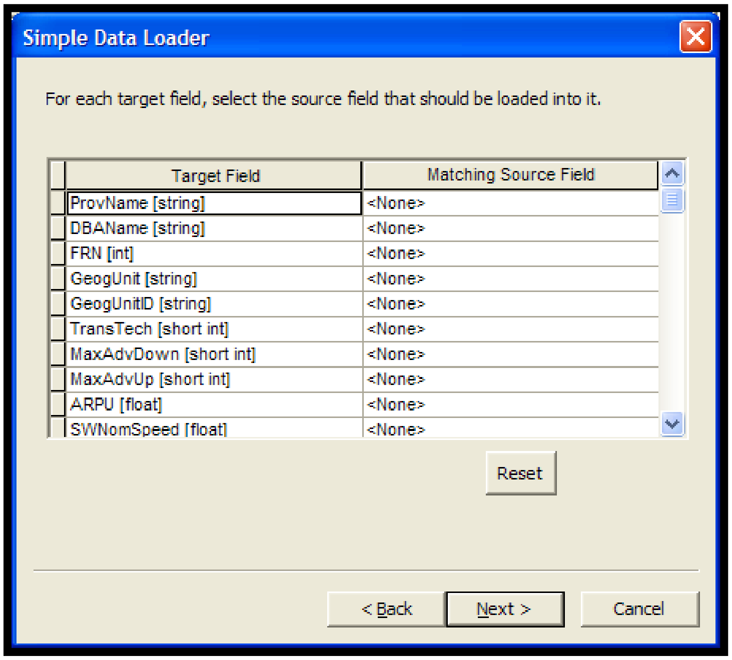
19) Click **OK**.
20) Select **Tools>Radio Coverage>Combined Cartesian** from the main menu.
21) Complete the dialog box as shown below, providing the **Maximum Range** from the highest tower beam radius supplied by the provider.
22) Set the **Pixel Size** at 5 (experiment depending on the area covered to get the right level of granularity), as shown below:



23) Set the **Signal range to draw** to S-Unit and type 5 in the **From (>=)** box.
24) Click on **Draw**. See below.



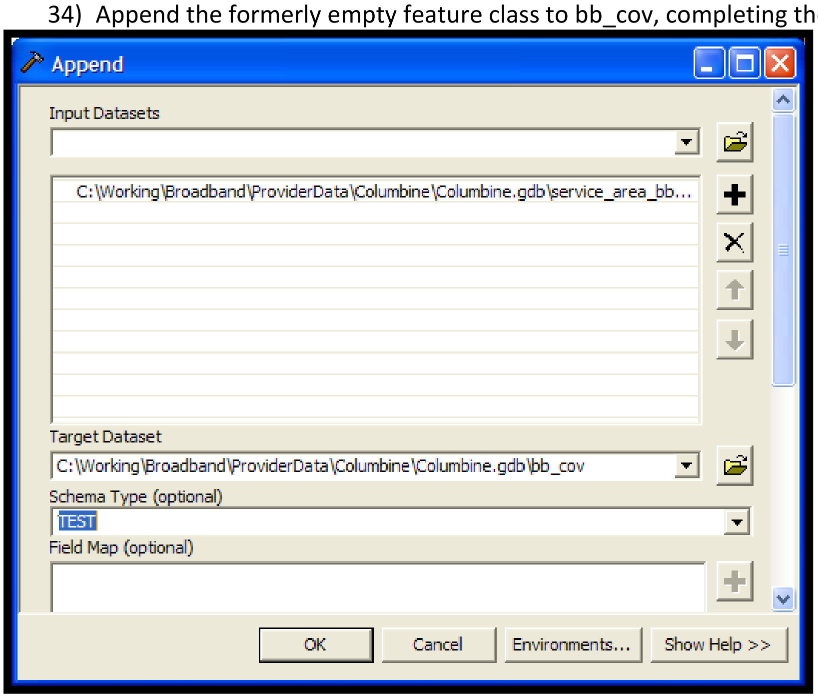
25) Save the resulting image as a TIF by selecting **File>Save Picture as**.
26) Open ArcMap® and load the BIL elevation data you used in Radio Mobile.
27) Load the TIF image you created and georeference it using the corners of the BIL data.
    a. The corners of the data can be seen in the TIF image.
28) Follow the georeferencing directions from the **Coverage Area—PDF/JPG/Other Image Format** section below.
29) Use the **Georeferencing Toolbar** to **Update the Georeferencing** for the TIF dataset.
30) In ArcToolbox®, select **Data Transformations>From Raster>Raster to Polygon** and input the georeferenced TIF you just created, as shown below:
31) Open the resulting polygon feature class for editing using the **Editing** toolbar in ArcMap® and clean up as necessary.
32) In ArcCatalog®, create an empty feature class with the schema of the bb_cov feature class and load the feature class created above into it.
    a. Right-click on the empty feature class, select **Load>Load Data** from the dropdown menu and navigate to the location of the service area feature class.
    b. Click the **Add** button, then click **Next**.
    c. Accept the defaults and click **Next**.
    d. DO NOT attempt to map any fields, as shown below:



e. Click **Next**, then **Next** again, then **Finish**.

33) In ArcToolbox®, go to **Data Management Tools>General>Append**.

34) Append the formerly empty feature class to bb_cov, completing the dialog box, as shown below:



35) Leave the **Schema Type** as TEST.

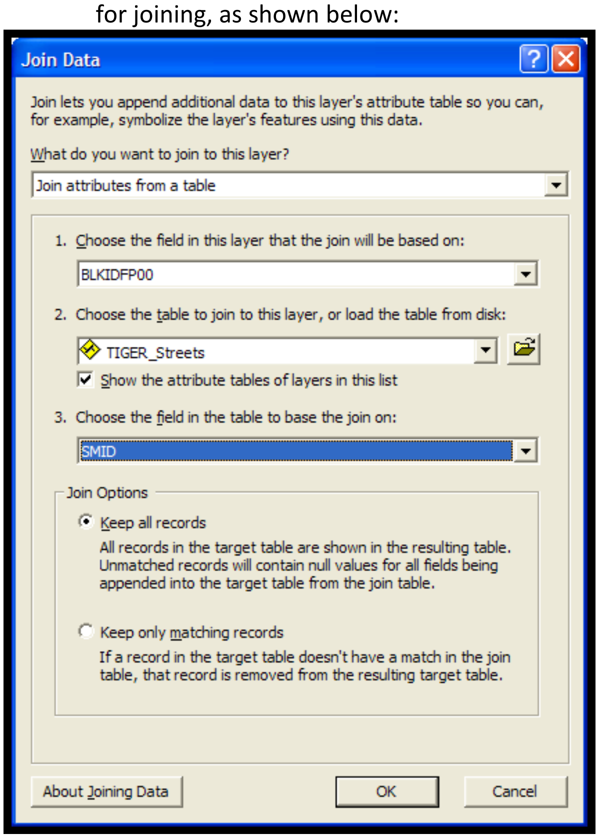
36) Click **OK**.

37) In ArcMap®, open bb_cov for editing and manually input associated attribution.

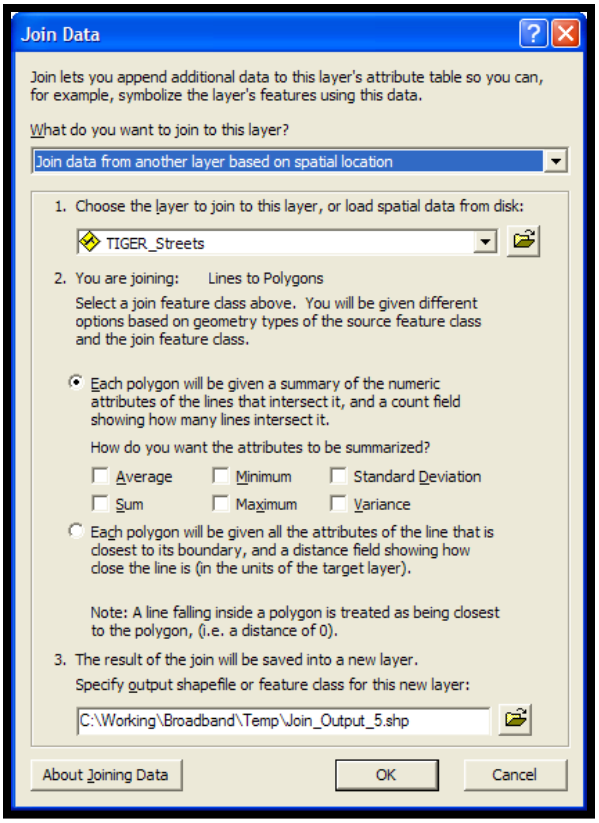
TIGER® STREET SEGMENTS—LIST, SPREADSHEET OR GIS DATA

In the event that the provider supplies TIGER® street segments in list or spreadsheet format, the steps are as follows:

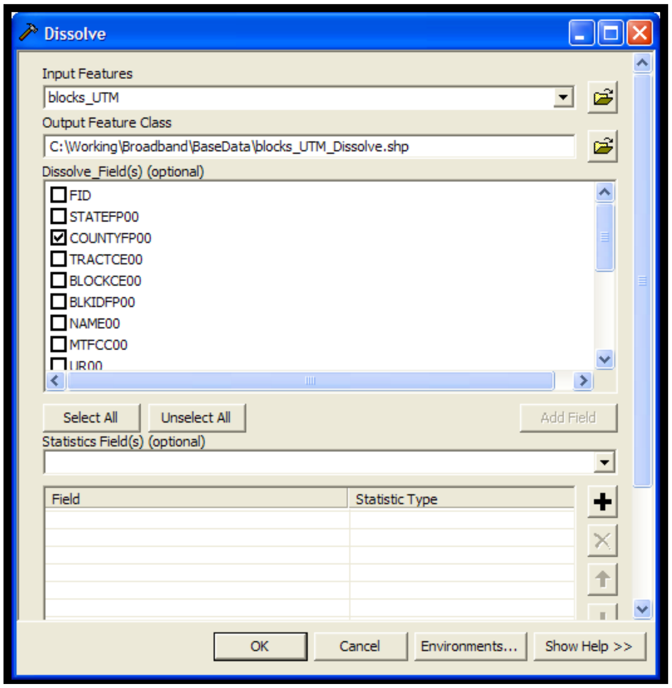
1) Join TIGER® road segments to 2000 census blocks feature class using one of two methods based on how the data is provided:
    a. If the TIGER® data is provided with a Census Block ID, then join the segments to the Census Block geometry based on that ID:
        (i.) Load both datasets into ArcMap®;
        (ii.) In the layer list, right-click on the 2000 census block feature class and select **Joins and Relates>Join**;
        (iii.) In the dialog box, select the TIGER® road segments data and the proper attribute fields for joining, as shown below:



        (iv.) Click **OK**.
    b. If the data provided is a list containing TLIDs, then join to the TIGER®/Line data using the TLID, and use a spatial join to associate the TIGER® segment with the coterminous block based on the block ID:
        (i.) Load both datasets into ArcMap®;
        (ii.) In the layer list, right-click on the 2000 census block feature class and select **Joins and Relates>Join**;
        (iii.) Select **Join data from another layer based on spatial location** from the dropdown menu;
        (iv.) Complete the dialog box, as shown below and click **OK**.

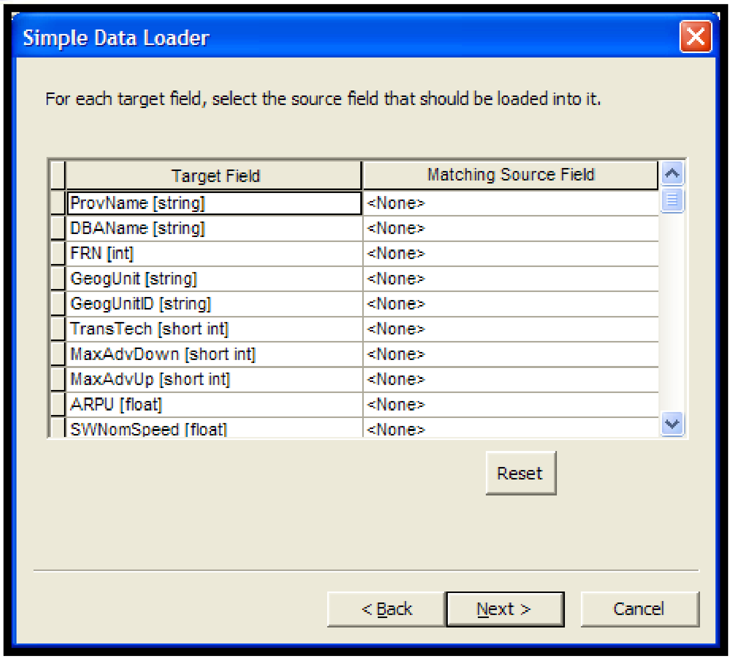


2) Export joined records into a temporary feature class.
3) If joined Census Block geometry is confined to one specific area, then dissolve blocks into one record. If joined Census Block geometry is distributed throughout a particular State, then dissolve sub-selections of census blocks for each county.
   a. Use the County FIPS code to dissolve by county.
   b. In ArcToolbox®, select **Data Management Tools>Generalization>Dissolve**.
   c. Complete the **Dissolve** dialog box, as shown below:



d. Click **OK**.

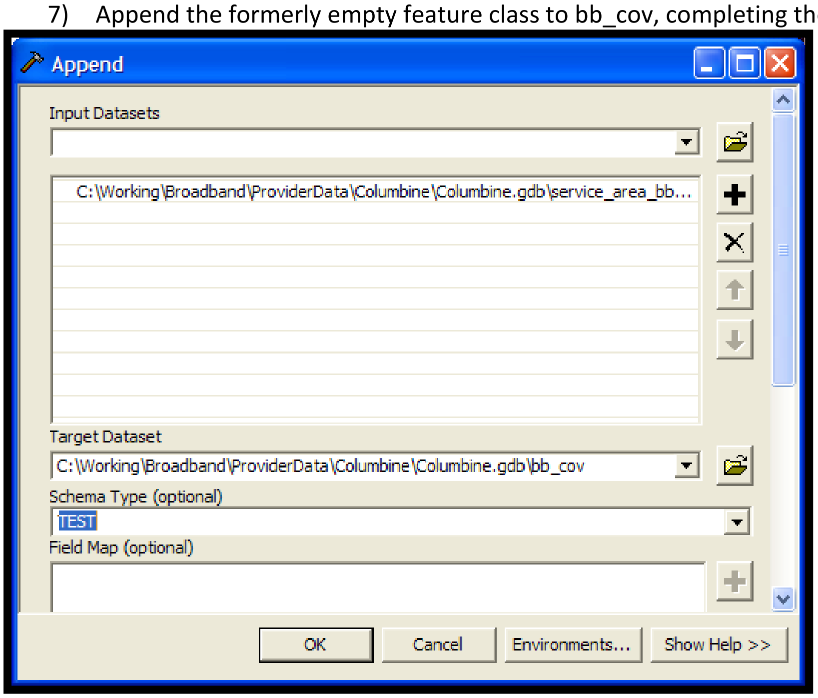
4) For each dissolved region, open the feature class for editing using the **Editing** tool in ArcMap® and remove unnecessary slivers and other small holes. For general guidance on editing features in ArcMap®, see **http://webhelp.esri.com/arcgisdesktop/9.3/pdf/Editing_Tutorial.pdf**
5) In ArcCatalog®, create an empty feature class with the schema of the bb_cov feature class and load the feature class created above into it.
   a. Right-click on the empty feature class, select **Load>Load Data** from the dropdown menu and navigate to the location of the service area feature class.
   b. Click on the **Add** button, then click **Next**.
   c. Accept the defaults and click **Next**.
   d. DO NOT attempt to map any fields, as shown below:



e. Click **Next**, then **Next** again, then **Finish**.

6) In ArcToolbox®, go to **Data Management Tools>General>Append**.

7) Append the formerly empty feature class to bb_cov, completing the dialog box, as shown below:



8) Leave the **Schema Type** as TEST.

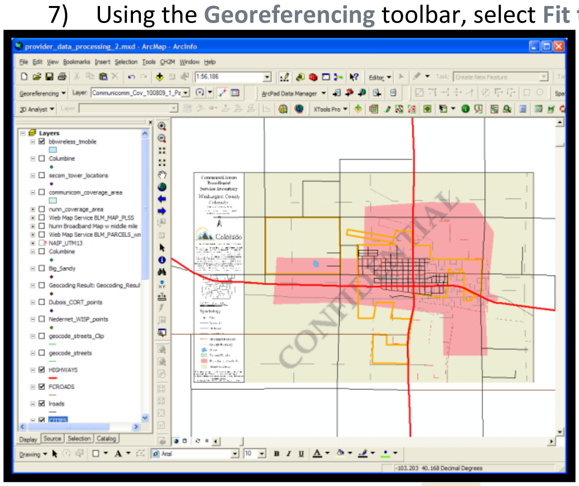
9) Click **OK**.

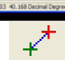
10) In ArcMap®, open bb_cov for editing and manually input associated attribution if necessary.

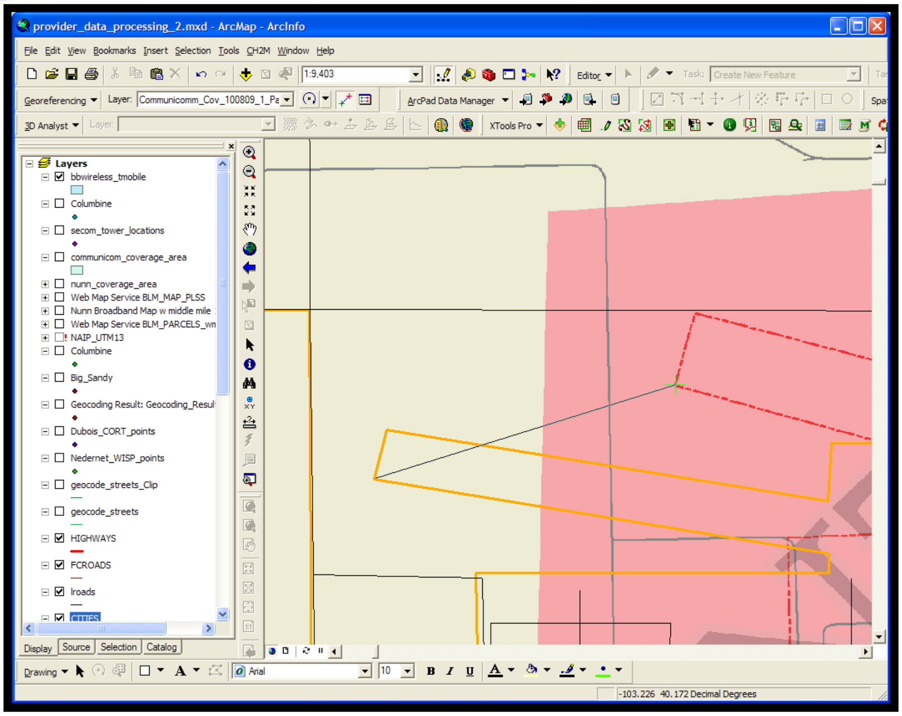
COVERAGE AREA—PDF/JPG/OTHER IMAGE FORMAT

In the event that the provider supplies coverage area data in some image format such as PDF or JPG format, the steps are as follows:

1) If in PDF format, open in Adobe Acrobat and **Save As…** JPG format.
2) Open the JPG image in ArcMap®.
3) Add the required base map vector data for georeferencing.
    a. This generally will be either the CDOT data or TIGER® data.
4) Change the coordinate system of the data frame to the desired end coordinate system.
5) Zoom to the general location of the JPG map image.
    a. This is the location based on the vector data, not the JPG image itself. For example, if you know that the JPG image represents an area around the town of Limon, zoom to the town of Limon in your vector data.
6) Open the **Georeferencing** toolbar by selecting **View>Toolbars>Georeferencing** from the main menu bar.
7) Using the **Georeferencing** toolbar, select **Fit to Display**; results are shown below:



8) Use the **Control Point** button  to add control points to the map.
9) Use common points in the base dataset and the JPG image.
    a. For example, find major street intersections, county/city boundaries, etc.
    b. Try to distribute the points more or less in the four corners on the image for the best transformation.
10) Click on the location on the image first, then click on the corresponding location on the vector database map, as shown in the image below:



11) After placing each control point, the image transformation will update automatically.
12) Repeat until satisfied with the transformation.

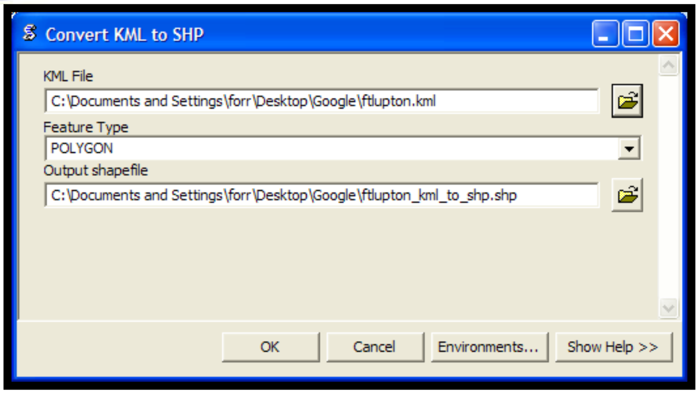
NOTE:
The transformation may take up to four points, although sometimes only two are necessary.

13) When satisfied with the transformation, select **Update Georeferencing** from the **Georeferencing** toolbar dropdown.
    a. This will create a "world" file (.jgw in the case of JPGs) in the same directory as the image file.
14) In ArcCatalog®, create a new polygon shapefile with the appropriate data schema for a provider coverage area, which can be found in Appendix D.
15) Add the shapefile to ArcMap®.
16) Using the **Editor** toolbar, select **Start Editing**. Set the **Task** to **Create New Feature**.
17) Use the **Sketch Tool** to digitize a new coverage polygon using the coverage area outline from the georeferenced JPG and add the required attributes manually.
18) Repeat the above steps for all subscriber speed coverage areas provided.
19) Follow the steps detailed in **Coverage Area—GIS Data** below.

COVERAGE AREA—KML/KMZ

In the event that the provider supplies coverage area data in Google Earth KML or KMZ format, the steps are as follows:

1) Use a KML to SHP converter to translate file into an Esri® format.
2) **http://arcscripts.esri.com/details.asp?dbid=15603**
3) Download the script and follow the provided instructions for installing it in ArcToolbox®.
4) Double-click on the script in ArcToolbox® and navigate to the location of the KML file, as shown below:



5) Add the new shapefile to ArcMap®. Repeat for all KML files provided.
6) Follow the steps detailed in **Coverage Area—GIS Data** below.

COVERAGE AREA—CAD DATA

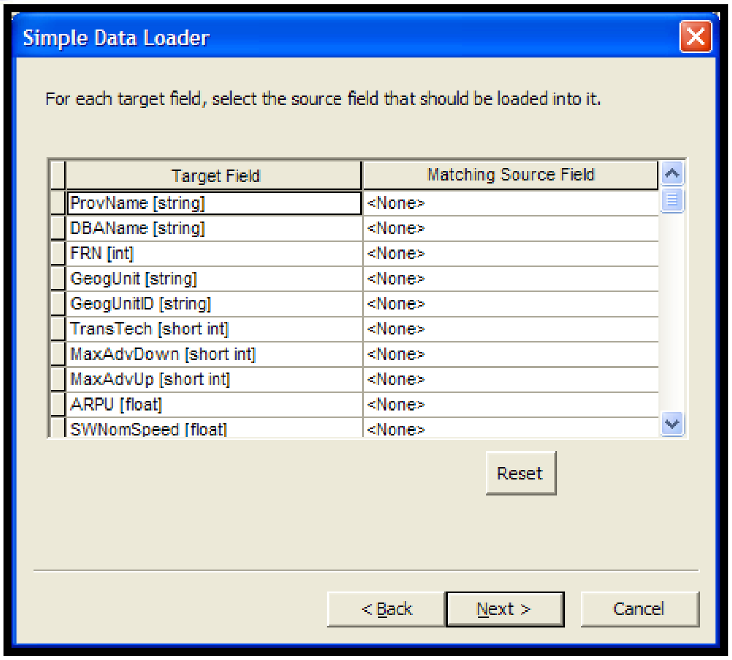
In the event that the provider supplies coverage area data in GIS format, the steps are as follows:

1) Transform the CAD dataset into an Esri® format.
2) **http://webhelp.esri.com/arcgisdesktop/9.2/index.cfm?TopicName=Transforming_CAD_datasets**
3) It may be necessary to contact the provider first to determine the coordinate system of the CAD data.
4) If the CAD data is not in a standard coordinate system, it may be necessary first to use ArcMap® to georeference the CAD data to a known coordinate system.
a) To do so, follow the instructions provided above in **Coverage Area—PDF/JPG/Other Image Format**.
5) In ArcCatalog®, create a new polygon shapefile with the appropriate data schema for a provider coverage area, which can be found in Appendix D.
6) Add the shapefile to ArcMap®.
7) Using the **Editor Toolbar**, select **Start Editing**. Set the **Task** to **Create New Feature**.
8) Use the **Sketch Tool**  to digitize a new coverage polygon using the coverage area outline from the georeferenced CAD file and add the required attributes manually.
9) Follow the steps detailed in **Coverage Area—GIS Data** below.

COVERAGE AREA—GIS DATA

In the event that the provider supplies coverage area data in GIS format, the steps are as follows:

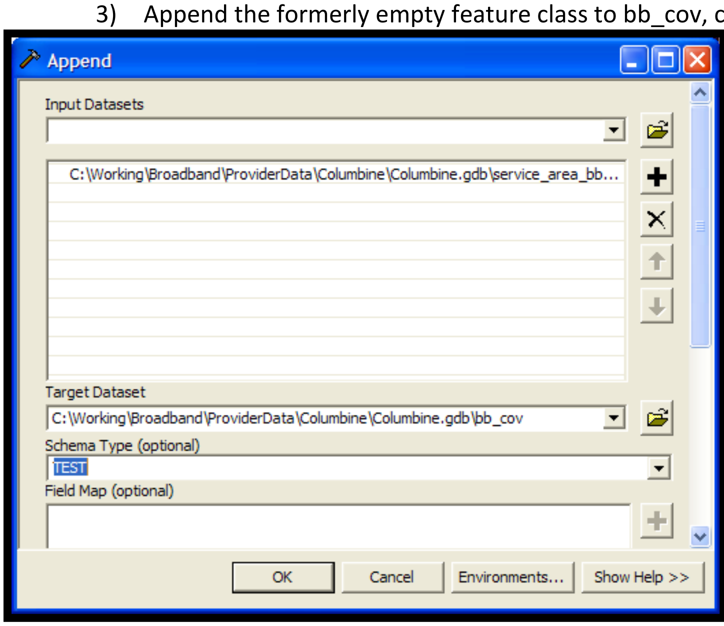
1) In ArcCatalog®, create an empty feature class with the schema of the bb_cov feature class and load the GIS feature class either created above or supplied by the provider into it.
   a. Right-click on the empty feature class, select **Load>Load Data** from the dropdown menu and navigate to the location of the service area feature class.
   b. Click on the **Add** button, then click **Next**.
   c. Accept the defaults and click **Next**.
   d. DO NOT attempt to map any fields, as shown below:



e. Click **Next**, then **Next** again, then **Finish**.

2) In ArcToolbox®, go to **Data Management Tools>General>Append**.

3) Append the formerly empty feature class to bb_cov, completing the dialog box, as shown below:



4) Leave the **Schema Type** as TEST.

5) Click **OK**.

6) In ArcMap®, open bb_cov for editing and manually input associated attribution, if necessary.

COMPACT POLYGON FROM SUBSCRIBER POINTS

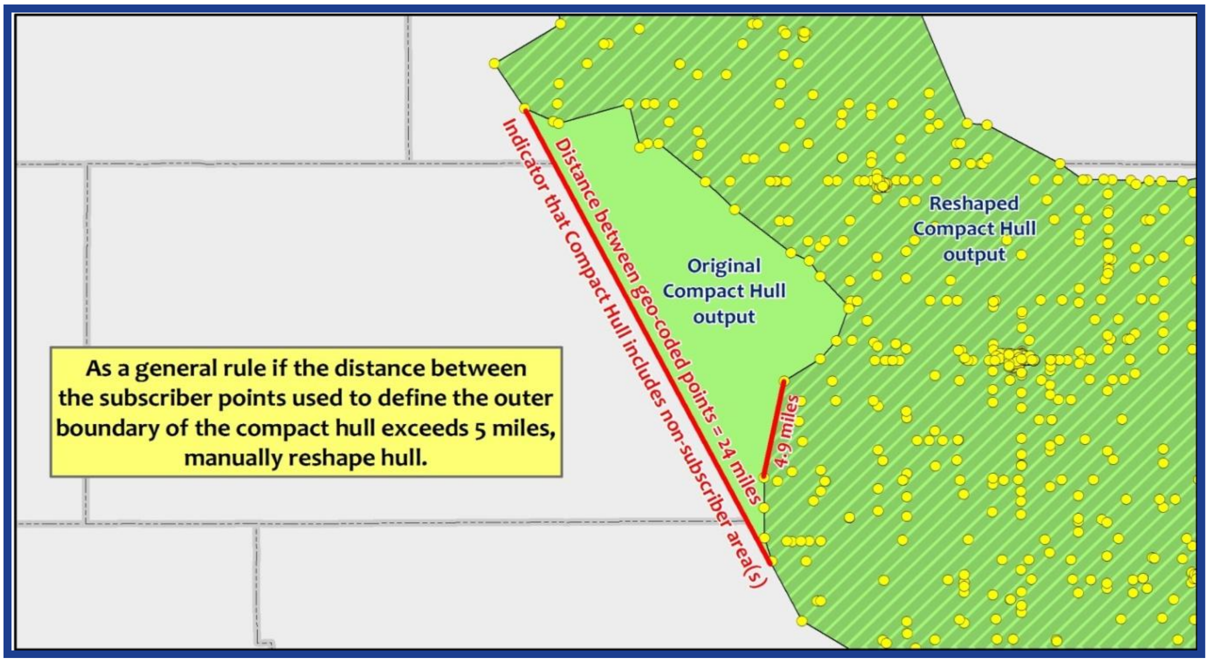
1) Geocode address list using latest **State Composite Locator**.

2) Verify that your geocoded file has only one TT (Technology Type). If not, export individual geocoded layers for each Technology Type.

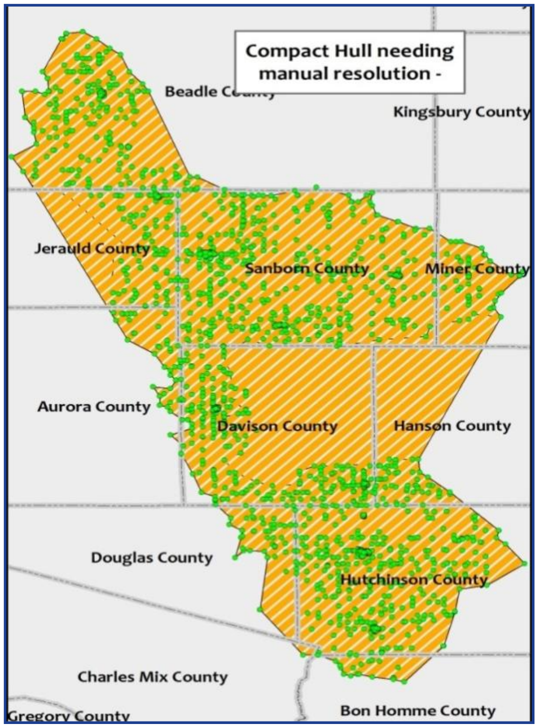
3) For each TT, check for differences in speed values or speed tiers and create separate layers for each speed value/tier.

4) Clean your geocoding results: remove any points that geocode to accuracy levels below ZIP+4 (ZIP centroids, carrier route centroids, etc). Also, verify that outliers with acceptable accuracy levels are legitimate, i.e., fall in correct city and Zip.
5) Perform spatial join between county polygons (using stcnyfips field) and the cleaned geocoded subscriber points in order to carry the county name and stcnty fips.
6) Summarize the number of subscribers by county and use the subscriber counts by county to populate the Rate Tier table.
7) Un-join the county data from the geocode subscribers list.
8) Create Compact Polygon using cleaned geocoded layer or sub-selection of XtoolsPro—ConvexHull-DetailedHull option. A sub-selection of geocoded points will be used in areas where more than one polygon will need to be created for one provider's service area.
9) Evaluate output Hull carefully, looking for areas that should not be covered by hull polygon.
    a. If it is determined that an area or areas should not be represented in coverage area, manually reshape hull polygon until coverage area is adequate.
    b. When not obvious and as a general rule, manually resolve compact polygon when the distance between the subscriber points used to define the outer boundary of the compact polygon exceeds 5 miles . When reshaping the hull polygon, snap to the outermost geocoded points. See the three figures below for examples.

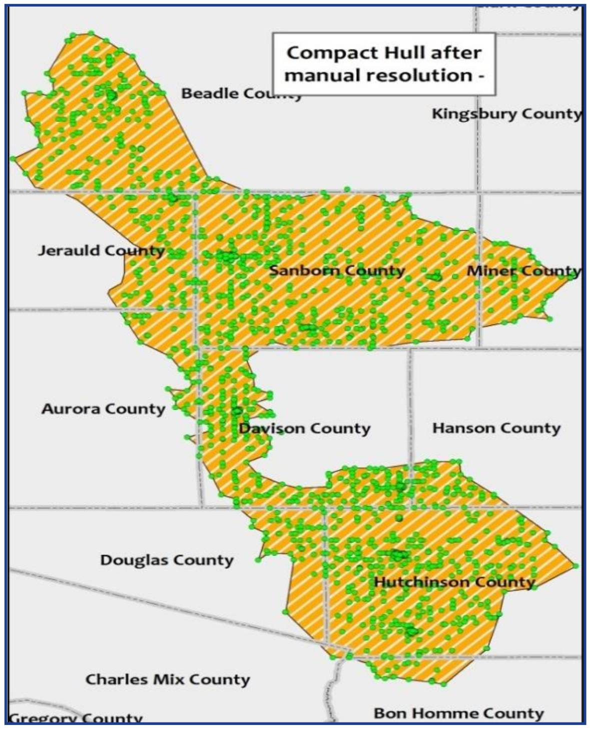
Compact Hull: Manual Resolution Required



Compact Hull: Manual Resolution Required



Compact Hull: After Manual Resolution



10) To attribute the compact polygon, perform a spatial join where your Target Feature Class is the compact polygon and the Join Feature Class is your geocoded point layer. Export compact hull with joined attributes and name file appropriately.
11) Append attributed compact polygon to Broadband TT template Feature Class and, if required, manually input any provider attribution that may not have carried over in the append process.
12) Intersect compact polygon with county boundaries to create unique records by county and use the state-county-fips field to populate stcty_fips field. Also use the county name field to populate the BBCov_Name field.
    a. Exception: where a provider's coverage is distributed throughout more than one area of any given county where the BBcov_Name should be populated using an appropriate city or other logical name based on geographical location.
13) Export/load into appropriate BB TT model dataset.

CENSUS BLOCKS—LIST OR SPREADSHEET

In the event that the provider supplies census block data in a list or spreadsheet, the steps are as follows:

1) Ensure block polygons supplied by the provider are 2000 currency.
2) If other currency, convert to 2000 currency before proceeding.
    a. To do this, remove the trailing letter (a, b, etc.) from the block ID.
    b. You will now have two blocks that equate to one block in the 2000 block geometry.
    c. Delete duplicate block IDs, retaining the higher service tier in each case.
3) Prepare the block list in clean Excel format, removing all Excel-only formatting, merged cells, colors, borders, etc.
4) Import the spreadsheet into ArcMap®.
5) Right-click on the 2000 census block feature class in the layer list in ArcMap® and select **Joins and Relates>Join** from the dropdown menu. Join the census block list to the 2000 census blocks feature class using the block ID and export joined records in a new feature class. The **Join** dialog

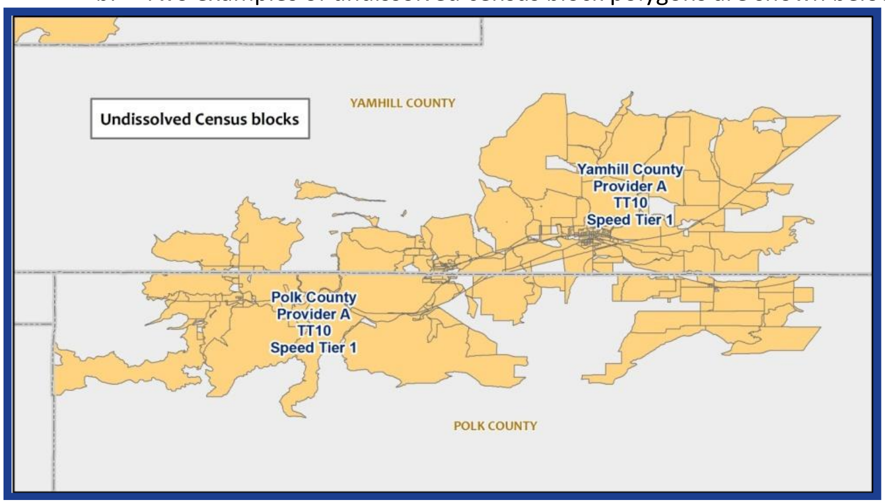
box and process can be seen above in the **TIGER® Street Segments—List, Spreadsheet or GIS Data** subsection.

6) Follow the steps in **Census Blocks—GIS Data** below.

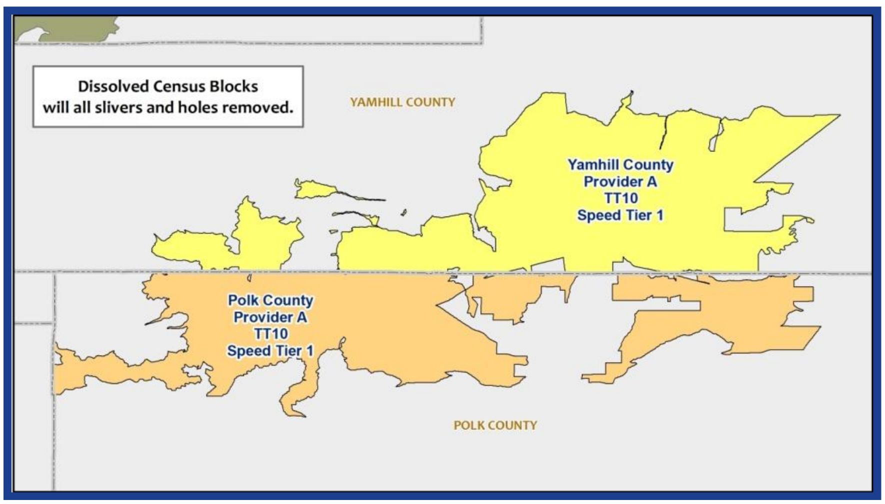
CENSUS BLOCKS—GIS DATA

In the event that the provider supplies census block GIS data, the steps are as follows:

1) Ensure that the blocks supplied by the provider are in the required data schema and are complete as far as required attribution.
   a. If not, manually enter the required attribution or contact the provider to fill gaps.
2) If census block geometry is distributed throughout more than one county, then select **Data Management Tools>Generalization>Dissolve** in ArcToolbox® and dissolve based on County/Provider/TT/Speed Tier so that unique records are created for each unique combination.
   a. The **Dissolve** dialog box is shown above in the **TIGER® Street Segments—List, Spreadsheet or GIS Data** section.
   b. Two examples of undissolved census block polygons are shown below:



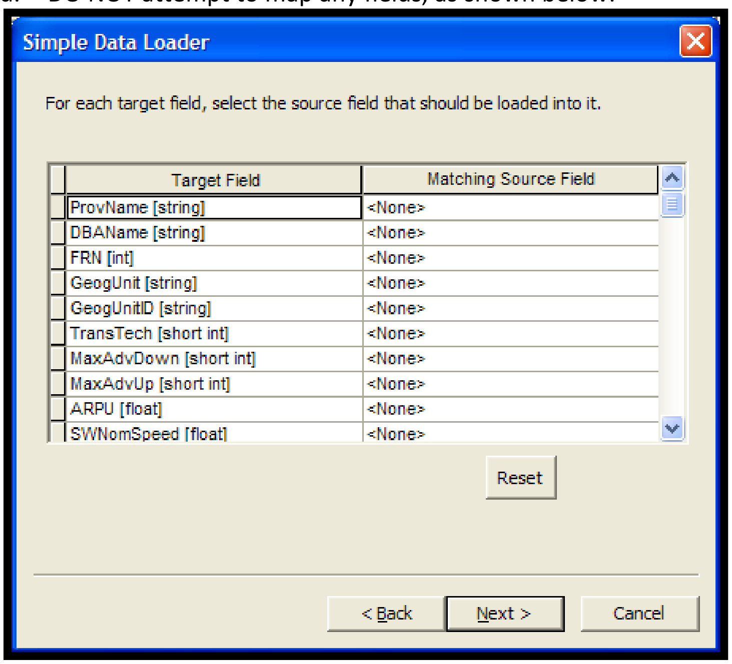
Undissolved census block polygons



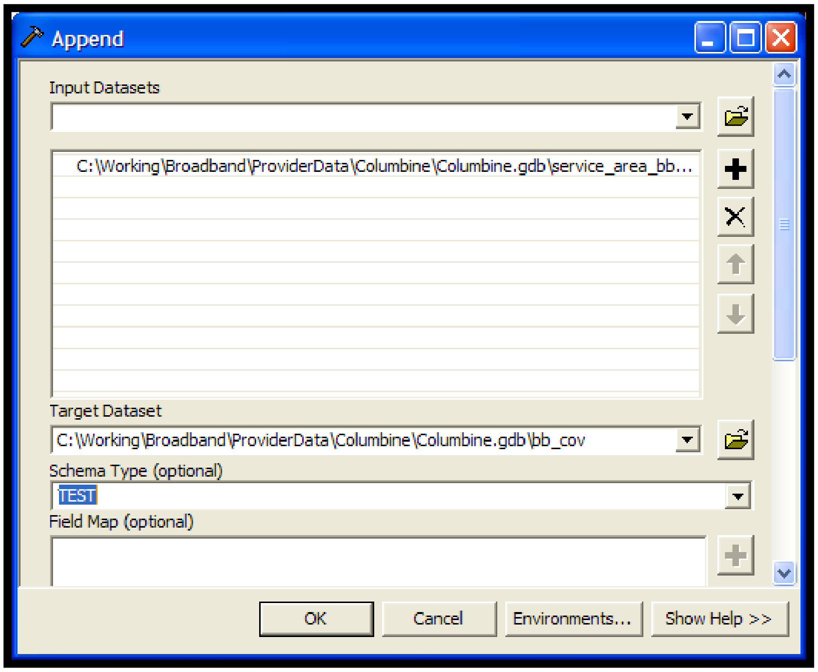
Census block polygons dissolved by county

3) For each dissolved region use the **Editing** toolbar in ArcMap® to remove unnecessary slivers and other small holes.

4) In ArcToolbox®, select **Data Management Tools>General>Merge** and merge the processed polygons into a single layer.
5) The merged census blocks will need to have the subscriber's frn field added and populated.
6) In ArcCatalog®, create an empty feature class with the schema of the bb_cov feature class and load the GIS feature class either created above or supplied by the provider into it.
   a. Right-click on the empty feature class, select **Load>Load Data** from the dropdown menu and navigate to the location of the service area feature class.
   b. Click the **Add** button, the click **Next.**
   c. Accept the defaults and click **Next.**
   d. DO NOT attempt to map any fields, as shown below:



   e. Click **Next**, then **Next** again, then **Finish**.
7) In ArcToolbox®, go to **Data Management Tools>General>Append**.
8) Append the formerly empty feature class to bb_cov, completing the dialog box, as shown below:



9) Leave the **Schema Type** as TEST.
10) Click **OK**.
11) In ArcMap®, open bb_cov for editing and manually input associated attribution, if necessary.

METADATA TRANSACTIONS

Following any updates or changes completed within the file geodatabase (fGDB) stored on the GIS-Analysts staging environment, the GIS-Analyst runs transactions to compare that fGDB with the one stored on the Core server to ensure metadata on all changes is recorded.

The steps taken to run transactions on the updated Core database are outlined below:

1) Open a command line window and run generateTransactions.py:
    a. Usage: **generateTransactions.py [Core fGDB] [Staging Environment fGDB]**
    b. Example of command line:

<path>**generateTransactions.py** <path>**ST_BB_POLY_SRV_AREAS.gdb** <path>**ST_BB_POLY_SRV_AREAS.gdb**

2) Shown below is an example of the output screen that will be displayed:

```
-----------  Collecting Transactions  ----------------

Calculating rec_id field for BBCov_0_BB_POLY_TEMPLATE
value can not be 0 or less
Trouble creating the progress meter

Calculating rec_id field for BBCov_10_CenturyLink

%   10   20   30   40   50   60   70   80   90   100

----|----|----|----|----|----|----|----|----|----|     Goal = 8
```

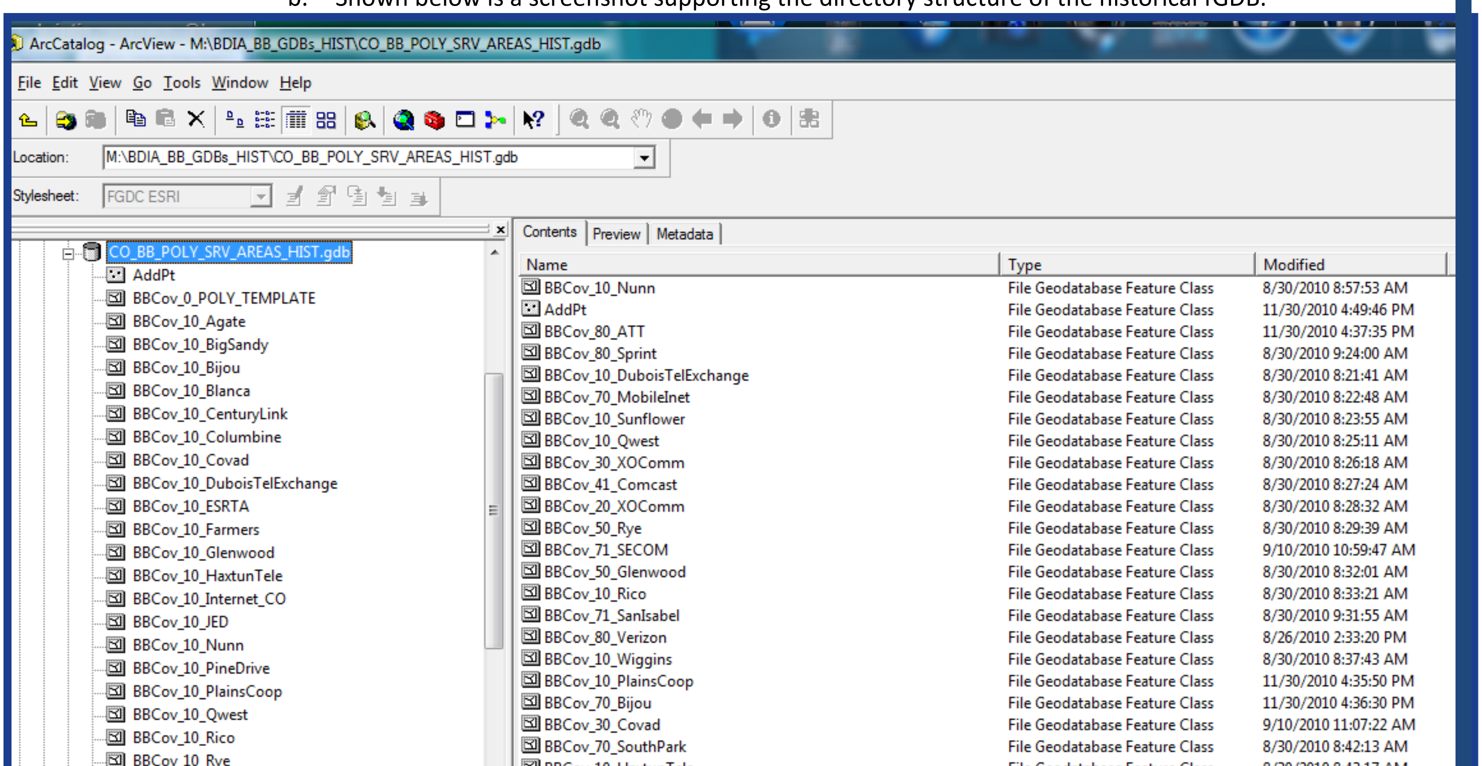
```
Merging change: X:\BDIA_BB_GDBs\MS_BB_POLY_SRV_AREAS.gdb\AddPt
Calculating Transaction fields for AddPt

%   10   20   30   40   50   60   70   80   90   100

----|----|----|----|----|----|----|----|----|----|     Goal = 1
**************************************************
X:\BDIA_BB_GDBs\MS_BB_POLY_SRV_AREAS.gdb\AddPt...changes is complete.

Your transaction FeatureClasses are in:
\\michigan\AllAccess\BDIA_BB_GDBs_HIST\MS_BB_POLY_SRV_AREAS_HIST.gdb
--------------------------------------------------------------------------------
------------
elapsed time = 2994.4 seconds
```

3) After the process has completed, results can be found in the ST_BB_POLY_SRV_AREAS_HIST.gdb:
   a. The transactions scripts records changes at a feature level.
   b. Shown below is a screenshot supporting the directory structure of the historical fGDB.



   c. Attribution associated with each added/removed/changed feature is tracked, including the following additional columns appended to the end of each:
      (i.) Commit_by

(1) Records the GIS-Analyst who committed the changes to the historical fGDB.

(ii.) Commit_date

(1) Records the date and time stamp on which the changes were committed.

(iii.) Trans_type

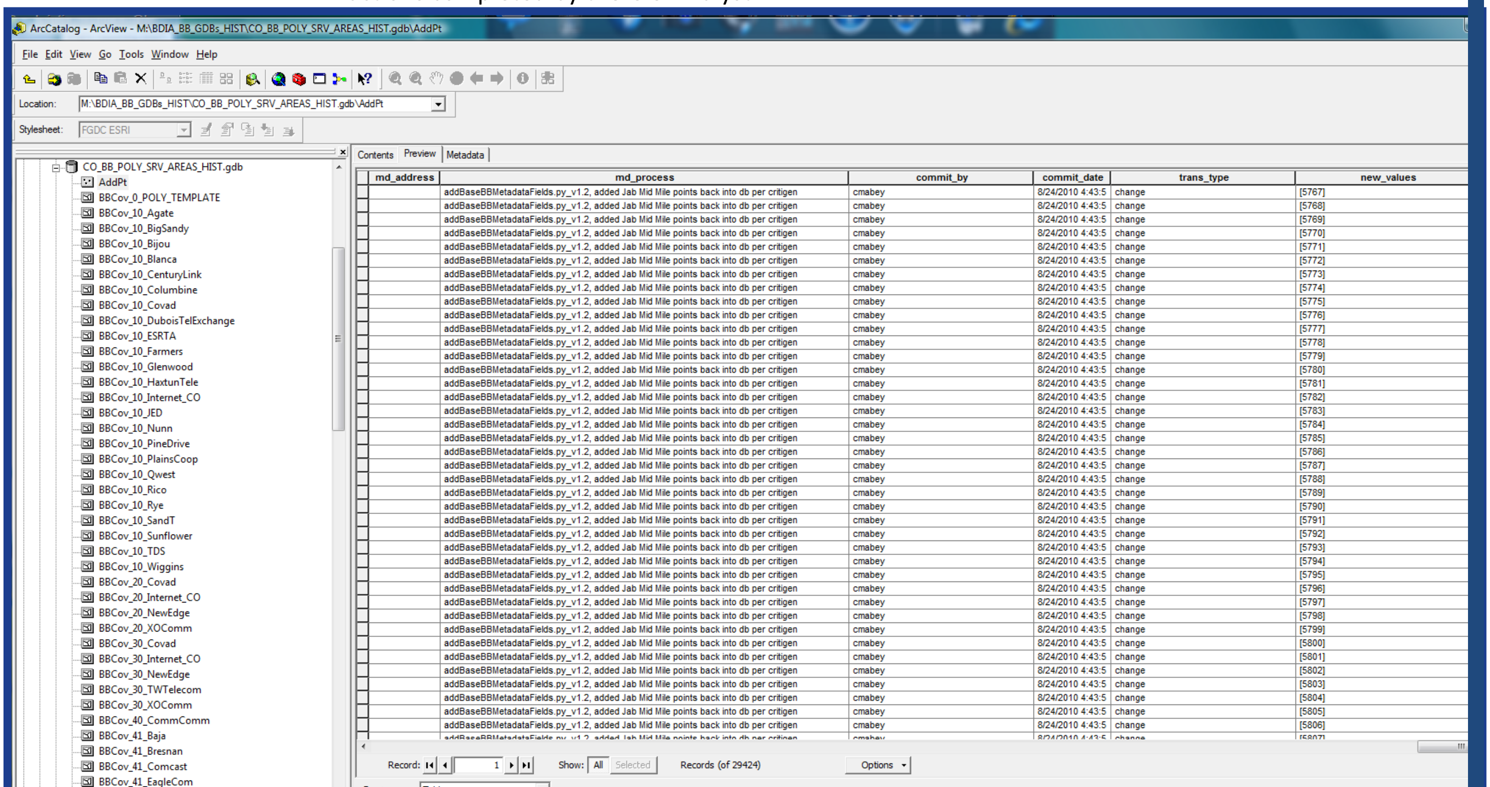
(1) This field reflects the type of change recorded;

(2) Categorized by: Adds/Change/Deletes.

(iv.) New_values

(1) Records the new values when a change was completed on a feature. Example: Name or speed change.

d. MD_Process also is transferred from the edited fGDB to the historical fGDB, which states the actions completed by the GIS-Analyst.



DATA PROCESSING

DATA PROCESSING OVERVIEW

The following subsections detail the steps and layout required to process the service provider data further to meet NTIA requirements:

- **Weighted Nominal Speed**;
- **Middle Mile**;
- **Broadband Coverage Template**.

WEIGHTED NOMINAL SPEED

The weighted nominal speed is populated in one of the following two ways: **subscriber data supplied by provider** or **value supplied by provider**.

SUBSCRIBER DATA SUPPLIED BY PROVIDER

Where the data provider supplies subscriber speed information, the following formula from the NOFA is used:

$$\frac{(\text{speed tier-1 in kbps} \times \text{no. of tier-1 subscribers}) + (\text{speed tier-2 in kbps} \times \text{no. of tier-2 subscribers}) + (\text{etc.})}{\text{Total average monthly subscribers}}$$

Data is initially broken up in the following order:

1) Stcty_fips;
2) Transmission technology type;
3) Subscriber tiers.

VALUE SUPPLIED BY PROVIDER

Some providers will supply their weighted nominal speed. In these cases, the data supplied will be populated instead of using the NOFA formula. These obtained or calculated values are used to update the service overview layer.

This can be done manually or by creating a table with the provider's FRN and average weighted speed and joining it to the service overview table in ArcMap®.

1) To join, right-click on the layer to join to and select **Joins and Relates>Join** from the dropdown menu.
2) Then navigate to the table to join to and select the join fields from the dropdown list.
3) Then open the source table (the table in ArcMap®) and right-click on the header of the **Average Weighted Speed** field and select **Calculate Field** from the dropdown menu.
4) Use the value of the average weighted speed from the joined table.

MIDDLE MILE

Middle mile information generally is provided in spreadsheet or text file format. The process is to take what is supplied by the provider and translate it into the required data schema.

1) If the data is supplied with address information, follow the process outlined above in **Subscriber Location—Address Data**.
2) If the data is supplied with associated XY coordinates, follow the process outlined above in **Subscriber Location—XY Data**.
3) Once the data is in GIS format, use the **Append** (**Data Management Tools>General>Append**) command in ArcToolbox® to append the data to the overall middle mile dataset.
4) Set the schema type to NO_TEST and use the Field Map to map the attribute fields from the source to the target dataset.

BROADBAND COVERAGE TEMPLATE

The table below lists descriptions of the fields within the bb_cov layer, which is the interim dataset used to create the final product deliverable.

NAME	ALIAS	DESCRIPTION
objectid	OBJECTID	Internal Object ID
shape	SHAPE	Internal Shape storage
prov_id	PROVIDER_ID	Unique numeric identifier for each provider
prov_name	PROVIDER_NAME	Unique name for each provider
dba_name	DOING_BUSINESS_AS	An alternative "Doing-Business-As" name for the provider
frn	FCC_REGISTRATION_NUMBER	Provider FCC Registration Number
bbcov_name	BBCOV_NAME	BroadMap Broadband Coverage name
trans_code	TRANSMISSION_CODE	Unique code for the transmission technology type described by this layer
trans_name	TRANSMISSION_NAME	Name for the transmissions technology type
trans_desc	TRANSMISSION_DESC	Description for the transmissions technology type
spect_code	SPECTRUM_CODE	Unique code for the spectrum [WIRELESS ONLY]
spect_name	SPECTRUM_NAME	Name for the spectrum [WIRELESS ONLY]
spect_desc	SPECTRUM_DESC	Description for the spectrum [WIRELESS ONLY]
mad_dwn_t	MAX_AD_DOWN_TIER	Maximum advertised downstream speed available within given area (speed tier)
mad_up_t	MAX_AD_UP_TIER	Maximum advertised upstream speed available within given area (speed tier)
typ_dwn_t	TYPICAL_DOWN_TIER	Typical downstream speed available within given area (speed tier)
typ_up_t	TYPICAL_UP_TIER	Typical upstream speed available within given area (speed tier)
mad_dwn_k	MAX_AD_DOWN_KBPS	Maximum advertised downstream speed available within given area (kbps)
mad_up_k	MAX_AD_UP_KBPS	Maximum advertised upstream speed available within given area (kbps)
typ_dwn_k	TYPICAL_DOWN_KBPS	Typical downstream speed available within given area (kbps)
typ_up_k	TYPICAL_UP_KBPS	Typical upstream speed available within given area (kbps)
subs	SUBSCRIBERS	Total average monthly subscribers for this provider for this technology for this coverage polygon
md_geom	MD_GEOMETRY	Metadata: Comma separated list of source ids from which the polygon extent was produced
md_exists	MD_EXISTS	Metadata: Comma-separated list of source ids used in understanding and editing the provider data for this polygon

NAME	ALIAS	DESCRIPTION
md_who	MD_WHO	Metadata: Name of the editor who last edited this feature at the time in md_when
md_when	MD_WHEN	Metadata: Date/time that this feature was last edited
md_process	MD_PROCESS	Metadata: Comma-separated list of processes used to create and/or modify this layer
stcty_fips	STATE_COUNTY_FIPS	State/County FIPS code
rec_id	RECORD_ID	Compound Key formed from STCTY_FIPS+"|"+Provider_ID+"|"+Trans_Code+"|"+BBCov_Name
st_area	ST_AREA(SHAPE)	Area in square decimal degrees
st_length	ST_LENGTH(SHAPE)	Length in decimal degrees
Provider_Type	Type of Provider	Has Subtype (1:Broadband provider as described in the NOFA,2:Reseller,3:Unknown), default value=1 (New 04/11 Model)

VERIFICATION AND VALIDATION

PROVIDER VALIDATION—PROVIDER PORTAL/PDF MAP REVIEW

Following the collection and aggregation of provider data, the aggregated data is validated by the provider to ensure it is an accurate representation of their coverage area and supporting broadband information.

- This validation is completed through the Provider Portal web application, which is a secure interactive map that displays the provider's coverage areas and allows the provider to validate, submit feedback or request changes.
    - If changes are requested, then the features on the portal are updated and an automatic request is sent to the provider to complete the validation process.
- Providers that did not use the Provider Portal are asked to validate a PDF map displaying their coverage area(s). This is accomplished via e-mail notification.

PROVIDER VERIFICATION—THIRD PARTY SOURCE REVIEW

After the provider has validated its coverage areas, a third-party source comparison and analysis is performed.

- Where anomalies or discrepancies are identified, a "SCAN" point is dropped and descriptive comments are applied to be reviewed later with the provider.
- During the provider review, the map is displayed along with the "SCAN" points and potential refinement is completed based on input from the provider.

The table below shows third-party sources used:

THIRD-PARTY SOURCE NAME	SOURCE TYPE	VERIFICATION TYPE
InfoUSA	Consumer and Business Listings	Community Anchor Institutions; Can also be used for demographic information supporting the State websites.
Pitney Bowes (PBBI)	Exchange Info Plus (Central Office Locations)	Exchange datasets are used to verify the following Transmission Technologies (TT): Asymmetric xDSL (10), Symmetric xDSL (20), Other Copper Wireline (30), and Optical Carrier/Fiber to the End User (50).
Media Prints	Cable Boundaries	Used to verify the following TT:

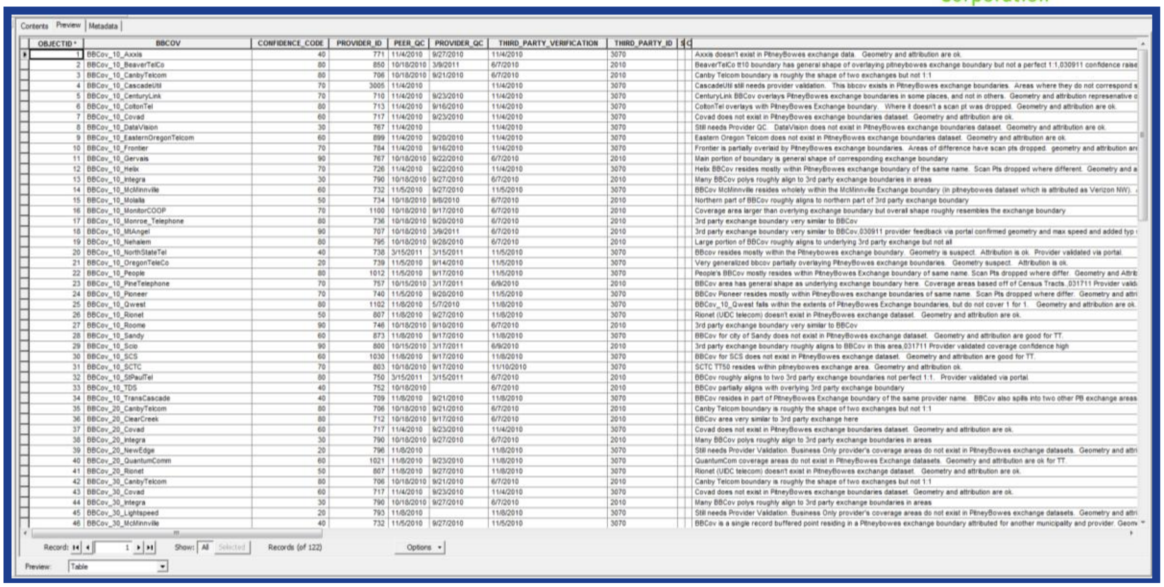
THIRD-PARTY SOURCE NAME	SOURCE TYPE	VERIFICATION TYPE
		Cable Modem—DOCSIS 3.0 (40) and Cable Modem—Other (41).
American Roamer	Wireless Coverage Patterns (EVDO, GPRS, WISP, HSPA)	Used to verify the following TT: Terrestrial Fixed Wireless—Unlicensed (70), Terrestrial Fixed Wireless—Licensed (71) and Terrestrial Mobile Wireless (80).
ComSearch	Wireless Spectrum Holdings and Tower Data	Used to verify the following TT: Terrestrial Fixed Wireless—Unlicensed (70), Terrestrial Fixed Wireless—Licensed (71) and Terrestrial Mobile Wireless (80).

ASSIGNING CONFIDENCE VALUES

All findings and results from the abovementioned **validation and verification activities**, plus internal peer quality reviews, are captured and tracked in a **Validation table** (see example on the following page) and form the basis of the confidence value assigned for each provider and then each technology.

CONFIDENCE VALUE	DESCRIPTION
0	Coverage area has not been reviewed.
10	Extremely Low: Single Source QC.
20	Very Low: Needs additional validation\verification.
30	Low: Even with validation\verification, coverage still is suspect.
40	Acceptable: Confirm with State prior to shipment.
50	Meets requirements to be included in shipment.
60	Moderate: Meets NTIA/State's standards, representative of Technology Type (TT).
70	High: Accurate representation of coverage based upon TT.
80	Very High: Multiple validation\verification with most third-party sources.
90	Extremely High: Multiple validation\verification sources.
100	Perfect: Multiple validation\verification sources, with complete alignment with sources and ground truth verification activities.

The **Validation table** is maintained as updates or changes occur for each provider, down to technology type, with the overall goal to improve the confidence values and overall map representation. An example of the Validation table is shown below:


Contents | Preview | Metadata

OBJECTID *	BBCOV	CONFIDENCE_CODE	PROVIDER_ID	PEER_QC	PROVIDER_QC	THIRD_PARTY_VERIFICATION	THIRD_PARTY_ID	S	C
1	BBCov_10_Axxis	40	771	11/4/2010	9/27/2010	11/4/2010	3070		Axxis doesn't exist in PitneyBowes exchange data. Geometry and attribution are ok.
2	BBCov_10_BeaverTelCo	80	850	10/18/2010	3/9/2011	6/7/2010	2010		BeaverTelCo tt10 boundary has general shape of overlaying pitneybowes exchange boundary but not a perfect 1:1,030911 confidence raise
3	BBCov_10_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010		Canby Telcom boundary is roughly the shape of two exchanges but not 1:1
4	BBCov_10_CascadeUtil	70	3005	11/4/2010		11/4/2010	3070		CascadeUtil still needs provider validation. This bbcov exists in PitneyBowes exchange boundaries. Areas where they do not correspond s
5	BBCov_10_CenturyLink	70	710	11/4/2010	9/23/2010	11/4/2010	3070		CenturyLink BBCov overlays PitneyBowes exchange boundaries in some places, and not in others. Geometry and attribution represenative c
6	BBCov_10_ColtonTel	80	713	11/4/2010	9/16/2010	11/4/2010	3070		ColtonTel overlays with PitneyBowes Exchange boundary. Where it doesn't a scan pt was dropped. Geometry and attribution are ok.
7	BBCov_10_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070		Covad does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
8	BBCov_10_DataVision	30	767	11/4/2010		11/4/2010	3070		Still needs Provider QC. DataVision does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
9	BBCov_10_EasternOregonTelcom	60	899	11/4/2010	9/20/2010	11/4/2010	3070		Eastern Oregon Telcom does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
10	BBCov_10_Frontier	70	784	11/4/2010	9/16/2010	11/4/2010	3070		Frontier is partially overlaid by PitneyBowes exchange boundaries. Areas of difference have scan pts dropped. geometry and attribution are
11	BBCov_10_Gervais	90	767	10/18/2010	9/22/2010	6/7/2010	2010		Main portion of boundary is general shape of corresponding exchange boundary
12	BBCov_10_Helix	70	726	11/4/2010	9/22/2010	11/4/2010	3070		Helix BBCov resides mostly within PitneyBowes exchange boundary of the same name. Scan Pts dropped where different. Geometry and a
13	BBCov_10_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010		Many BBCov polys roughly align to 3rd party exchange boundaries in areas
14	BBCov_10_McMinnville	60	732	11/5/2010	9/27/2010	11/5/2010	3070		BBCov McMinnville resides wholely within the McMinnville Exchange boundary (in pitneybowes dataset which is attributed as Verizon NW).
15	BBCov_10_Molalla	50	734	10/18/2010	9/8/2010	6/7/2010	2010		Northern part of BBCov roughly aligns to northern part of 3rd party exchange boundary
16	BBCov_10_MonitorCOOP	70	1100	10/18/2010	9/17/2010	6/7/2010	2010		Coverage area larger than overlying exchange boundary but overall shape roughly resembles the exchange boundary
17	BBCov_10_Monroe_Telephone	80	736	10/18/2010	9/20/2010	6/7/2010	2010		3rd party exchange boundary very similar to BBCov
18	BBCov_10_MtAngel	90	707	10/18/2010	3/9/2011	6/7/2010	2010		3rd party exchange boundary very similar to BBCov,030911 provider feedback via portal confirmed geometry and max speed and added typ
19	BBCov_10_Nehalem	80	795	10/18/2010	9/28/2010	6/7/2010	2010		Large portion of BBCov roughly aligns to underlying 3rd party exchange but not all
20	BBCov_10_NorthStateTel	40	738	3/15/2011	3/15/2011	11/5/2010	3070		BBcov resides mostly within the Pitneybowes exchange boundary. Geometry is suspect. Attribution is ok. Provider validated via portal.
21	BBCov_10_OregonTeleCo	20	739	11/5/2010	9/14/2010	11/5/2010	3070		Very generalized bbcov partially overlaying PitneyBowes exchange boundaries. Geometry suspect. Attribution is ok.
22	BBCov_10_People	80	1012	11/5/2010	9/17/2010	11/5/2010	3070		People's BBCov mostly resides within PitneyBowes Exchange boundary of same name. Scan Pts dropped where differ. Geometry and Attrib
23	BBCov_10_PineTelephone	70	757	10/15/2010	3/17/2011	6/9/2010	2010		BBCov area has general shape as underlying exchange boundary here. Coverage areas based off of Census Tracts.,031711 Provider valid
24	BBCov_10_Pioneer	70	740	11/5/2010	9/20/2010	11/5/2010	3070		BBCov Pioneer resides mostly within PitneyBowes exchange boundaries of same name. Scan Pts dropped where differ. Geometry and attri
25	BBCov_10_Qwest	80	1102	11/8/2010	5/7/2010	11/8/2010	3070		BBCov_10_Qwest falls within the extents of PitneyBowes Exchange boundaries, but do not cover 1 for 1. Geometry and attribution are ok.
26	BBCov_10_Rionet	50	807	11/8/2010	9/27/2010	11/8/2010	3070		Rionet (UDC telecom) doesn't exist in PitneyBowes exchange dataset. Geometry and attribution are ok.
27	BBCov_10_Roome	90	746	10/18/2010	9/10/2010	6/7/2010	2010		3rd party exchange boundary very similar to BBCov
28	BBCov_10_Sandy	60	873	11/8/2010	9/17/2010	11/8/2010	3070		BBCov for city of Sandy does not exist in PitneyBowes exchange dataset. Geometry and attribution are good for TT.
29	BBCov_10_Scio	90	800	10/15/2010	3/17/2011	6/9/2010	2010		3rd party exchange boundary roughly aligns to BBCov in this area,031711 Provider validated coverage confidence high
30	BBCov_10_SCS	60	1030	11/8/2010	9/17/2010	11/8/2010	3070		BBCov for SCS does not exist in PitneyBowes exchange dataset. Geometry and attribution are good for TT.
31	BBCov_10_SCTC	70	803	10/18/2010	9/17/2010	11/10/2010	3070		SCTC TT50 resides within pitneybowes exchange area. Geometry and attribution ok.
32	BBCov_10_StPaulTel	80	750	3/15/2011	3/15/2011	6/7/2010	2010		BBCov roughly aligns to two 3rd party exchange boundaries not perfect 1:1. Provider validated via portal.
33	BBCov_10_TDS	40	752	10/18/2010		6/7/2010	2010		BBCov partially aligns with overlying 3rd party exchange boundary
34	BBCov_10_TransCascade	40	709	11/8/2010	9/21/2010	11/8/2010	3070		BBCov resides in part of PitneyBowes Exchange boundary of the same provider name. BBCov also spills into two other PB exchange areas
35	BBCov_20_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010		Canby Telcom boundary is roughly the shape of two exchanges but not 1:1
36	BBCov_20_ClearCreek	80	712	10/18/2010	9/17/2010	6/7/2010	2010		BBCov area very similar to 3rd party exchange here
37	BBCov_20_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070		Covad does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
38	BBCov_20_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010		Many BBCov polys roughly align to 3rd party exchange boundaries in areas
39	BBCov_20_NewEdge	20	796	11/8/2010		11/8/2010	3070		Still needs Provider Validation. Business Only provider's coverage areas do not exist in PitneyBowes exchange datasets. Geometry and attri
40	BBCov_20_QuantumComm	60	1021	11/8/2010	9/23/2010	11/8/2010	3070		QuantumCom coverage areas do not exist in PitneyBowes Exchange datasets. Geometry and attribution are ok for TT.
41	BBCov_20_Rionet	50	807	11/8/2010	9/27/2010	11/8/2010	3070		Rionet (UDC telecom) doesn't exist in PitneyBowes exchange dataset. Geometry and attribution are ok.
42	BBCov_30_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010		Canby Telcom boundary is roughly the shape of two exchanges but not 1:1
43	BBCov_30_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070		Covad does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
44	BBCov_30_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010		Many BBCov polys roughly align to 3rd party exchange boundaries in areas
45	BBCov_30_Lightspeed	20	793	11/8/2010		11/8/2010	3070		Still needs Provider Validation. Business Only provider's coverage areas do not exist in PitneyBowes exchange datasets. Geometry and attri
46	BBCov_30_McMinnville	40	732	11/5/2010	9/27/2010	11/5/2010	3070		BBCov is a single record buffered point residing in a Pitneybowes exchange boundary attributed for another municipality and provider. Geom

Record: 1 Show: All Selected Records (of 122) Options
Preview: Table

COMMUNITY ANCHOR INSTITUTION (CAI) DATA

DATA COLLECTION

The CAI data was initially collected from the State to create the baseline inventory. All location information and broadband coverage data supplied also was ingested into the data deliverable. Additional collection of CAI information was done via data mining and/or webscraping to build out the inventory further. For example: Collection of additional CAIs and location information.

The State-agency-provided CAI inventory was comprehensive but the challenge is collecting broadband related data: service provider(s), technology and speed data for each CAI. Availability of the CAI portal has not significantly increased submission of this data. Additional promotion to CAIs to use the CAI portal will be needed to increase this data for subsequent deliverables.

INSTITUTION DATA

Institution data is obtained from a variety of sources and almost always provided in Excel spreadsheet format. The general process for incorporating this data is as follows:

1) If the data is provided in Excel or some similar format:
   a. Clean and standardize the Excel spreadsheet, removing any cell formats, merged cells, etc.
   b. Standardize the address format as defined in the staging CAI database.
   c. If the spreadsheet includes X and Y values, such as latitude and longitude, use the **Add XY Data** tool in ArcMap® to create a spatial data layer.
   d. If there are only addresses, then follow the geocoding steps outlined above to create spatial data points for each of the institutions.
      (i.) Institutions that do not geocode based on the TIGER® 2009 dataset will have to be located manually using Google Maps, Google Earth or some other information source.
2) If the CAI source data is in GIS format, add the Latitude and Longitude fields and use the **Calculate Geometry** tool to populate them, using the WGS 84 coordinate system.
3) Using ArcCatalog®, load the new data into the staging CAI database.
4) This database is ready for the makeDeliverable.py script to process the information into the final State and NTIA deliverables.

COMMUNITY ANCHOR INSTITUTION (CAI) PORTAL UPDATES

A web application has been released to allow for further data collection and validation of anchor institution location information, broadband coverage and speed test data. Information collected from the CAI Portal is then ingested into the overall inventory and will be compared later against the provider coverage areas mapped to locate any potential discrepancies.

PRODUCT EXTRACT

PYTHON SCRIPTS

The following subsections make use of Python scripts. In general, to use a Python script you must have Python installed on your computer. To download the latest version of Python, go to **http://www.python.org/download/** and download the latest stable version. As of August 2010, this was version 2.7. Once this is installed, the general way to run a script is to type the following at a command prompt: C:\Python27\python.exe C:\<location of script>. Many of the scripts provided have environment variables that must be set before they can be run.

The Python code for BroadMap's product extract has been incorporated into a Hudson CI System, which is detailed in the **Process Operation and Monitoring** section of this document. This was a process improvement activity so that all processes can be monitored, controlled and will contain historical tracking on each process.

PRODUCT EXTRACT PROCESS

NOTE:
Specific Python scripts are called out in **red** font in the subsections below.

The MapConnect™ product extract process, makeDeliverable.py, uses the BB_Cov and BROADMAP_POINTS interim datasets to create the following layers according to the current specifications:

- BB_Service_Road_Segment
  - This layer contains all broadband services associated with specific street segments for census 2000 blocks larger in area than two square miles.
- BB_ServiceCensusBlock
  - Contains all broadband services associated with census blocks of no greater than two square miles.
- BB_Service_Wireless
  - This layer contains all wireless services not associated with specific addresses.
- BB_ServiceOverview
  - This layer contains subscriber-weighted nominal speed for each provider's service area at a county level and is meant to act as a summarized view.
- BB_ConnectionPoint_MiddleMile
  - This layer contains middle-mile and backbone interconnection points.
- BB_Service_CAInstitutions
  - Broadband Service at Community Anchor Institutions (CAI).
  - Community Anchor Institutions consist of schools, libraries, medical and healthcare providers, public safety entities, community colleges and other institutions of higher education as well as other community support organizations and entities.

Because of a NTIA model change for the October 2010 data deliverable, an addition to this code was created to support both models in case a comparison is later desired or a request is made to revert to the original model. This script name is bdia2ntia.py and creates the following layers in addition to the layers mentioned above, rolled up to NATL_Broadband_Map.

- BB_ConnectionPoint_LastMile
  - This layer contains last mile infrastructure points, which is populated only if data cannot be provided at a more granular level.
- BB_Service_Address
  - Represents broadband availability for service address points. Address Point availability refers to those individual addresses at which each facilities-based provider of broadband service can provide broadband services of minimal characteristics within 7-10 business days.
- State_Boundary
  - State boundary supporting topological validation of point feature classes.
- NATL_Broadband_Topology
  - Supports basic topology quality checking. Example: No CAIs or Middle Mile points outside of the State boundary.

The following process flow provides a view of how the Core fGDB is extrapolated to the NTIA final deliverable via the makeDeliverable.py script. Following that, the bdia2ntia.py script is run, which limits what is placed in the final layers based on the NTIA modeling standards.

The product scripts and supporting extract were originally created separately per request, in case data model comparisons were to be completed.

PRODUCT STATISTICS

Following the completion of a product extract, the product statistics script (BDIA_ReleaseNotesStats.py) extracts the following information supporting that product deliverable.

- Provider Statistics:
  - Collects all provider information, listing by Provider Name.
  - Provides output of FRN.
  - Counts the number of features supported within the following layers:
    - Census Block;
    - Street Segment;
    - Max Upstream;
    - Wireless Services;
    - Infrastructure Points.
  - These updates were made to support the Data Package required to accompany every NTIA product deliverable.
- Community Anchor Institution (CAI) Statistics:
  - Breaks down CAI to the eight categories:
    - 1: School: K through 12;
    - 2: Library;
    - 3: Medical/Healthcare;
    - 4: Public Safety;
    - 5: University/College;
    - 6: Other Government;
    - 7: Other Community non-government;
    - None: Unknown Category. In cases where this occurs, further investigation is completed prior to product shipment to ensure all CAIs are categorized accurately.
  - Reports out the following counts:

- Total CAIs within that category;
- Total CAIs that contain partial BB coverage. Contains any of the following information for a given CAI: BB Subscriber, Transmission Technology, Speed Down Speed Up;
- Total CAIs that contain full BB coverage. Contains all of the abovementioned BB information for a given CAI.

The output of this script is two CSV files: AnchorInstitutions.csv and Providers.csv. These files then can be inspected to ensure that there are the expected number of CAIs and providers for every release.

QUALITY ASSURANCE

Quality assurance is supported manually and algorithmically on the interim data, BB_Cov file geodatabase and on the final product. For scheduled product releases, a test product extract and subsequent manual and algorithmic QC run is completed along with a release review. The product specifications, project status reports and previous product release notes are used as references throughout this review.

The following parameters are tested using the methodology listed below each:

- Product Deliverable Format:
  - Correct names and format of data deliverables.
    - BDIA_QC_SUITES (please see below for details).
  - Correct Projections/Datum.
    - Manual interaction with product.
  - Metadata Present and Correct.
    - Manual interaction with product.
- Table Structure:
  - All required tables included.
    - BDIA_QC_SUITES.
  - Extraneous tables identified.
    - BDIA_QC_SUITES.
- Field Structure:
  - All fields included.
    - BDIA_QC_SUITES.
  - Extraneous fields identified.
    - BDIA_QC_SUITES.
  - Correct field names, types and widths.
    - BDIA_QC_SUITES.
- Field Domains:
  - Values in all tables are constrained to the specified values specified:
    - This action is accomplished via BDIA_QC_SUITES and manual review of the product;
    - This tends to identify project completeness issues as fields with a null value are identified.
- Geometric Representation:
  - Identify if all layers have the correct geometric representation:
    - Manual review of the BB_ServiceOverview layer;
    - Dependent on NTIA and client requirements.
- Geographic Extent:
  - Product includes the necessary Geography associated with Product?
    - Manual Review—ArcGIS®.
  - Is there extraneous geography included in Product?
    - Manual Review—ArcGIS®.
- Completeness:
  - Products contain the expected amount of data?

- Manual review of product statistics relative to weekly State reports and defined expectations.
- Accuracy:
  - Product meets the stated accuracy requirements for the deliverable?
    - Sampling procedure to manually review source material to resulting product;
    - Provider Validation;
    - Verification using Third-Party Data;
    - Verification against reality, where applicable.
- Data Regression:
  - Any unexplainable data loss or change?
    - This action is accomplished by comparing results within product statistics script (BDIA_ReleaseNotesStats.py) from previous releases, as well as manual review of the product.
- Confidentiality:
  - Any unauthorized confidential information included in the delivery?
    - Review of NDAs and delivery expectations.
- Prior Issues Resolved:
  - Have expected internal issues been resolved?
    - Manual review of data against previous product release notes.
  - Have agreed-upon customer issues been resolved?
    - Manual review of data against previous product release notes, status report and client feedback.
- Delivery Medium:
  - Has the product medium been verified?
    - Manual review.
  - All files present.
    - Manual review of SFTP site to ensure all files are copied correctly, including file/directory size.
  - Correct location.
    - Manual review—confirmation of SFTP link, username and password.

QC SUITE

The BDIA_QC_SUITES consists of four main types of scripts supporting the overall QC process. These scripts are all run in concert and are called from the test_runner script and the test_BDIAProductGDB script.

CONFIGURATION

These scripts establish the configuration for the test_BDIAProductGDB script, which is the core of the QC Suite.

update_test_config
active_config
config_PROCESS01_automated
config_PROCESS01_manual
set_active_config

LIBRARIES

These scripts provide additional functionality that is called from with the test_BDIAProductGDB script.

bb_unittest_fixture
bbcov_structure
BC_XmlWriter
file_folder
search_and_replace
unittst_fixture

validate_BB_DB
validate_BB_GDB
xmlrunner_gui

QC SUITE

This is the core script for performing automated QA/QC on the interim and final data deliverables.
test_BDIAProductGDB

OTHER

These scripts perform other functions detailed below:
test_runner—this is the main script that runs all the other QC scripts and imports all the necessary scripts and libraries.
which_build—this determines the current build and passes information to the configuration scripts.

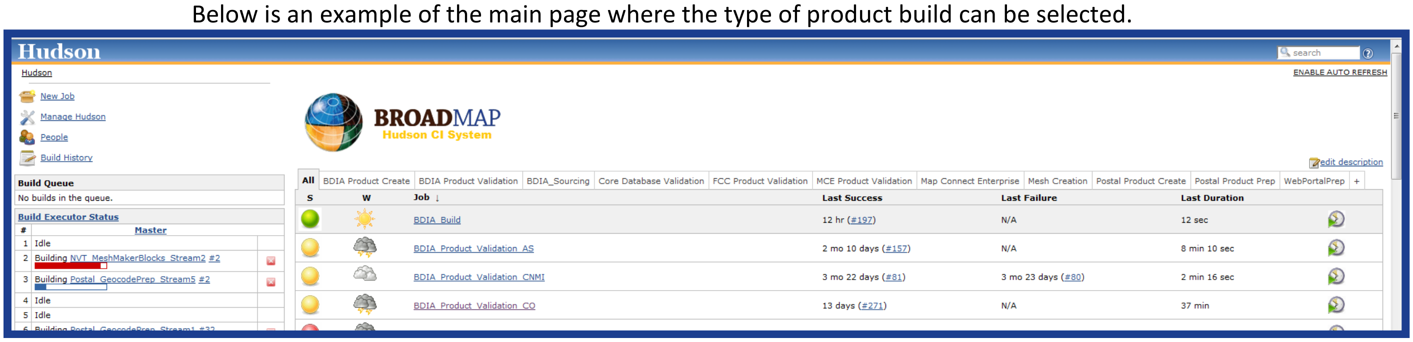
PROCESS OPERATION AND MONITORING

Product Extract, makeDeliverable.py and bdia2ntia.py, is run within BroadMap using a platform called Hudson that has been enhanced to support BDIA product extraction, process monitoring, as well as product validation. The same platform can be planned for implementation for the State, if desired.

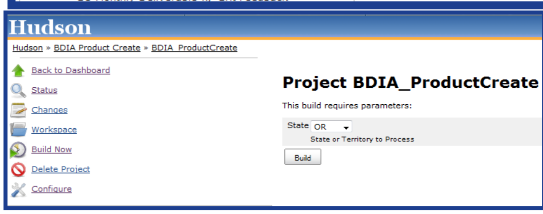
Below are examples of the product create, product validation, product statistics and monitoring processes that are managed within the BroadMap Hudson CI-System. All of the **abovementioned Python scripts**, with the exception of metadata transactions script, are run via this system.

BDIA PRODUCT CREATE

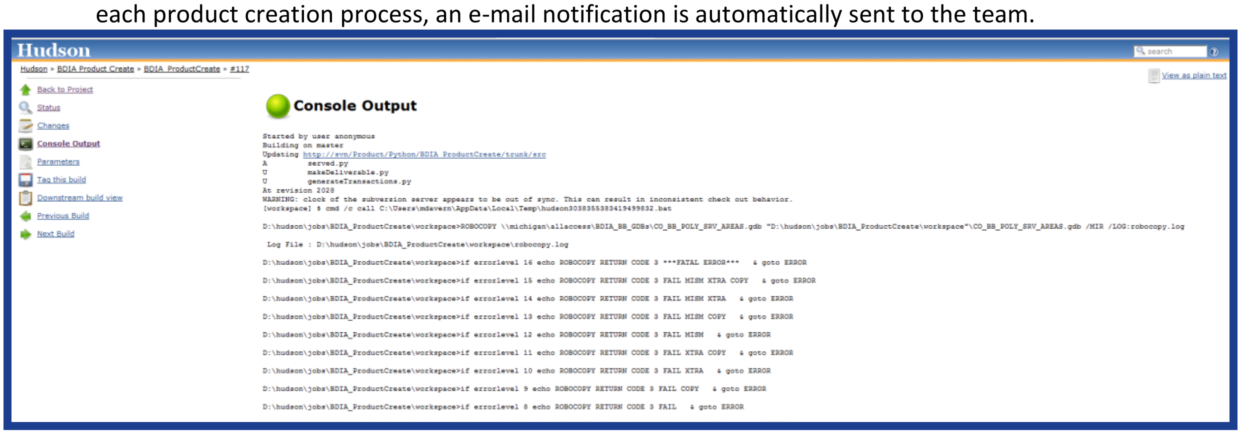
Below is an example of the main page where the type of product build can be selected.



Selecting based on the type of process that will be initiated is shown below:



The Console Output can be reviewed to see the progress of product create. Following the completion of each product creation process, an e-mail notification is automatically sent to the team.



All processes run via the BroadMap Hudson CI-System are stored for historical reporting. Each process can be reviewed, including the Console Output and Build Artifacts from that run.

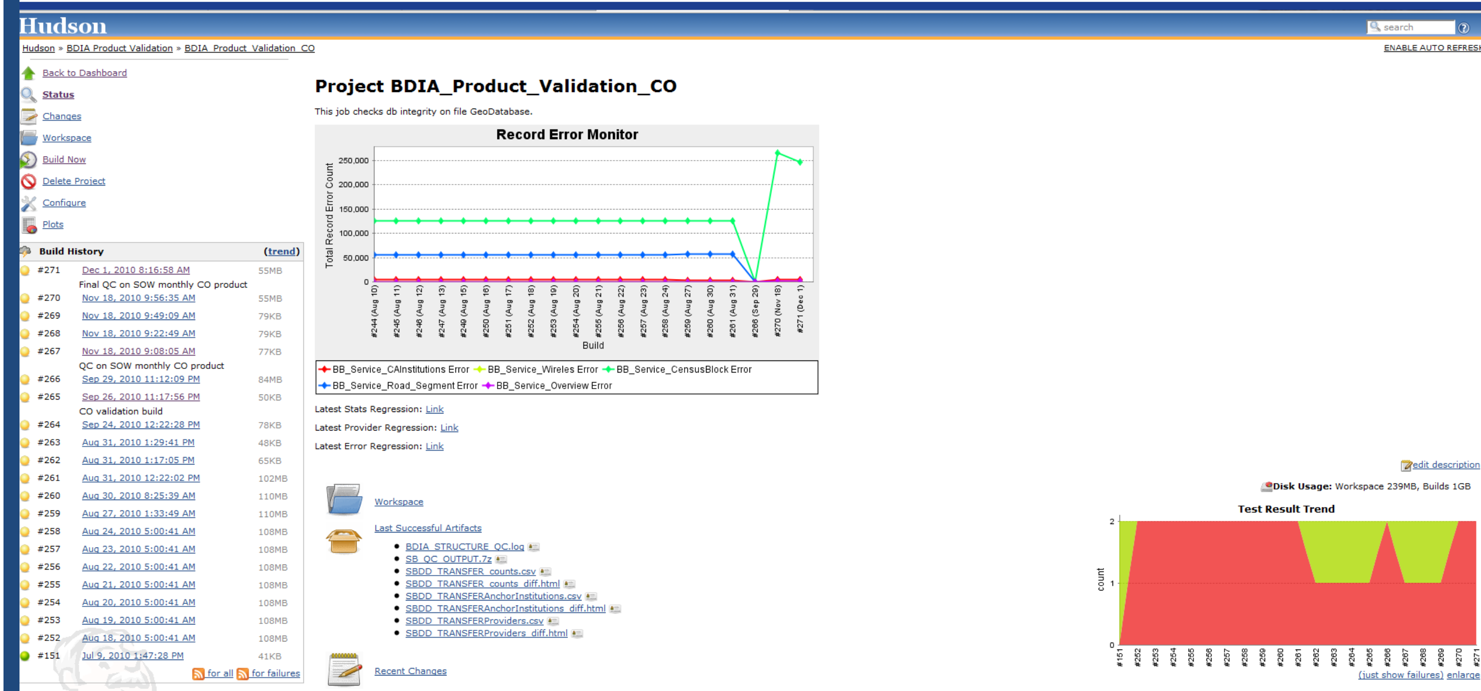

Hudson
search
Hudson » BDIA Product Create » BDIA_ProductCreate » #161
ENABLE AUTO REFRESH
Back to Project
Status
Changes
Console Output
Parameters
Tag this build
Downstream build view
Previous Build
Next Build
Build #161 (Mar 28, 2011 9:44:40 PM)
OR Pre-Release Build
Delete this build
Started 1 day 1 hr ago
Took 3 hr 31 min on Alaska
edit description
Build Artifacts
bdia2ntia.log
makeDeliverable.log
robocopy.log
Revision: 3099
No changes.
Started by user anonymous

PRODUCT VALIDATION AND STATISTICS

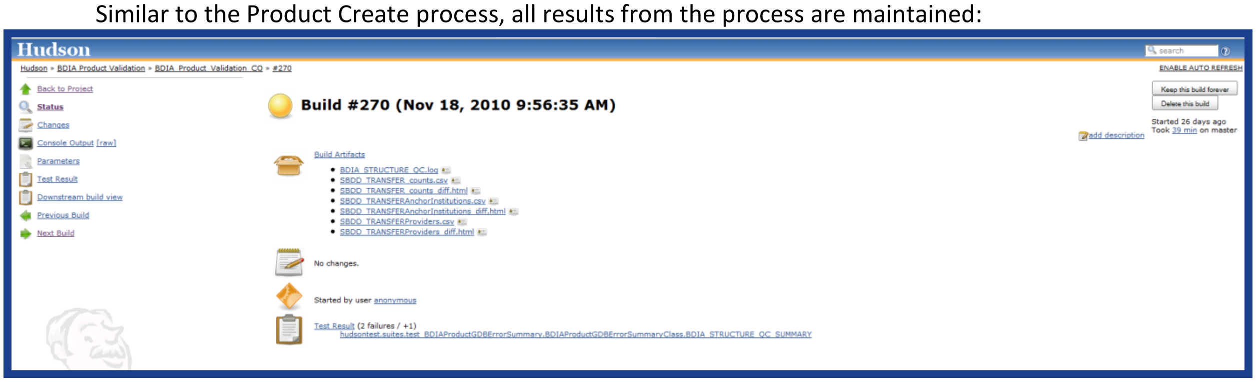
Once the product creation process is complete, Product Validation and Statistics are then initiated. These support the BDIA_ReleaseNotesStats.py script and the BDIA_QC_SUITES scripts detailed above.

All statistics and reports are stored for historical review with the capability to place violation criticality on each quality control check, allowing the identification of errors because of project status/completeness verses project correctness. Example: Typical Speeds populated.

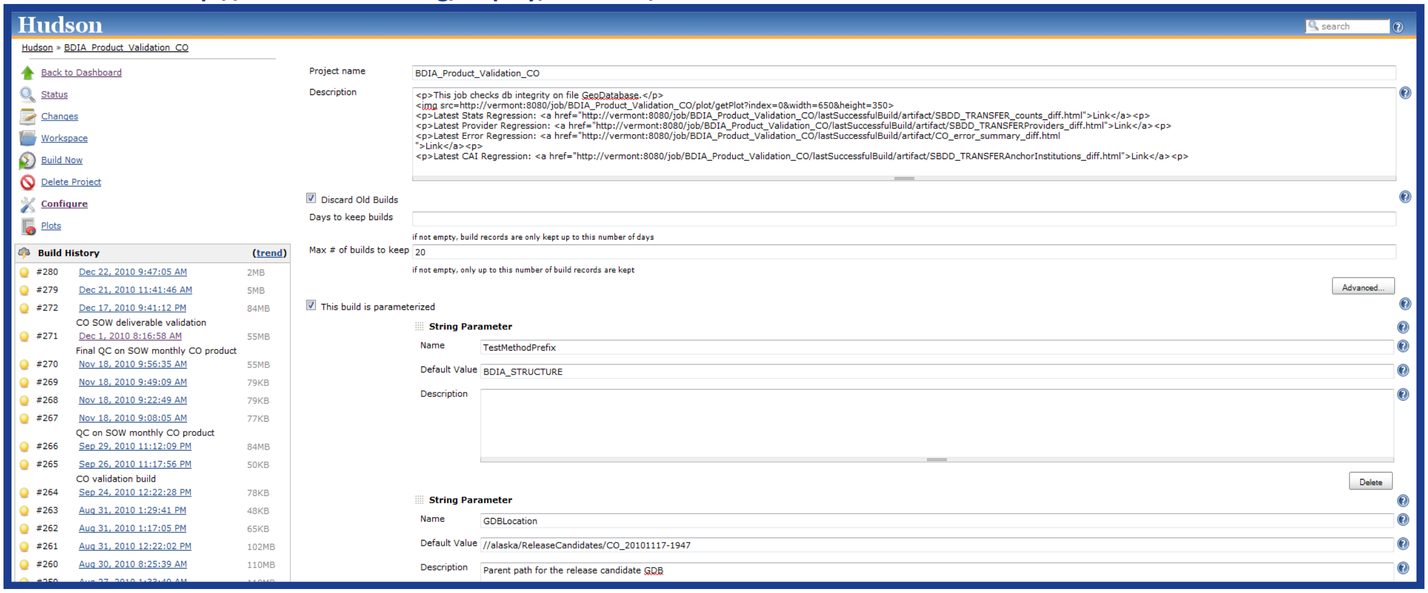
Below is an example of the report provided based on various control points running over a specified period:



Similar to the Product Create process, all results from the process are maintained:



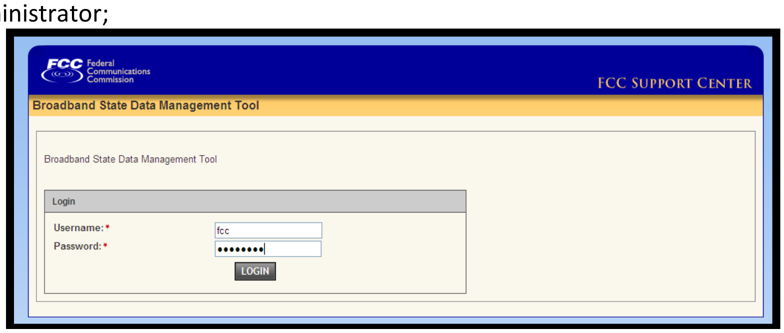
Results are then reviewed manually to ensure no errors reported are critical or in violation of the NTIA data model or project completion statements. Any errors of concern are communicated ahead of product delivery and included within the product release notes. Further detail on the Hudson-CI System environment can be found by navigating to the following link:
http://wiki.hudson-ci.org/display/HUDSON/Meet+Hudson



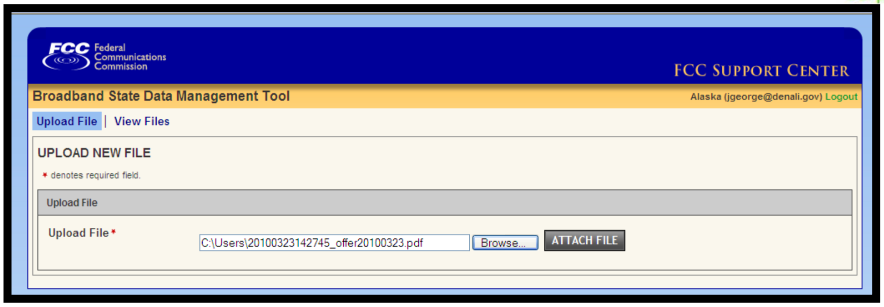
PRODUCT EXTRACT DATA DELIVERY

Product delivery for MapConnect™ Broadband is handled two ways, depending on client requirements:

1) State Submittal:
   a. Data is submitted via SFTP site;
   b. Product Release Notes and QC Test Report accompany the delivery.
2) NTIA Submittal:
   a. Directions for using the NTIA State Broadband Data file submission tool:
      (i.) Go to the following website: **https://esupport.fcc.gov/statedata**;
      (ii.) Enter your **username and password** as provided to you from the NTIA program administrator;



      (iii.) Click in **Upload a file** field;
      (iv.) Browse to local file for submission using the **Browse** button. Select file, then select **ATTACH FILE**. See example below.



(v.) **Logout/Receipt** using the **Logout** button in the top right of the screen;

(vi.) A receipt of submission is e-mailed to username e-mail address.

Mississippi Broadband Mapping Project: Product Release White Paper

Contact Name Manager: Nicole Stofer
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Submitted By: Kristin Rousseau
Contact E-mail: kristin.rousseau@broadmap.com

Product Specification: Fall 2011 NTIA Data Model
Product/Process: NTIA—October 1, 2011 Data Deliverable
Dataset Submission QC: NTIA—SBDD_CheckSubmission.py

Table of Contents

OVERVIEW

This white paper highlights the **Submission Summary** for this deliverable, as well as describes the **Data Gathering**, **Data Integration**, **Data Validation and Verification** and **Quality Control** processes used to create the Broadband Mapping Project's October 1, 2011 data submission. To support varying levels of technical and program knowledge, both a **high-level summary** and a **detailed process review** are supplied.

SUBMISSION SUMMARY

PROVIDER DETAILS

PROVIDER PARTICIPATION

- Providers Included

Bay Springs Telephone Co. Inc.	GulfPines Communications, LLC
BellSouth Telecommunications, Inc. d/b/a AT&T Mississippi	Lakeside Telephone Company Inc.
BPM Inc. (Noxapater Telephone Company)	Level 3 Communications, LLC
Bruce Telephone Co. Inc.	Megagate Broadband, Inc.
Cable One, Inc.	MetroCast of MS, LLC
Cellular South Licenses, Inc.	Mound Bayou Telephone & Communications, Inc.
CenturyTel Of North MS. Inc.	NetWireless Solutions, LLC
Charter Fiberlink MS - CCVI, LLC	Rural Cellular Corporation (Verizon)
Comcast Phone of Mississippi, LLC	Sledge Telephone Co. Inc.
Contact Network, Inc. (Inline)	Smithville Telephone Co. Inc.
Covad Communication	Southern Light, L.L.C.
Cricket Communications of MS	Sprint PCS
Decatur Telephone Co. Inc.	StarBand Communications Inc.
Delta Link LLC.	TDS Telecommunications Corporation
Delta Telephone Co. Inc.	TEC of Jackson, Inc.
DeltaCom, Inc.	Telepak Networks, Inc.
Dixie Net Communications, Inc.	T-Mobile USA, Inc.
Franklin Telephone Co. Inc.	Trust Communications
Frontier Communications of Miss. LLC	tw telecom of mississippi llc
Fulton Telephone Co. Inc.	Windstream Mississippi LLC
Georgetown Telephone Company Inc.	XFone USA, Inc.

- New Providers Since Last Data Submission
  - Delta Link LLC.
  - EarthLink Business
  - Firenet1.com
  - New Edge Networks
  - StarBand Communications Inc.
  - T-Mobile USA, Inc.

- Non-Responsive/Non-Cooperative Providers
    - None

- Other Provider Comments
    - Provider coverage areas were removed from the final product in cases where their speeds reported as below broadband, according to the NOFA requirements.

COVERAGE AREA CHANGES

- Coverage Footprint Reductions/Map Refinement –
    - Comcast (TT-41)
    - Mound Bayou Telephone and Communications, Inc (TT-10)

- Coverage Footprint Expansion –
    - AT&T Mississippi (TT-10)
    - Bruce Telephone Company, Inc. (TT-10)
    - CenturyLink (TT-10)
    - Comcast (TT-40)
    - Covad Communications Company (TT-30)
    - DIXIE-NET (TT-10)
    - Decatur Telephone Co. Inc. (TT-10)
    - Delta Telephone Co. Inc. (TT-10 and TT-50)
    - Franklin Telephone Co. Inc. (TT-10)
    - Frontier Communications of Mississippi, LLC (TT-10)
    - Fulton Telephone Company, Inc (TT-10)
    - Georgetown Telephone Company Inc. (TT-10)
    - GulfPines Communications (TT-10)
    - InLine (TT-50)
    - Lakeside Telephone Company Inc. (TT-50)
    - Level 3 Communications, LLC (TT-50)
    - Megagate Broadband (TT-10 and TT-30)
    - MetroCast Communications of Mississippi, LLC (TT-40 and TT-41)
    - Network Telephone Corp. (TT-30)
    - Noxapater Telephone Company (TT-10)
    - Sledge Telephone Co. Inc. (TT-10 and TT-50)
    - Smithville Telephone Company, Incorporated (TT-10)
    - Southern Light LLC (TT-50)
    - TDS Telecom (TT-10)
    - TEC of Jackson, Inc (TT-10)
    - Telepak Networks, Inc. (TT-41 and TT-50)
    - Trust Communications (TT-41)
    - Windstream Mississippi LLC (TT-10)
    - Xfone USA, Inc. (TT-10)

DATA CORRECTIONS

- No data corrections were required for this round.

COMMUNITY ANCHOR INSTITUTION (CAI) DETIALS

OVERALL STATISTICS

Community Anchor Institution - Categories	Overall Count	Broadband Subscriber (1 or 2)	Trans Tech	Advertised Speed Down	Advertised Speed Up
Category 1 - School K through 12	697	502	502	502	56
Category 2 - Library	278	197	197	197	37
Category 3 - Medical/Healthcare	437	243	243	243	136
Category 4 - Public Safety	869	136	136	136	93
Category 5 - Universities/Colleges	40	0	0	0	0
Category 6 - Other: Government	409	335	335	335	142
Category 7 - Other: Non-Government	0	0	0	0	0
Total	**2730**	**1413**	**1413**	**1413**	**464**

CAI CHANGES

- The core change completed was the inclusion of CAIIDs to the CAI Inventory for Category 1: K-12 Schools, Category 2: Libraries and Category 5: Colleges, which were extracted from the three databases communicated by NTIA. These databases are as follows:

    - For K-12 institutions (CAI type 1) please add the NCES ID CCD ID value found here: **http://nces.ed.gov/ccd/bat/**

    - For Higher Education (CAI type 5) please add the NCES IPEDS ID value found here: **http://nces.ed.gov/ipeds/datacenter/**

    - For Libraries (CAI type 2) please. Combine (do not add) “FSCSKey” and “FSCs_SEQ” from the “puout08av2000” file and place them here: **http://harvester.census.gov/imls/data/pls/index.asp** (FYI the LIBID is your state’s unique ID for libraries)

SUBMISSION RECEIPT

SUBMISSION RECEIPT RESULTS

- Attached are the results from the NTIA data submission receipt quality script.

MS_2011_10_01.txt

- Error Report
  - The only item flagged in the submission receipt output is the following error, which has been verified as correct entries within the data submission.

  - Field Check: FAILED CAInstitutions_TRANSTECH has 2679 UNEXPECTED VALUES for query: TRANSTECH <> 0 AND TRANSTECH <> 10 AND TRANSTECH <> 20 AND TRANSTECH <> 30 AND TRANSTECH <> 40 AND TRANSTECH <> 41 AND TRANSTECH <> 50 AND TRANSTECH <> 60 AND TRANSTECH <> 70 AND TRANSTECH <> 71 AND TRANSTECH <> 80 AND TRANSTECH <> 90 AND TRANSTECH <> 0

  - This was flagged due to an inconsistency between the data model and the submission receipt script, which has also been communicated by other Grantees on PBWorks.

    Hyperlink to Grantee Workspace in which the same issues were identified by other Grantees:
    https://sbdd-granteeworkspace.pbworks.com/w/page/42442088/Data%20Model%20Issues-June2011

HIGH-LEVEL SUMMARY

DATA GATHERING

BROADBAND SERVICE AREAS, MIDDLE MILE AGGREGATION POINTS AND BROADBAND SERVICE OVERVIEW

The collection of Broadband Service Areas, Middle Mile Aggregation Points and Broadband Service Overview information is handled through the following Provider Outreach Process:

- Build and maintain an inventory of Broadband providers through research and State inputs.
- Update provider material that describes the data requirements and logistics for data transfer.
- Update Non-Disclosure Agreement (NDA) for use in project, where applicable.
- Maintain multiple protocols for the provider to submit data, including Secure File Transfer Protocol (SFTP) technology when desired.
- Conduct one-on-one informational discussions with each provider to communicate the following:
    - Requirements of this project;
    - Broadband data required to support the product data model;
    - Submission protocols available;
    - Capability to validate how the supplied data is aggregated.
- Download/receive provider data.
- Establish a repeatable process with provider. Maintain provider communication, transaction and data handling records throughout the project (dates contacted, data received, etc.).

COMMUNITY ANCHOR INSTITUTION (CAI)

The collection of CAI information is handled through the following CAI Collection Process:

- Collect and maintain inventory of CAIs through data mining, research and State inputs.
- Maintain web-based CAI portal for institutions to add or confirm attribution, location and enter broadband-specific information.
- Upload web-based data to Core Database for standardization.
- Perform internal cleansing, such as removing duplicate records, identifying gaps in broadband attribution and verifying category.
- Geocode CAI locations.
- Translate Core Database data to deliverable-ready format.
- Continue engagement with non-responsive institutions.

DATA INTEGRATION PROCESS

The data integration and processing mechanisms currently used allow for multiple types of inputs and result in a standardized output that meets the NTIA deliverable requirements. This flexible process supports data model changes and project-requested enhancements.

- Receive inputs from providers via submission protocols; upload into Sourcing Database and catalog with provider information.
- Review provider-supplied data for completeness and for potential discrepancies that require resolution prior to processing and flag as necessary.
- Categorize input into data-type category (addresses, block lists, paper maps, etc.).
- Standardize input based on data type within Staging Database.
- Create Compact Polygons (CP)—(internal methodology for generating area-based feature for coverage in Staging Database).
- Apply broadband attribution to CP; apply metadata to CP.
- Perform quality analysis of the CP against the source supplied to identify any completeness or accuracy issues.
- Request additional information from the provider if elements of coverage are missing or contain discrepancies. This is a second manual quality check to ensure data is complete.
    - Process coverage area to build the required NTIA data model layers.
- Process CAI data input into internal standardized format, as discussed above in the **Community Anchor Institution (CAI) subsection**, based on NTIA and State-level requirements.

DATA VALIDATION AND VERIFICATION

Following the creation of the product, process steps within Data Validation and Verification occur. To ensure the data collected and processed is as accurate and comprehensive as possible, provider validation and internal verification activities are employed. After the initial mapping of providers' coverage areas and serviceability claims, additional reviews are performed using the methods described in the subsections below (**Third-Party Data Verification**, **Broadband Provider Validation**, **Confidence Values**).

THIRD-PARTY DATA VERIFICATION

The coverage is visually and programmatically compared against third-party data. Pitney Bowes and American Roamer data are used in cases where a coverage area is questionable. All anomalies identified during this analysis are reviewed with the providers.

BROADBAND PROVIDER VALIDATION—PROVIDER PORTAL APPLICATION

Providers are trained on and requested to use a secure interactive web application to review their current coverage area(s) and supporting broadband attribution and validate their data or submit change requests to update their data. All provider change requests go through the **Data Integration Process** and are reviewed with the provider to complete validation.

CONFIDENCE VALUES

All verification, validation and manual quality review results are tracked by provider/technology type and stored and maintained within a **Validation table**. A confidence value is assigned, based on internal assessments of the collected information, to highlight the provider coverage areas and/or attributions that would benefit from further investigation and/or enhancements.

QUALITY CONTROL

Following collection, processing and analysis of the provider and CAI data, the product is checked manually and algorithmically against the NTIA data model. Some of the items included within these checks are:

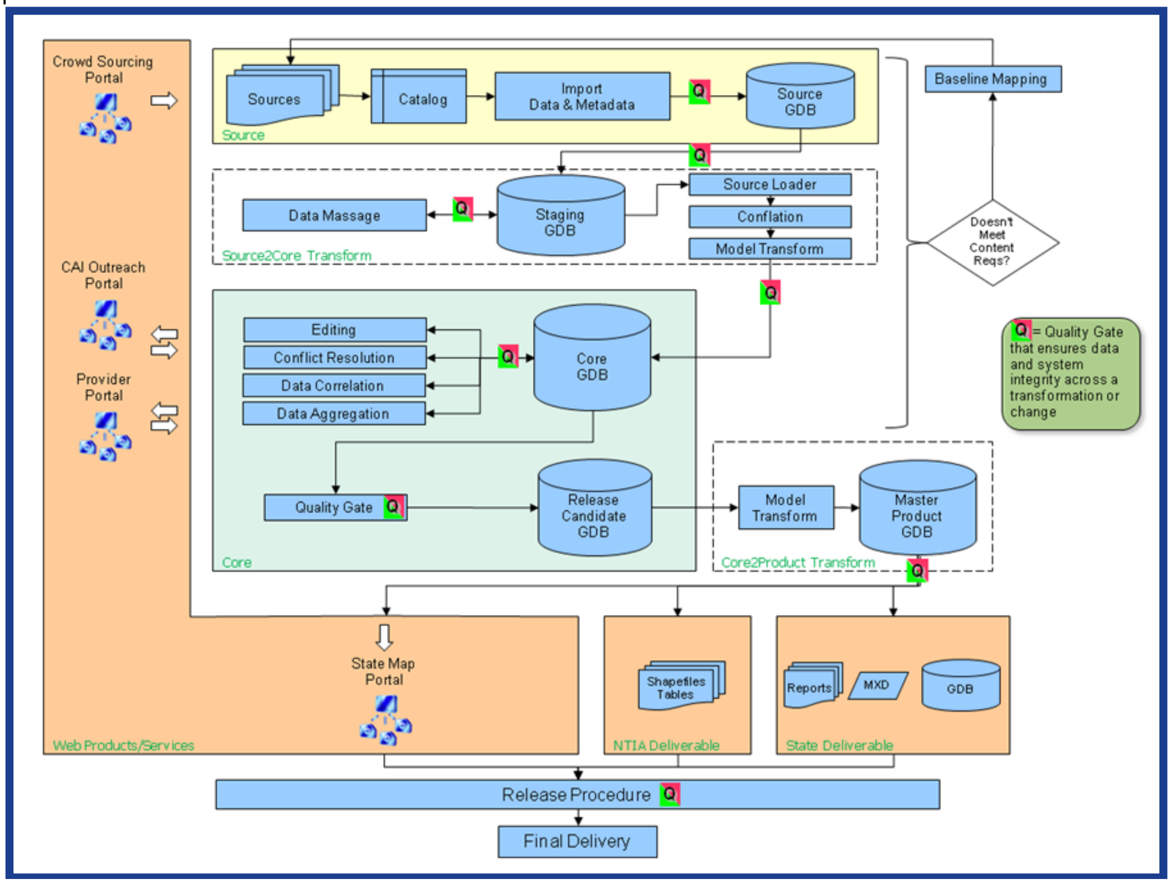
- Format correctness;
- Table and field structure;
- Valid values, including default values, where applicable;
- Geographic extent and topology errors.

Prior to data submission, another quality control script supplied by NTIA is run. This script, SBDD_CheckSubmission.py, creates an output in text form that is required to be submitted along with the final deliverable. All errors must come up clean, unless otherwise specified by NTIA. Exceptions to the script as noted by NTIA on the SBDD Workspace on 03/25/11 can be found at the following link: **https://sbdd-granteeworkspace.pbworks.com/w/page/38218329/CheckSubmissionExceptions**

- Longitude values for States outside the lower 48 (any table);
- CAI results for Transtech, MaxAdUp, MaxAdDown if BBService is “No” or “Unknown”;
- Overview MaxAdDown, MaxAdUp if 100% of record-level data has MaxAdDown or MaxAdUp populated.

DETAILED PROCESS REVIEW

A detailed review of the data collection, integration and quality control points within the broadband data gathering and mapping process are discussed in the subsections that follow. In addition, a diagram showing the overall process can be seen below.



PROVIDER OUTREACH

For the October 2011 data submission, an e-mail notification was sent to all providers with supporting deliverable dates. The providers mainly used the Provider Portal web application to submit changes to and/or validate their current coverage area(s).

In support of the data collection effort, providers that did not timely respond to the outreach were contacted by phone.

OUTREACH MATERIALS

The original provider packet sent via e-mail to the providers included the following documents and files:

- Letter from the State inviting them to participate in the program;
- Copy of the Non-Disclosure Agreement (NDA);
- Copy of the Mapping NOFA from the NTIA;
- Copy of the NOFA Clarification from the NTIA;
- Broadband service address example file in CSV format;
- Word document describing service address example file;
- Broadband service block example file in CSV format;
- Word document describing service block example file;
- Broadband service street example file in CSV format;
- Word document describing service street example file;
- Broadband subscriber example file in CSV format;
- Word document describing subscriber example file;
- Broadband wireless coverage area sample shapefile;
- Word document describing wireless coverage area sample shapefile;
- Instructions for downloading, installing and using the WinSCP SFTP application.

OUTREACH PROCESS

The provider outreach process is comprised of the following general steps:

- Send the provider package and introduction letter to the main point of contact for the provider.
- Follow up with e-mail and telephone to verify that the main point of contact is correct.
- If necessary, discuss the NDA further and resolve any redlines.
- Once the correct primary contact is established, set up a telephone call, if necessary, to learn more about the provider's offerings and direct them to the appropriate outreach materials.
- If providers are unable to be contacted (non-responsive) or indicate that they are not interested in participating (non-cooperative), mark them as such on the provider tracking sheet. These providers will be escalated to the State for further action.
- As the providers are collecting the required data, provide instructions on downloading, installing and using the WinSCP SFTP application, if required.
- Arrange with the providers to transfer the data in whatever way they are comfortable: some providers will find regular email acceptable; others will want to use the SFTP application.
- After data is received and reviewed, it may be necessary to contact a provider for clarification or to address incomplete datasets. In the interest of building and maintaining relationships, care is given not to push the provider but to work with it to obtain accurate data in the best possible format.

DATA COLLECTION

DATA TRANSFER PROCEDURES

There are three primary ways data is collected from providers. These are:

- Secure FTP (SFTP) using the WinSCP application;
- Regular e-mail;
- Mail.

INITIAL DATA REVIEW AND QUALITY ASSURANCE

The initial data review and quality assurance process consists of the following general steps:

1) Access the data from the SFTP site or e-mail.
   a. If e-mailed, place copy of original dataset in the appropriate provider folder on the SFTP site.
2) Place copy of raw data on local computer in a working directory.
3) Review data and determine course of action based on type of data received.
4) Ensure data is complete and contact provider to address any gaps.

NOTE:
The goal is to get as many providers as possible to provide subscriber address data in the correct format. Obviously, this will not be possible with all providers so we will continue to have to process various types of provider-supplied data.

DATA INGESTION

DATA INGESTION OVERVIEW

The following subsections outline the process steps taken based on the type of input supplied by the data provider:

- **Point Data**:
  - Subscriber location;
  - DSLAM location;
  - Central Office location;
  - Broadcast Tower location.
- **Linear Data**:
  - TIGER® street segments.
- **Polygonal Data**:
  - Census Blocks;
  - Coverage Area.

Overall, the process is geared toward taking the provider data supplied and creating polygon shapes to append to the bb_cov feature class. The bb_cov feature class is the interim dataset that is then processed using the makeDeliverable.py Python script to create the MapConnect™ data layers that will be delivered to the State and, ultimately, to the NTIA. Detailed instructions used in this process can be found in the subsections below.

POINT DATA

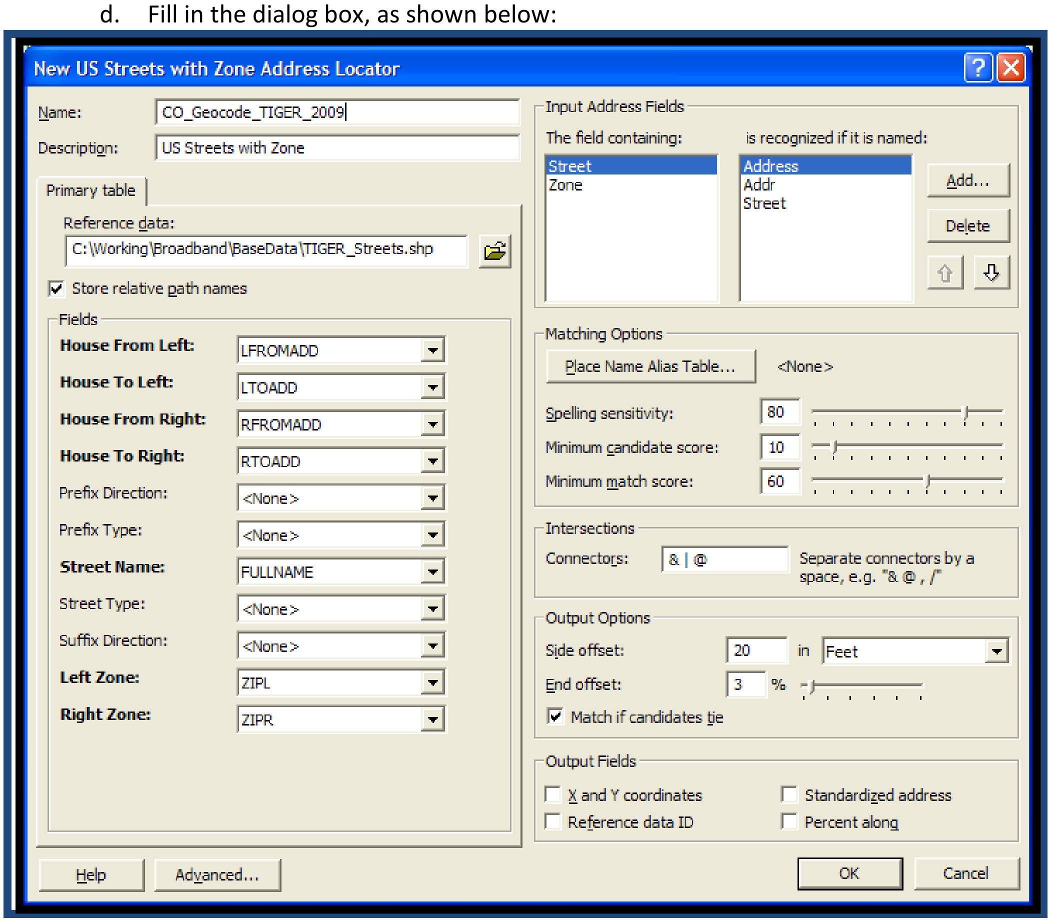
SUBSCRIBER LOCATION—ADDRESS DATA

In the event that the data provider supplies subscriber address data, the steps are as follows:

1) First, convert the address data to a clean Excel spreadsheet in an appropriate address data format.
   a. Usually, this has the following columns: street address (number, pre-directional, pre-modifier, street name, street type, post-directional and post-modifier concatenated), city, state, ZIP.
2) Configure the ArcGIS® geocoding tool to use the TIGER® 2009 streets dataset.
   a. In ArcCatalog®, create a new Address Locater by right-clicking in the white space of the appropriate directory and selecting **New>Address Locater** from the dropdown menu.
   b. Select **US Streets with Zone** and click **OK**.

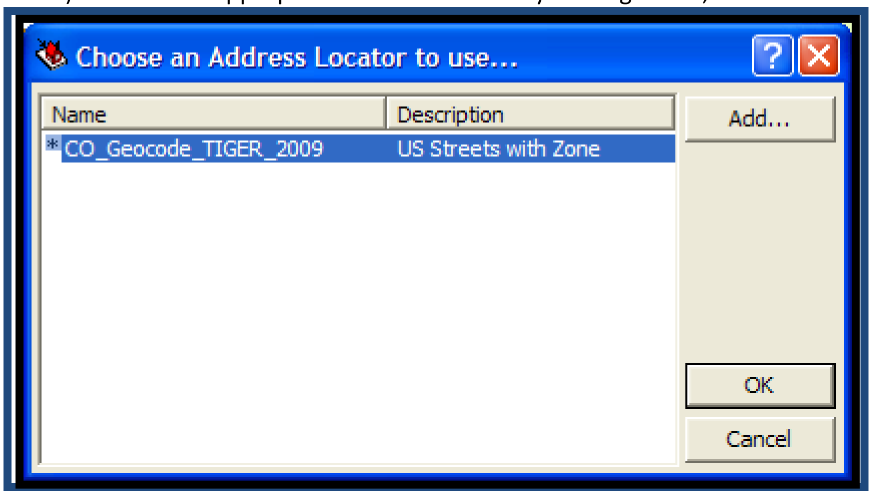
NOTE:
It is likely that multiple Address Locators will have to be set up to handle the variety of provider address data received.

   c. Navigate to the **TIGER Streets 2009 file** and click **OK**.
   d. Fill in the dialog box, as shown below:

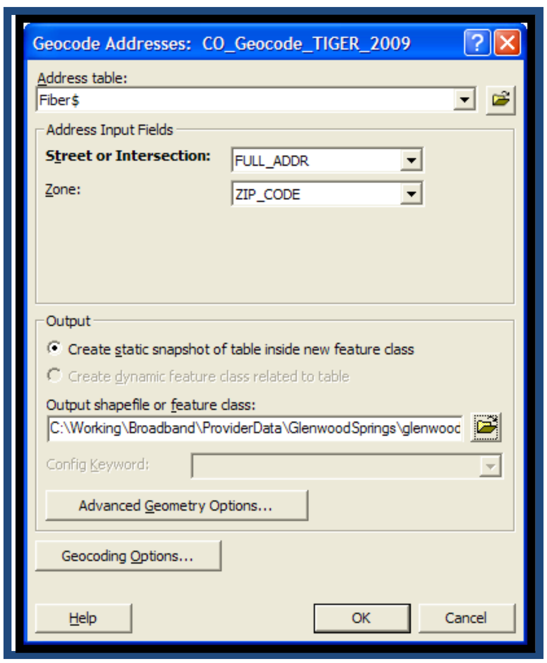


e. Click **OK**.

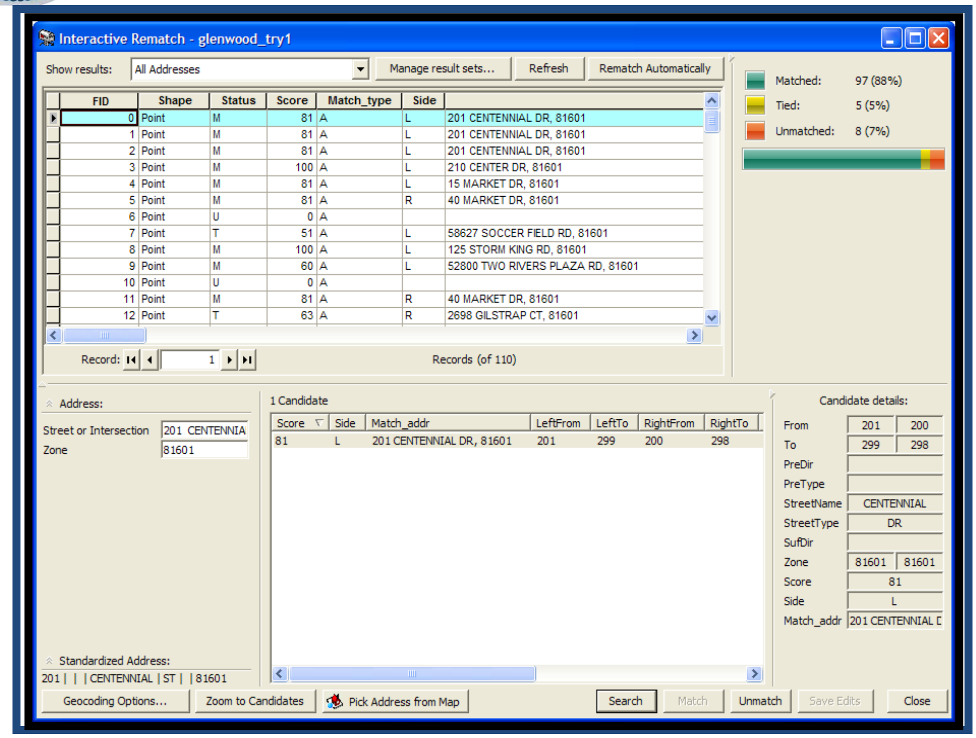
3) Open ArcMap® and add the Excel spreadsheet with the address information.
4) Right-click on the Excel spreadsheet and select **Geocode Addresses** from the dropdown menu.
5) Select the appropriate address locator by clicking **Add…**, then **OK**.



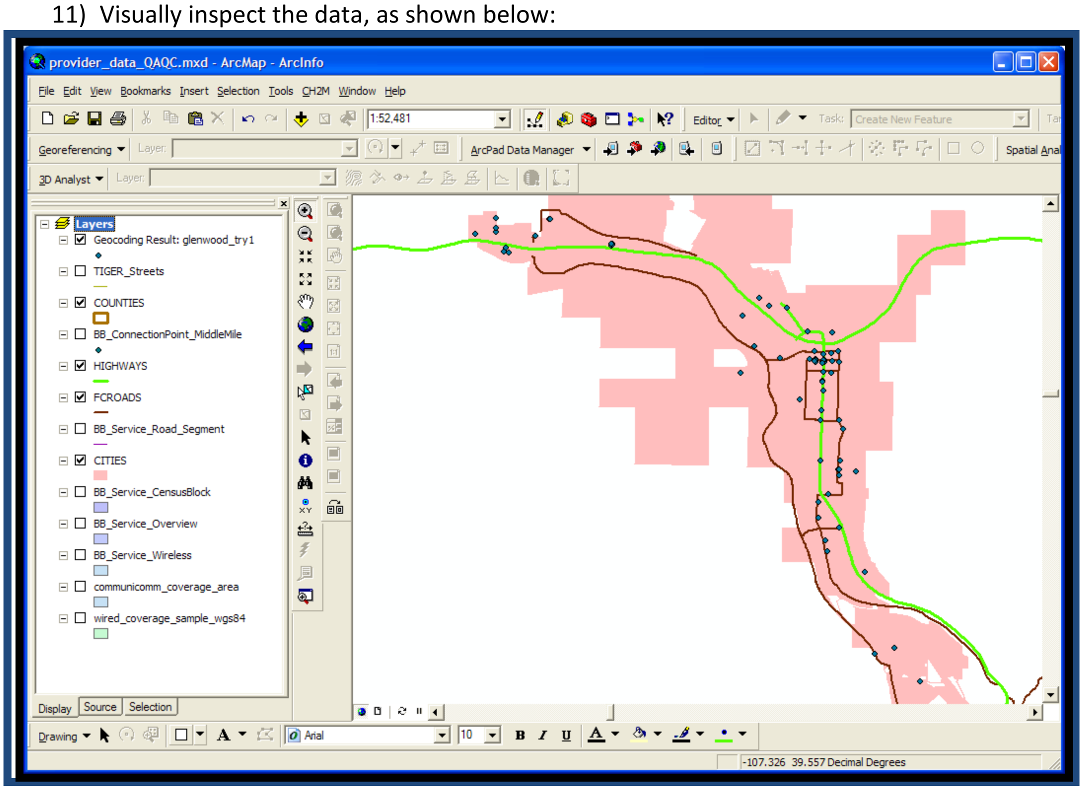
6) Fill out the **Geocode Addresses** dialog box, as shown below:



7) Geocode the list in batch mode using the geocode service set up in **Step 2** above, accepting all the default parameters.
8) Review results. See example below.



9) Adjust geocoding parameters accordingly and repeat batch to resolve issues.
10) Manually geocode unmatched addresses until target hit rate achieved, generally 90%.
11) Visually inspect the data, as shown below:



12) Follow the steps detailed in **Subscriber Location—GIS Data** below.

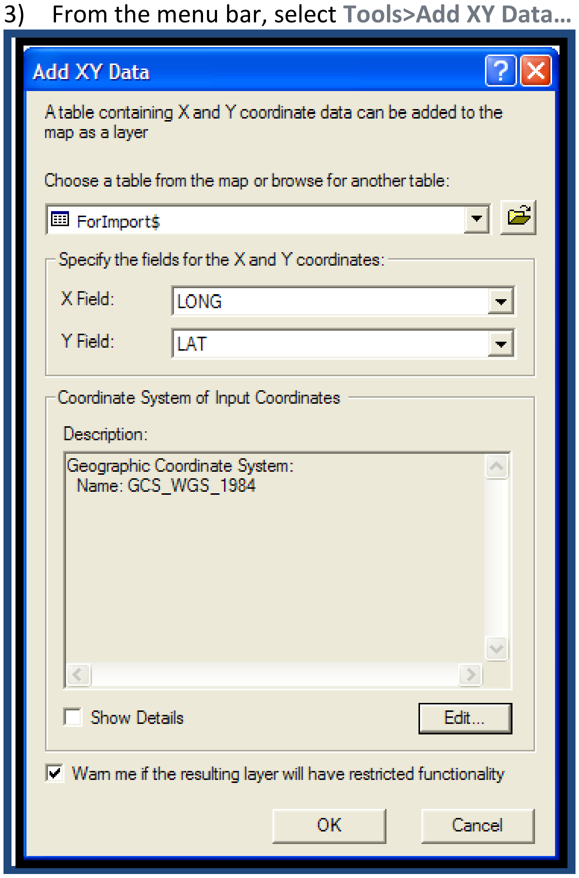
SUBSCRIBER LOCATION—XY DATA

If the provider supplies a list of subscriber data with accompanying XY data such as latitude and longitude, the steps are as follows:

1) Refine the format in Excel so that the data can be opened easily using ArcMap®.
   a. Remove all font color, highlighting, cell colors and borders, clean up column headers and make certain there are no merged cells.
   b. Make certain that XY locations are in decimal degrees.
      (i.) To convert from degrees, minutes, seconds (39º 26’ 45.67”) to decimal degrees, use the following formula: DD + (MM/60) + (SS.SSS/3600).

NOTE:
If XY locations from some other coordinate system are provided, you can use those in the process below but you must know what the coordinate system is.

2) Open the Excel worksheet in ArcMap®.
3) From the menu bar, select **Tools>Add XY Data…**

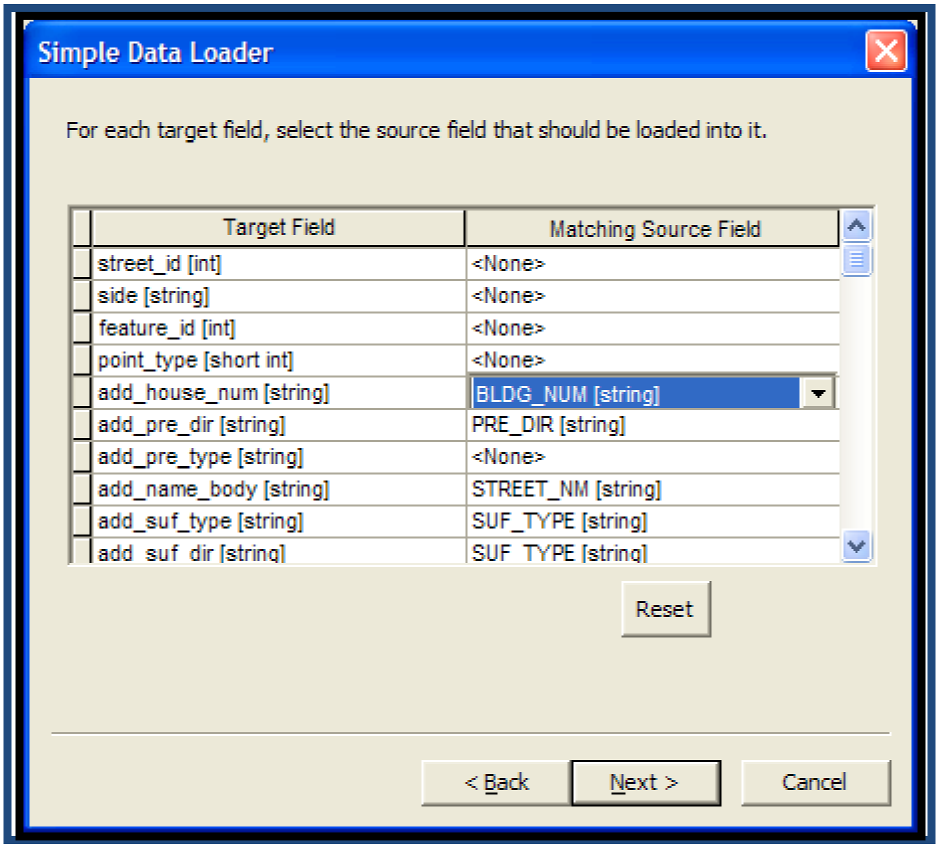


4) Supply the appropriate fields for the X and Y coordinates, choose the appropriate coordinate system and click **OK**.
5) Results are an event layer, not a true spatial layer. Export the data by right-clicking the event layer and selecting **Data>Export Data…** from the dropdown menu.
6) Follow the steps detailed in **Subscriber Location—GIS Data below**.

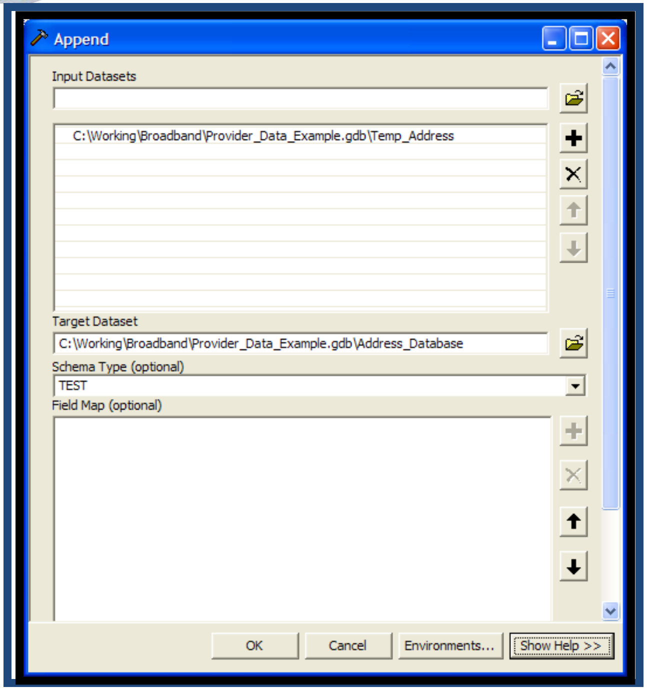
SUBSCRIBER LOCATION—GIS DATA

If the provider supplies subscriber location in GIS format, the only process step is to load that data into the appropriate data schema and it will be ready for processing.

1) First, load the data into the Point Address database schema (please see Appendix D for an example of the Point Address database schema.) using an empty feature class in that schema.
2) In ArcCatalog®, right-click on the empty feature class and select **Load** from the dropdown menu.
3) Navigate to the provider address GIS dataset and then map the attribute fields accordingly, as shown below:



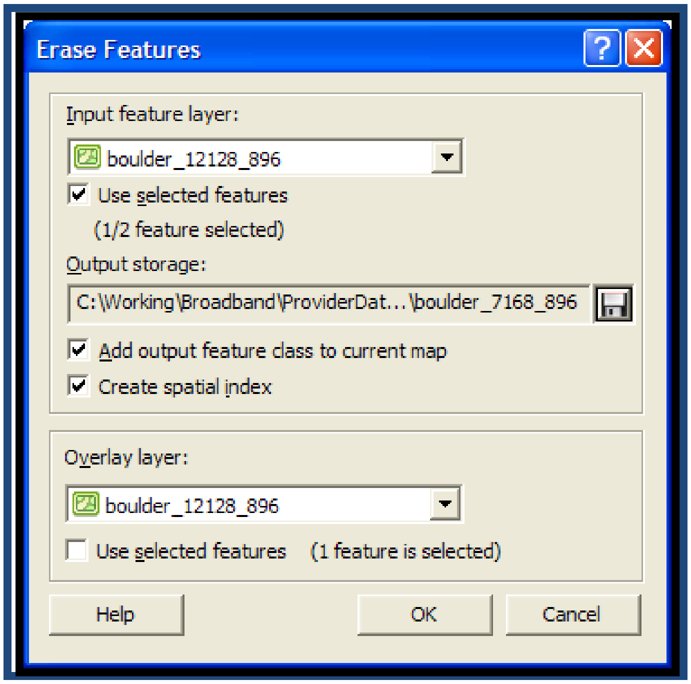
4) Once you have successfully loaded the provider address data into the temporary database with the correct schema, you now will append that data to the overall Point Address database.
5) In ArcToolbox®, use the **Append** command (**Data Management Tools>General> Append**) to add the features into the overall Point Address database, as shown below:



6) Since the data is already in the Point Address database schema, there is no need to alter the Field Map in the Append tool.
7) After appending, calculate metadata reflecting geometry source and representation values.
8) Break provider-specific points into separate county feature classes and perform the following steps per county feature class:
   a. Within ArcGIS®:
      (i.) Summarize download and upload speeds [first,last] to determine all speeds available for county.
         (1) This will save as a DBF table. Keep track of location for future reference.
      (ii.) Buffer county address point featureclass to 150'.
         (1) During buffer command, dissolve on ad_down; ad_up; provider; dba; frn; tt; all metadata fields; stctyfips. Save as…. county_fastestdown_fastestup.
         (2) Example using Qwest data: boulder_40128_20128, where boulder=county; 40128=ad_down; 20128=ad_up.

NOTE:
These attribute fields are specific to the Point Address database.

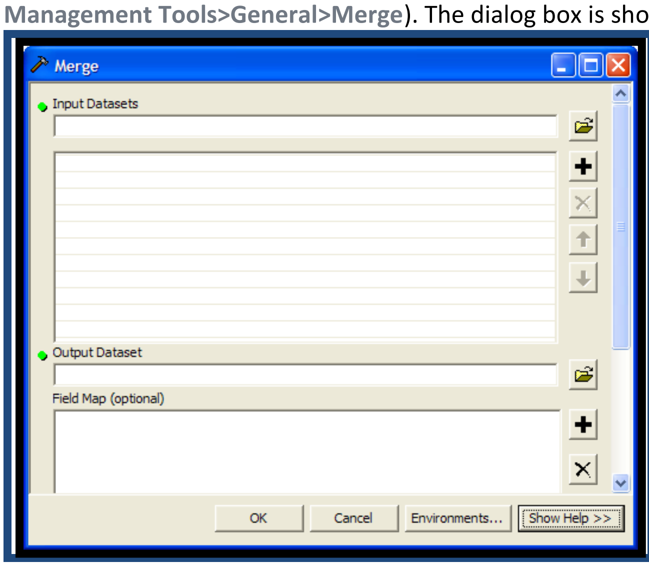
      (iii.) Select the features that represent the lowest speeds.
   b. Using XtoolsPro (***http://www.xtoolspro.com/***):
      (i.) In the XTools Pro toolbar, select **XTools Pro>Layer Operations>Erase Features.**
      (ii.) Use the same feature class for Input and Overlay.
      (iii.) Check **Use selected features** on the **Input** feature, as shown below.
      (iv.) Repeat and erase slowest speeds one speed at a time. Save each new feature class as the next slowest speed, using the same naming convention as shown in **a.(ii.)(1)** above. A general example is shown below:



c. Return to ArcGIS®:

(i.) Edit/delete speeds from the attribution table of each feature class, so each remaining feature class has only one speed value.

(ii.) Merge individual speed feature classes using the **Merge** command in ArcToolbox® (**Data Management Tools>General>Merge**). The dialog box is shown below:



(iii.) Merge individual county feature classes using the **Merge** command in ArcToolbox (**Data Management Tools>General>Merge**).

(iv.) Since the county files are all in the same schema, DO NOT alter the Field Map portion of the command interface.

(v.) When all the county files are merged into one dataset, use the **Append** command in ArcToolbox® (**Data Management Tools>General>Append**) to add the features to the bb_cov interim dataset. Use the **Field Map** portion of the **Append** tool to map the appropriate field values to their corresponding fields in the bb_cov feature class.

DSLAM OR CENTRAL OFFICE LOCATION—ADDRESS DATA

In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office address data, the steps are as follows:

1) Follow the process for geocoding points in **Subscriber Location—Address Data** above.
2) Follow the steps detailed in **DSLAM or Central Office Location—GIS Data** below.

DSLAM OR CENTRAL OFFICE LOCATION—XY DATA

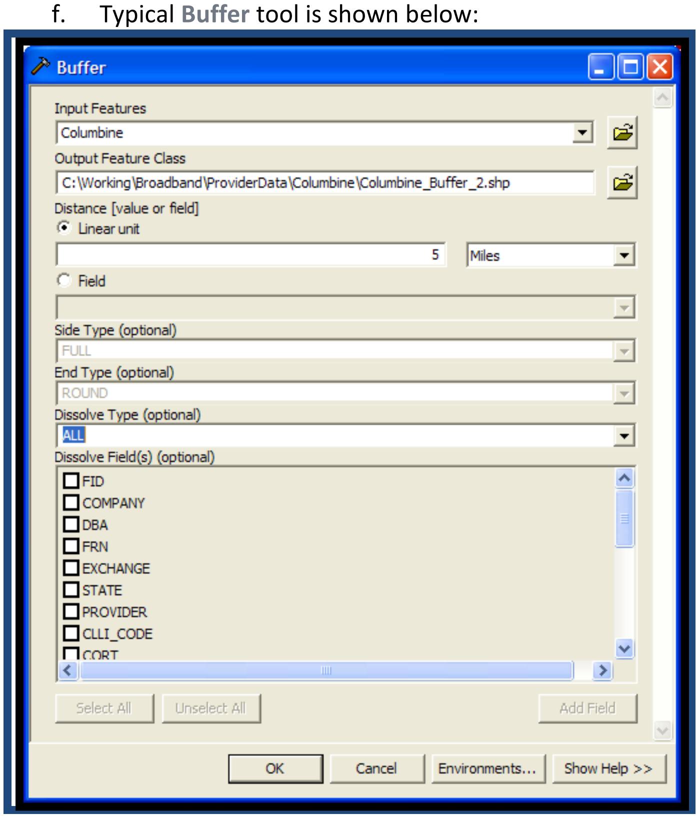
In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office XY data, the steps are as follows:

1) Follow the process for creating points from XY data in **Subscriber Location—XY Data** above.
2) Follow the steps detailed in **DSLAM or Central Office Location—GIS Data** below.

DSLAM OR CENTRAL OFFICE LOCATION—GIS DATA

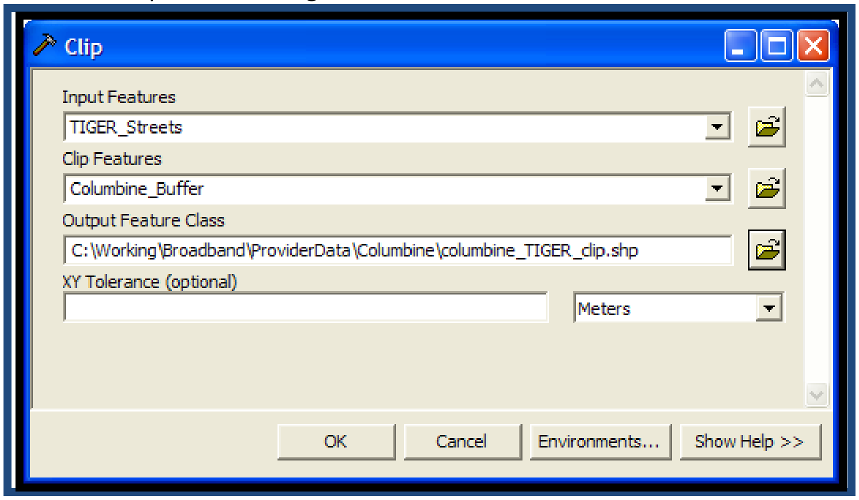
In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office GIS data, the steps are as follows:

1) Buffer the DSLAM/Central Office points feature class.
   a. Add the point feature class to ArcMap®.
   b. Open the ArcToolbox® and go to **Analysis Tools>Proximity>Buffer**.
   c. Set the buffer distance to 5 miles.
   d. Set the dissolve type to **ALL**.
   e. Name the output feature class.
   f. Typical **Buffer** tool is shown below:



   g. Click **OK**.

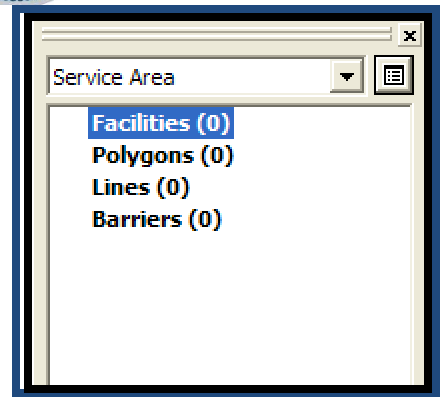
2) Use the resulting buffer feature class to clip the TIGER® street layer:
   a. Add TIGER® street layer to ArcMap®.
   b. Open the ArcToolbox® and go to **Analysis Tools>Extract>Clip**.
   c. Complete the dialog box as shown below:



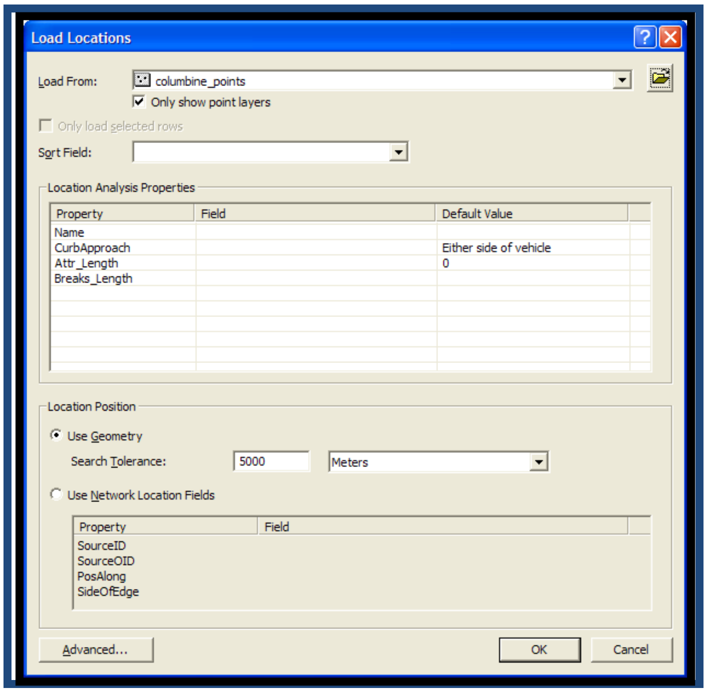
   d. Click **OK**.
3) Using ArcCatalog® and within the file geodatabase:
   a. Right-click and create a new Feature Dataset.
      (i.) For the Feature Dataset settings:
         (1) Name the feature dataset accordingly.
         (2) Select horizontal coordinate system by importing the coordinate system associated with the clipped TIGER® street layer by selecting **Import** and navigating to the location of that feature class.
         (3) No vertical coordinate system needed.
         (4) Leave all x,y,z,m values at default.
         (5) Click **Finish**.
4) Import previously created street feature class into new **Feature Dataset**.
5) Right-click **Feature Dataset** and create new Network Dataset—accept all default setting for the Network Dataset.

NOTE:
The Network Analyst extension must be turned on.

6) In ArcMap® turn on the **Network Analyst Toolbar** by going to **View>Toolbars>Network Analyst**.
7) Add the Network Dataset created in **Step 5** to ArcMap.
8) Using the **Network Analyst Toolbar** dropdown, create **New Service Area**.
9) Open the **Network Analyst Window** by selecting the  button. See below.



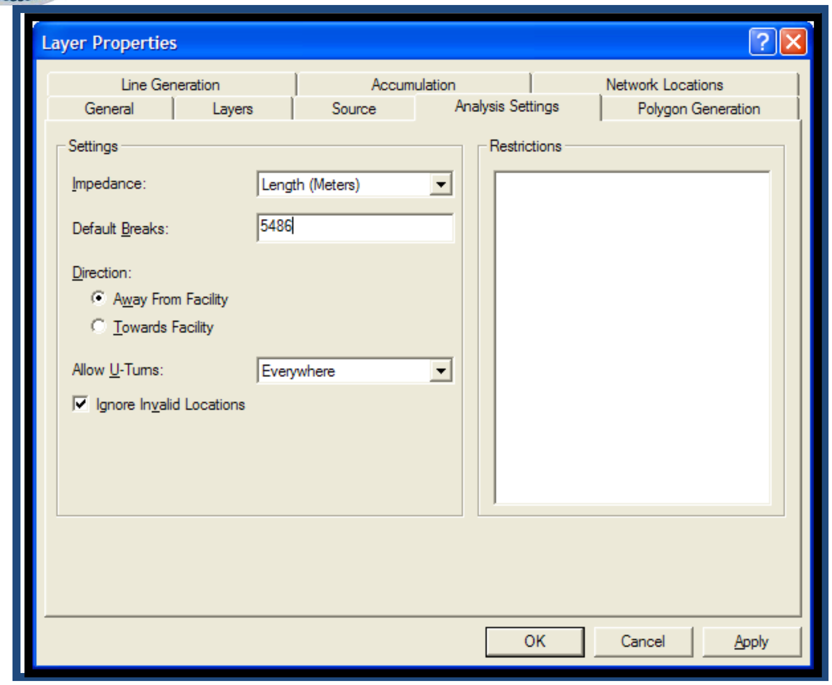
10) Right-click **Facilities** layer, select **Load Locations** and navigate to the DSLAM/Central Office facilities feature class.



11) Click **OK**.

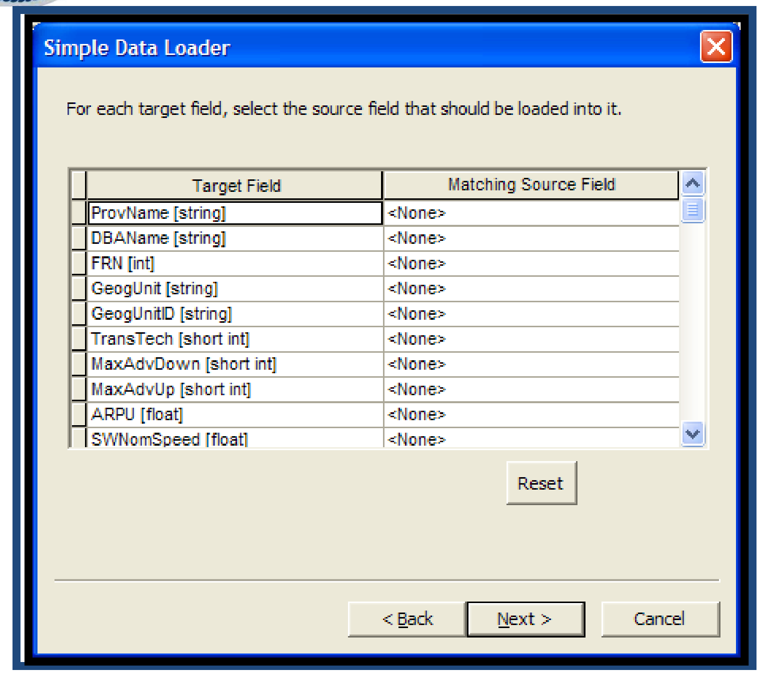
12) Click the **Service Area Properties** button .

13) For the following tabs, change the following properties:
   a. **Polygon Generation** tab:
      (i.) Select **Merge by break value**.
      (ii.) Also disable the **Trim Polygons** option.
   b. **Analysis Settings** tab—using and converting the specified DSLAM buffer distance from feet to meters—input buffer distance value in meters into the **Default Breaks** location.
      (i.) Generally, 18,000 feet (5486 meters) from DSLAM or Central Office location is used as the buffer distance. See below.



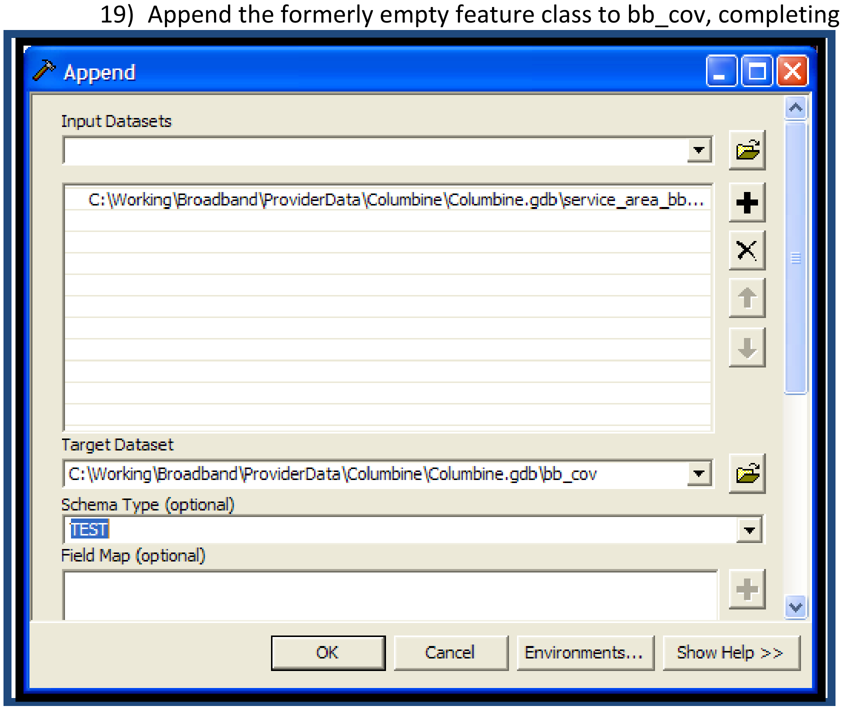
c. Click **OK**.

14) On the **Network Analyst Toolbar**, click the **Solve** button to create service area polygons.
15) Right-click on the created service area polygon in the layer list, and select **Data>Export Data** from the dropdown list.
16) Export to a feature class in the file geodatabase you created earlier.
17) In ArcCatalog®, create an empty feature class with the schema of the bb_cov feature class and load the feature class created in **Step 16** into it.
    a. Right-click on the empty feature class, select **Load>Load Data** from the dropdown menu and navigate to the location of the service area feature class.
    b. Click the **Add** button, then click **Next**.
    c. Accept the defaults and click **Next**.
    d. DO NOT attempt to map any fields, as shown below:



e. Click **Next**, then **Next** again, then **Finish**.

18) In ArcToolbox®, go to **Data Management Tools>General>Append**.
19) Append the formerly empty feature class to bb_cov, completing the dialog box, as shown below:



20) Leave the **Schema Type** as TEST.
21) Click **OK**.
22) In ArcMap®, open bb_cov for editing and manually input associated attribution.

BROADCAST TOWER LOCATION—ADDRESS DATA

In the event that the provider supplies wireless broadcast tower location address data, the steps are as follows:

1) Follow the process for geocoding points in **Subscriber Location—Address Data** above.
2) Follow the steps detailed in **Broadcast Tower Location—GIS Data** below.

BROADCAST TOWER LOCATION—XY DATA

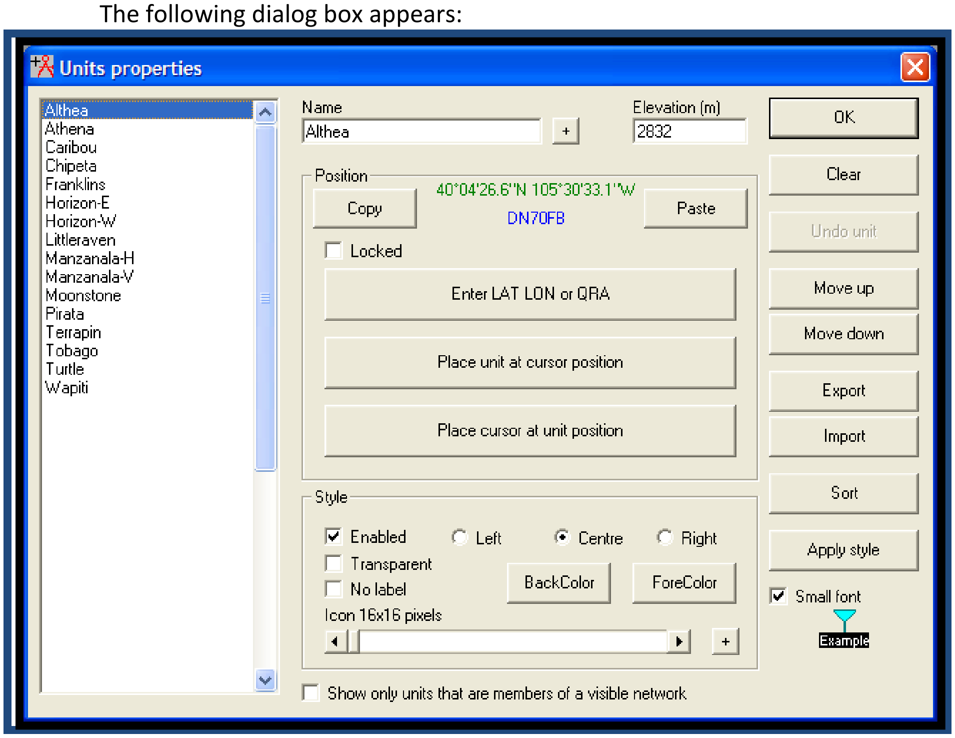
In the event that the provider supplies wireless broadcast tower location XY data, the steps are as follows:

1) Follow the process for creating points from XY data in **Subscriber Location—XY Data** above.
2) Follow the steps detailed in **Broadcast Tower Location—GIS Data** below.

BROADCAST TOWER LOCATION—GIS DATA

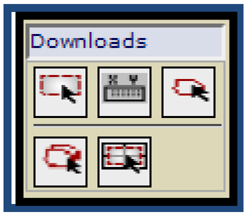
In the event that the provider supplies wireless broadcast tower location GIS data, the steps are as follows:

1) Download the required software (Radio Mobile) from the website: **http://www.cplus.org/rmw/english1.html**
2) Install the software according to the standard directions, found here: **http://www.cplus.org/rmw/download/download.php?S=1**
3) Open the application.
4) Load the broadcast tower location and elevation information by selecting **File>Unit properties**. The following dialog box appears:

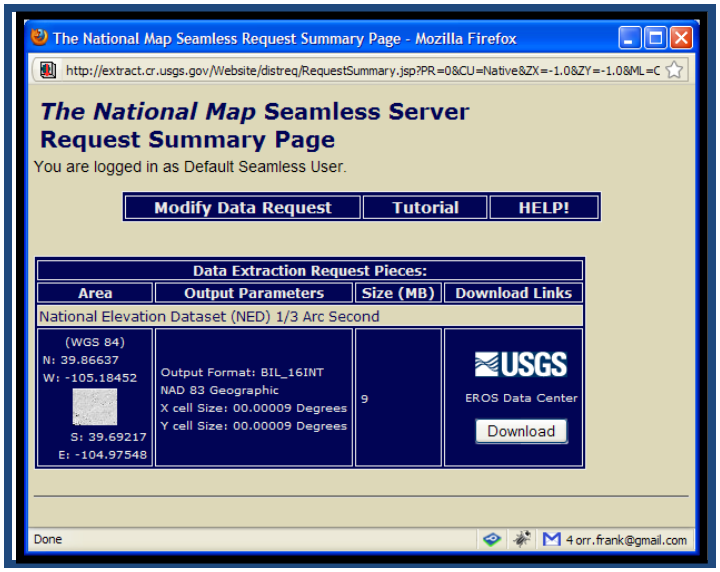


5) Add the information for all the towers supplied by the WISP data provider, including the elevation. If provider does not supply elevation, this information can be obtained from Google Earth.
   a. If available, use the **Import** button to import a Google Earth KML of the tower locations.
6) Go to the National Map Seamless Server (**http://seamless.usgs.gov/**) and download elevation data sufficient to contain the tower locations.
   a. At least the 1/3" NED data is needed. Select this by clicking the **Download** button in the upper right of the website and checking the box next to **1/3" NED**.

b. Zoom to the area of interest and use the **Download** tools to define the area to download:

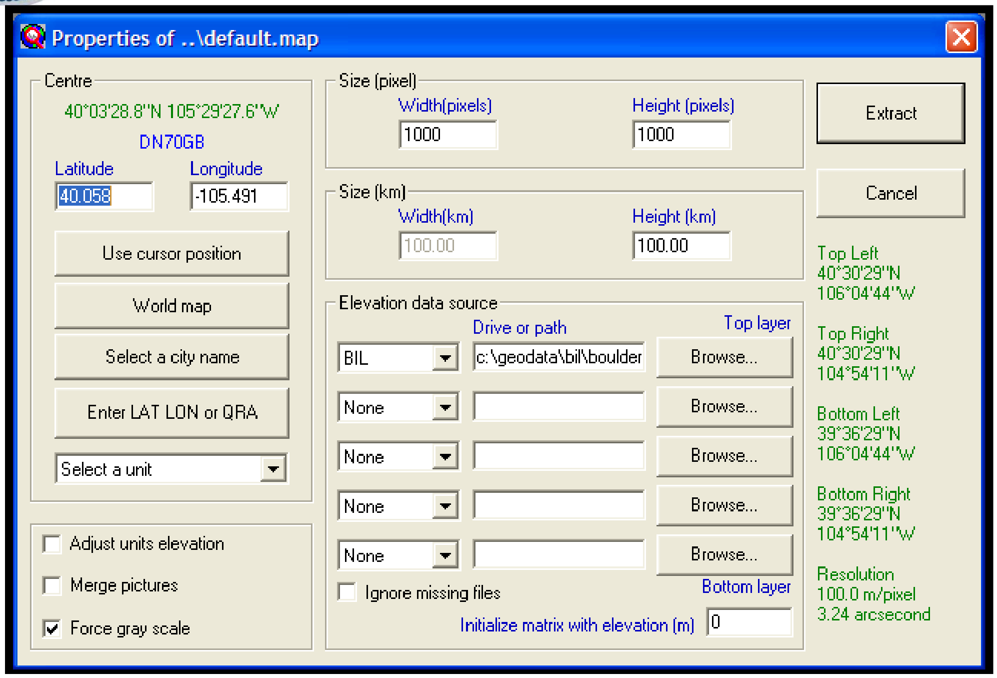


c. Click the **Modify Data Request** button to request the data in BIL_16INT format, not ESRI GRID, as shown below:

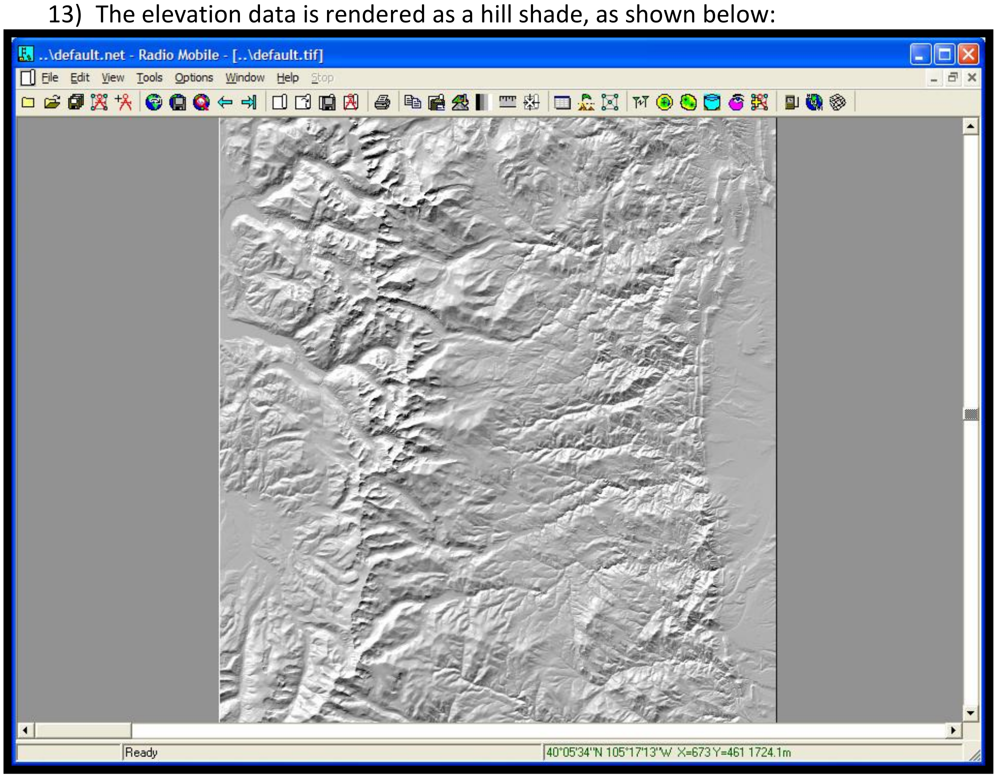


d. Download the data and unzip it.

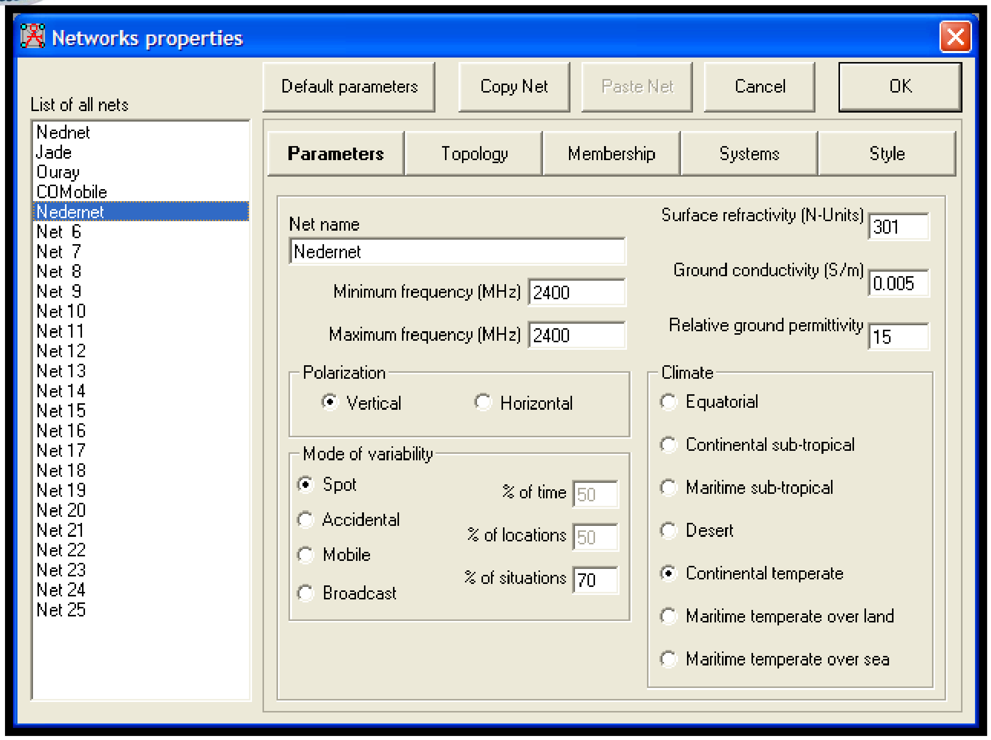
7) Select **File>Map Properties** to define the map.
8) Enter a latitude and longitude in the center of the tower locations.
9) Set the size (in pixels) and the size (in kilometers) of the map.
10) Set the directory path leading to the BIL elevation data just downloaded.
11) The dialog box is shown below:



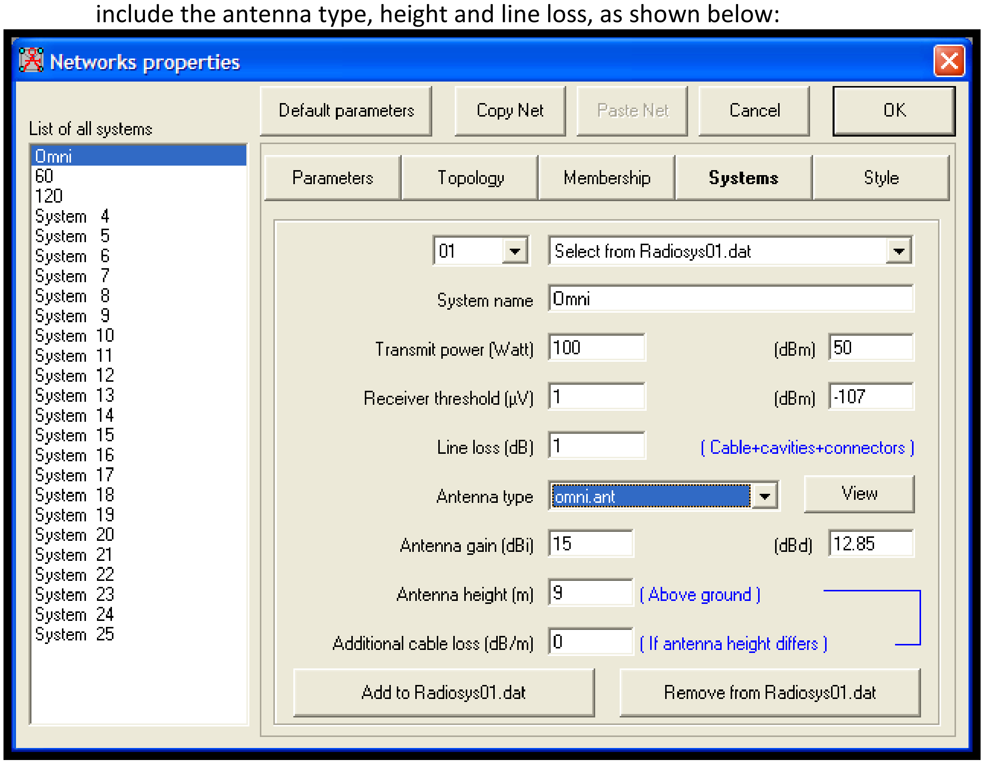
12) Click **Extract**.
13) The elevation data is rendered as a hill shade, as shown below:



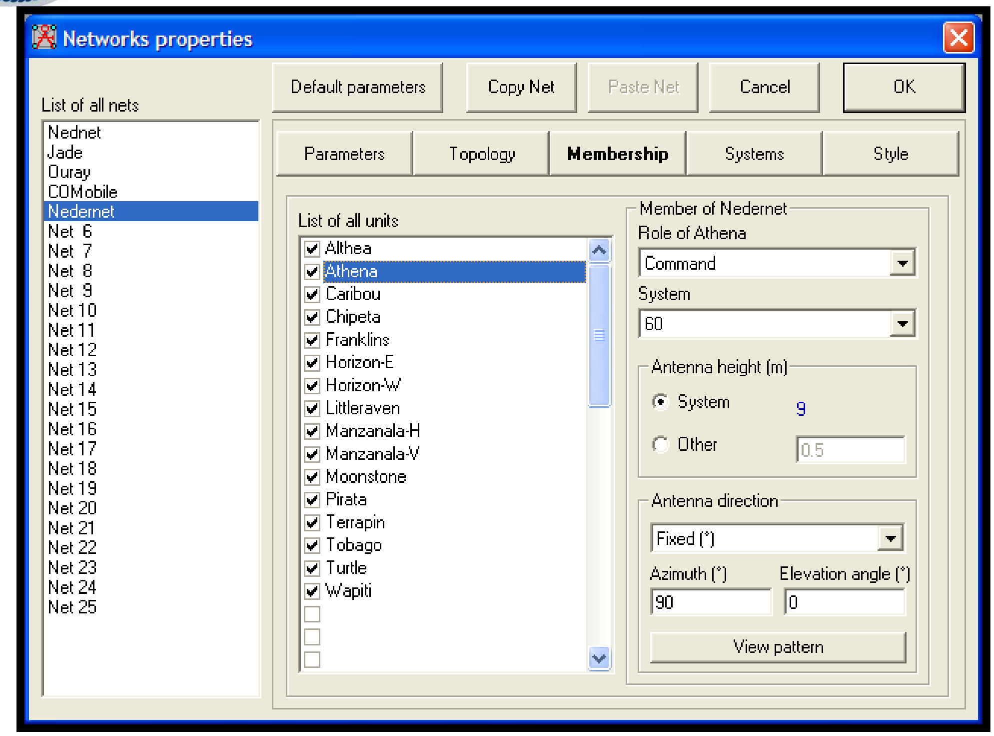
14) Select **File>Network properties** from the main menu.
15) Create a new network and enter in the frequency range under the **Parameters** tab, as shown below:



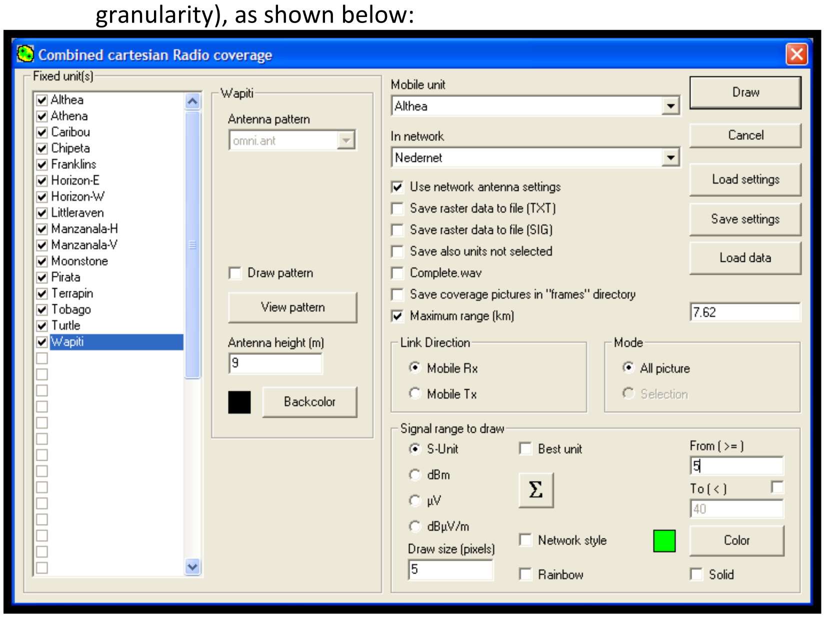
16) Leave all the other values as they appear, and select the **Systems** tab.
17) Create enough systems to cover all the varieties of equipment in the provider network. This will include the antenna type, height and line loss, as shown below:



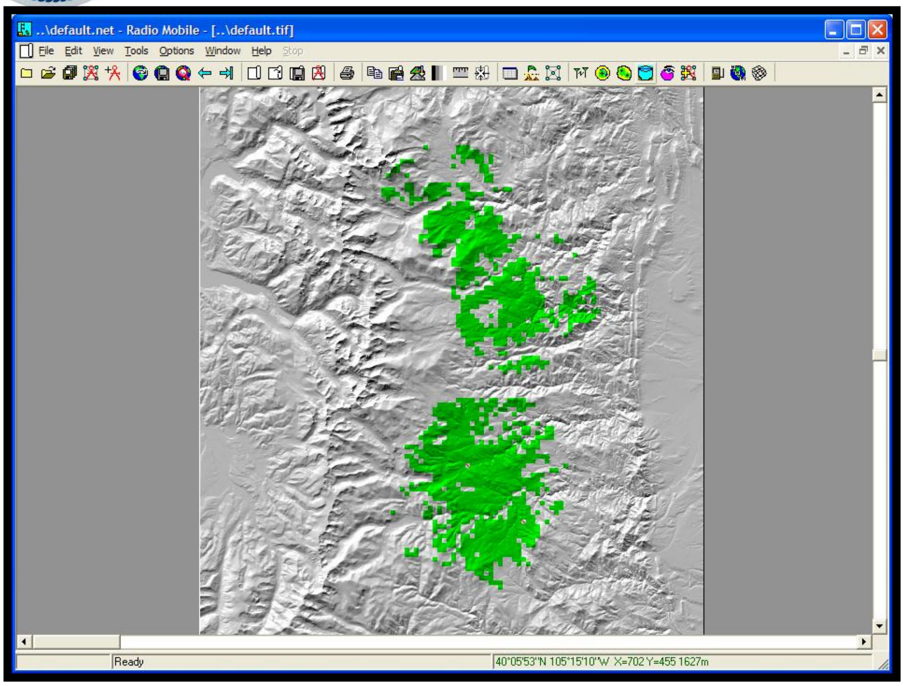
18) Now click on the **Membership** tab, and assign the individual towers to their respective systems, providing the azimuth for non-omnidirectional antennas, as shown below:



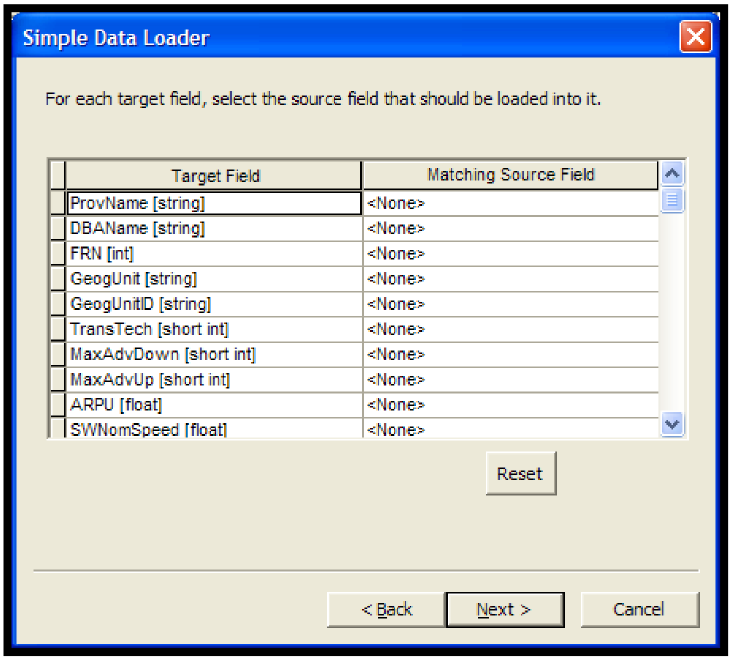
19) Click **OK**.
20) Select **Tools>Radio Coverage>Combined Cartesian** from the main menu.
21) Complete the dialog box as shown below, providing the **Maximum Range** from the highest tower beam radius supplied by the provider.
22) Set the **Pixel Size** at 5 (experiment depending on the area covered to get the right level of granularity), as shown below:



23) Set the **Signal range to draw** to S-Unit and type 5 in the **From (>=)** box.
24) Click on **Draw**. See below.



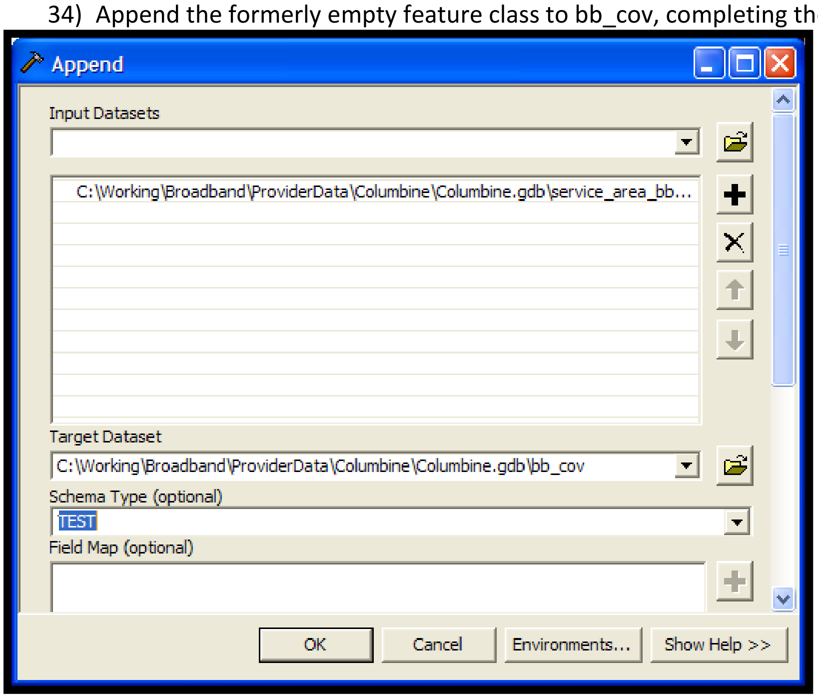
25) Save the resulting image as a TIF by selecting **File>Save Picture as**.
26) Open ArcMap® and load the BIL elevation data you used in Radio Mobile.
27) Load the TIF image you created and georeference it using the corners of the BIL data.
    a. The corners of the data can be seen in the TIF image.
28) Follow the georeferencing directions from the **Coverage Area—PDF/JPG/Other Image Format** section below.
29) Use the **Georeferencing Toolbar** to **Update the Georeferencing** for the TIF dataset.
30) In ArcToolbox®, select **Data Transformations>From Raster>Raster to Polygon** and input the georeferenced TIF you just created, as shown below:
31) Open the resulting polygon feature class for editing using the **Editing** toolbar in ArcMap® and clean up as necessary.
32) In ArcCatalog®, create an empty feature class with the schema of the bb_cov feature class and load the feature class created above into it.
    a. Right-click on the empty feature class, select **Load>Load Data** from the dropdown menu and navigate to the location of the service area feature class.
    b. Click the **Add** button, then click **Next**.
    c. Accept the defaults and click **Next**.
    d. DO NOT attempt to map any fields, as shown below:



e. Click **Next**, then **Next** again, then **Finish**.

33) In ArcToolbox®, go to **Data Management Tools>General>Append**.

34) Append the formerly empty feature class to bb_cov, completing the dialog box, as shown below:



35) Leave the **Schema Type** as TEST.

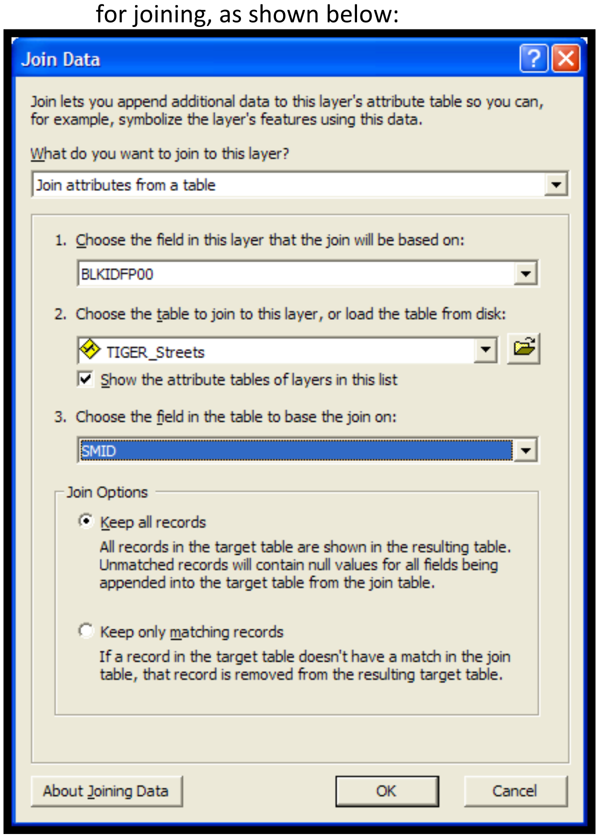
36) Click **OK**.

37) In ArcMap®, open bb_cov for editing and manually input associated attribution.

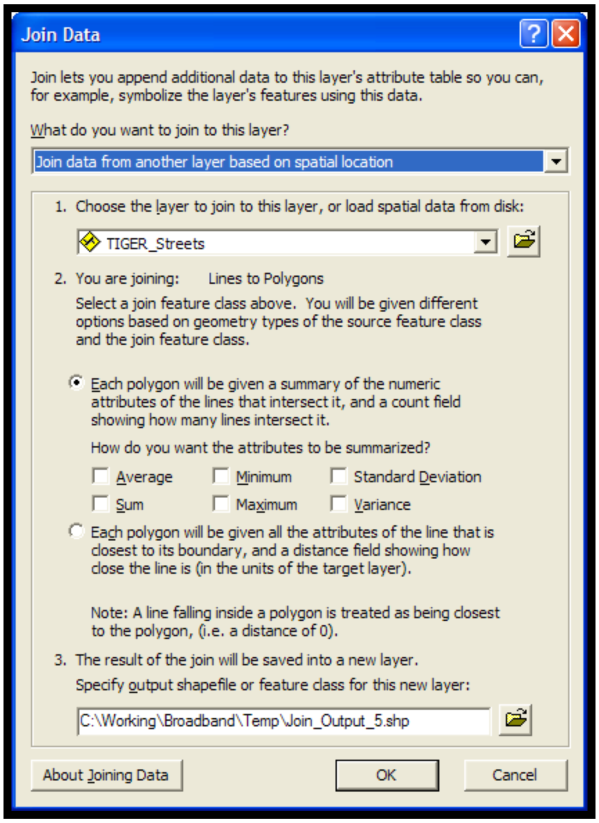
TIGER® STREET SEGMENTS—LIST, SPREADSHEET OR GIS DATA

In the event that the provider supplies TIGER® street segments in list or spreadsheet format, the steps are as follows:

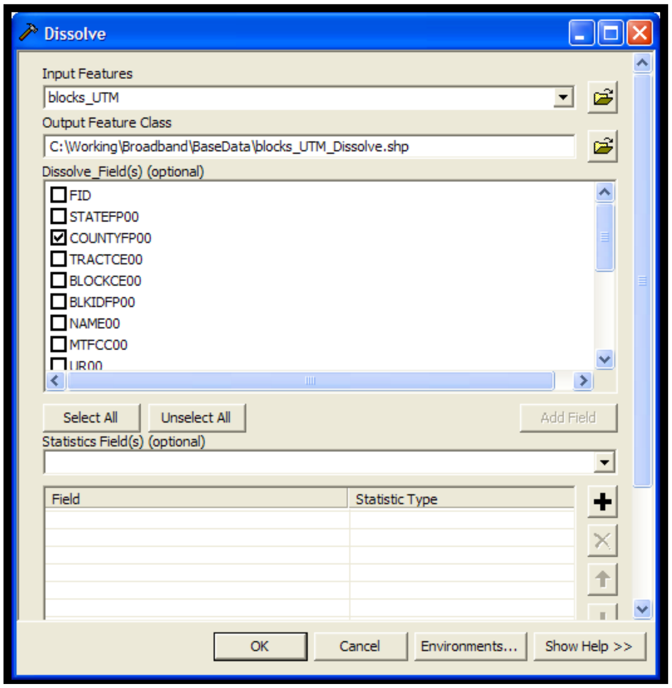
1) Join TIGER® road segments to 2000 census blocks feature class using one of two methods based on how the data is provided:
   a. If the TIGER® data is provided with a Census Block ID, then join the segments to the Census Block geometry based on that ID:
      (i.) Load both datasets into ArcMap®;
      (ii.) In the layer list, right-click on the 2000 census block feature class and select **Joins and Relates>Join**;
      (iii.) In the dialog box, select the TIGER® road segments data and the proper attribute fields for joining, as shown below:



      (iv.) Click **OK**.
   b. If the data provided is a list containing TLIDs, then join to the TIGER®/Line data using the TLID, and use a spatial join to associate the TIGER® segment with the coterminous block based on the block ID:
      (i.) Load both datasets into ArcMap®;
      (ii.) In the layer list, right-click on the 2000 census block feature class and select **Joins and Relates>Join**;
      (iii.) Select **Join data from another layer based on spatial location** from the dropdown menu;
      (iv.) Complete the dialog box, as shown below and click **OK**.

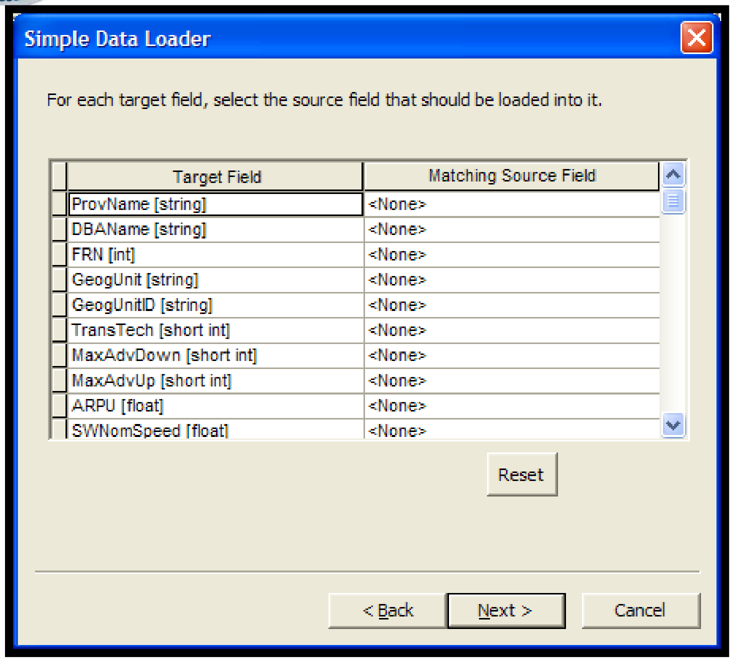


2) Export joined records into a temporary feature class.
3) If joined Census Block geometry is confined to one specific area, then dissolve blocks into one record. If joined Census Block geometry is distributed throughout a particular State, then dissolve sub-selections of census blocks for each county.
   a. Use the County FIPS code to dissolve by county.
   b. In ArcToolbox®, select **Data Management Tools>Generalization>Dissolve**.
   c. Complete the **Dissolve** dialog box, as shown below:



   d. Click **OK**.

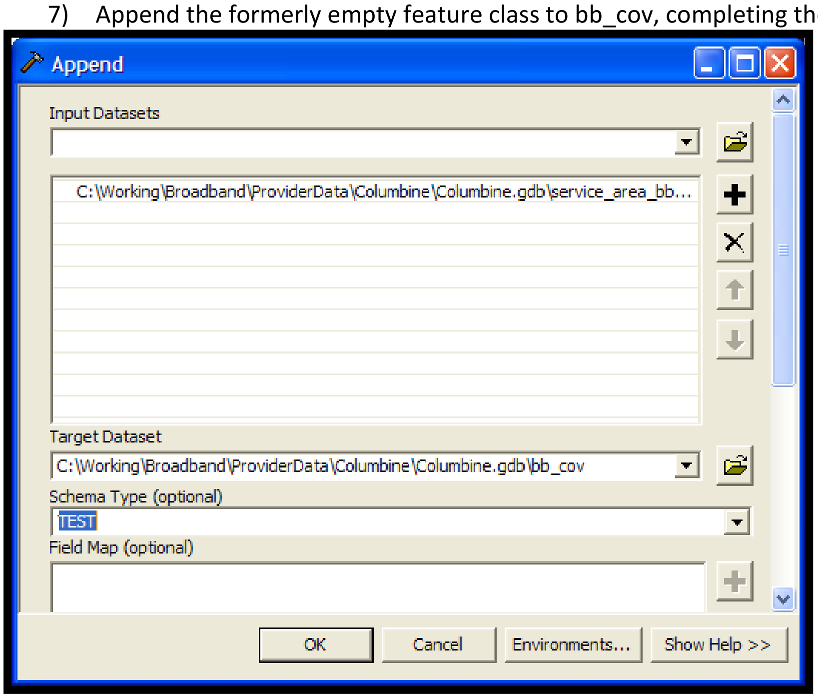
4) For each dissolved region, open the feature class for editing using the **Editing** tool in ArcMap® and remove unnecessary slivers and other small holes. For general guidance on editing features in ArcMap®, see **http://webhelp.esri.com/arcgisdesktop/9.3/pdf/Editing_Tutorial.pdf**
5) In ArcCatalog®, create an empty feature class with the schema of the bb_cov feature class and load the feature class created above into it.
   a. Right-click on the empty feature class, select **Load>Load Data** from the dropdown menu and navigate to the location of the service area feature class.
   b. Click on the **Add** button, then click **Next**.
   c. Accept the defaults and click **Next**.
   d. DO NOT attempt to map any fields, as shown below:



e. Click **Next**, then **Next** again, then **Finish**.

6) In ArcToolbox®, go to **Data Management Tools>General>Append**.

7) Append the formerly empty feature class to bb_cov, completing the dialog box, as shown below:



8) Leave the **Schema Type** as TEST.

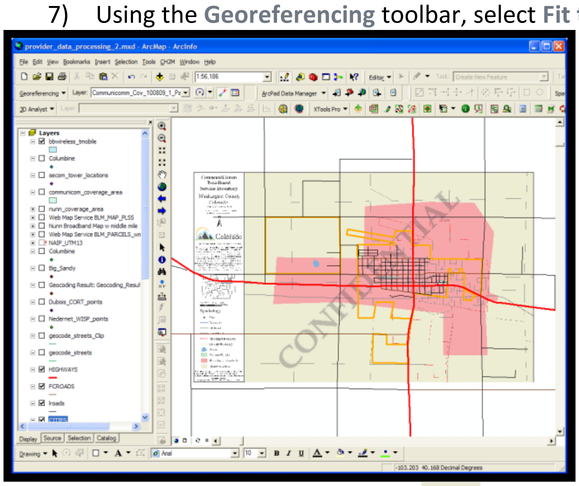
9) Click **OK**.

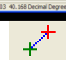
10) In ArcMap®, open bb_cov for editing and manually input associated attribution if necessary.

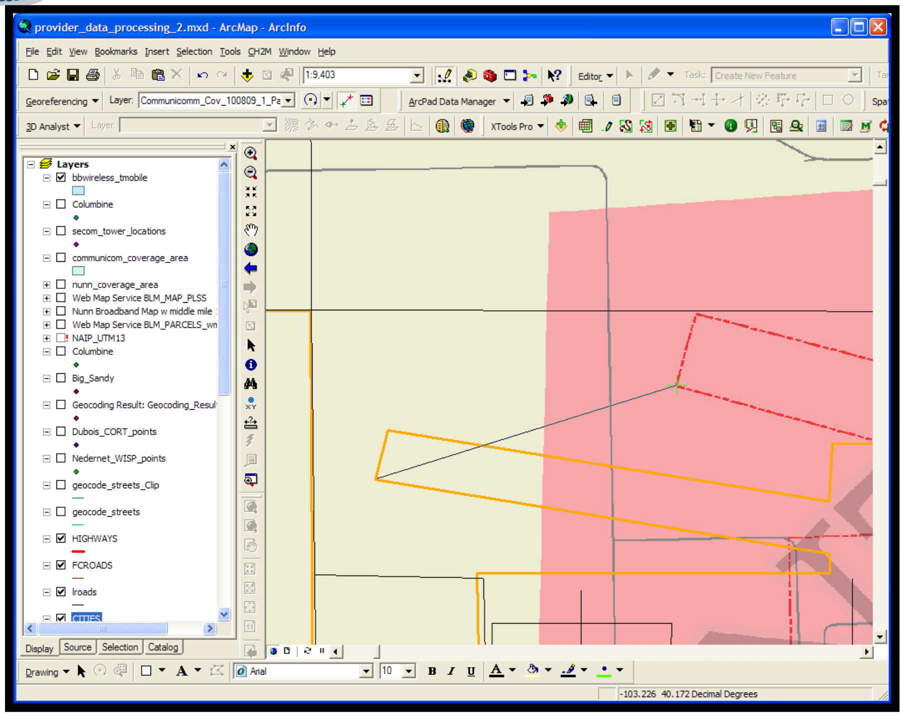
COVERAGE AREA—PDF/JPG/OTHER IMAGE FORMAT

In the event that the provider supplies coverage area data in some image format such as PDF or JPG format, the steps are as follows:

1) If in PDF format, open in Adobe Acrobat and **Save As…** JPG format.
2) Open the JPG image in ArcMap®.
3) Add the required base map vector data for georeferencing.
   a. This generally will be either the CDOT data or TIGER® data.
4) Change the coordinate system of the data frame to the desired end coordinate system.
5) Zoom to the general location of the JPG map image.
   a. This is the location based on the vector data, not the JPG image itself. For example, if you know that the JPG image represents an area around the town of Limon, zoom to the town of Limon in your vector data.
6) Open the **Georeferencing** toolbar by selecting **View>Toolbars>Georeferencing** from the main menu bar.
7) Using the **Georeferencing** toolbar, select **Fit to Display**; results are shown below:



8) Use the **Control Point** button  to add control points to the map.
9) Use common points in the base dataset and the JPG image.
   a. For example, find major street intersections, county/city boundaries, etc.
   b. Try to distribute the points more or less in the four corners on the image for the best transformation.
10) Click on the location on the image first, then click on the corresponding location on the vector database map, as shown in the image below:



11) After placing each control point, the image transformation will update automatically.
12) Repeat until satisfied with the transformation.

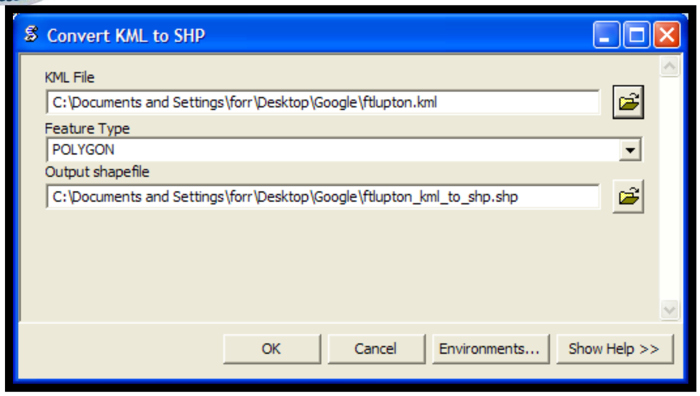
NOTE:
The transformation may take up to four points, although sometimes only two are necessary.

13) When satisfied with the transformation, select **Update Georeferencing** from the **Georeferencing** toolbar dropdown.
    a. This will create a "world" file (.jgw in the case of JPGs) in the same directory as the image file.
14) In ArcCatalog®, create a new polygon shapefile with the appropriate data schema for a provider coverage area, which can be found in Appendix D.
15) Add the shapefile to ArcMap®.
16) Using the **Editor** toolbar, select **Start Editing**. Set the **Task** to **Create New Feature**.
17) Use the **Sketch Tool** to digitize a new coverage polygon using the coverage area outline from the georeferenced JPG and add the required attributes manually.
18) Repeat the above steps for all subscriber speed coverage areas provided.
19) Follow the steps detailed in **Coverage Area—GIS Data** below.

COVERAGE AREA—KML/KMZ

In the event that the provider supplies coverage area data in Google Earth KML or KMZ format, the steps are as follows:

1) Use a KML to SHP converter to translate file into an Esri® format.
2) **http://arcscripts.esri.com/details.asp?dbid=15603**
3) Download the script and follow the provided instructions for installing it in ArcToolbox®.
4) Double-click on the script in ArcToolbox® and navigate to the location of the KML file, as shown below:



5) Add the new shapefile to ArcMap®. Repeat for all KML files provided.
6) Follow the steps detailed in **Coverage Area—GIS Data** below.

COVERAGE AREA—CAD DATA

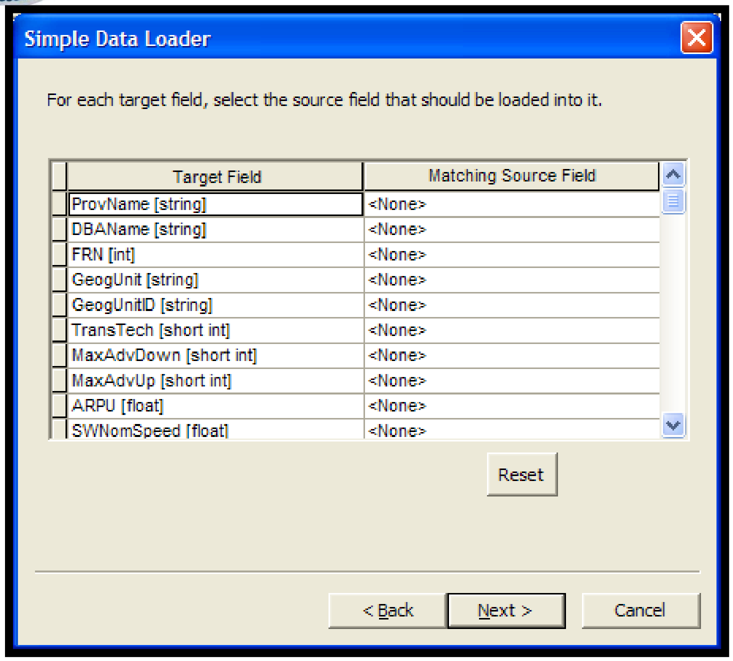
In the event that the provider supplies coverage area data in GIS format, the steps are as follows:

1) Transform the CAD dataset into an Esri® format.
2) **http://webhelp.esri.com/arcgisdesktop/9.2/index.cfm?TopicName=Transforming_CAD_datasets**
3) It may be necessary to contact the provider first to determine the coordinate system of the CAD data.
4) If the CAD data is not in a standard coordinate system, it may be necessary first to use ArcMap® to georeference the CAD data to a known coordinate system.
a) To do so, follow the instructions provided above in **Coverage Area—PDF/JPG/Other Image Format**.
5) In ArcCatalog®, create a new polygon shapefile with the appropriate data schema for a provider coverage area, which can be found in Appendix D.
6) Add the shapefile to ArcMap®.
7) Using the **Editor Toolbar**, select **Start Editing**. Set the **Task** to **Create New Feature**.
8) Use the **Sketch Tool**  to digitize a new coverage polygon using the coverage area outline from the georeferenced CAD file and add the required attributes manually.
9) Follow the steps detailed in **Coverage Area—GIS Data** below.

COVERAGE AREA—GIS DATA

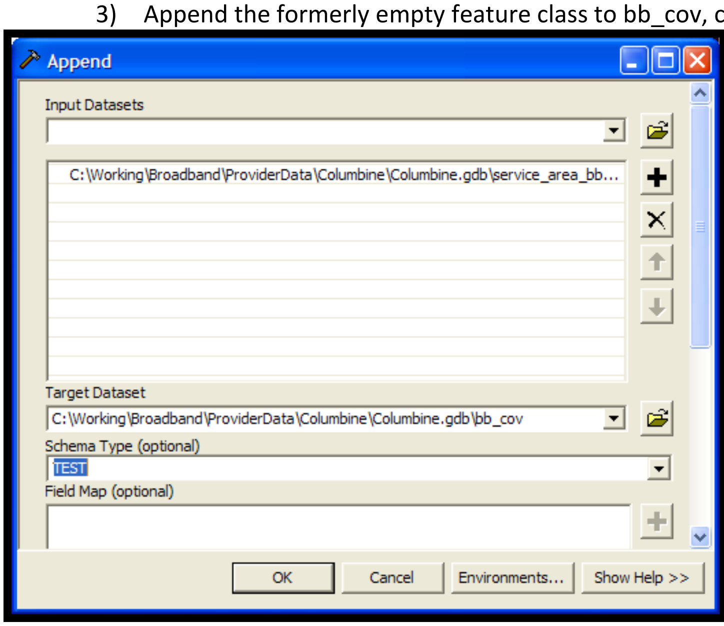
In the event that the provider supplies coverage area data in GIS format, the steps are as follows:

1) In ArcCatalog®, create an empty feature class with the schema of the bb_cov feature class and load the GIS feature class either created above or supplied by the provider into it.
   a. Right-click on the empty feature class, select **Load>Load Data** from the dropdown menu and navigate to the location of the service area feature class.
   b. Click on the **Add** button, then click **Next**.
   c. Accept the defaults and click **Next**.
   d. DO NOT attempt to map any fields, as shown below:



e. Click **Next**, then **Next** again, then **Finish**.

2) In ArcToolbox®, go to **Data Management Tools>General>Append**.
3) Append the formerly empty feature class to bb_cov, completing the dialog box, as shown below:



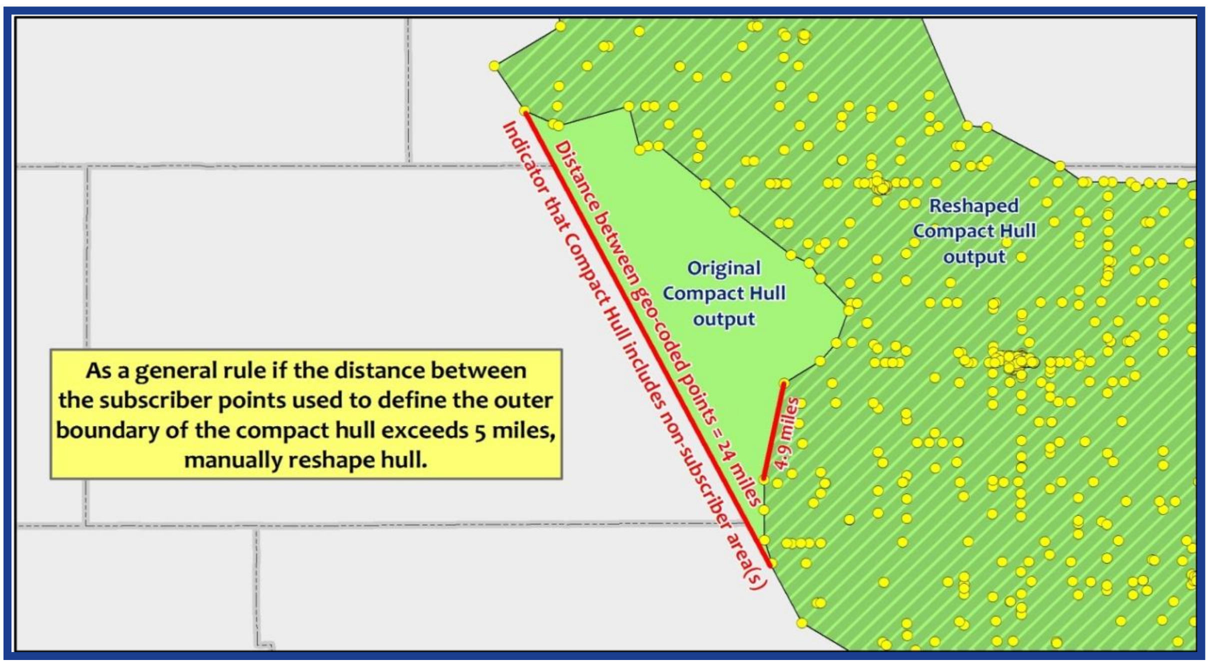
4) Leave the **Schema Type** as TEST.
5) Click **OK**.
6) In ArcMap®, open bb_cov for editing and manually input associated attribution, if necessary.

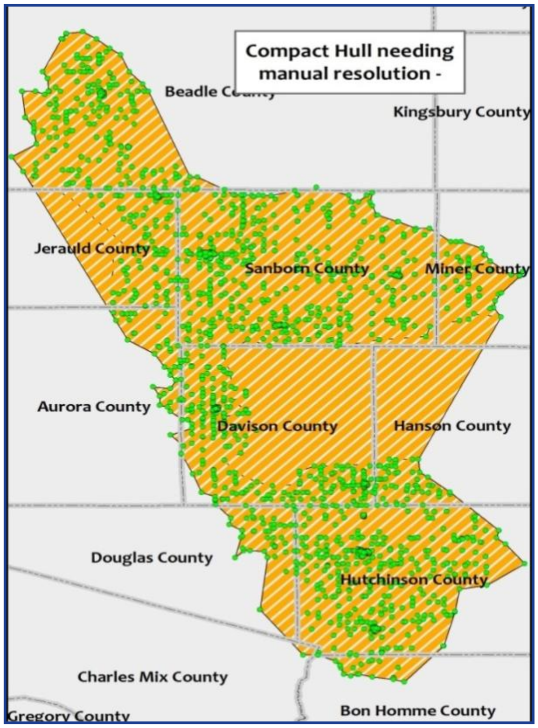
COMPACT POLYGON FROM SUBSCRIBER POINTS

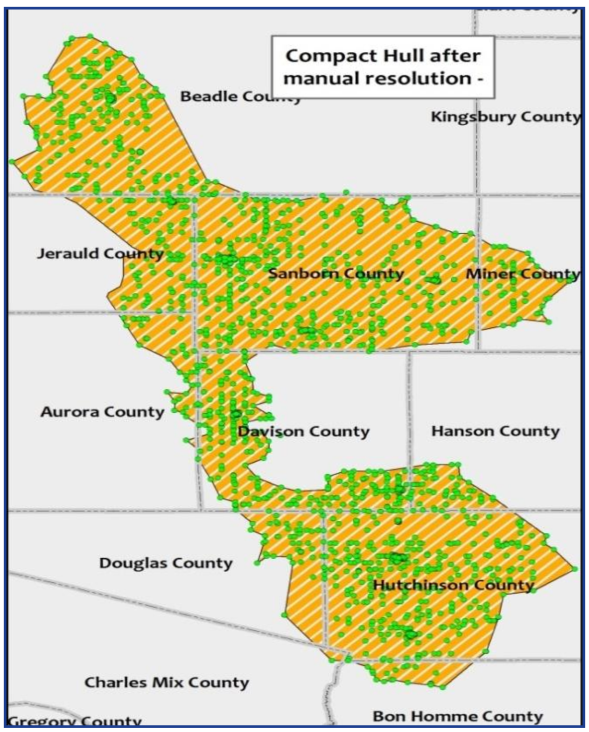
1) Geocode address list using latest **State Composite Locator**.
2) Verify that your geocoded file has only one TT (Technology Type). If not, export individual geocoded layers for each Technology Type.
3) For each TT, check for differences in speed values or speed tiers and create separate layers for each speed value/tier.

4) Clean your geocoding results: remove any points that geocode to accuracy levels below ZIP+4 (ZIP centroids, carrier route centroids, etc). Also, verify that outliers with acceptable accuracy levels are legitimate, i.e., fall in correct city and Zip.
5) Perform spatial join between county polygons (using stcnyfips field) and the cleaned geocoded subscriber points in order to carry the county name and stcnty fips.
6) Summarize the number of subscribers by county and use the subscriber counts by county to populate the Rate Tier table.
7) Un-join the county data from the geocode subscribers list.
8) Create Compact Polygon using cleaned geocoded layer or sub-selection of XtoolsPro—ConvexHull-DetailedHull option. A sub-selection of geocoded points will be used in areas where more than one polygon will need to be created for one provider's service area.
9) Evaluate output Hull carefully, looking for areas that should not be covered by hull polygon.
    a. If it is determined that an area or areas should not be represented in coverage area, manually reshape hull polygon until coverage area is adequate.
    b. When not obvious and as a general rule, manually resolve compact polygon when the distance between the subscriber points used to define the outer boundary of the compact polygon exceeds 5 miles . When reshaping the hull polygon, snap to the outermost geocoded points. See the three figures below for examples.

Compact Hull: Manual Resolution Required







10) To attribute the compact polygon, perform a spatial join where your Target Feature Class is the compact polygon and the Join Feature Class is your geocoded point layer. Export compact hull with joined attributes and name file appropriately.
11) Append attributed compact polygon to Broadband TT template Feature Class and, if required, manually input any provider attribution that may not have carried over in the append process.

12) Intersect compact polygon with county boundaries to create unique records by county and use the state-county-fips field to populate stcty_fips field. Also use the county name field to populate the BBCov_Name field.
    a. Exception: where a provider's coverage is distributed throughout more than one area of any given county where the BBcov_Name should be populated using an appropriate city or other logical name based on geographical location.
13) Export/load into appropriate BB TT model dataset.

CENSUS BLOCKS—LIST OR SPREADSHEET

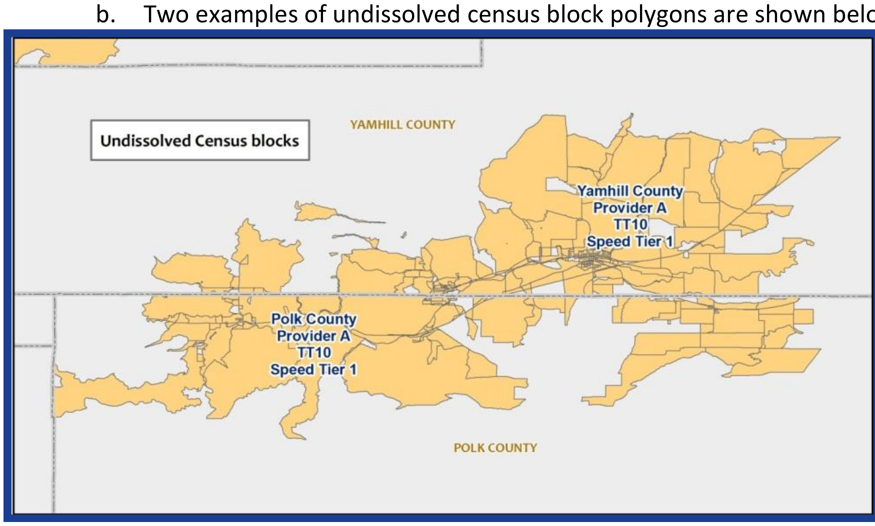
In the event that the provider supplies census block data in a list or spreadsheet, the steps are as follows:

1) Ensure block polygons supplied by the provider are 2000 currency.
2) If other currency, convert to 2000 currency before proceeding.
    a. To do this, remove the trailing letter (a, b, etc.) from the block ID.
    b. You will now have two blocks that equate to one block in the 2000 block geometry.
    c. Delete duplicate block IDs, retaining the higher service tier in each case.
3) Prepare the block list in clean Excel format, removing all Excel-only formatting, merged cells, colors, borders, etc.
4) Import the spreadsheet into ArcMap®.
5) Right-click on the 2000 census block feature class in the layer list in ArcMap® and select **Joins and Relates>Join** from the dropdown menu. Join the census block list to the 2000 census blocks feature class using the block ID and export joined records in a new feature class. The **Join** dialog box and process can be seen above in the **TIGER® Street Segments—List, Spreadsheet or GIS Data** subsection.
6) Follow the steps in **Census Blocks—GIS Data** below.

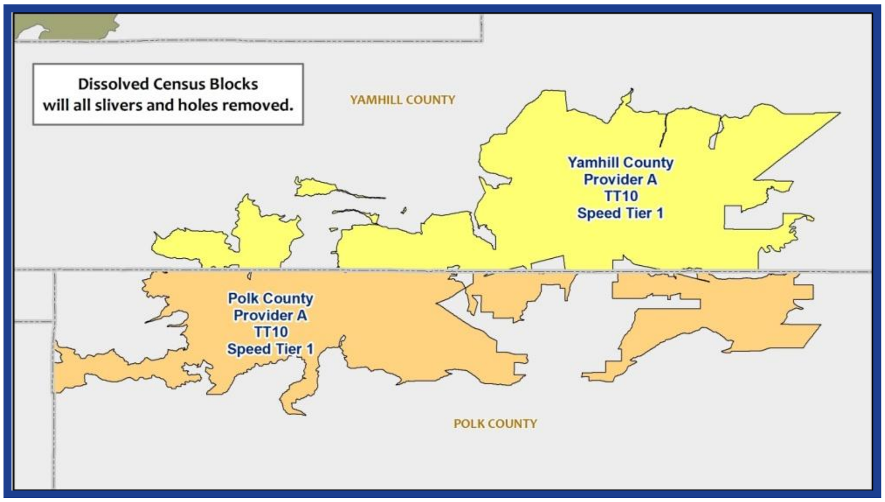
CENSUS BLOCKS—GIS DATA

In the event that the provider supplies census block GIS data, the steps are as follows:

1) Ensure that the blocks supplied by the provider are in the required data schema and are complete as far as required attribution.
    a. If not, manually enter the required attribution or contact the provider to fill gaps.
2) If census block geometry is distributed throughout more than one county, then select **Data Management Tools>Generalization>Dissolve** in ArcToolbox® and dissolve based on County/Provider/TT/Speed Tier so that unique records are created for each unique combination.
    a. The **Dissolve** dialog box is shown above in the **TIGER® Street Segments—List, Spreadsheet or GIS Data** section.
    b. Two examples of undissolved census block polygons are shown below:

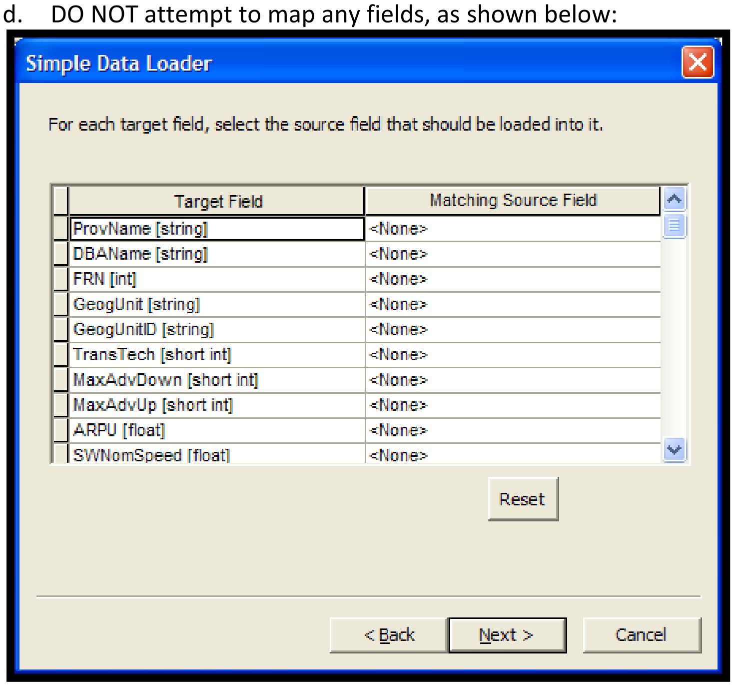


Undissolved census block polygons



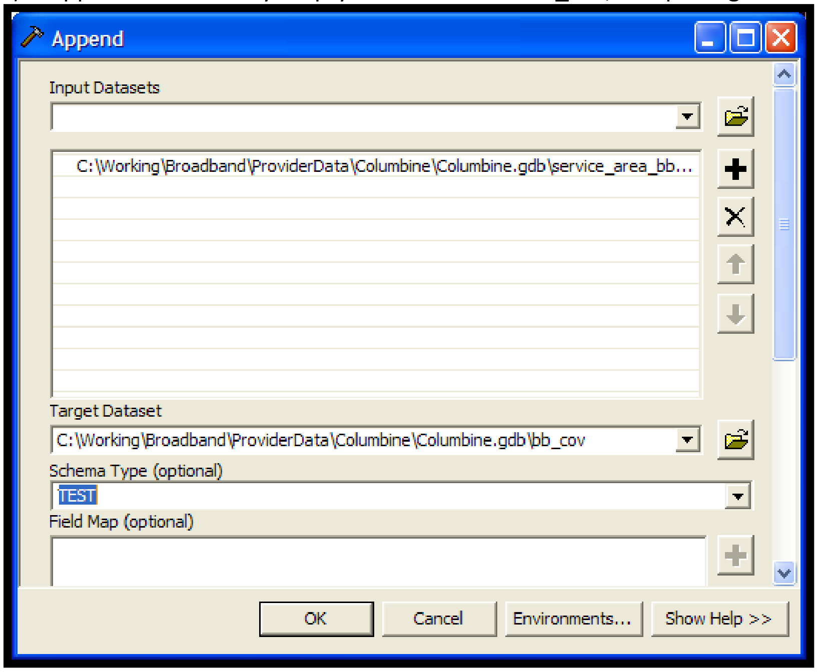
Census block polygons dissolved by county

3) For each dissolved region use the **Editing** toolbar in ArcMap® to remove unnecessary slivers and other small holes.
4) In ArcToolbox®, select **Data Management Tools>General>Merge** and merge the processed polygons into a single layer.
5) The merged census blocks will need to have the subscriber's frn field added and populated.
6) In ArcCatalog®, create an empty feature class with the schema of the bb_cov feature class and load the GIS feature class either created above or supplied by the provider into it.
   a. Right-click on the empty feature class, select **Load>Load Data** from the dropdown menu and navigate to the location of the service area feature class.
   b. Click the **Add** button, the click **Next.**
   c. Accept the defaults and click **Next.**
   d. DO NOT attempt to map any fields, as shown below:



   e. Click **Next**, then **Next** again, then **Finish**.

7) In ArcToolbox®, go to **Data Management Tools>General>Append**.
8) Append the formerly empty feature class to bb_cov, completing the dialog box, as shown below:



9) Leave the **Schema Type** as TEST.
10) Click **OK**.
11) In ArcMap®, open bb_cov for editing and manually input associated attribution, if necessary.

METADATA TRANSACTIONS

Following any updates or changes completed within the file geodatabase (fGDB) stored on the GIS-Analysts staging environment, the GIS-Analyst runs transactions to compare that fGDB with the one stored on the Core server to ensure metadata on all changes is recorded.

The steps taken to run transactions on the updated Core database are outlined below:

1) Open a command line window and run generateTransactions.py:
    a. Usage: **generateTransactions.py [Core fGDB] [Staging Environment fGDB]**
    b. Example of command line:

<path>**generateTransactions.py** <path>**ST_BB_POLY_SRV_AREAS.gdb** <path>**ST_BB_POLY_SRV_AREAS.gdb**

2) Shown below is an example of the output screen that will be displayed:

```
-----------  Collecting Transactions  ----------------


Calculating rec_id field for BBCov_0_BB_POLY_TEMPLATE
value can not be 0 or less
Trouble creating the progress meter


Calculating rec_id field for BBCov_10_CenturyLink

%   10   20   30   40   50   60   70   80   90   100

----|----|----|----|----|----|----|----|----|----|      Goal = 8
```

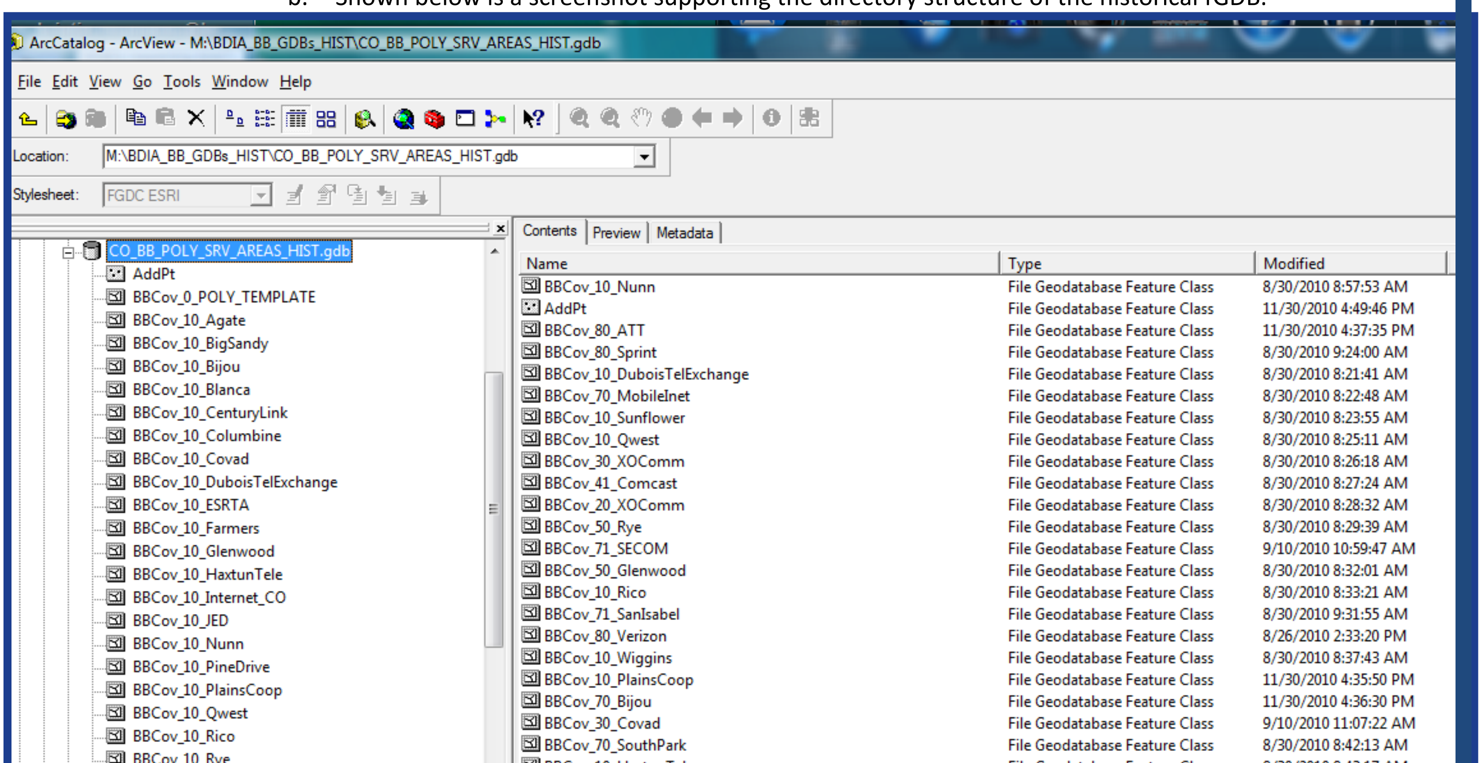
```
Merging change: X:\BDIA_BB_GDBs\MS_BB_POLY_SRV_AREAS.gdb\AddPt
Calculating Transaction fields for AddPt

%   10   20   30   40   50   60   70   80   90   100

----|----|----|----|----|----|----|----|----|----|      Goal = 1
**************************************************
X:\BDIA_BB_GDBs\MS_BB_POLY_SRV_AREAS.gdb\AddPt...changes is complete.


Your transaction FeatureClasses are in:
\\michigan\AllAccess\BDIA_BB_GDBs_HIST\MS_BB_POLY_SRV_AREAS_HIST.gdb
--------------------------------------------------------------------------------
------------
elapsed time = 2994.4 seconds
```

3) After the process has completed, results can be found in the ST_BB_POLY_SRV_AREAS_HIST.gdb:
   a. The transactions scripts records changes at a feature level.
   b. Shown below is a screenshot supporting the directory structure of the historical fGDB.



   c. Attribution associated with each added/removed/changed feature is tracked, including the following additional columns appended to the end of each:
      (i.) Commit_by

(1) Records the GIS-Analyst who committed the changes to the historical fGDB.

(ii.) Commit_date

(1) Records the date and time stamp on which the changes were committed.

(iii.) Trans_type

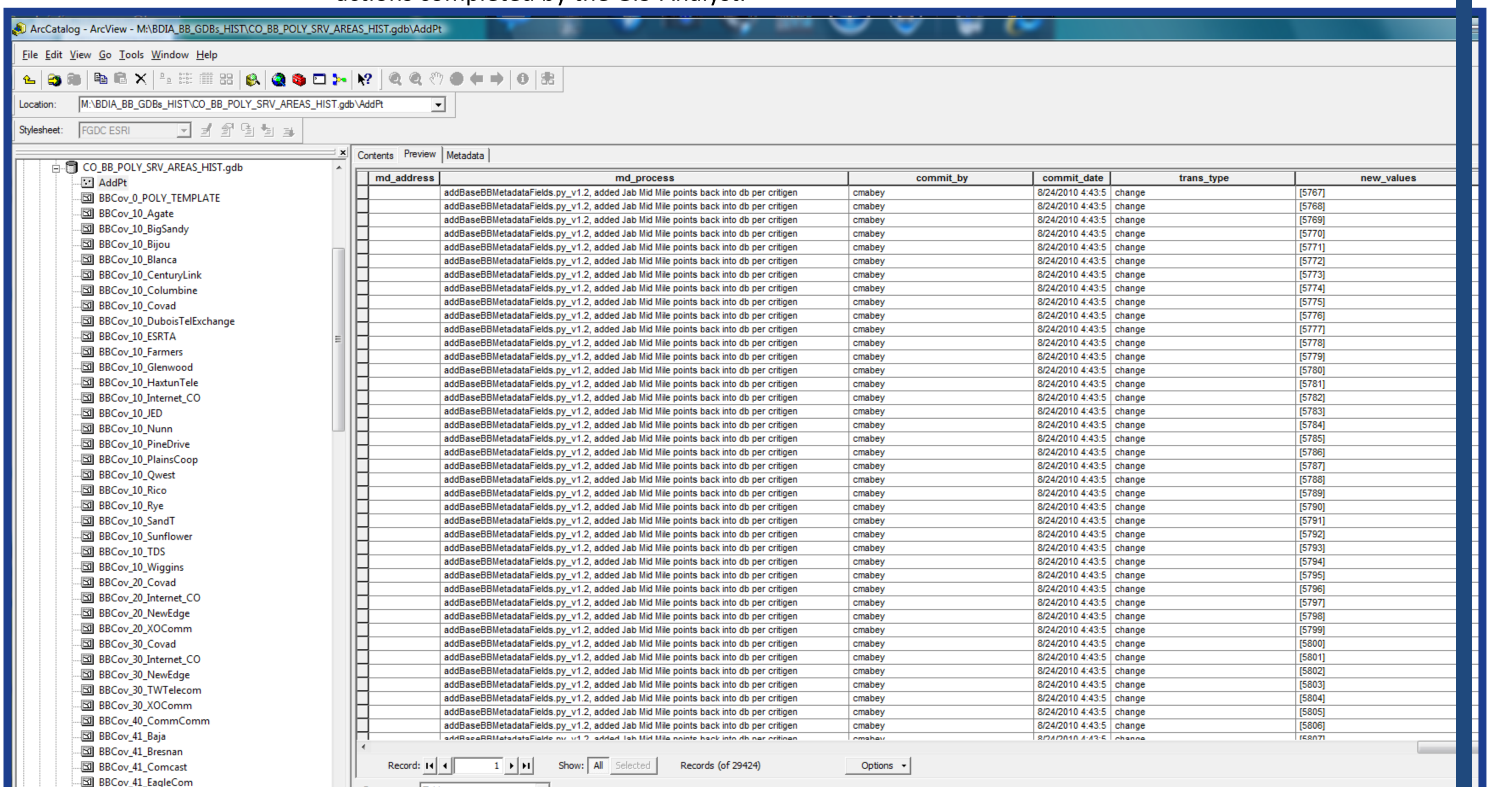
(1) This field reflects the type of change recorded;

(2) Categorized by: Adds/Change/Deletes.

(iv.) New_values

(1) Records the new values when a change was completed on a feature. Example: Name or speed change.

d. MD_Process also is transferred from the edited fGDB to the historical fGDB, which states the actions completed by the GIS-Analyst.



DATA PROCESSING

DATA PROCESSING OVERVIEW

The following subsections detail the steps and layout required to process the service provider data further to meet NTIA requirements:

- **Weighted Nominal Speed**;
- **Middle Mile**;
- **Broadband Coverage Template**.

WEIGHTED NOMINAL SPEED

The weighted nominal speed is populated in one of the following two ways: **subscriber data supplied by provider** or **value supplied by provider**.

SUBSCRIBER DATA SUPPLIED BY PROVIDER

Where the data provider supplies subscriber speed information, the following formula from the NOFA is used:

$$\frac{(\text{speed tier-1 in kbps} \times \text{no. of tier-1 subscribers}) + (\text{speed tier-2 in kbps} \times \text{no. of tier-2 subscribers}) + (\text{etc.})}{\text{Total average monthly subscribers}}$$

Data is initially broken up in the following order:

1) Stcty_fips;
2) Transmission technology type;
3) Subscriber tiers.

VALUE SUPPLIED BY PROVIDER

Some providers will supply their weighted nominal speed. In these cases, the data supplied will be populated instead of using the NOFA formula. These obtained or calculated values are used to update the service overview layer.

This can be done manually or by creating a table with the provider's FRN and average weighted speed and joining it to the service overview table in ArcMap®.

1) To join, right-click on the layer to join to and select **Joins and Relates>Join** from the dropdown menu.
2) Then navigate to the table to join to and select the join fields from the dropdown list.
3) Then open the source table (the table in ArcMap®) and right-click on the header of the **Average Weighted Speed** field and select **Calculate Field** from the dropdown menu.
4) Use the value of the average weighted speed from the joined table.

MIDDLE MILE

Middle mile information generally is provided in spreadsheet or text file format. The process is to take what is supplied by the provider and translate it into the required data schema.

1) If the data is supplied with address information, follow the process outlined above in **Subscriber Location—Address Data**.
2) If the data is supplied with associated XY coordinates, follow the process outlined above in **Subscriber Location—XY Data**.
3) Once the data is in GIS format, use the **Append** (**Data Management Tools>General>Append**) command in ArcToolbox® to append the data to the overall middle mile dataset.
4) Set the schema type to NO_TEST and use the Field Map to map the attribute fields from the source to the target dataset.

BROADBAND COVERAGE TEMPLATE

The table below lists descriptions of the fields within the bb_cov layer, which is the interim dataset used to create the final product deliverable.

NAME	ALIAS	DESCRIPTION
objectid	OBJECTID	Internal Object ID
shape	SHAPE	Internal Shape storage
prov_id	PROVIDER_ID	Unique numeric identifier for each provider
prov_name	PROVIDER_NAME	Unique name for each provider
dba_name	DOING_BUSINESS_AS	An alternative "Doing-Business-As" name for the provider
frn	FCC_REGISTRATION_NUMBER	Provider FCC Registration Number
bbcov_name	BBCOV_NAME	BroadMap Broadband Coverage name
trans_code	TRANSMISSION_CODE	Unique code for the transmission technology type described by this layer
trans_name	TRANSMISSION_NAME	Name for the transmissions technology type
trans_desc	TRANSMISSION_DESC	Description for the transmissions technology type
spect_code	SPECTRUM_CODE	Unique code for the spectrum [WIRELESS ONLY]
spect_name	SPECTRUM_NAME	Name for the spectrum [WIRELESS ONLY]
spect_desc	SPECTRUM_DESC	Description for the spectrum [WIRELESS ONLY]
mad_dwn_t	MAX_AD_DOWN_TIER	Maximum advertised downstream speed available within given area (speed tier)
mad_up_t	MAX_AD_UP_TIER	Maximum advertised upstream speed available within given area (speed tier)
typ_dwn_t	TYPICAL_DOWN_TIER	Typical downstream speed available within given area (speed tier)
typ_up_t	TYPICAL_UP_TIER	Typical upstream speed available within given area (speed tier)
mad_dwn_k	MAX_AD_DOWN_KBPS	Maximum advertised downstream speed available within given area (kbps)
mad_up_k	MAX_AD_UP_KBPS	Maximum advertised upstream speed available within given area (kbps)
typ_dwn_k	TYPICAL_DOWN_KBPS	Typical downstream speed available within given area (kbps)
typ_up_k	TYPICAL_UP_KBPS	Typical upstream speed available within given area (kbps)
subs	SUBSCRIBERS	Total average monthly subscribers for this provider for this technology for this coverage polygon
md_geom	MD_GEOMETRY	Metadata: Comma separated list of source ids from which the polygon extent was produced
md_exists	MD_EXISTS	Metadata: Comma-separated list of source ids used in understanding and editing the provider data for this polygon

NAME	ALIAS	DESCRIPTION
md_who	MD_WHO	Metadata: Name of the editor who last edited this feature at the time in md_when
md_when	MD_WHEN	Metadata: Date/time that this feature was last edited
md_process	MD_PROCESS	Metadata: Comma-separated list of processes used to create and/or modify this layer
stcty_fips	STATE_COUNTY_FIPS	State/County FIPS code
rec_id	RECORD_ID	Compound Key formed from STCTY_FIPS+"|"+Provider_ID+"|"+Trans_Code+"|"+BBCov_Name
st_area	ST_AREA(SHAPE)	Area in square decimal degrees
st_length	ST_LENGTH(SHAPE)	Length in decimal degrees
Provider_Type	Type of Provider	Has Subtype (1:Broadband provider as described in the NOFA,2:Reseller,3:Unknown), default value=1 (New 04/11 Model)

VERIFICATION AND VALIDATION

PROVIDER VALIDATION—PROVIDER PORTAL/PDF MAP REVIEW

Following the collection and aggregation of provider data, the aggregated data is validated by the provider to ensure it is an accurate representation of their coverage area and supporting broadband information.

- This validation is completed through the Provider Portal web application, which is a secure interactive map that displays the provider's coverage areas and allows the provider to validate, submit feedback or request changes.
    - If changes are requested, then the features on the portal are updated and an automatic request is sent to the provider to complete the validation process.
- Providers that did not use the Provider Portal are asked to validate a PDF map displaying their coverage area(s). This is accomplished via e-mail notification.

PROVIDER VERIFICATION—THIRD PARTY SOURCE REVIEW

After the provider has validated its coverage areas, a third-party source comparison and analysis is performed.

- Where anomalies or discrepancies are identified, a "SCAN" point is dropped and descriptive comments are applied to be reviewed later with the provider.
- During the provider review, the map is displayed along with the "SCAN" points and potential refinement is completed based on input from the provider.

The table below shows third-party sources used:

THIRD-PARTY SOURCE NAME	SOURCE TYPE	VERIFICATION TYPE
InfoUSA	Consumer and Business Listings	Community Anchor Institutions; Can also be used for demographic information supporting the State websites.
Pitney Bowes (PBBI)	Exchange Info Plus (Central Office Locations)	Exchange datasets are used to verify the following Transmission Technologies (TT): Asymmetric xDSL (10), Symmetric xDSL (20), Other Copper Wireline (30), and Optical Carrier/Fiber to the End User (50).
Media Prints	Cable Boundaries	Used to verify the following TT:

THIRD-PARTY SOURCE NAME	SOURCE TYPE	VERIFICATION TYPE
		Cable Modem—DOCSIS 3.0 (40) and Cable Modem—Other (41).
American Roamer	Wireless Coverage Patterns (EVDO, GPRS, WISP, HSPA)	Used to verify the following TT: Terrestrial Fixed Wireless—Unlicensed (70), Terrestrial Fixed Wireless—Licensed (71) and Terrestrial Mobile Wireless (80).
ComSearch	Wireless Spectrum Holdings and Tower Data	Used to verify the following TT: Terrestrial Fixed Wireless—Unlicensed (70), Terrestrial Fixed Wireless—Licensed (71) and Terrestrial Mobile Wireless (80).

ASSIGNING CONFIDENCE VALUES

All findings and results from the abovementioned **validation and verification activities**, plus internal peer quality reviews, are captured and tracked in a **Validation table** (see example on the following page) and form the basis of the confidence value assigned for each provider and then each technology.

CONFIDENCE VALUE	DESCRIPTION
0	Coverage area has not been reviewed.
10	Extremely Low: Single Source QC.
20	Very Low: Needs additional validation\verification.
30	Low: Even with validation\verification, coverage still is suspect.
40	Acceptable: Confirm with State prior to shipment.
50	Meets requirements to be included in shipment.
60	Moderate: Meets NTIA/State's standards, representative of Technology Type (TT).
70	High: Accurate representation of coverage based upon TT.
80	Very High: Multiple validation\verification with most third-party sources.
90	Extremely High: Multiple validation\verification sources.
100	Perfect: Multiple validation\verification sources, with complete alignment with sources and ground truth verification activities.

The **Validation table** is maintained as updates or changes occur for each provider, down to technology type, with the overall goal to improve the confidence values and overall map representation. An example of the Validation table is shown below:

Contents | Preview | Metadata

OBJECTID *	BBCOV	CONFIDENCE_CODE	PROVIDER_ID	PEER_QC	PROVIDER_QC	THIRD_PARTY_VERIFICATION	THIRD_PARTY_ID	
1	BBCov_10_Axxis	40	771	11/4/2010	9/27/2010	11/4/2010	3070	Axxis doesn't exist in PitneyBowes exchange data. Geometry and attribution are ok.
2	BBCov_10_BeaverTelCo	80	850	10/18/2010	3/9/2011	6/7/2010	2010	BeaverTelCo tt10 boundary has general shape of overlaying pitneybowes exchange boundary but not a perfect 1:1,030911 confidence raise
3	BBCov_10_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010	Canby Telcom boundary is roughly the shape of two exchanges but not 1:1
4	BBCov_10_CascadeUtil	70	3005	11/4/2010		11/4/2010	3070	CascadeUtil still needs provider validation. This bbcov exists in PitneyBowes exchange boundaries. Areas where they do not correspond s
5	BBCov_10_CenturyLink	70	710	11/4/2010	9/23/2010	11/4/2010	3070	CenturyLink BBCov overlays PitneyBowes exchange boundaries in some places, and not in others. Geometry and attribution represenative c
6	BBCov_10_ColtonTel	80	713	11/4/2010	9/16/2010	11/4/2010	3070	ColtonTel overlays with PitneyBowes Exchange boundary. Where it doesn't a scan pt was dropped. Geometry and attribution are ok.
7	BBCov_10_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070	Covad does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
8	BBCov_10_DataVision	30	767	11/4/2010		11/4/2010	3070	Still needs Provider QC. DataVision does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
9	BBCov_10_EasternOregonTelcom	60	899	11/4/2010	9/20/2010	11/4/2010	3070	Eastern Oregon Telcom does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
10	BBCov_10_Frontier	70	784	11/4/2010	9/16/2010	11/4/2010	3070	Frontier is partially overlaid by PitneyBowes exchange boundaries. Areas of difference have scan pts dropped. geometry and attribution are
11	BBCov_10_Gervais	90	767	10/18/2010	9/22/2010	6/7/2010	2010	Main portion of boundary is general shape of corresponding exchange boundary
12	BBCov_10_Helix	70	726	11/4/2010	9/22/2010	11/4/2010	3070	Helix BBCov resides mostly within PitneyBowes exchange boundary of the same name. Scan Pts dropped where different. Geometry and a
13	BBCov_10_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010	Many BBCov polys roughly align to 3rd party exchange boundaries in areas
14	BBCov_10_McMinnville	60	732	11/5/2010	9/27/2010	11/5/2010	3070	BBCov McMinnville resides wholely within the McMinnville Exchange boundary (in pitneybowes dataset which is attributed as Verizon NW).
15	BBCov_10_Molalla	50	734	10/18/2010	9/8/2010	6/7/2010	2010	Northern part of BBCov roughly aligns to northern part of 3rd party exchange boundary
16	BBCov_10_MonitorCOOP	70	1100	10/18/2010	9/17/2010	6/7/2010	2010	Coverage area larger than overlying exchange boundary but overall shape roughly resembles the exchange boundary
17	BBCov_10_Monroe_Telephone	80	736	10/18/2010	9/20/2010	6/7/2010	2010	3rd party exchange boundary very similar to BBCov
18	BBCov_10_MtAngel	90	707	10/18/2010	3/9/2011	6/7/2010	2010	3rd party exchange boundary very similar to BBCov,030911 provider feedback via portal confirmed geometry and max speed and added typ
19	BBCov_10_Nehalem	80	795	10/18/2010	9/28/2010	6/7/2010	2010	Large portion of BBCov roughly aligns to underlying 3rd party exchange but not all
20	BBCov_10_NorthStateTel	40	738	3/15/2011	3/15/2011	11/5/2010	3070	BBcov resides mostly within the Pitneybowes exchange boundary. Geometry is suspect. Attribution is ok. Provider validated via portal.
21	BBCov_10_OregonTeleCo	20	739	11/5/2010	9/14/2010	11/5/2010	3070	Very generalized bbcov partially overlaying PitneyBowes exchange boundaries. Geometry suspect. Attribution is ok.
22	BBCov_10_People	80	1012	11/5/2010	9/17/2010	11/5/2010	3070	People's BBCov mostly resides within PitneyBowes Exchange boundary of same name. Scan Pts dropped where differ. Geometry and Attrib
23	BBCov_10_PineTelephone	70	757	10/15/2010	3/17/2011	6/9/2010	2010	BBCov area has general shape as underlying exchange boundary here. Coverage areas based off of Census Tracts.,031711 Provider valid
24	BBCov_10_Pioneer	70	740	11/5/2010	9/20/2010	11/5/2010	3070	BBCov Pioneer resides mostly within PitneyBowes exchange boundaries of same name. Scan Pts dropped where differ. Geometry and attri
25	BBCov_10_Qwest	80	1102	11/8/2010	5/7/2010	11/8/2010	3070	BBCov_10_Qwest falls within the extents of PitneyBowes Exchange boundaries, but do not cover 1 for 1. Geometry and attribution are ok.
26	BBCov_10_Rionet	50	807	11/8/2010	9/27/2010	11/8/2010	3070	Rionet (UIDC telecom) doesn't exist in PitneyBowes exchange dataset. Geometry and attribution are ok.
27	BBCov_10_Roome	90	746	10/18/2010	9/10/2010	6/7/2010	2010	3rd party exchange boundary very similar to BBCov
28	BBCov_10_Sandy	60	873	11/8/2010	9/17/2010	11/8/2010	3070	BBCov for city of Sandy does not exist in PitneyBowes exchange dataset. Geometry and attribution are good for TT.
29	BBCov_10_Scio	90	800	10/15/2010	3/17/2011	6/9/2010	2010	3rd party exchange boundary roughly aligns to BBCov in this area,031711 Provider validated coverage confidence high
30	BBCov_10_SCS	60	1030	11/8/2010	9/17/2010	11/8/2010	3070	BBCov for SCS does not exist in PitneyBowes exchange dataset. Geometry and attribution are good for TT.
31	BBCov_10_SCTC	70	803	10/18/2010	9/17/2010	11/10/2010	3070	SCTC TT50 resides within pitneybowes exchange area. Geometry and attribution ok.
32	BBCov_10_StPaulTel	80	750	3/15/2011	3/15/2011	6/7/2010	2010	BBCov roughly aligns to two 3rd party exchange boundaries not perfect 1:1. Provider validated via portal.
33	BBCov_10_TDS	40	752	10/18/2010		6/7/2010	2010	BBCov partially aligns with overlying 3rd party exchange boundary
34	BBCov_10_TransCascade	40	709	11/8/2010	9/21/2010	11/8/2010	3070	BBCov resides in part of PitneyBowes Exchange boundary of the same provider name. BBCov also spills into two other PB exchange areas
35	BBCov_20_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010	Canby Telcom boundary is roughly the shape of two exchanges but not 1:1
36	BBCov_20_ClearCreek	80	712	10/18/2010	9/17/2010	6/7/2010	2010	BBCov area very similar to 3rd party exchange here
37	BBCov_20_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070	Covad does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
38	BBCov_20_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010	Many BBCov polys roughly align to 3rd party exchange boundaries in areas
39	BBCov_20_NewEdge	20	796	11/8/2010		11/8/2010	3070	Still needs Provider Validation. Business Only provider's coverage areas do not exist in PitneyBowes exchange datasets. Geometry and attri
40	BBCov_20_QuantumComm	60	1021	11/8/2010	9/23/2010	11/8/2010	3070	QuantumCom coverage areas do not exist in PitneyBowes Exchange datasets. Geometry and attribution are ok for TT.
41	BBCov_20_Rionet	50	807	11/8/2010	9/27/2010	11/8/2010	3070	Rionet (UIDC telecom) doesn't exist in PitneyBowes exchange dataset. Geometry and attribution are ok.
42	BBCov_30_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010	Canby Telcom boundary is roughly the shape of two exchanges but not 1:1
43	BBCov_30_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070	Covad does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
44	BBCov_30_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010	Many BBCov polys roughly align to 3rd party exchange boundaries in areas
45	BBCov_30_Lightspeed	20	793	11/8/2010		11/8/2010	3070	Still needs Provider Validation. Business Only provider's coverage areas do not exist in PitneyBowes exchange datasets. Geometry and attri
46	BBCov_30_McMinnville	40	732	11/5/2010	9/27/2010	11/5/2010	3070	BBCov is a single record buffered point residing in a Pitneybowes exchange boundary attributed for another municipality and provider. Geom

Record: 1 Show: All Selected Records (of 122) Options

Preview: Table

COMMUNITY ANCHOR INSTITUTION (CAI) DATA

DATA COLLECTION

The CAI data was initially collected from the State to create the baseline inventory. All location information and broadband coverage data supplied also was ingested into the data deliverable. Additional collection of CAI information was done via data mining and/or webscraping to build out the inventory further. For example: Collection of additional CAIs and location information.

The State-agency-provided CAI inventory was comprehensive but the challenge is collecting broadband related data: service provider(s), technology and speed data for each CAI. Availability of the CAI portal has not significantly increased submission of this data. Additional promotion to CAIs to use the CAI portal will be needed to increase this data for subsequent deliverables.

INSTITUTION DATA

Institution data is obtained from a variety of sources and almost always provided in Excel spreadsheet format. The general process for incorporating this data is as follows:

1) If the data is provided in Excel or some similar format:
    a. Clean and standardize the Excel spreadsheet, removing any cell formats, merged cells, etc.
    b. Standardize the address format as defined in the staging CAI database.
    c. If the spreadsheet includes X and Y values, such as latitude and longitude, use the **Add XY Data** tool in ArcMap® to create a spatial data layer.
    d. If there are only addresses, then follow the geocoding steps outlined above to create spatial data points for each of the institutions.
        (i.) Institutions that do not geocode based on the TIGER® 2009 dataset will have to be located manually using Google Maps, Google Earth or some other information source.
2) If the CAI source data is in GIS format, add the Latitude and Longitude fields and use the **Calculate Geometry** tool to populate them, using the WGS 84 coordinate system.
3) Using ArcCatalog®, load the new data into the staging CAI database.
4) This database is ready for the makeDeliverable.py script to process the information into the final State and NTIA deliverables.

COMMUNITY ANCHOR INSTITUTION (CAI) PORTAL UPDATES

A web application has been released to allow for further data collection and validation of anchor institution location information, broadband coverage and speed test data. Information collected from the CAI Portal is then ingested into the overall inventory and will be compared later against the provider coverage areas mapped to locate any potential discrepancies.

PRODUCT EXTRACT

PYTHON SCRIPTS

The following subsections make use of Python scripts. In general, to use a Python script you must have Python installed on your computer. To download the latest version of Python, go to **http://www.python.org/download/** and download the latest stable version. As of August 2010, this was version 2.7. Once this is installed, the general way to run a script is to type the following at a command prompt: C:\Python27\python.exe C:\<location of script>. Many of the scripts provided have environment variables that must be set before they can be run.

The Python code for BroadMap's product extract has been incorporated into a Hudson CI System, which is detailed in the **Process Operation and Monitoring** section of this document. This was a process improvement activity so that all processes can be monitored, controlled and will contain historical tracking on each process.

PRODUCT EXTRACT PROCESS

NOTE:
Specific Python scripts are called out in **red** font in the subsections below.

The MapConnect™ product extract process, makeDeliverable.py, uses the BB_Cov and BROADMAP_POINTS interim datasets to create the following layers according to the current specifications:

- BB_Service_Road_Segment
  - This layer contains all broadband services associated with specific street segments for census 2000 blocks larger in area than two square miles.
- BB_ServiceCensusBlock
  - Contains all broadband services associated with census blocks of no greater than two square miles.
- BB_Service_Wireless
  - This layer contains all wireless services not associated with specific addresses.
- BB_ServiceOverview
  - This layer contains subscriber-weighted nominal speed for each provider's service area at a county level and is meant to act as a summarized view.
- BB_ConnectionPoint_MiddleMile
  - This layer contains middle-mile and backbone interconnection points.
- BB_Service_CAInstitutions
  - Broadband Service at Community Anchor Institutions (CAI).
  - Community Anchor Institutions consist of schools, libraries, medical and healthcare providers, public safety entities, community colleges and other institutions of higher education as well as other community support organizations and entities.

Because of a NTIA model change for the October 2010 data deliverable, an addition to this code was created to support both models in case a comparison is later desired or a request is made to revert to the original model. This script name is bdia2ntia.py and creates the following layers in addition to the layers mentioned above, rolled up to NATL_Broadband_Map.

- BB_ConnectionPoint_LastMile
  - This layer contains last mile infrastructure points, which is populated only if data cannot be provided at a more granular level.
- BB_Service_Address
  - Represents broadband availability for service address points. Address Point availability refers to those individual addresses at which each facilities-based provider of broadband service can provide broadband services of minimal characteristics within 7-10 business days.
- State_Boundary
  - State boundary supporting topological validation of point feature classes.
- NATL_Broadband_Topology
  - Supports basic topology quality checking. Example: No CAIs or Middle Mile points outside of the State boundary.

The following process flow provides a view of how the Core fGDB is extrapolated to the NTIA final deliverable via the makeDeliverable.py script. Following that, the bdia2ntia.py script is run, which limits what is placed in the final layers based on the NTIA modeling standards.

The product scripts and supporting extract were originally created separately per request, in case data model comparisons were to be completed.

PRODUCT STATISTICS

Following the completion of a product extract, the product statistics script (BDIA_ReleaseNotesStats.py) extracts the following information supporting that product deliverable.

- Provider Statistics:
  - Collects all provider information, listing by Provider Name.
  - Provides output of FRN.
  - Counts the number of features supported within the following layers:
    - Census Block;
    - Street Segment;
    - Max Upstream;
    - Wireless Services;
    - Infrastructure Points.
  - These updates were made to support the Data Package required to accompany every NTIA product deliverable.
- Community Anchor Institution (CAI) Statistics:
  - Breaks down CAI to the eight categories:
    - 1: School: K through 12;
    - 2: Library;
    - 3: Medical/Healthcare;
    - 4: Public Safety;
    - 5: University/College;
    - 6: Other Government;
    - 7: Other Community non-government;
    - None: Unknown Category. In cases where this occurs, further investigation is completed prior to product shipment to ensure all CAIs are categorized accurately.
  - Reports out the following counts:

- Total CAIs within that category;
- Total CAIs that contain partial BB coverage. Contains any of the following information for a given CAI: BB Subscriber, Transmission Technology, Speed Down Speed Up;
- Total CAIs that contain full BB coverage. Contains all of the abovementioned BB information for a given CAI.

The output of this script is two CSV files: AnchorInstitutions.csv and Providers.csv. These files then can be inspected to ensure that there are the expected number of CAIs and providers for every release.

QUALITY ASSURANCE

Quality assurance is supported manually and algorithmically on the interim data, BB_Cov file geodatabase and on the final product. For scheduled product releases, a test product extract and subsequent manual and algorithmic QC run is completed along with a release review. The product specifications, project status reports and previous product release notes are used as references throughout this review.

The following parameters are tested using the methodology listed below each:

- Product Deliverable Format:
  - Correct names and format of data deliverables.
    - BDIA_QC_SUITES (please see below for details).
  - Correct Projections/Datum.
    - Manual interaction with product.
  - Metadata Present and Correct.
    - Manual interaction with product.
- Table Structure:
  - All required tables included.
    - BDIA_QC_SUITES.
  - Extraneous tables identified.
    - BDIA_QC_SUITES.
- Field Structure:
  - All fields included.
    - BDIA_QC_SUITES.
  - Extraneous fields identified.
    - BDIA_QC_SUITES.
  - Correct field names, types and widths.
    - BDIA_QC_SUITES.
- Field Domains:
  - Values in all tables are constrained to the specified values specified:
    - This action is accomplished via BDIA_QC_SUITES and manual review of the product;
    - This tends to identify project completeness issues as fields with a null value are identified.
- Geometric Representation:
  - Identify if all layers have the correct geometric representation:
    - Manual review of the BB_ServiceOverview layer;
    - Dependent on NTIA and client requirements.
- Geographic Extent:
  - Product includes the necessary Geography associated with Product?
    - Manual Review—ArcGIS®.
  - Is there extraneous geography included in Product?
    - Manual Review—ArcGIS®.
- Completeness:
  - Products contain the expected amount of data?

- Manual review of product statistics relative to weekly State reports and defined expectations.

- Accuracy:
  - Product meets the stated accuracy requirements for the deliverable?
    - Sampling procedure to manually review source material to resulting product;
    - Provider Validation;
    - Verification using Third-Party Data;
    - Verification against reality, where applicable.
- Data Regression:
  - Any unexplainable data loss or change?
    - This action is accomplished by comparing results within product statistics script (BDIA_ReleaseNotesStats.py) from previous releases, as well as manual review of the product.
- Confidentiality:
  - Any unauthorized confidential information included in the delivery?
    - Review of NDAs and delivery expectations.
- Prior Issues Resolved:
  - Have expected internal issues been resolved?
    - Manual review of data against previous product release notes.
  - Have agreed-upon customer issues been resolved?
    - Manual review of data against previous product release notes, status report and client feedback.
- Delivery Medium:
  - Has the product medium been verified?
    - Manual review.
  - All files present.
    - Manual review of SFTP site to ensure all files are copied correctly, including file/directory size.
  - Correct location.
    - Manual review—confirmation of SFTP link, username and password.

QC SUITE

The BDIA_QC_SUITES consists of four main types of scripts supporting the overall QC process. These scripts are all run in concert and are called from the test_runner script and the test_BDIAProductGDB script.

CONFIGURATION

These scripts establish the configuration for the test_BDIAProductGDB script, which is the core of the QC Suite.

update_test_config
active_config
config_PROCESS01_automated
config_PROCESS01_manual
set_active_config

LIBRARIES

These scripts provide additional functionality that is called from with the test_BDIAProductGDB script.

bb_unittest_fixture
bbcov_structure
BC_XmlWriter
file_folder
search_and_replace
unittst_fixture
validate_BB_DB

validate_BB_GDB
xmlrunner_gui

QC SUITE

This is the core script for performing automated QA/QC on the interim and final data deliverables.
test_BDIAProductGDB

OTHER

These scripts perform other functions detailed below:
test_runner—this is the main script that runs all the other QC scripts and imports all the necessary scripts and libraries.
which_build—this determines the current build and passes information to the configuration scripts.

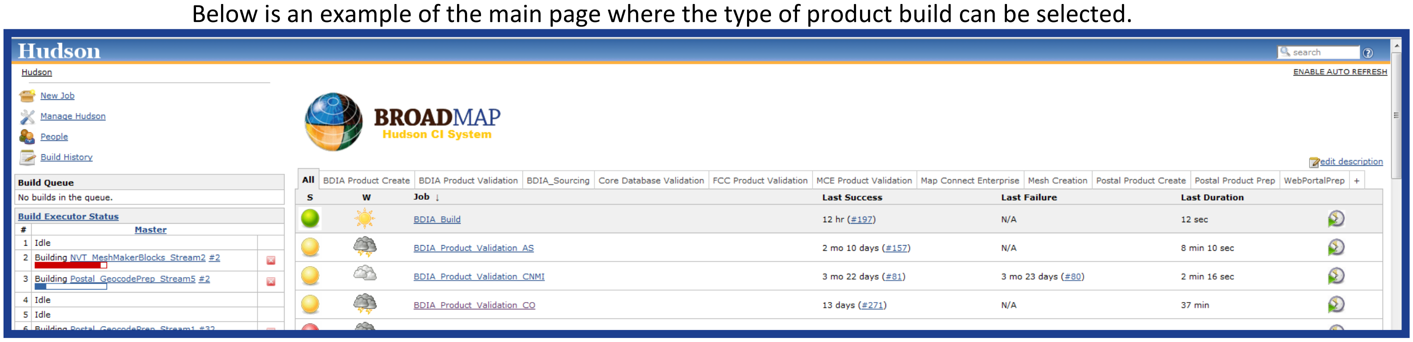
PROCESS OPERATION AND MONITORING

Product Extract, makeDeliverable.py and bdia2ntia.py, is run within BroadMap using a platform called Hudson that has been enhanced to support BDIA product extraction, process monitoring, as well as product validation. The same platform can be planned for implementation for the State, if desired.

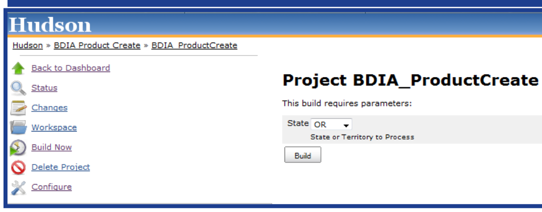
Below are examples of the product create, product validation, product statistics and monitoring processes that are managed within the BroadMap Hudson CI-System. All of the abovementioned Python scripts, with the exception of metadata transactions script, are run via this system.

BDIA PRODUCT CREATE

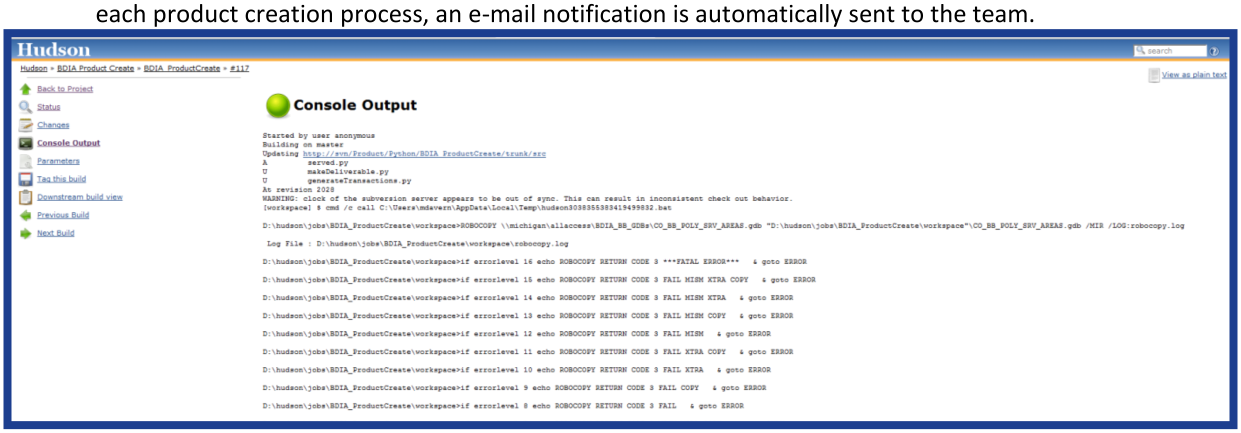
Below is an example of the main page where the type of product build can be selected.



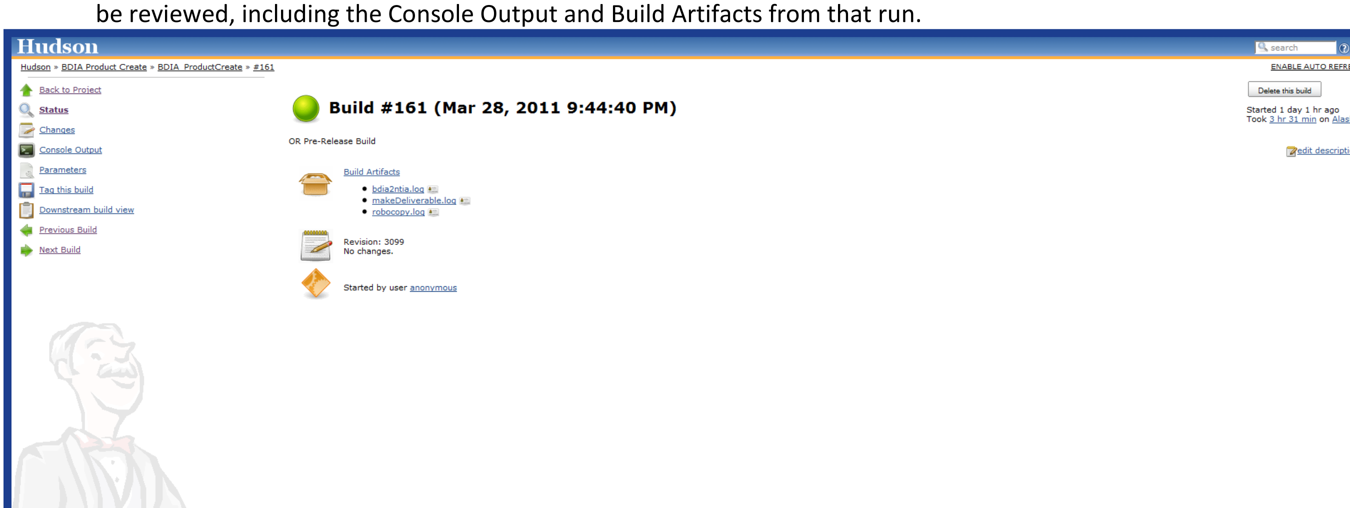
Selecting based on the type of process that will be initiated is shown below:



The Console Output can be reviewed to see the progress of product create. Following the completion of each product creation process, an e-mail notification is automatically sent to the team.



All processes run via the BroadMap Hudson CI-System are stored for historical reporting. Each process can be reviewed, including the Console Output and Build Artifacts from that run.

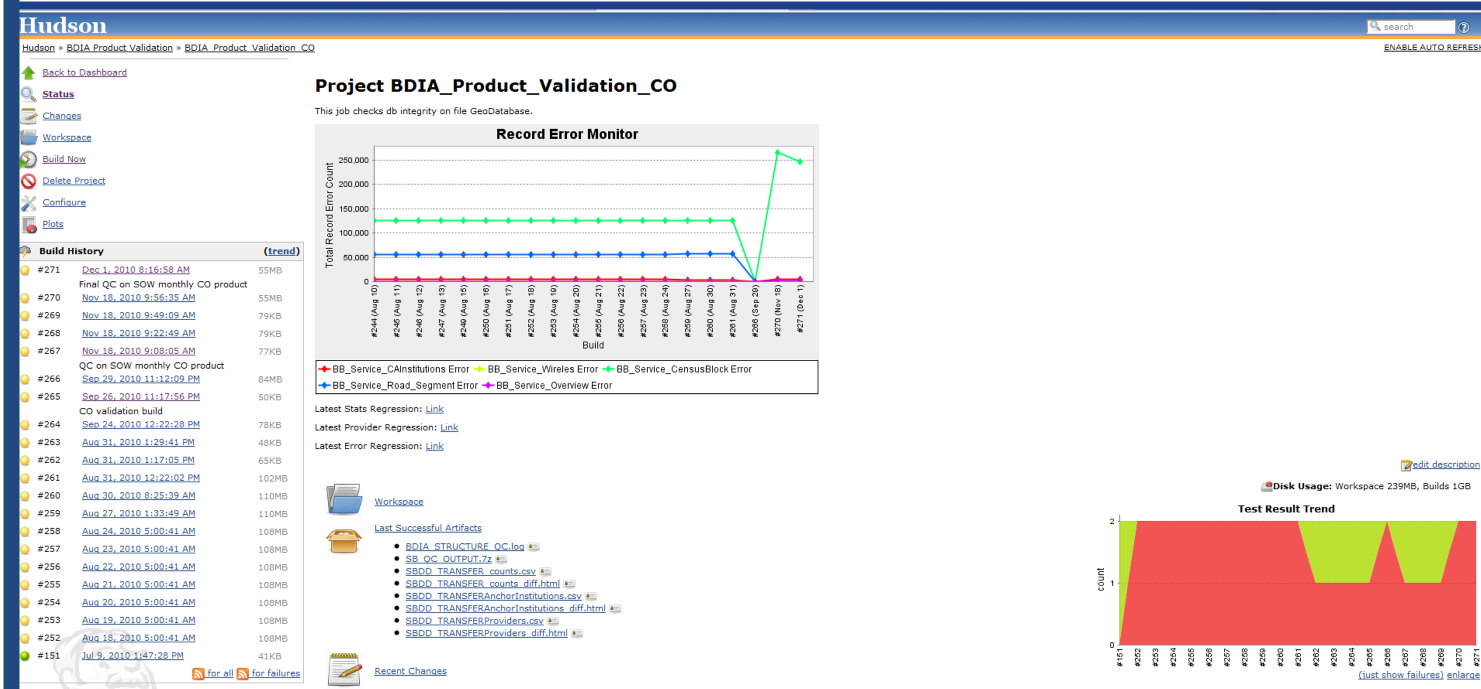


PRODUCT VALIDATION AND STATISTICS

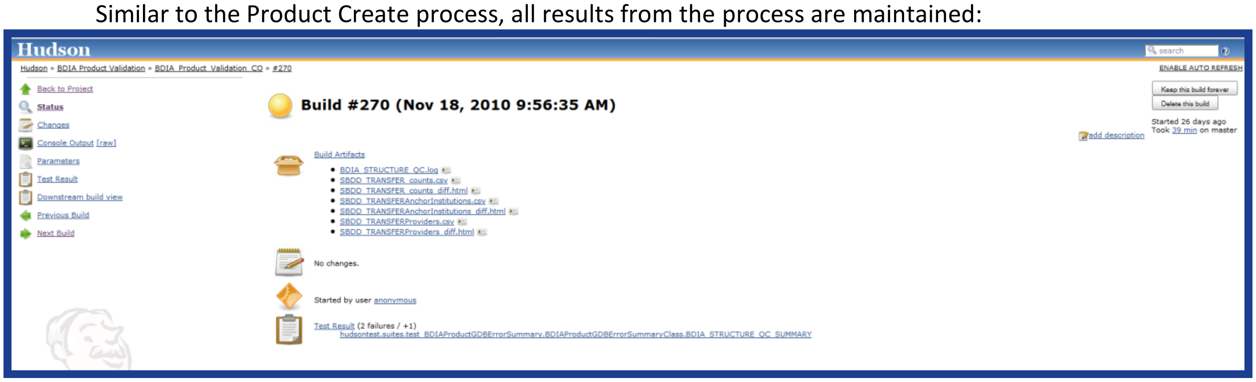
Once the product creation process is complete, Product Validation and Statistics are then initiated. These support the BDIA_ReleaseNotesStats.py script and the BDIA_QC_SUITES scripts detailed above.

All statistics and reports are stored for historical review with the capability to place violation criticality on each quality control check, allowing the identification of errors because of project status/completeness verses project correctness. Example: Typical Speeds populated.

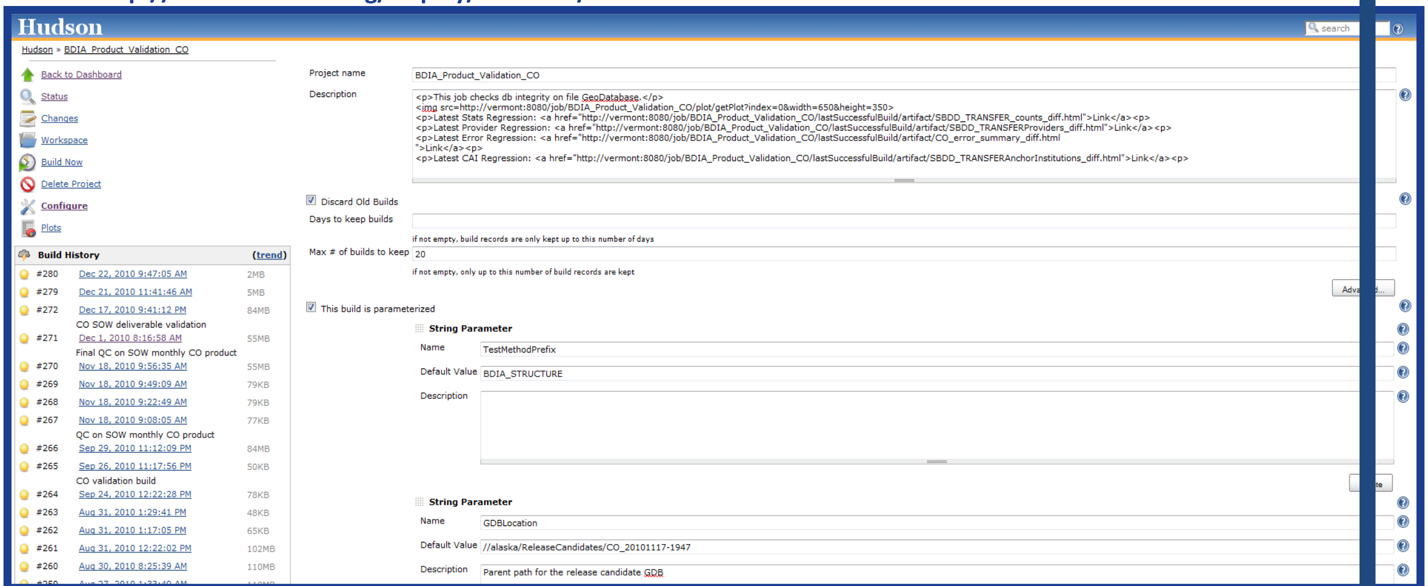
Below is an example of the report provided based on various control points running over a specified period:



Similar to the Product Create process, all results from the process are maintained:



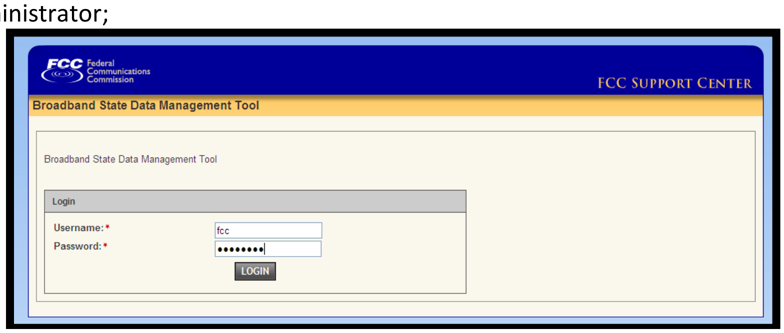
Results are then reviewed manually to ensure no errors reported are critical or in violation of the NTIA data model or project completion statements. Any errors of concern are communicated ahead of product delivery and included within the product release notes. Further detail on the Hudson-CI System environment can be found by navigating to the following link:
http://wiki.hudson-ci.org/display/HUDSON/Meet+Hudson



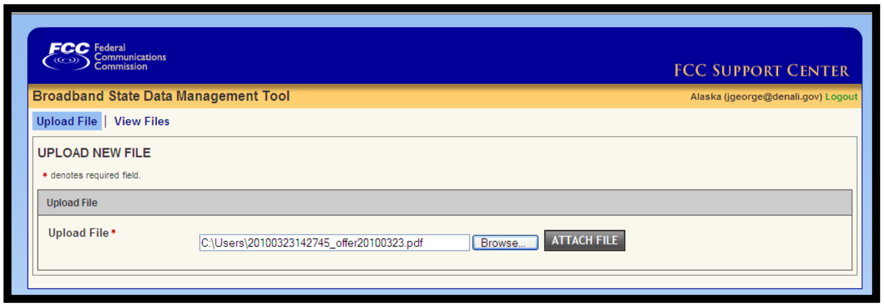
PRODUCT EXTRACT DATA DELIVERY

Product delivery for MapConnect™ Broadband is handled two ways, depending on client requirements:

1) State Submittal:
   a. Data is submitted via SFTP site;
   b. Product Release Notes and QC Test Report accompany the delivery.
2) NTIA Submittal:
   a. Directions for using the NTIA State Broadband Data file submission tool:
      (i.) Go to the following website: **https://esupport.fcc.gov/statedata**;
      (ii.) Enter your **username and password** as provided to you from the NTIA program administrator;



      (iii.) Click in **Upload a file** field;
      (iv.) Browse to local file for submission using the **Browse** button. Select file, then select **ATTACH FILE**. See example below.



(v.) **Logout/Receipt** using the **Logout** button in the top right of the screen;

(vi.) A receipt of submission is e-mailed to username e-mail address.

North Carolina Data Submission
October 2011

Data Collection Methodology

The e-NC Authority

10/1/2011

Table of Contents

Executive Summary

The e-NC Authority

The e-NC Authority, created by the N.C. General Assembly under Session Law 2003-425, is dedicated to growing local-level wealth and creating jobs and educational opportunity through increased broadband deployment. Mandated as the primary Internet policy and planning body for the state, e-NC works with citizens, broadband service providers, local and state government and partners across the state. Its responsibilities include:

- Serving as the Broadband Authority for the state, with a focus on rural and urban-distressed areas;
- Conducting research to help guide the state in economic development decision-making;
- Mapping of broadband infrastructure in North Carolina per the requirements of the National Telecommunications & Information Administration (NTIA);
- Providing Technical Assistance to communities and organizations;
- Responding to citizen inquiries;
- Facilitating local-level programs on technology-based economic development (i.e. the e-NC Business & Technology Telecenters); and
- Serving as a grant-making and monitoring organization.

e-NC finds and advocates for solutions to ensure that all North Carolina citizens and businesses increase broadband adoption and usage and have equal access to affordable, high-speed broadband. e-NC also promotes the benefits of broadband investments around commerce, education, healthcare, agriculture and government services to demonstrate greater economic opportunities. e-NC serves as a resource and manager for various statewide broadband initiatives and accomplishes its work through public-private partnerships, targeted research and direct outreach and education. Currently, the e-NC Authority is implementing a five-year project under the NTIA of the U.S. Department of Commerce.

North Carolina's SBDD Grant

The e-NC Authority (through its fiscal agent, the Rural Economic Development Center), is the recipient of the NTIA's State Broadband Data and Development Grant for North Carolina. The SBDD grant program enables North Carolina to collect comprehensive and accurate state-level broadband availability data and to display a state-level broadband map (http://e-ncbroadband.org/), with these efforts aimed at aiding in the development and maintenance of the national broadband map. The e-NC Authority is currently using provider data for its map, but is also evaluating other data collection methodologies including Web crawling techniques and collecting broadband consumer data at the local level. In addition, e-NC uses radio wave propagation prediction modeling (using GIS) to reflect wireless coverage in North Carolina. We recently turned in a report on the evaluation of various data collection techniques to the NTIA SBDD offices . Initial broadband planning funds for the project were used to conduct the 2010 Citizen Survey on broadband usage in North Carolina and the 2010 e-Strategy Survey of businesses, organizations, and households looking at broadband usage and benefits among industry sectors. In addition to the data collection, validation and display work; and the initial broadband planning surveys, the SBDD funding allows e-NC to undertake the following additional programs: state broadband capacity building, a technical assistance program, a Lifeline Online pilot to improve computer ownership and Internet usage (LITE-UP), and funding to partner with the NC Center for Geographic Information and Analysis on address file improvements for the state, with all these efforts continuing through October 2014.

Spring 2011 Broadband Data Collection and Mapping Process

Data Collection

The official data request letter was sent to all 104 identified providers of broadband service on June 28, 2011, via e-mail and hardcopy mailed letter. Attachments were included explaining the SBDD mapping project effort, the e-NC Authority's role in the endeavor, and all requested parameters for information. Providers were asked to reply to the request on or before July 29, 2011.

Excel and geodatabase templates were shared with providers, along with PDF format instructions summarizing all NTIA requirements and information relevant to each type of provider (fixed wireless, mobile wireless, and wireline). Technical assistance was provided to any organization who requested it.

A secure server hosted by MCNC is configured with an open source, browser-based direct file upload system called eGroupware. Providers were sent a log-in name and password for this upload system once they contacted either Samantha Jackson or Stephanie Jane Edwards to communicate that their data was ready for submission. A confirmation e-mail went to Stephanie Jane once data had been uploaded.

Reminder e-mails were sent to unresponsive providers with usernames and passwords for data upload. An official reminder e-mail was sent out the first week of August to providers of broadband service that were unresponsive to the data request. Phone calls were placed at various times in September to organizations that had not yet responded to the data request or reminders. These phone calls and some background research allowed for e-NC to determine the companies that have gone out of business and those that refused to submit data. One provider which was thought to be out of business was found to still be operational in one McDowell County (AND Wireless and Security, Inc.), and another provider (Cherokee Broadband Enterprises) was identified for the first time. The number of known broadband service providers operating in North Carolina is now at 104.

Integration of Provider Data into NTIA Statewide Geodatabase

For ease of data integration, a front-end Excel format template was offered to all providers, containing notes defining required fields, explanations of which data is required in which formats by which types of providers, and hyperlinks connecting fields to additional tables listing the corresponding NTIA-specified values and codes (for speed tiers, technology types, connection point facility types and capacities, county codes, end user types). A brief description of how census block FIPS codes work was also taken from an internet source and distributed as needed to providers who had questions about how to report this information.

BB Service by Census Block

As requested by the NTIA mapping and planning team, all census block data is included with 2010 census block geometry. Technical assistance was often needed by providers to correctly report served areas by either the 15-digit FIPS codes or in some way by which e-NC staff could derive the appropriate FIPS codes.

BB Service Road Segment

The reporting and mapping of data by street segment presented significant challenges to accurate interpretation of where broadband availability is and is not. This is mainly attributed to the difficulty of standardization among the many data structures by which providers report street segments. Quality of data has improved since some providers have switched to submitting data in shapefile format, and others have been able to start including a Tigerline ID (TLID) field for reference in mapping tabular information. Use of this unique identifier has reduced ambiguity in some tabular datasets and improved data quality upon mapping.

BB Service Address

A few address-level datasets were submitted to e-NC with the latitude/longitude coordinates already included, but most needed to be geocoded. This was done using the NC Master Address file as the primary reference file, significantly increasing the accuracy of matching records. Secondary sources for address records that did not find a match this way included street segment interpolation, ESRI data utilizing the 4-digit ZIP extension, and manual placement/digitizing based on a combination of reference data and online browser maps. Upon completion of geocoding for each provider submitting address data, the address point features were overlain with a 2010 census block layer to add the census block FIPS code attribute, then all address feature points were loaded into the geodatabase feature class. The geocoded shapefiles for each provider are kept with geocode match score and match reference type for every matched address, so the thoroughness of this data type could be tracked and/or improved with more time.

BB Service Wireless

Approximately seven small, fixed wireless providers have been able to share technical information about their transmitting towers, antennae, and frequencies, so that e-NC can produce for them a service coverage shapefile using the contracted services of the University of NC at Greensboro Center for Geographical Information Science (http://cgis.uncg.edu) . An Excel template was developed with all the relevant information that can be filled in by providers with technical assistance in some cases, and the propagation model is field-calibrated to reflect actual ground conditions.

BB Service Overview

Records for overview containing subscriber-weighted nominal speeds of a given provider were generally joined to a template layer of county features, using the option to keep matching records only. Then these matching features and their new attributes were exported as a new shapefile before being loaded into the collective overview feature class. For providers with multiple technology types serving a given county in at least one instance, this information was single-field geocoded using the 5-digit county FIPS code, and then geocoded point features were spatially joined to the county polygon using “within” criteria.

Some detail formatting performed as needed:

- Add state FIPS code and any needed leading zeros onto county code for the new State+County FIPS code. Most providers list just the county code because this was the original NOFA request.
- Change state abbreviation values from “37” to “NC”.

- Change weighted speeds to appropriate units (kbps) and remove unit text.
- Translate to county from weighted speeds reported by RSA/MSA.

BB Service - Critical Anchor Institutions

Only anchor Institutions that could be geolocated were included. Only 17 CAIs were identified that could not be geocoded to a point feature. CAIs were collected by contacting administrative offices of some CAI category types and receiving databases of information, as well as collecting from individual CAI locations for other types using survey emails and follow up phone calls as necessary. There are 5,857 CAI's identified, located, and included in the geodatabase to date.

Census Block data (tabular)

- Fields standardized and transferred into Excel template
- Geocoded to centroids of census blocks using 2010 Census Block layer in WGS1984 projection as reference file for "Address Locator".
- Spatial join of geocoded census block data points to polygon features

Census Block Geometry Conversion (2000 to 2010)

The following providers either are represented based on data submitted in previous data pulls, or submitted new data in census block geometry from 2000, therefore requiring geometry conversion:

- Carolina Mountain Cable
- Cherokee Cablevision
- CoMPAS Cable
- Country Cablevision
- Inteliport
- Lexcom
- North State
- Piedmont TMC
- Skyenet
- Star TMC
- Suddenlink
- Surry TMC
- Tele-Media Corporation
- Windstream Concord Telephone
- Windstream North Carolina

The following steps were carried out in ArcGIS for each provider:

- Select all records in Spring 2011 provider dataset
- Relate FIPS 2000 field in provider data to FIPS 2000 field in statewide crosswalk table
- Relate FIPS 2010 field in statewide crosswalk table to GEOID field in 2010 census block layer.
- Export related/selected 2010 CB records as new layer, and related/selected crosswalk records as a provider-specific dBase table.
- Attribute join on exported Crosswalk subset with Spring 2011 provider data layer based on year 2000 CB number, keeping matching records only. Number of records should stay the same. Export all features as new joined crosswalk DBF.

- Attribute join on new 2010 CB layer with the joined crosswalk DBF (which should now have the relevant provider data) based on 2010 FIPS field, keeping matching records only. Number of records should stay the same.
- Export 2ns join results into new finalized 2010 CB layer with broadband data.
- After adding the new EndUserCat field, this 2010 CB service area layer is loaded into the geodatabase.

Street Data

Some datasets were submitted to e-NC by providers already in shapefile format, and others were reported in various tabular formats (text, Excel, CSV, etc.). Of the tabular datasets, some included a Tigerline ID ("TLID") field along with some or all other fields such as city, state, zip, and census block FIPS.

- For datasets submitted tabular with TLID:
  - Max and Min address ranges were calculated from the FromRight, ToRight, FromLeft, ToLeft format used by most standard street segment reference files and incoming datasets
  - All data formatted into back-end Excel format, including converted speeds if reported at some other granularity.
  - Table geocoded to Tigerline 2010 street segment file using single-field and "TLID" values, with zero offset.
  - Geocoded point features converted to street segment geometry via spatial join using "contains" criteria, keeping matched records only.
- For datasets submitted tabular without TLID:
  - Max and Min address ranges were calculated from the FromRight, ToRight, FromLeft, ToLeft format used by most standard street segment reference files and incoming datasets
  - All data formatted into back-end Excel format, including converted speeds if reported at some other granularity.
  - Table geocoded to Tigerline 2010 street segment file using false midpoint address and either ZIP5 or census block FIPS (whichever available) as address locator zone.
  - Geocoded point features converted to street segment geometry via spatial join using "contains" criteria, keeping matched records only.
- For datasets submitted as shapefiles: VB If/Then statements used to calculate "Max" and "Min" address range attributes required by the NTIA/FCC, converted from the FromRight, ToRight, FromLeft, ToLeft format used by most standard street segment reference files and incoming datasets:
  - **To calculate "Min":**

```
Dim fromRight
Dim toRight
Dim fromLeft
Dim toLeft

fromRight = [FROMRIGHT]
toRight = [TORIGHT]
```

```
fromLeft = [FROMLEFT]
toLeft = [TOLEFT]


Dim minright
If fromRight = 0 And toRight = 0 Then
   minright = 0
ElseIf fromRight = 0 Then
  minright = toRight
ElseIf toRight = 0 Then
  minright = fromRight
Else
  If fromRight < toRight Then
    minright = fromRight
  Else
    minright = toRight
  End If
End If

Dim minleft
If fromLeft = 0 And toLeft = 0 Then
   minleft = 0
ElseIf fromLeft = 0 Then
  minleft = toLeft
ElseIf toLeft = 0 Then
  minleft = fromLeft
Else
  If fromLeft < toLeft Then
    minleft = fromLeft
  Else
    minleft = toLeft
  End If
End If
```

- **To calculate "Max":**

```
Dim fromRight
Dim toRight
Dim fromLeft
Dim toLeft


fromRight = [FROMRIGHT]
toRight = [TORIGHT]
fromLeft = [FROMLEFT]
toLeft = [TOLEFT]


Dim maxright
If fromRight > toRight Then
```

```
  maxright = fromRight
Else
  maxright = toRight
End If

Dim maxleft
If fromLeft > toLeft Then
  maxleft = fromLeft
Else
  maxleft = toLeft
End If

Dim max
If maxleft > maxright Then
  max = CStr(maxleft)
Else
  max = CStr(maxright)
End If
```

Creating last mile and middle mile features

- Formatted numeric fields in Excel as text since the short integer format in the data model for these fields will not accept values from the Excel import's default general format.
- ArcToolbox > Data Management Tools > Layers and Table Views > Create XY Event Layer
- Zoom to Layer, verifying that all points are located inside NC boundaries

Provider-specific notes, functions and corrections performed by e-NC as needed

Access/On Multimedia Inc.

- This is a middle mile only provider
- Provider confirmed no changes since last round so fall data was used

AT&T F11

- Converted subscriber weighted nom speed data from CBSA to county
- Converted max advertised speed data from CBSA to county
- Translated max advertised speeds from KBPS to NTIA codes
- Applied converted speeds to appropriate availability records by county based on FIPS codes, by pasting the CBlock FIPS codes into speed columns and using Find/Replace functions in Excel (ex Find fields with 37001* and Replace with 7). For data by street and CB.
- Copied max advertised speeds into typical speed columns (for which data was not supplied by AT&T)
- Calculated conversion of Left and Right To/From addresses for street segment data to NTIA's required Max/Min values (using "min" and "max" formulas in Excel)
- Checked data by CB for duplicates, 14,399 found and removed.
- Used 2010 TLID field in attribute join to map street segment data.

AT&T Mobility F11

- Merged shapefile features into a single multipart polygon to remove arbitrary grid boundaries.

- Validation: Ran “Eliminate Polygon Part” tool to remove any parts or donut holes less than 0.125 square miles in area.
- Added attributes supplied in Excel spreadsheet.

ATMC

- Added Address field populated with a concatenation formula of component address information.
- Added EndUserCat field and populated with code 5
- Overlay of address points w/CB layer to get FIPS code field
- Created new fields and used Calculate Geometry function in ArcMap to generate Lat and Long attributes

ATMC Wireless

- Clipped shapefile to state boundary
- Eliminated polygon parts less than 0.125 square miles
- Added spectrum attribute

CenturyLink F11

- Reprojected CB and street shapefiles and changed format of some fields for loading
- Ran Delete Identical tool on streets shapefile to remove duplicates based on Tigerline Ref numbers.
- Used If/Then scripts to calculate min and max address fields from left and right max/min ranges in ArcMap field calculator
- Created new fields of compatible type for TransTech and Provider_Type fields

Charter F11

- Projected and formatted attribute fields.
- Streets submitted and mapped in 2010 Tigerline, which has no address range information.

Comporium F11

- Removed duplicate records in Excel during formatting
- Ran address sorter, transferred previously geocoded features into new GDB (with the newer tech and speed attributes) and geocoded new data.

Comcast F11

- Mapped previous CB’s and streets, then new CB’s and Streets submitted this round
- Calculated min/max address ranges for street segment data in Excel
- Geocoded hypothetical midpoint of tabular street segments by address range and spatially joined to street segment features.
- Used Overview data from Fall 2010
- Low quality on streets from previous data pulls (only a 61% match to tiger streets w/CB zone)

Country Cablevision and Carolina Mountain Cable F11

- Converted CB shapefile from Spring 2011 into 2010 geometry
- Duplicated max advertised speeds into typical speed fields via Field Calculator
- Added Provider Type field and populated with code 1

Electronics Service Co of Hamlet

- Customized propagation model for unique antenna setup high up in trees
- Clipped output to state boundary

Electronic Solutions

- Converted coordinates, added negative sign to longitude
- Produced shapefile from data supplied in Tab D. Converted raw speeds to NTIA codes.
- Put weighted speeds into correct units.

Epproach

- Copied Census blocks from Fall 2010 geodatabase
- Merged census block polygons
- Loaded into geodatabase and populated Unlicensed for spectrum field.

Frontier F11

- Started with Spring 2010 Verizon data with legal agreement from both Verizon and Frontier.
- Applied Max Advertised speeds from MSA to CB and Street Segment level based on FIPS codes and relevant counties.
- Missing speed data: duplicated Max speeds for Typical which were not submitted. Speeds were not reported for all CB's and streets reported, and for these the lowest (except for 1 CB) values from Max speed data, NTIA code 5 for down and 3 for up, were applied.
- Middle Mile: assumed "Owned" for Ownership field to substitute for missing information, as instructed by federal program office.
- Created XY Event layer for new last mile points submitted. Learned from follow up with provider that data from previous round still applies, and that 15,000 foot service circle applies to new last mile points for availability.
- Selected 2010 road segments that intersect eitherthe new 15,000 ft radius buffers, the previously reported census blocks, or the previously reported streets. Exported as single streets shapefile for fall.
- Manually deleted stray street segments which mapped far outside of counties reported as served.
- Selected and exported census blocks <2mi^2 which contained a served street segment.
- Erased street segments from new layer which overlap 2010 census blocks <2mi^2.
- Manually attributed provider/tech/speed data (uniform across service area)
- Loaded last mile points from current and previous data pulls. Middle mile points from previous data pull.

Greenlight (City of Wilson) F11

- Re-projected shapefiles into WGS84.
- Added FRN2 field with leading zeroes, Lat, Long, EndUserCat (populated with code 5), and Provider type field (populated with code 1) to address attributes, and re-concatenated "Address" field.
- Removed duplicate addresses using Delete Identical tool in ArcToolbox, checking in Address, TransTech, MaxAdDown and MaxAdUp fields.
- Populated missing Typical speed fields with Maximum Advertised fields.
- Added/populated FRN w/leading zeroes, lat and long fields for middle and last mile

- Attribute join to county template feature class for Overview

Hughes Network Systems F11
- Added leading zeros and concatenated tabular census state, county, tract, and block FIPS component fields.
- Geocode and spatial join on year 2000 census block list. Merge on all census block features into a single polygon. Manual attribution from email and website contents.

Interstar
- Mapped subscriber addresses supplied by the provider, then used the point locations to derive a Minimum Bounding Polygon (Convex Hull) representing available wireless coverage.
- One-to-one spatial join associating provider attributes and speeds (max for served area) with minimum bounding polygon.
- Added spectrum field and populated with code 6.

Level 3
- 11 duplicate address records removed, 209 unique records remaining.

Mediacast F11
- Max Advertised speed values duplicated to populate typical speed fields.

Mediacom F11
- Corrected fields in MidMile (provider name typo, ownership, positive longitude value)
- Removed duplicate address records from data in Excel
- Concatenated street address and other full address components
- Used end user field in supplied data translating "RES" as EndUserCat code 1, and "COM" as EndUserCat code 3 (though size of the business cannot be determined).
- Manual cleanup of some address field values
- Duplicated max advertised speed values for typical speed fields
- Run script to sort out/update previously geocoded addresses and prepare new addresses for processing.

MI-Connection F11
- Deleted 8,071 duplicate records (using address, transtech, and all speed fields)
- Populated unmatched/ungeocoded addresses with placeholder values (-9999)
- Re-concatenated Address field for cleaner, consistent contents

Morris F11
- Use of same address list as Spring 2011, confirmed that these include both current and potential broadband customer locations.
- Learned that speeds for fiber records had been reported by Mbps and converted these to NTIA codes to match other records.
- Spatial join with 2010 census blocks for FIPS field.

North State
- Emailed about missing FIPS digit and inserted (leading zero for tracts) upon their response.

- Speeds were reported as Typical Up/Down only. Substituted these values into Max Ad Up/Down as well.
- Duplicate CB records were given to us for each service tier. Merged into CB shapefile after geocoding by:
  - Splitting into separate shapefiles by tech type (10, 30, and 50)
  - One-to-one spatial join field merge rule taking the maximum value from duplicates' speed fields.
- Middle Mile, Last Mile: Added negative sign to longitude values
- Last Mile point with longitude -70.97528 fell out of state boundaries and was changed to -79.97528 based on locations of all the other last mile locations.

Sprint Nextel F11

- Validation: Ran "Eliminate Polygon Part" tool to remove any parts or donut holes less than 0.125 square miles in area.

Starvision F11

- Parsed tabular address-level data in Excel.
- XY event layer created with address-level data that included coordinates.
- Corrected typo on one point that appeared outside of service area, moved point and applied new census block FIPS code.

Surry TMC and Piedmont TMC

- Contacted for clarification and formatted mislabeled "street" information into address tab
- Removed 7 duplicates from address data in Excel

Skybest and Skyline F11

- Downloaded and created missing .prj file for shapefile exports from provider, based on follow up determining an NAD 83 North Carolina FIPS 3200 ft projection.
- Converted polylines to polygon for each DSL and fiber-to-the-home technology layers.
- Reprojected into WGS 1984
- Selected Tigerline 2010 streets by location inside newly created polygons
- Attributed for TransTech then merged into street layers by provider
- Created fields and attributed manually from contents of provider-supplied Word documents.
- Used VB script in Field Calculator to derive max/min address range information

Sky Catcher

- Wireless Propagation study.
- Created XY Event Layer to map Middle Mile information, deleted duplicate records. Remaining records loaded into geodatabase.

Suddenlink F11

- Deleted 203 census block records and 332 address records that had blank technology/speed info, after confirming with the provider these records are not relevant to broadband.
- Removed 410 duplicates in the address field after concatenating without apartment numbers.
- Mapped census blocks then converted to 2010 census block geometry/attributes.
- Manually deleted 2 census blocks that mapped well outside the reported service area.

TDS Telecom

- 713 out of 741 matches for addresses submitted found in old data. Remaining records geocoded.

Tele-media

- Provider type of 1 assumed and populated.
- Checked for duplicates CB's in Excel, none found

Time Warner Cable

- CB and Streets:
  - Padded FRN w/two zeroes
  - Reprojected into WGS 1984
  - Added Provider Type field and coded as a "1"
  - Input Max Advertised speeds as Typical Speeds as well, since they were not provided.
- Streets: created "AddyMax" and "AddyMin" fields and used If/Then statement to calculate values from LFrom, LTo, RFrom, and RTo fields

T-Mobile F11

- Reprojected shapefiles into WGS 1984.
- Added field to categorize by technology type/T-mobile service tier (3G, 4G).
- Attributed manually from information sent in a text file from T-Mobile.
- Executed spatial Union between coverage of higher speed and the broader 3G coverage, then extracted (Data Export selected features) resulting 3G only features to distinguish max speeds here versus where higher speeds are also available. Merged into single shapefile
- Eliminate Polygon part tool to remove features <0.125 square mile.

Tri-County

- Concatenated address information into single Address field in BackEnd template spreadsheet.
- Duplicates removed by technology type (17 dsl, 3 wireless)
- Lat/longs from provider with address data, so mapped using Create XY Event Layer in ArcToolbox
- Sorted, selected, and exported by TransTech types 70 and 10, then one-to-one overlay of each shapefile with CB layer. Maximum merge rule used for speed information.
- For Tech Type 10: Selected and exported resulting aggregated CB data for CB's <2 mi. These were loaded into the geodatabase with associated broadband data.
- For Tech Type 70: created copy of resulting CB's <2 shapefile and merged all features into one multi-part polygon. This was loaded into the wireless feature class and manually assigned "Unlicensed" spectrum value.
- Address feature layer was clipped using polygons created from merged CB's OVER 2 miles, and those in the clip result were loaded into the geodatabase with associated broadband data.

Verizon Wireless

- Compared submitted shapefile with previously submitted shapefile, differences confirmed.

Windstream (Windstream North Carolina, Windstream Concord Telephone, and Lexcom)

- Sorted 2 Access tables by "DSL" field and deleted all records without a "Y"
- Sorted 2 Access tables by census block size field, dividing up data by CB and streets

- Copy pasted all relevant fields into Excel Template column by column, including number listed indicating company name and MSA/RSA name pasted into Max Advertised Download Speed field.
- Used Find/Replace to populate appropriate Provider, DBA Names and FRN's (sent in emails upon request) and Up/Down Max Advertised Speed info based on contents of cells w/direct relationship to this information.
- Recalculated left/right, to/from street segment address ranges to max and min
- Created false address using the integer midpoint of max and min concatenated with street name provided, then geocoded these "addresses" using Tigerline 2009 overlain with CB 2000 to use as Zone
- Split Windstream NC and Windstream CT geocode results up into two tables, then one-to-one keep common spatial join w/Tigerline 2009 features using "contains" criteria.

Yadtel F11

- Corrected middle mile capacity code after checking with the provider.

Post-processing Functions for Final Integration

Census Block

After Census Block data was loaded into the transfer geodatabase feature class, FIPS code fields were calculated using commands in the Field Calculator and contents of the FullFIPSID field. The following calculation formulas were used:

STATE FIPS = Left ([FULLFIPSID],2)
COUNTYFIPS = Mid([FULLFIPSID],3,3)
TRACT = Mid([FULLFIPSID],6,6)
BLOCKID = Right ([FULLFIPSID],4)

- 1019 duplicate records (with same value for Provider Name, DBA Name, FRN, TransTech, and FullFIPS ID) were removed using the ArcToolbox Delete Duplicates tool. Identified by provider using the ArcToolbox frequency tool, the following number of duplicates were removed:

    - CenturyLink (1010)
    - Covad Communications (1)
    - Ellerbe TMC (3)
    - Time Warner Cable (1)
    - PTC Communications (1)
    - TriCounty Telecom (3)

Address Data

- Exported features into a shapefile, conducted one-to-one, keep all spatial join with CB 2010 using "Is_Within" criteria to produce the associated 15-digit FIPS Code. These features were then reloaded into a clean version of the Address feature class.
- Parsing of 317 records that had null value for building number or street name or city.
- Reverse selection within state boundary used to then export (for record-keeping) and deletion of addresses outside North Carolina.

- Excluded 23 records (from @Communications) that did not meet broadband speed threshold values.
- Sorted out, selected, and field calculated missing End User Category values from "ZZ" default value to "5" for Other/Cannot Determine.
- Calculated geometry for missing Lat/long, for unmatched addresses changed to -9999.

Wireless

- Duplication of multipart coverage polygons to reflect multiple spectrum ranges used, per NTIA/FCC instruction.

Overview

- Field Calculated "Geographic Unit Type" field to CO, and "StateAbbr" field to NC.
- Field Calculated missing Maximum Advertised Up and Down speed fields to "ZZ" "default" values.
- Deleted records of information for wireless technology types.
- Verified that all FRN's were either 9999 or 10 digits with leading zeroes.

Last Mile

- Field Calculated "Ownership" field to -9999, as we do not collect this field. Calculated "StateAbbr" field to NC. Then went back and calculated all "Ownership" field values to "0" for owned since the data model script does not accept the default values we were instructed to use.

Middle Mile

- Spatial join with census block layer to derive the 15-digit FIPS code, then reload features into middle mile feature class including the new values for populating the "FullFIPSID" field.
- Replaced Null Elevation values with -9999 "default" value using Field Calculator.
- Populated State Abbreviation column with "NC".

CAI

- Parsed address information for address fields
- Deleted "DMV Tag Office" in "Charlotte, NC" due to absence of street address information. Was geocoded incorrectly.
- Deleted 526 records for which survey respondents report that they do subscribe to broadband but did not give speed information accepted by the NTIA's script.

Verification Implemented Prior to Fall Data Submission

Data verification methods implemented by e-NC in time for submission at the federal level followed generally along the lines of quality control. Methods most often used are outlined below. Time constraints on existing staff did not allow for the execution of some less basic verification approaches that are in the planning/setup stages, but more substantial verification involving multiple data sources are in development.

Standardizing

The files from datasets received from each provider, except for those few submitted in shapefile format, were manually transferred to a back end Excel-format template with field headers, to create a single-file, standardized field structure for each provider's data that could be used for quick reference and map feature creation. This step also helped staff to ensure that all required components were either present or requested in follow up to the provider, and that the components were reported in the correct format.

Lat/long coordinates

Some information was submitted to e-NC with lat/long coordinates included for the location of point features. This location information was checked during the mapping process, and values were corrected if the provider had made mistakes such as reversing the latitude with the longitude, or forgetting to include the negative sign for the longitude value. In addition, e-NC followed up with providers on point features that showed up in the map outside the state and/or outside the provider's reasonably expected service area. Point features that mapped outside the state after follow up with providers, including those that mapped to zero degrees latitude and longitude due to an unknown location, were deleted from the geodatabase for submission at the federal level. For fixed wireless data generated by propagation model from antenna specs, the latitude/longitude coordinates of the antenna locations reported by the provider to e-NC were verified by e-NC's university GIS research contractor using high-resolution orthoimagery.

Multiple FRNs

In several instances, providers reported multiple FRN's that increased in numerical increments of one for each record of data, and this was found to be a simple error when the providers were trying to paste their organization information down the rows applying to a list of broadband data records. This was checked for and corrected after confirming that the lowest/first reported FRN was the correct one.

Correct technology type codes

Knowledge from our technical staff and online research was sometimes used to supplement data that e-NC had relevant to a provider that was unresponsive or otherwise did not supply this specific piece of the information. For example, a provider may have gaps in their transmission technology field and these were filled in when technical staff could confirm that the provider operates with only a single technology type. Or the staff may know which technology type is used by a provider who simply left this field blank on all records.

Subscriber-weighted nominal speeds

Weighted nominal speed values were checked, and staff followed up with the provider if all values were the same for multiple counties, as this could result from either a single speed tier for a given transmission technology across counties, or in some cases providers were not following the formula provided and had manually entered the same value regardless of differences in subscriber numbers. When these cases were discovered, technical assistance was offered and a new subscriber-weighted nominal speed dataset created to reflect variation between counties.

Wireless model fieldwork

For fixed wireless provider data that was generated as coverage area output from models based on technology and environmental factors, the data was verified by "ground-truthing" with measurements of signal strengths at sample locations within a provider's service area, observation of the influential ground conditions in each location, and comparison to the expected signal strengths at the same locations in the model. Some calibration of the model was then performed so that the resulting polygons could more accurately reflect what would be found in real life.

Check Geometry

After compiling all datasets into the geodatabase feature classes, the check geometry process in Arc Toolbox's Data Management section was used on each feature class to identify and repair any geometry errors in the features.

Comparisons with Citizen-Sourced Data

The e-NC Authority has recently constructed a mapped layer of input from citizens who report having no access to broadband at their location, from any broadband provider. The compiled layer is collected from local citizen advocates, citizen input on e-NC's website feedback form, and locally conducted surveys. Comparison of provider-sourced data with this source of information has allowed for targeted follow up with providers in order to promote access to broadband for these citizens, as well as to begin refinement of our statewide broadband data. Further data collection from citizen input and comparative analysis approaches will be described in spring 2012.

Nebraska Public Service Commission
Broadband Methodology Paper

October 1, 2011

1.0 Provider Outreach

1.1 Mapping Participants

Apex and the Nebraska Public Service Commission (NPSC) began the mapping project by collecting contact information for providers listed on the FCC's 477 data base and from Nebraska certificated and rural local exchange carriers, communications providers (internet service providers, cellular, fixed, and mobile wireless) that had registered with the NPSC and other potential providers thought to be in the State of Nebraska. The total number of potential internet service providers (ISPs) on the original combined list was 283. Using various research methods (telephone calls, web searches, crowd source) 159 names were identified as either a subsidiary of an ISP already on the list or did not provide internet access service at that time.

Non-disclosure agreements (NDAs) were sent to 124 potential ISPs. In reviewing the NDA information some ISPs determined that they did not meet the broadband speed qualification standard by the National Telecommunication and Information Administration (NTIA) or did not return the NDA. Two ISPs refused to participate in the mapping program. The NE_DataPackage_2011_10_01.xls file in the NE_SBDD_2011_10_01 data submittal provides a current list of ISPs and their status. The NPSC staff and Apex continue to be engaged in ongoing outreach activities to encouraging ISPs to participate and identify new ISPs.

1.2 Non-disclosure Agreement (NDA) Process

The NDA process was completed for most providers during the first quarter of 2010. Prior to that time, Apex developed a standard NDA to be used in this project. Broadband providers were made aware of the NDA through a series of emails and reminder emails, workshops and individual calls to contact persons. Most providers used the standard NDA. However, a few of the providers requested minor changes in the standard NDA. Those changes were accepted whenever possible. In a limited number of instances, several iterations of changes were negotiated. Providers and Apex were able to agree on the final NDA.

NDAs will be executed with new ISPs as they are identified.

2.0 Data Collection

2.1 Data Input

2.1.1 First and Second Round

In the first round a data input template in an Excel spreadsheet format was developed by Apex and given to ISPs for use in the data submission. The template was based on the appendix to the NTIA Notice of Funds Available (NOFA) as amended by the NOFA clarification. The template included the following worksheets associated with the State Broadband Data and Development (SBDD) Grant Program Data transfer deliverable:

a. BB_Service_Address
b. BB_ConnectionPoint_MiddleMile
c. BB_Service_CensusBlock
d. BB_Service_RoadSegment
e. BB_Service_Wireless
f. BB_Service_Wireless_Antenna
g. BB_ConnectionPoint_LastMile
h. BB_Service_Overview
i. BB_Service_CAInstitutions

The wireless worksheet included information requested by the NOFA and information required to generate the propagation patterns for wireless service areas.

In the first round data collection, Apex experienced numerous occasions where Information Service Provider (ISPs) submitted data that was incorrect or insufficient.

In the second round the NPSC, selected ISPs based on geographic coverage and willingness to work with the NPSC to improve the data collection process.

These efforts included on-site meetings with the staff of the ISPs to explain in detail the overall mapping process, sharing of the specific data requirements of the NOFA, examining the results of the first round of data collection, and identifying issues that contributed to difficulties in data collection, submission, and presentation.

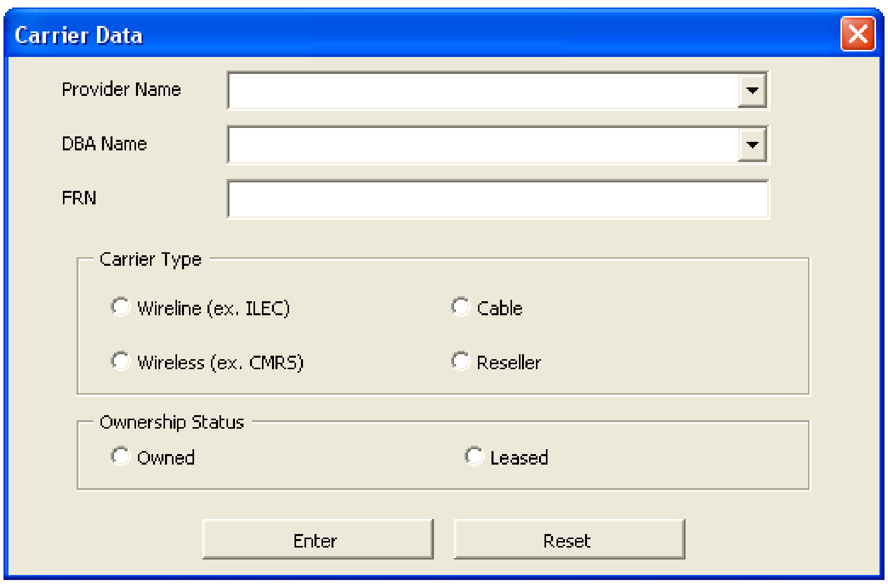
2.1.2 Third Round

After the one-on-one meetings with the selected ISPs in Round 2, the NPSC perceived a need for a more simplified, user-friendly, and standardized method for ISPs to provide the required data in the allowed Microsoft Excel format. Consequently, the NPSC began development of a sophisticated, user friendly, method to allow ISPs the ability to provide broadband data in a standardized, validated format. The DIM was implemented for the third round of data collection.

The DIM provides a uniform method of data entry; minimize the repetitive entry of company specific data, while performing real-time validation of submitted data. The DIM is a robust mechanism, developed in Microsoft Excel, on a Windows platform, with all supporting modules residing in a Visual Basic environment.

The DIM provides for three operations; manual record input, with field verification, import of an entire dataset, with field verification and error logging, and export of a verified dataset to be submitted to the NPSC.

To facilitate these operations, DIM users are guided through an interactive menu environment. Initial menus allow for entry of Provider Name and DBA Name unique pairs based on a dropdown list of predefined entities. The Federal Registration Number (FRN) associated with that unique pair is then populated as a function of the user's entries.[1] Finally, in order to enter the record input stage, an ISP must select the modality and ownership status of service for which broadband data is being provided.



Specific data requirements, also as a function of the user's selections, are then dynamically displayed and made available for entry. The data entry structure is demonstrated below.

<u>Wireline / Cable Carriers</u>

<u>Alternative I</u>

Required Tabs

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[1] The NPSC requires all ISPs have an FCC Federal Registration Number (FRN) to submit data, ensuring all data and DBAs are appropriately assigned. The DIM allows the NPSC to manage this requirement as, absent the existence of a valid FRN, an ISP is unable to enter the data entry portion of the DIM. The NPSC enacted this requirement to ensure knowledge of any new ISP entering the Nebraska market, prior to its providing broadband data.

BB_SERVICE_ADDRESS
BB_SERVICE_OVERVIEW
BB_CONNECTIONPOINT _MIDDLEMILE

Optional Tabs

BB_CONNECTIONPOINT_LASTMILE
BB_SERVICE_CAINSTITUTION

Alternative II

Required Tabs

BB_SERVICE_CENSUSBLOCK
BB_SERVICE_ROADSEGMENT
BB_SERVICE_OVERVIEW
BB_CONNECTIONPOINT _MIDDLEMILE

Optional Tabs

BB_CONNECTIONPOINT_LASTMILE
BB_SERVICE_CAINSTITUTION

Wireless Carriers

Required

BB_SERVICE_WIRELESS
BB_SERVICE_OVERVIEW
BB_CONNECTIONPOINT _MIDDLEMILE

Verification Required

BB_WIRELESS_ANTENNA

Optional

BB_CONNECTIONPOINT_LASTMILE
BB_SERVICE_CAINSTITUTION

For each record in a worksheet, key fields are required to initiate and continue the data entry process. Each field is validated upon entry to ensure consistency and compliance with NTIA data model requirements.[2] Finally, once entry is complete, the ISP utilizes the DIM's export function and provides said results for submittal to the NPSC.

The data entry requirements inherent to the DIM's underlying validation result in a more uniform dataset for mapping purposes, ensuring a more accurate mapping process and effective mapping product. The project mapping vendor, California State University – Chico, found the use of the DIM in the third round of data collection created efficiencies not experienced in earlier rounds.

[2] To further facilitate the process, each data tab is color coded to indicate those datasets which are mandatory versus voluntary, as well as available help for each field.

The DMI's dynamic, forward-thinking, design gives the NPSC a priceless tool to utilize in its endeavors as it strives to provide an accurate picture of the landscape today, while maintaining focus in an ever-changing environment, on the visions of tomorrow.

2.1.3 Fourth Round

Based upon feedback from the ISPs and the fact that the project mapping vendor, California State University – Chico, found the use of the DIM in the third round of data collection had created efficiencies not experienced in earlier rounds, the DIM was upgraded for Round Four to implement the changes in data fields required by the NTIA.

When compared with previous rounds the Round 4 DIM reduced the amount of data that was being returned to ISPs and allowed the NPSC to provide a longer data submission window to the ISPs. Additional improvements to the DIM are being considered for future rounds of data collection.

2.2 Engage ISP Participants

2.2.1 Workshop

NPSC and Apex conducted a workshop prior to Round 3 data collection to explain how to use the DIM. This workshop was conducted in Lincoln, Nebraska, on October 7, 2010. ISPs that could not attend were able to participate via web based Live Meeting©

At the workshop NPSC discussed the data collection and mapping issues faced during the first two data submissions to the NTIA, the lessons learned, plans for the Third Round Data submission and how to use the data submission and review tools. Participants were provided a CD containing the DIM for use in collecting and submitting the next round of data to the Commission and the ESRI ArcReader tool for reviewing their data after processing and before submittal to the NTIA.

No additional workshops were conducted during Round 4 since there had not been any major changes in the method of data collection and the use of SharePoint for ISPs to submit data.

2.2.2 Teleconferences

The NPSC staff and Apex continued to provide "help-desk" service to the broadband providers through teleconferences. During the calls, the NSPC staff and Apex gave in depth guidance to provider questions regarding the DIM, alternative data submission templates and other inquiries from the providers regarding the Nebraska and NTIA projects. In each of these sessions the ISP was walked through the process of loading data into the DIM and submitting the data to Apex using the SharePoint Portal.

2.3 SharePoint Portal for Data and Map

Apex uses a SharePoint portal to collect data and distribute information to broadband providers. General information and announcements are available to all participating providers. In addition, each provider is assigned a unique password protected folder. The provider submits confidential data into the folder. Apex gathers the submitted data from the folders to begin the data processing procedures.

2.4 Data Scrub using DataSlave

During Round 3 data submission the NTIA SBDD data model requirements and python script (SBDD_CheckSubmission.py Version 1.0) checks were implemented in DataSlave. The Python source code was examined and reverse engineered into the DataSlave. ISP data submission in the DIM format was processed in DataSlave and fall outs were addressed with the individual providers.

With the improvements in the Round 4 DIM the DataSlave used in Round 3 was not needed but remains a tool available for future use if needed.

3.0 Community Anchor Institutions

3.1 Community Anchor Institutions (CAI)

The method used to collect data consisted of the NPSC sending emails and making telephone calls to specific groups that represent Community Anchor Institutions (CAI's) in Nebraska such as:

- Chief Information Officer for Nebraska
- Nebraska Hospital Association
- Nebraska Office of Rural Health
- Nebraska Library Commission
- Nebraska Information Technology Commission
- Catholic Health Initiatives and Network Nebraska

These entities provided information on the locations and contact information for hospitals, county health departments, libraries and schools including post-secondary institutions. Network Nebraska is tasked with implementing legislation designed to migrate the past distance learning environment to an IP based system which includes scheduling software. The NPSC is represented on the Network Nebraska steering committee known as the Collaborative Aggregation Partnership (CAP) and significant information on broadband service provided to schools was obtained from Network Nebraska data. ISP's have also provided CAI broadband information.

The primary focus of the NPSC on CAI data during Round 4 was the identification and collection of school and Library ID's. Programmatic efforts resulted in locating the ID numbers for 1,259 K-12 and secondary education schools and Library's. Manual methods will be used to locate the ID numbers for the remaining 481 K-12 and secondary education schools and Library's.

The collection of CAI broadband information requires extensive time and effort to send initial emails, follow-up emails and place telephone calls. The following analysis is a summary of the classification of CAI's contained in our data set:

Nebraska Round 3 CAI Data Analysis	
1 - School - K through 12	1,487
2 - Library	91
3 - Medical/healthcare	147
4 - Public safety	129
5 - University, college, other post-secondary	162
6 - Other community support - government	348
7 - Other community support - nongovernmental	134
TOTAL	**2,498**

4.0 Data Validation

Four validation techniques were developed and implemented for Round 3 data. First, a direct in-person survey was conducted by Edison Research (Appendix B). Second, Apex developed ProField Drive application to test the wireless signal coverage of major wireless broadband providers. Third, Apex conducted phone and mail survey of Nebraska residential customers. Finally Apex developed an online speed test, however as discussed below, this test was discontinued.

Validation Methods	Wireline	Wireless
ProField - Field Survey	x	x
Drive Test		x
Phone and Mail Survey	x	x
Online Speed Test	x	x

4.1 Edison's Sample Methodology Scope

The sample methodology for the Nebraska broadband study conforms to principles of probability sampling. That is, each census block has a known, and measurable, probability of being selected. Likewise, each household within a census block has a known selection probability. The population consists of all households in Nebraska. The sample frame is a list of all census blocks with households (as reported by the 2000 census) in Nebraska. For additional information on the sample methodology and survey refer to Appendix B.

Stratum	Sample Census Block Allocation	Percent of Households
1 – Douglas County	75	27.3%
2 – Cass, Lancaster, Sarpy counties	37	22.8%
3 – Medium Rural/Urban Area (17 counties)	97	24.7%
4 – Rural West (53 counties)	77	13.7%
5 – Rural East (18 counties)	57	11.1%
6 – Thurston County (Indian Reservation)	7	0.3%

The in-person survey was conducted in 597 Nebraska census blocks. The survey validated ISPs' supplied information that Broadband service was available in 583 (98%) of the survey census blocks. In the remaining 14 (2%) of the census blocks Edison was unable to determine if the offered service qualified as a Broadband service per NTIA's definition.

4.2 ProField Drive Test

Apex used two Nebraska residents to perform the Spectrum Drive Test. The hardware used included a laptop with 3 nationwide ISP data cards. (AT&T, Verizon and Sprint) and customized ProField software. The route was divided into two regions, Eastern and Western Nebraska. A total of over 3,000 road miles were covered during the drive test.

The ProField application cycles through each ISP card and captured the RSSI value and recorded to the database. The data was continuously uploaded to the Database Server. A chart of East and West routes along with the validation charts are contained in Appendix C.

The Spectrum drive test was conducted in 5,637 Nebraska census blocks. The drive test validated ISPs' (AT&T, Verizon and Sprint) supplied information that Broadband service was available in 5,287 (94%) of the census blocks. In the remaining 350 census blocks Apex was unable to determine if the offered service qualified as a Broadband service per NTIA's definition.

4.3 Mail and Phone Survey

Apex procured Nebraska resident data from US Data Corporation. Apex selected a random sample of residents. The sample was divided into two groups. The first group was called over a period of two weeks. The second group received the survey in the mail and was asked to complete the survey and return it in a pre-paid envelope.

The sample was selected to complement the in-person Edison survey and the planning survey. Census blocks already sampled by the Edison survey and the planning survey were excluded from the mail and phone survey.

Mail and phone survey questionnaire collected information that was similar to Edison's in-person survey.

The mail survey was sent to 3,003 Nebraska residents. A total of 506 residents responded to the survey, a response rate of 17%. Of the 506 residents, 445 had broadband service. The broadband customers resided in 433 unique census blocks. The responses indicated that 88% of the residential customers subscribed to a broadband service. The results validated ISPs' submitted data for census blocks with broadband service.[3]

The phone survey contacted 2,500 Nebraska residents in 293 unique census blocks. Broadband service was available in 63% of the census blocks. The results matched the ISPs' submitted data for the respective census blocks.

[3] A mail survey conducted by the Nebraska Planning group (consisting of the University of Nebraska – Lincoln, Nebraska Information and Technology Commission, and the Nebraska Department of Economic Development) in February/March 2010 had a response rate of 47% and identified similar broadband availability. The complete results of this survey were filed with the NTIA program office in the NPSC quarterly report on July 30, 2010.

4.4 Online Speed Test

As a component of verification, the NPSC's vendor, Apex, initially established an Online Speed Test, requesting consumers perform a test to record the speed of their broadband connection. Data collected was to include geographical identifiers, upload and download speeds, and latency. Preliminary review of the testing methodology was conducted by Apex.

In addition to the online availability of the Apex speed test, the NPSC provided a disclaimer to participants noting, in part, the irregular variability inherent to measuring broadband speed availability at a given time, using a given hardware configuration. Further, the NPSC stated, while a speed test may give consumers information on relative speed, the test was not endorsed as a definitive testing method.

Irrespective, subsequent to implementation, the NPSC began fielding numerous complaints regarding the testing results from consumers and industry representatives alike. In an independent effort, the NPSC conducted a review of the testing methodology and determined the testing results to be inconsistent and unreliable. Results deviated significantly when compared to those obtained utilizing Speedtest.net, owned and operated by Ookla, and displayed significant variation across platforms. Further, the results obtained via the Apex Online Speed Test were not consistent with those reported by ISPs themselves.

As such, the NPSC determined it necessary to remove access to the Online Speed Test, rather than risk losing the trust and confidence of consumers and the support of the industry.

5.0 Map Processing

5.1 CSU – Chico (Appendix A) Map Processing

As a result of the improvements in the DIM for Round 4 data collection, new data process methodologies were used as described in the follow sections.

5.1.1 Address Submissions

Internet service providers submit address data in tabular format. Address records are geocoded to the street segment level using E911 reference data. Matched records are preserved as a geographic point layer. Records not meeting the minimum match requirements are selected and exported in tabular format. Non-matching records are run through a second geocoding process using a composite locator built on underlying TeleAtlas reference data. This secondary geocoding process produces match results at the street segment level where possible. Non-matching records are run through a third geocoding process using a composite locator built on underlying 2010 Tigerline reference data. This additional geocoding process produces match results at the street segment level where possible. If no qualifying street segment is found the locator will move to a secondary level of matching based on city/state. City/state matches are represented as a generalized center point of the geographic area considered to be included or related to any city, town, or community within the state. Street segment and city/sate matches are preserved as a geographic point layer. The two geocoding match result layers are then merged to create a single geographic point layer representing all records within the submission that were able to be matched with confidence at any particular level. The attribute table of this layer is analyzed to produce a report of how many records were matched to each specific locator through both geocoding processes. The address point layer is then run through a spatial relation process against census block polygons in order to obtain the appropriate FIPS number for each address point location. All non-matching records are preserved in table format and returned to the provider for review.

Optionally, Internet service providers submit address data as longitude and latitude coordinate pairs in tabular format. Longitude and latitude coordinate pairs are plotted on the map and preserved as geographic point locations. This layer is then run through the same spatial relation process as the geocoded points to obtain the appropriate FIPS number for each address point location.

If a combination of address listings and longitude and latitude coordinate information is submitted, the data will be processed accordingly in respect to each data type and then combined upon output to create final address output layer.

5.1.2 Census Blocks from Address Submissions

Final address result layers are run through a spatial relation process against census block polygons. The resulting output is a polygon format representing all census blocks in which each geographic address point resides. All broadband specific attribution is propagated over to the census block polygons from the provider's final address point layer. Census block polygons are then reviewed in regards to their geographic area. Only those census block polygons that are less than two square miles in size are preserved. All polygons that are greater than two square miles in size are removed. This process can result in duplicate stacked polygon in cases where multiple address points fell within the same census block polygon and have the same underlying characteristics in regards to broadband data attribution. Census block polygons are reviewed for duplicate records and filtered to preserve unique records only.

5.1.3 Street Segments from Address Submissions

Final address result layer is divided into multiple layers specific to technology of transmission and speed characteristics. Each unique class of address is run through spatial relation processes along with a street segment line layer to obtain a unique identifier for the nearest segment to each individual address point. Resulting output is address point features containing the unique identifier of the closest street segment attributed in the address layer's data table. A table join is executed appending the broadband characteristics of the address data to the street segments. The appropriate street segments are called out and preserved. An erase operation is then run using the provider's resulting census block polygon layer to remove any street segments that fall within service census blocks that are less than two square miles in area. All remaining street segments are preserved to represent service in areas where census blocks are greater than two square miles in area.

5.1.4 Census Block Submissions

Internet service providers submit census block data in tabular format. A table join is done using census block centroid points to append longitude and latitude coordinates to each record in the submitted census block table. Output is a standalone representing each census block submitted by the provider and now contains the longitude and latitude coordinates of a point within the relative census block. This information is used to plot coordinate pair events. The output is a point dataset representing each record submitted by the provider. This point layer is then run through a spatial relation process along with the census block polygons. Output is a polygon layer representing all submitted census block records for said provider. Census block polygons are reviewed for duplicate records and filtered to preserve unique records only.

5.1.5 Census Block Migration – 2000 to 2010 Vintage

Consistent with Round 3 many internet service providers submit census block data using vintage 2000 geography. The U.S. census delivered and supplied a crosswalk database to assist in migration of 2000 geography to the equivalent 2010 geography. Using this crosswalk a query table is created to properly cross reference FULLFIPSIDS between 2000 and 2010 census years. The output is a polygon layer representing all 2010 census blocks that are geographically equivalent to the submitted 2000 census block records for said provider. Census block polygons are reviewed for duplicate records and filtered to preserve unique records only.

5.1.6 Street Segment Submissions

Internet service providers submit street segment data by census block in tabular format. A spatial relation process is run using the submitted census block records to call out the specific census blocks in which a provider claims to have service. The appropriate street segments are called out via the census blocks reported, and preserved.

An erase operation is then run using the provider's resulting census block polygon layer to remove any street segments that fall within service census blocks that are less than two square miles in area. All remaining street segments are preserved to represent service in areas where census blocks are greater than two square miles in geographic area.

5.1.7 Street Segment Migration – 2000 to 2010

Consistent with Round 3, many internet service providers submit street segment data using vintage 2000 geography. A spatial relationship process is run using the submitted street segment geography to transfer provider data to all street segments within 50 feet. This is done to insure that all final output data is Tigerline 2010 street data. An erase operation is then run using the provider's resulting census block polygon layer to remove any street segments that fall within service census blocks that are less than two square miles in area. All remaining street segments are preserved to represent service in areas where census blocks are greater than two square miles in geographic area.

5.1.8 County Overview Submissions

Internet service providers submit county overview data in tabular format. A table join is done using county centroid points to append longitude and latitude coordinates to each record in the submitted census block table. Output is a standalone representing each county submitted by the provider and now contains the longitude and latitude coordinates of a point within the relative county. This information is used to plot coordinate pair events. The output is a point dataset representing each record submitted by the provider. This point layer is then run through a spatial relation process along with the county polygons. Output is a polygon layer representing all submitted county records for said provider. County polygons are reviewed for duplicate records and filtered to preserve unique records only.

5.1.9 Middle Mile Submissions

Internet service providers submit middle mile data as longitude and latitude coordinate pairs in tabular format. Longitude and latitude coordinate pairs are plotted on the map and preserved as geographic point locations. The middle mile point layer is then run through a spatial relation process against census block polygons in order to obtain the appropriate FIPS number for each middle mile point location.

5.1.10 Wireless Submissions

Providers who offer wireless service but could not submit a shapefile or geographic representation of their service area give tabular antenna information. Wireless antenna parameters are used to model a service area and shapefiles are created for each provider. The wireless propagation model is based on the Longley-Rice, Irregular Terrain propagation model. Individual unit specifications are used to measure performance based on frequency, transmit power, receiver sensitivity, antenna gain, and height. Signal coverage patterns are produced for each individual unit taking into account terrain and vegetation features that may hinder signal dispersion.

5.2 Provider Verification

During Rounds 2 and 3, broadband providers received static PDF maps which proved to be a less than adequate tool for the broadband providers to review the submitted data. . During Round 3, the project mapping partner produced a preliminary ESRI map file for each broadband provider. This changeover allowed the broadband providers to obtain a more focused and flexible mapping review product and therefore enhanced the confidence of the broadband providers in the mapping process. Apex and the NPSC staff helped the provider community obtain ESRI ArcReader and gave assistance to the providers in using the ESRI ArcReaders. The provider reviewed the map and either accepted the map or returned comments regarding any perceived inaccuracies. Apex, the NPSC staff and the provider discussed the comments and, when necessary, made corrections to the preliminary maps.

The use of the ArcReader maps revealed a problem with geocoding results. Too many locations were stacked at the centroid of a town or zip code rather than at the correct customer site. Apex and the NPSC staff engaged in a detailed analysis of this issue.

At the same time, the NPSC staff worked with selected providers in a one-on-one labor-intensive process comparing the submitted data tables to the preliminary maps. For locations that appeared problematic, the providers were able to collect additional information to improve the data table. In some instances, the additional information was acquired by driving past a customer location with GPS equipment to obtain the exact latitude and longitude of the customer. This improved data was entered into the data tables allowing CSU-Chico to revise the providers' maps.

ArcReader maps continued to be used in Round 4 as a provider verification tool.

6.0 Nebraska Matching Fund

6.1 E911 Data

The NPSC's implementation of enhanced wireless 911 throughout Nebraska required the arduous task of designing the framework to initiate, develop, and maintain the robust, and invaluable, GIS databases vital and necessary for the provision of enhanced wireless 911. These GIS databases are in a standard projection and include; street centerline, depicting all public roadways; railways; political boundaries, including city, township, and county; areas of interest, including parks, cemeteries, hazardous facilities, power plants and substations; water features; fire districts; ambulance districts; law enforcement districts; and emergency service boundaries.

Nebraska GIS data for all 93 counties, 77,358 square miles, has been developed and is continually maintained; all through funding support provided by the Nebraska Wireless E911 Fund. Nebraska data is housed within the NPSC's secure on-line statewide GIS Data Repository.

The NPSC utilized the data, developed through the Nebraska Wireless E911 Fund, to fulfill the matching requirements of the SBDD Grant Program.

Further, during the validation phase of the second round of data collection, the NPSC identified broadband unique field enhancements, when applied in addition to the existing E911 data, resulted in significant geocoding improvements in many rural areas of Nebraska served by smaller ISPs. The NPSC and the project mapping subcontractor worked extensively for several weeks to develop and implement these improvements prior to the third round of data collection. Sample geocoding results analyzed subsequent to completion of all enhancements, indicated an average record resolution increase of just over 51% in those rural areas.

The project mapping vendor, California State University – Chico, utilized the enhanced dataset to develop an Address Locator, unique to Nebraska, which is then used to geocode address data provided by ISPs and ultimately submit to the NTIA for the third round broadband data submission.

The NPSC will continue to utilize the E911 data resources for address processing and geospatial verification throughout the term of the SBDD Grant Program.

Appendix - A Mapping Project Partners

Apex CoVantage LLC

Apex CoVantage is a private, employee-owned company that has helped businesses to develop and execute information and knowledge strategies for more than two decades. Apex was a pioneer in offshore knowledge-based solutions and now has more than 2,500 employees in the US and abroad. Apex is known for developing and improving man-machine processes that optimally combine human creativity with machine processing efficiency, introducing transformative solutions that lead to quantum gains in efficiency.

Apex is recognized as one of the premier firms in its field, working for clients such as AT&T, Exelon, Baltimore Gas and Electric, Qwest, Silver Spring Networks, SMUD, Veridian Connections and more.

California State University (CSU)-Chico

GEOGRAPHICAL INFORMATION CENTER

The Geographical Information Center (GIC) at California State University, Chico was established in 1988 to introduce digital mapping and geographical information systems (GIS) technology to the Northern California region and to provide valuable on-the-job training and employment opportunities for our students. The Center's mission is both academic and service oriented. With numerous research opportunities available throughout California, the growth of the GIC has resulted in a renewed University commitment to strengthen ties to the Northern California region.

The GIC employs between 10 and 20 individuals. The staff includes professionals with extensive GIS training mentoring qualified graduates, student assistants and interns. The center runs its own intranet and is connected to the multi-campus CSU-Net, giving it state-of-the-art networking capability.

While the center’s primary area of expertise is GIS technology, the GIC also has experience in digital orthophoto development, global positioning system (GPS) applications, computer cartography, image processing and air photo interpretation.

The GIC has the technical expertise to plan, develop, install, serve and maintain an agency’s GIS. It uses ESRI GIS software and can develop a customized ArcGIS training workshop to meet an agency’s needs. Because it is affiliated with California State University, Chico, it can draw specialized expertise from the academic community. The center’s contracts are primarily with federal, state and local agencies, but it also serves a variety of private sector clients. Projects are equally split between urban and natural resource applications. Contracts are administered through the California State University, Chico Research Foundation.

Edison Research

Edison Research conducts market research and exit polling, providing strategic information for businesses and media organizations worldwide.

With an expertise in both quantitative and qualitative research, Edison works with many established corporations looking to keep their edge or expand, as well as young companies just starting to develop their businesses. Edison offers expertise in telephone, Internet and in-person research as well as focus groups and dial testing.

Edison Research has been the sole provider of exit poll information to the six major news organizations - ABC, CBS, CNN, FOX, NBC and the Associated Press - since 2003. Edison has conducted exit polls and collected precinct vote returns to project and analyze results for every major primary and the general election in 2004, 2006 and 2008.

Edison is also the leading provider of consumer exit polling and has conducted face-to-face research in almost every imaginable venue. Edison Research has conducted research at leisure locations (movie theaters, golf courses, health clubs, museums, cruise ships), transit locations (airports, subway stations, bus stations, truck stops, school buses, parking garages, gas stations), retail establishments (shopping malls, restaurants, stores), stadiums/arenas (concerts, sporting events), and many other locations including office buildings, conventions/conferences, and medical centers. Our network of more than 10,000 experienced interviewers allows us to conduct research in almost any location.

Another specialty for Edison is its work for radio stations throughout the world, conducting both strategic and music research for successful stations in North America, South America, Europe and Asia. Additionally, Edison conducts research for the U.S. Government's broadcasting ventures in the Middle East including "Radio Sawa" and "Radio Farda." This research is currently conducted weekly in Abu Dhabi, Egypt, Iraq, Jordan, Lebanon and Morocco.

Appendix - B

Strata Sample Methodology

An in person survey was conducted using personal digital assistants with customized software. The sample included four households or community anchor institutions in each selected census block. The initial phase included 1,400 in person's interviews.

Sample Design Overview

The sample design was a *stratified cluster sample*. The first layer consisted of six strata that encompassed the entirety of Nebraska. The second layer of the design consisted of a sample of 350 census blocks. These census blocks were referred to as the *primary sampling unit* (PSU). The third layer of the design was the household/community anchor. These locations are known as the *secondary sampling unit* (SSU), or observation unit.

Stratification

Six strata encompassing all of Nebraska were created for this sample design. These strata were created based on the relative rural/urban nature of the area, the cultural makeup of the area and the geographic region of the state. All strata boundaries follow county boundary lines.

These strata for Nebraska consist of:

1. Stratum 1 – Douglas County
2. Stratum 2 – Cass, Lancaster, Sarpy counties
3. Stratum 3 – Medium Rural/Urban Area – (17 counties)
4. Stratum 4 – Rural West – (53 counties)
5. Stratum 5 – Rural East – (18 counties)
6. Stratum 6 – Thurston County (Indian Reservation)

Of the sample of 350 census blocks, each strata were allocated a portion of the sample. The allocation was an optimal allocation procedure based on the racial makeup of each stratum. This means that the strata with greater racial variability will be allocated more census blocks than strata with less variability. Consequently, heterogeneous strata had more census blocks and homogeneous strata had fewer census blocks. This resulted in a more efficient use of the sample placing the census blocks where they were most needed. Stratification sample allocation and household distribution:

Stratum	Sample Census Block Allocation	Percent of Households
1 – Douglas County	75	27.3%
2 – Cass, Lancaster, Sarpy counties	37	22.8%
3 – Medium Rural/Urban Area (17 counties)	97	24.7%
4 – Rural West (53 counties)	77	13.7%
5 – Rural East (18 counties)	57	11.1%
6 – Thurston County (Indian Reservation)	7	0.3%

Primary Sampling Units – Census Blocks

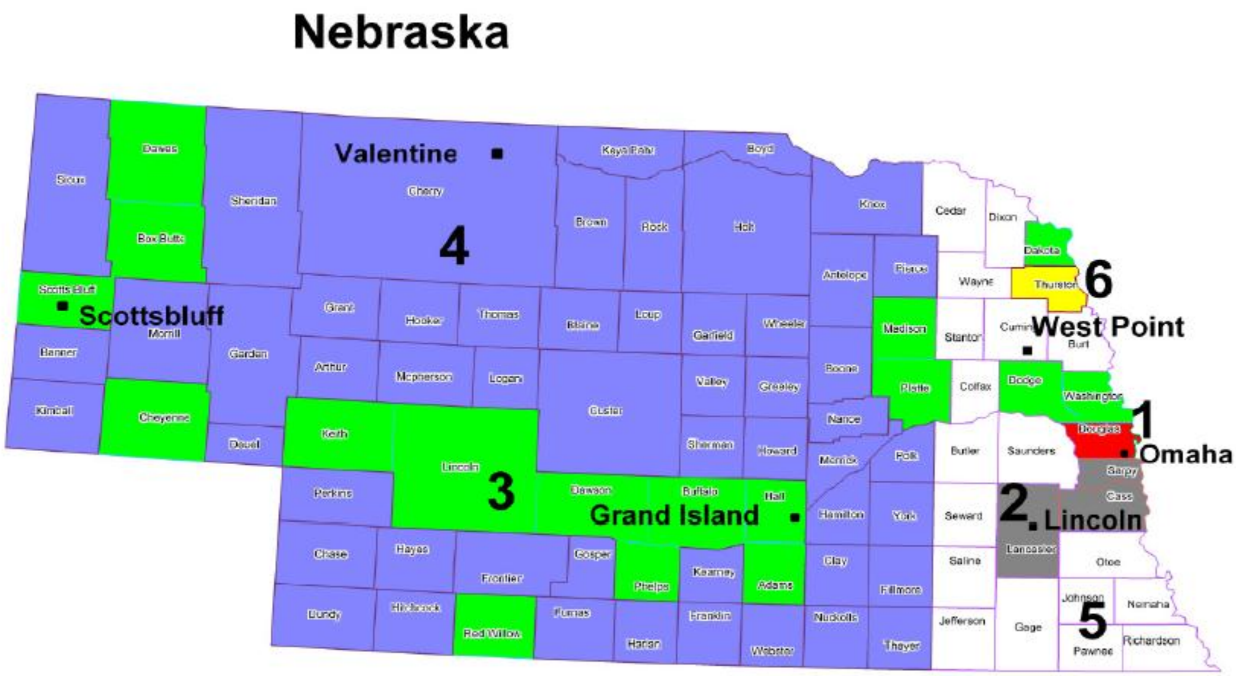
The primary sampling units was the census block. These census blocks were nested within a given stratum. Each census block had a known probability of selection based on the number of households that exist within that census block. Every census block was contained within a county. Nebraska has many small census blocks where the number of completed interviews from households/community anchors was less than four (4). In this situation the interviewer was instructed to begin sampling at the nearest neighboring census block contained within the census block group of the sampled census block. They continued interviewing until four interviews are obtained. By keeping the interviewer within the census block group this ensured that interviews obtained outside the original sampled block were still within the same county and consequently the same stratum.

Secondary Sampling Units – Households/CAI

Secondary sampling units, households/community anchors, were selected systematically within a census block. Community anchor locations were not specifically targeted. However, they were included if they fell within the systematic selection. The interviewer was given a random starting point within the census block. The interviewer proceeded to follow their assigned path and interviewing rate until four (4) completed interviews were obtained.

Conclusion

This sampling plan resulted in a statistically valid sample. This sampling plan consisted of an initial sample of size 350 (up to 425 in the final sample). This resulted in a final anticipated statewide margin of error of (+/- 5%). A total of 1,400 households/community anchors were sampled. The results of this sample could be used for further estimation and extrapolation to other census blocks that were not part of the final sample.



Edison In-person Survey Questionnaire

1. Enter census block number **(DO NOT READ)**: __ __ __ __

2. Code type of location **(DO NOT READ)**

Household **(Use "household")**	1	**SKIP TO Q.4**
Commercial Business **(Use "business")**	2	
Other location: ________________ **(Use "location")**	3	**SKIP TO Q.4**

3. What type of business is this? **(RECORD EXACT RESPONSE)**

   ____

   Don't Know/No Answer 9

4. Does this **(ANSWER FROM Q.2)** have Internet access? **(PROBE: IF UNSURE, ASK IF SOMEONE ELSE IS AVAILABLE)**

Yes	1	**CONTINUE**
No	2	**SKIP TO Q.10**
Don't Know/No one available	9	**TERMINATE**

5. Which type of Internet access does this **(ANSWER FROM Q.2)** have? If you are not sure, let me know and I can describe the difference between the two. **(READ LIST)**

Dial-up	1	**CODE Q.6 AS "DIAL-UP" & SKIP TO Q.10**
Broadband	2	**CODE Q.6 AS "BROADBAND" & SKIP TO Q.8**
Both **(DO NOT READ)**	3	**CODE Q.6 AS "BOTH" & SKIP TO Q.8**
Don't Know/No Answer **(DO NOT READ)**	9	**CONTINUE**

6. Most people who access the Internet do so through dial-up or broadband. A dial-up connection is where your computer connects to the Internet using your telephone line.

   A broadband connection usually uses a cable modem provided by your cable company or a service called DSL. Broadband connections access the Internet at much faster speeds than a dial-up connection, and allow you to always remain connected to the Internet.

   Which of these two types of Internet connections does this **(ANSWER FROM Q.2)** have-- a dial-up connection or a broadband connection?

Dial-up	1	**SKIP TO Q.8**
Broadband	2	**SKIP TO Q.8**
Both **(VOLUNTEERED)**	3	**SKIP TO Q.8**
Don't Know/No Answer **(DO NOT READ)**	9	**CONTINUE**

7. Is there anyone else who might know whether or not this **(ANSWER FROM Q.2)** accesses the Internet through dial-up or broadband?

Yes, available	1	**ASK FOR THAT PERSON, GO BACK TO Q.5**
Yes, not available	2	**THANK AND TERMINATE**
No	3	**THANK AND TERMINATE**
Don't Know/No Answer	4	**THANK AND TERMINATE**

8. Who is the broadband Internet provider for this **(ANSWER FROM Q.2)**? **(READ LIST) (PROBE: IF UNSURE, ASK IF SOMEONE ELSE IS AVAILABLE)**

   Insert list of known service providers in the census block entered in Q.1
   Other: __________________ 98

   Don't Know/No Answer **(DO NOT READ)** 99

9. Which type of broadband service does your Internet provider supply to this **(ANSWER FROM Q.2)**? **(READ LIST) (PROBE: IF UNSURE, ASK IF SOMEONE ELSE IS AVAILABLE)**

Cable	1
DSL	2
Other: ______________	3
Don't Know/No Answer **(DO NOT READ)**	9

10. Code gender **(DO NOT READ)**

    Male 1

Female	2

11. Can you please tell me your age? **(RECORD EXACT RESPONSE)** ________

12. The last few questions are for classification purposes only. Which of the following best describes you? Are you…?

White	1
African-American	2
Asian	3
Or of some other background?	4
Refused/No Answer	9

13. Are you of Hispanic or Latino descent?

Yes	1
No	2
Refused/No Answer	9

IF Q.2 CODED "1", CONTINUE, OTHERWISE, SKIP TO NOTE ABOVE Q.17

14. What is the highest level of education achieved by ANYONE in this household? **(READ LIST)**

High school or less	1
One to three years of college	2
Four year college degree	3
Some graduate credits	4
Advanced degree such as MA, MBA or PhD	5
Don't Know/No Answer **(DO NOT READ)**	9

15. Including yourself, how many adults age 18 or older live in this household? **(RECORD EXACT RESPONSE)** _______

16. Is there anyone under the age of 18 living in this household?

Yes	1
No	2
Don't Know/No Answer	9

IF Q.6 CODED "1"/DIAL-UP, SKIP TO Q.18, OTHERWISE, CONTINUE

17. The state of Nebraska would also like to know how fast the broadband connection is in this **(ANSWER FROM Q.2)**. Login to the Nebraska speed test web site, enter the ID number located on this postcard **(SHOW POSTCARD)** and it will automatically log your speed. No identifying information is captured on the speed test web site. This would be a great help and we would appreciate the additional effort.

UNIQUE ID NUMBER IS GENERATED

Enter the ID number on to the postcard. Hand it to the respondent. **(DO NOT READ)**

18. In case my supervisor needs to verify that I completed this interview, may I please have your first name? **(RECORD EXACT RESPONSE)** ______________________

Don't Know/No Answer 9

19. And may I have your phone number or email address? It will ONLY be used if my supervisor wants to verify any of the information in this interview. **(RECORD EXACT RESPONSE)**

Phone number (__ __ __) __ __ __ - __ __ __ __
E-mail address _____________@________.______

Don't Know/No Answer 9

20. Thank you for your time and cooperation!

21. Enter respondent's address. **(RECORD AFTER YOU HAVE COMPLETED THE INTERVIEW)**

Address 1: _________________________________
Address 2: _________________________________
City, State, Zip: Insert city, state and zip code as determined by the census block entered in Q.1

Mail Survey Questionnaire

Your response is important! Please fill out and promptly mail the Nebraska Broadband Mapping Survey. Results from these surveys will be used to map the availability of Broadband service for the ENTIRE STATE OF NEBRASKA. Without enough completed surveys, your community may not receive its fair share of government funding to support the build out of the Broadband network in Nebraska!

Please mark the appropriate answers to the survey questions below.

1. Do you have Internet access at your home?

☐ Yes (Continue) ☐ No (Skip to Question 5)

2. Which type of Internet access does your household have? (Mark all that apply)

☐ Dial-up (A dial-up connection is when you will not be able to receive a telephone call using the same telephone line that connects your computer to the Internet.)

☐ Broadband (A broadband connection usually uses a cable modem provided by your cable company or a service called DSL. Broadband connections access the Internet at much faster speeds than a dial-up connection, and allow you to always remain connected to the Internet.)

☐ Don't Know (Skip to Question 5)

3. Who is your broadband Internet provider?

____

4. Which type of broadband service does your Internet provider supply to your home? (Mark all that apply)

☐ Cable ☐ DSL

☐ Satellite ☐ Other: ________________________ (specify)

5. Gender: ☐ Male ☐ Female

6. Please provide your exact age: ___________

7. Are you…? (Mark all that apply)

☐ White ☐ African-American ☐ Asian

☐ Other background

8. Are you of Hispanic or Latino descent?

☐ Yes ☐ No

9. What is the highest level of education achieved by anyone in this household?

☐ High School or less

☐ One to three years of college

☐ Four year college degree

☐ Some graduate credits

☐ Advanced degree such as MA, MBA, or PhD

10. Including you, how many adults age 18 or older live in this household?

____

11. Is there anyone under the age of 18 living in this household?

☐ Yes ☐ No

The State of Nebraska would also like to know how fast your broadband connection is. Please go to the Nebraska Public Service Commission Web site at www.psc.nebraska.gov. Click on "Speed Test", enter your address and it will automatically log your speed. No identifying information is captured. This would be a great help and we would appreciate the additional effort.

Thank you for your time and cooperation!

Phone Survey Questionnaire

Please use the script below for Nebraska Broadband Availability Mapping Survey.

1. Does your household have Internet access?

1 _____ Yes **CONTINUE**

2 _____ No **SKIP TO Q.5**

9 _____ Don't Know **(DO NOT READ) SKIP TO Q.5**

2A. Which type of Internet access does your household have? If you are not sure, let me know and I can describe the difference between the two. **(READ LIST) (PROBE: IF UNSURE, ASK IF SOMEONE ELSE MIGHT KNOW AND IS AVAILABLE)**

1 _____ Dial-up **SKIP TO Q.5**

2 _____ OR Broadband **SKIP TO Q.3**

3 _____ Both **(DO NOT READ) SKIP TO Q.3**

9 _____ Don't Know **(DO NOT READ) CONTINUE TO Q.2B**

2B. Most people who access the Internet do so through dial-up or broadband. A dial-up connection is when you will not be able to receive a telephone call using the same telephone line that connects your computer to the Internet.

A broadband connection usually uses a cable modem provided by your cable company or a service called DSL. Broadband connections access the Internet at much faster speeds than a dial-up connection, and allow you to always remain connected to the Internet.

Which of these two types of Internet connections do you have -- a dial-up connection or a broadband connection?

1 _____ Dial-up **SKIP TO Q.5**

2 _____ OR Broadband

3 _____ Both **(DO NOT READ)**

3. Who is your broadband Internet provider? **(PROBE: IF UNSURE, ASK IF SOMEONE ELSE MIGHT KNOW AND IS AVAILABLE)**

__________________ **If it was left blank, leave the cell blank.**

9______ Don't Know/No Answer **(DO NOT READ)**

4. Which type of broadband service does your Internet provider supply to your home? **(PROBE: IF UNSURE, ASK IF SOMEONE ELSE MIGHT KNOW AND IS AVAILABLE) (ACCEPT MULTIPLE RESPONSES)**

   1 _____ Cable

   2 _____ DSL

   3 _____ Satellite

   4 _____ Other: _____________________________ (**RECORD EXACT RESPONSE**)

5. Gender of the Resident answering the Survey **(DO NOT READ, BUT USE VOICE AND NAME TO RECORD GENDER)**

   1 _____ Male

   2 _____ Female

6. Can you please tell me your age? **(RECORD EXACT RESPONSE)** ________

   NA ______ No Answer **(DO NOT READ)**

7. The last few questions are for classification purposes only. Which of the following bests describes you? Are you…?

   1 _____ White

   2 _____ African-American

   3 _____ Asian

   4 _____ Other background

   9 _____ No Answer **(DO NOT READ)**

8. Are you of Hispanic or Latino descent?

1 _____ Yes

2 _____ No

9 _____ No Answer **(DO NOT READ)**

9. What is the highest level of education achieved by anyone in this household? **(ACCEPT MULTIPLE RESPONSES)**

1 _____ High School or less

2 _____ One to three years of college

3 _____ Four year college degree

4 _____ Some graduate credits

5 _____ Advanced degree such as MA, MBA, or PhD

9 _____ No Answer **(DO NOT READ)**

10. Including yourself, how many adults age 18 or older live in this household? **(RECORD EXACT RESPONSE) ________**

NA _____ No Answer **(DO NOT READ)**

11. Is there anyone under the age of 18 living in this household?

1 _____ Yes

2 _____ No

9 _____ No Answer **(DO NOT READ)**

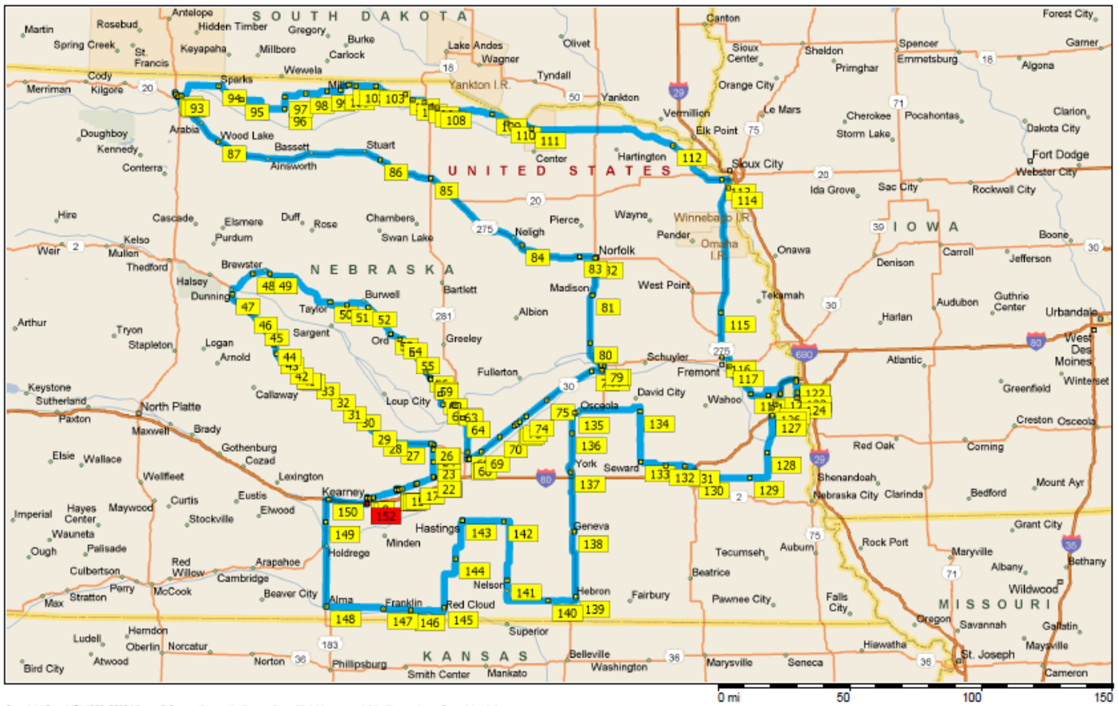
12. The State of Nebraska would also like to know how fast your broadband connection is. Go to the Nebraska Public Service Commission Web site at www.psc.nebraska.gov. Click on "Speed Test", enter your address and it will automatically log your speed. No identifying information is captured. This would be a great help and NPSC would appreciate the additional effort.

Thank you for your time and cooperation!

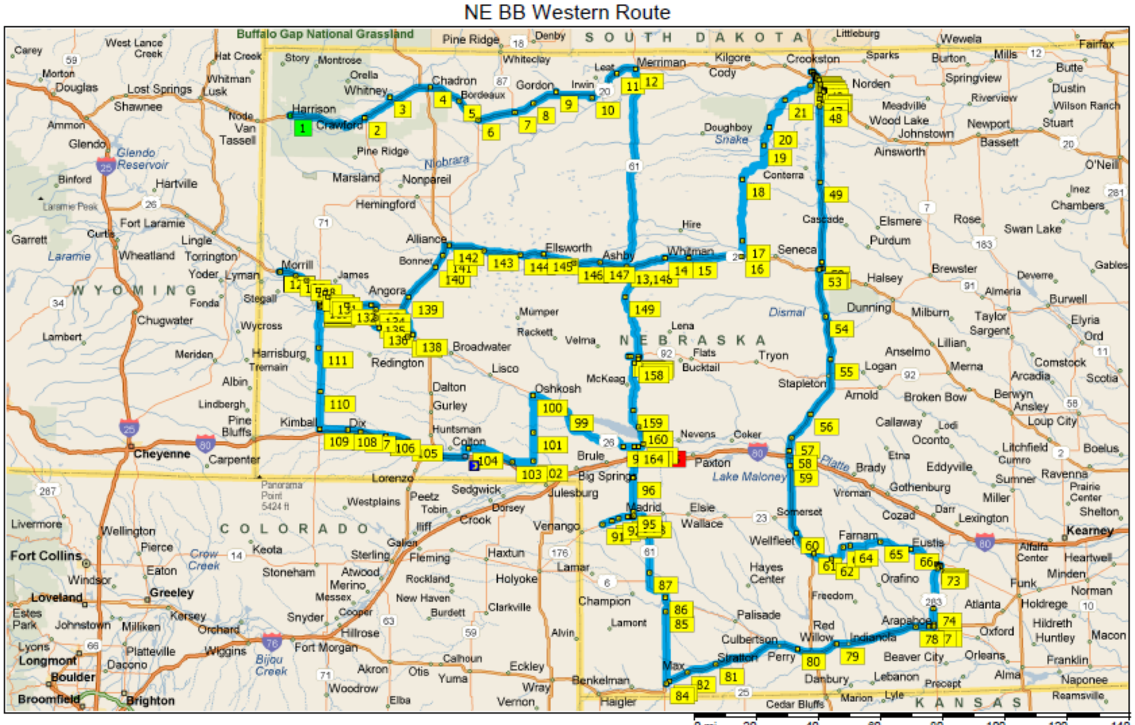
Appendix - C Spectrum Drive Test

ProField Drive Test

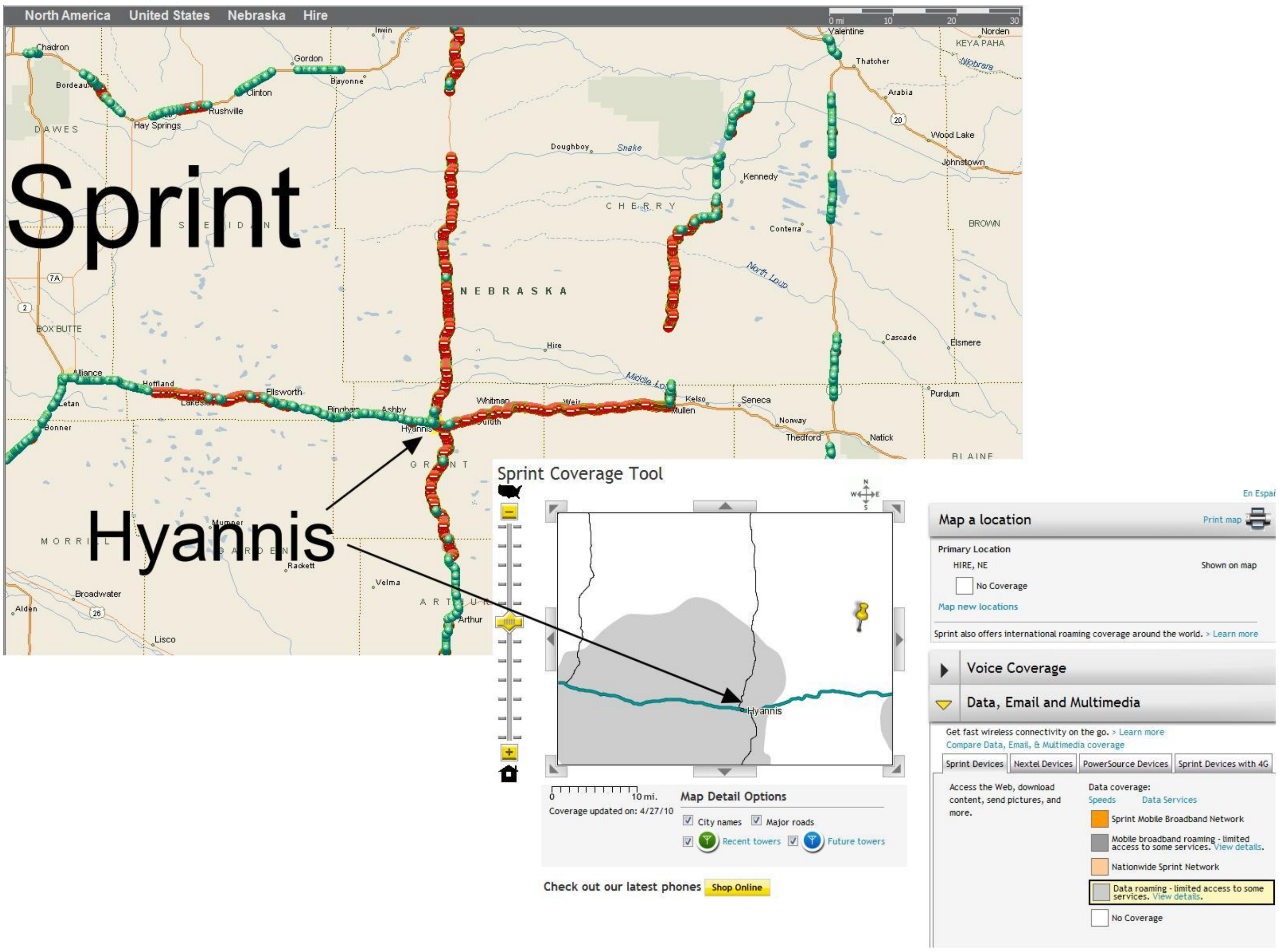
NE BB Eastern Route-2



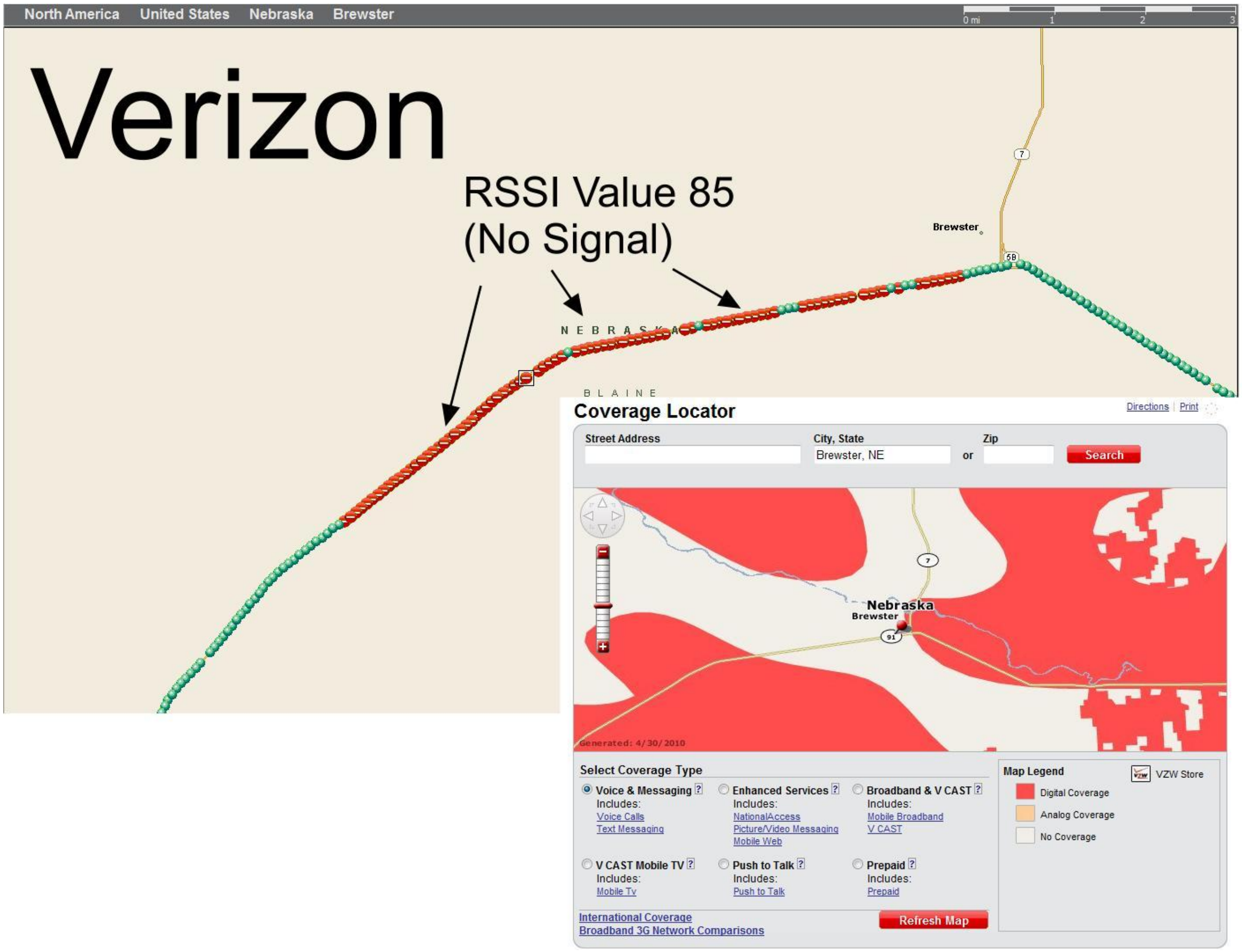
NE BB Western Route



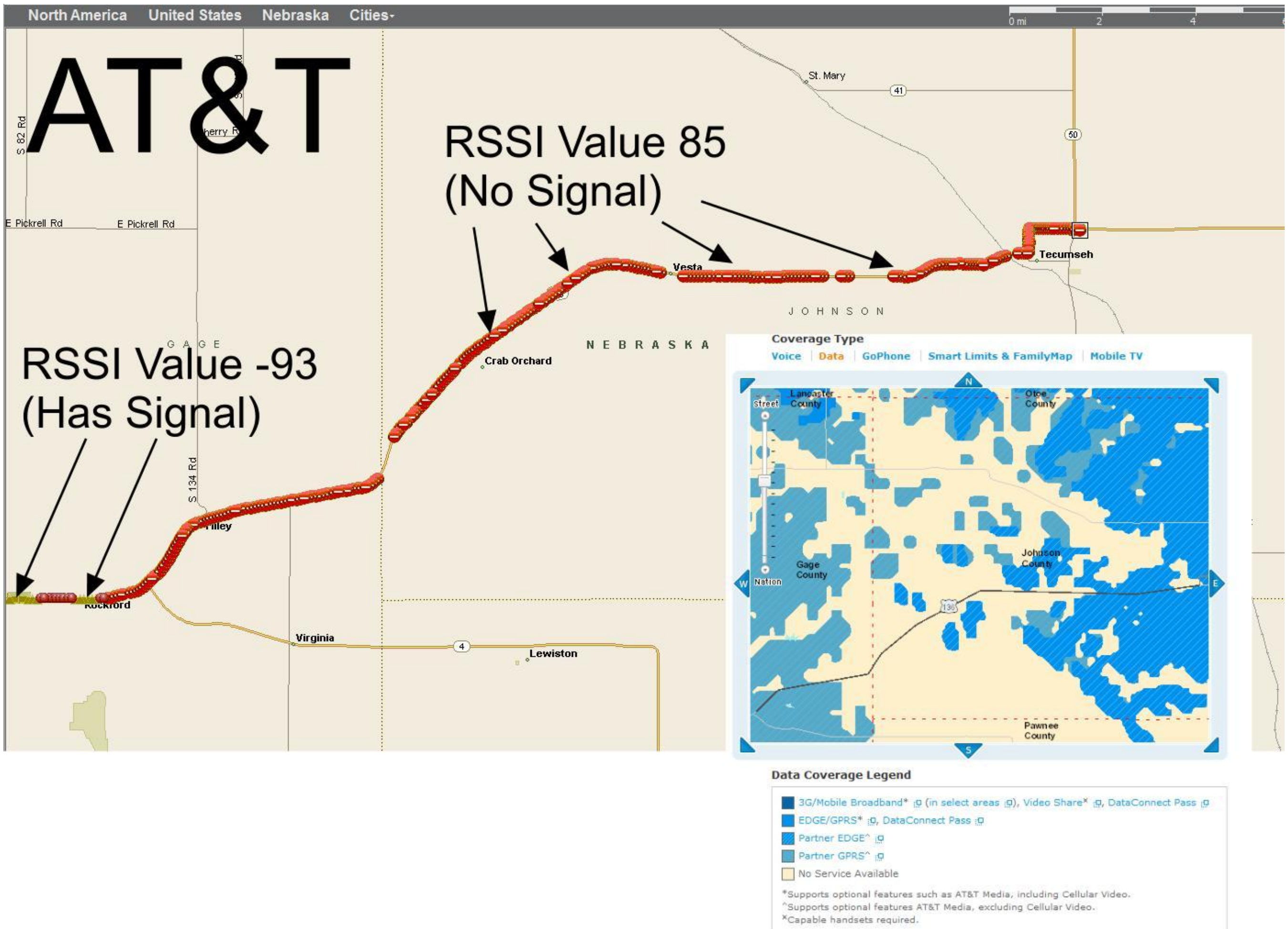
Results from Drive Test



http://coverage.sprint.com/IMPACT.jsp?ECID=vanity:coverage



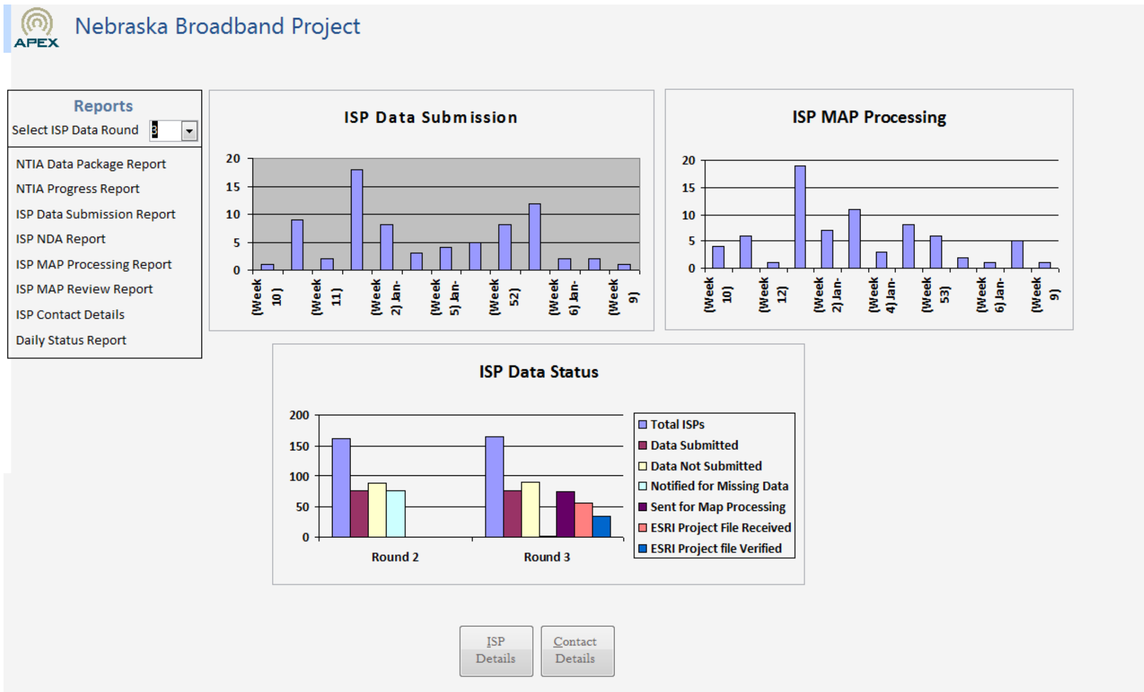
http://www.verizonwireless.com/wireless-coverage-area-map.shtml



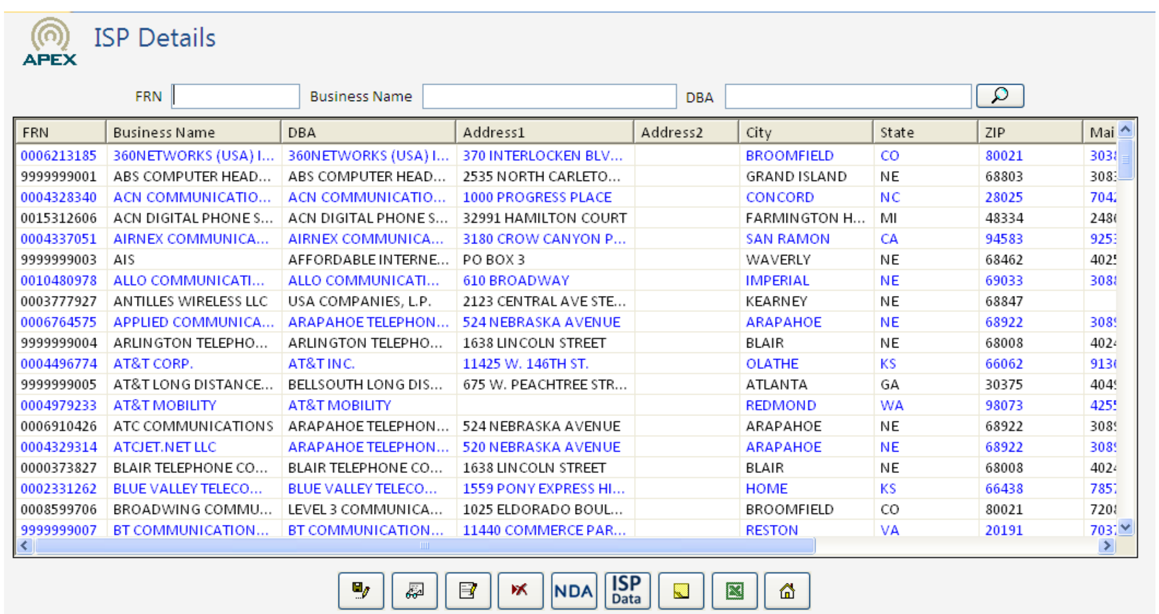
http://www.wireless.att.com/coverageviewer/#?type=data

Appendix - D Access Database

All information regarding Nebraska Broadband Project is available in an Access database. The database tracks the details such as ISP submission filings and contacts,



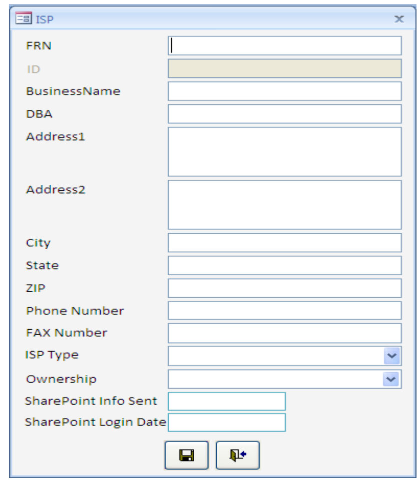
The ISP details table contains information regarding FRN, Business Name & DBA. It is possible to search the table by field



FRN	Business Name	DBA	Address1	Address2	City	State	ZIP	Mai
0006213185	360NETWORKS (USA) I...	360NETWORKS (USA) I...	370 INTERLOCKEN BLV...		BROOMFIELD	CO	80021	303
9999999001	ABS COMPUTER HEAD...	ABS COMPUTER HEAD...	2535 NORTH CARLETO...		GRAND ISLAND	NE	68803	308
0004328340	ACN COMMUNICATIO...	ACN COMMUNICATIO...	1000 PROGRESS PLACE		CONCORD	NC	28025	704
0015312606	ACN DIGITAL PHONE S...	ACN DIGITAL PHONE S...	32991 HAMILTON COURT		FARMINGTON H...	MI	48334	248
0004337051	AIRNEX COMMUNICA...	AIRNEX COMMUNICA...	3180 CROW CANYON P...		SAN RAMON	CA	94583	925
9999999003	AIS	AFFORDABLE INTERNE...	PO BOX 3		WAVERLY	NE	68462	402
0010480978	ALLO COMMUNICATI...	ALLO COMMUNICATI...	610 BROADWAY		IMPERIAL	NE	69033	308
0003777927	ANTILLES WIRELESS LLC	USA COMPANIES, L.P.	2123 CENTRAL AVE STE...		KEARNEY	NE	68847	
0006764575	APPLIED COMMUNICA...	ARAPAHOE TELEPHON...	524 NEBRASKA AVENUE		ARAPAHOE	NE	68922	308
9999999004	ARLINGTON TELEPHO...	ARLINGTON TELEPHO...	1638 LINCOLN STREET		BLAIR	NE	68008	402
0004496774	AT&T CORP.	AT&T INC.	11425 W. 146TH ST.		OLATHE	KS	66062	913
9999999005	AT&T LONG DISTANCE...	BELLSOUTH LONG DIS...	675 W. PEACHTREE STR...		ATLANTA	GA	30375	404
0004979233	AT&T MOBILITY	AT&T MOBILITY			REDMOND	WA	98073	425
0006910426	ATC COMMUNICATIONS	ARAPAHOE TELEPHON...	524 NEBRASKA AVENUE		ARAPAHOE	NE	68922	308
0004329314	ATCJET.NET LLC	ARAPAHOE TELEPHON...	520 NEBRASKA AVENUE		ARAPAHOE	NE	68922	308
0000373827	BLAIR TELEPHONE CO...	BLAIR TELEPHONE CO...	1638 LINCOLN STREET		BLAIR	NE	68008	402
0002331262	BLUE VALLEY TELECO...	BLUE VALLEY TELECO...	1559 PONY EXPRESS HI...		HOME	KS	66438	785
0008599706	BROADWING COMMU...	LEVEL 3 COMMUNICA...	1025 ELDORADO BOUL...		BROOMFIELD	CO	80021	720
9999999007	BT COMMUNICATION...	BT COMMUNICATION...	11440 COMMERCE PAR...		RESTON	VA	20191	703

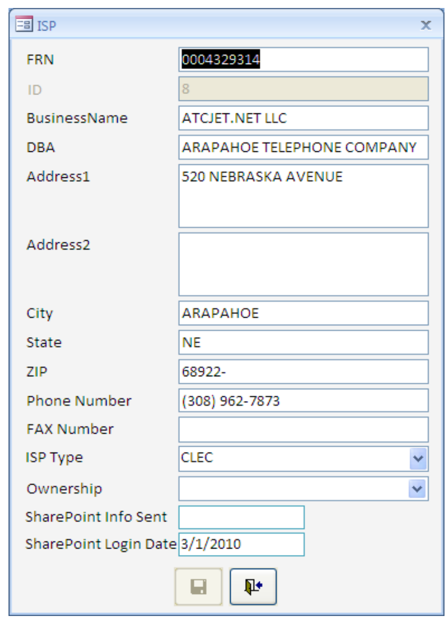
Add New ISP:

Click on add button to generate the add formpopulate the form with ISP data and press the save button.



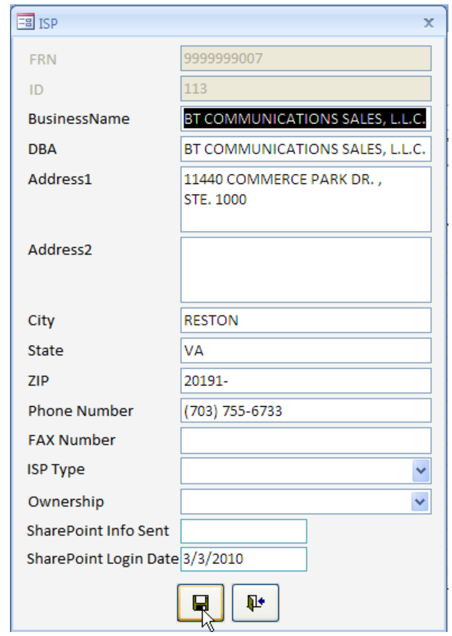
View ISP details:

Double click ISP details in list view or select the ISP from the list view and press view button.



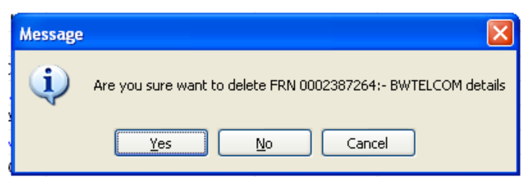
Edit ISP details:

To edit the ISP details, select the ISP from the list view and press view button Edit the ISP form and press save button.



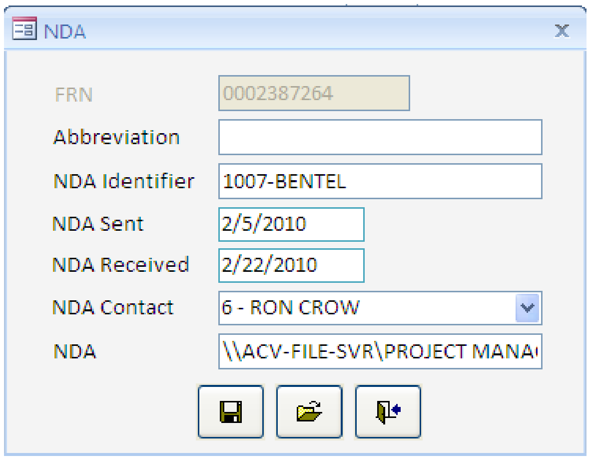
Delete ISP:

To delete an ISP details, select ISP from the list view and press delete button.



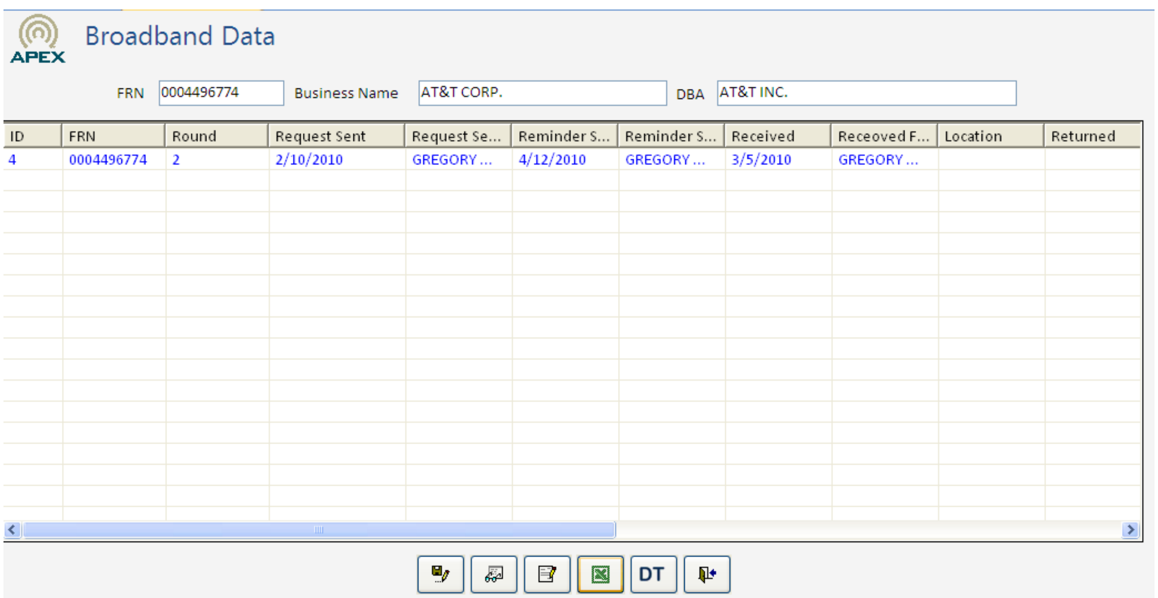
NDA:

To view the NDA details for an ISP select the ISP from the list view and press NDA button. Click on open NDA button to view the NDA scanned document.



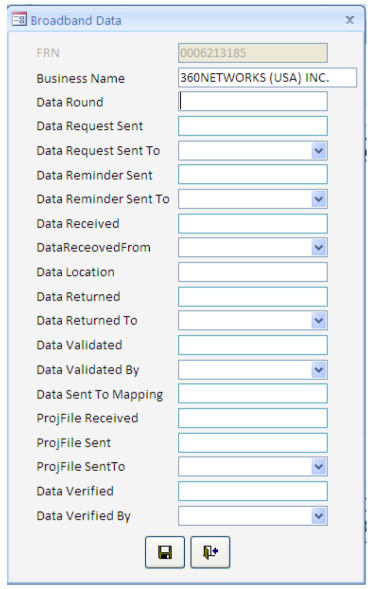
ISP Data:

To get the ISP Broadband Data we need to select ISP from the list view and press ISP Data ,then Broadband Data form opened. Using this module we can Add, Edit & View ISP Broadband Data & Data Tracking details of each round of data.



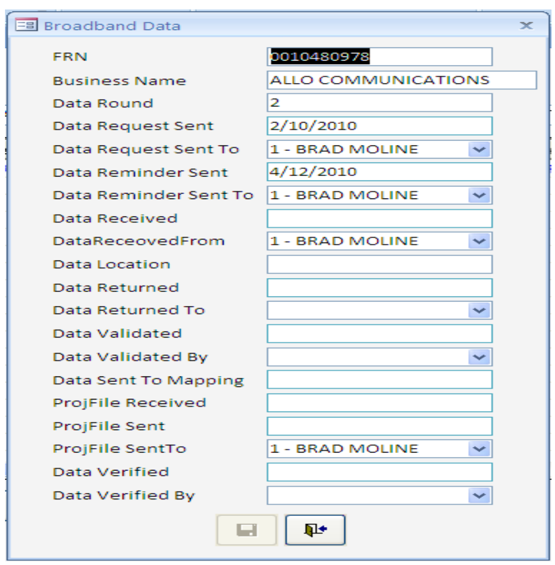
Add Broadband Data:

Click on "Add ISP Data" button. Broadband Data form will be opened. You need to fill the required fields and press save button.



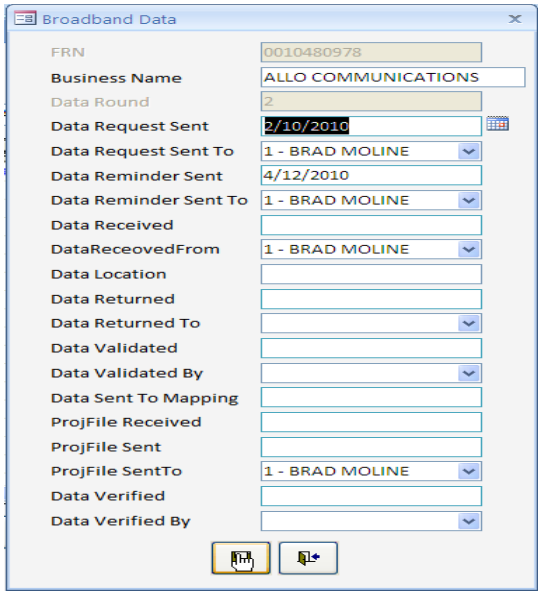
View Broadband Data:

Double click ISP round data in list view or select the round data from the list view and press view button. You can view all details as shown below.



Edit Broadband Data:

Select the round data which you want to edit from the list view and press button. Update the data and press save button.

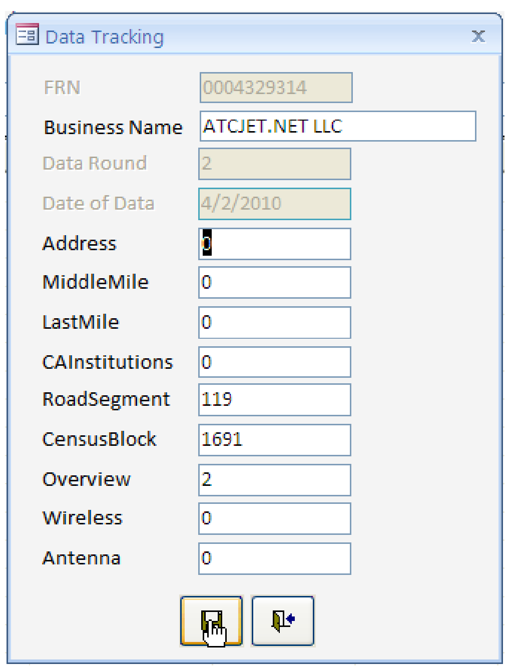


Export Broadband Data:

Click on the export button to export ISP Broadband Data to excel.

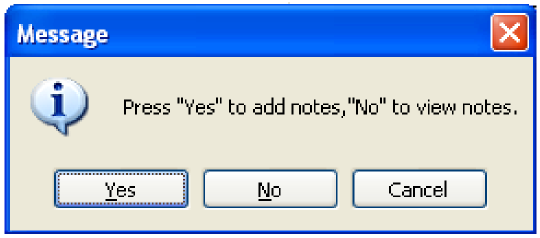
Add & Edit Data Tracking:

The number of records in "Geo Database" submitted by the ISP will be updated in Data Tracking module for each round of data. Select the round from the list view and click on Data Tracking button. The Data Tracking form will be opened. Update the values and press save button.

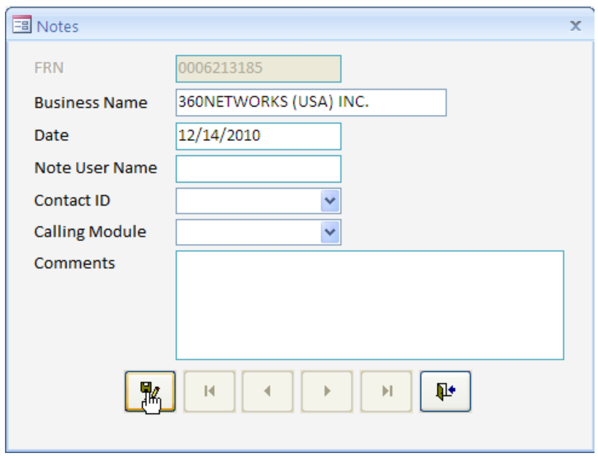


Notes:

Add or view notes by selecting the ISP from the list view and press the Notes button. Click the notes button you will get a message "Press Yes to add notes, No to view notes" as show below.



If you press "Yes", the Notes form will be displayed. Key in values and press the save button.

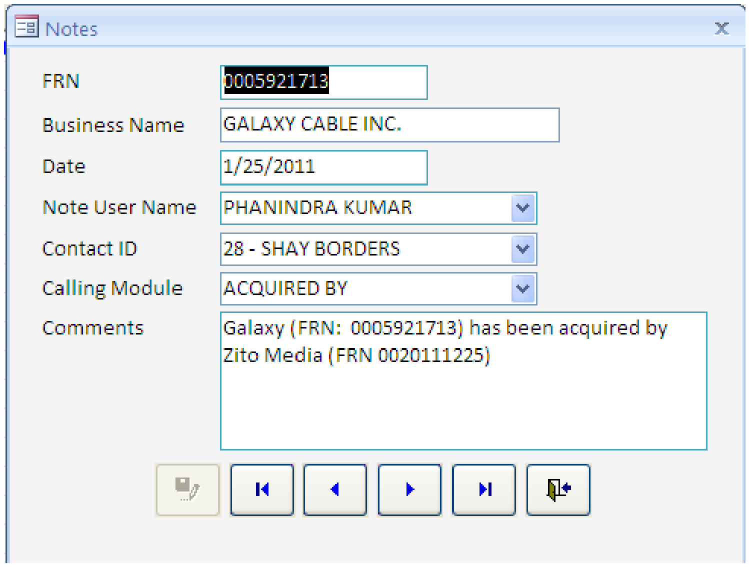


If you press "No", Notes form will be displayed. You can view all the notes by pressing navigation buttons.

Calling Module

- ISSUES IN SUBMITTED DATA: - If we have any issues with the data we need to select this option and add the missing data details in the comments. So that when we generate the daily status thes comments will be displayed.
- ISP COMMENTS: - If ISP's give any comments we need to select this.
- ACQUIRED BY: - If ISP acquired by any other ISP's we need to add a note by select this. So that when we generate the daily status this comments will be displayed.

  For Exp: - Galaxy (FRN:0005921713) has been acquired by Zito Media (FRN 0020111225)

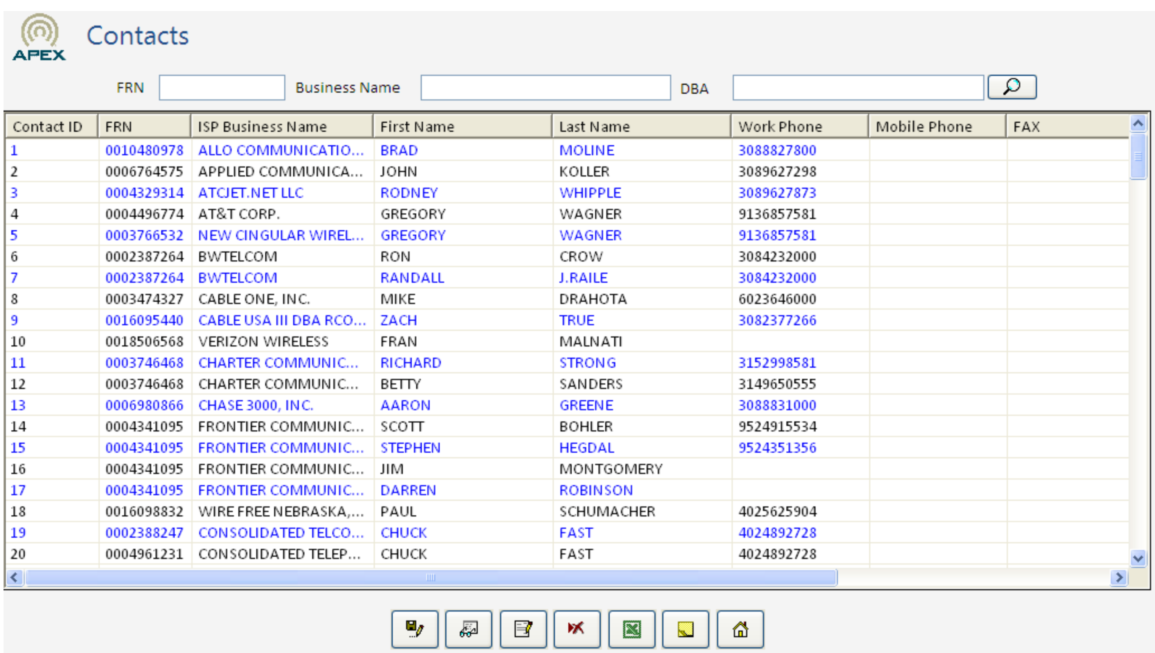


- NOTES:-if you want to add any notes select this as a calling module

Export to Excel

To export the ISP details to Excel by press export button.

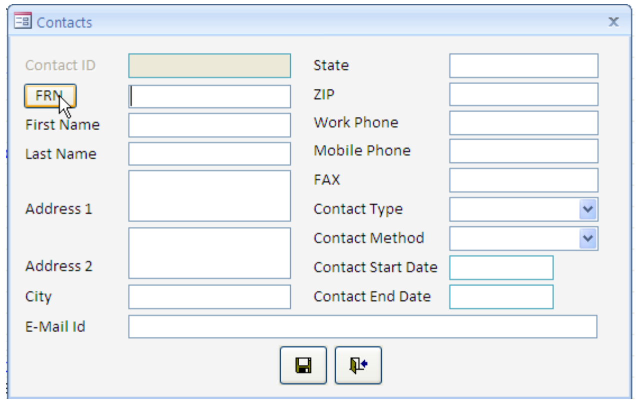
Click on the Contact details, to see the below contact details form. It is also possible to search contact details by FRN, Business Name & DBA and press the search button.



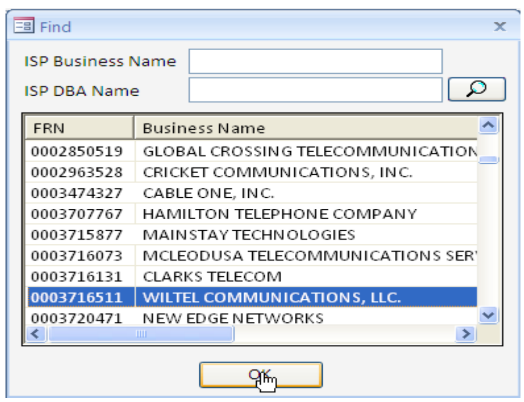
Contact ID	FRN	ISP Business Name	First Name	Last Name	Work Phone	Mobile Phone	FAX
1	0010480978	ALLO COMMUNICATIO...	BRAD	MOLINE	3088827800		
2	0006764575	APPLIED COMMUNICA...	JOHN	KOLLER	3089627298		
3	0004329314	ATCJET.NET LLC	RODNEY	WHIPPLE	3089627873		
4	0004496774	AT&T CORP.	GREGORY	WAGNER	9136857581		
5	0003766532	NEW CINGULAR WIREL...	GREGORY	WAGNER	9136857581		
6	0002387264	BWTELCOM	RON	CROW	3084232000		
7	0002387264	BWTELCOM	RANDALL	J.RAILE	3084232000		
8	0003474327	CABLE ONE, INC.	MIKE	DRAHOTA	6023646000		
9	0016095440	CABLE USA III DBA RCO...	ZACH	TRUE	3082377266		
10	0018506568	VERIZON WIRELESS	FRAN	MALNATI			
11	0003746468	CHARTER COMMUNIC...	RICHARD	STRONG	3152998581		
12	0003746468	CHARTER COMMUNIC...	BETTY	SANDERS	3149650555		
13	0006980866	CHASE 3000, INC.	AARON	GREENE	3088831000		
14	0004341095	FRONTIER COMMUNIC...	SCOTT	BOHLER	9524915534		
15	0004341095	FRONTIER COMMUNIC...	STEPHEN	HEGDAL	9524351356		
16	0004341095	FRONTIER COMMUNIC...	JIM	MONTGOMERY			
17	0004341095	FRONTIER COMMUNIC...	DARREN	ROBINSON			
18	0016098832	WIRE FREE NEBRASKA,...	PAUL	SCHUMACHER	4025625904		
19	0002388247	CONSOLIDATED TELCO...	CHUCK	FAST	4024892728		
20	0004961231	CONSOLIDATED TELEP...	CHUCK	FAST	4024892728		

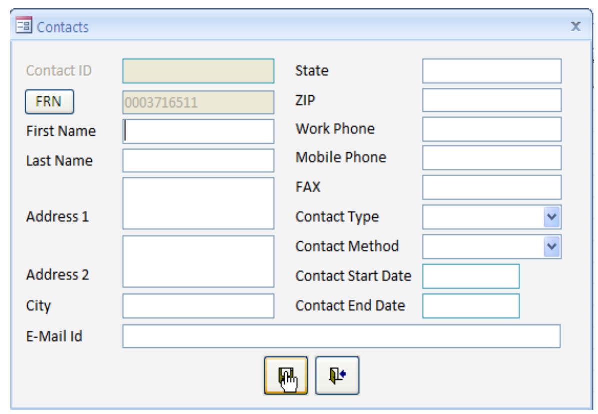
Add Contacts:

Click on add contact button. The Contacts form will be opened.



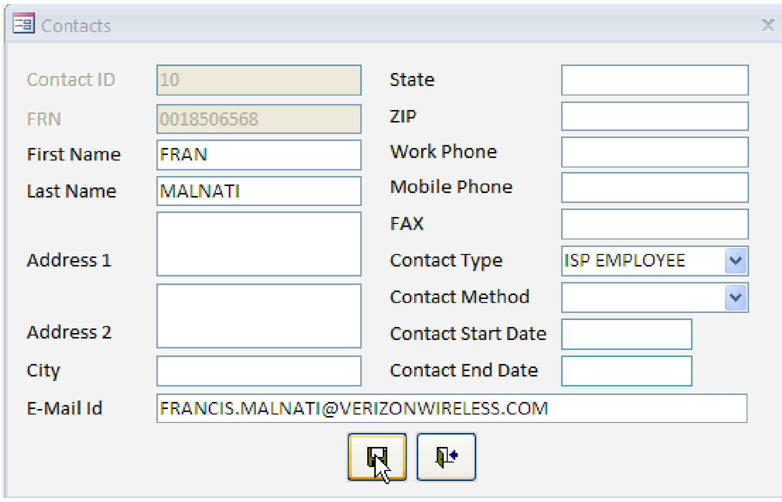
Click FRN button and the Find form will be opened. Select the FRN from the list and press Ok button as shown below. Key in First, Last name, etc and click save button.





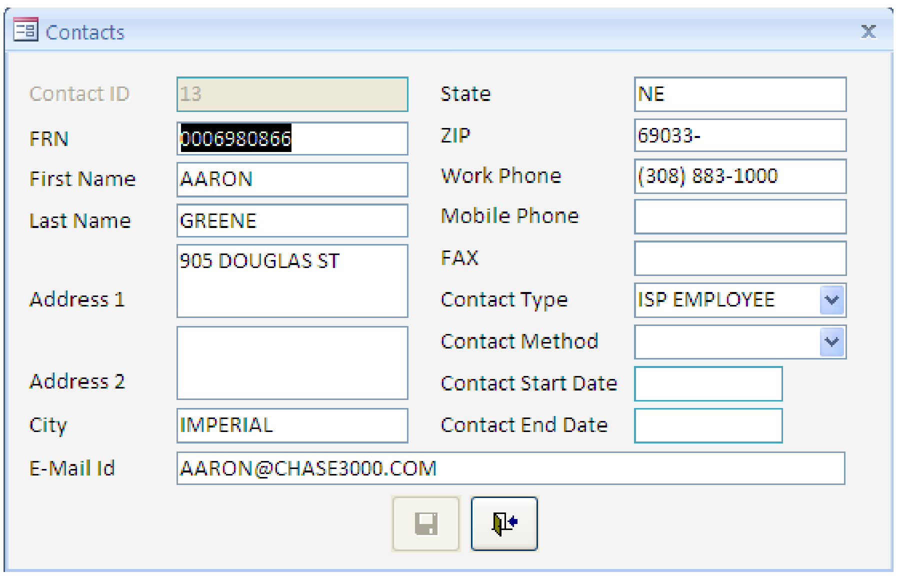
Edit Contacts:

Select contact person from the list view and press edit button. Update the data and press save button.



View Contacts:

Double click contact person in list view or select the contact person and press view button.



Delete Contacts:

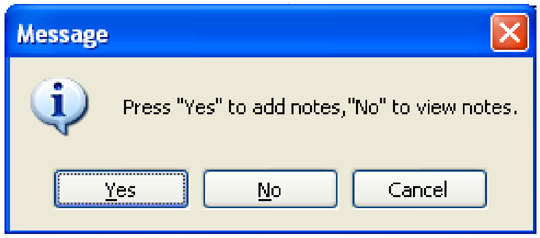
Select contact person whom you want to delete from the list view and press delete button.

Export to Excel:

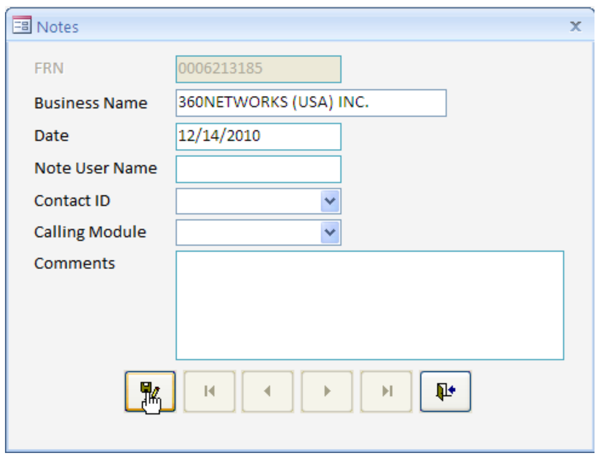
You can even export the Contact details to excel by pressing export button.

Notes:

To add or view notes, select the contact person from the list view and press the Notes button. Clicking the notes button and the following message is shown

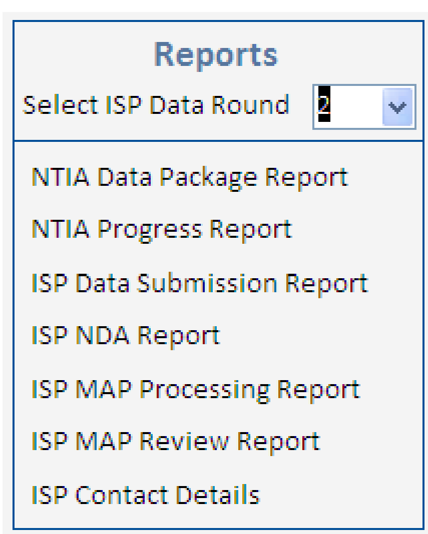


If you press "Yes", the Notes form will be displayed. Key in values and press the save button.



If you press "No", the Notes form will be displayed. You can view all the notes by pressing navigation buttons.

In access database main form there is a report option. Seven reports are available as shown below. Select ISP data round and click on the report name.



Appendix - E DataSlave

DataSlave™ (used in Round 3) is an award winning Windows product designed to help you validate, de-duplicate and transform your data. Quickly move data from in and out of your business applications.

- Migrate data from one system to another
- Import leads into your marketing system
- Validate and correct key data. Includes comprehensive data transformation tools.

DataSlave provides a graphical tool to import, validate, transform and export data. At all times the data can be reviewed in the data panel showing rows that pass validation and those that fail.

Any column can be validated to check, for example,

- The customer ID is in range
- The Contact Name is valid
- The Region is not missing
- The ZIP code is of correct format
- The Phone and Fax numbers are correctly formatted

Data can be mapped onto the fields of your database, and where required, transformed. In this case the Contact Name is split into separate FirstName and LastName fields

Validation of Feature Class in DataSlave

a) BB_Service_Address.

b) BB_ConnectionPoint_MiddleMile.

c) BB_ConnectionPoint_LastMile.

d) BB_Service_CAInstitutions.

e) BB_Service_CensusBlock.

f) BB_Service_RoadSegment.

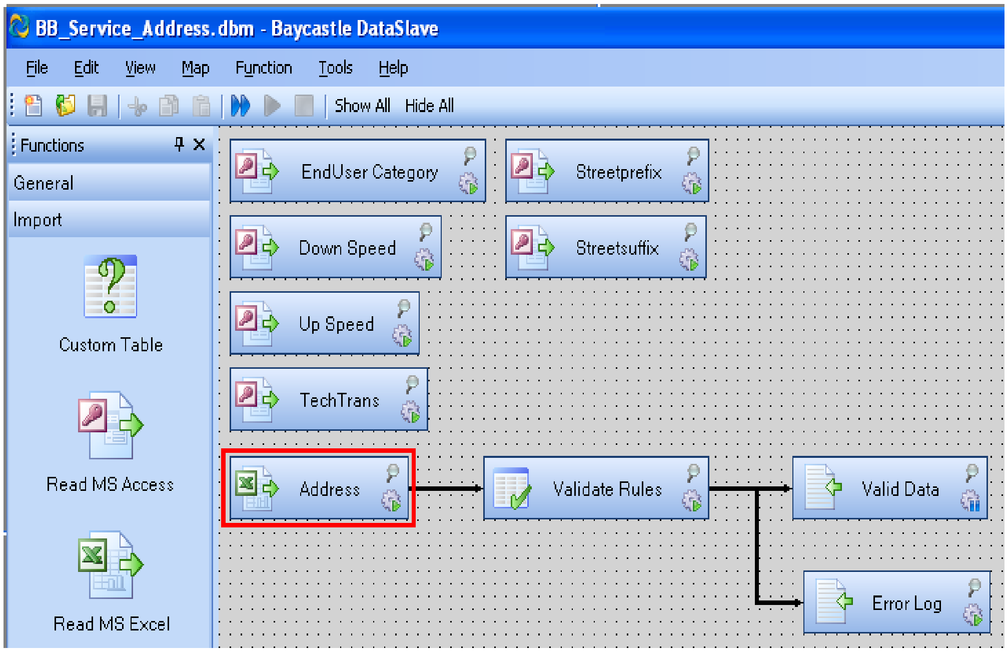
g) BB_Service_Overview.

h) BB_Service_Wireless.

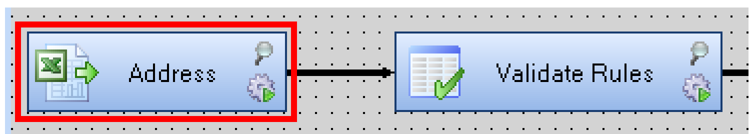
i) BB_Wireless_Antenna

Steps in DataSlave

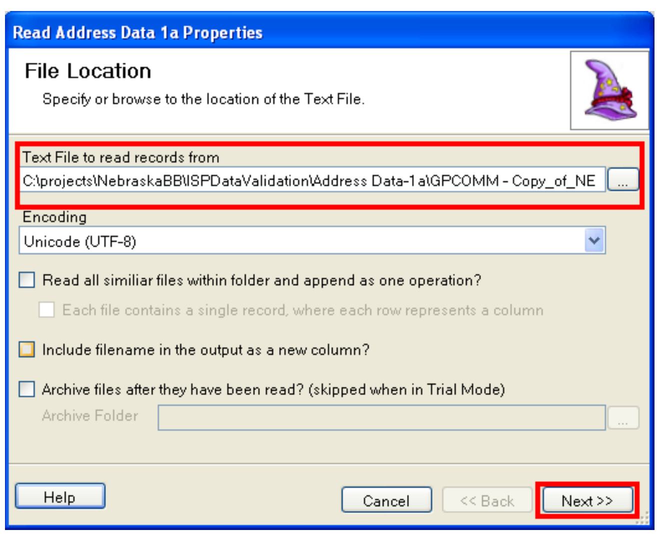
a) Go to "File" menu, click on "Open Map" and the "Open" dialog will be shown, open the file named "BB_Service_Address.dbm", for validate "BB_Service_Address" tab data. The BB_Service_Address Map file was open as shown below.



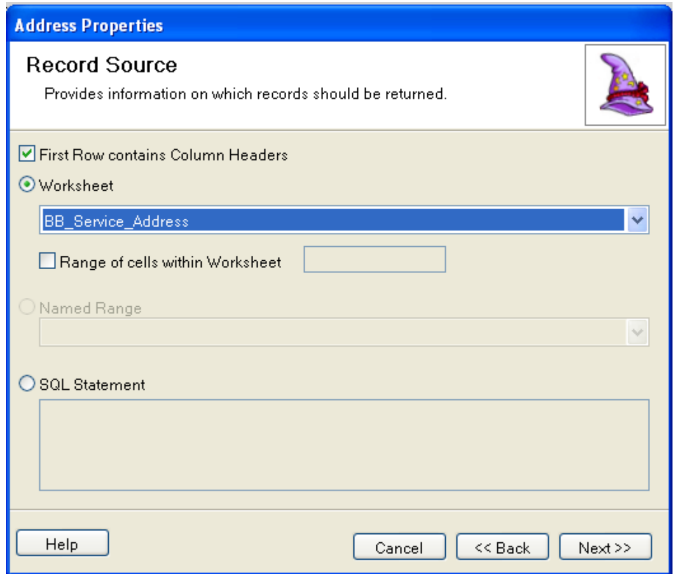
b) Click on the "Address" button for select the file data file



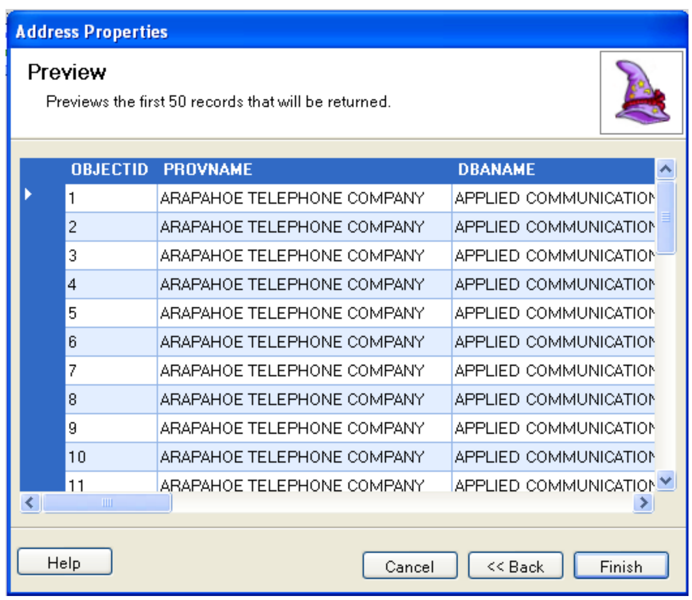
c) Then "File Location" dialog box will apprise as shown below. There select the path of the address file to be validated. Then press Next button.

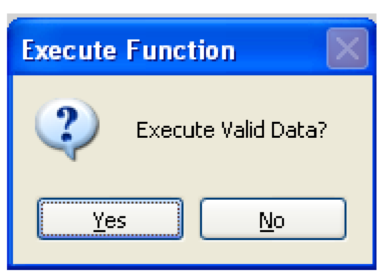


d) "Record Source" dialog box will apprise as shown below. Select the worksheet. Then press the Next button.



e) Preview dialog box will apprise as shown below. Then press the Finish button. Once you click on the Finish button you will get the message box asking "Execute Valid Data?" as shown below, press the "No" button.

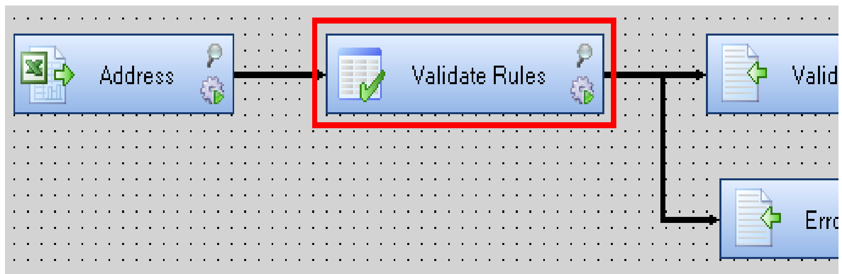




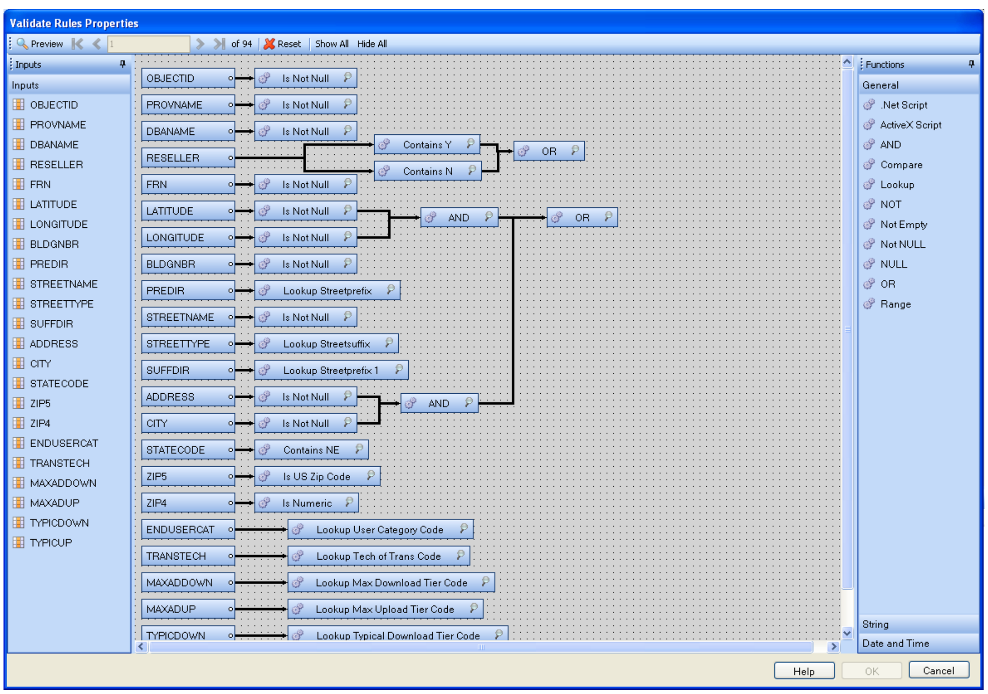
f) Click the double arrow button  on the toolbar to start validating all the Address Data files.

g) A summary of the results of the validation will appear in the "Output" area at the bottom. Invalid records are written to a log file called "Address Data Invalid.log" in the ISP Data directory. Valid records are written to "Address Data Valid.csv".

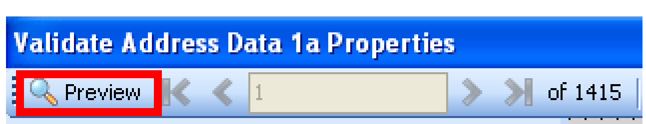
h) If you want to see the validation rules for the "BB_Service_Address. dbm", click on the "Validate Rules" button as shown below.



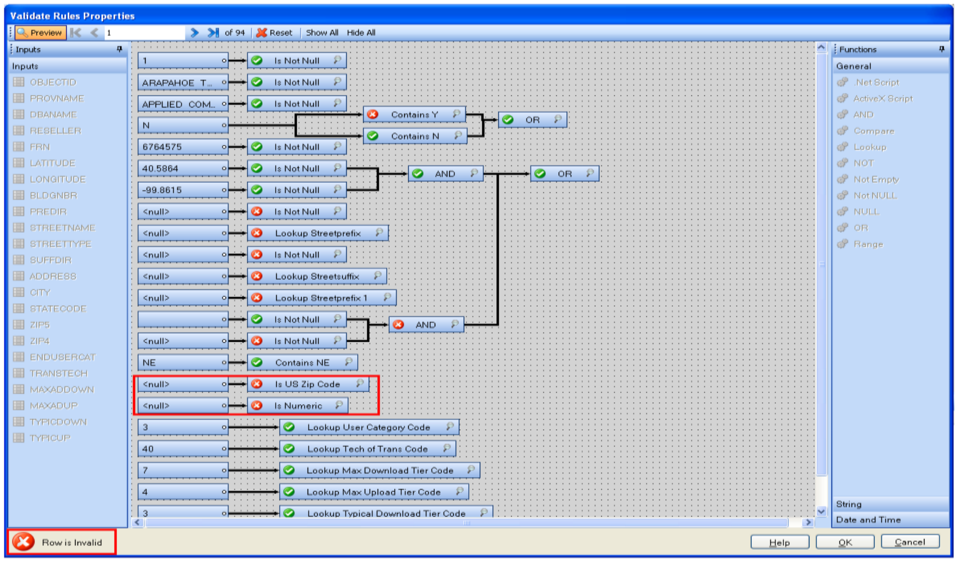
i) See the validation rule for the "BB_Service_Address.dbm" as shown below. It is possible to "Add or Delete or Edit" any rules from here.



j) To preview the validation status for each record, click on the "Preview" button.



k) To check if any record failed the validation checks, the application will mark error (sign.) to the value as shown in the below snapshot.



New Hampshire Broadband Mapping and Planning Program
University of New Hampshire
September 2011 Data Submission

I. Data Description

In accordance with the effective NTIA guidance for Round 4 data submissions, the New Hampshire Broadband Mapping and Planning Program (NHBMPP) submitted the data set described below and associated documents to NTIA in September of 2011.

NH_SBDD_2011_09_30.gdb – file geodatabase containing feature classes for:

Feature Class	Number of Records
BB_ConnectionPoint_LastMile	0
BB_ConnectionPoint_MiddleMile	109
BB_Service_Address	17
BB_Service_CAInstitutions	3,778
BB_Service_CensusBlock	95,452
BB_Service_Overview	0
BB_Service_RoadSegment	33,770
BB_Service_Wireless	37
State_Boundary	1

In total, almost 133,200 individual data records on broadband availability were submitted by New Hampshire. Collectively, these records describe availability as reported by 39 broadband providers in the state, representing an increase of 8 participating providers from the Spring 2011 submission. In addition, the NHBMPP submitted data on 3,778 community anchor institutions, an increase of 402 records from the prior submission.

II. Provider Participation

The NHBMPP has identified 63 broadband providers in the state. As noted above, 39 of these providers actively participated in the program for the Fall 2011 cycle. The participating providers include:

Provider Name	Technology
1. Argent Communications*	Cable, Fixed Wireless
2. AT&T Mobility LLC	Mobile Wireless
3. Charter Ring Communications	Cable
4. Comcast Cable Communications, LLC.	Cable
5. Covad Communications Company	DSL, Middle Mile
6. Cyberpine Cooperative, Inc.*	Fixed Wireless
7. Dunbarton Telephone Company, Inc.*	DSL
8. Earthlink Business (aka One Communications)	DSL, Middle Mile
9. FairPoint Communications, Inc.	DSL

10. Freedom Ring Communications, LLC. (dba BayRing Communications)*	Middle Mile
11. G4	DSL, Middle Mile
12. Granite State Communications (aka Granite State Telephone)*	DSL, Fiber
13. Great Auk Wireless**	Fixed Wireless
14. GWI (aka Biddeford Internet Corporation)	DSL
15. HughesNet	Satellite
16. IAMNOW.net	Fixed Wireless
17. Lakes Region Wireless	Fixed Wireless
18. Level 3 Communications	Fiber, Middle Mile
19. Lightower Fiber Networks*	Middle Mile
20. MetroCast*	Cable
21. OTT Communications	DSL, Middle Mile
22. Oxford Networks*	Middle Mile
23. Sidera Networks, LLC	Middle Mile
24. SkiSat*	Cable
25. Sovernet Communications*	DSL
26. Spectra Access	Middle Mile
27. Sprint	Mobile Wireless
28. StarBand Communications, Inc.	Satellite
29. Tamworth Wireless Cooperative*	Fixed Wireless
30. TDS Telecom	DSL, Fiber, Middle Mile
31. Time Warner Cable	Cable
32. T-Mobile	Mobile Wireless
33. Topsham Communications*	Fiber
34. U.S. Cellular	Mobile Wireless
35. Verizon Wireless	Mobile Wireless
36. Wave Comm, LLC	Fixed Wireless
37. WildBlue	Satellite
38. Wireless LINC of NH and VT (f/k/a NCIC)	Fixed Wireless
39. WiValley	Fixed Wireless

* Provider did not submit revised data for this round. Data collected for the March, 2011 submission was reported as still being effective. All previously submitted data was reprocessed using Census 2010 geography.

** Provider's data submission was incomplete or contained errors. Consequently, data included in NHBMPP submission represents only part of their coverage footprint.

The following 14 providers were identified during prior data submission rounds, but have remained unresponsive to multiple requests to participate in the NHBMPP.

Provider Name	
1. Boston Telephone	2. Broadview Networks
3. CityVoice	4. DSCI
5. ITLLC (f/k/a Russet Communications)	6. NCIA
7. NHvt	8. Qwest Communications

9. RadiusNorth	10. segTel, Inc.
11. SkyWireWifi (f/k/a Akers Pond)	12. telJet
13. The Granite Connection	14. Turnpike Technologies

Finally, the 7 providers listed below were identified during the current submission round from analysis of the FCC Form 477 data (filings through February, 2011). The NHBMPP has contacted these providers, but to this date the providers have either been unresponsive or data has not been received.

Provider Name	
1. Airespring, Inc.	2. BergNet
3. Global Crossing North America, Inc.	4. New Edge Network, Inc.
5. NextWave Wireless, Inc.	6. PaeTec Communications
7. Telovations, Inc.	

The NHBMPP is continuing its efforts to identify active service providers in the state beyond those listed above. Preliminary review of speed tests submitted through the project web site has identified additional providers that may be offering broadband service but are not yet represented in our current listings. Additional analysis will be conducted to identify which of the recorded entities represents new providers, and not providers doing-business-as a currently identified provider, providers operating private networks, out-of-state cellular service providers, and/or providers that are a remnant of mergers.

III. Data Collection and Integration

A. Primary Data Collection

Data Acquisition

Primary data was collected directly from the service providers. The NHBMPP first developed a set of guidance documents based on NTIA specifications, and distributed those to the individual providers. Once the guidance was disseminated, NHBMPP staff followed up with providers via phone/email to encourage participation and address questions, as required. Typically, multiple communications were required to ensure a complete data submission was received.

Data Pre-Processing

To support the data mapping and integration efforts, the following base data sets were acquired and/or retrieved from the NH GRANIT state GIS clearinghouse archives:

- State and town boundaries (based on 1:24,000 USGS DLG files);
- 2001 Land Cover data set (derived from Landsat TM imagery);
- 2010 TIGER Census Blocks;
- 2010 Census MAF/TIGER Road Segments; and
- 2009 USGS National Elevation Data set (NED).

All required NTIA fields were added to the census block and road segment data sets. In addition, the road segments were processed against the census blocks to populate two fields used internally – the left block ID and the right block ID associated with each road segment.

Data Processing and Integration

The broadband availability data was processed and integrated using a suite of GIS tools and procedures, depending upon the format and content of the data submitted by the individual providers. Generally, the processing involved executing one or more of the following steps:

- Scanning and georeferencing paper maps and using the results as a visual reference to select out corresponding features from the project base data sets.
- Geocoding addresses using both an internal locator based on the TIGER road segments, and where required, the ESRI TA_BatchAddress_US subscription service; where NDAs were in place, geocoded points were then used to identify the host census block (if <= 2 sq. mi.), or the TIGER road segment in closest proximity but within 500' (if the host census block was > 2 sq. mi.). Related note(s):
  - In some cases, the selection of the TIGER road segment in closest proximity to the geocoded point yielded a pattern of disconnected road segments with broadband service.
- Using ArcGIS Network Analyst to select road segments within a cumulative distance of 18,000 lineal feet from central office locations. The selected segments were subsequently used to identify adjacent census blocks <= 2 sq. mi. or used as features to quantify coverage along census blocks > 2 sq. mi.
- Processing KMZ image files, using the bounding rectangle to establish interior georeferencing, and then converting the georeferenced image to polygons.
- Utilizing Cellular Expert ArcGIS extension to generate a signal prediction surface for wireless providers submitting antenna locations (and associated data). Related note(s):
  - Working with UNC-Raleigh and a NH-based fixed-wireless provider, the data processing models previously utilized were refined to take into consideration visibility parameters (in addition to vegetation and topography).
  - A -86 DB threshhold was used to define service areas of fixed-wireless providers.
  - In processing the fixed-wireless polygon data, exterior polygons, e.g. those outside of the main coverage footprint, that were < .125 sq. mi. were eliminated. Interior non-coverage polygons were not eliminated.
- Processing satellite coverage footprints to incorporate the Utah shadow analysis (as posted on PBWorks).

Data Processing Issues

The NHBMPP encountered a number of issues in processing the broadband data for the state. These include:

- Most providers submitted data only on areas that are currently served, and not on areas that could be served following the NTIA guidance. This contributed to the pattern of occasional disconnected rural road segments with broadband service.

- Reliance on the TIGER road segments likely yielded overstated broadband coverage in rural areas. A single rural customer address, when geocoded, could result in a long street segment being selected as part of a provider's coverage area.
- Most providers did not submit typical speed data. As the volume of our speed test data set grows, we will explore using this information to estimate typical speeds.
- Fixed wireless providers frequently did not deliver the full set of antenna parameters required for the signal propagation software, and required multiple requests for data followed by requests for clarification of those data submitted. In some cases, data was missing on exact antenna patterns (which in some instances was also unavailable from the antenna manufacturer), and/or on detailed power information specific to an antenna (e.g. power information provided on the host tower only). In these situations, default values were used to run the software. As reported in the previous section, our refinement of the data processing models has yielded improved results despite missing detailed power information.
- Elevation data submitted by middle mile providers was typically reported relative to sea level, not relative to grade.
- Providers who are knowledgeable and experienced with the original 2009 NTIA NOFA and corresponding clarification documentation provided information appropriate to that data schema / model, and modifications to these in June 2011 resulted in additional follow-up required to achieve a complete data submission.
- Migration to the 2010 census data provided some processing challenges. Crosswalking strictly via attributes tables between the 2000 and 2010 vintage data sets was difficult, as we encountered cases where sections of 2000 census blocks were appended/split into 2010 blocks. As a result, the NHBMPP opted to use spatial overlays rather than a crosswalking approach to convert provider data reported based on 2000 geometry to the 2010 standard. All data submitted to NTIA in the Fall 2011 data round was processed against 2010 geometry (census blocks and road segments), regardless of whether the provider submitted data previously or delivered updated information for this submission.
- As a result of reprocessing the data against 2010 geometry, coverage footprints occasionally changed even when providers did not report new data. Some blocks that were formerly greater than 2 square miles were split into smaller census blocks, resulting in coverage that was previously reported in the road segment feature class now being reported in the census block feature class. The opposite situation also occurred, in that some formerly smaller census blocks expanded to cover an area larger than 2 square miles, resulting in the data being reported at the census block level rather than the road segment level.
- For providers who submitted address records, the first process was to geocode those addresses to the 2010 TIGER road segments. For any ungeocoded addresses, the program next utilized ESRI's online geocoding services. Any remaining, ungeocoded records were geocoded manually using Bing. In some instances, records continued to remain uncoded after this three-phase approach. We have identified a number of issues with some of the resulting geocoded data:
    - In reviewing addresses geocoded against ESRI services, we discovered a small number of records that did not appear to be correctly positioned. The incorrect positioning was confirmed by viewing the geocoded points relative to both TIGER road data and by referencing Bing. In some instances, the geocoded

    points were positioned a significant distance away from any mapped road segment. A proximity analysis with a 500' distance constraint was used to identify the closest road in these instances.
  - Finally, some geocoded results were mapped in a town other than the town identified by the provider in their address records. In most instances the geocoded result was to a neighboring town and was within .1 miles of the recorded town. The NHBMPP retained the geocoded locations and notified the provider of these discrepancies.
- For speeds reported by providers in ranges, e.g. 4G LTE, the speed tier reported was selected to include the upper end of the range.
- Some fixed wireless providers continue to report minimum download speeds < 768 kbps, e.g. outside of the NTIA domain, but maximum download speeds within NTIA speed tier domain values. In these instances, the NHBMPP reported the data based on the maximum speed reported.

B. Community Anchor Institutions

Data was submitted for 3,778 Community Anchor Institutions (CAIs) in the state covering the full range of categories established by NTIA, as follows:

Category	Number of CAIs	Percent of Total
1. School – K through 12	770	20.4%
2. Library	774	20.5%
3. Medical/health care	808	21.4%
4. Public safety	566	15.0%
5. University, college, other post-secondary	65	1.7%
6. Other community support – government	745	19.7%
7. Other community support – non governmental	50	1.3%
TOTAL	3,778	100.0%

In this data collection and maintenance round, the collection was largely accomplished by the nine regional planning commissions in New Hampshire, with the Upper Valley Lake Sunapee Regional Planning Commission (UVLSRPC) & NHBMPP staff at the University responsible for developing guidance, for overseeing collection, and for compiling the resulting regional data sets into a standardized statewide layer. The primary steps in the process included:

- Develop a master list of CAIs by category that were not inventoried in previous rounds through review of updated statewide lists (schools, libraries, health care facilities), existing GIS data sets (largely from local hazard mitigation plans), and local knowledge;
- Develop a list of previously identified CAIs with incomplete broadband information;
- Contact those entities to collect their broadband details using an email outreach methodology, as well as phone surveys;
- Map the location of each unmapped CAI, using existing GIS data sets, reference to aerial imagery, property boundaries, web research, and field data collection where necessary;

- Verify data (see verification section below).

IV. Validation

A. Primary Data Collection

The NHBMPP utilized multiple processes to verify the broadband provider data collected during the current round. First, the NHBMPP continued to use local knowledge to conduct an internal analysis of the reasonableness and consistency of our mapping results. Significant overstatements or understatements of service areas resulting from internal processing issues were readily identified and addressed.

Secondly, the Fall 2011 feedback loop with providers was more robust than prior rounds, largely due to increased effort on the part of program staff to solicit comment and the strong relationship now established between the providers and program staff. Unlike in the previous round where feedback/verification was primarily implemented in cases where the provider delivered non-geographic data, this round's efforts engaged all providers, including those who did not submit new data. The NHBMPP returned maps (.pdf files) to each provider for review and correction. Where providers delivered addresses or road segments, the product returned was a geographically referenced version of the data that was submitted. For wireless providers who delivered antenna locations and specifications, the program provided maps that displayed the modeled coverage area generated from the Cellular Expert signal propagation modeling software. Some providers requested the data verification information be provided in shapefile and/or Google Earth (.kmz) format. The process was successful in identifying several significant errors/omissions, e.g. in one instance, a provider identified that their data vendor incorrectly processed the coverage information and required them to resubmit their data for inclusion in the NHBMPP.

Thirdly, the NHBMPP utilized FCC Form 477 filings (through February, 2011) to support the verification of provider coverage areas. Analysis of tracts reported as being served by each provider against those developed from the provider's submission allowed for verification and validation of service areas. There were some instances where a provider's FCC report indicated a greater footprint than indicated by their data submission, and this information was relayed back to the provider during the data review period. In two cases to date, providers identified that their FCC Form 477 was incorrect and would require updating due to the NHBMPP mapping and verification efforts.

The NHBMPP also verified the "reasonableness" of data by comparing current coverage footprints to those reported during the prior round. This allowed us to identify areas where significantly greater (or reduced) service areas were mapped, and to communicate these findings to the provider for verification.

Other verification measures included:

- Speed test – The NHBMPP program has posted a customized speed test on the project web site (iwantbroadbandnh.org). To date, approximately 4,000 records have been submitted. We have processed those data to generate speed result summaries and the locations from which the tests were conducted. Through further analysis of the speed tests focusing on reported providers, the program will compare the service identified to the provider's reported coverage area to ensure there are not areas unreported, and/or areas where speed test results represent a significant deviation from the reported speed tier.

- Broadband survey – The NHBMPP website also hosts an online broadband survey, encouraging users to report their broadband access (or lack thereof) at the address level. The address submitted is then geocoded, which delivers a means of verifying provider coverage data at specific locations. (The survey is also linked to the speed test, so that users completing the form are asked to take the speed test as well.) To date, 324 surveys have been completed.

- Satellite dish survey – The NHBMPP has completed a drive-by inventory of satellite dishes in selected rural areas of the state, under the premise that a cluster of buildings with satellite broadband dishes signifies an area with no other broadband options available. This information has been utilized as part of the internal data review cycle.

B. Community Anchor Institutions

The CAI data has been subjected to several rounds of verification during this and previous data submission cycles. An initial round of verification was completed in May, 2010 by re-interviewing a randomly selected subset of CAI contacts (20% of the entities within each of the 7 data categories). Subsequent verification rounds, including one conducted during July/August of 2011, were accomplished by generating a broadband profile sheet for each CAI, emailing that to each CAI contact for review, and modifying the CAI record based on any updates returned. Over 275 responses were received, and those updates were incorporated in the data set prior to the Fall 2011 submission.

New Jersey Broadband Mapping Project:

Methodology Report on Data Integration and Validation Procedures For September 2011 Submission

September 30, 2011

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Data Processing: Collection, Reception, Loading, Validation

This document presents a description of the process used by the New Jersey Office of Information Technology (OIT) and Telcordia Technologies to collect, receive, load, validate and verify broadband availability and usage data submitted to us by wireless and wireline service providers, CAIs, and other sources and organizations for the State of New Jersey. Individual provider data reports attached hereto provide details on each provider's submission and explain how the policies presented in this document were applied to the data. The CAI summary report, also attached, provides details on the CAI data processing. This report also describes some of the complexities and challenges we have encountered to date in this project.

1 Structure of this Report

This methodology report consists of the following

- Section 2 summarizes our outreach efforts to collect data
  - This section also describes some of the challenges in determining what service providers are in and out of scope for this work and our approach to service provider categorization, in addition to summarizing our efforts to engage CAI constituencies
- Section 3 provides an overview of our process for Service Provider Data Reception
- Section 4 provides an overview of our process for Service Provider Data Loading
- Section 5 provides an overview of our process for Data Validation
  - This section includes a table of business rules and how they were implemented.
- Section 6 provides additional details on two issues related to Geometry
- Appendix A: NJ Provider Data Reports
  - This appendix concatenates 36 files in Microsoft Word format, one file for each provider whose data was included in the submission. Each report provides a narrative describing the steps involved in collecting, verifying, loading, and validating the provider data, including a log of the interactions with the provider.
- Appendix B: CAI Processing Report
  - This is a summary of the details of the CAI processing for this submission.

2 Data Outreach

2.1 Provider Data Outreach

Telcordia and OIT have conducted further outreach this summer to identify additional potential resellers as well as providers not previously participating. We have used web searches and email and telephone contact to investigate the status of these organizations with respect to the NOFA definitions and the goals of this project. OIT will negotiate NDAs with those providers who request them. Providers are given instructions on data requirements, including how to submit via our custom-designed Web site found at http://connectingnj.state.nj.us/.

Most providers were willing to participate, although several have expressed concerns about the burdens of the data collection process. One provider – Hotwire Communications – previously declined to devote any effort to submitting data. The large national providers clearly have processes in place to collect and submit data, while the small local providers require greater assistance. Telcordia offers assistance where possible, allowing providers to submit whatever data they have available in any convenient format. This increases the complexity of the data collection and processing operations, but enables greater coverage of providers. As examples, some smaller wireline providers simply submitted a list of addresses where they offer service and some small cable operators submitted the names of the municipalities they cover.

- In this round we have submitted availability data from 35 facilities-based providers plus one reseller, including five organizations that are new to our program this round (Clearwire, Level 2, NetCarrier Telecom, and Network Billing Systems are new providers and New Edge Networks dba Earthlink Business is a new reseller). We also continued to include the three satellite providers whose data we first submitted in April (i.e., Hughes, Starband and Wildblue). Our initial company list at the onset of this project came from FCC aggregate Form-477 data that we receive under the Form-477 sharing arrangement. We have been subsequently working to expand this list by screening other potential providers and resellers. In addition we have been tracking the evolution of the provider community over time – this includes mergers and acquisitions among organizations as well as organizations that expand their region of operation and go in or out of business.

- There are numerous web-based sources and aggregators that provide information on potential broadband service providers and resellers. As just one example, the Broadband Internet Directory (http://broadband.theispguide.com/) is a consumer website that lists broadband offerings and plans. Other examples are www.dslone.net/nj, www.globalspec.com, www.broadbandinfo.com, etc. We periodically review these sources to identify organizations that may be relevant for this program.
- The broadband industry is dynamic with mergers and acquisitions taking place regularly. We track the consolidation of entities, among other reasons, because the availability data may not reflect the larger organization for some time after the closure of the transaction. Some of the transactions we are currently tracking include: PaeTec acquisition of Cavalier; CenturyLink acquisitions of Qwest and Savvis; MegaPath acquisitions of Covad and Speakeasy; Earthlink acquisition of One Communications; Appia Services acquisition of Voxitas; etc.
- On the reseller front, there is a wide range of entities that fit rather differently into this program, ranging from resellers like New Edge Networks whose data is included in this submission to MetTel who does not maintain engineering data about customer service technologies. We would also like to note that Global Crossing was very responsive to our outreach. As a facilities-based provider who does not meet the 7-10 service provision window, however, they do not meet the NOFA definition.

2.2 Service Provider Classification

We have classified Service Providers into the four categories as follows:

Type 1 = Broadband
These are broadband providers that meet the NOFA definition of a facilities-based provider with a 7-10 service provision time frame.

Type 2 = Reseller
These are broadband providers who do not meet the NOFA definition of a facilities-based provider because they resell facilities that belong to another service provider.

Type 3= Other
These are broadband providers who are known not to be of Type 1 or Type 2. Typically this is either because they cannot meet the 7-10 day service provision time frame or because their service architecture is complex and is neither facilities-based nor a reseller.

Type 4 = N/A
We are not currently using Type 4.

Since it is only Type 1 providers who are squarely in scope for this program, these are the only ones for whom we have ensured that the NDA, provider_ind and submit_ind columns in the service_provider_info spreadsheet are completed. Our rationale for this is the following -- we would not want to categorize a non-Type-1 organization as “will not provide data” or “non-responsive” under provider_ind, as this may appear pejorative.

In our ongoing efforts to reach out to the full set of broadband service providers in New Jersey, we work to identify potential providers and screen them to determine if they are providing or reselling broadband services in the state. We maintain a commented list of those organizations that we have determined not to be New Jersey broadband providers or resellers and of those organizations that remain under investigation. Some of these organizations are no longer active business concerns; some are no longer independent organizations, but have been acquired by other entities; some offer or resell broadband service in other locations but not in New Jersey; some are companies that provide engineering or consulting support around broadband, but do not provide or resell service; and some are firms for which further interaction is needed to definitely determine their situation. Service Providers

During the summer we initiated additional outreach to try and identify potential broadband service providers or resellers and then determine their categorization. The impetus for this effort was the program’s expansion of focus to include resellers and the additional service provider types. Our efforts resulted in the categorization of twenty-nine additional organizations:

- Four additional Type 1 service providers whose data is included in this submission: Clearwire, Level 3, NetCarrier Telecom, Network Billing Systems.

- One additional Type 2 service provider whose data is included in this submission: New Edge Networks dba Earthink Business.
- Two additional Type 3 service providers: airBand Communications (fixed wireless provider with service in Philadelphia; they have one location in New Jersey from which they cannot serve additional customers) and Global Crossing (cannot typically meet the 7-10 day service provisioning time frame).
- Sixteen organizations for which we are still in the process of determining their status and role in the industry.
- Six organizations that are neither broadband service providers nor resellers; these firms are summarized in the table below.

Name of Company	URL	Explanation
American Telephone Company LLC	americantelephoneinc.com	Equipment provider
DatNet Communications Group, Inc.	See under lightower.com	Acquired in 2007 by Lightower.
Hickory Tech Corporation	hickorytech.com	Not currently offering service in New Jersey
Towerstream, Inc.	towerstream.com	Not currently offering service in New Jersey.
World Discount Communications Co.	mywdt.com	Provides discount calling cards.
Yipes Holdings, Inc.	Redirects to Reliance Globecom	Yipes was acquired in 2007 by Reliance.

2.3 CAI Data Outreach

Telcordia and OIT used a variety of means to collect Community Anchor institution data. We collected reference data with lists of CAIs of various types in the state and we collected broadband data from individual institutions via our website and from aggregated sources. For healthcare institutions we had previously obtained a reference list of hospitals from the New Jersey Hospital Association and we augmented this with information parsed from the New Jersey Department of Health and Senior Services (NJ HSS) which maintains on-line records of all licensed health care facilities. For K-12 education we augmented our broadband records with information extracted from NJ applications to the federal e-Rate program. For the e-Rate program, we obtained public information on all New Jersey applications from the USAC website. There are five funding categories established in the e-Rate program, plus a Miscellaneous category. We selected applications that requested funding for the Internet Access category. The available information allowed us to identify these schools as having broadband access

For each CAI category, the following table provides the number of records we obtained from the reference source, the number of broadband access records we obtained, the total number of records we submitted to the NTIA and the number of complete records, with verified address information and broadband access information.

<table>
<tr><th>CAI Category</th><th>Reference Records</th><th>Broadband Records</th><th>Total Records</th><th>Complete Records</th><th>Submitted Records</th></tr>
<tr><td>School K-12 (Public)</td><td>2603</td><td rowspan="2">796 (Web)
478 (eRate)</td><td>2598</td><td>175</td><td rowspan="2">3518</td></tr>
<tr><td>School K-12 (Private)</td><td>1260
(NCES)</td><td>1267</td><td>169</td></tr>
<tr><td>Libraries</td><td>465
(IMLS)</td><td>89</td><td>472</td><td>50</td><td>443</td></tr>
</table>

<table>
<tr><th>CAI Category</th><th>Reference Records</th><th>Broadband Records</th><th>Total Records</th><th>Complete Records</th><th>Submitted Records</th></tr>
<tr><td>Medical/Healthcare</td><td>1107
(NJ-DHHS)</td><td>5</td><td>1107</td><td>5</td><td>1106</td></tr>
<tr><td>Public Safety</td><td>343
(NJ 911 Comm.)</td><td>120</td><td>349</td><td>104</td><td>328</td></tr>
<tr><td>University</td><td>158
(NCES IPEDS)</td><td>39
(NJEdge)</td><td>158</td><td>39</td><td>147</td></tr>
<tr><td>Other – State Government</td><td>0</td><td>2007</td><td>1947</td><td>1947</td><td rowspan="2">1671</td></tr>
<tr><td>Other – Local Government</td><td>0</td><td>54</td><td>54</td><td>54</td></tr>
<tr><td>Other – Non Government</td><td>0</td><td>8</td><td>8</td><td>8</td><td>8</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Total</td><td></td><td></td><td></td><td></td><td>5814</td></tr>
</table>

Abbreviations and Acronyms

911 Comm	New Jersey 9-1-1 Commission
IMLS	Institute of Museum and Library Services
IPEDS	Integrated Postsecondary Education Data System
NCES	National Center for Education Statistics
NJHA	New Jersey Hospital Association
NJ-DHHS	New Jersey Department of Health and Human Services

New Jersey has a strong tradition of home rule and, like many eastern states, a plethora of small governance entities – towns, townships, boroughs, cities, and other local municipalities. Among the major challenges we face in collecting broadband CAI data in the state are the dearth of strong, state-level organizations that might compel members to provide data (as opposed to comparatively weaker coordinating bodies) and the lack of existing broadband data sources. NJEdge's data on the higher education institutions to which they provide service is one of the very few such resources in the state.

NJ OIT executives worked through state-level contacts in public safety, education and libraries, etc., to encourage their constituencies to participate and submit data through the website. While some groups were more responsive than others, many expressed concerns about placing additional burdens in a time of shrinking budgets and cutbacks. Telcordia also conducted individual outreach county-by-county in the state which resulted in some additional broadband submissions from county government through the website.

We encountered a few issues with collection, interpretation and processing of CAI data:

- Some institutions provide information on multiple connections to the internet, each with its own technology of transmission and maximum speeds. These may represent separate redundant connections for a large institution that provides critical services or separate facilities for different classes of users (e.g., staff and clients). Our policy has been to submit a single entry for each institution, using the highest available download speed, but this policy may be a candidate for refinement.
- Satellite institutions such as branch libraries or campus outreach centers can complicate the CAI picture. Our policy is to attempt to collect data for each separate geographic location as a separate CAI.
- Sometimes multiple government offices are co-located in one geographic location; e.g., a large building or complex that may include county government offices, court, jail, and/or other government offices. Here the challenge is not to incorrectly overstate broadband capability or understate the need for broadband services.

- It remains challenging to convince busy employees at CAIs to take the time to provide this data.
- The CAI transfer model requires a street number and for some CAIs this is not readily available as institutions may use a cross street for directions, a PO box for paper mail, etc. We suggest that the NTIA consider making street number *optional* in the transfer model on a going forward basis.

3 Service Provider Data Reception

Telcordia defined a process for handling provider data upon receipt. The following steps describe that process:

These steps must be performed upon receipt of provider data. These steps set up the file system and database for later processing, including both the initial assessment and load, and protect the confidentiality of the information.

1. Update the provider interaction log spreadsheet with the date of receipt and other metadata.
2. Copy the email or decrypt the uploaded files to individual directory on dedicated and secure server.
3. Test that the files can be opened, read, etc. This may require using ESRI ArcCatalog to check a shapefile or file geodatabase.
4. Send an acknowledgement to the provider of receipt of readable submission, or request re-send as needed.
5. Create empty provider data report into the new folder, using the appropriate wireless or wireline template**.**
6. Connect to the PostgreSQL database and instantiate a schema for the provider
7. Import the NTIA transfer model tables to the new schema using ArcCatalog. These are available in the “ntiamodel” schema.
8. Add triggers to the newly imported tables. These triggers update columns with the user name and date/time for each insert and update.
9. Perform an initial evaluation on the submitted data, evaluating the completeness of the submission and the validity and reasonableness of the included values. Interact with provider to address any questions or issues.

4 Service Provider Data Loading

All providers are responding to the mandate to provide the different types of data that go into the various tables in the NTIA data transfer model. The provider data submissions vary in form, format and content and in the ease versus complexity of the processing and loading tasks.

In general, the most straightforward data to process are shape files submitted by wireless providers. Wireline providers who submit census block data are a step up in terms of complexity. Some cable providers simply list the municipalities which they serve. A number of smaller providers provide address lists corresponding to locations where they provide service. These are much more challenging to process as we must first manipulate the address information and then geo-code the locations; these operations can be time consuming and subject to inaccuracies.

The service provider reports attached in Appendix A give the full details per provider on all steps taken to extract, transform, and load the contents of the provider tables into the NTIA tables. Note that every NTIA table has a “shape” column where a geographic feature such as a point, line (e.g., road segment) or area (e.g., census block) must be submitted.

Here is a summary of some of our key policies and challenges:

- All non-disclosure agreements executed with providers prohibit us from disclosing customer addresses. Although some providers have not executed NDAs, we have chosen to treat all providers similarly. We have chosen to obfuscate the address data by transforming it to census blocks or street segments. This carries a slight risk of overstating coverage, but that seems more appropriate than simply dropping the data because it is sensitive.
- Speeds associated with address data from some providers represent the price plan chosen by the customer; they are definitely neither the max advertised speed nor the typical speed. Our decision was to keep the maximum speeds encountered in the census block and report them in the maximum advertised fields and to report typical as null. If customers’ selections in neighboring census blocks were vastly different, we would use the highest speed in a (subjectively defined) area as the maximum advertised speed.
- Maximum advertised speed, combined with the 7-10 availability requirement, results in vagaries in interpretation. In particular, the concept of advertised speed is well suited for providers who offer services to extended areas, such as large telephone and cable television companies. Its application is less clear for smaller providers who offer

service to defined set of specific addresses. They deliver services to those specific addresses, and could offer the same service to a new tenant within the time limit. In some cases, they could increase the speed within that time period as well. They could not easily deliver service to any neighboring location with a two-week period. We have operationalized the notion of maximum advertised speed by determining the maximum speed a provider could offer on the facilities they have in place at customer locations, then reporting that speed for census blocks or street segments.

- After initial poor results in geo-coding the customer address lists provided by some cable providers who had no geo-spatial capabilities, we identified an alternate approach that leveraged the franchise-nature of cable television service in the state. We asked those cable TV providers to send us the list of municipalities that they are licensed to serve. We build the submission by locating the municipality shapes and using those shapes to find all census blocks contained within them. For large census blocks, we report all the TigerLine street segments that are contained within those blocks.
- For middle mile data, the exact definition of a connection point remains open to interpretation and requires further development. We are not completely sure that all providers interpret middle mile in the same fashion and do not have a clear enough picture ourselves to provide appropriate guidance or validation. Despite this, we have submitted the middle mile information that we received.
- All but one provider submitted 2010 Census Blocks (CBs). Xchange was the one provider who submitted 2000 CBs, requiring us to map the coverage to 2010. This results in a modest overstatement as we show availability for all 2010 CBs for which there is overlap with a 2000 CB in their serving territory.

5 Data Validation

Incoming data was subjected to a number of validation checks. When incoming data failed a validation check, we first investigated our process to ensure that we were not inadvertently creating an issue. If the problem was determined to be with the submitted data, we notified the provider concerned and recorded the interaction in the provider data report as provided in Appendix A. Where possible, we impute missing data. As reported with our April submission, we have attempted to perform some data validation using the FCC speed-test data, but had limited success due to the sparseness of the coverage of the speed-test data. Recent FCC speed test data is showing a reduction in the number of measurements, which only increases the sparsity.

We have observed a few issues that arose when processing the current submission:

- The alignment of Tiger Lines and 2010 CBs has sometimes been problematic, particularly for large CBs. When a 2010 CB has a Tiger Line road segment as part of its boundary, we have found a number of examples where there is misalignment which makes the road segment appear to be within a specific CB rather than as a boundary. Please see Section 6.1 for an example.
- New Jersey placenames can be difficult. We validate against data from the following sources: State of New Jersey geographic information (https://njgin.state.nj.us/NJ_NJGINExplorer/DataDownloads.jsp), the Federal Government placename information (http://geonames.usgs.gov/domestic/download_data.htm), and the US Postal Service data (available for a fee).
- A survey of 3100 New Jersey households was conducted in November and December by Rutgers University as Telcordia's subcontractor under this program. Householders who responded that they were broadband users were asked who their service provider was and this was compared against service provider serving areas. 95% of the responses aligned with service provider information. In the remaining 63 cases, the survey respondents reported being served by a provider whose coverage area did not appear to cover that location. Through these cases we have identified an area for additional investigation which may lead to improvements in service provider coverage. The technique, based on geo-spatial analysis of neighboring CBs is briefly described in Section 6.2.
- T-Mobile submitted wireless coverage data that provided one of the more interesting validation issues. T-Mobile provided separate information about three different varieties of 3GPP-based wireless technology, each of which supports broadband data services through mobile terrestrial wireless service capability; namely: UMTS, HSPA21 (i.e., HSPA) and HSPA42 (i.e., HSPA+)[1]. In order to avoid duplicates – that is, rows of T-Mobile data with

[1] Here are a few more technical details. UMTS is based upon 3GPP release 99 and is the oldest and slowest of the three varieties. HSPA (HSPA21) is 3GPP R6 which supports HSDPA and HSDPU for downlink and uplink high-speed packet access and offers

identical shapes and the same technology and spectrum codes, differing only in maximum speed, we performed spatial joins separately for each of UMTS, HSPA21 and HSPA42. We then submitted one shape for each 3GPP technology.

- The End_User_Category for Census Blocks or Road Segments is an optional field for designating the geography as being primarily Residential, Non-Residential, or Other (primarily neither Residential nor Non-Residential). Based on discussions with NJ OIT we have elected not to complete this field as OIT does not have a trusted data source for this information.

We applied the business rules in the script supplied by the NTIA and other data-specific validations after the data were loaded into the tables. These were applied as a check on both the data supplied by the providers and on the process we used for data collections, reception and loading.

The following business rules were applied above and beyond those in the NTIA script:

We checked uniqueness of the entries in each table, using the following definitions of uniqueness:

Layer	**Unique key**	**Notes**
Middle Mile	frn, latitude, longitude	
CAI	anchorname, address, transtech	
Census Block	frn, fullfipsid, transtech	
Street Segment	frn, tlid, transtech	Tlid is an internal column.
Wireless	frn,transtech, spectrum, shape	

We also performed the following additional validations:

Layer	**Validation Rules**
Middle Mile	• Check (dbaname, provname, frn) against our FRN reference table • Valid census block id within the state of New Jersey • Check latitude not between 38.7 and 41.4 • Check longitude not between -75.6 and -73.8 • Shape should not be empty • All check_submission rules
CAI	• Valid zip code • Check latitude not between 38.7 and 41.4 • Check longitude not between -75.6 and -73.8 • Shape should not be empty • All check_submission rules
Census Block	• Check (dbaname, provname, frn) against our FRN reference table • Valid census block id within the state of New Jersey • The area of a census block should be less than < 2 square Mile • Shape should not be empty • All check_submission rule
Street Segment	• Check (dbaname, provname, frn) against our FRN reference table • Street segment is present in a census block >= 2 square miles • Shape should not be empty • All check_submission rule

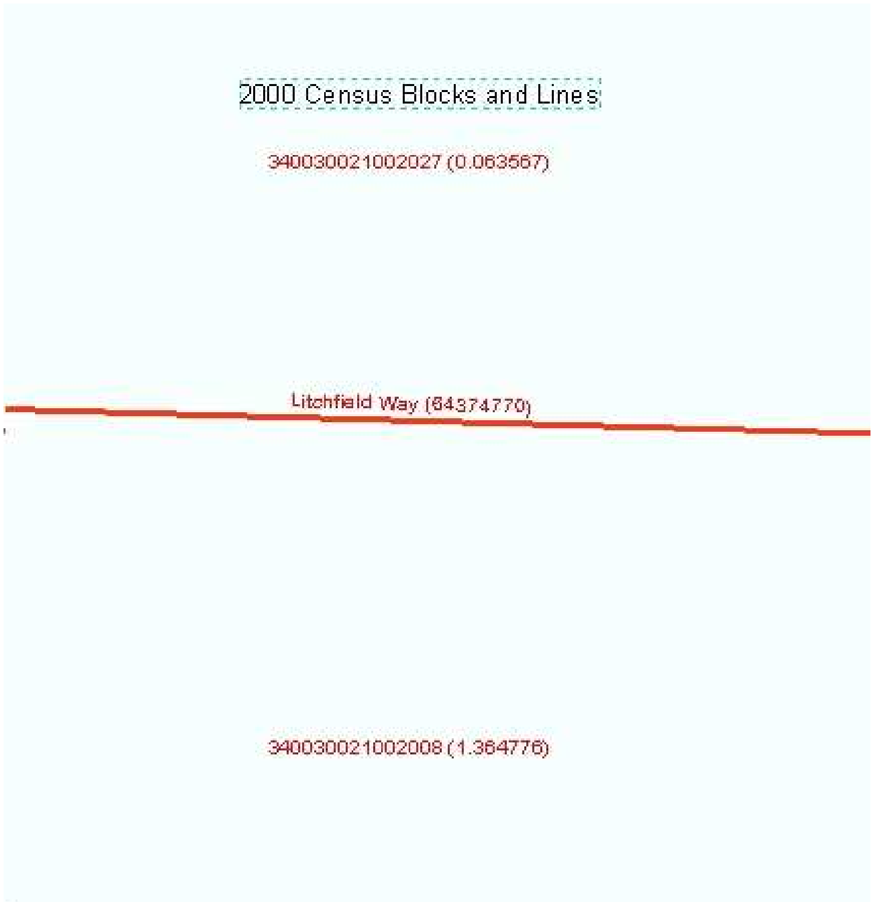
intermediate speeds. HSPA+ (HSPA42) is 3GPP R7. It is the most advanced of the three and supports high-speed packet access evolution with peak data rate increases from MIMO and higher-order modulation, among other technical advances.

Wireless	• Check (dbaname, provname, frn) against our FRN reference table • Shape should not be empty • All check_submission_rule

6 Two Issues in Geometry

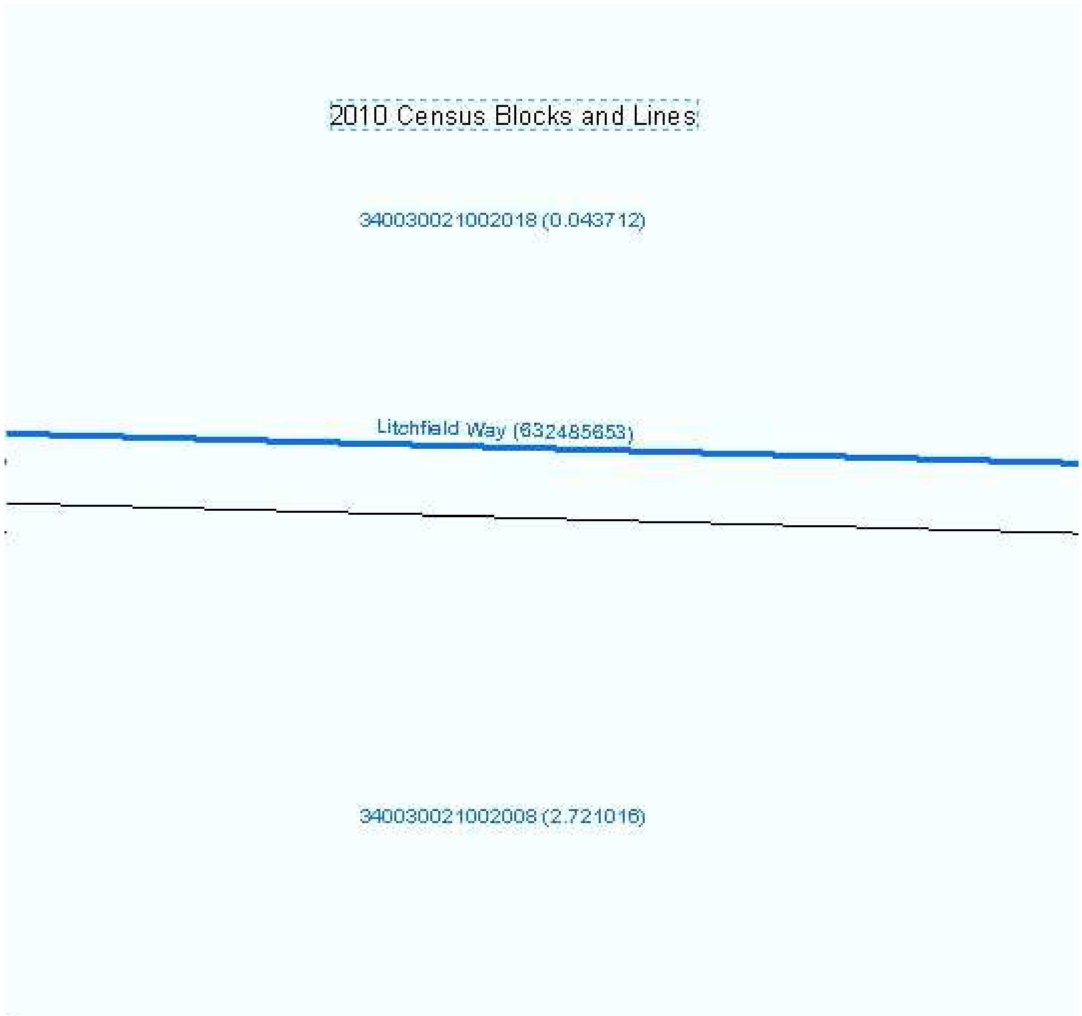
6.1 Tiger Lines and 2010 Census Block Misalignment

Here is an example of two 2000 Census Blocks and the Tiger Line which forms part of the boundary illustrating proper alignment.



The next page shows an example of the same geometry with 2010 Census Blocks and illustrates the misalignment between the line and the CB boundary.

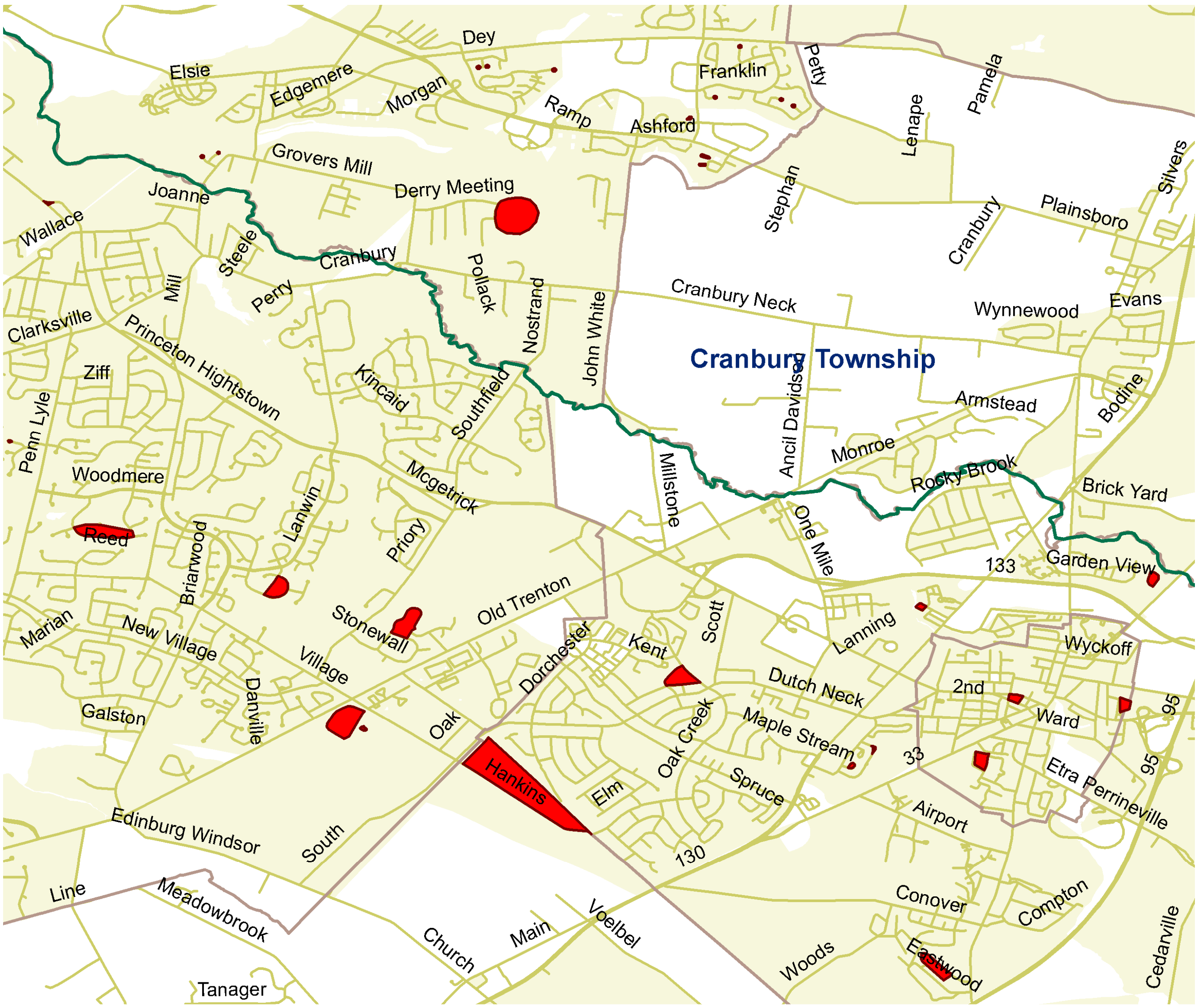
Misaligned line and 2010 CB boundary:



6.2 Gap Analysis of Neighboring Census Blocks

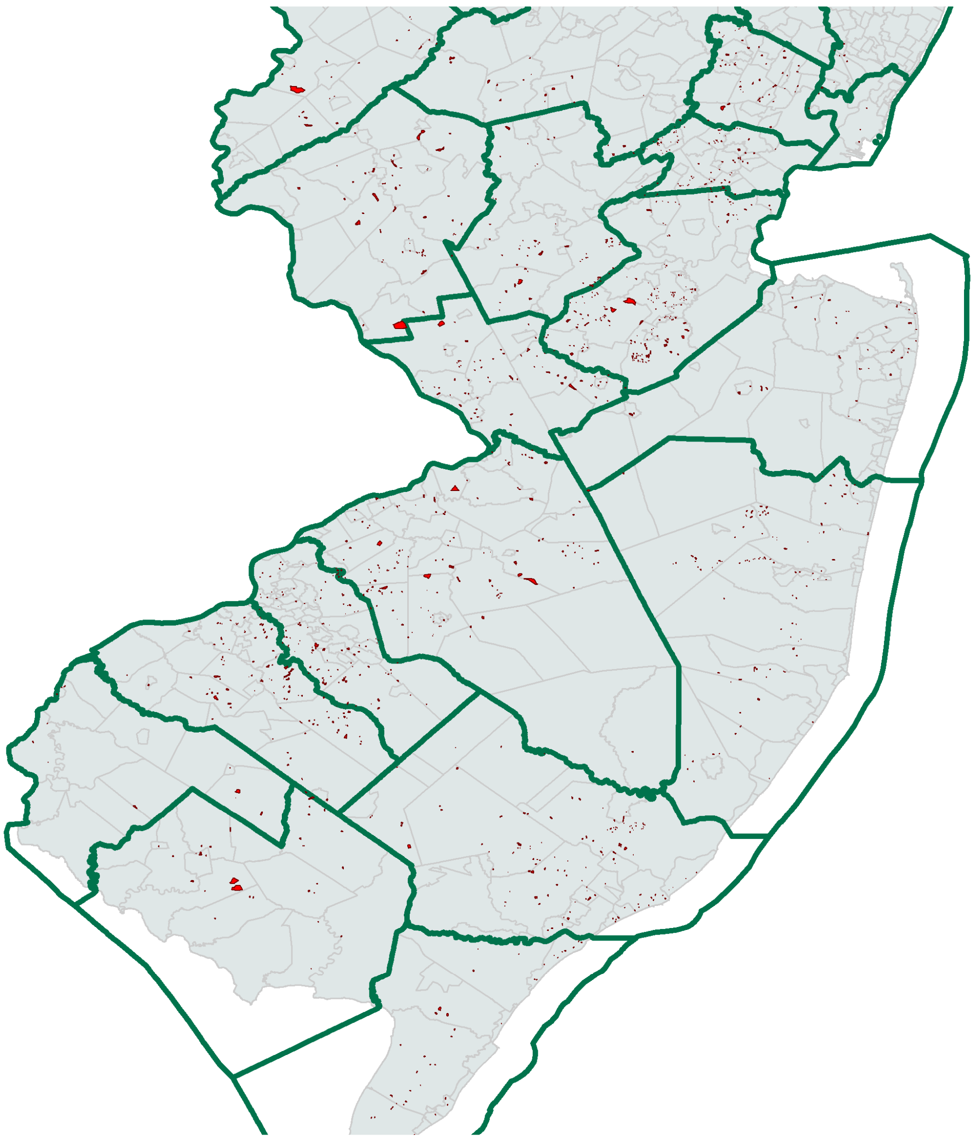
The analysis of the survey data identified some instances where a survey respondent identified their service provider and then the service provider's data did not show coverage in that respondent's Census Block. Further analysis indicated that a number of these instances occurred in 'gaps' or 'holes' in submitted provider coverage data. One way to define a simple hole is that it is a single CB that is not in the stated provider coverage area when all neighboring CBs are in the stated coverage area. Our investigations of these simple holes showed that some are associated with zero-population CBs – e.g., a CB that comprises a strip of land neighboring a major roadway. Other simple holes, however, appear to be anomalies in service provider data as we find examples of a residential CB, surrounded by other residential CBs, and no clear rationale to explain why the initial (middle) CB would not have coverage when all neighboring CBs do have coverage.

The next figure shows a few simple holes in Comcast data from Cranbury Township at a fine resolution.



Our analysis of the simple holes shows that some are anomalies that may provide a way to improve the accuracy of provider data. To pursue such possible improvements, we developed software that automates the identification of simple holes. Somewhat to our surprise, when we ran this software on the data for this submission, we found rather sizeable numbers of holes for some of the providers. For example, we identified almost 250 simple holes for Cablevision (including Lightpath) and over 1400 for Comcast. The following graphic illustrates the simple holes for Comcast.

Graphic of Simple Holes in Comcast Data:



Given the number of holes, it is apparent that conveying them one-by-one to providers for review is not feasible. However, the identification of these simple holes opens an avenue for implementation of additional automated verification of service provider coverage. Essentially what we are considering is entering the geospatial locations of the holes in major providers' on-line service availability systems in a mechanized fashion. This would allow us to conduct an efficient and automatic internal consistency check between provider data and the web-based service availability systems offered by major providers.

New Jersey Broadband Mapping Project:

Detailed Methodology Report on Data Integration and Validation Procedures For September 2011 Submission

September 30, 2011

Grantee:
New Jersey Office of Information Technology
200/300 Riverview Plaza
PO Box 212
Trenton, NJ 08625

Contact:
Shelley Bates
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609-633-9605

Contractor:
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1 Telcordia Drive
Piscataway, NJ 08854

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732-699-2687

Table of Contents

Overview

This document is a concatenation of the individual data reports for each provider whose data was processed and included in the October 2011 submission to the NTIA.

Provider: Advanza

Received: August 2011
Submission date: October 2011

This report presents details on processing of broadband data for delivery to the National Telecommunications and Information Administration.

Section 1: NDA Status

Advanza states that NONE is required.

Section 2: Submission Overview

<table>
<tr><th colspan="3">AVAILABILITY DATA – RECEIVED AUGUST, 2010</th></tr>
<tr><td rowspan="5">ID</td><td>Provider name</td><td>Advanza Telecom Inc</td></tr>
<tr><td>“Doing business as” name</td><td>Advanza</td></tr>
<tr><td>FRN</td><td>0017029141</td></tr>
<tr><td>Holding Company Name</td><td>Advanza Telecom, Inc.</td></tr>
<tr><td>Holding Company Number</td><td>180002</td></tr>
<tr><th colspan="3">FOR WIRELINE</th></tr>
<tr><td>Filetypes</td><td colspan="2">1 xlsx spreadsheet</td></tr>
<tr><td>File size</td><td colspan="2">NJBB_0017029141_AddressLevelAvailability-20110630.xls file has 47 records</td></tr>
<tr><td>Speeds</td><td><table>
<tr><th>Type</th><th></th><th>Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)</th></tr>
<tr><td>Typical-upstream</td><td>X</td><td>address</td></tr>
<tr><td>Typical-downstream</td><td>X</td><td>address</td></tr>
<tr><td>Advertised-upstream</td><td>X</td><td>address</td></tr>
<tr><td>Advertised-downstream</td><td>X</td><td>address</td></tr>
<tr><td>Subscriber-weighted-up</td><td>☐</td><td>Not provided</td></tr>
<tr><td>Subscriber-weighted-down</td><td>☐</td><td>Not provided</td></tr>
</table></td><td>All provided speeds have code 4 (1.5 mbps ≤ BW < 3.0 mbps) for all records, which would make sense if all service is T1</td></tr>
<tr><td>Technology Type</td><td colspan="2">Code 30 (= Other Copper Wireline) given for all records</td></tr>
<tr><td>End-user specification</td><td colspan="2">Data not available</td></tr>
<tr><td colspan="3">Comments:</td></tr>
</table>

INTERCONNECTION DATA	
ID	
File size	No data provided
Ownership	
Transport Type	
Data Rates/Capacity	
Location	
Comments:	

Section 3: Submission File Details

Received one file by secure upload to the connectingnj web site.

Size	Name
71,168	NJBB_0017029141_AddressLevelAvailability-20110630.xls

The addresses in this file appear to be for individual customers (as opposed to addresses of multi-tenant buildings in a central business district).

Section 4: Validations and Results

All addresses were successfully geocoded using Arroyo with Yahoo geocoder. All records successfully spatially joined on 2010 NJ Census Block shapes.

Passed all validations described in summary report.

Section 5: Data Transformation and Loading

The standard NDA prohibits us from submitting address-level data to the NTIA. Instead, we discover the census block for each customer address, and then report the census block shape drawn from Census Bureau TigerLine reference data.

NTIA Table BB_Service_CensusBlock

Loaded from the file mentioned above. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	Set to " Advanza Telecom Inc" (no trailing period)
DBANAME	Not supplied; set same as PROVNAME

PROVIDER_TYPE	Set to 1
FRN	Set to "0017029141"
STATEFIPS	Set to “34” (NJ)
COUNTYFIPS	Populated from Census Block FIPS Code (first 3 digits)
TRACT	Populated from Census Block FIPS Code (next 6 digits)
BLOCKID	Populated from Census Block FIPS Code
FULLFIPSID	Populated from Census Block FIPS Code
TRANSTECH	As supplied in column Tehcnology of Transmission (sic)
MAXADDOWN	As supplied in column Maximum Advertised Downstream Speed
MAXADUP	As supplied in column Maximum Advertised Upstream Speed
TYPICDOWN	Set to null (see below)
TYPICUP	Set to null (see below)
ENDUSERCAT	Set to null (see below)
SHAPE	Copied from Census Bureau TigerLine 2010, as matched by spatial join on geocoded address

Internal processing notes:

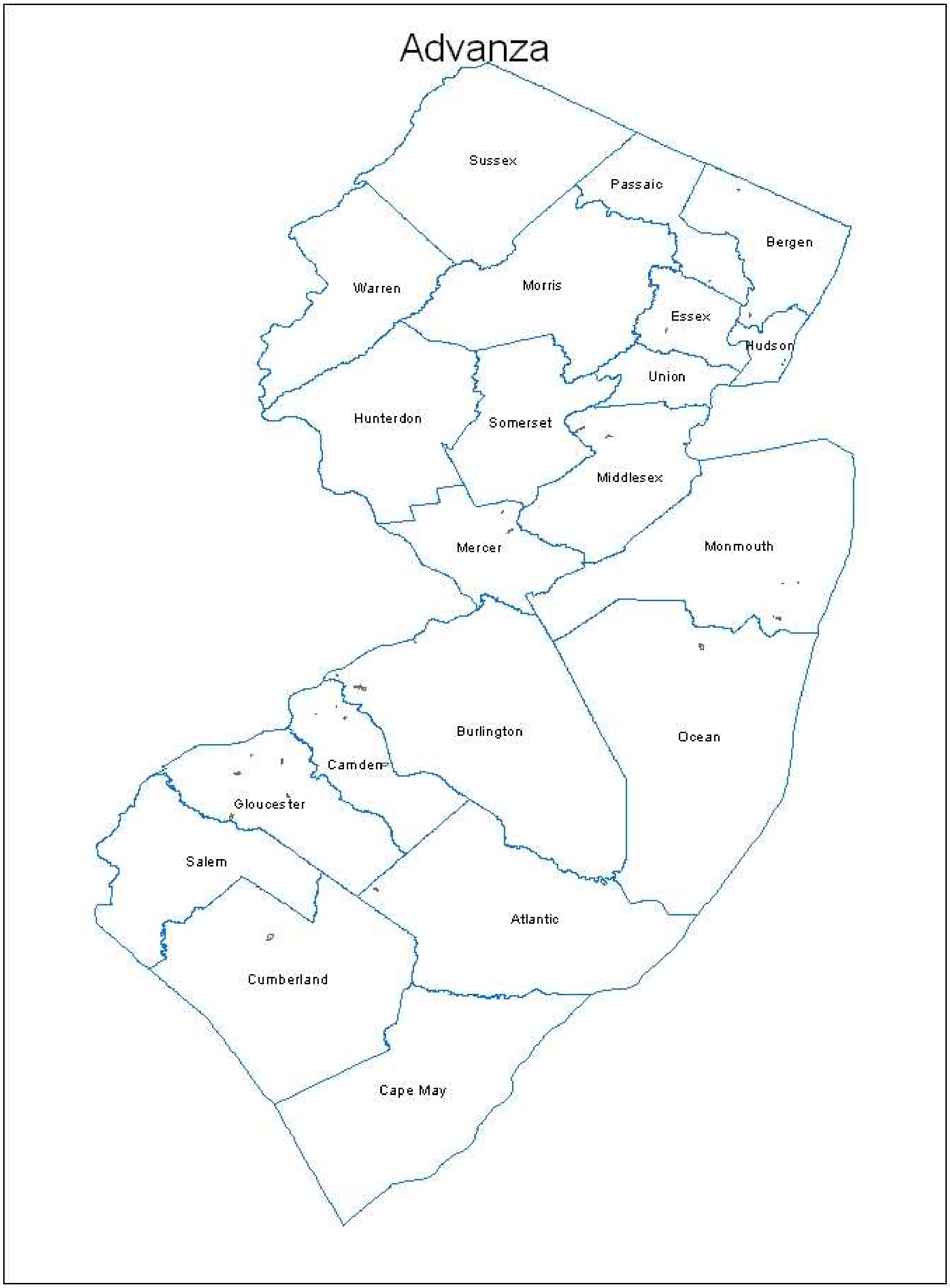
1. Geocoded the addresses using an Arroyo flow and the Yahoo geocoder, leaving the result with address and lat, long data in an Excel spreadsheet.
2. Imported the spreadsheet to a simple ESRI geodatabase table
3. Added point shapes corresponding to each Latitude,Longitude pair by creating a feature class from the table using ArcCatalog’s “Create Feature Class from XY Table” option
4. Added a column containing the ID of the containing year 2010 census block using ArcCatalog's spatial join feature. The newly created point shapes are joined against census block shapes from reference data.
5. Discarded typical speeds since they were in all cases identical to maximum advertised speeds, not measured values.
6. The end user category value as originally supplied applied to an address. The NTIA directs us to report the “predominant” end-user category, which is not supplied here.
7. Copied contents to the target data model table with the transformations specified above. Discarded 15 rows with duplicate census blocks.

Section 6: Clarification Questions and Responses

None required as part of initial review.

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Provider: AT&T Mobility LLC

Received: August 4 2011
Submission date: October 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Section 1: NDA Status

NDA was executed with NJ OIT.

Section 2: Submission Overview

AVAILABILITY DATA		
ID	Provider name "Doing business as" name FRN	AT&T Mobility LLC AT&T Mobility LLC 0004979233 for mobility NB: "AT&T Corporation, Inc." with FRN 0004979244 for middle mile
FOR WIRELESS		
Filetypes	shapefile collection: shp/dbf/prj/shx, mdb, gdb, imagefile etc.	Spreadsheet (XLSX) and shapefile that uses projection GCS_WGS_1984
Speeds	Type	Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode)
	Upstream max adv	State
	Downstream max adv	State
	Upstream typical	Not provided
	Downstream typical	Not provided
	Subscriber-weighted	Not provided
Technology Type	Spectrum (Mhz, FCC code)	Cellular (code 1) and PCS (code 3)
Comments:		
INTERCONNECTION DATA		

ID	
File size	Single row
Ownership	Code 0
Transport Type	Code 1
Data Rates/Capacity	Code 6
Location	Newark, NJ
Comments: Single location provided	

Data overview:

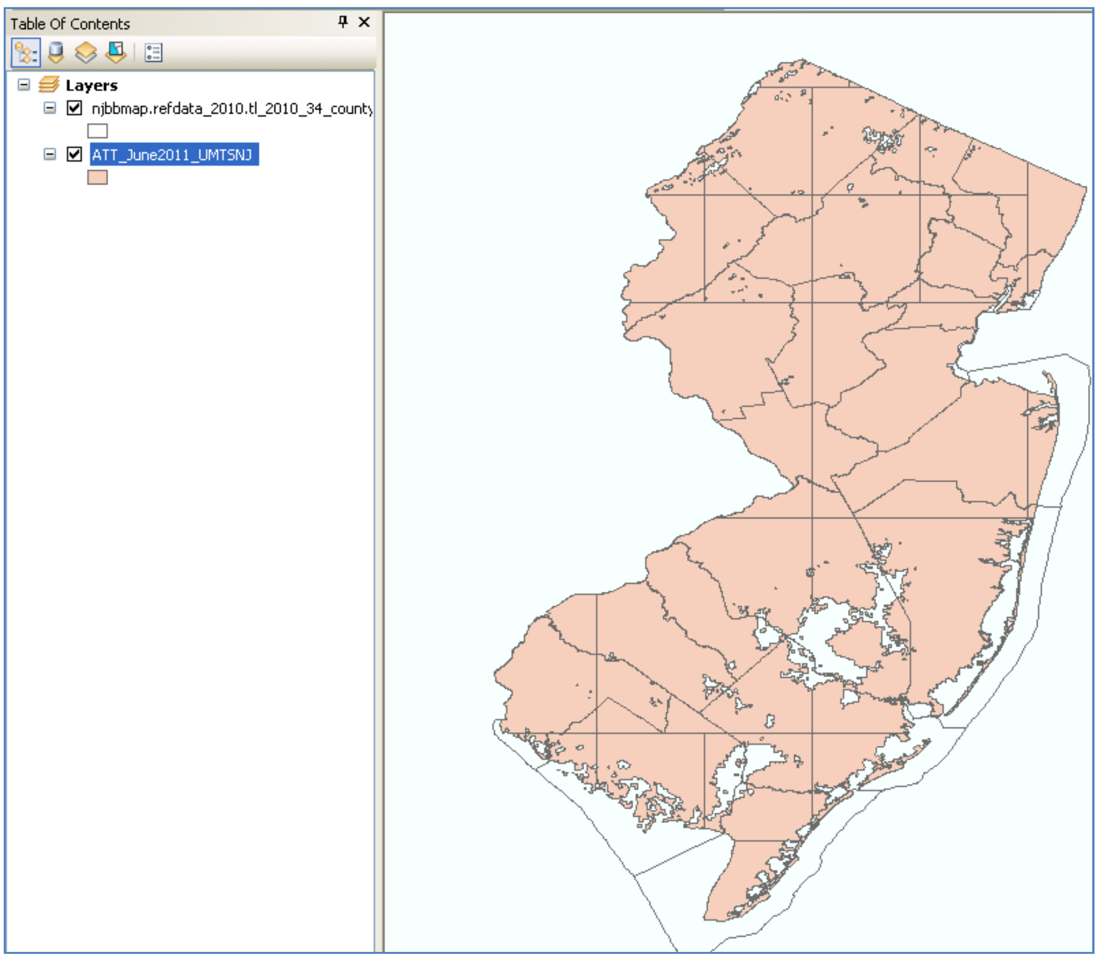


Figure. Quick load of data into ArcMap

Section 3: Submission File Details

Received six (6) files by SECURE UPLOAD:

Size kb	Name
9	Mobility Response NJ June 2011.xlsx
3	ATT_June2011_UMTSNJ.DBF
1	ATT _ June2011_UMTSNJ.PRJ
488	ATT _ June2011_UMTSNJ.shp
1	ATT _ June2011_UMTSNJ.SHX
8	ATT Router Locations NJ June 2011.xlsx

Subscriber-Weighted Nominal Speed by county was NOT provided.

Middle-mile (connection point) data is available in a previous submission.

Section 4: Validations and Results

File "Mobility Response NJ June 2011.xlsx"

Contains a single row with provider name, DBA name, FRN, technology of transmission, a specification of the spectrum bands used, and the maximum advertised up/down speeds. The FRN is missing the leading zeros. The TechTrans code is valid. The max speed values are plausible.

Shapefile "NJ_June2011_UMTSNJ" (DBF, PRJ, SHP, and SHX file extensions)

Contains a 63 rows representing a multiple polygons. No text attributes are associated with the row. The coverage area is most of the State of New Jersey, broken into separate shapes by various horizontal and vertical lines. The map strongly resembles the map shown at www.wireless.att.com.

Section 5: Data Transformation and Loading

NTIA Table BB_ConnectionPoint_MiddleMile

Loaded from supplied Excel Spreadsheet "ATT Router Locations NJ June 2011.xlsx" (1 row). The following table explains the transformations that were applied.

Table Column	Data Source / Transformation
PROVNAME	As supplied
DBANAME	As supplied
FRN	Added leading zeroes to read 0004496774 (see below)

OWNERSHIP	As provided in column “Ownership”
BHCAPACITY	As provided in column “Serving Facility Capacity”
BHTYPE	As provided in column “Serving Facility Type”
LATITUDE	As provided in column “Latitude_geo”
LONGITUDE	As provided in column “Longitude_geo”
ELEVFEET	Set to “0” (zero)
STATEABBR	Set to “NJ”
FULLFIPSID	ID of containing census block from Year 2010 Census Bureau TigerLine reference data
SHAPE	Created using ESRI ArcDesktop

Internal notes on processing:

1. Used the provider name, DBA name, and FRN as supplied, after adding back leading zeros to the FRN. Note that the middle-mile entity is different than the mobility entity and per clarification from AT&T during the October 2010 submission round, should indeed be reported differently.
2. Imported the excel sheet to a geodatabase table.
3. Added point for the Latitude,Longitude pair by creating a feature class from the table using ArcCatalog’s “Create Feature Class from XY Table” option.
4. Mapped to separate shape file to correct tolerance.
5. Added a column containing the ID of the containing year 2010 census block via a spatial join of the points and the census block shapes from reference data.

NTIA Table BB_Service_Wireless

Loaded from the supplied shapefile “EVDO_NJ”. The following table explains the transformations that were applied.

Table Column	Data Source / Transformation
PROVNAME	Set to “AT&T Mobility LLC”
DBANAME	As supplied in file Mobility Response NJ June 2011.xlsx
FRN	Set to 0004979233
TRANSTECH	As supplied in file Mobility Response NJ June 2010.xlsx
SPECTRUM	Set to “3” per translation shown below
MAXADDOWN	Set to “4”, see below.
MAXADUP	Set to “3”, see below.
TYPICDOWN	Not provided, set to null
TYPICUP	Not provided, set to null
STATEABBR	Set to “NJ”
SHAPE	As supplied.

Internal notes on processing:

1. The supplied shape uses geographic coordinate system name GCS_WGS_1984 The NTIA data model requires the same coordinate system. No geographic transformation was required, but the XY Tolerance values differ if the shapefile is

imported trivially into the geodatabase. Imported shape then mapped to separate shape with proper tolerance.

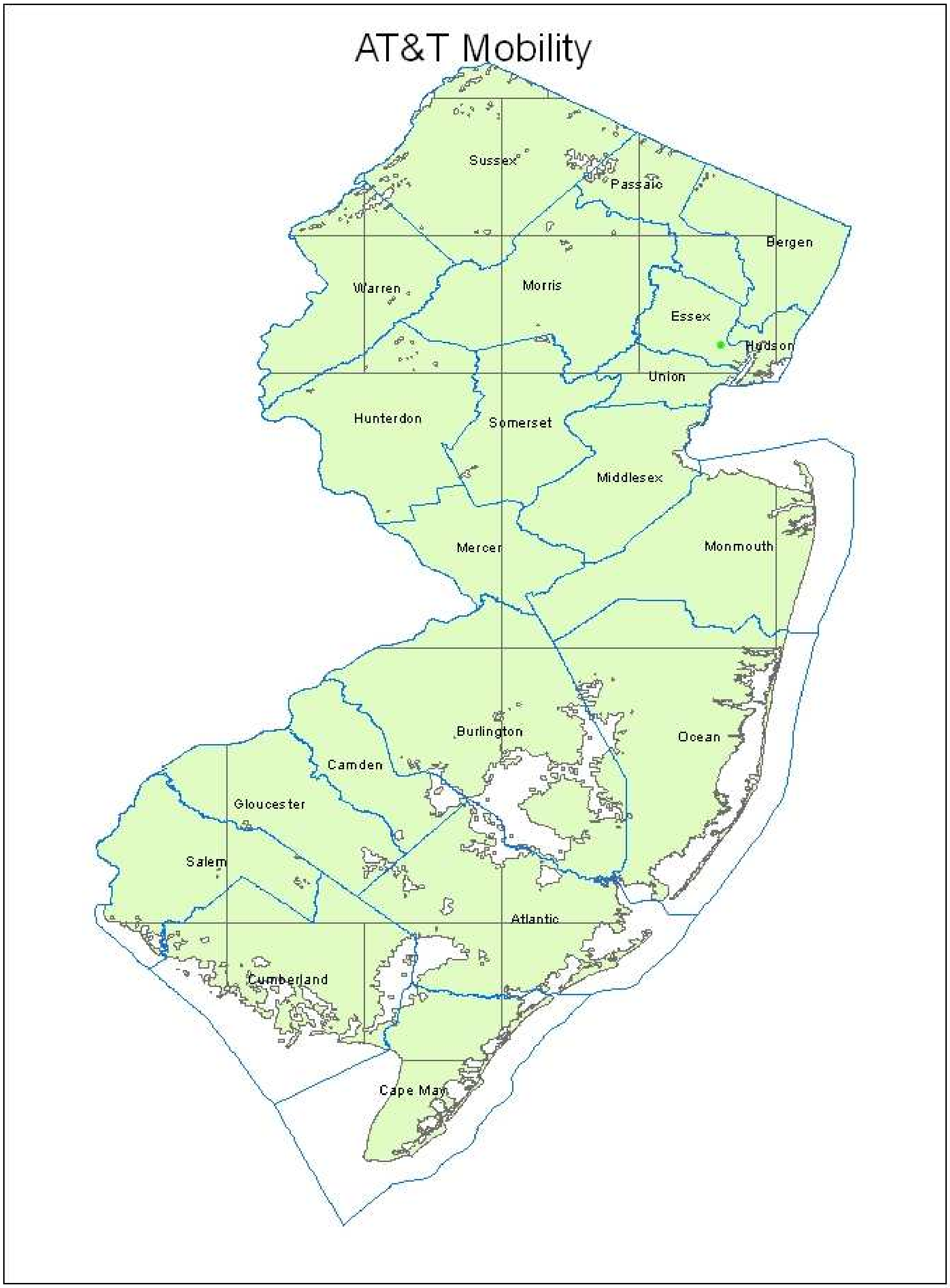
2. Spectrum: AT&T Mobility provided multiple columns of data about their spectrum use. Searching on the web suggests that AT&T 3G uses frequencies 850MHz and 1900Mhz. The NTIA data model has a single column for spectrum. No mapping is provided for frequency 850MHz. Frequency 1900MHz corresponds to NTIA “SPECTRUM USED” code value 3.
3. Speeds: The maximum advertised speeds provided in the spreadsheet are 1.7 Mbps down and 1.2 Mbps up. For max adv speeds we encoded the submitted down speed as value 4 (range 1.5-3 Mbps) and encoded the submitted up speed as value 3 (range 768 Kbps – 1.5 Mbps).
4. The only data imputed was the state abbreviation.

Section 6: Clarification Questions and Responses

None

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Provider: Broadview Networks, Inc.

Submission date: October 2011

This report presents details on processing broadband data for delivery to the National Telecommunications and Information Administration (NTIA).

This is a stub report, since data from the previous submission was reused unchanged. The complete report from the previous submission begins on the next page. Notable differences from the processing done on the previous submission are listed next.

NTIA Table BB_ConnectionPoint_MiddleMile

No changes to columns since the last submission.

Total rows loaded: 30

NTIA Table BB_Service_CensusBlock

1. Column " blocksubgroup" was dropped.
2. Column "endusercat" was added; set to null because data was not supplied.
3. Discarded 22 records for addresses that could not be geocoded in New Jersey (mostly in New York State).
4. Discarded 150 records with speeds that do not meet the NOFA definition of broadband
5. Discarded 354 records with duplicate census blocks (i.e., multiple addresses in the same census block)

Total rows loaded: 1404

NTIA Table BB_Service_RoadSegment

1. Column " blocksubgroup" was dropped.
2. Column "endusercat" was added; set to null because data was not supplied.
3. See discards above.
4. Found 6 large census blocks while loading the BB_Service_CensusBlock table.
5. Found 247 road segments in these large census blocks.

Total rows loaded: 247

Notes

To create the “providerInput” tables for this submission, we removed the 2000 census block column from the old providerInput tables and performed a spatial join against the 2010 census block reference data table.

Provider Interactions

Received email from Jarrod Harper on 8/22/2011 instructing us to use previously submitted data.

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Tuesday, September 13, 2011 1:10 PM
To: 'Harper, Jarrod'
Cc: ConnectingNJ@research.telcordia.com
Subject: NJ BB Clarification

Jarrod,
We have reviewed the data you submitted to the NJ Broadband Mapping program and have a few clarification questions. We had asked these questions when you submitted the data last March, but we did not receive a reply from you.

1. The values you provided for the max. advertised up/down speeds appear to be the price plan choices. Can we use the highest values as the Maximum Advertised speeds across all your locations??
2. Do you own or lease the facilities at the interconnection points you have listed?
3. You provided the service facility type for the middle-mile points but not the facility capacity. Would it be possible for you to provide this data.

Thanks for your participation in the program!

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

Provider: Broadview Networks, Inc.

Received: September 2010
Submission date: April 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Section 1: NDA Status

No NDA executed.

Section 2: Submission Overview

<table>
<tr><th colspan="3">AVAILABILITY DATA</th></tr>
<tr><td>ID</td><td>Provider name
“Doing business as” name
FRN</td><td>Broadview Networks Inc.
Broadview Networks
0003775285</td></tr>
<tr><th colspan="3">FOR WIRELINE</th></tr>
<tr><td>Filetypes</td><td colspan="2">Excel spreadsheet</td></tr>
<tr><td>File size</td><td colspan="2">1,936 data rows</td></tr>
<tr><td>Speeds</td><td><table>
<tr><th>Type</th><th></th><th>Address level data</th></tr>
<tr><td>Typical-upstream</td><td></td><td>Not provided</td></tr>
<tr><td>Typical-downstream</td><td></td><td>Not provided</td></tr>
<tr><td>Advertised-upstream</td><td></td><td>Customer speed choice listed</td></tr>
<tr><td>Advertised-downstream</td><td></td><td>Customer speed choice listed</td></tr>
<tr><td>Subscriber-weighted-nominal speed</td><td></td><td>Not provided</td></tr>
</table></td><td>Instead of max advertised, each service address price plan is shown.</td></tr>
<tr><td>Technology Type</td><td colspan="2">10 (ADSL), 20 (SDSL), 30 (Other Wireline)</td></tr>
<tr><td>End-user specification</td><td colspan="2">Yes</td></tr>
<tr><td colspan="3">Comments:</td></tr>
<tr><th colspan="3">INTERCONNECTION DATA</th></tr>
<tr><td>ID</td><td colspan="2"></td></tr>
<tr><td>File size</td><td colspan="2">Excel spreadsheet with 31 rows</td></tr>
<tr><td>Ownership</td><td colspan="2">Not provided</td></tr>
<tr><td>Transport Type</td><td colspan="2">Code 2, copper</td></tr>
</table>

Data Rates/Capacity	Not provided
Location	Address provided
Comments:	

Section 3: Submission File Details

Received 2 files by secure upload:

Size	**Name**
514560	NJ Table 1 063010.xls
24576	NJ Table 8 - Middle Mile & Backbone Interconnection Point 063010.xls

Section 4: Validations and Results

Table 1 has 1,936 service addresses (with abbreviated town names and many missing zip codes), the technology speed tiers in service at each address, and the count of connections. Most records contain max advertised up/down speed codes, but over 100 do not. Records have no typical up/down speed and no specification of subscriber-weighted nominal speed. Table 1 shows no provider name, no DBA name, and no FRN. Geocoding succeeded for N of the addresses and failed for 628 addresses. Most of the addresses that failed geocoding have no street component, just a city name.

Table 8 has 33 middle-mile points, with addresses, CLLI codes, and the service facility type (all copper). There is no specification of ownership or facility capacity. Table 8 lists provider name, DBA name, and FRN. Geocoding succeeded for 32 of the addresses and failed for 1 ("Delsea Dr N & Focer St, Glassboro, NJ 08028, USA").

Section 5: Data Transformation and Loading

NTIA Table BB_ConnectionPoint_MiddleMile

Loaded from data supplied in the XLS sheet. The following table explains the necessary transformations that were applied.

Table Column	**Data Source / Transformation**
PROVNAME	Set to "Broadview Networks Inc."
DBANAME	Set to "Broadview Networks"
FRN	As supplied in column "FRN"

OWNERSHIP	Set to null, not supplied
BHCAPACITY	Set to null, not supplied
BHTYPE	As supplied in column "Serving Facility Type"
LATITUDE	Obtained by geocoding the address
LONGITUDE	Obtained by geocoding the address
ELEVFEET	Set to “0” (zero), not supplied
STATEABBR	Set to “NJ”
FULLFIPSID	ID of containing census block from Year 2000 Census Bureau TigerLine reference data
SHAPE	Point shape created using ESRI ArcDesktop

Internal notes on processing:

6. Geocoded the addresses to obtain Latitude, Longitude value pairs.
7. Created an excel sheet and imported to a geodatabase table.
8. Added a point shape corresponding to the Latitude, Longitude pair by creating a feature class from the table using ArcCatalog’s “Create Feature Class from XY Table” option.
9. Added a column containing the ID of the containing Year 2010 Census Block via a spatial join of the points and the census block shapes from reference data.

NTIA Table BB_Service_CensusBlock

The standard NDA prohibits us from submitting address-level data to the NTIA. So we do not populate the table BB_Service_Address with the availability data. Instead, we discover the census block for each customer address, then report the census block shape drawn from Census Bureau TigerLine reference data.

Loaded from supplied file of addresses after applying the corrections discussed below. The following table explains the transformations that were applied to load the target table.

Table Column	**Data Source / Transformation**
PROVNAME	Set to "Broadview Networks Inc."
DBANAME	Set to "Broadview Networks"
PROVIDER_TYPE	Set to 1
FRN	Set to " 0003775285"
STATEFIPS	Set to “34” (NJ)
COUNTYFIPS	Populated from Census Block FIPS Code (first 3 digits)
TRACT	Populated from Census Block FIPS Code (next 6 digits)
BLOCKID	Populated from Census Block FIPS Code
BLOCKSUBGROUP	Set to null
FULLFIPSID	Populated from Census Block FIPS Code
TRANSTECH	As supplied in column Technology
MAXADDOWN	As supplied in column Max Advertised Upstream
MAXADUP	As supplied in column Max Advertised Downstream

TYPICDOWN	Set to null
TYPICUP	As supplied in column Typical Upstreatm Speed (sic)
SHAPE	Copied from Census Bureau TigerLine 2010, as matched by spatial join on geocoded address

Internal processing notes:

8. Geocoded the addresses using the Google geocoder to obtain a Latitude, Longitude pair for each.. Addresses that yielded results with accuracy of 6 or below were excluded; only intersection (7) or rooftop (8) accuracy is acceptable. The list of addresses that failed geocoding is available.
9. Created an Excel sheet and imported it to a geodatabase table.
10. Added point shapes corresponding to each Latitude, Longitude pair by creating a feature class from the table using ArcCatalog's "Create Feature Class from XY Table" option.
11. Added a column containing the ID of the containing year 2000 census block via a spatial join of the point shapes and the census block shapes from reference data.
12. Discarded 150 rows with no value for the maximum advertised download speed.
13. Discarded 383 rows with duplicate census blocks.
14. Loaded 1,377 census blocks.

NTIA Table BB_Service_RoadSegment

Loaded with street segments in census blocks larger than 2 square miles as gathered from Census Bureau TigerLine reference data. The following table explains the transformations that were applied to load the target table.

Table Column	**Data Source / Transformation**
PROVNAME	Set to "Broadview Networks Inc."
DBANAME	Set to "Broadview Networks"
PROVIDER_TYPE	Set to 1
FRN	Set to " 0003775285"
ADDMIN	From reference data
ADDMAX	From reference data
PREDIR	Set to null, not available in reference data
STREETNAME	From reference data
STREETTYPE	Set to null, not available in reference data
SUFFDIR	Set to null, not available in reference data
CITY	From reference data
STATECODE	Set to "NJ"
ZIP5	From reference data
ZIP4	Set to null, not available in reference data
TRANSTECH	As supplied in column Technology
MAXADDOWN	As supplied in column Max Advertised Upstream
MAXADUP	As supplied in column Max Advertised Downstream
TYPICDOWN	Set to null, not provided

TYPICUP	Set to null, not provided
SHAPE	From reference data

Internal processing notes:

1. Discovered all street segments that touch census blocks larger than 2 square miles using the census block list discovered as discussed for table BB_Service_Censusblock above.
2. Joined against reference data to discover street segment, for a total of 208 entries.

Section 6: Clarification Questions and Responses

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Tuesday, September 13, 2011 1:10 PM
To: Harper, Jarrod
Cc: ConnectingNJ@research.telcordia.com
Subject: NJ BB Clarification

Jarrod,
We have reviewed the data you submitted to the NJ Broadband Mapping program and have a few clarification questions. We had asked these questions when you submitted the data last March, but we did not receive a reply from you.

1. The values you provided for the max. advertised up/down speeds appear to be the price plan choices. Can we use the highest values as the Maximum Advertised speeds across all your locations??
2. Do you own or lease the facilities at the interconnection points you have listed?
3. You provided the service facility type for the middle-mile points but not the facility capacity. Would it be possible for you to provide this data.

Thanks for your participation in the program!

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: Harper, Jarrod [mailto:jharper@broadviewnet.com]
Sent: Tuesday, September 13, 2011 3:45 PM
To: ConnectingNJ@research.telcordia.com
Subject: RE: NJ BB Clarification

John,

1. Yes, use those across the locations
2. The facilities are leased
3. I will have to inquire about this and get back to you on it.

Thanks,

Jarrod

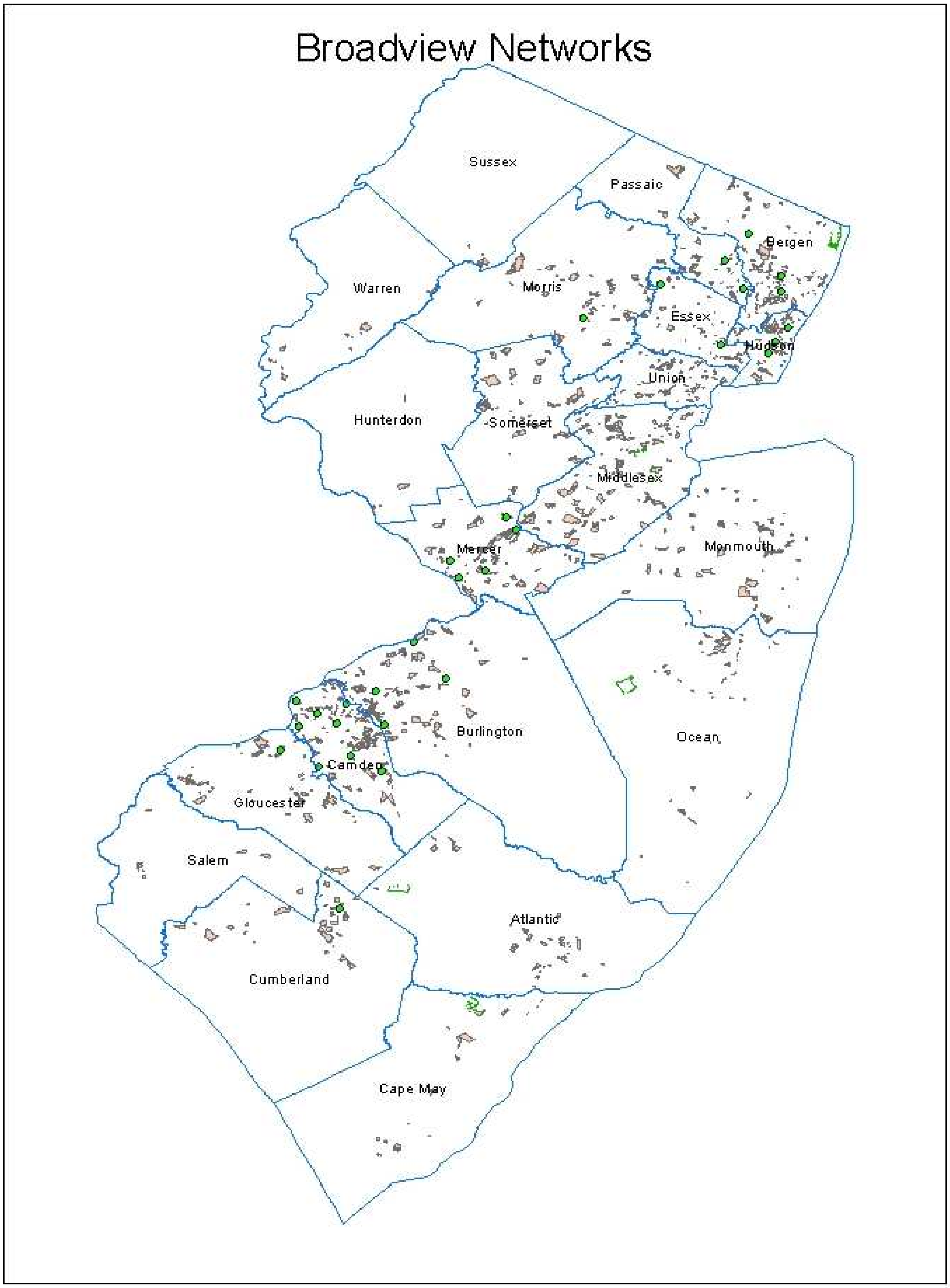
From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Tuesday, September 13, 2011 3:48 PM
To: 'Harper, Jarrod'
Cc: ConnectingNJ@research.telcordia.com
Subject: RE: NJ BB Clarification

Jarrod,
Thanks for the quick response. We'll begin processing with the first two answers and will hold up the middle mile awaiting your answer to item 3.

John

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Provider: Cavalier Telephone Mid-Atlantic LLC

Submission date: October 2011

This report presents details on processing broadband data for delivery to the National Telecommunications and Information Administration (NTIA).

This is a stub report, since data from the previous submission was reused unchanged. The complete report from the previous submission begins on the next page. Notable differences from the processing done on the previous submission are listed next.

NTIA Table BB_Service_CensusBlock

6. Column " blocksubgroup" was dropped.
7. Column "endusercat" was added; set to null because data was not supplied.

Notes

To create the “providerInput” table for this submission, we removed the 2000 census block column from the old providerInput table and performed a spatial join against the 2010 census block reference data table.

NTIA Table BB_ConnectionPoint_MiddleMile

1. No changes.

Notes

To create the “providerInputMiddleMileTol” table for this submission, we removed the 2000 census block column from the old providerInput table and performed a spatial join against the 2010 census block reference data table.

Provider Interactions

Margaret Ring reported on 9/8/2011 that there were no substantive changes to coverage, speed or middle mile since last submission.

Connecting New Jersey - Broadband Provider Data Report
Provider: Cavalier Telephone Mid-Atlantic LLC
Submission date: April 2011

This report presents details on processing broadband data for delivery to the National Telecommunications and Information Administration (NTIA).

This is a stub report, since data from the previous submission was reused unchanged. The complete report from the previous submission begins on the next page. Notable differences from the processing done on the previous submission are listed next.

NTIA Table BB_Service_CensusBlock

1. Column "reseller" was dropped.
2. Set the new column "provider_type" to value 1 ("Broadband provider as described in the NOFA")
3. Dropped non-measured typical up/down speed code values.

NTIA Table BB_ConnectionPoint_MiddleMile

1. No changes.

Provider Interactions

From: Ring, Margaret H. [mailto:mhring@cavtel.com]
Sent: Friday, March 04, 2011 1:03 PM
To: 'ConnectingNJ@research.telcordia.com'
Subject: RE: NJ BB Data Collection - Spring 2011

Cavalier Telephone has had no substantial changes to its broadband footprint since its last data submission. Please feel free to use the same data for this round of reporting. Let me know if you have any questions or concerns.

Regards,

Margaret Ring, Director
Regulatory
Cavalier Telephone
850.465.1748

Provider: Cavalier Telephone Mid-Atlantic LLC
Received: August 2010
Submission date: August 2010

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Section 1: NDA Status

NDA in place

Section 2: Submission Overview

<table>
<tr><th colspan="3">AVAILABILITY DATA</th></tr>
<tr><td>ID</td><td>Provider name
“Doing business as” name
FRN</td><td>Cavalier Telephone Mid-Atlantic LLC
No DBA name (confirmed with company)
0015-7991-33</td></tr>
<tr><th colspan="3">FOR WIRELINE</th></tr>
<tr><td>Filetypes</td><td colspan="2">Excel (Cavalier NJ Broadband Response.xls)</td></tr>
<tr><td>File size</td><td colspan="2">52736 bytes; 122 records</td></tr>
<tr><td>Speeds</td><td><table>
<tr><th>Type</th><th></th><th>Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)</th></tr>
<tr><td>Typical-upstream</td><td></td><td>Address</td></tr>
<tr><td>Typical-downstream</td><td></td><td>Address</td></tr>
<tr><td>Advertised-upstream</td><td></td><td>Address</td></tr>
<tr><td>Advertised-downstream</td><td></td><td>Address</td></tr>
<tr><td>Subscriber-weighted-up</td><td></td><td>Not provided</td></tr>
<tr><td>Subscriber-weighted-down</td><td></td><td>Not provided</td></tr>
</table></td><td>Typical up speeds 3,4; down 5,6,7,7. Adv up speed 4, down 6. Note typical speed code that is greater than the max advertised speed code

Company clarified during October submission that the 7 typical speed should be a 6.</td></tr>
<tr><td>Technology Type</td><td colspan="2">Initial submission included Codes 1 and 3. Provider clarified during October 2010 submission that these should be ADSL (1=10) and Other Copper Wireline (3-30).</td></tr>
<tr><td>End-user specification</td><td colspan="2">Codes 1 (residential) and 3 (small business).</td></tr>
<tr><td colspan="3">Comments:</td></tr>
<tr><th colspan="3">INTERCONNECTION DATA</th></tr>
<tr><td>ID</td><td colspan="2"></td></tr>
</table>

File size	
Ownership	
Transport Type	
Data Rates/Capacity	
Location	
Comments:	

Section 3: Submission File Details

Received 1 file by email.

Size	**Name**
52736	Cavalier NJ Broadband Response.xls

The file contains 124 rows and 122 data records for broadband availability by address, and 18 rows of middle-mile connection points.

Section 4: Validations and Results

Some of the address records (13) are post office boxes, which are invalid for this purpose.

All validations described in summary were applied

Section 5: Data Transformation and Loading

NTIA Table BB_ConnectionPoint_MiddleMile

Loaded from supplied file "Cavalier NJ Broadband Response.xls", tab "Middle Mile Interconnection". The following table explains the transformations that were applied.

Table Column	**Data Source / Transformation**
PROVNAME	As supplied in column "Provider Name"
DBANAME	Not supplied; set same as PROVNAME
FRN	As supplied in column "FRN", after removing hyphens
OWNERSHIP	As supplied in column "Ownership"
BHCAPACITY	As supplied in column "Serving Facility Capacity"
BHTYPE	As supplied in column "Serving Facility Type"

LATITUDE	Created by geocoding the supplied address
LONGITUDE	Created by geocoding the supplied address
ELEVFEET	Set to “0” (zero)
STATEABBR	Set to “NJ”
FULLFIPSID	ID of containing census block from Year 2010 Census Bureau TigerLine reference data
SHAPE	Point shape created using ESRI ArcDesktop

Internal notes on processing:

10. Geocoded the addresses using the Google geocoder.
11. Created an excel sheet and imported to a geodatabase table.
12. Added point shapes corresponding to each Latitude,Longitude pair by creating a feature class from the table using ArcCatalog’s “Create Feature Class from XY Table” option.
13. Added a column containing the ID of the containing year 2000 census block via a spatial join of the point shapes and the census block shapes from reference data.

NTIA Table BB_Service_CensusBlock

The standard NDA prohibits us from submitting address-level data to the NTIA. So we do not populate the table BB_Service_Address with the availability data. Instead, we discover the census block for each customer address, then report the census block shape drawn from Census Bureau TigerLine reference data.

Loaded from supplied file “Cavalier NJ Broadband Response.xls”, tab “Wireline Address-Level” after applying the corrections discussed below. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	As supplied in column “Provider Name”
DBANAME	Not supplied; set same as PROVNAME
PROVIDER_TYPE	Set to 1
FRN	As supplied in column “FRN”, after removing hyphens
STATEFIPS	Set to “34” (NJ)
COUNTYFIPS	Populated from Census Block FIPS Code (first 3 digits)
TRACT	Populated from Census Block FIPS Code (next 6 digits)
BLOCKID	Populated from Census Block FIPS Code
BLOCKSUBGROUP	Set to null
FULLFIPSID	Populated from Census Block FIPS Code
TRANSTECH	As supplied in column Technology
MAXADDOWN	As supplied in column Max Advertised Upstream
MAXADUP	As supplied in column Max Advertised Downstream
TYPICDOWN	Set to null
TYPICUP	Set to null
SHAPE	Copied from Census Bureau TigerLine 2010,

	as matched by spatial join on geocoded address

Internal processing notes:

1. Created a corrected spreadsheet based on response to questions, see next section.
2. Geocoded the addresses using the Google geocoder to obtain a Latitude, Longitude pair for each.. Addresses that yielded results with accuracy of 6 or below were excluded; only intersection (7) or rooftop (8) accuracy is acceptable. The list of addresses that failed geocoding is available.
3. Created an Excel sheet and imported it to a geodatabase table.
4. Added point shapes corresponding to each Latitude, Longitude pair by creating a feature class from the table using ArcCatalog's "Create Feature Class from XY Table" option.
5. Added a column containing the ID of the containing year 2000 census block via a spatial join of the point shapes and the census block shapes from reference data.
6. Discarded 173 rows with duplicate census blocks while preserving the greatest speed.

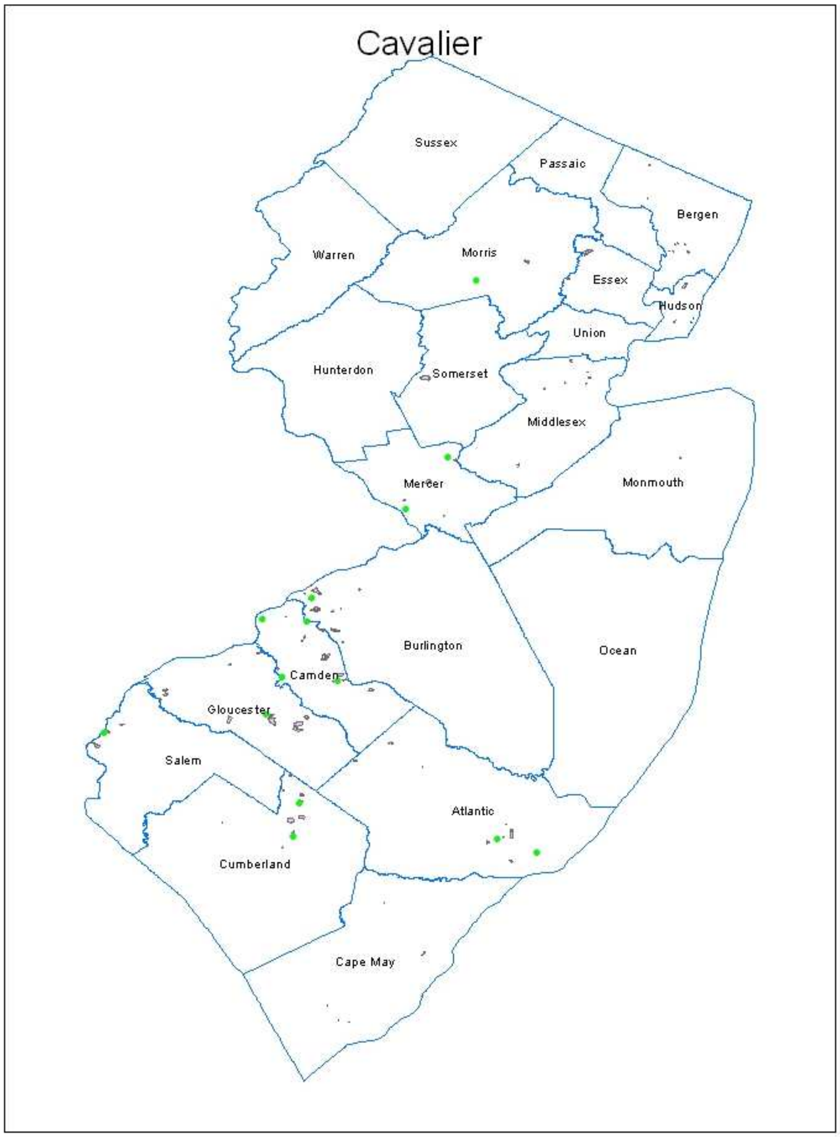
The mechanized procedure for the three steps is described in file GeoExcel_proc.txt.

Section 6: Clarification Questions and Responses

None this round

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Provider: CenturyTel DBA Century Link

Received: August 2011
Submission date: October 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Section 1: NDA Status

Century Link executed an NDA with NJ OIT; the data files refer to the NDA.

Section 2: Submission Overview

AVAILABILITY DATA		
ID	Provider name	CenturyLink, Inc. (per email)
	"Doing business as" name	Century Link
	FRN	0018626853
FOR WIRELINE		
Filetypes	Shapefiles "ResultantBroadBandInfo-NJ_6_30_11_polyline" and "...region"	
File size		
Speeds	Type	Spatial Resolution: county
	Typical-upstream	Census block and street segment (w. TigerLine REF)
	Typical-downstream	Census block and street segment (w. TigerLine REF)
	Advertised-upstream	Census block
	Advertised-downstream	Census block
	Subscriber-weighted-up	Not provided
	Subscriber-weighted-down	
Technology Type	10 (ADSL)	
End-user specification	Not provided	
Comments:		
INTERCONNECTION DATA		

ID	
File size	
Ownership	
Transport Type	
Data Rates/Capacity	
Location	
Comments: Middle-mile data was not provided this submission.	

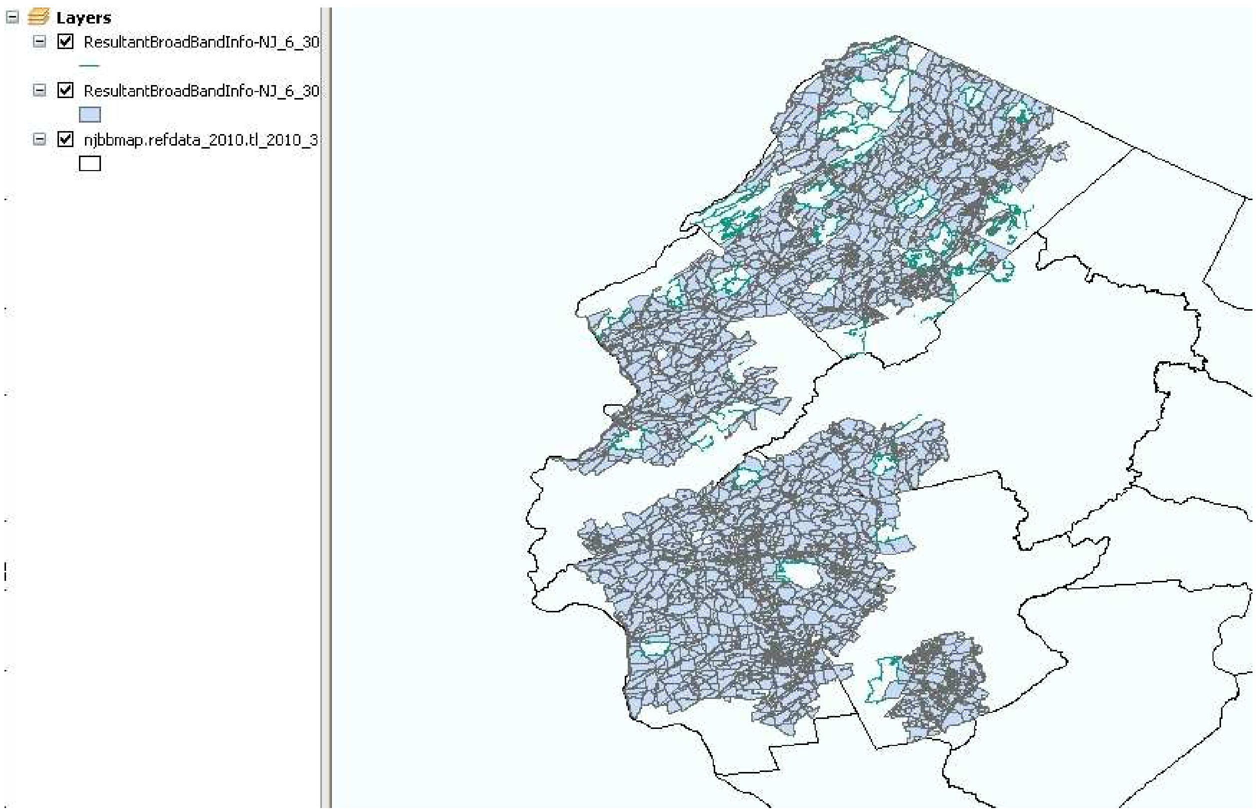


Figure1. Quick load test results

Section 3: Submission File Details

Size (kb)	**Name**
1202	ResultantBroadBandInfo-NJ_polyline.dbf
1	ResultantBroadBandInfo-NJ_polyline.prj
723	ResultantBroadBandInfo-NJ_polyline.shp
29	ResultantBroadBandInfo-NJ_polyline.shx
2474	ResultantBroadBandInfo-NJ_region.dbf
1	ResultantBroadBandInfo-NJ_region.prj

11745	ResultantBroadBandInfo-NJ_region.shp
58	ResultantBroadBandInfo-NJ_region.shx

Section 4: Validations and Results

Two shapefiles were submitted:

Shapefile (feature class) ResultantBroadBandInfo-NJ_6_30_11_region provides coverage data for census blocks with an area less than or equal to 2 square miles. It contains 7,405 records. All of the IDs shown in the shapefile correspond to valid Year 2010 Census Block IDs and all are smaller than 2 square miles.

Shapefile (feature class) ResultantBroadBandInfo-NJ_6_30_11_polyline shows street segments, for census blocks larger than 2 square miles. It contains 3,597 records. The polyline data includes a field called TIGER_REF. We attempted to validate this as a Tiger Line ID against Year 2010 line-segment reference data records, but none were matched, so we do not know what the column contains. (In the previous submission, we received an answer in response to email that the values are not TigerLine IDs)

The address left-from, left-to, right-from, and right-to fields are problematic because they are defined as numeric (not text) which precludes address such as those found in parts of NYC such as “12-26”. The fields of this polyline data include:
AREA_SQMI
PROVIDER, DBA, FRN, ID, LOCATION
CENSUS_BLOCK
MAX_DOWNLOAD, MAX_UPLOAD, TYPICAL_DOWN, TYPICAL_UP
TECHNOLOGY
TIGER_REF

The speed data gives cause for concern. We see significantly different maximum advertised speeds in adjacent census blocks. How is this possible? Further, the typical and maximum advertised columns are *always* identical. Maybe these data correspond to actual customer speed and price-plan choices rather than advertised speeds.

Section 5: Data Transformation and Loading

NTIA Table BB_ConnectionPoint_MiddleMile

Loaded 1 row of data from Excel Spreadsheet “middlemile_NJ.txt” (1 row) that was supplied for the October 2010 submission. The following table explains the transformations that were applied.

Table Column	Data Source / Transformation

PROVNAME	Set to “CenturyLink, Inc.” per email
DBANAME	As supplied in DbaName
FRN	As supplied in FRN
OWNERSHIP	As supplied in Own
BHCAPACITY	As supplied in BHCap
BHTYPE	As supplied in BHType
LATITUDE	As supplied in Lat
LONGITUDE	As supplied in Long
ELEVFEET	Set to “0” (zero)
STATEABBR	Set to “NJ”
FULLFIPSID	ID of containing census block from Year 2010 Census Bureau TigerLine reference data
SHAPE	Point shape created using ESRI ArcDesktop

Internal notes on October 2011 processing:

1. Source table was reused from the October 2010 submission.
2. Added a column containing the ID of the containing year 2010 census block via a spatial join of the point and the census block shapes from reference data.

NTIA Table BB_Service_CensusBlock

Loaded from supplied shapefile feature “ResultantBroadBandInfo-NJ_region”. The following table explains the transformations that were applied to load the target table.

Table Column	**Data Source / Transformation**
PROVNAME	Set to “CenturyLink, Inc.” per email
DBANAME	As supplied in column “dba_name”
PROVIDER_TYPE	Set to 1
FRN	Set to "0018626853"
STATEFIPS	Set to “34” (NJ)
COUNTYFIPS	Populated from census_blo (digits 3-5)
TRACT	Populated from census_blo (digits 6-11)
BLOCKID	Populated from census_blo (digits 12-15)
BLOCKSUBGROUP	Set to null
FULLFIPSID	As supplied in column census_blo See discussion of Census blocks below.
TRANSTECH	As supplied in column technology
MAXADDOWN	As supplied in column max_downlo
MAXADUP	As supplied in column max_upload
TYPICDOWN	Set to null
TYPICUP	Set to null
SHAPE	As supplied

Internal notes on processing

1. The supplied feature class uses XY coordinate system name GCS_North_American_1983. The NTIA data model requires XY coordinate system GCS_WGS_1984. To change the projection we applied the geographic transformation NAD_1983_To_WGS_1984_5 (per NAD), resulting in a feature class with a suffix of "_wgs".
2. We had to create a new feature class and reload the data so that the tolerance value matches the NTIA transfer model's tolerance value exactly, resulting in a feature class with a suffix of "_wgs_tol".
3. The feature class "region" has 287 rows with duplicate census block IDs and identical technology codes (confusingly the speeds are different for the some of these duplicates). We discarded these to avoid creating duplicate shapes in the table.

NTIA Table BB_Service_RoadSegment

Loaded from supplied shapefile feature "ResultantBroadBandInfo-NJ_6_30_11_polyline". The following table explains the transformations that were applied to load the target table.

Table Column	**Data Source / Transformation**
PROVNAME	Set to "CenturyLink, Inc." per email
DBANAME	As supplied in column "dba_name"
PROVIDER_TYPE	Set to 1
FRN	Set to "0018626853"
ADDMIN	Set to the least of the non-empty address numbers
ADDMAX	Set to the greatest of the non-empty address numbers
PREDIR	Set to null (no value supplied)
STREETNAME	As supplied (has all street components, not just name)
STREETTYPE	Set to null (no value supplied)
SUFFDIR	Set to null (no value supplied)
CITY	Set to null (no value supplied)
STATECODE	Set to "NJ"
ZIP5	Set to null (no value supplied)
ZIP4	Set to null (no value supplied)
TRANSTECH	As supplied
MAXADDOWN	As supplied
MAXADUP	As supplied
TYPICDOWN	Set to null
TYPICUP	Set to null
TLID	Set to null since the supplied values in column "tiger_ref" are not valid TLID values
SHAPE	As supplied

Internal notes on processing:

1. The supplied feature class uses XY coordinate system name

GCS_North_American_1983. The NTIA data model requires XY coordinate system GCS_WGS_1984. To change the projection we applied the geographic transformation NAD_1983_To_WGS_1984_5 (per ESRI KB article 24159), resulting in a feature class with a suffix of “_wgs”.

2. We had to create a new feature class and reload the data so that the tolerance value matches the NTIA transfer model’s tolerance value exactly, resulting in a feature class with a suffix of “_wgs_tol”.
3. We discarded 529 records with no street name (field empty).
4. The county number and a column "tiger_ref" are supplied for each segment. We checked for uniqueness using the county number and tiger_ref. After discarding records with an empty street name, 2002 unique records were accepted and 1066 duplicates were dropped. However this is questionable. As mentioned in validations, the tiger_ref column is not a TLID, so using it for validation might not be reasonable.

Section 6: Questions

1. The midlemile data is missing. In the last submission, there is 1 middlemile data? Should we assume it is the same as the last submission?

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Monday, August 22, 2011 10:41 AM
To: 'David.Bonsick@CenturyLink.com'
Subject: NJBB Clarification

David,

We have performed our initial analysis on the data you submitted and had two clarification questions:

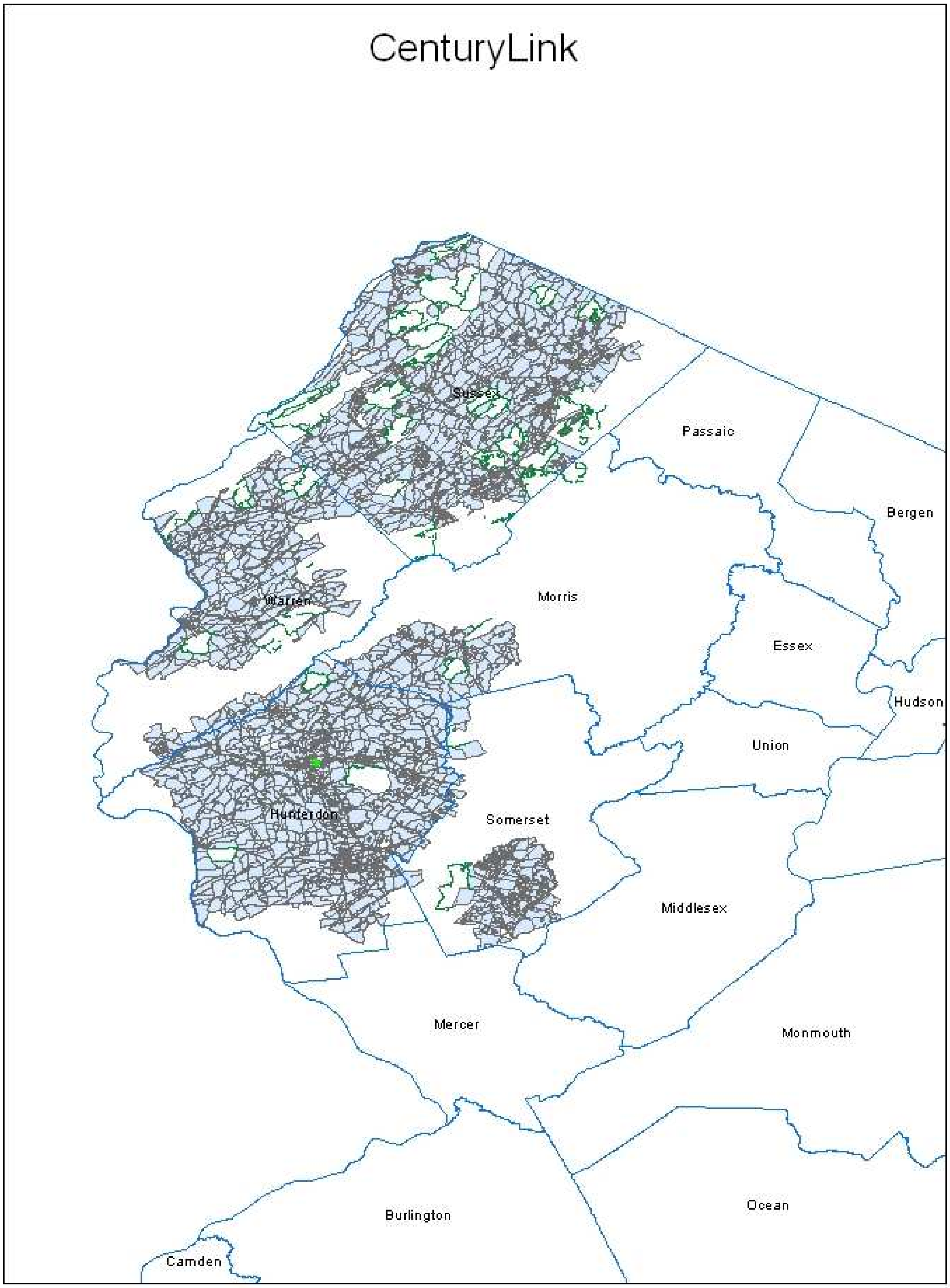
1. Did you use the 2010 geometry for the census blocks that you submitted?
2. You did not submit any middle mile data. Does that data you submitted for the October 2010 delivery still represent your facilities?

Thanks for your cooperation,

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Provider: Clearwire

Received: September 2011
Submission date: October 2011

This report presents details on processing of broadband data for delivery to the National Telecommunications and Information Administration.

Section 1: NDA Status

None

Section 2: Submission Overview

<table>
<tr><th colspan="3">AVAILABILITY DATA</th></tr>
<tr><td rowspan="5">ID</td><td>PROVIDER NAME</td><td>Clearwire Corporation</td></tr>
<tr><td>DBA NAME</td><td>Clearwire Corporation</td></tr>
<tr><td>FRN</td><td>0017775628</td></tr>
<tr><td>Holding company name:</td><td></td></tr>
<tr><td>Holding company number:</td><td></td></tr>
<tr><th colspan="3">FOR WIRELESS</th></tr>
<tr><td>Filetypes</td><td>1 Mapinfo file corresponding to NJ terrestrial mobile wireless coverage</td><td>The MapInfo file contains 522 polygon shapes, as well as attributes for each that include: ID_UNIQUE (6 digit number), CODE (RDG, WMT, PHL), and MARKET_ID (3 digit number)</td></tr>
<tr><td>Speeds</td><td colspan="2"><table>
<tr><th>Type</th><th>Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode)</th><th></th></tr>
<tr><td>Upstream max adv</td><td>no.</td><td></td></tr>
<tr><td>Downstream max adv</td><td>no.</td><td></td></tr>
<tr><td>Upstream typical</td><td>no.</td><td></td></tr>
<tr><td>Downstream typical</td><td>no.</td><td></td></tr>
<tr><td>Subscriber-weighted</td><td>no.</td><td></td></tr>
</table></td></tr>
<tr><td>Technology Type</td><td>Spectrum : no</td><td></td></tr>
<tr><td colspan="3">Comments:</td></tr>
</table>

INTERCONNECTION DATA	
ID	
File size	
Ownership	
Transport Type	
Data Rates/Capacity	
Location	
Comments: no IC data provided.	

Preview of submitted Mapinfo data:

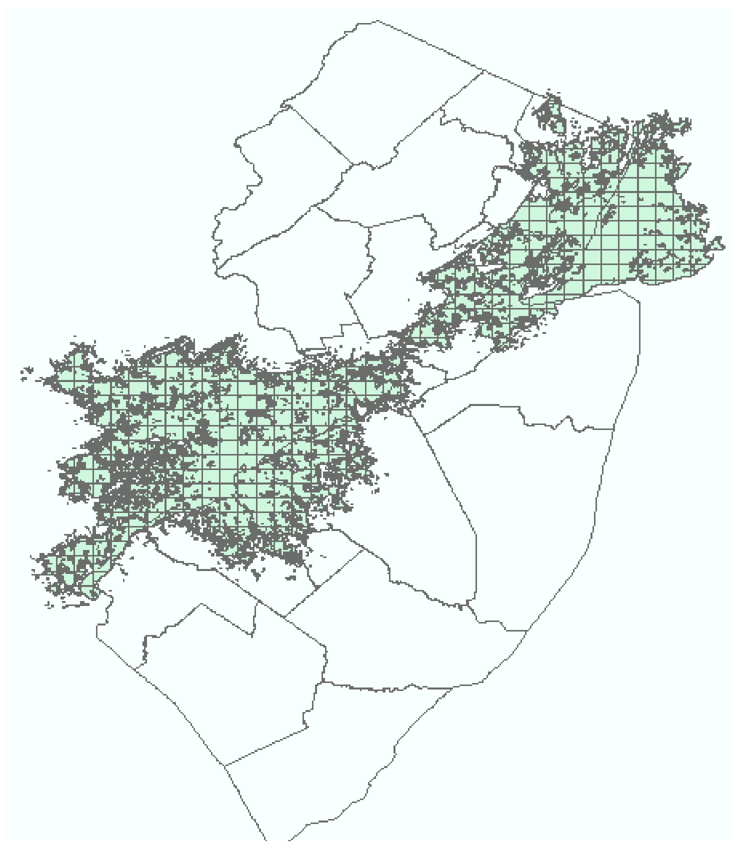


Figure 1. View of submitted data

Section 3: Submission File Details

1 zip file containing 4 files:

Size kb	**Name**
19 kb	NJ_WiMAX_090211_region.dbf
1	NJ_WiMAX_090211_region.prj
6145	NJ_WiMAX_090211_region.shp
5	NJ_WiMAX_090211_region.shx

Section 4: Validations and Results

The MapInfo file contains 522 polygon shapes, as well as attributes for each that include: ID_UNIQUE (a 6 digit number), CODE (RDG, WMT, PHL (are these location codes??), and MARKET_ID (a 3 digit (internal?) code).

The shape goes beyond the NJ state boundary.

Provider does not provide:
1. Name, DBA Name , FRN, Holding company information
2. Typical speeds, spectrums
3. Weighted averages
4. Interconnection data

Section 5: Data Transformation and Loading

NTIA Table BB_Service_Wireless

Loaded from the supplied shapefiles as augmented by email and phone conversations. The following table explains the transformations that were applied.

Table Column	Data Source / Transformation
PROVNAME	Set to “Clearwire Corporation” per email and phone interactions
DBANAME	Set to “Clearwire Corporation” per email and phone interactions
FRN	Set to “0017775628” per email and phone interactions
TRANSTECH	Set to “80” (terrestrial mobile wireless) based on statement of WiMAX
SPECTRUM	Set to “5” per email and phone interactions
MAXADDOWN	Set to “5” (code for range of 3-6Mbps) per email and phone interactions
MAXADUP	Set to “3” (code for range that includes 1Mbps) per email and phone interactions
TYPICDOWN	Set to null
TYPICUP	Set to null
STATEABBR	Set to “NJ”
SHAPE	As supplied.

Internal notes on processing:

5. The supplied shapefile uses geographic coordinate system name GCS_WGS_1984. The NTIA data model requires the same coordinate system. No geographic transformation was required. Loaded into our geodatabase to feature class name NJ_WiMAX_090211_region.
6. The XY Tolerance value differs on the supplied data from the required NTIA model. Imported the table schema and the table data in two separate operations, thereby ensuring perfect compatibility with the NTIA data model. The table has the suffix "_tol".
7. The shape extends beyond the NJ State boundary. Clipped the shape using ESRI: Analysis Tools-> Extract -> Clip with, select feature class Ntia_oct2011.State_Boundary. The table has the suffix "_clip". 272 rows are left after clip operation.
8. Loaded 272 rows.

Section 6: Clarification Questions and Responses

(N.B. note "Oregon" and other non-New Jersey locations referenced below.)

```
Subject: RE: Summary Sheet: New Jersey Broadband Data Collection
Date: Mon, 12 Sep 2011 15:58:09 +0000
From: Tajit Mehta <tajit.mehta@clearwire.com>
To: Diane E. Duffy <diane@research.telcordia.com>

Clearwire appreciates the opportunity to participate.  Attached are map files
for Clearwire's  WiMAX and Expedience Coverage in Oregon State. Clearwire
operates WiMAX service with respective speeds below in Portland and Salem.
All other markets in the attached file operate using expedience technology.
Below are some particulars regarding our service that you might need per NTIA
form.

Provider Name: Clearwire Corporation
DBA: Clear (WiMAX markets), Clearwire (Expedience Markets)
FRN: 0017775628

Spectrum:  Clearwire operates its WiMAX and Expedience network's using
2.5MHz spectrum (Spectrum 5 on the NTIA's list).

WIMAX Speed:  Clearwire's WiMAX network delivers average mobile download
speeds of 3 to 6 mbps with bursts over 10 mbps.*  Wimax up is 1 Mbps

* Speed claims based on download speeds only. Actual performance may vary and
is not guaranteed. CLEAR performance claim is based on average download user
speeds achieved during tests performed on the CLEAR commercial network by
CLEAR. Other carrier performance based on their advertised claims.

Expedience Speed:   Service is offered at Premium (1.5 Mbps down) and
Premium Plus (2 Mbps down). 256 kbps up for both premium and premium plus.

Average Speeds: Clearwire does not disclose speeds as stand-alone
average only a range.

FCC Classification:  Clearwire is classified as terrestrial mobile
wireless-licensed spectrum.

Middle Mile Request:  Non-response
```

Regards,
Taj

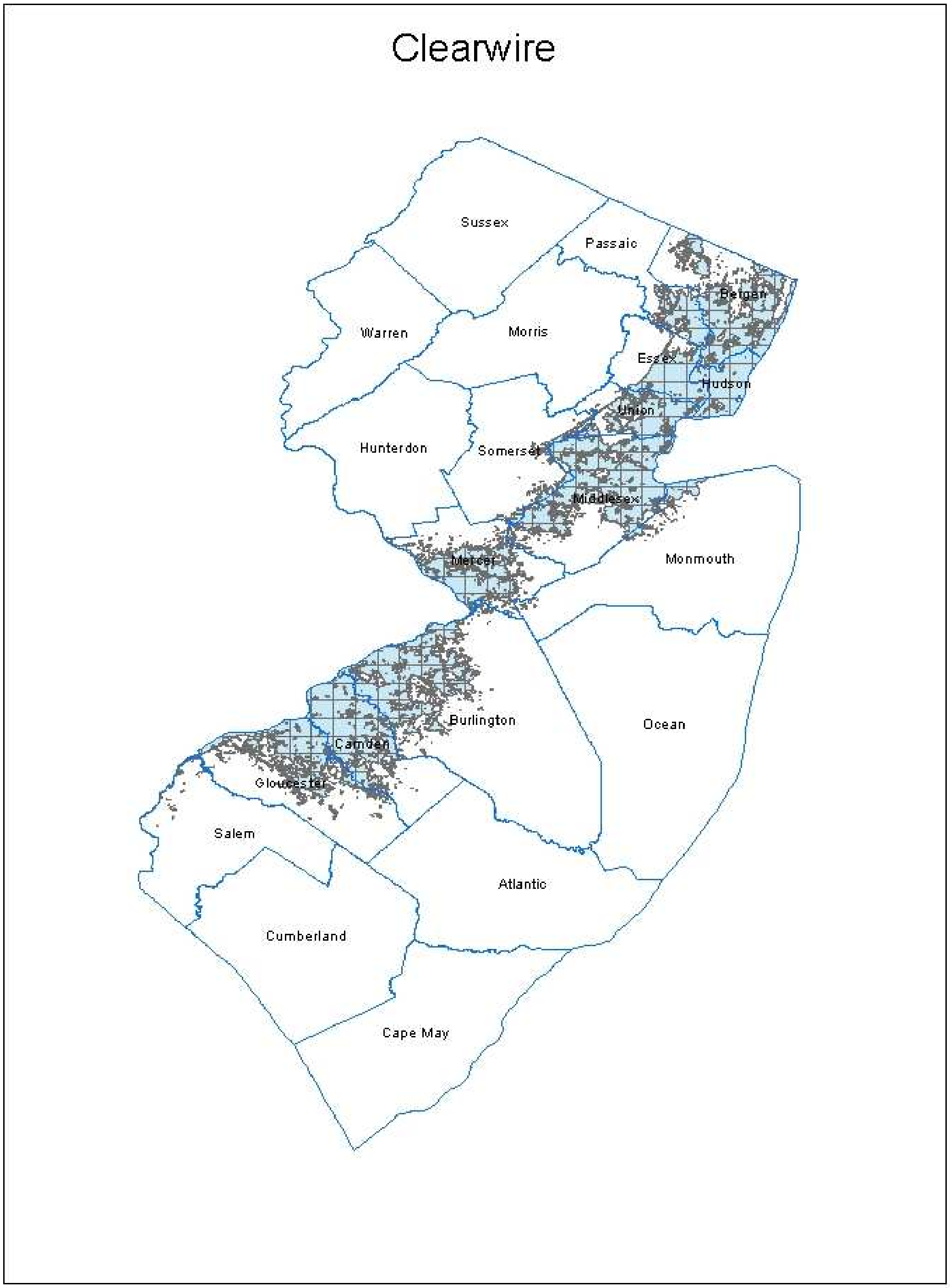
Taj Mehta - clearw.re - Spectrum Development
593 Herndon Parkway, Herndon, VA 20170 - Office 571-490-8577 - Mobile 571-220-4657 - Fax 571-490-8491

-----Original Message-----
From: Diane E. Duffy [mailto:diane@research.telcordia.com]
Sent: Monday, September 12, 2011 11:50 AM
To: Tajit Mehta
Cc: Diane Duffy
Subject: Summary Sheet: New Jersey Broadband Data Collection

Hi Taj,
Might you be able to forward the summary sheet? Bill is working on this, but he needs to get certain approvals from folks in the state of Pennsylvania and I'm not sure how long that will take.
Thnx again,
Diane

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Provider: Cogent

Submission date: October 2011

This report presents details on processing broadband data for delivery to the National Telecommunications and Information Administration (NTIA).

This is a stub report, since data from the previous submission was reused unchanged. The complete report from the previous submission begins on the next page. Notable differences from the processing done on the previous submission are listed next.

NTIA Table BB_Service_CensusBlock

1. Column " blocksubgroup" was dropped.
2. Column "endusercat" was added; set to null because data was not supplied.

Total rows loaded: 14

Notes

To create the “providerInput” table for this submission, we removed the 2000 census block column from the old providerInput table and performed a spatial join against the 2010 census block reference data table.

Provider Interactions

From: Zulager, Ried [mailto:RZulager@Cogentco.com]
Sent: Thursday, July 07, 2011 11:11 AM
To: Wullert, John R II
Subject: For your information: NJ Broadband Data Collection

Fine.   The website may have changed slightly, but you can still get a list of address locations fairly easily from Cogent’s public facing data. Just limit your searches to NJ as the jurisdiction of interest.

http://www.cogentco.com/en/network/service-locations

Ried Zulager
Corporate Secretary
Cogent Communications Group, Inc.
1015 31st St. NW
Washington, DC 20007
tel: +1-202-295-4274
rzulager@cogentco.com

Broadband Provider Data Report

Provider: Cogent Communications
Received: August 2010
Submission date: April 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Section 1: NDA Status

No NDA was executed. All data were taken from the provider’s public web site, FCC filings and/or information supplied by the provider via email

Section 2: Submission Overview

<table>
<tr><th colspan="3">MAPPING DATA - RECEIVED MARCH 1, 2011</th></tr>
<tr><td>ID</td><td>Provider name
“Doing business as” name
FRN</td><td>Cogent Communications, Inc.
Not provided
0019898303</td></tr>
<tr><th colspan="3">FOR WIRELINE</th></tr>
<tr><td>Filetypes</td><td>Txt, xls, pdf, etc.</td><td>Email and pointers to Web site and SEC filings</td></tr>
<tr><td>File size</td><td>Number of records, data elements</td><td>List of 20 addresses where they offer service</td></tr>
<tr><td>Speeds</td><td><table>
<tr><th>Type</th><th>Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode)</th></tr>
<tr><td>Adver down</td><td>Address</td></tr>
<tr><td>Adver up</td><td>Address</td></tr>
<tr><td>Typical down</td><td>Not provided</td></tr>
<tr><td>Typica up</td><td>Not provided</td></tr>
<tr><td>Subscriber-weighted</td><td>Not provided</td></tr>
</table></td><td>Provided building addresses. Adver down and up are 10/11, very fast.</td></tr>
<tr><td>Technology Type</td><td>DOCSIS, xDSL, fiber, etc.</td><td>Fiber</td></tr>
<tr><td>End-user specification</td><td>Business, consumer, gov’t etc</td><td></td></tr>
<tr><td colspan="3">Comments: They offer service directly to businesses at the addresses they provided. They are a reseller of broadband access to businesses at other locations.
They had previously refused to provide data on Typical and Subscriber Weighted speeds. Inquired whether there was any change in their position on this via email.</td></tr>
<tr><th colspan="3">INTERCONNECTION DATA</th></tr>
<tr><td>ID</td><td>Provider name</td><td></td></tr>
</table>

	“Doing business as” name FRN	
File size	Number of records, data elements	
Ownership	Leased/owned	
Transport Type	Fiber, wireless, copper	
Data Rates/Capacity		
Location	Street address, lat/lon, elevation	
Comments: We had previously extracted data for Middle Mile sites, based on the assumption that Cogent’s Data Centers were interconnection points. We were instructed by the provider that these sites did not meet the definition of Middle Mile sites and thus should be removed.		
DATA COMPLETENESS		
Data Validation/ Verification		

Section 3: Submission File Details

Received one file by email on 13 Aug 2010: NJ State locations 100813 B.docx. Updated the address information via a query of "Service Locations" from provider's Web site (http://www.cogentco.com/?lang=en&option=com_content&view=article&id=40&action=search). Searched using: North America, United States, New Jersey.

Section 4: Validations and Results

Noted that 3 addresses have no street address, and one address did not have a valid zip code. Used Internet search to determine zip code for that location and verified with Cogent.

Confirmed provider reported data rates with their published information and SEC filings.

The only other validation to be done is whether each address can be successfully geocoded. See next section. One address is not

Section 5: Data Transformation and Loading

The standard NDA prohibits us from submitting address-level data to the NTIA. Instead, we discover the census block for each customer address, then report the census block shape drawn from Census Bureau TigerLine reference data.

NTIA Table BB_Service_CensusBlock

We copied the information to a spreadsheet. The following table explains the transformations that were applied to load the target table.

Table Column	**Data Source / Transformation**
PROVNAME	Set to “Cogent Communications, Inc.”
DBANAME	Same as PROVNAME
PROVIDER_TYPE	Set to 1
FRN	Set to “0019898303”
STATEFIPS	Set to “34” (NJ)
COUNTYFIPS	Populated from Census Block FIPS Code (first 3 digits)
TRACT	Populated from Census Block FIPS Code (next 6 digits)
BLOCKID	Populated from Census Block FIPS Code
BLOCKSUBGROUP	Set to null
FULLFIPSID	Populated from Census Block FIPS Code
TRANSTECH	Set to “50”
MAXADDOWN	Populated from column “Maximum Advertised Speed Down”
MAXADUP	Populated from column “Maximum Advertised Speed Up
TYPICDOWN	Set to null
TYPICUP	Set to null
SHAPE	Copied from Census Bureau TigerLine 2000, as matched by spatial join on geocoded address

Internal processing notes:

14. Geocoded the addresses using the Google geocoder to obtain a Latitude, Longitude pair for each..
15. Created an excel sheet and imported it to a geodatabase table.
16. Added point shapes corresponding to each Latitude, Longitude pair by creating a feature class from the table using ArcCatalog’s “Create Feature Class from XY Table” option.
17. Added a column containing the ID of the containing year 2000 census block via a spatial join of the point shapes and the census block shapes from reference data.
18. Discarded 8 rows with duplicate census blocks.

The mechanized procedure for the geocoding step is described in file GeoExcel_proc.txt.

Section 6: Clarification Questions and Responses

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Tuesday, March 01, 2011 4:45 PM
To: 'Zulager, Ried'
Cc: ConnectingNJ@research.telcordia.com
Subject: RE: NJ BB Data Collection - Spring 2011
Sensitivity: Private

Ried,
The attached spreadsheet integrates the data you submitted to us last year with and the data we could obtain from your Web site and SEC filings. We will use this data as the basis for the submission to the NTIA. If you have any comments or corrections on the data, please let me know.
We did notice that the "Service Location" form on your Web site did not return a valid zip code for the 5851 Westside Ave in North Bergen. We assigned an zip code of 07047 based on a Google search.
Of the data requested by NTIA, we were not able to obtain data on Typical speeds and the Subscriber Weighted Nominal Speed. You indicated last time that you were not prepared to offer this information. If your position on this matter has changed, we would be happy to receive the data.

Thanks for your cooperation

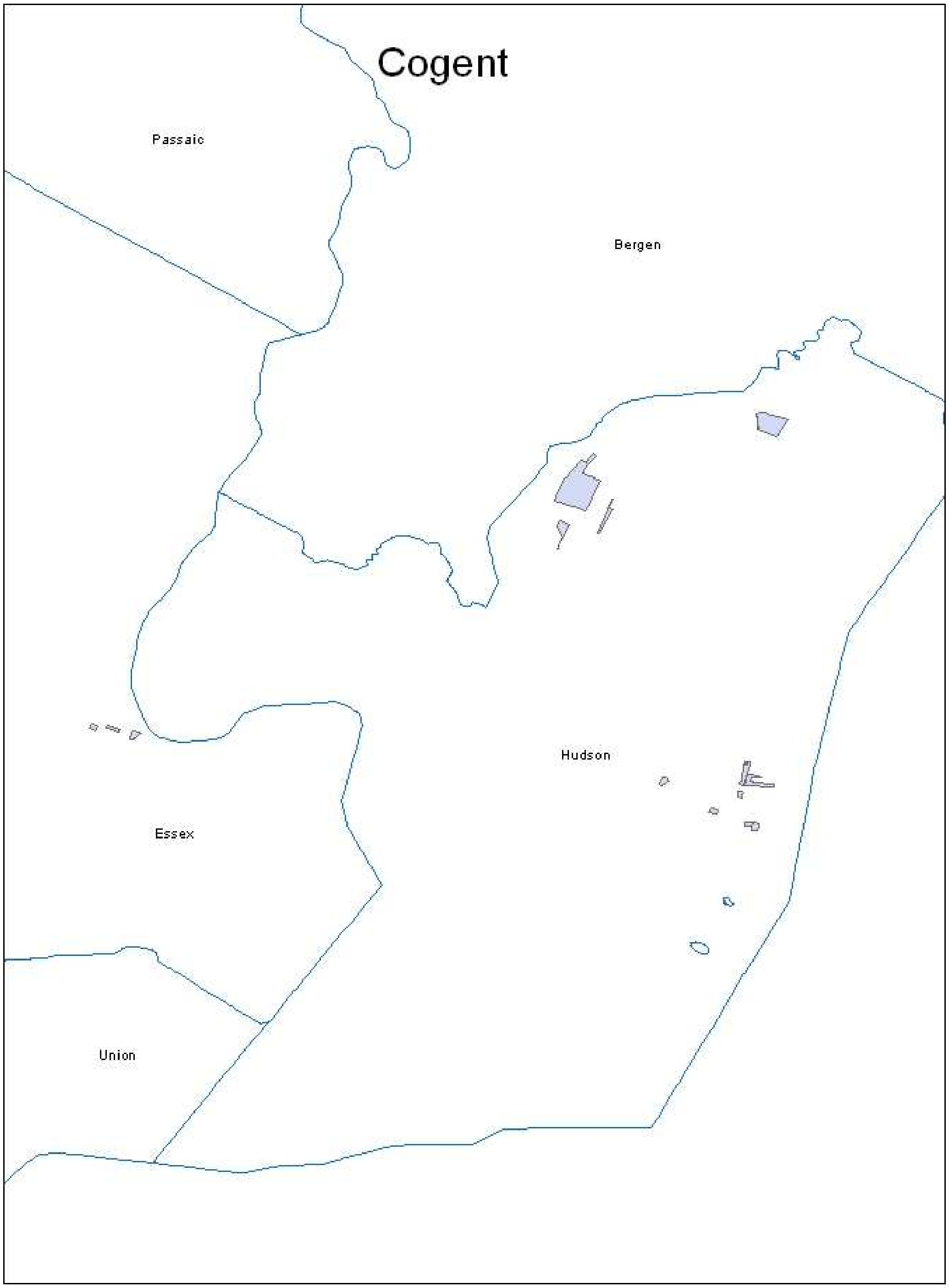
John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: Zulager, Ried [mailto:RZulager@Cogentco.com]
Sent: Tuesday, March 01, 2011 6:03 PM
To: ConnectingNJ@research.telcordia.com
Subject: RE: NJ BB Data Collection - Spring 2011
Sensitivity: Private

"We did notice that the "Service Location" form on your Web site did not return a valid zip code for the 5851 Westside Ave in North Bergen. We assigned an zip code of 07047 based on a Google search."
Seems reasonable; since zip codes are fairly irrelevant to Cogent's business the zip code is not something that hits out A list of priorities in any database – nor is geocode.

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Provider: Comcast

Received: August 2011
Submission date: October 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Section 1: NDA Status

NDA in place

Section 2: Submission Overview

AVAILABILITY DATA		
ID	Provider name "Doing business as" name FRN	COMCAST CABLE COMMUNICATIONS LLC COMCAST 0004-4416-63
FOR WIRELINE		
Filetypes	Excel files w. Census Block Year 2010 data. Street segment level and CB level availability tables for CB's less than and greater than 2 sq. mi.	
File size	see files	
Speeds		
Technology Type	40 (Cable Modem DOCSIS3.0)	
End-user specification	Comcast provides availability at the Census Block and Street Segment level.	
INTERCONNECTION DATA: PROVIDED AFTER REQUEST		

Speeds:

Type		Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)
Typical-upstream		Not provided
Typical-downstream		Not provided
Advertised-upstream		yes (CBSA/RSA level)
Advertised-downstream		yes (CBSA/RSA level)
Subscriber-weighted-up		no
Subscriber-weighted-down		no.

ID	
File size	
Ownership	
Transport Type	
Data Rates/Capacity	
Location	
Comments:	

Section 3: Submission File Details

Received three (3) files by SECURE UPLOAD.

Size	**Name**
55KB	34-streets-NJ.xlsx
2743KB	34-blocks-NJ.xlsx
9KB	New Jersey Maximum Advertised Speeds 6 30 11.xlsx

Section 4: Validations and Results

File 34-streets-NJ.xlsx contains 516 records. No shape is provided, and no reference ID such as Tiger Line ID is provided either. We cannot validate these segments against reference data, nor can we generate shapes for these segments.

File 34-blocks-NJ.xlsx contains 62,834 records. No shape is provided, but a Census Block ID is provided. Every ID is 15 digits long. Provider asserts that these are 2010 census blocks.

File "..Max Ad.." contains 7 records specifying the max advertised speed by CBSA/RSA. The max down speeds are 9 or 10; the max up speeds are all 7.

Section 5: Data Transformation and Loading

NTIA Table BB_Service_CensusBlock

Loaded 62,834 records from supplied Excel file “34-streets-NJ.xlsx”. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation

PROVNAME	As supplied in column “Provider_Name” but without trailing period
DBANAME	As supplied in column “DBA_NAme”
PROVIDER_TYPE	Set to 1
FRN	As supplied in column “FRN”
STATEFIPS	Set to “34” (NJ)
COUNTYFIPS	Populated from Census_Block_FIPS_Code (first 3 digits)
TRACT	Populated from Census_Block_FIPS_Code (next 6 digits)
BLOCKID	Populated from Census_Block_FIPS_Code (last 4 digits)
FULLFIPSID	As supplied in column Census_Block_FIPS_Code
TRANSTECH	As supplied in column Technology_of_Transmission
MAXADDOWN	Set to “10” or “9” (see below)
MAXADUP	Set to “7” (see below)
TYPICDOWN	Set to null, not supplied
TYPICUP	Set to null, not supplied
SHAPE	Copied from Census Bureau TigerLine 2010, As matched by Census block 2010 ID

Processing notes:

1. Census Blocks: Comcast supplied Census 2010 block IDs. We referenced the Census Bureau reference database for Year 2010 to extract and submit geographic features (i.e., shapes) for each census block based on the supplied Census_Block_FIPS_Code.
2. Speeds: Data for maximum advertised down and up speeds were taken from file “New Jersey Maximum Advertised Speeds 6 30 11.xlsx”. Comcast listed the same upload speed (7) for all seven MSAs they serve. Six of the MSAs had the same download speed (10). The remaining MSA (Allentown-Bethlehem-Easton, PA-NJ Metropolitan Statistical Area) has a download speed category of 9. This MSA encompasses Warren County in New Jersey. We identified the census blocks in Warren County (CountyFIPS = 041) and set the download speed to 9; the speed for all other census blocks was set to 10.

NTIA Table BB_Service_RoadSegment

Loaded as discussed below. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	Set to “Comcast Cable Communications, LLC”
DBANAME	Set to “Comcast”
PROVIDER_TYPE	Set to 1
FRN	Set to “0004441663”
ADDMIN	Set to the least of the non-empty address numbers for the line segment
ADDMAX	Set to the greatest of the non-empty address numbers for the line segment

PREDIR	Set to null (no value supplied)
STREETNAME	As supplied (has all street components, not just name)
STREETTYPE	Set to null (no value supplied)
SUFFDIR	Set to null (no value supplied)
CITY	Set to null (no value supplied)
STATECODE	Set to “NJ”
ZIP5	Set to value of zipl column for the line segment
ZIP4	(no value supplied)
TRANSTECH	As supplied (40)
MAXADDOWN	See below
MAXADUP	Set to 7
TYPICDOWN	Set to null
TYPICUP	Set to null
SHAPE	Copied from Census Bureau TigerLine 2010, As matched by County + Tiger Line ID

As mentioned above, the Comcast submission of street segments could not be matched with the Census Bureau TigerLine database. Instead we gathered a list of segments in large census blocks based on the municipalities served by Comcast. We processed 3142 street segments.

For municipalities served in their entirety by Comcast, the following approach was used. (Note: steps 1-4 were performed previously and not repeated for this round.)

1. Adjusted the Municipality names provided by Comcast with the following rules to enable matching with official New Jersey Municipality reference data
    a. Changed to upper case
    b. Performed the following string replacements on the Municipality field
        i. TOWNSHIP -> TWP
        ii. BOROUGH -> BORO (only when preceded by a space)
        iii. MT. -> MOUNT
        iv. PT. -> POINT
        v. ORANGE CITY -> CITY OF ORANGE TWP (ORANGE at start of line)
    c. Removed any additional information in parentheses (I.e., appended county name)
2. Performed join between two data sources, using Municipality and County as keys
3. Dropped four military bases that did not match any municipality
4. Generated a file with Municipality, Type, County and Municipal Code
5. Joined this information with the large census blocks for each municipality, and then joined that result with the street segments for each large census block.
6. Loaded the resulting set of street segments and shapes after removing duplicates.

Download Speed

1. Speeds: Data for maximum advertised down and up speeds were taken from file “New Jersey Maximum Advertised Speeds 6 30 11.xlsx”. Comcast listed the

same upload speed (7) for all seven MSAs they serve. Six of the MSAs had the same download speed (10). The remaining MSA (Allentown-Bethlehem-Easton, PA-NJ Metropolitan Statistical Area) has a download speed category of 9. This MSA encompasses Warren County in New Jersey. For large census blocks that were listed as being in Warren County, we set the download speed to 9; the speed for all other census blocks was set to 10.

Section 6: Clarification Questions and Responses

From: Ruger, Michael [mailto:Michael_Ruger@comcast.com]
Sent: Monday, August 15, 2011 5:12 PM
To: ConnectingNJ@research.telcordia.com
Cc: Shelley Bates
Subject: RE: Reminder - NJ Broadband Data Collection

Good afternoon—

Attached please find Comcast's response to the state's broadband mapping request for information. The data reflects Comcast's broadband service as of June 30, 2011. This submission is being provided to the state consistent with the terms provided for in the State Broadband Data and Development Grant Program established by the Department of Commerce's National Telecommunications and Information Administration. In particular, this submission is intended to comply with the commitments made by Comcast as described in the Department of Commerce's clarification of the information requirements for State Broadband Data and Development Grant Program published on August 7, 2009.

The attached spreadsheets provide the following data, as of June 30, 2011:

- Data for 2010 Census blocks less than two square miles
- Data for address availability
- Maximum advertised speeds

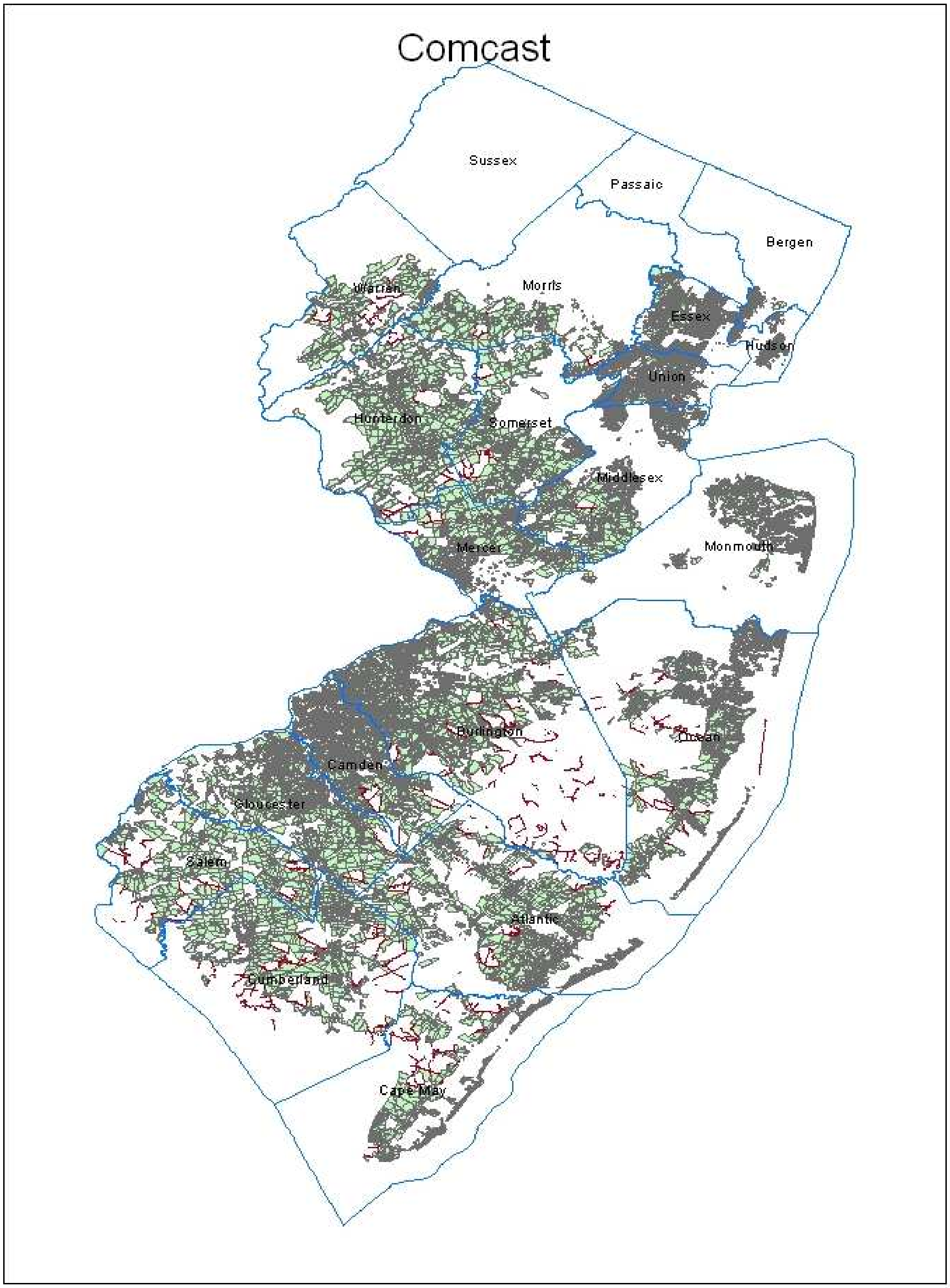
Please give me a call if you have any questions.

Thanks--
Michael

Michael Ruger
Senior Director, Government Affairs
Comcast Cable Communications, LLC
One Comcast Center
Philadelphia, Pennsylvania 19103
(215) 286-7586

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Provider: Cablevision

Received: August 2011
Submission date: October 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Section 1: NDA Status

Executed with NJ OIT.

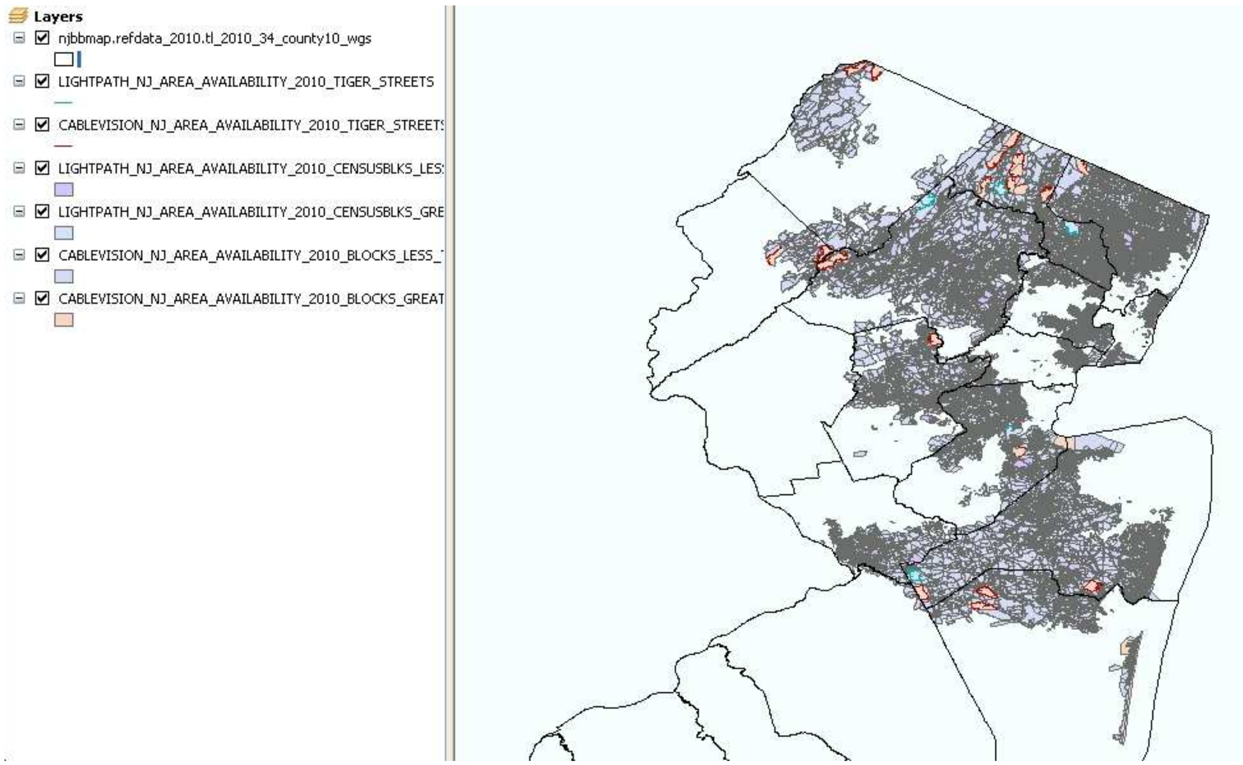
Section 2: Submission Overview

<table>
<tr><th colspan="3">AVAILABILITY DATA</th></tr>
<tr><td rowspan="5">ID</td><td>Provider name</td><td>CSC HOLDINGS INC</td></tr>
<tr><td>“Doing business as” name</td><td>CABLEVISION / LIGHTPATH</td></tr>
<tr><td>FRN</td><td>0003735909, 0003510195</td></tr>
<tr><td>Holding company name</td><td>CSC Holdings, Inc.</td></tr>
<tr><td>Holding company number</td><td>130370</td></tr>
<tr><th colspan="3">FOR WIRELINE</th></tr>
<tr><td>Filetypes</td><td colspan="2">Shapefile with Census Block Year 2010 data</td></tr>
<tr><td>File size</td><td colspan="2">Multiple tables and shapes, for cable modem and optical (Lightpath) technologies.</td></tr>
<tr><td>Speeds</td><td colspan="2">
<table>
<tr><th>Type</th><th></th><th>Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)</th></tr>
<tr><td>Typical-upstream</td><td></td><td>Not provided</td></tr>
<tr><td>Typical-downstream</td><td></td><td>Not provided</td></tr>
<tr><td>Advertised-upstream</td><td></td><td>Census block and street segment</td></tr>
<tr><td>Advertised-downstream</td><td></td><td>Census block and street segment</td></tr>
<tr><td>Subscriber-weighted-up</td><td></td><td>Not provided</td></tr>
<tr><td>Subscriber-weighted-down</td><td></td><td>Not provided</td></tr>
</table>
</td></tr>
<tr><td>Technology Type</td><td colspan="2">40 (Cable Modem DOCSIS3.0), 41 (Cable Modem - Other), 50 (Optical carrier)</td></tr>
<tr><td>End-user specification</td><td colspan="2">Yes. Address data provided in 2 shape files (for both cable and optical) with street segment ID. (a field is called TLID, which is assumed means Tiger Line ID).</td></tr>
</table>

Comments: Street data is comprised solely of polylines in the shapefile while the other files are polygons representing coverage. No subscriber weighted data found.	
INTERCONNECTION DATA: PROVIDED AFTER REQUEST	
ID	
File size	
Ownership	
Transport Type	
Data Rates/Capacity	
Location	
Comments: None.	

Figure 1. submitted data (quick preview)

Overview of submitted data



Section 3: Submission File Details

Received one (1) file by SECURE UPLOAD. The zip archive contains six shapefiles: large census blocks (Cablevision and Lightpath), small census blocks (Cablevision and Lightpath), and one with roadsegments (Cablevision and Lightpath). The data and shapes appear to use Year 2010 Census Bureau geometry. The shapefiles use the XY Coordinate System GCS_North_American_1983.

Size Name

CABLEVISION_NJ_AREA_AVAILABILITY_2010_BLOCKS_GREATER_THAN_2MI....	7 KB
CABLEVISION_NJ_AREA_AVAILABILITY_2010_BLOCKS_GREATER_THAN_2MI....	1 KB
CABLEVISION_NJ_AREA_AVAILABILITY_2010_BLOCKS_GREATER_THAN_2MI....	160 KB
CABLEVISION_NJ_AREA_AVAILABILITY_2010_BLOCKS_GREATER_THAN_2MI....	1 KB
CABLEVISION_NJ_AREA_AVAILABILITY_2010_BLOCKS_LESS_THAN_2MI.dbf	13,622 KB
CABLEVISION_NJ_AREA_AVAILABILITY_2010_BLOCKS_LESS_THAN_2MI.prj	1 KB
CABLEVISION_NJ_AREA_AVAILABILITY_2010_BLOCKS_LESS_THAN_2MI.shp	32,275 KB
CABLEVISION_NJ_AREA_AVAILABILITY_2010_BLOCKS_LESS_THAN_2MI.shx	470 KB
CABLEVISION_NJ_AREA_AVAILABILITY_2010_TIGER_STREETS.dbf	260 KB
CABLEVISION_NJ_AREA_AVAILABILITY_2010_TIGER_STREETS.prj	1 KB
CABLEVISION_NJ_AREA_AVAILABILITY_2010_TIGER_STREETS.shp	179 KB
CABLEVISION_NJ_AREA_AVAILABILITY_2010_TIGER_STREETS.shx	5 KB
LIGHTPATH_NJ_AREA_AVAILABILITY_2010_CENSUSBLKS_GREATER_THAN_2...	2 KB
LIGHTPATH_NJ_AREA_AVAILABILITY_2010_CENSUSBLKS_GREATER_THAN_2...	1 KB
LIGHTPATH_NJ_AREA_AVAILABILITY_2010_CENSUSBLKS_GREATER_THAN_2...	40 KB
LIGHTPATH_NJ_AREA_AVAILABILITY_2010_CENSUSBLKS_GREATER_THAN_2...	1 KB
LIGHTPATH_NJ_AREA_AVAILABILITY_2010_CENSUSBLKS_LESS_THAN_2MI.dbf	177 KB
LIGHTPATH_NJ_AREA_AVAILABILITY_2010_CENSUSBLKS_LESS_THAN_2MI.prj	1 KB
LIGHTPATH_NJ_AREA_AVAILABILITY_2010_CENSUSBLKS_LESS_THAN_2MI.shp	805 KB
LIGHTPATH_NJ_AREA_AVAILABILITY_2010_CENSUSBLKS_LESS_THAN_2MI.shx	7 KB
LIGHTPATH_NJ_AREA_AVAILABILITY_2010_TIGER_STREETS.dbf	45 KB
LIGHTPATH_NJ_AREA_AVAILABILITY_2010_TIGER_STREETS.prj	1 KB
LIGHTPATH_NJ_AREA_AVAILABILITY_2010_TIGER_STREETS.shp	44 KB
LIGHTPATH_NJ_AREA_AVAILABILITY_2010_TIGER_STREETS.shx	2 KB

Section 4: Validations and Results

Cablevision Census blocks:	60,122
Cablevision Large Census blocks:	29
Cablevision Streets:	516
Lightpath Census blocks:	811
Lightpath Large Census blocks:	6
Lightpath Streets:	140

Feature class "CV_NJ_AR_AV_2009_TI_ST"

This road segment table has 39 duplicate shapes according to ESRI.

Feature class "LP_NJ_AR_AV_2009_TI_ST"

This road segment table has 9 duplicate shapes according to ESRI.

Section 5: Data Transformation and Loading

NTIA Table BB_ConnectionPoint_MiddleMile

Loaded from data supplied in the XLS sheet. Only one row describes a connection point in New Jersey. The following table explains the transformations that were applied.

Table Column	Data Source / Transformation
PROVNAME	Set to “CSC HOLDINGS INC”
DBANAME	Set to “CABLEVISION”
FRN	As supplied in column frn_name
OWNERSHIP	Set to code 1, leased
BHCAPACITY	Set to code 4; 1gbps falls in range 600mbps – 2.4gbps
BHTYPE	Set to code 1, fiber
LATITUDE	Obtained by geocoding the address
LONGITUDE	Obtained by geocoding the address
ELEVFEET	Set to “0” (zero)
STATEABBR	Set to “NJ”
FULLFIPSID	ID of containing census block from Year 2010 Census Bureau TigerLine reference data
SHAPE	Point shape created using ESRI ArcDesktop

Internal notes on processing:

1. Reused the table created for the October 2010 submission, but mapped Lat/Long to 2010 census block.

NTIA Table BB_Service_CensusBlock

Loaded from the two supplied feature classes (shapefiles) with census blocks, one for Cablevision and one for LightPath. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	As supplied in column proname
DBANAME	As supplied in column dbaname
PROVIDER_TYPE	Set to 1

FRN	As supplied in column frn
STATEFIPS	Set to “34” (NJ)
COUNTYFIPS	Populated from cenblock (digits 3-5)
TRACT	Populated from cenblock (digits 6-11)
BLOCKID	Populated from cenblock (digits 12-15)
FULLFIPSID	As supplied in column cenblock
TRANSTECH	As supplied - For Cablevision: column trechtrans2 - For Lightpath: column techtrans
MAXADDOWN	As supplied in column maxaddnsp
MAXADUP	As supplied in column maxadupsp
TYPICDOWN	Set to null, not supplied
TYPICUP	Set to null, not supplied
ENDUSERCAT	Set to null, not supplied
SHAPE	As supplied in column shape

Internal processing notes:

1. Import the features with XY Coordinate System " GCS_North_American_1983" via the following three-step process. (A simple Import using ArcCatalog yields an incompatible tolerance value.)
    a. First, copy the data from the shapefiles to the geodatabase using a geographic transformation “NAD_1983_to_WGS_1984_5”. This yields feature classes with the required coordinate system but an incorrect tolerance value. Names are "cv_nj_ar_av_cb_lt_2mi" and "lp_nj_ar_av_db_lt_2mi".
    b. Second, create new feature classes with the same schema as the provided shapefile feature classes and the required coordinate reference system (GCS_WGS_1984) and tolerance (0.000000002 degrees). Names are " cv_nj_ar_av_cb_lt_2mi _tol" and "lp_nj_ar_av_db_lt_2mi _tol".
    c. Third, load the data into the newly created feature classes to ensure perfect compatibility with the required coordinate reference system and tolerance.
2. Ignored the column "techtrans1" in the Cablevision feature class
3. All of the cenblock values correspond to valid Year 2010 Census Block IDs.
4. The Cablevision data includes 29 census blocks that are larger than 2.0 square miles, including blocks 340258017005001 (approx 9 sq mi) and 340258106003000 (approx 3 sq mi). We discarded this data. No large blocks were found in Lightpath data.

NTIA Table BB_Service_RoadSegment

Loaded from the two supplied features with line segments. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	As supplied in column prvd_name
DBANAME	As supplied in column dba_name
PROVIDER_TYPE	Set to 1
FRN	As supplied in column frn_name
ADDMIN	Set to the least of the non-empty address numbers
ADDMAX	Set to the greatest of the non-empty address numbers
PREDIR	Set to null (no value supplied)
STREETNAME	As supplied (has all street components, not just name)
STREETTYPE	Set to null (no value supplied)
SUFFDIR	Set to null (no value supplied)
CITY	Set to null (no value supplied)
STATECODE	Set to “NJ”
ZIP5	Set to null (no value supplied)
ZIP4	Set to null (no value supplied)
TRANSTECH	As supplied in column tech_trans
MAXADDOWN	As supplied in column max_ad_dwn
MAXADUP	As supplied in column max_ad_up
TYPICDOWN	Set to null (no value supplied)
TYPICUP	Set to null (no value supplied)
SHAPE	As supplied

Internal processing notes:

1. Feature classes were imported exactly as discussed above for table BB_Service_CensusBlock.
2. Ignored the column "tech_trans2" in the Cablevision feature class.
3. Dropped 145 rows with empty street name values.
4. One data column in the Cablevision and Lightpath feature classes is named "linearid". We validated the data in the “linearid” column against Year 2010 TigerLine Census Bureau reference data, but none are valid values. We used the supplied shapes.

Section 6: Clarification Questions and Responses

1. no interconnection data. (same as the last time)

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Monday, August 22, 2011 11:00 AM
To: 'tbaecher@cablevision.com'
Subject: NJBB Clarification

Ted,
We have performed our initial review of the data you submitted and we have a clarification question. Your recent submission did not include any middle mile information. Is the middle mile information you submitted in March still valid? If not, could you please supply us with updated information?

Thanks for your cooperation.

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: Theodore Baecher [mailto:TBAECHER@cablevision.com]
Sent: Monday, August 22, 2011 11:29 AM
To: ConnectingNJ@research.telcordia.com
Subject: Re: NJBB Clarification

John-

The middle mile information we submitted in March is still valid.

Thanks-

Ted

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Friday, August 26, 2011 11:34 AM
To: 'Theodore Baecher'
Cc: 'ConnectingNJ@research.telcordia.com'
Subject: NJBB - Data Clarification Request

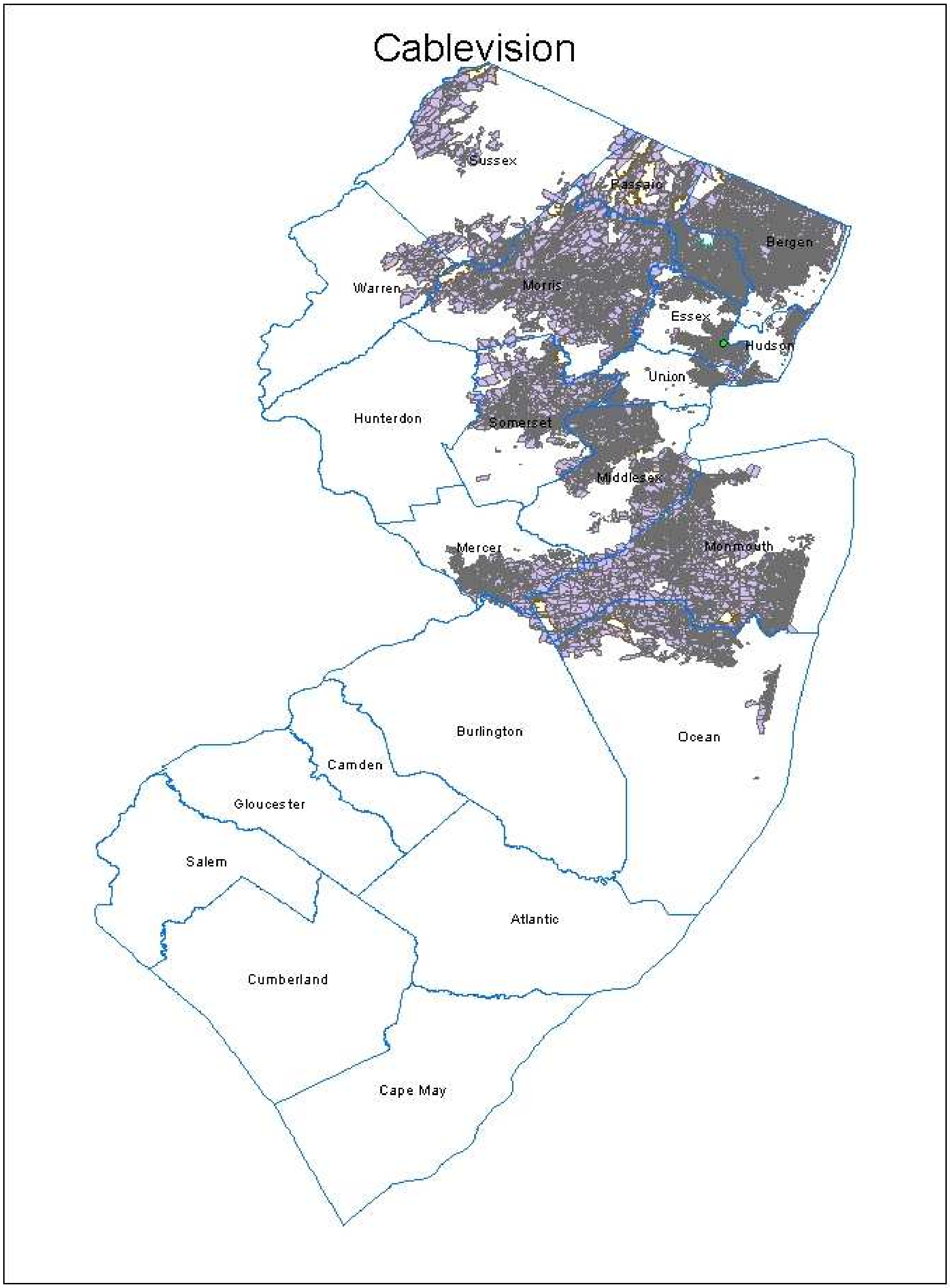
Ted,
We have attempted to load the data you submitted to the NJBB Mapping program and have run into a problem with the data for census blocks larger than 2 square miles. The data we received does not include TigerLine IDs and does not include minimum/maximum addresses for the street segments. This information was included in your previous submissions. We do see a “linearID” field in the submitted data, but we do not know how to interpret that data. This is true for both the cable and LightPath services.
Can you please provide updated information that includes the street-segment information?

Thanks,

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Provider: Dieca DBA Covad

Received: July 2011
Submission date: October 2011

This report presents details on processing broadband data for delivery to the National Telecommunications and Information Administration.

Section 1: NDA Status

NDA was executed with NJ OIT.

Section 2: Submission Overview

<table>
<tr><th colspan="3">AVAILABILITY DATA</th></tr>
<tr><td>ID</td><td>Provider name
“Doing business as” name
FRN</td><td>DIECA Communications, Inc.
Covad Communications Company
0003753753</td></tr>
<tr><th colspan="3">FOR WIRELINE</th></tr>
<tr><td>Filetypes</td><td colspan="2"></td></tr>
<tr><td>File size</td><td colspan="2"></td></tr>
<tr><td>Speeds</td><td><table>
<tr><th>Type</th><th></th><th>Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)</th></tr>
<tr><td>Typical-upstream</td><td></td><td>Address & block</td></tr>
<tr><td>Typical-downstream</td><td></td><td>Address & block</td></tr>
<tr><td>Advertised-upstream</td><td></td><td>Address & block</td></tr>
<tr><td>Advertised-downstream</td><td></td><td>Address & block</td></tr>
<tr><td>Subscriber-weighted-up</td><td></td><td>county level</td></tr>
<tr><td>Subscriber-weighted-down</td><td></td><td>county level</td></tr>
</table></td><td>Speeds are provided at address (line segment) and census block granularity.</td></tr>
<tr><td>Technology Type</td><td colspan="2">10 (ADS), 20 (SDSL), 30 (other copper)</td></tr>
<tr><td>End-user specification</td><td colspan="2">Not provided</td></tr>
<tr><td colspan="3">Comments:</td></tr>
<tr><th colspan="3">INTERCONNECTION DATA</th></tr>
<tr><td>ID</td><td colspan="2">File **MiddleMileConnection*.txt</td></tr>
</table>

File size	1kb
Ownership	1
Transport Type	
Data Rates/Capacity	4, 5
Location	5 locations
Comments:Five (5) data rows provided	

Section 3: Submission File Details

Received a zip file by SECURE UPLOAD in July 2011:

Size	**Name**
712799	DIECACommunicationsInc._NJ_CONFIDENTIAL.zip

The original archive contains the following five (5) files:

Size	**Name**
111959	NJBB_0003753753_AddressSegmentAvailability_DIECACommunicationsInc._CONFIDENTIAL.txt
21006114	NJBB_0003753753_CensusBlockAvailability_DIECACommunicationsInc._CONFIDENTIAL.txt
2509	NJBB_0003753753_CMAAdvertisedAvailability_DIECACommunicationsInc._CONFIDENTIAL.txt
644	NJBB_0003753753_MiddleMileConnection_DIECACommunicationsInc._CONFIDENTIAL.txt
2254	NJBB_0003753753_SubscriberWeightedNominalSpeed_DIECACommunicationsInc._CONFIDENTIAL.txt

Received a revised zip file by secure upload in September 2011:

Size	**Name**
715421	DIECACommunicationsInc._NJ_CONFIDENTIAL.zip

The revised archive contains the following five (5) files:

Size	**Name**
84891	NJBB_0003753753_AddressSegmentAvailability_DIECACommunicationsInc._CONFIDENTIAL.txt
20820959	NJBB_0003753753_CensusBlockAvailability_DIECACommunicationsInc._CONFIDENTIAL.txt
2509	NJBB_0003753753_CMAAdvertisedAvailability_DIECACommunicationsInc._CONFIDENTIAL.txt
644	NJBB_0003753753_MiddleMileConnection_DIECACommunicationsInc._CONFIDENTIAL.txt
2254	NJBB_0003753753_SubscriberWeightedNominalSpeed_DIECACommunicationsInc._CONFIDENTIAL.txt

Section 4: Validations and Results

File “..AddressSegmentAvailability..”
Technologies: 30,20,10 (xDSL and other copper)

Fields:
Provider Name
DBA Name
FRN
Census Block ID
Street NameStreet Segment ID (TLID)
Technology of Transmission
Maximum Advertised Downstream Speed
Maximum Advertised Upstream Speed
Typical Downstream Speed
Typical Upstream Speed

All TLID were validated against year 2010 Census Bureau reference data successfully, and all are in large census blocks.

File “..CensusBlockAvailability..”
Fields:
Provider Name
DBA Name
FRN
Census Block ID
Technology of Transmission
Maximum Advertised Downstream Speed
Maximum Advertised Upstream Speed
Typical Downstream Speed
Typical Upstream Speed

The input contains Year 2010 census block data, judging from the consistent length of 15 digit block IDs. Due to use of multiple technologies there are more rows here than the number of NJ census blocks (169,588). No duplicates were received, all submitted IDs are valid according to Year 2010 reference data, and all are less than 2 square miles.

File “..CMAAdvertisedAvailability..”
Provides three technology codes (10, 20, 30), MSA codes, and max advertised up and down speed codes. The max speed for a given technology is different for different MSAs. We are unlikely to use this data since max speed codes are provided on a row-by-row basis.

File “..MiddleMileConnection..”

There are 5 rows, the same as the last submission. Viewing the data in ArcMap indicates that all points are in New Jersey.

File “..SubscriberWeightedNominalSpeed..”

We do not submit overview data in this submission round so will not use this input file.

Section 5: Data Transformation and Loading

NTIA Table BB_ConnectionPoint_MiddleMile

Loaded from supplied file “..MiddleMileConnection..”. The following table explains the transformations that were applied.

Table Column	Data Source / Transformation
PROVNAME	As supplied in column Provider Name
DBANAME	As supplied in column DBA Name
FRN	As supplied in column FRN
OWNERSHIP	As supplied in column Ownership
BHCAPACITY	As supplied in column Serving Facility Capacity
BHTYPE	As supplied in column Service Facility Type
LATITUDE	As supplied in column Latitude
LONGITUDE	As supplied in column Longitude
ELEVFEET	As supplied in column Elevation
STATEABBR	Set to “NJ”
FULLFIPSID	ID of containing census block from Year 2010 Census Bureau reference data
SHAPE	Point shape created using ESRI

Internal notes on processing:

1. Created an Excel sheet and imported to a geodatabase table.
2. Added a point shape to each row corresponding to the Latitude, Longitude pair by creating a feature class from the table using ArcCatalog’s “Create Feature Class from XY Table” option. Specify WGS84 for the coordinate system of the points. Result is feature class middlemile_point_tol.
3. Added a column “geoid10” with the ID of the containing year 2010 census block via a spatial join of the points and the census block shapes from reference data. Result is feature class middlemile_point_tol_cb.

NTIA Table BB_Service_CensusBlock

Loaded from supplied file “..CensusBlockAvailability..”. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	As supplied in column Provider_Name
DBANAME	As supplied in column DBA_Name
PROVIDER_TYPE	Set to 1
FRN	As supplied in column FRN
STATEFIPS	Set to “34” (NJ)
COUNTYFIPS	Populated from Census_Block_ID (first 3 digits)
TRACT	Populated from Census_Block_ID (next 6 digits)
BLOCKID	Populated from Census_Block_ID (remaining 4 digits)
FULLFIPSID	As supplied in column Census_Block_ID
TRANSTECH	As supplied in column Technology_of_Transmission
MAXADDOWN	As supplied in column Maximum_Advertised_Downstream_Speed
MAXADUP	As supplied in column Maximum_Advertised_Upstream_Speed
TYPICDOWN	Set to null (see below)
TYPICUP	Set to null (see below)
ENDUSERCAT	Set to null because not supplied
SHAPE	As found in Census Bureau year 2010 reference data

Internal processing notes:

1. The supplied text file has 219,166 rows.
2. Discarded typical speeds since they were in all cases identical to maximum advertised speeds, not measured values.
3. We used Census Bureau reference data for Year 2010 to locate and submit geographic features (i.e., shapes) for each census block. All submitted blocks were matched.
4. Total rows (shapes) loaded is 219,166.

NTIA Table BB_Service_RoadSegment

Loaded from supplied File “..AddressSegmentAvailability..". The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	As supplied in column Provider_Name
DBANAME	As supplied in column DBA_Name
PROVIDER_TYPE	Set to 1
FRN	As supplied in column FRN
ADDMIN	Set to the least of the non-empty address numbers from TigerLine
ADDMAX	Set to the greatest of the non-empty address numbers from TigerLine

PREDIR	Set to null (no value supplied)
STREETNAME	As supplied (has all street components, not just name)
STREETTYPE	Set to null (no value supplied)
SUFFDIR	Set to null (no value supplied)
CITY	Set to null (no value supplied)
STATECODE	Set to "NJ"
ZIP5	Set to zipl from TigerLine
ZIP4	Set to null (no value available in reference data)
TRANSTECH	As supplied in column Technology_of_Transmission
MAXADDOWN	As supplied in column Maximum_Advertised_Downstream_Speed
MAXADUP	As supplied in column Maximum_Advertised_Upstream_Speed
TYPICDOWN	Set to null (see below)
TYPICUP	Set to null (see below)
SHAPE	Road segment shape from Year 2010 TigerLine reference data, as matched by TLID

Internal processing notes:

1. Of 722 input rows, discarded 1 row as duplicates based on compound key of county, TLID, and tech_transmission fields (TLID 134418087). This probably occurs because a road segment touches different counties, but we cannot submit duplicate shapes.
2. After a join against Census Bureau 2010 reference data, no rows were discarded based on compound key of county, TLID, and tech_transmission fields.
3. Total rows (shapes) loaded is 721.

Section 6: Clarification Questions and Responses

1. It looks like that they use the 2010 Census blocks. But we need to confirm.

From: Wullert, John R II
Sent: Monday, August 22, 2011 11:04 AM
To: 'SSanta@covad.com'
Subject: NJBB Clarification

Stefanie,

We have performed our initial review of the data you submitted and we have a clarification question. Your recent submission did not include any middle mile information. Is the middle mile information you submitted in February still valid? If not, could you please supply us with updated information?

Thanks for your cooperation.

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: Stefanie Santa-Esparza [mailto:Stefanie.Santa-Esparza@megapath.com]
Sent: Monday, August 22, 2011 1:54 PM
To: Wullert, John R II
Subject: RE: NJBB Clarification

John,
There were 5 txt docs in the zip file I uploaded to your FTP site. NJBB_0003753753_MiddleMileConnection_DIECACommunicationsInc._CONFIDENTIAL.txt is the one with our middle mile information. However, it is true that it is unchanged from last submission.

Thanks,
Stefanie

From: Wullert, John R II [mailto:jwullert@telcordia.com]
Sent: Monday, August 22, 2011 11:01 AM
To: Stefanie Santa-Esparza
Subject: RE: NJBB Clarification

Stefanie,
I apologize. I am sending questions to many providers and I inadvertently sent the wrong question to you. What I did want to do is confirm that you submission did use the 2010 Census Block geometry.

John

From: Stefanie Santa-Esparza [mailto:Stefanie.Santa-Esparza@megapath.com]
Sent: Monday, August 22, 2011 2:03 PM
To: Wullert, John R II
Subject: RE: NJBB Clarification

John,
No worries. Yes, we used 2010 census data.

Thanks,
Stefanie

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Thursday, September 15, 2011 5:04 PM
To: 'SSanta@covad.com'
Cc: ConnectingNJ@research.telcordia.com
Subject: NJBB Clarification

Stefanie,
In the course of our validation of the data you submitted to the New Jersey Broadband project, we have come across a problem. It seems that a large number of the street segments that you submitted (192 of them) are not located in large census blocks. The attached file gives several examples. We would like to represent your service area as accurately as possible, and hope that you can analyze the data and resubmit within the next week. If you are not able to do so, we will have to drop those street segments from the submission.
If you have any questions, please call or email.

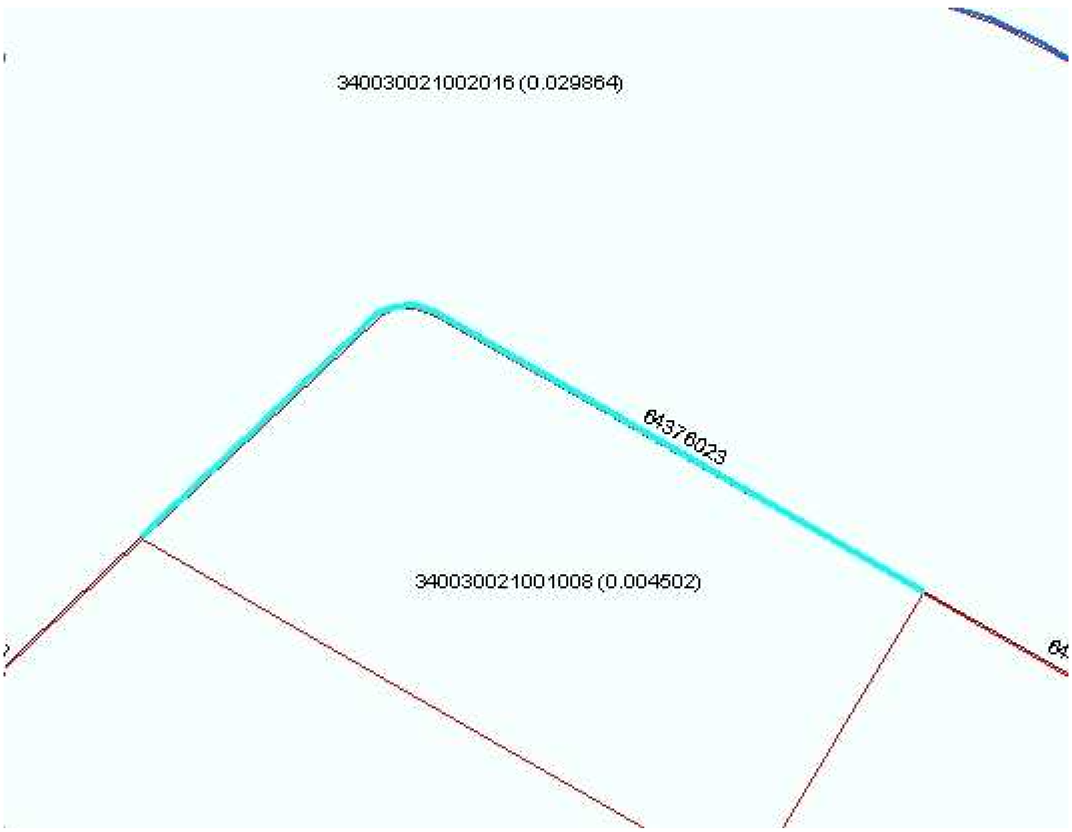
John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

Section 7: Notes and Open Issues

There are 192 street segments that do not belong to large census blocks. Below are a few examples:

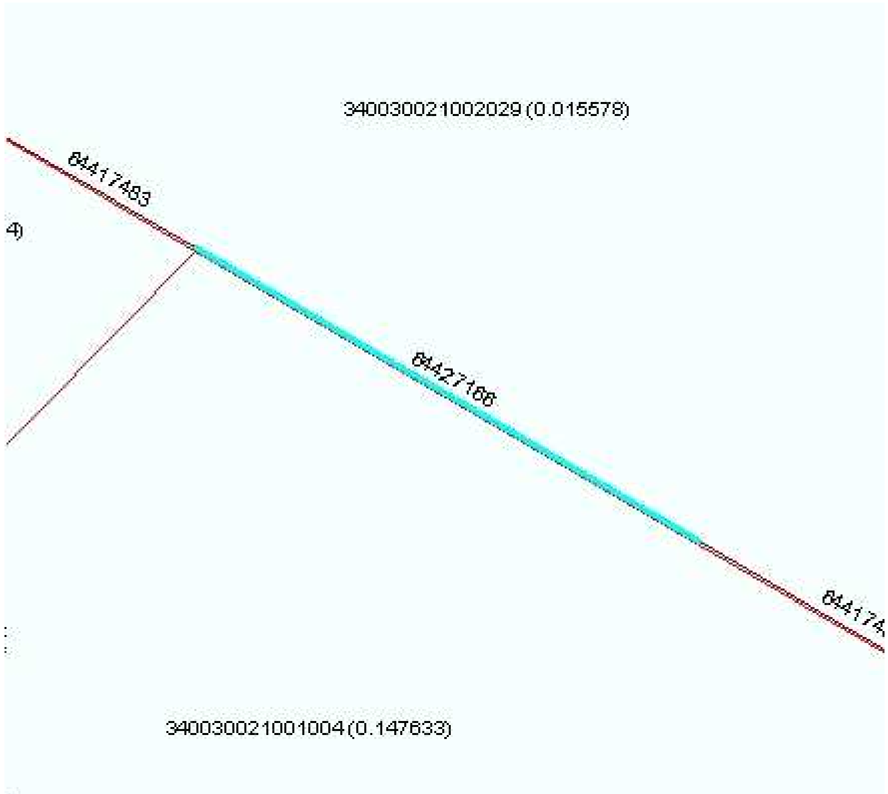
Example 1.

Block ID	Street Name	Street Segment ID (TLID)
340030021002008	Allison Rd	64376023



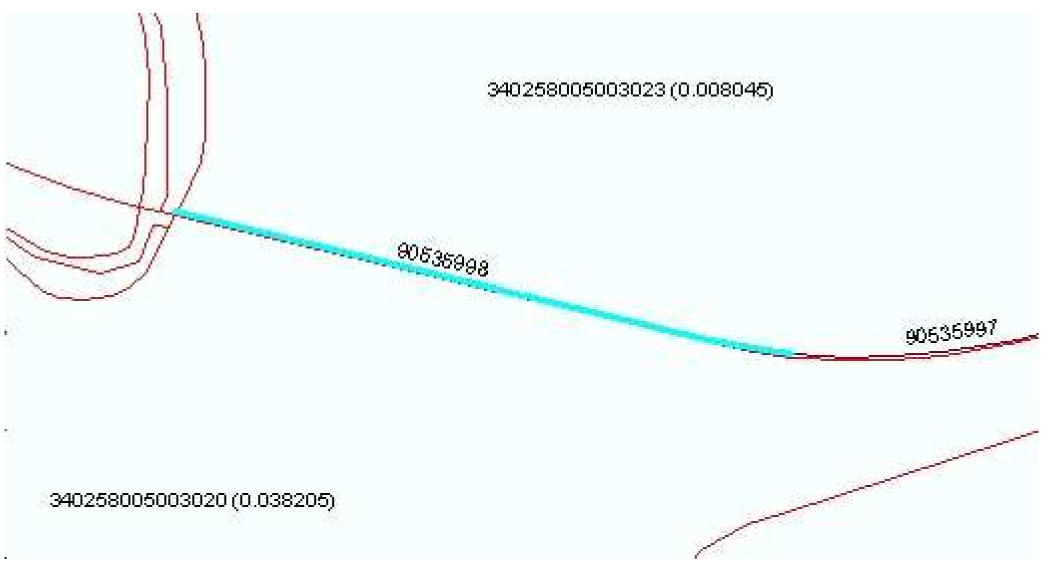
Example 2:

Block ID	Street Name	Street Segment ID (TLID)
340030021002008	Closter Dock Rd	64427166

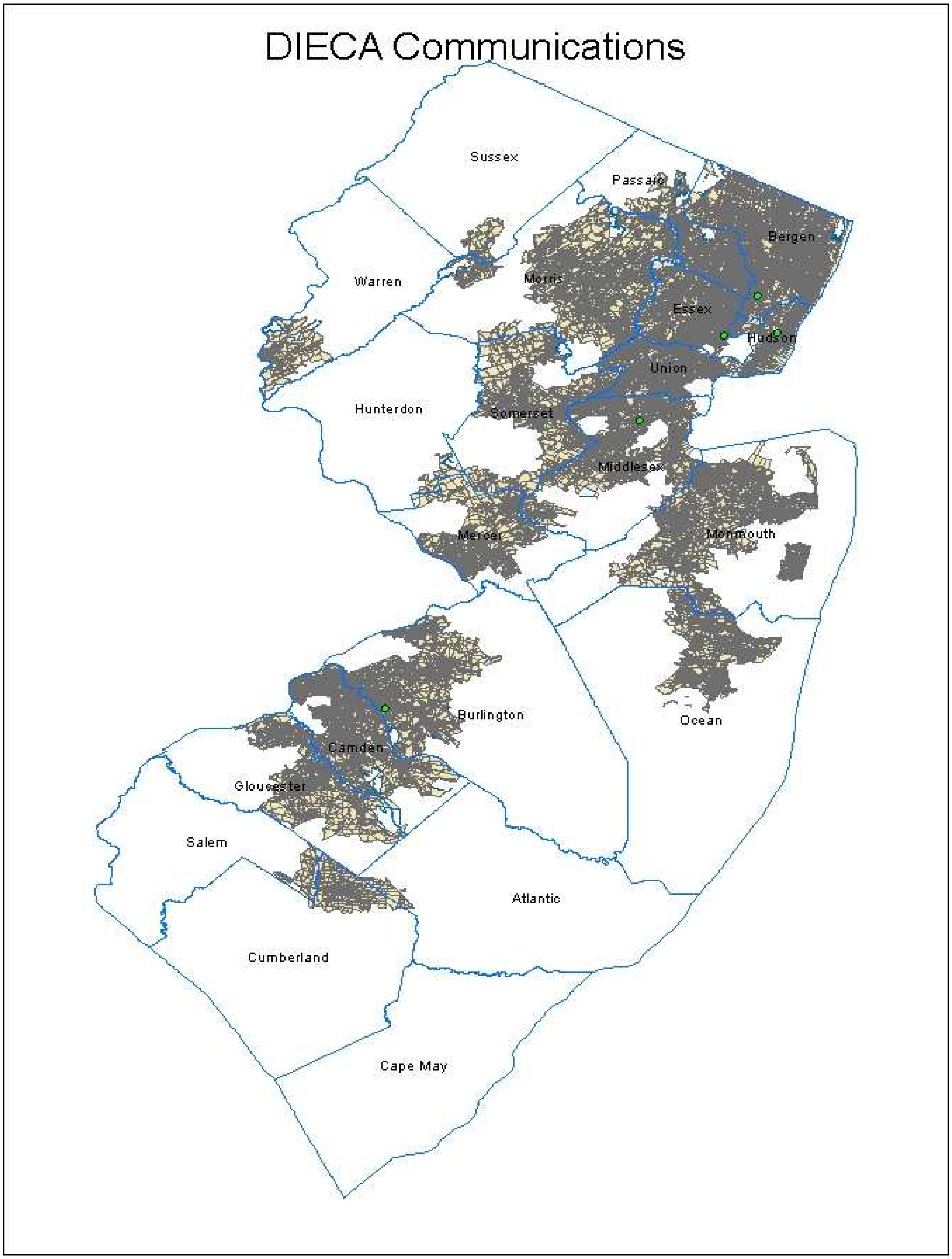


Example 3:

Block ID	Street Name	Street Segment ID (TLID)
340258005003001	Broadway	90535998



Section 8: Overview Map of Submitted Data



Provider: Earthlink Business (previously New Edge)

Received: October 2011
Submission date: October 2011

This report presents details on processing of broadband data for delivery to the National Telecommunications and Information Administration.

Section 1: NDA Status

None

Section 2: Submission Overview

AVAILABILITY DATA			
ID	Provider name “Doing business as” name FRN		EarthLink Business EarthLink Business 0003720471
FOR WIRELINE			
Filetypes	Txt, xls, pdf, etc.		Xls
File size	Number of records, data elements		605 rows
Speeds	Type	Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode)	Existing customer addresses as unfielded data No census blocks.
	Upstream	1 = < 200, 2 = 200-768, 3 = 768-1.5, 4 = 1.5-3	
	Downstream	3 = 768-1.5, 4 = 1.5-3, 5 = 3-6	
	Typical	Not given	
	Advertised	See above	
Technology Type	DOCSIS, xDSL, fiber, etc.		10 = ADSL, 20 = SDSL, 30 = other D
End-user specification	Business, consumer, gov’t etc		Not specified; looks like businesses
FOR WIRELESS			
Filetypes	shapefile collection: shp/dbf/prj/shx, mdb, gdb, imagefile etc.		**N/A**
Speeds	Type	Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode)	
	Upstream		
	Downstream		
	Typical		
	Advertised		
	Subscriber-weighted		
Technology Type	Spectrum (Mhz, FCC code)		

INTERCONNECTION DATA		
ID	Provider name "Doing business as" name FRN	None
File size	Number of records, data elements	
Ownership	Leased/owned	
Transport Type	Fiber, wireless, copper	
Data Rates/Capacity		
Location	Street address, lat/lon, elevation	
DATA VALIDATION AND VERIFICATION		
Data Validation/ Verification	-	

Section 3: Submission File Details

Received 1 file by a CD in June 2010. Instructed by provider to use prior data.

Size **Name**
184320 NJ_Service_Address.xls

Section 4: Validations and Results

Address data has 605 records.

Data Completeness

- New Edge reported a list of addresses that appears to be locations where they currently offer service
  - o We are interpreting this to mean they offer service in that census block
- New Edge reported maximum advertised speeds
- New Edge did not report typical speeds or subscriber weighted average speeds.
- New Edge said that they do not have the ability to report Middle Mile data

Speed/technology data

- The New Edge data included certain addresses with multiple services
  - o In some cases the same location had more than one record with different maximum advertised speeds
- New Edge reported technologies of ADSL (code 10), SDSL (code 20) and other DSL (code 30)
- The Maximum Advertised Speeds reported by New Edge indicated downloads at rates of 768 kbps to 6 Mbs (codes, 3, 4, 5) and uploads at less than 200 kbs to 3 Mbs (codes 1, 2, 3, 4)

Middle Mile Data
None reported

Section 5: Data Transformation and Loading

We determine the census block for each customer address, and then report the census block shape drawn from Census Bureau TigerLine reference data.

NTIA Table BB_Service_CensusBlock

Loaded from the file mentioned above. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	Set to “EarthLink Business”
DBANAME	Set to “EarthLink Business”
PROVIDER_TYPE	Set to “2”
FRN	As supplied in column
STATEFIPS	Set to “34” (NJ)
COUNTYFIPS	Populated from Census Block FIPS Code (first 3 digits)
TRACT	Populated from Census Block FIPS Code (next 6 digits)
BLOCKID	Populated from Census Block FIPS Code
FULLFIPSID	Populated from Census Block FIPS Code
TRANSTECH	As supplied in column
MAXADDOWN	As supplied in column
MAXADUP	As supplied in column
TYPICDOWN	Set to null (see below)
TYPICUP	Set to null (see below)
ENDUSERCAT	Set to null (see below)
SHAPE	Copied from Census Bureau TigerLine 2010, as matched by spatial join on geocoded address

Internal processing notes:

1. Geocoded the addresses using an Arroyo flow and the Yahoo geocoder, leaving the result with address and lat, long data in an Excel spreadsheet.
2. Imported the spreadsheet to a simple ESRI geodatabase table
3. Added point shapes corresponding to each Latitude/Longitude pair by creating a feature class from the table using ArcCatalog’s “Create Feature Class from XY Table” option
4. Added a column containing the ID of the containing year 2010 census block using ArcCatalog's spatial join feature. The newly created point shapes are joined against census block shapes from reference data. All records successfully spatially joined on 2010 NJ Census Block shapes.
5. Discarded 198 records with upload speeds that are not considered broadband (speed code 1).
6. Discarded 83 duplicate census block records, which result from multiple

addresses in the same census block.

7. Discarded 1 large census block record (340330216005000).
8. Loaded 323 records.

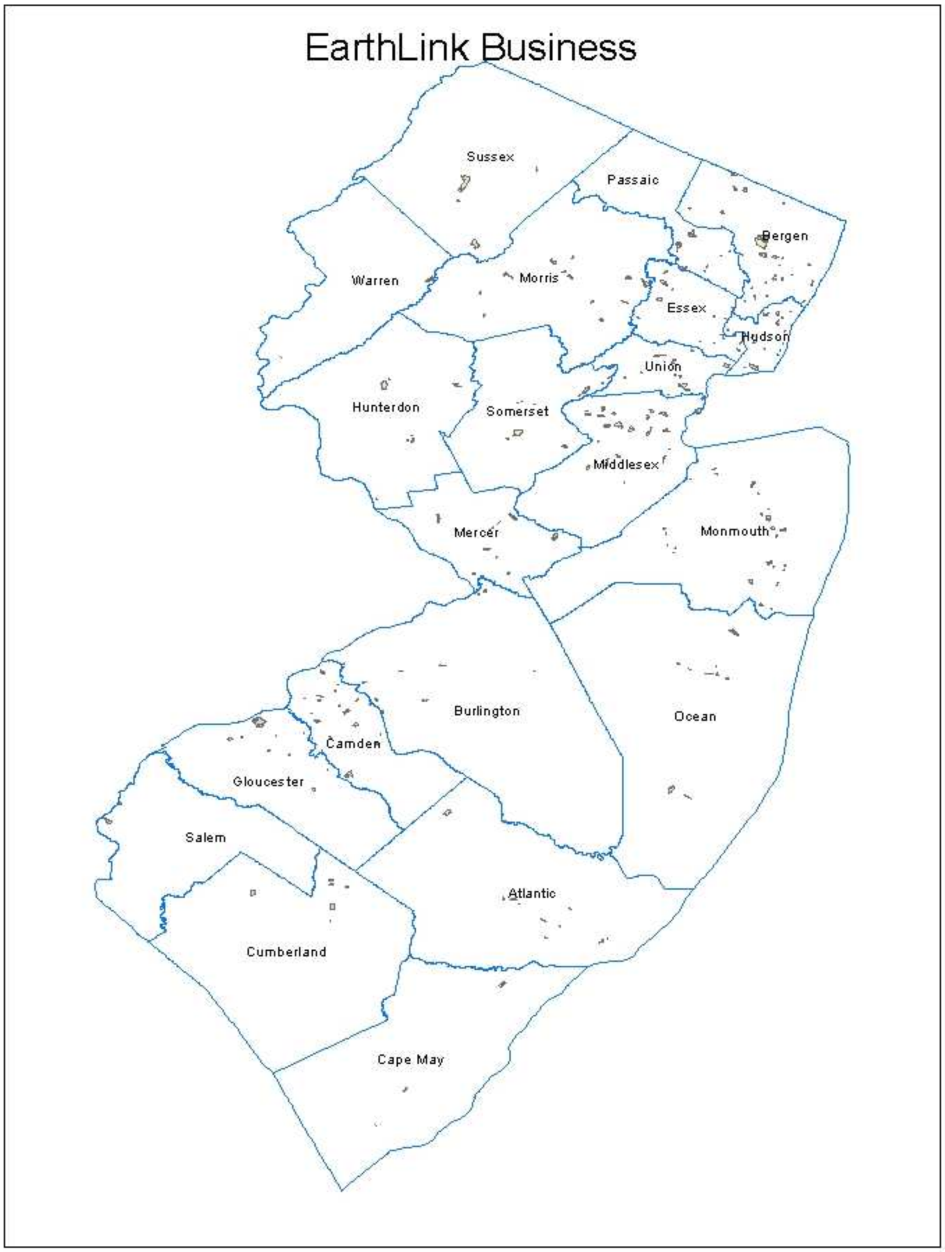
Section 6: Clarification Questions and Responses

Questions for clarification

- The data submitted by New Edge Networks appears to be based on a listing of existing customers. What does the offering of service at these locations imply about the ability to offer service to other locations within the census block or along a street segment.
- Response (via phone conversation): New Edge is a pure reseller serving business customers only. They do not do residential at all (not home-based business, according to Pia). They are co-located in LEC central offices and, when they get a service request, they go to LECs for pre-qualification. Pia's view is that they can provide service anywhere that a LEC can. But she also said that 'technically they are not facilities-based.' We elected to limit their coverage area based on current delivery. We will need to determine in the future if we should adjust the coverage area to match LEC.

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Provider: GOES Telecom

Received: July 2011
Submission date: October 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Section 1: NDA Status

None

Section 2: Submission Overview

<table>
<tr><th colspan="3">AVAILABILITY DATA</th></tr>
<tr><td>ID</td><td>Provider name
“Doing business as” name
FRN
Holding company name
Holding company number</td><td>GOES Telecom
Not provided
0011437746
GOES
130548</td></tr>
<tr><th colspan="3">FOR WIRELINE</th></tr>
<tr><td>Filetypes</td><td colspan="2">1 Excel</td></tr>
<tr><td>File size</td><td colspan="2">worksheet 17,408 bytes, approx 28 rows</td></tr>
<tr><td>Speeds</td><td><table>
<tr><th>Type</th><th></th><th>Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)</th></tr>
<tr><td>Typical-upstream</td><td></td><td>Not provided</td></tr>
<tr><td>Typical-downstream</td><td></td><td>Not provided</td></tr>
<tr><td>Advertised-upstream</td><td></td><td>Not provided</td></tr>
<tr><td>Advertised-downstream</td><td></td><td>Not provided</td></tr>
<tr><td>Subscriber-weighted-up</td><td></td><td>Not provided</td></tr>
<tr><td>Subscriber-weighted-down</td><td></td><td>Not provided</td></tr>
</table></td><td>Submitted 28 addresses with upload and download speeds (generally in kbps) for each address. These are delivered speeds to customers. We located advertised speeds on their Web site, and provider confirmed that those speeds were available at each location they served. We will use the data from Web site as advertised speeds.

Note that for three addresses, submitted speeds as “10mpbh”. Need to ask them what that means. We asked these questions last time, but did not receive a response in time to submit. This time we received corrected data.

Note also that some speeds are listed as having faster upload speeds than download speeds. Need to verify. We asked these questions last time, but did not</td></tr>
</table>

		receive a response in time to submit. This time we received corrected data. No typical or subscriber weighted speeds were provided.
Technology Type	10 (ADSL) and 70 (Terrestrial fixed wireless)	
End-user specification	None	
Comments: Provided a list of 28 customers and the speeds they are subscribed to. Most are 128K up, 512K down.		
INTERCONNECTION DATA		
ID	None provided	
File size		
Ownership		
Transport Type		
Data Rates/Capacity		
Location		
Comments:		

Section 3: Submission File Details

Received 1 file by email:

Size	**Name**
17,408	20110711 Telcordia.xls

The file contains a list of addresses and max speeds; e.g., the “up-to” limit of their rate plan. The addresses in this file appear to be for individual customers (as opposed to addresses of multi-tenant buildings in a central business district).

Section 4: Validations and Results

For many ADSL subscribers, a download/upload rating of 512K/128K looks reasonable, but this is not a "broadband" service according to the NOFA definition. We will discard records for slow services.

Some ADSL subscribers have upload speeds that exceed download. The last two entries have unknown speed ratings: 10mpbh up and 10mpbh down.

What spectrum is used by the fixed wireless service?

Section 5: Data Transformation and Loading

All addresses were successfully geocoded using Arroyo with Yahoo geocoder. All records successfully spatially joined on 2010 NJ Census Block shapes.

The standard NDA prohibits us from submitting address-level data to the NTIA. Instead, we will discover the census block for each customer address, then report the census block shape drawn from Census Bureau TigerLine reference data.

NTIA Table BB_Service_CensusBlock

Loaded from supplied file "20110711 Telcordia_update.xls" (28 data rows). The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	Set to "Global Online Electronic Services, Inc."
DBANAME	Not supplied; set same as PROVNAME
PROVIDER_TYPE	Set to 1
FRN	Set to "0011437746"
STATEFIPS	Set to "34" (NJ)
COUNTYFIPS	Populated from Census Block FIPS Code (first 3 digits)
TRACT	Populated from Census Block FIPS Code (next 6 digits)
BLOCKID	Populated from Census Block FIPS Code
BLOCKSUBGROUP	Set to null
FULLFIPSID	Populated from Census Block FIPS Code
TRANSTECH	As supplied in column Technology Code
MAXADDOWN	Set to code 4 per March 2011 email response to questions
MAXADUP	Set to code 3 per March 2011 email response to questions
TYPICDOWN	Set to null, not provided
TYPICUP	Set to null, not provided
SHAPE	Copied from Census Bureau 2010, as matched by spatial join on geocoded address point

Internal processing notes:

1. Geocoded the addresses using the Google geocoder to obtain latitude, longitude value pairs.
2. Created point shapes using ESRI from lat, long value pairs.
3. Spatially joined the points with Census Bureau Year 2010 reference data to find the containing census block. This yielded census block attributes including the block ID ("geoid10").
4. Dropped duplicate census blocks (caused by two customers in the same census block).

5. Loaded the resulting data into an SDE feature class. Of 28 original records, all were successfully geocoded; 10 have broadband speeds (rest are 512Kbps down); and 2 are duplicates, leaving 8 records; 7 use wireline technology.

The mechanized procedure for the three steps is described in file GeoExcel_proc.txt.

NTIA Table BB_Service_Wireless

Loaded using shapes from reference data for the 1 record that indicates wireless technology. The following table explains the transformations that were applied.

Table Column	**Data Source / Transformation**
PROVNAME	Set to “Global Online Electronic Services, Inc.”
DBANAME	Not supplied; set same as PROVNAME
FRN	Set to "0011437746"
TRANSTECH	Set to 70 as supplied in XLS sheet
SPECTRUM	Set to 6
MAXADDOWN	Set to 7
MAXADUP	Set to 7
TYPICDOWN	Set to null
TYPICUP	Set to null
STATEABBR	Set to “NJ”
SHAPE	Year 2010 Census Block shape obtained from reference data.

Internal processing notes:

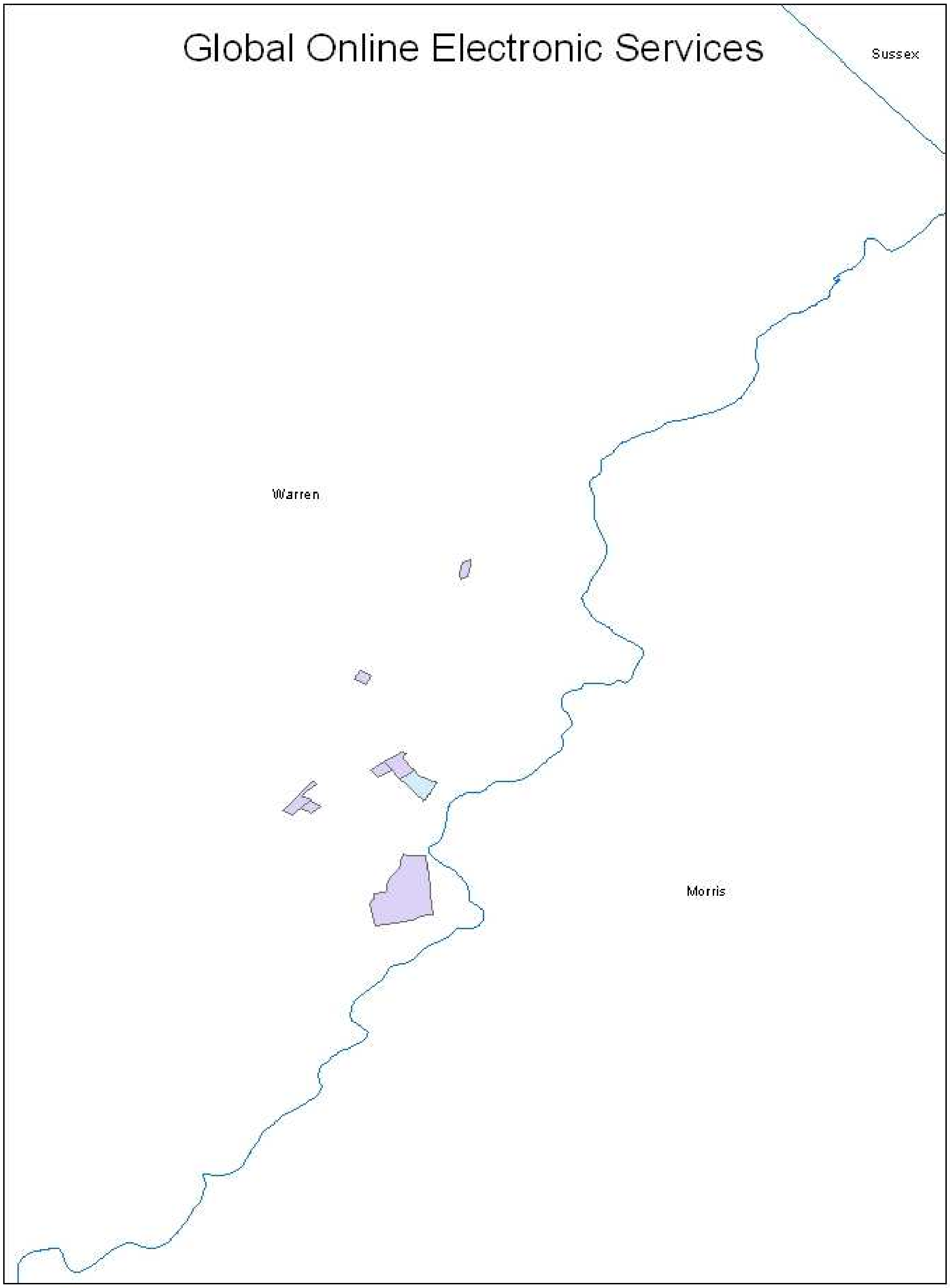
9. See above for discussion of geocoding addresses and finding the containing census block.
10. Spectrum: Set to 6, Unlicensed
11. Speeds: The fixed-wireless link is reported with 10Mbps in each direction (symmetric). That corresponds to NOFA speed code 7.

Section 6: Clarification Questions and Responses

See March 2011 provider data report.

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Provider: Hometown Online

Received: July 2011
Submission date: October 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Section 1: NDA Status

No NDA in place.

Section 2: Submission Overview

<table>
<tr><th colspan="3">AVAILABILITY DATA</th></tr>
<tr><td>ID</td><td>Provider name
“Doing business as” name
FRN</td><td>Hometown Online Inc.
Warwick Online
0006-6512-44</td></tr>
<tr><th colspan="3">FOR WIRELINE</th></tr>
<tr><td>Filetypes</td><td colspan="2">Text</td></tr>
<tr><td>File size</td><td colspan="2">1,764,352 bytes; 6,778 rows</td></tr>
<tr><td>Speeds</td><td>
<table>
<tr><th>Type</th><th></th><th>Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)</th></tr>
<tr><td>Typical-upstream</td><td></td><td>Not provided</td></tr>
<tr><td>Typical-downstream</td><td></td><td>Not provided</td></tr>
<tr><td>Advertised-upstream</td><td></td><td>Not provided</td></tr>
<tr><td>Advertised-downstream</td><td></td><td>Not provided</td></tr>
<tr><td>Subscriber-weighted-up</td><td></td><td>Not provided</td></tr>
<tr><td>Subscriber-weighted-down</td><td></td><td>Not provided</td></tr>
</table>
</td><td>Provided list of customer locations with column “DSL speed avail”. This is probably downstream speed, but need to verify with provider.

Communications with provider and validation via their Web site resulted in clarification: Max advertised speeds are:
Downstream: 15 Mbps
Upstream: 800 Mbps.
‘
Rows where the speed and DSL Qual columns are blank indicate no-service. These should be dropped.

Provider has column that indicates geo-spatial capabilities, but only one address in list appears to be geo-located on their map</td></tr>
<tr><td>Technology Type</td><td colspan="2">DSL – not clear in each case whether it is Asymmetric or Symmetric</td></tr>
</table>

End-user specification	Not provided
Comments: Address data with some indications of qualification for different data services.	
INTERCONNECTION DATA	
ID	
File size	
Ownership	
Transport Type	
Data Rates/Capacity	
Location	
Comments:No connection-point data provided	

Section 3: Submission File Details

Received one (1) file by EMAIL:

Size	**Name**
1,761,280	M4 STRUCTURES - NJ 7-18-11.xls

Section 4: Validations and Results

The file contains 6778 rows of data. Each row has a street address. All rows have an indication of maximum possible DSL speed. Some indicate 5Mbps, some 15Mpbs and some 25Mbps. Also has information about TV qualification, which we will ignore.

All normal validations performed.

Section 5: Data Transformation and Loading

The standard NDA prohibits us from submitting address-level data to the NTIA. Instead, we discover the census block for each customer address, and then report the census block shape drawn from Census Bureau TigerLine reference data.

NTIA Table BB_Service_CensusBlock

Loaded from the supplied file after geocoding. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	Set to “Hometown Online Inc.”
DBANAME	Set to “Warwick Online”
PROVIDER_TYPE	Set to 1
FRN	Set to “0006651244”
STATEFIPS	Set to “34” (NJ)
COUNTYFIPS	Populated from Census Block 2010 (first 3 digits)
TRACT	Populated from Census Block 2010 (next 6 digits)
BLOCKID	Populated from Census Block 2010 Code
BLOCKSUBGROUP	Set to null
FULLFIPSID	Populated from Census Block 2010 Code
TRANSTECH	Set to code “10” (ADSL)
MAXADDOWN	Set to code “7” (range includes 15Mbps, per email)
MAXADUP	Set to code “3” (range includes 1Mbps, per email)
TYPICDOWN	Set to null, not supplied
TYPICUP	Set to null, not supplied
SHAPE	Copied from Census Bureau TigerLine 2000, as matched by spatial join on geocoded address point

Internal processing notes:

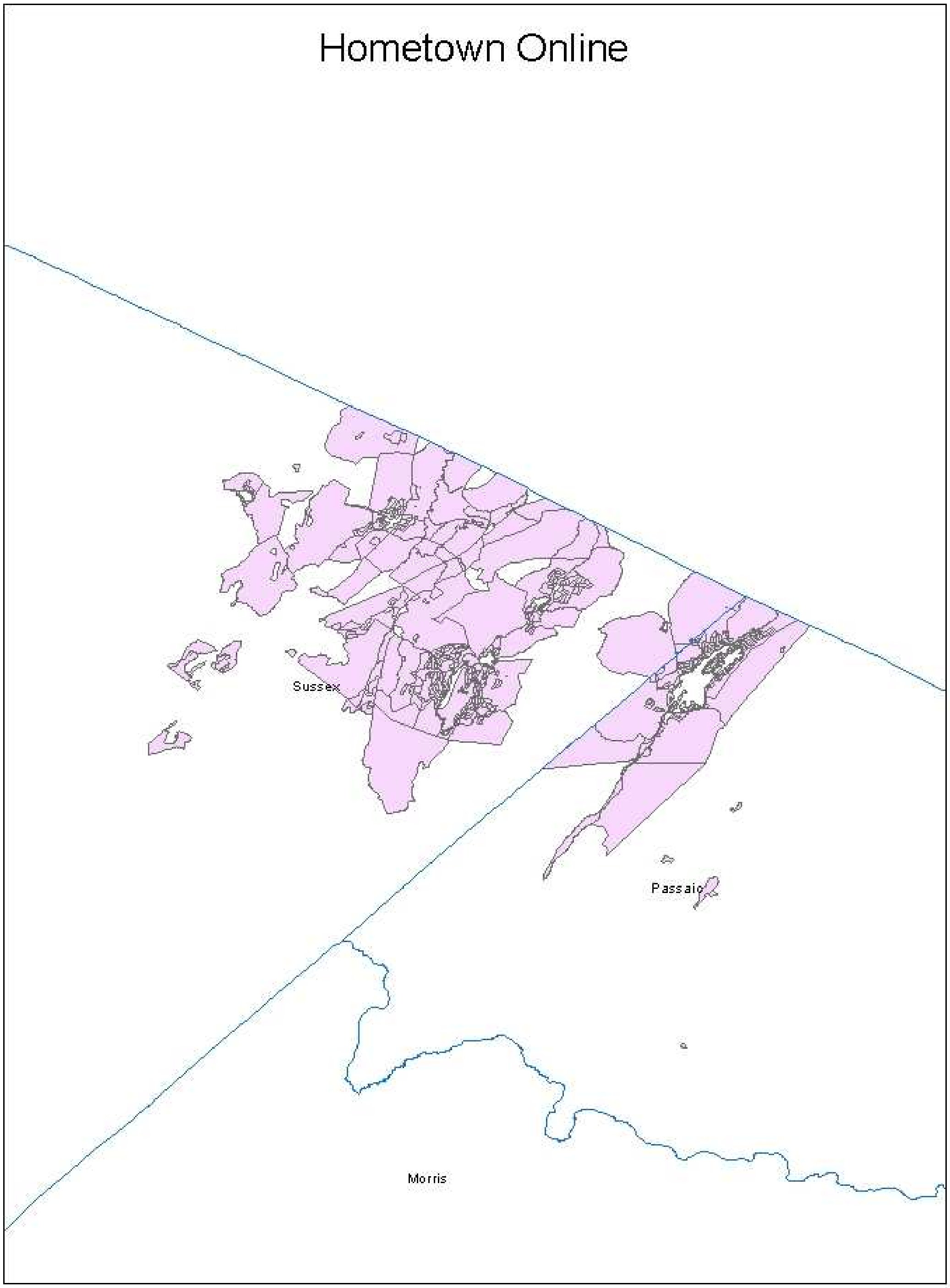
1. All addresses were successfully geocoded using Arroyo with the Yahoo geocoder. Four records failed to spatially join on 2010 NJ Census Block shapes.
2. Created an excel sheet and imported to a geodatabase table.
3. Added point shapes corresponding to each Latitude,Longitude pair by creating a feature class from the table using ArcCatalog’s “Create Feature Class from XY Table” option.
4. Added a column containing the ID of the containing year 2010 census block via a spatial join of the point shapes and the census block shapes from reference data.
5. Kept only blocks in the cities of Hardyston, Highland, Vernon, and West Milford (several variations like Twp and Township). Discarded 14 blocks that were geolocated in cities Hewitt, Hillsdale, Wantage Twp, etc.
6. Discarded 6310 rows with duplicate census blocks, leaving 449 unique census blocks.
7. Discarded 1 census block larger than 2 square miles (340312568021002).
8. Loaded 448 blocks.

Section 6: Clarification Questions and Responses

See April 2011 report for clarifications.

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Provider: HughesNet Communications Inc.

Submission date: October 2011

This report presents details on processing broadband data for delivery to the National Telecommunications and Information Administration (NTIA).

This is a stub report, since data from the previous submission was reused unchanged. The complete report from the previous submission begins on the next page. Notable differences from the processing done on the previous submission are listed next.

NTIA Table BB_Service_Wireless

Total rows loaded: 21 (each county in New Jersey)

Notes

Provider Interactions

None, the provider did not respond to our requests for updates. This data was used without explicit instructions from the provider. It seemed highly unlikely that the satellite coverage has changed in six months, so we elected to reuse prior data.

Connecting New Jersey - Broadband Provider Data Report

Provider: HughesNet Communications Inc.
Received: March 2011
Submission date: April 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Sections:

1. NDA Status
2. Submission Overview
3. Submission File Details
4. Data Validations and Results
5. Data Transformation and Loading
6. Clarification Questions and Provider Responses
7. Notes and Open Issues

Section 1: NDA Status

NONE

Section 2: Submission Overview

<table>
<tr><th colspan="3">AVAILABILITY DATA</th></tr>
<tr><td rowspan="3">ID</td><td>Provider name</td><td>Hughes Network Systems, LLC</td></tr>
<tr><td>“Doing business as” name</td><td>HughesNet</td></tr>
<tr><td>FRN</td><td>0017434911</td></tr>
<tr><th colspan="3">FOR WIRELINE</th></tr>
<tr><td>Filetypes</td><td colspan="2"></td></tr>
<tr><td>File size</td><td colspan="2"></td></tr>
<tr><td>Speeds</td><td>
<table>
<tr><th>Type</th><th></th><th>Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)</th></tr>
<tr><td>Typical-upstream</td><td></td><td>Not provided</td></tr>
<tr><td>Typical-downstream</td><td></td><td>Not provided</td></tr>
<tr><td>Advertised-upstream</td><td></td><td>Provided</td></tr>
<tr><td>Advertised-downstream</td><td></td><td>Provided</td></tr>
<tr><td>Subscriber-weighted-up</td><td></td><td>Not provided</td></tr>
</table>
</td><td>Submitted Excel file containing a list of counties per state that are covered by their service. This included all 21 counties in New Jersey.

Email message contained an image that listed their three consumer service plans and the associated upstream and downstream data rate.
Max plan "Power 200" is 2Mbps down, 300Kbps up. The corresponding speed range codes are 4 down, 2 up.</td></tr>
</table>

	Subscriber-weighted-down		Not provided	Spectrum is 7, satellite.
Technology Type	Code 60 (Satellite)			
End-user specification	Voice message indicated that the referenced plans are consumer-focused.			
Comments:				

INTERCONNECTION DATA: NONE	
ID	
File size	
Ownership	
Transport Type	
Data Rates/Capacity	
Location	
Comments: Not provided	

Section 3: Submission File Details

Received an extraordinarily short email explaining their service offering, with a JPG image of the northeastern United States showing where they have subscribers.

Section 4: Validations and Results

No rows of data need to be validated.

Section 5: Data Transformation and Loading

NTIA Table BB_Service_Wireless

Loaded county shapes from reference data for the State of New Jersey based on emailed statements that all counties are covered. The following table explains the transformations that were applied.

Table Column	Data Source / Transformation
PROVNAME	Set to "Hughes Network Systems, LLC"
DBANAME	Set to "HughesNet"

FRN	Set to 0017434911
TRANSTECH	Set to 60
SPECTRUM	Set to 7 per translation shown below
MAXADDOWN	Set to 4, see below.
MAXADUP	Set to 2”, see below.
TYPICDOWN	Not provided, set to null
TYPICUP	Not provided, set to null
STATEABBR	Set to “NJ”
SHAPE	County shape read from reference data.

Internal notes on processing:

12. Spectrum: No statement was provided. The NTIA data model has a single column for spectrum. Satellite corresponds to NTIA “SPECTRUM USED” code value 7.
13. Speeds: The maximum advertised speeds provided in the emailed brochure are as discussed above For max adv speeds we encoded the submitted down speed as value 4 (range 1.5-3 Mbps) and encoded the submitted up speed as value 2 (range 200 Kbps -- 768 Kbps).

Section 6: Clarification Questions and Responses

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Wednesday, March 09, 2011 1:46 PM
To: 'Mark Wymer'
Cc: ConnectingNJ@research.telcordia.com
Subject: RE: NJ Broadband Data Collection

Mark,
Thanks for the information. Sorry I did not return your call – I just got back from a meeting.

One question – do you have information on typical speeds that are experienced by your customers on each of these plans?

A side note – the NTIA is interested in finer-grained information than this, looking at specific factors that affect satellite coverage, such as terrain and building shadowing. As I understand it, they will be contacting satellite providers at some point in the future to discuss appropriate techniques to model such effects.

Thanks for you participation in the program.

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Friday, March 18, 2011 10:43 AM

To: 'Mark.Wymer@hughes.com'
Cc: 'NJ Broadband Data Collection'
Subject: Hughes NJ Broadband Clarification

Mark,
We need to report data to the NTIA using Provider Name, Doing-Business-As Name and FCC Registration number. The information we retrieved from the FCC is:

Provider Name: Hughes Network Systems, LLC
FRN: 00 17434911

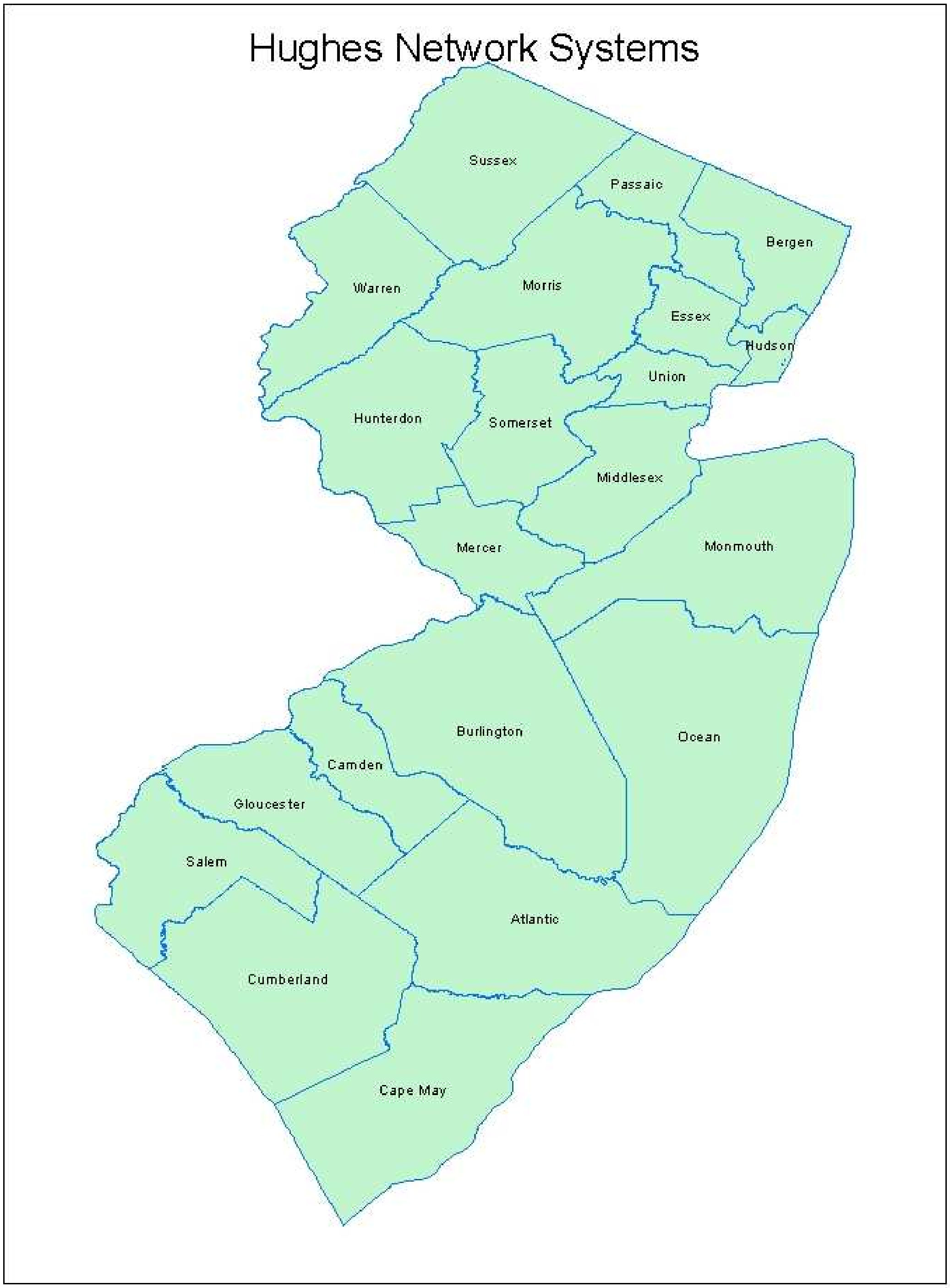
Are these correct? Also, do you have another "doing-business-as" name?

Thanks,

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Provider: Leap Cricket

Received: Aug, 2011
Submission date: Oct, 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Section 1: NDA Status

None

Section 2: Submission Overview

AVAILABILITY DATA			
ID	PROVIDER NAME DBA NAME FRN Holding company name: Holding company number:	Leap Wireless International, Inc. Cricket Communications, Inc. 0002963528 Leap Wireless International, Inc." 130730	
FOR WIRELESS			
Filetypes	1 Mapinfo file corresponding to NJ terrestrial mobile wireless coverage (type 80)		
Speeds	Type	Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode)	
	Upstream max adv	yes (for entire shapefile) given in tier	
	Downstream max adv	yes (for entire shape) given in tier	
	Upstream typical	no.	
	Downstream typical	no.	
	Subscriber-weighted	no.	
Technology Type	Spectrum : yes		3 (PCS) and 4(AWS)
Comments:			
INTERCONNECTION DATA			
ID			
File size			

Ownership	
Transport Type	
Data Rates/Capacity	
Location	
Comments: no IC data provided.	

Quick loading results:

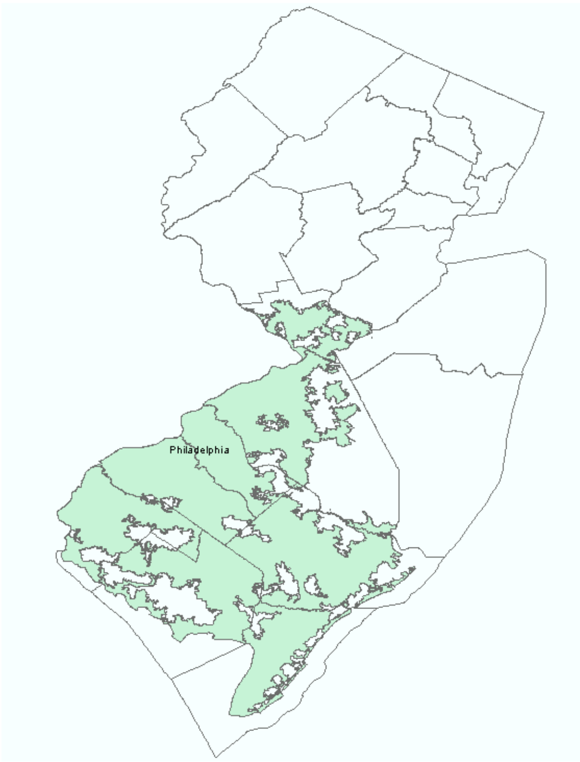


Figure 1. Loading results

Section 3: Submission File Details

1 zip file containing 5 files by (EMAIL, SECURE UPLOAD):

Size	Name
1KB	NJ_Broadband_region.dbf
1KB	NJ_Broadband_region.prj
1KB	NJ_Broadband_region.shx
820KB	NJ_Broadband_region.shp
2KB	NJ_Broadband_region.TAB

Section 4: Validations and Results

The Mapinfo file contains a single row with a multipolygon shape (see above for preview picture). The columns identify that the technology of transmission is wireless and that two different spectrum ranges are in use. Speed values were reasonable for the technology.

Section 5: Data Transformation and Loading

Loaded from the supplied Mapinfo file, with transformations as s

Table Column	Data Source / Transformation
PROVNAME	As supplied in column prov_name
DBANAME	As supplied in column dba_name
FRN	Set to "130730"
TRANSTECH	As supplied in column tech_trans
SPECTRUM	Set to “4” per translation shown below
MAXADDOWN	As supplied in column down_speed.
MAXADUP	As supplied in column up_speed..
TYPICDOWN	Not supplied, set to null
TYPICUP	Not supplied, set to null.
STATEABBR	Set to “NJ”
SHAPE	As supplied.

Internal notes on processing:

1. The supplied shape uses geographic coordinate system GCS_WGS_1984, same as that required by the NTIA data model.
2. Spectrum: Leap provided “Y” value in the columns spectrum_pcs and spectrum_aws. In the NTIA model the AWS spectrum is coded as value 4. In a response to our query, Leap indicated that the different spectra are in use in different places of their footprint. They have not provided separate shape files for these different spectrum bands.

Section 6: Clarification Questions and Responses

Provider provides 2 spectrum values for the coverage shape (PCS and AWS). We have previously requested separation of the shapes for these different technologies to no avail.

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Friday, March 04, 2011 1:33 PM
To: 'dougwhite@cricketcommunications.com'
Cc: 'ConnectingNJ@research.telcordia.com'
Subject: NJBB Clarification Questions

Doug,
We have reviewed the data you submitted to the NJ Broadband mapping program and have a few clarification questions:

1. You include two spectrum values in the data you submitted. Are those two spectrum bands used uniformly throughout the area specified by the shape?
2. The NTIA is encouraging us to request and submit to them subscriber weighted nominal speed (down only) for each county served and middle mile locations. Are you willing to provide this data?

Thanks for your participation in the program.

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: Douglas White [mailto:dougwhite@cricketcommunications.com]
Sent: Monday, March 14, 2011 6:54 PM
To: ConnectingNJ@research.telcordia.com
Subject: RE: NJBB Clarification Questions
Importance: High

John – please see Cricket's response below. Thanks,
-Doug

Doug White
Manager, Government Affairs
Cricket Communications, Inc.
5887 Copley Drive
San Diego, CA 92111
Phone: 858-882-9394
Fax: 858-882-6080
dougwhite@cricketcommunications.com

cricket communications

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Friday, March 04, 2011 10:33 AM
To: Douglas White
Cc: ConnectingNJ@research.telcordia.com
Subject: NJBB Clarification Questions

Doug,
We have reviewed the data you submitted to the NJ Broadband mapping program and have a few clarification questions:

3. You include two spectrum values in the data you submitted. Are those two spectrum bands used uniformly throughout the area specified by the shape?
    - No, they are not used uniformly in all the shape area. PCS spectrum band is used only in Mercer and Cumberland counties and AWS in all the rest of the counties with coverage.
4. The NTIA is encouraging us to request and submit to them subscriber weighted nominal speed (down only) for each county served and middle mile locations. Are you willing to provide this data?
    - We will not be providing middle mile data.

Thanks for your participation in the program.

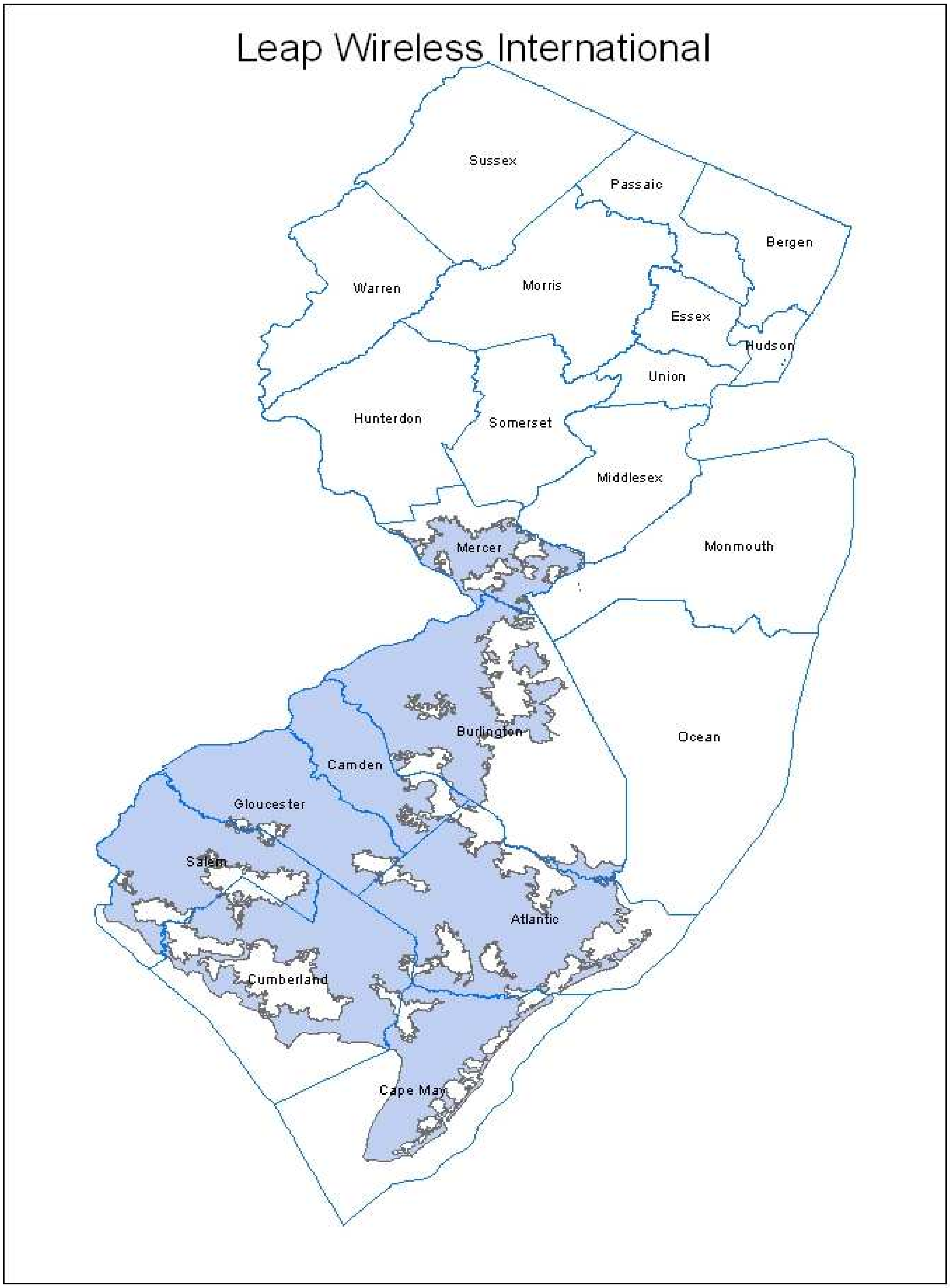
From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Monday, March 14, 2011 8:44 PM
To: 'Douglas White'
Cc: 'ConnectingNJ@research.telcordia.com'
Subject: RE: NJBB Clarification Questions

Doug,
Can you provide us with separate shape files for the PCS and AWS? I would offer to extract a shape for the counties, but I am sure your coverage areas do not line up exactly with the county boundaries.

Thanks,
John

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Provider: Level3 Networks, Inc.

Received: August 2011
Submission date: October 2011

This report presents details on processing of broadband data for delivery to the National Telecommunications and Information Administration.

Section 1: NDA Status

No NDA executed.

Section 2: Submission Overview

<table>
<tr><th colspan="3">AVAILABILITY DATA</th></tr>
<tr><td>ID</td><td>Provider name
“Doing business as” name
FRN</td><td>Level 3 Communications, LLC
Level 3
0003723822</td></tr>
<tr><th colspan="3">FOR WIRELINE</th></tr>
<tr><td>Filetypes</td><td colspan="2">Text file spreadsheets</td></tr>
<tr><td>File size</td><td colspan="2">350 data rows</td></tr>
<tr><td>Speeds</td><td><table>
<tr><th>Type</th><th></th><th>Address level data</th></tr>
<tr><td>Typical-upstream</td><td></td><td>Yes</td></tr>
<tr><td>Typical-downstream</td><td></td><td>Yes</td></tr>
<tr><td>Advertised-upstream</td><td></td><td>Yes</td></tr>
<tr><td>Advertised-downstream</td><td></td><td>Yes</td></tr>
<tr><td>Subscriber-weighted-nominal speed</td><td></td><td>Not provided</td></tr>
</table></td><td>All set to same value: 11 (>= 1gpbs)</td></tr>
<tr><td>Technology Type</td><td colspan="2">50 (optical carrier/fibre)</td></tr>
<tr><td>End-user specification</td><td colspan="2">Yes (addresses)</td></tr>
<tr><td colspan="3">Comments: typical and Advertised UP and DOWN are ALL THE SAME VALUE: 11 (>= 1gpbs)</td></tr>
<tr><th colspan="3">INTERCONNECTION DATA</th></tr>
<tr><td>ID</td><td colspan="2"></td></tr>
<tr><td>File size</td><td colspan="2">text spreadsheet with 338 rows. (See comment)</td></tr>
<tr><td>Ownership</td><td colspan="2">Not provided</td></tr>
<tr><td>Transport Type</td><td colspan="2">provided</td></tr>
<tr><td>Data</td><td colspan="2">provided</td></tr>
</table>

Rates/Capacity	
Location	Address provided as well as lat/long
Comments: A large number of duplicate rows were confusing. This is worth asking the provider. Provider indicates that they are separate instances and should NOT be removed as duplicates.	

Section 3: Submission File Details

Received 2 files by secure upload:

Size kb	Name
45	AddressAvailability_NewJersey_8-18-2011.txt
41	MiddleMile_New Jersey_8-18-2011.txt

Section 4: Validations and Results

The “address” file has 350 rows. All speed codes set the same, code 11 (1+ Gbps), suggesting these are all commercial customers.

The “middlemile” file has 338 rows, including many rows that are exact duplicates which we will have to discard despite the provider’s assurances that they are “different”.

Section 5: Data Transformation and Loading

The standard NDA prohibits us from submitting address-level data to the NTIA. Instead, we discover the census block for each customer address, and then report the census block shape drawn from Census Bureau TigerLine reference data.

NTIA Table BB_ConnectionPoint_MiddleMile

Loaded from the supplied tab-separated file. The following table explains the transformations that were applied.

Table Column	Data Source / Transformation
PROVNAME	As supplied in column “DBA” (no provider name supplied separately)
DBANAME	As supplied in column “DBA”
FRN	As supplied in column “FRN” after removing dashes
OWNERSHIP	Set to null (not supplied)
BHCAPACITY	As provided in column “Serving Facility Capacity”
BHTYPE	As provided in column “Serving Facility Type”

LATITUDE	As supplied
LONGITUDE	As supplied
ELEVFEET	As supplied (all zero values)
STATEABBR	Set to “NJ”
FULLFIPSID	ID of containing census block from Year 2010 Census Bureau TigerLine reference data
SHAPE	Point shape created using ESRI ArcDesktop

Internal notes on processing:

1. Imported the data to a geodatabase table
2. Added a point for each Latitude, Longitude pair by creating a feature class from the table using ArcCatalog’s “Create Feature Class from XY Table” option.
3. Added a column containing the ID of the containing year 2010 census block via a spatial join of the points and the census block shapes from reference data. All records successfully spatially joined on 2010 NJ Census Block shapes.
4. Discarded 149 records with identical lat, long values and addresses.
5. Loaded 188 records.

NTIA Table BB_Service_CensusBlock

Loaded from the supplied tab-separated file. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	As supplied in column “DBA” (no provider name supplied separately)
DBANAME	As supplied in column “DBA”
PROVIDER_TYPE	Set to “1”
FRN	As supplied in column “FRN”
STATEFIPS	Set to “34” (NJ)
COUNTYFIPS	Populated from Census Block FIPS Code (first 3 digits)
TRACT	Populated from Census Block FIPS Code (next 6 digits)
BLOCKID	Populated from Census Block FIPS Code
FULLFIPSID	Populated from Census Block FIPS Code
TRANSTECH	As supplied in column “Technology of Transmission”
MAXADDOWN	As supplied in column “Maximum Advertised Download Speed”
MAXADUP	As supplied in column “Maximum Advertised Upload Speed”
TYPICDOWN	Set to null (see below)
TYPICUP	Set to null (see below)
ENDUSERCAT	Set to null (see below)
SHAPE	Copied from Census Bureau TigerLine 2010, as matched by spatial join on the geocoded address

Internal processing notes:

1. Geocoded the addresses using an Arroyo flow and the Yahoo geocoder, leaving

the result with address and lat, long data in an Excel spreadsheet. All addresses were successfully geocoded, although 1 was not placed in New Jersey.

2. Imported the spreadsheet to an ESRI geodatabase table
3. Added point shapes corresponding to each Latitude,Longitude pair by creating a feature class from the table using ArcCatalog's "Create Feature Class from XY Table" option
4. Added a column containing the ID of the containing year 2010 census block using ArcCatalog's spatial join feature. The newly created point shapes are joined against census block shapes from reference data. All but three records successfully spatially joined on 2010 NJ Census Block shapes.
5. Discarded typical speeds since they were in all cases identical to maximum advertised speeds, not measured values.
6. The end user category value as originally supplied applied to an address, but we must anonymize the addresses and report census blocks. The NTIA directs us to report the "predominant" end-user category, which is not supplied here.
7. Discarded 79 duplicate census block records, which result from multiple addresses in the same census block.
8. Loaded 270 records.

Section 6: Clarification Questions and Responses

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Wednesday, August 24, 2011 9:14 AM
To: Diamond, Greg
Cc: ConnectingNJ@research.telcordia.com
Subject: NJBB Data Clarification

Greg,
We have reviewed the data you submitted to the New Jersey Broadband Mapping program. We have one question. The middle-mile data you submitted in MiddleMile_New Jersey_8-18-2011.txt includes many rows that are duplicates. Can we safely discard these duplicate entries?

Thanks for you participation,

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: Diamond, Greg [mailto:Greg.Diamond@Level3.com]
Sent: Wednesday, August 24, 2011 1:17 PM
To: ConnectingNJ@research.telcordia.com
Subject: RE: NJBB Data Clarification

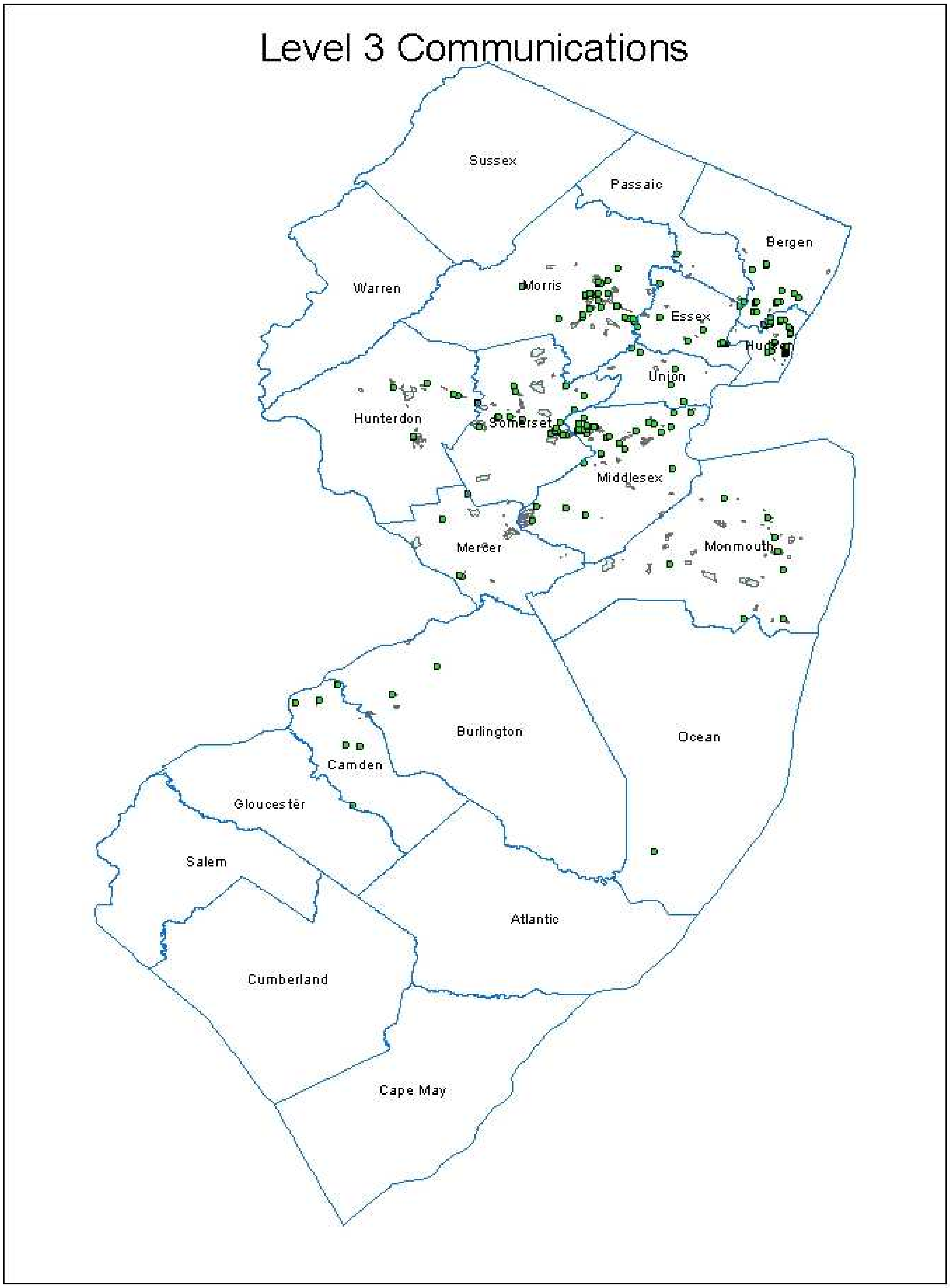
John, this issue came up with our CA submission as well. We investigated and determined that there were in fact some differences, albeit small, with some of the sites such that each site is in fact unique. Give that, I would not treat them as duplicates.

Greg

PLEASE NOTE MY NEW ADDRESS AND TELEPHONE NUMBER
Gregory T. Diamond
Regulatory Counsel
Level 3 Communications
1505 5th Avenue
Suite 501
Seattle, WA 98110
Desk: 206-652-5608
Mobile: 303-562-7378

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Provider: Monmouth Telephone and Telegraph

Received: July 2011
Submission date: October 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Section 1: NDA Status

Signed NDA is in place with NJ OIT.

Section 2: Submission Overview

AVAILABILITY DATA		
ID	Provider name "Doing business as" name FRN	Monmouth Telephone & Telegraph same 0004325205
FOR WIRELINE		
Filetypes	Csv (NJBB_0004325205_AddressLevelAvailability.csv)	
File size	105958 bytes, 1054 records	
Speeds	Type	Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)
	Typical-upstream	Address
	Typical-downstream	Address
	Advertised-upstream	Address
	Advertised-downstream	Address
	Subscriber-weighted-up	None provided
	Subscriber-weighted-down	Not provided
Technology Type	Code 30 – other copper line Code 50 - Optical Carrier/Fiber to the End User	
End-user specification	Code 4 – Medium or Large Enterprise	
Comments:		
INTERCONNECTION DATA		
ID		

File size	
Ownership	
Transport Type	
Data Rates/Capacity	
Location	
Comments: No middle mile was provided at this time. Monmouth gave the following explanation: Please note that Table 8, "Middle-mile and Backbone Interconnection Points Data", is not included per instructions on page 11 of the Data Submission Specifications" "Middle-mile and Backbone Interconnection Point information should focus on the connectivity at a point. That is, if a point at which network elements or segments are joined would not reasonably offer the possibility of technical connectivity with the network[s], it should not be reported".	

Section 3: Submission File Details

The data are very similar to the last submission.

Received 1 zip file:

Size	**Name**
20Kb	Broadband Mapping.zip

The zip archive contains the following files:

Size	**Name**
104Kb	NJBB_0004325205_AddressLevelAvailability.csv
1Kb	NJBB_0004325205_CMAAdvertisedAvailability.csv
1Kb	NJBB_0004325205_SubscriberWeightedNominalSpeed.csv
21Kb	Read Me.doc

File details:

File NJBB_0004325205_AddressLevelAvailability.csv:

The file contains 1054 records. Note that data file does not have a header row, but follows (largely) the ADDRESS DATA table from the NTIA "State Broadband Data and Development Grant Program" document. The columns and the corresponding headers are:

A - Provider Name
C - FRN
D-L - Address
M - EndUserCat
N - TransTech

O - MaxAdvDown
P - MaxAdvUp
Q - TypicDown
R - TypicUp

The FRN is missing leading zeros. Very few entries are provided in the 4-digit zip column (L), some do not have the required leading zeros. It was established (prior interactions) that the DBA is Monmouth Telephone & Telegraph. Certain addresses will need to be fixed for geocoding (also per prior interactions).
Some records have speed tiers of 2 or less.

NJBB_0004325205_CMAAdvertisedAvailability.csv

The file contains 14 records. Note that data file does not have a header row, but follows the CMA data submission template that we posted on the connectingnj web site. The columns and the corresponding headers are:

A - Provider Name
C - FRN
D - CMA
E - TransTech
F - MaxAdvDown
G - MaxAdvUp

NJBB_0004325205_SubscriberWeightedNominalSpeed.csv

The file contains 14 records. Note that data file does not have a header row, but follows the Subscriber-Weighted Nominal Speed data submission template that we posted on the connectingnj web site. The columns and the corresponding headers are:

A - Provider Name
C - FRN
D - CMA
E - TransTech
F - SubsWeightedSpeed

Read Me.doc

The file contains explanations of the submission.

Section 4: Validations and Results

See notes in file description section

Some of the addresses will be difficult or impossible to geo-locate due to format; e.g., “179 Ave at the Common & 11, Shrewsbury, NJ”

Section 5: Data Transformation and Loading

The standard NDA prohibits us from submitting address-level data to the NTIA. Instead, we will discover the census block for each customer address, then report the census block shape drawn from Census Bureau TigerLine reference data.

NTIA Table BB_Service_CensusBlock

Loaded from supplied Excel spreadsheet after suitable geospatial operations. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	Set to “Monmouth Telephone & Telegraph”
DBANAME	Set same as PROVNAME
PROVIDER_TYPE	Set to 1
FRN	Set to “0004325205”
STATEFIPS	Set to “34” (NJ)
COUNTYFIPS	Populated from Census Block FIPS Code (first 3 digits)
TRACT	Populated from Census Block FIPS Code (next 6 digits)
BLOCKID	Populated from Census Block FIPS Code
BLOCKSUBGROUP	Set to null
FULLFIPSID	Populated from Census Block FIPS Code
TRANSTECH	As supplied in column TransTech
MAXADDOWN	As supplied in column MaxAdvDown
MAXADUP	As supplied in column MaxAdvUp
TYPICDOWN	Set to null
TYPICUP	Set to null
SHAPE	Copied from Census Bureau TigerLine 2000, as matched by spatial join on geocoded address

Internal processing notes:

1. All NJBB_0004325205_AddressLevelAvailability.csv records were successfully geocoded. Geocoded the addresses using the Google and Yahoo geocoders to obtain a Latitude, Longitude pair for each.. Addresses that yielded results with accuracy of 6 or below were excluded; only intersection (7) or rooftop (8) accuracy is acceptable.
2. Created an Excel sheet and imported it to a geodatabase table.
3. Added point shapes corresponding to each Latitude, Longitude pair by creating a feature class from the table using ArcCatalog’s “Create Feature Class from XY Table” option.
4. Added a column containing the ID of the containing year 2010 census block via a spatial join of the point shapes and the census block shapes from reference data.

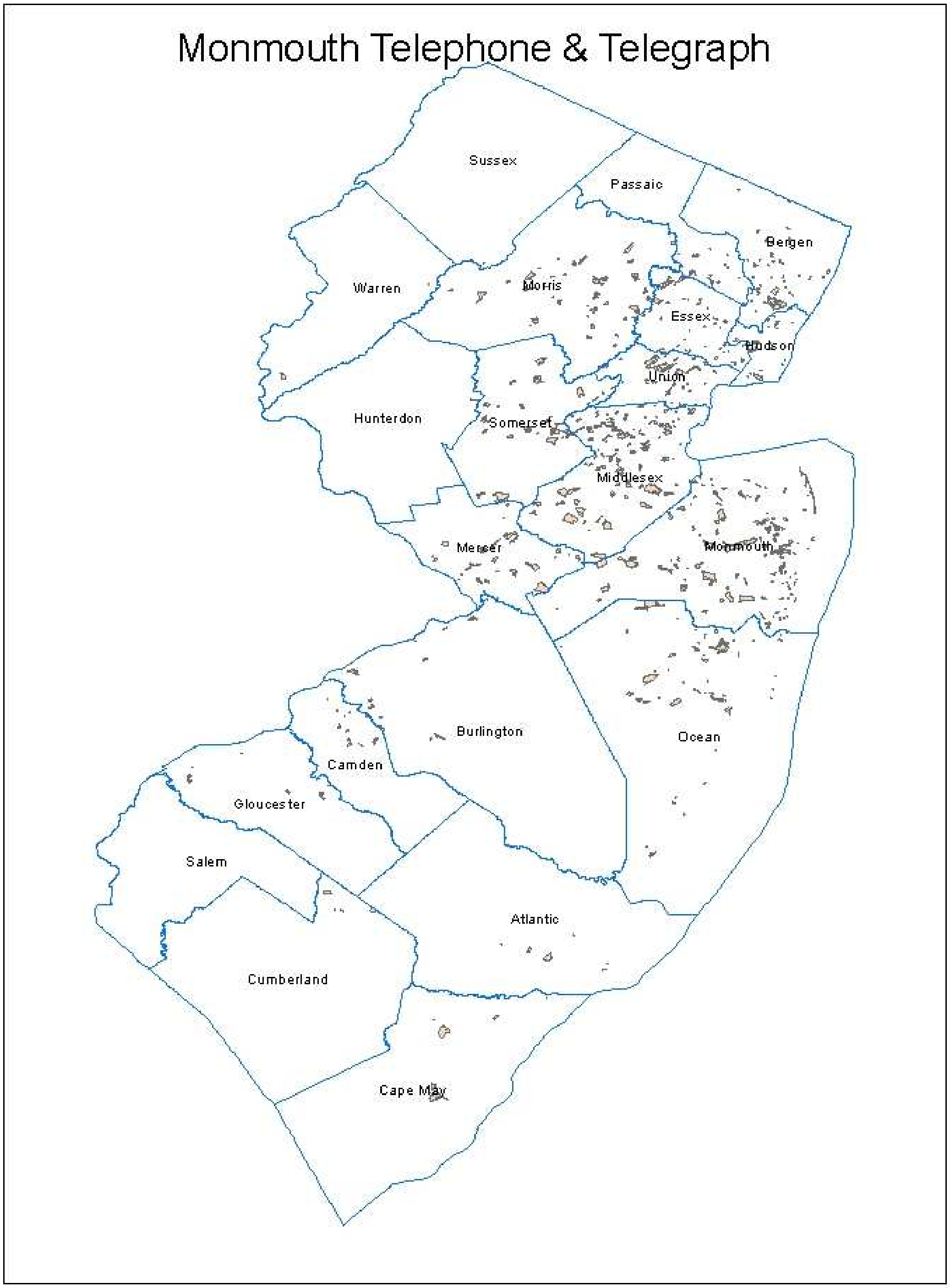
One record failed to spatially join on the 2010 NJ Census Block shapes.

5. Discarded 100 rows because the max adv down speed code was 1 or 2, which is not broadband according to the requirements of the NOFA
6. Discarded 185 rows with duplicate census blocks while preserving the greatest speed. These result from multiple customers in the same census block.
7. Discarded 4 large census blocks (greater than 2 square miles).
8. Final record count loaded is 764.

Section 6: Clarification Questions and Responses

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Provider: Netcarrier

Received: June 2011
Submission date: October 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Section 1: NDA Status

None

Section 2: Submission Overview

<table>
<tr><th colspan="4">AVAILABILITY DATA</th></tr>
<tr><td>ID</td><td colspan="2">Provider name
“Doing business as” name
FRN</td><td>Netcarrier
Netcarrier Telecom, Inc.
0005043195</td></tr>
<tr><th colspan="4">FOR WIRELINE</th></tr>
<tr><td>Filetypes</td><td colspan="3">Excel</td></tr>
<tr><td>File size</td><td colspan="3">119 KB (595 rows)</td></tr>
<tr><td rowspan="7">Speeds</td><td>Type</td><td>Spatial Resolution: address</td><td rowspan="7">Provides a .xls file with 895 rows of information (end user addresses).</td></tr>
<tr><td>Typical-upstream</td><td>Address-level</td></tr>
<tr><td>Typical-downstream</td><td>Address-level</td></tr>
<tr><td>Advertised-upstream</td><td>Address-level</td></tr>
<tr><td>Advertised-downstream</td><td>Address-level</td></tr>
<tr><td>Subscriber-weighted-up</td><td>Not provided</td></tr>
<tr><td>Subscriber-weighted-down</td><td>Not provided</td></tr>
<tr><td>Technology Type</td><td colspan="3">Types: 10, 30, 50</td></tr>
<tr><td>End-user specification</td><td colspan="3">Address level.</td></tr>
<tr><td colspan="4">Comments: No weighted values provided.</td></tr>
<tr><th colspan="4">INTERCONNECTION DATA</th></tr>
<tr><td>ID</td><td colspan="3">NJ_Broadband_Mapping-Backbone-090711</td></tr>
<tr><td>File size</td><td colspan="3">12 kb</td></tr>
<tr><td>Ownership</td><td colspan="3">Not provided</td></tr>
</table>

Transport Type	Facility type provided (code 1 and 2 used)
Data Rates/Capacity	Not provided
Location	Provided by street address (elevation provided as well)
Comments: 2 other fields called V-COORD and H-COORD (5 digit #'s) are provided.	

Section 3: Submission File Details

Received 1 file by secure upload:

Size	**Name**
74 kb	NJ477_Workbook-090411-NJ-BroadbandMapping-A.xls
12	NJ_Broadband_Mapping-Backbone-090711.xls

Section 4: Validations and Results

Address data has 895 records that appear to be valid locations with reasonable technology and speed information

Backbone has 11 records.

Section 5: Data Transformation and Loading

The standard NDA prohibits us from submitting address-level data to the NTIA. Instead, we discover the census block for each customer address, and then report the census block shape drawn from Census Bureau TigerLine reference data.

NTIA Table BB_ConnectionPoint_MiddleMile

Loaded from the supplied Excel Spreadsheet. The following table explains the transformations that were applied.

Table Column	Data Source / Transformation
PROVNAME	As supplied in column "Provider Name" but changed "c" to "C"
DBANAME	As supplied in column "DBA" but changed "c" to "C"
FRN	As supplied in column "FRN"
OWNERSHIP	As provided in column "Ownership"
BHCAPACITY	As provided in column "Serving Facility Capacity"
BHTYPE	As provided in column "Serving Facility Type"

LATITUDE	As computed from address
LONGITUDE	As computed from address
ELEVFEET	Set to “0” (zero); values such as “Fl 1” were not parsed
STATEABBR	Set to “NJ”
FULLFIPSID	ID of containing census block from Year 2010 Census Bureau TigerLine reference data
SHAPE	Created using ESRI ArcDesktop

Internal notes on processing:

1. Used the provider name, DBA name, and FRN as supplied.
2. Geocoded the address to obtain a Latitude, Longitude value pair. All middle-point addresses were successfully geocoded using Arroyo with Yahoo geocoder.
3. Imported the resulting data to a geodatabase table.
4. Added a point for the Latitude, Longitude pair by creating a feature class from the table using ArcCatalog’s “Create Feature Class from XY Table” option.
5. Added a column containing the ID of the containing year 2010 census block via a spatial join of the points and the census block shapes from reference data. All records successfully spatially joined on 2010 NJ Census Block shapes.
6. Loaded 11 records.

NTIA Table BB_Service_CensusBlock

Loaded from the file mentioned above. The following table explains the transformations that were applied to load the target table.

Table Column	**Data Source / Transformation**
PROVNAME	As supplied in column “Provider Name” but changed “c” to “C”
DBANAME	As supplied in column “DBA” but changed “c” to “C”
PROVIDER_TYPE	Set to “1”
FRN	As supplied in column “FRN”
STATEFIPS	Set to “34” (NJ)
COUNTYFIPS	Populated from Census Block FIPS Code (first 3 digits)
TRACT	Populated from Census Block FIPS Code (next 6 digits)
BLOCKID	Populated from Census Block FIPS Code
FULLFIPSID	Populated from Census Block FIPS Code
TRANSTECH	As supplied in column “Technology Code”
MAXADDOWN	As supplied in column “Max Ad Download Speed”
MAXADUP	As supplied in column “Max Ad Upload Speed”
TYPICDOWN	Set to null (see below)
TYPICUP	Set to null (see below)
ENDUSERCAT	Set to null (see below)
SHAPE	Copied from Census Bureau TigerLine 2010, as matched by spatial join on geocoded address

Internal processing notes:

1. Geocoded the addresses using an Arroyo flow and the Yahoo geocoder, leaving the result with address and lat, long data in an Excel spreadsheet. All addresses were successfully geocoded (note: Excel file has an empty record at the end).
2. Imported the spreadsheet to a simple ESRI geodatabase table
3. Added point shapes corresponding to each Latitude,Longitude pair by creating a feature class from the table using ArcCatalog's "Create Feature Class from XY Table" option
4. Added a column containing the ID of the containing year 2010 census block using ArcCatalog's spatial join feature. The newly created point shapes are joined against census block shapes from reference data. All but three records successfully spatially joined on 2010 NJ Census Block shapes.
5. Discarded typical speeds since they were in all cases identical to maximum advertised speeds, not measured values.
6. The end user category value as originally supplied applied to an address, but we must anonymize the addresses and report census blocks. The NTIA directs us to report the "predominant" end-user category, which is not supplied here.
7. Discarded 324 duplicate census block records, which result from multiple addresses in the same census block.
8. Discarded 1 large census block record (340297351041013).
9. Loaded 567 records.

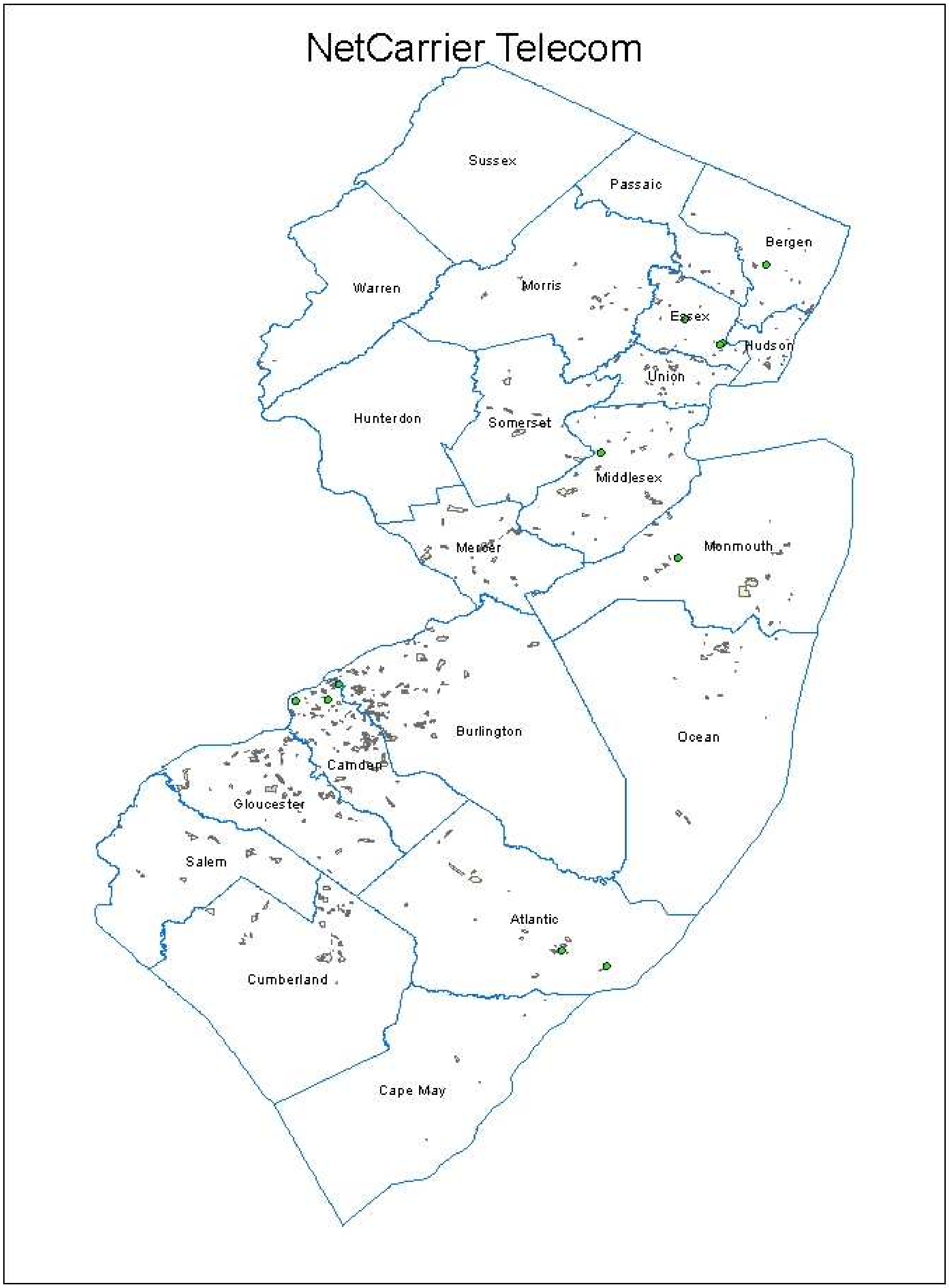
Section 6: Clarification Questions and Responses

Provider did not provide:

1. Subscriber weighted values

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data\



Provider: Network Billing Systems

Received: August 2011
Submission date: October 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Section 1: NDA Status

None

Section 2: Submission Overview

AVAILABILITY DATA				
ID	Provider name "Doing business as" name FRN			Network Billing Systems LLC 0004965141
FOR WIRELINE				
Filetypes	NO Data Provided			
File size				
Speeds	Type		Spatial Resolution:	None
	Typical-upstream			
	Typical-downstream			
	Advertised-upstream			
	Advertised-downstream			
	Subscriber-weighted-up			
	Subscriber-weighted-down			
Technology Type	Types:			
End-user specification				
Comments:				
INTERCONNECTION DATA				
ID				
File size				
Ownership	Not provided			

Transport Type	Fiber
Data Rates/Capacity	Not provided
Location	Provided by street address
One email with three addresses of their fiber ring interconnections, two in New Jersey.	

Section 3: Submission File Details

Received 1 file by email:

Size	**Name**
1Kb	NBS_MiddleMile txt.txt

Section 4: Validations and Results

Addresses were geocoded. Limited validation is possible as only middle mile data was provided.

Section 5: Data Transformation and Loading

NTIA Table BB_ConnectionPoint_MiddleMile

The following table explains the transformations that were applied.

Table Column	**Data Source / Transformation**
PROVNAME	Set to “Network Billing Systems LLC”
DBANAME	Set to “Network Billing Systems LLC”
FRN	Set to “0004965141”
OWNERSHIP	Set to null, not provided
BHCAPACITY	Set to 5, OC-48 is 2.5Gbps
BHTYPE	Set to 1, transport facility is fiber
LATITUDE	As computed from address
LONGITUDE	As computed from address
ELEVFEET	Set to “0” (zero)
STATEABBR	Set to “NJ”
FULLFIPSID	ID of containing census block from Year 2010 Census Bureau TigerLine reference data
SHAPE	Created using ESRI ArcDesktop

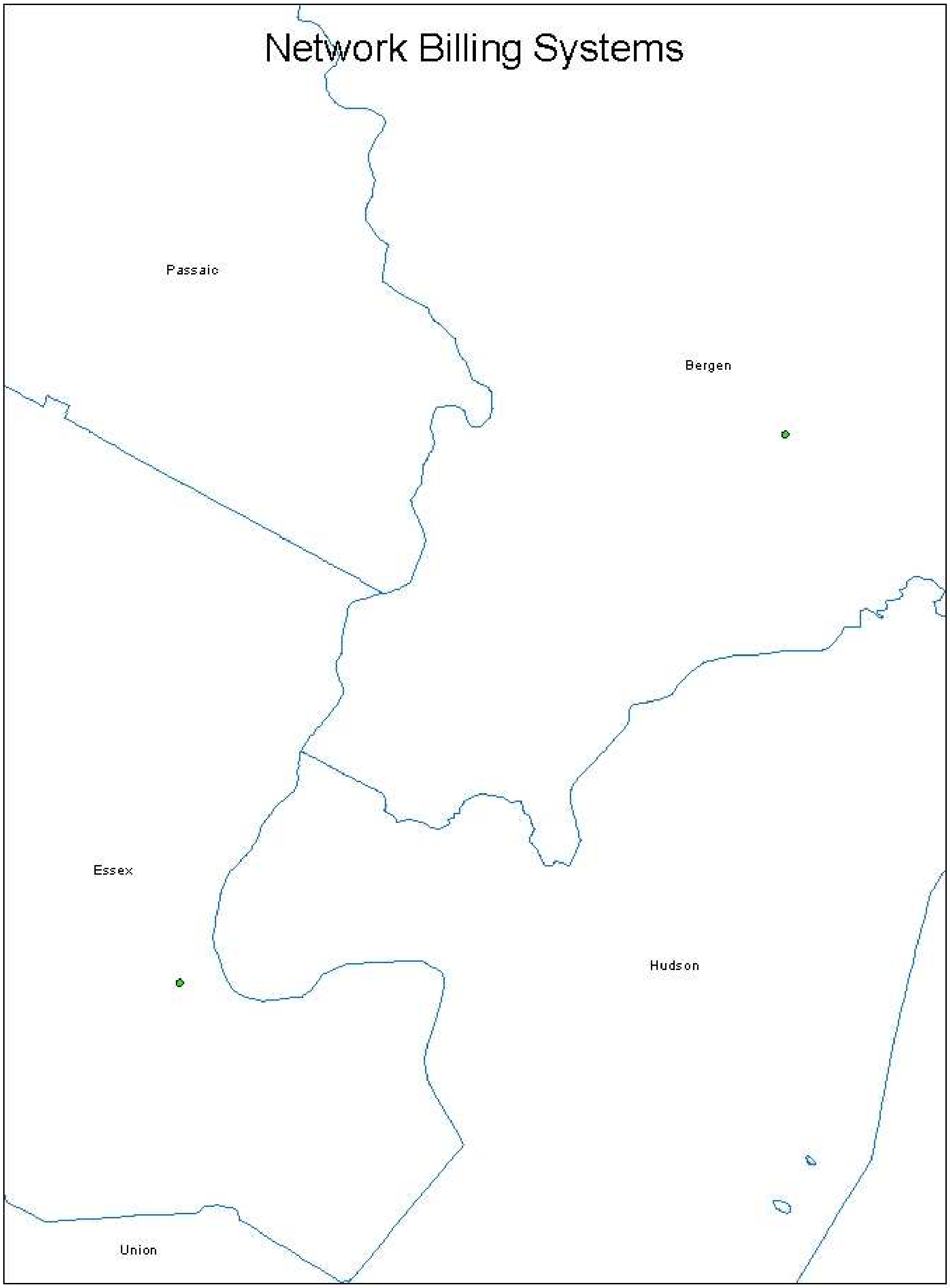
Internal notes on processing:

1. Used the provider name, DBA name, and FRN from FCC Form 477 reference data.
2. Geocoded the address to obtain a Latitude, Longitude value pair. All middle-point addresses were successfully geocoded using Arroyo with Yahoo geocoder.
3. Imported the resulting data to a geodatabase table.
4. Added a point for the Latitude, Longitude pair by creating a feature class from the table using ArcCatalog's "Create Feature Class from XY Table" option.
5. Added a column containing the ID of the containing year 2010 census block via a spatial join of the points and the census block shapes from reference data. All records successfully spatially joined on 2010 NJ Census Block shapes.
6. Loaded 2 records.

Section 6: Clarification Questions and Responses

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Provider: One Communications

Received: June 2011
Submission date: October 2011

This report presents details on processing of broadband data for delivery to the National Telecommunications and Information Administration.

Section 1: NDA Status

Executed an NDA with NJ OIT.

Section 2: Submission Overview

<table>
<tr><td colspan="4">AVAILABILITY DATA</td></tr>
<tr><td rowspan="3">ID</td><td colspan="2">Provider name</td><td>One Communications</td></tr>
<tr><td colspan="2">“Doing business as” name</td><td>Not provided</td></tr>
<tr><td colspan="2">FRN</td><td>015-33-7702</td></tr>
<tr><td colspan="4">FOR WIRELINE</td></tr>
<tr><td>Filetypes</td><td colspan="3">Excel (“One NJ Broadband Connections Data as of 06.30.11.xls”)</td></tr>
<tr><td>File size</td><td colspan="3">119 KB (595 rows)</td></tr>
<tr><td>Speeds</td><td colspan="2">
<table>
<tr><th>Type</th><th></th><th>Spatial Resolution: address</th></tr>
<tr><td>Typical-upstream</td><td></td><td>Not provided</td></tr>
<tr><td>Typical-downstream</td><td></td><td>Not provided</td></tr>
<tr><td>Advertised-upstream</td><td></td><td>Not provided</td></tr>
<tr><td>Advertised-downstream</td><td></td><td>Not provided</td></tr>
<tr><td>Subscriber-weighted-up</td><td></td><td>Not provided</td></tr>
<tr><td>Subscriber-weighted-down</td><td></td><td>Not provided</td></tr>
</table>
</td><td>Provided table with addresses and speeds at each address. Speed columns are labeled “Downstream speed” and “Maximum upstream speed” with values 2..8.
Code 8 is “25 mbps and less than 50 mbps”;(Verified that is possible on copper?)</td></tr>
<tr><td>Technology Type</td><td colspan="3">10 (ADSL), 20 (SDSL), 30 (Other copper)</td></tr>
<tr><td>End-user specification</td><td colspan="3">All 3 (small business) – 88 rows at the end of the set have no EndUserCat specified.?</td></tr>
<tr><td colspan="4">Comments:</td></tr>
<tr><td colspan="4">INTERCONNECTION DATA</td></tr>
<tr><td>ID</td><td colspan="3">Not provided</td></tr>
<tr><td>File size</td><td colspan="3"></td></tr>
<tr><td>Ownership</td><td colspan="3"></td></tr>
</table>

Transport Type	
Data Rates/Capacity	
Location	
Comments:	

Section 3: Submission File Details

Received 1 file by secure upload:

Size	**Name**
119 kb	One NJ Broadband Connections Data as of 6.30.11.xls

Section 4: Validations and Results

Speed data has values between 2 and 8.
Code 8 is "25 mbps and less than 50 mbps".
Verified that is possible on copper.

Section 5: Data Transformation and Loading

NTIA Table BB_Service_CensusBlock

Loaded from supplied Excel file. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	As supplied in column "Provider Name"
DBANAME	Not supplied; set same as PROVNAME
PROVIDER_TYPE	Set to 1
FRN	As supplied in column FRN, without dashes
STATEFIPS	Set to "34" (NJ)
COUNTYFIPS	Populated from Census_Block_ID (first 3 digits)
TRACT	Populated from Census_Block_ID (next 6 digits)
BLOCKID	Populated from Census_Block_ID (remaining 4 digits)
FULLFIPSID	As discovered from reference data (see below)
TRANSTECH	As supplied in column Technology of Transmission
MAXADDOWN	As supplied in column Maximum Downstream Speed
MAXADUP	As supplied in column Maximum Upstream Speed
TYPICDOWN	Set to null (see below)
TYPICUP	Set to null (see below)

ENDUSERCAT	Set to null because not supplied
SHAPE	As found in Census Bureau year 2010 reference data

Internal processing notes:

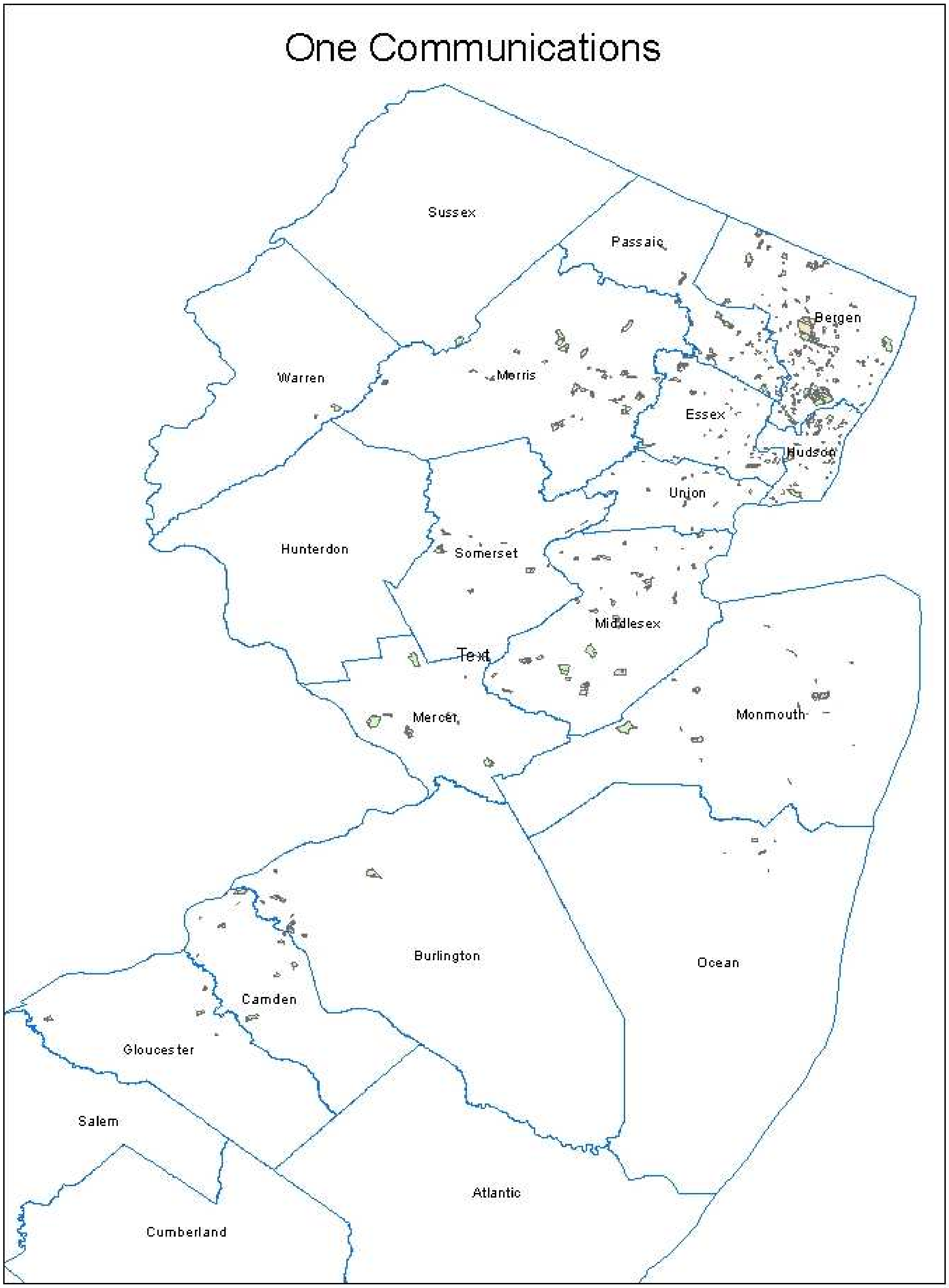
1. All addresses were successfully geocoded using Arroyo with Yahoo geocoder.
2. Created an excel sheet and imported it to a geodatabase table.
3. Added point shapes corresponding to each Latitude, Longitude pair by creating a feature class from the table using ArcCatalog's "Create Feature Class from XY Table" option.
4. All records successfully spatially joined on 2010 NJ Census Block shapes to find the containing census block (ID and shape) for each address.
5. Discarded 84 rows with duplicate census blocks (multiple addresses in the same census block).
6. Discarded 1 row with a census block larger than 2 square miles (340230085021027).
7. Loaded 509 records.

Section 6: Clarification Questions and Responses

1. 88 rows at the end of the set have no EndUserCat specified
2. Clarify semantics of table rows named "Donwstream Speed" (e.g., typical, chosen?), and "Maximum Upstream Speed" (see question from last round). From last round the response was:
    a. "The data in the max up/down columns correspond to the maximum speeds available to each respective customer for his/her service. I realize that the request asks for typical up/download speeds. However, I was informed by our engineering department that this information is not typical kept and available in our systems."
3. Looks like the rest is similar to past input so similar questions remain (though they may have been answered acceptably already). E.g., see Speed's table above and the comments left there.

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data\



Provider: Service Electric Cable TV of Hunterdon

Submission date: October 2011

This report presents details on processing broadband data for delivery to the National Telecommunications and Information Administration (NTIA).

This is a stub report, since data from the previous submission was reused unchanged. The complete report from the previous submission begins on the next page. Notable differences from the processing done on the previous submission are listed next.

NTIA Table BB_Service_CensusBlock

1. Column " blocksubgroup" was dropped.
2. Column "endusercat" was added; set to null because data was not supplied.

Total rows loaded: 1,745

NTIA Table BB_Service_RoadSegment

1. Column " blocksubgroup" was dropped.
2. Column "endusercat" was added; set to null because data was not supplied.

Total rows loaded: 76

Notes

Provider Interactions

August 10, 2011: Tim Himmelright informed us via voice mail that there have been no changes in their speeds or coverage.

August 11, 2011: John sent email asking for written confirmation.

Connecting New Jersey - Broadband Provider Data Report

Provider: Service Electric Cable TV of Hunterdon
Submission date: April 2011

This report presents details on processing broadband data for delivery to the National Telecommunications and Information Administration (NTIA). This is a stub report, since data from the previous submission was reused unchanged. The complete report from the previous submission begins on the next page. Notable differences from the processing done on the previous submission are listed next.

NTIA Table BB_Service_CensusBlock

1. Dropped the column "reseller".
2. Added the column "provider_type" and populated with value 1 ("Broadband provider as described in the NOFA")

NTIA Table BB_Service_RoadSegment

1. Dropped the column "reseller".
2. Added the column "provider_type" and populated with value 1 ("Broadband provider as described in the NOFA")

Provider Interactions

Tim Himmelright of Service Electric called and spoke to John Wullert on 4 March 2011 and confirmed that their data had not changed since the October data collection cycle and instructed us to use the previous data.

Connecting New Jersey - Broadband Provider Data Report

Provider: Service Electric Cable TV of Hunterdon
Received: August 2010
Submission date: October 2010

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Section 1: NDA Status

None.

Section 2: Submission Overview

<table>
<tr><th colspan="5">AVAILABILITY DATA</th></tr>
<tr><td>ID</td><td colspan="3">Provider name
“Doing business as” name
FRN</td><td>Service Electric Cable TV of Hunterdon, Inc.
DBA not provided
0003760014</td></tr>
<tr><th colspan="5">FOR WIRELINE</th></tr>
<tr><td>Filetypes</td><td colspan="4">Text (a letter, not structured data)</td></tr>
<tr><td>File size</td><td colspan="4"></td></tr>
<tr><td rowspan="7">Speeds</td><td>Type</td><td></td><td>Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)</td><td rowspan="7">Advertised downstream speeds 1.5, 3, 5, 7 and 10 mbps; up speed 800 kbps.

Typical Speeds were confirmed prior to October submission to be 10-15% below advertised.</td></tr>
<tr><td>Typical-upstream</td><td></td><td>Not provided</td></tr>
<tr><td>Typical-downstream</td><td></td><td>Not provided</td></tr>
<tr><td>Advertised-upstream</td><td></td><td>Municipality</td></tr>
<tr><td>Advertised-downstream</td><td></td><td>Municipality</td></tr>
<tr><td>Subscriber-weighted-up</td><td></td><td>Not provided</td></tr>
<tr><td>Subscriber-weighted-down</td><td></td><td>Not provided</td></tr>
<tr><td>Technology Type</td><td colspan="4">Docsis 2.0 (use code 41)</td></tr>
<tr><td>End-user specification</td><td colspan="4">Not provided</td></tr>
<tr><td colspan="5">Comments:</td></tr>
</table>

INTERCONNECTION DATA	
ID	None
File size	
Ownership	
Transport Type	
Data Rates/Capacity	
Location	
Comments:	

Section 3: Submission File Details

Received email for October submission with information on the municipalities served in entirety, the technology of transmission, and the speed tiers offered to customers. Confirmed that information via phone on March 4, 2011

Section 4: Validations and Results

The sole data to validate is their provided list of municipality names:

Municipality	**County**
Alexandria Township	Hunterdon
Alpha Borough	Warren
Bloomsbury Borough	Hunterdon
Frenchtown Borough	Hunterdon
Greenwich Township	Warren
Harmony Township	Warren
Holland Township	Hunterdon
Kingwood Township	Hunterdon
Lopatcong Township	Warren
Milford Borough	Hunterdon
Phillipsburg	Warren
Pohatcong Township	Warren

Section 5: Data Transformation and Loading

NTIA Table BB_Service_CensusBlock

Loaded based on email received on August 23, 2010. We submitted all census blocks in the named municipalities. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	Set to “Service Electric Cable TV of Hunterdon, Inc.”
DBANAME	Not supplied; set same as PROVNAME
RESELLER	Set to “N”
FRN	Set to “0003760014”
STATEFIPS	Set to “34” (NJ)
COUNTYFIPS	Populated from Census Block FIPS Code (first 3 digits)
TRACT	Populated from Census Block FIPS Code (next 6 digits)
BLOCKID	Populated from Census Block FIPS Code
BLOCKSUBGROUP	Set to null
FULLFIPSID	Populated from Census Block FIPS Code
TRANSTECH	Set to 41 (Cable Modem – Other) per email Docsis-2.0
MAXADDOWN	Set to 7 (10Mbps) per email
MAXADUP	Set to 3 (800Kbps) per email
TYPICDOWN	Set to null, not provided
TYPICUP	Set to null, not provided
SHAPE	Copied from Census Bureau TigerLine 2000, as matched by spatial join on geocoded address

Internal processing notes:

1. Created a file with municipality names that match exactly names in the “name” column in the Year 2000 Census Bureau TigerLine database. Primarily this meant changing “Boro” to “Borough”.
2. Joined against reference data to discover census blocks.

NTIA Table BB_Service_RoadSegment

Loaded with street segments in census blocks larger than 2 square miles as listed in Census Bureau TigerLine reference data. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	Set to “Service Electric Cable TV of Hunterdon, Inc.”
DBANAME	Not supplied; set same as PROVNAME
RESELLER	Set to “N”
FRN	Set to “0003760014”
ADDMIN	From reference data
ADDMAX	From reference data
PREDIR	From reference data
STREETNAME	From reference data
STREETTYPE	From reference data
SUFFDIR	From reference data
CITY	From reference data

STATECODE	From reference data
ZIP5	From reference data
ZIP4	From reference data
TRANSTECH	Set to 41 (Cable Modem – Other) per email Docsis-2.0
MAXADDOWN	Set to 7 (10Mbps) per email
MAXADUP	Set to 3 (800Kbps) per email
TYPICDOWN	Set to null, not provided
TYPICUP	Set to null, not provided
SHAPE	From reference data

Section 6: Clarification Questions and Responses

1. What is the FRN?
2. Should we expect any middle-mile data?

Interaction from August 2010:

Tim,

We have been reviewing the data you submitted to the New Jersey Broadband mapping program. Based on our initial review, we have some questions for you that will help us better understand the data and process it accurately.

1. Could you please provide the FRN for your company?
2. Is there any information you can provide about the typical speeds experienced by your customers, based on your network configurations, monitoring results or general experience?
3. Do you have any middle mile locations to report?

We would appreciate your prompt attention to these questions. If you need further clarification, please feel free to contact me.

Thank you for your participation!

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

Tim Himmel called John Wullert on 8/27/2010. He answered the questions as followed:

- He will have to check on the FRN. He wasn't quite sure what that meant.
- He said that their typical speeds are generally 10-15% below advertised (5.9 to 6.3 Mbps on a 7 Mbps line). (They are going to build out DOCSIS 3

over the next six months to a year to address this. With that, they may over-provision the lines (provide 12 Mbps for 10 Mbps line).

- They do not have any middle mile sites. They connect direct to PenTeleData, who provides Internet access for multiple cable operators.

Tim Himmel called John Wullert on 8/31/2010 to report the FRN number. The number he provided is: FRN 0003-7600-14

From: Tim Himmelwright [mailto:himmelt@sectv.com]
Sent: Friday, March 04, 2011 3:58 PM
To: ConnectingNJ@research.telcordia.com
Subject: Re: NJ BB Data Collection - Spring 2011

John,

Computing data rates are the same as our last report. We have deployed high-speed 2-way internet services in 100-percent of all 12 communities that we serve in New Jersey.

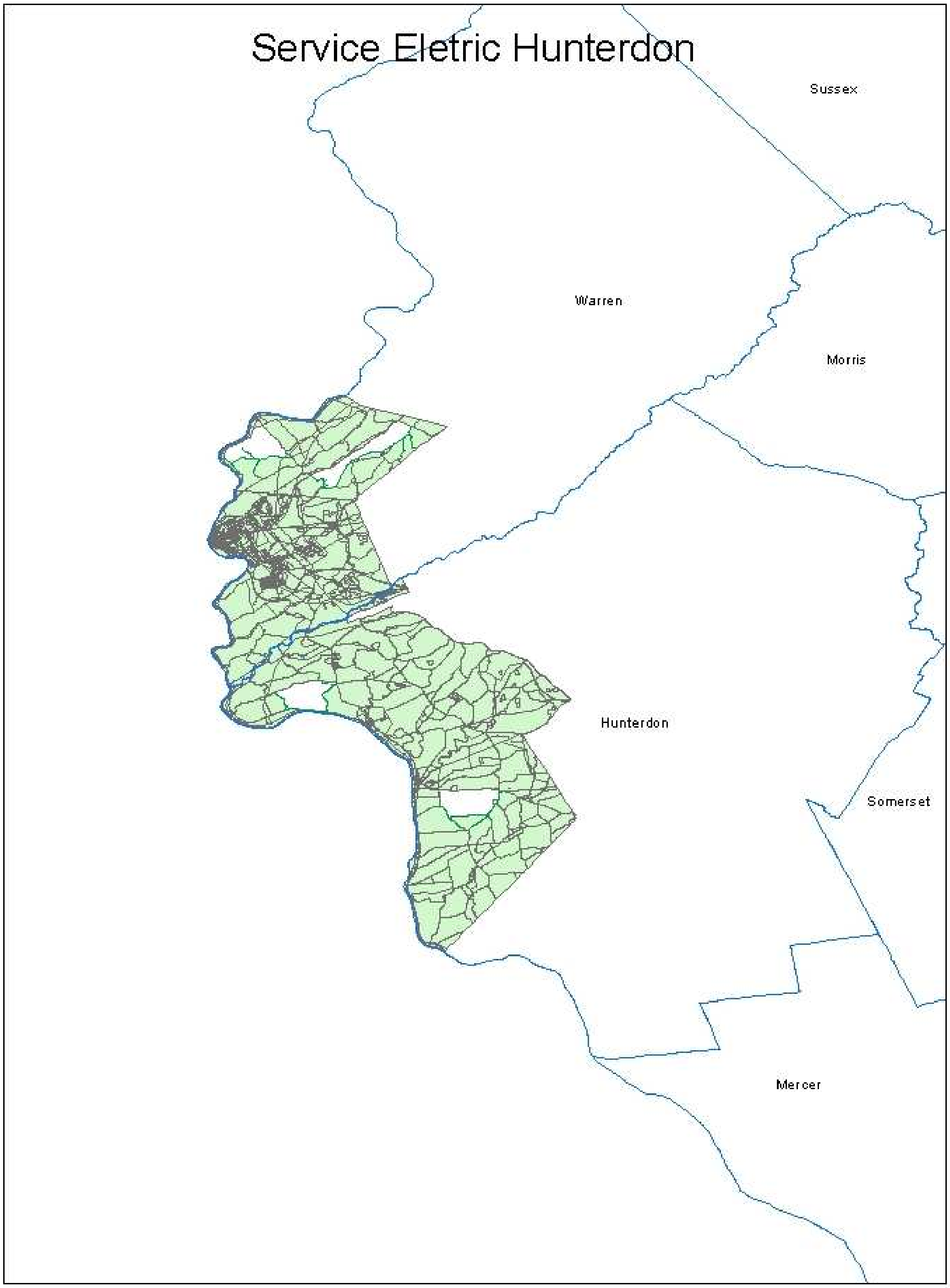
Our platform is still operating on DOCSIS 2.0. However, we are testing DOCSIS 3.0 in two of our Pennsylvania franchises. Once we work out the few small bugs we have encountered, we do plan to migrate our New Jersey properties to DOCSIS 3.0 as well. I will keep you up to date on our progress.

Best Regards,

Timothy S. Himmelwright
Communications & Public Affairs
Service Electric Cable TV & Communications

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Provider: Service Electric Cable TV of Sparta

Submission date: October 2011

This report presents details on processing broadband data for delivery to the National Telecommunications and Information Administration (NTIA).

This is a stub report, since data from the previous submission was reused unchanged. The complete report from the previous submission begins on the next page. Notable differences from the processing done on the previous submission are listed next.

NTIA Table BB_ConnectionPoint_MiddleMile

1. No changes to columns, loaded as before, but using Year 2010 Census Bureau data.

Total rows loaded: 8

Notes

To create the “providerMMInput” table for this submission from the previous version, we removed the 2000 census block ID column and performed a spatial join against the 2010 census block reference data table to add a new column “geoid10” with the Year 2010 census block ID.

NTIA Table BB_Service_CensusBlock

1. Column " blocksubgroup" was dropped.
2. Column "endusercat" was added; set to null because data was not supplied.

Total rows loaded: 5,265

NTIA Table BB_Service_Roadsegment

1. Column " blocksubgroup" was dropped.
2. Column "endusercat" was added; set to null because data was not supplied.

Total rows loaded: 986

Provider Interactions

Received email from James Galliford on 8/22/2011 instructing us to use previously submitted data.

Provider: Service Electric Cable TV of Sparta
Received: March 2011
Submission date: April 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Section 1: NDA Status

No NDA executed.

Section 2: Submission Overview

AVAILABILITY DATA		
ID	Provider name "Doing business as" name FRN	Service Electric Cable TV of NJ Inc. Service Electric Broadband Cable 0005007125
FOR WIRELINE		
Filetypes	Text	
File size	9728 bytes	
Speeds	Type	Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)
	Typical-upstream	Not provided
	Typical-downstream	Not provided
	Advertised-upstream	Municipality
	Advertised-downstream	Municipality
	Subscriber-weighted-up	Municipality
	Subscriber-weighted-down	Municipality
Technology Type	Docsis 3.1 (will use code 40)	
End-user specification	Not provided	
Comments:		
INTERCONNECTION DATA		
ID		
File size	Several addresses provided	

Ownership	Not provided
Transport Type	Fiber
Data Rates/Capacity	One says "Fiber 10 gbps"; others have no statement - Clarified this via email. See answers below.
Location	Address
Comments:	

Section 3: Submission File Details

Received one (1) file by EMAIL:

Size **Name**
9728 Broadband data Information.xls

Received a spreadsheet with information on the municipalities served in entirety, the technology of transmission, the modem speeds offered to customers, and some connection points.

We will gather all the census blocks in the municipality based on the TigerLine reference data and report those shapes in the BB_service_censusblock table.

Section 4: Validations and Results

Municipality names were normalized to agree with Census Bureau reference data.

In this submission the speeds appear to be provided in a straightforward fashion as Max.Down/MaxUp values, the 'Combined' value can probably be ignored.

Section 5: Data Transformation and Loading

NTIA Table BB_ConnectionPoint_MiddleMile

Loaded from 8 rows in the supplied Excel spreadsheet. The following table explains the transformations that were applied.

Table Column	Data Source / Transformation
PROVNAME	Set to "Service Electric Cable TV of NJ Inc." per email response
DBANAME	Set to "Service Electric Broadband Cable" per email response
FRN	Set to "0005007125" per email response
OWNERSHIP	Set to 0 to indicate owned per email

BHCAPACITY	Set to null, not provided
BHTYPE	Set to null, not provided
LATITUDE	Created by geocoding the supplied address
LONGITUDE	Created by geocoding the supplied address
ELEVFEET	Set to “0” (zero)
STATEABBR	Set to “NJ”
FULLFIPSID	ID of containing census block from Year 2000 Census Bureau TigerLine reference data
SHAPE	Created using ESRI ArcDesktop

Internal notes on processing:

1. Created an excel sheet and imported to a geodatabase table.
2. Added points corresponding to each Latitude,Longitude pair by creating a feature class from the table using ArcCatalog’s “Create Feature Class from XY Table” option.
3. Added a column containing the ID of the containing year 2000 census block via a spatial join of the points and the census block shapes from reference data.

NTIA Table BB_Service_CensusBlock

Loaded based on the supplied file “Broadband data Information.xls”. We submitted all census blocks less than 2 square miles in the named municipalities. The following table explains the transformations that were applied to load the target table.

Table Column	**Data Source / Transformation**
PROVNAME	Set to “Service Electric Cable TV of NJ Inc.” per email response
DBANAME	Set to “Service Electric Broadband Cable” per email response
PROVIDER_TYPE	Set to 1
FRN	Set to “0005007125” per email response
STATEFIPS	Set to “34” (NJ)
COUNTYFIPS	Populated from Census Block FIPS Code (first 3 digits)
TRACT	Populated from Census Block FIPS Code (next 6 digits)
BLOCKID	Populated from Census Block FIPS Code
BLOCKSUBGROUP	Set to null
FULLFIPSID	Populated from Census Block FIPS Code
TRANSTECH	Set to 41 (Cable Modem – Other) per file
MAXADDOWN	Set to code 7 per max speed 30Mbps on web site
MAXADUP	Set to code 4 per max speed 2Mbps on web site
TYPICDOWN	Set to null, not provided
TYPICUP	Set to null, not provided
SHAPE	Copied from Census Bureau TigerLine 2010, as matched by spatial join on geocoded address

Internal processing notes:

1. Created a file with municipality names that match exactly names in the “name” column in the Year 2010 Census Bureau TigerLine database. Primarily this meant changing “Boro” to “Borough”.
2. Joined against reference data to discover census blocks, for a total of 4,135 blocks.

NTIA Table BB_Service_RoadSegment

Loaded with street segments in census blocks larger than 2 square miles as gathered from Census Bureau TigerLine reference data. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	Set to “Service Electric Cable TV of NJ Inc.” per email response
DBANAME	Set to “Service Electric Broadband Cable” per email response
PROVIDER_TYPE	Set to 1
FRN	Set to “0005007125” per email response
ADDMIN	From reference data
ADDMAX	From reference data
PREDIR	Set to null, not available in reference data
STREETNAME	From reference data
STREETTYPE	Set to null, not available in reference data
SUFFDIR	Set to null, not available in reference data
CITY	From reference data
STATECODE	Set to "NJ"
ZIP5	From reference data
ZIP4	Set to null, not available in reference data
TRANSTECH	Set to 41 (Cable Modem – Other) per email Docsis-2.0
MAXADDOWN	Set to code 7 per max speed 30Mbps on web site
MAXADUP	Set to code 4 per max speed 2Mbps on web site
TYPICDOWN	Set to null, not provided
TYPICUP	Set to null, not provided
SHAPE	From reference data

Internal processing notes:

3. Discovered all street segments that touch census blocks larger than 2 square miles using the census block list discovered as discussed for table BB_Service_Censusblock.
4. Joined against reference data to discover street segment, for a total of 2,223 entries.

Section 6: Clarification Questions and Responses

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Thursday, March 10, 2011 8:54 AM

To: 'cherie@secable.com'
Cc: ConnectingNJ@research.telcordia.com
Subject: Service Electric of Sparta - NJ BB Data Clarifications

Cherie,
We have reviewed the data you submitted to the NJ Broadband Data Mapping program and have a few clarification questions about the middle mile data you submitted:

1. You list Fiber at 10Gbps with one address in your middle mile list. Do you have this same type of connection at all the locations listed? If not, can you please provide the technology and speed for each location?
2. Do you own or lease the facilities at the interconnection points you have listed?

We appreciate your participation in the program!

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: James Galliford [mailto:james.galliford@secable.com]
Sent: Thursday, March 10, 2011 1:13 PM
To: ConnectingNJ@research.telcordia.com
Cc: cherie@secable.com
Subject: Re: FW: Service Electric of Sparta - NJ BB Data Clarifications

Hello John,

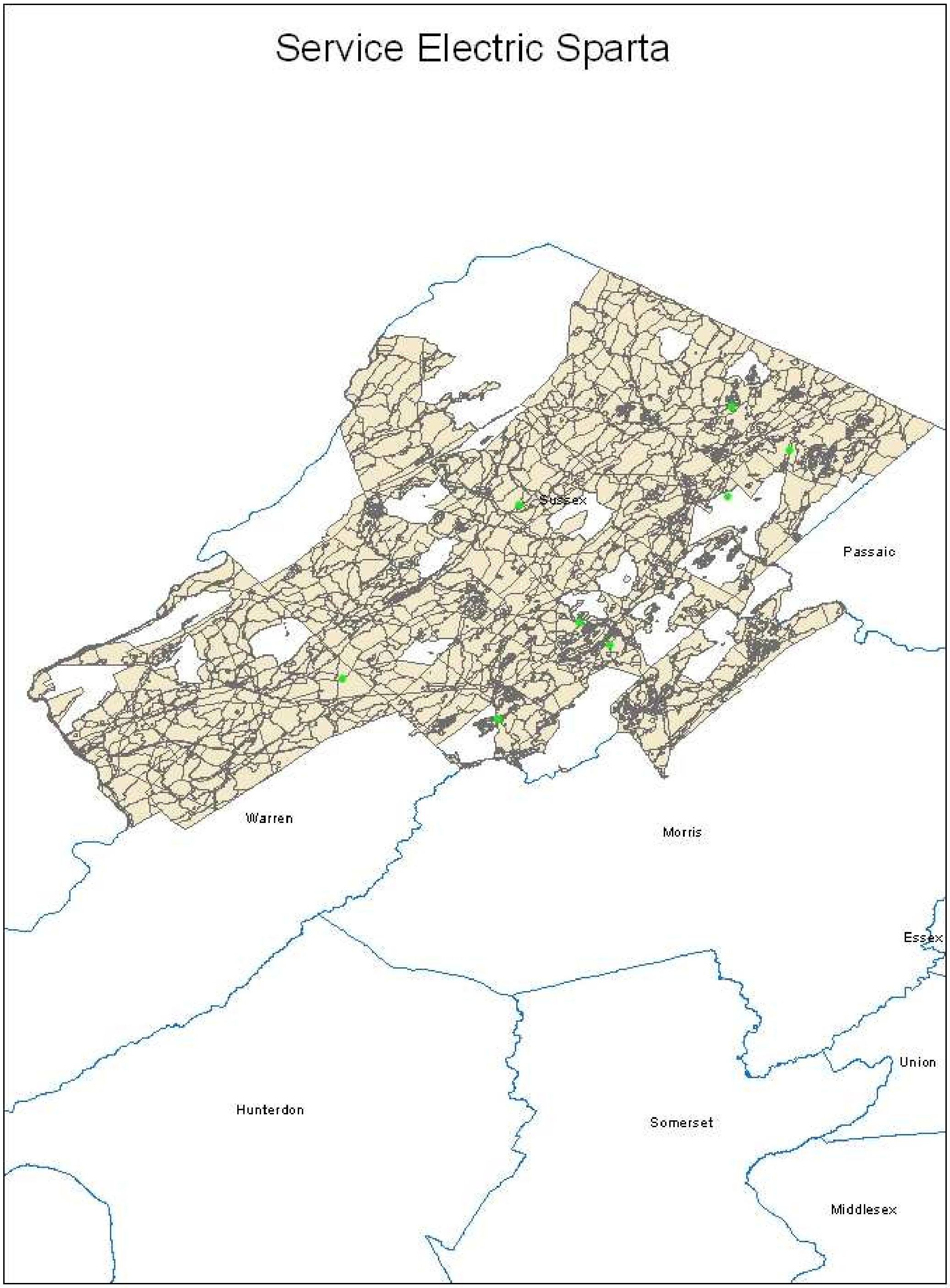
I hope my answers clear up your questions:

1. Further detail into interconnection links:
    1. 320 Sparta Ave, Sparta, NJ & 50 Esto Lane, Hamburg, NJ are interconnected via dual 10Gbps circuits
    2. All other hubsites are connected via dual 1Gbps circuits
2. We own all of the facilities used for data propagation.

Thanks.

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Provider: Sidera Networks (formerly RCN)

Received: August 2011
Submission date: October 2011

This report presents details on processing of broadband data for delivery to the National Telecommunications and Information Administration.

Section 1: NDA Status

Executed with NJ OIT.

Section 2: Submission Overview

AVAILABILITY DATA		
ID	Provider name “Doing business as” name FRN	RCN New York Communications, LLC Sidera Networks 0006-2544-03
FOR WIRELINE		
Filetypes	Text	
File size	32 rows	
Speeds	<table><tr><td>Type</td><td></td><td>Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)</td></tr><tr><td>Typical-upstream</td><td></td><td>Not provided (despite the provider’s claim)</td></tr><tr><td>Typical-downstream</td><td></td><td>Not provided (despite the provider’s claim)</td></tr><tr><td>Advertised-upstream</td><td></td><td>Address</td></tr><tr><td>Advertised-downstream</td><td></td><td>Address</td></tr><tr><td>Subscriber-weighted-up</td><td></td><td>Not provided</td></tr><tr><td>Subscriber-weighted-down</td><td></td><td>Not provided</td></tr></table>	
Technology Type	50 (fiber)	
End-user specification	Category 4 (med or lg enterprise)	
Comments:		

INTERCONNECTION DATA	
ID	Provided – see above
File size	73 rows
Ownership	Leased
Transport Type	Fiber
Data Rates/Capacity	Will use the max. of 3 provided values (Ethernet, SONET, and/or Waves)
Location	

Section 3: Submission File Details

Received two (2) files by SECURE UPLOAD:

Size	Name
1952	NJ_Sidera_Networks_LLC_Proprietary_and_Confidential_20110701.txt

Given the prior interactions, each row is established to contain an address, end-user category, technology code (50), max advertised down/up speeds and two additional columns: ADVER_DOWNLOAD_SPEED and ADVER_UPLOAD_SPEED, which the provider claims (in their response) to be the typical down/up-load speed. We will NOT use data in these columns as the typical down/up-load speed data.

41984 NJ (Sidera) Middle Mile Proprietary and Confidential 20110701.xls

Each row has an address, building type, statement of Ethernet, SONET, and/or Waves backhaul network speed, building ownership (all leased), and entrance (all fiber). We will use the max. of the three provided network speed values (Ethernet, SONET, and Waves) as the serving facility backhaul capacity value.

Section 4: Validations and Results

All addresses were successfully geocoded using Arroyo with Yahoo geocoder. All records successfully spatially joined on 2010 NJ Census Block shapes.

Section 5: Data Transformation and Loading

NTIA Table BB_Connectionpoint_Middlemile

Loaded from supplied file NJ (Sidera) Middle Mile Proprietary and Confidential 20110701.xls" (73 rows). The following table explains the transformations that were applied.

Table Column	**Data Source / Transformation**
PROVNAME	Set to "Sidera Networks, LLC"
DBANAME	Set to "Sidera Networks"
FRN	Set to "0006254403"
OWNERSHIP	Set to 1 (leased)
BHCAPACITY	Set to 6 (10 Gbps or greater)
BHTYPE	Set to 1 (fiber)
LATITUDE	Created by geocoding the supplied address
LONGITUDE	Created by geocoding the supplied address
ELEVFEET	Set to "0" (zero)
STATEABBR	Set to "NJ"
FULLFIPSID	ID of containing census block from Year 2010 Census Bureau reference data
SHAPE	Point shape created using ESRI ArcDesktop

Internal notes on processing:

1. Geocoded the addresses using the Google geocoder.
2. Created an excel sheet and imported to a geodatabase table.
3. Added point shapes corresponding to each Latitude,Longitude pair by creating a feature class from the table using ArcCatalog's "Create Feature Class from XY Table" option.
4. Added a column containing the ID of the containing year 2010 census block via a spatial join of the point shapes and the census block shapes from reference data.
5. Loaded 73 rows.

NTIA Table BB_Service_CensusBlock

Loaded from supplied file "NJ_Sidera_Networks_LLC_Proprietary_and_Confidential_20110701.txt" (20 rows). The following table explains the transformations that were applied to load the target table.

Table Column	**Data Source / Transformation**
PROVNAME	Set to "Sidera Networks, LLC"
DBANAME	Set to "Sidera Networks"
PROVIDER_TYPE	Set to 1
FRN	Set to "0006254403"
STATEFIPS	Set to "34" (NJ)
COUNTYFIPS	Populated from Census Block FIPS Code (first 3 digits)

TRACT	Populated from Census Block FIPS Code (next 6 digits)
BLOCKID	Populated from Census Block FIPS Code
FULLFIPSID	Populated from Census Block FIPS Code
TRANSTECH	As supplied in column Technology_Code
MAXADDOWN	As supplied in column Max_Download_Speed
MAXADUP	As supplied in column Max_Download_Speed_1
TYPICDOWN	Set to null, not supplied
TYPICUP	Set to null, not supplied
ENDUSERCAT	Set to null, not supplied
SHAPE	Copied from Census Bureau 2010 reference data, as matched by spatial join on geocoded address

Internal processing notes:

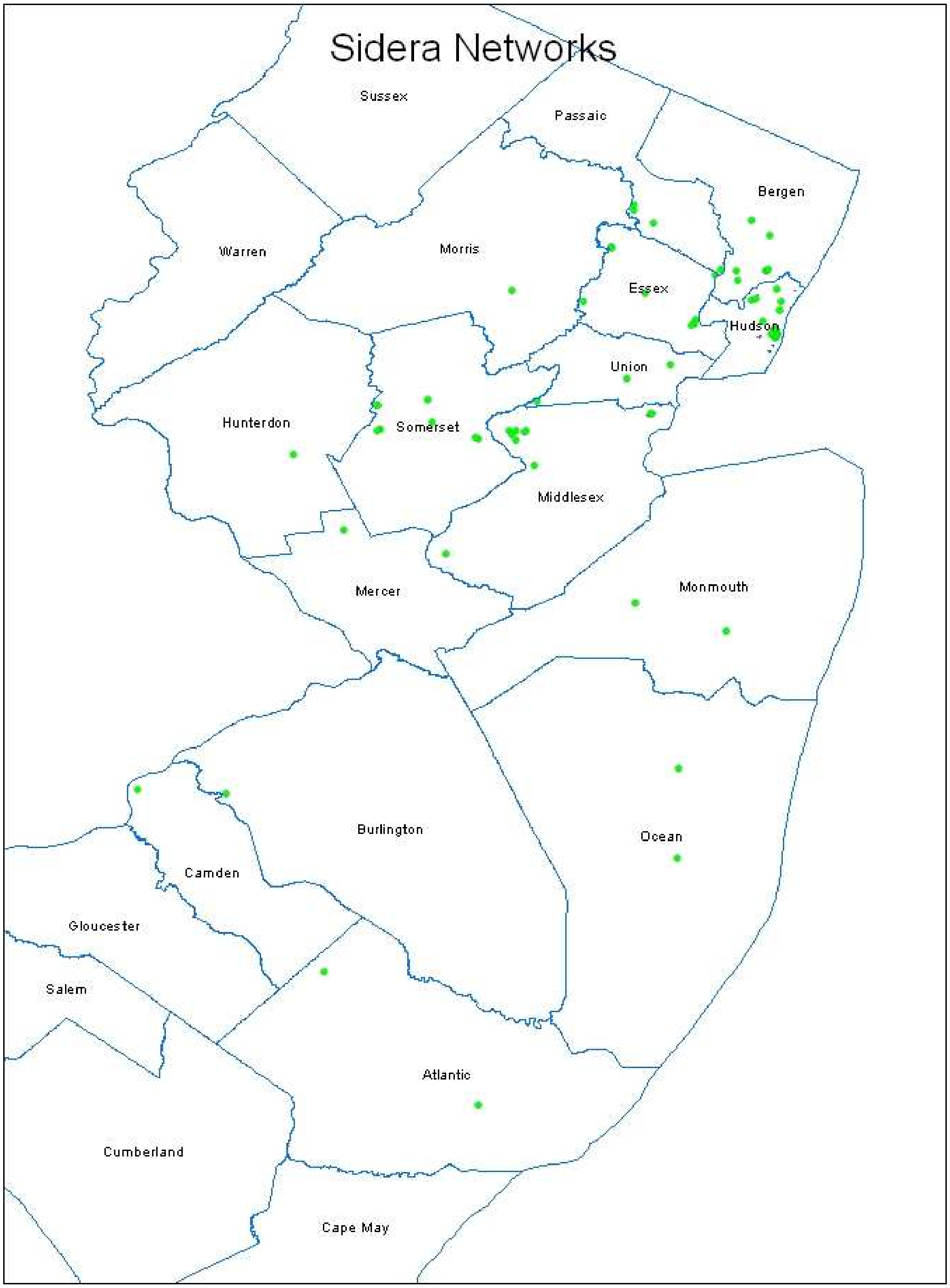
1. Geocoded the addresses using the Google geocoder to obtain a Latitude, Longitude pair for each.
2. Created an Excel sheet and imported it to a geodatabase table.
3. Added point shapes corresponding to each Latitude, Longitude pair by creating a feature class from the table using ArcCatalog's "Create Feature Class from XY Table" option.
4. Created a new feature class and loaded data to correct tolerance value.
5. Added a column containing the ID of the containing year 2010 census block via a spatial join of the point shapes and the census block shapes from reference data.
6. Discarded 20 rows with duplicate census blocks while preserving the greatest speed.
7. Loaded 12 rows.

Section 6: Clarification Questions and Responses

1. NTIA specifies four serving facility types (1=Fiber; 2=Copper;3=Hybrid Fiber Coax (HFC); 4=Wireless) for the middle-mile connection points data. You have provided 3 columns referring (we assume) to the serving facilities in you network. One of them is titled 'Waves'. Does that indicate the wireless facility ?
   (This question seems to have been already posted in the previous round.)
    a. This was answered – all middle-mile points are Fiber.

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Provider: Sprint

Received: July 2011
Submission date: October 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Section 1: NDA Status

NDA was executed.

Section 2: Submission Overview

<table>
<tr><th colspan="3">AVAILABILITY DATA - RECEIVED JULY 15, 2010</th></tr>
<tr><td>ID</td><td>Provider name
“Doing business as” name
FRN</td><td>Sprint Nextel Communications
Sprint
0003-77-45-93</td></tr>
<tr><th colspan="3">FOR WIRELINE</th></tr>
<tr><td>Filetypes</td><td>Txt, xls, pdf, etc.</td><td></td></tr>
<tr><td>File size</td><td>Number of records, data elements</td><td></td></tr>
<tr><td>Speeds</td><td><table>
<tr><th>Type</th><th>Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode)</th></tr>
<tr><td>Upstream</td><td></td></tr>
<tr><td>Downstream</td><td></td></tr>
<tr><td>Typical</td><td></td></tr>
<tr><td>Advertised</td><td></td></tr>
<tr><td>Subscriber-weighted</td><td></td></tr>
</table></td><td></td></tr>
<tr><td>Technology Type</td><td>DOCSIS, xDSL, fiber, etc.</td><td></td></tr>
<tr><td>End-user specification</td><td>Business, consumer, gov’t etc</td><td></td></tr>
<tr><td colspan="3">Comments:</td></tr>
<tr><th colspan="3">FOR WIRELESS</th></tr>
<tr><td>Filetypes</td><td>shapefile collection: shp/dbf/prj/shx, mdb, gdb, imagefile etc.</td><td>Supplied a shapefile (zip archive) with a two rows that uses projection GCS_WGS_1984. The actual shape in the</td></tr>
</table>

<table>
<tr><td></td><td></td><td>archive is a multi-polygon. The 2 rows correspond to spectrums 3 and 5.</td></tr>
<tr><td>Speeds</td><td><table>
<tr><th>Type</th><th>Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode)</th></tr>
<tr><td>Upstream max adv</td><td>Single shape, single speed</td></tr>
<tr><td>Downstream max adv</td><td>Single shape, single speed</td></tr>
<tr><td>Upstream typical</td><td>Single shape, single speed</td></tr>
<tr><td>Downstream typical</td><td>Single shape, single speed</td></tr>
<tr><td>Subscriber-weighted</td><td>County; but all values are identical</td></tr>
</table></td><td>Max advertised up 3, down 2; typical upstream 3, down 2.</td></tr>
<tr><td>Technology Type</td><td>Spectrum (Mhz, FCC code)</td><td>3 and 5 (PCS 1850-1915 MHz, 1930-1995)</td></tr>
<tr><td colspan="3">Comments:</td></tr>
</table>

INTERCONNECTION DATA		
ID	Provider name “Doing business as” name FRN	Sprint Nextel Corporation Sprint 0003-77-45-93
File size	Number of records, data elements	4
Ownership	Leased/owned	Leased = 2, owned = 2
Transport Type	Fiber, wireless, copper	Fiber
Data Rates/Capacity		2.4 GBPS < < 10GBPS
Location	Street address, lat/lon, elevation	Lat/Long
Comments:		

Section 3: Submission File Details

Received these files by upload to the secure web site:

Size **Name**

1	Confidential_Middlemile_NJ.zip
3547KB	Sprint_AreaAvailability_NJ.zip

The zip archives contained these files:

Size	**Name**
427	Confidential_Middlemile_NJ.txt
1754	Confidential_Sprint_Pricing_NJ.txt
209	readme.txt
2	Sprint_AreaAvailability_NJ_region.dbf
1	Sprint_AreaAvailability_NJ_region.prj
5470	Sprint_AreaAvailability_NJ_region.shp
1	Sprint_AreaAvailability_NJ_region.shx

Section 4: Validations and Results

- Sprint provided a map showing coverage areas covering the majority of the state of New Jersey
- Sprint provided a single set of attribute data, to be applied to the entire coverage area on 2 polygons
    - They included typical and maximum advertised upload and download speeds
- Sprint provided spectrum data

Section 5: Data Transformation and Loading

Loaded 4 rows from the text file “Confidential_Middlemile_NJ.txt” supplied in October 2010. The following table explains the transformations that were applied.

Table Column	Data Source / Transformation
PROVNAME	As supplied in column “provider_name”
DBANAME	As supplied
FRN	As supplied in column “frn”, after removing hyphens
OWNERSHIP	As supplied
BHCAPACITY	As supplied in column “servingfacilitycapacity”
BHTYPE	As supplied in column “servicefacilitytype”
LATITUDE	As supplied
LONGITUDE	As supplied
ELEVFEET	As supplied in column “elevation” (all zero)
STATEABBR	Set to “NJ”
FULLFIPSID	Year 2010 Census Bureau TigerLine reference data
SHAPE	Created via ArcMap “Add XY Data” feature for lat/long value pairs

Internal notes on processing:

1. Created an excel sheet with the data and imported to a geodatabase table.
2. Created a feature class from the table by creating a Point shape using ArcMap’s

"Add XY Data" feature corresponding to each Latitude, Longitude pair.
3. Added a column containing the ID of the containing year 2000 census block via a spatial join of the points and the census block shapes from reference data.
4. The only data imputed was the state abbreviation.
5. Reused the ESRI feature class created in the last round.

NTIA Table BB_Service_Wireless

Loaded two rows from from the supplied shapefile "Sprint_AreaAvailability_NJ_region. The following table explains the transformations that were applied.

Table Column	Data Source / Transformation
PROVNAME	As supplied in column "provider_name"
DBANAME	As supplied in column "dbaname"
FRN	As supplied in column "frn" after removing hyphens
TRANSTECH	As supplied in column "techtrans"
SPECTRUM	Set to 3 or 5 per translation shown below
MAXADDOWN	As supplied in column "maxaddnsp"
MAXADUP	As supplied in column "maxadupsp"
TYPICDOWN	Set to null
TYPICUP	Set to null
STATEABBR	Set to "NJ"
SHAPE	As supplied.

Internal notes on processing:
1. The supplied shape uses geographic coordinate system name GCS_WGS_1984 The NTIA data model requires the same coordinate system. No geographic transformation was required, but the XY Tolerance values differ when the shapefile is imported into the geodatabase. Imported the table schema and the table data in two separate operations, thereby ensuring perfect compatibility with the NTIA data model.
2. Details on spectrum transformation: Sprint provided input columns: spectrum1, spectrum2, spectrum3, spectrum4, spectrum5, spectrum6, spectrum7. Sprint put a "Y" in columns spectrum3 (representing range 1850-1915 MHz) and spectrum5 (representing range 2496–2690 MHz). The NTIA data model has a single column for spectrum. The corresponding NTIA "SPECTRUM USED" coded values are 3 and 5.
3. The only data imputed was the state abbreviation.

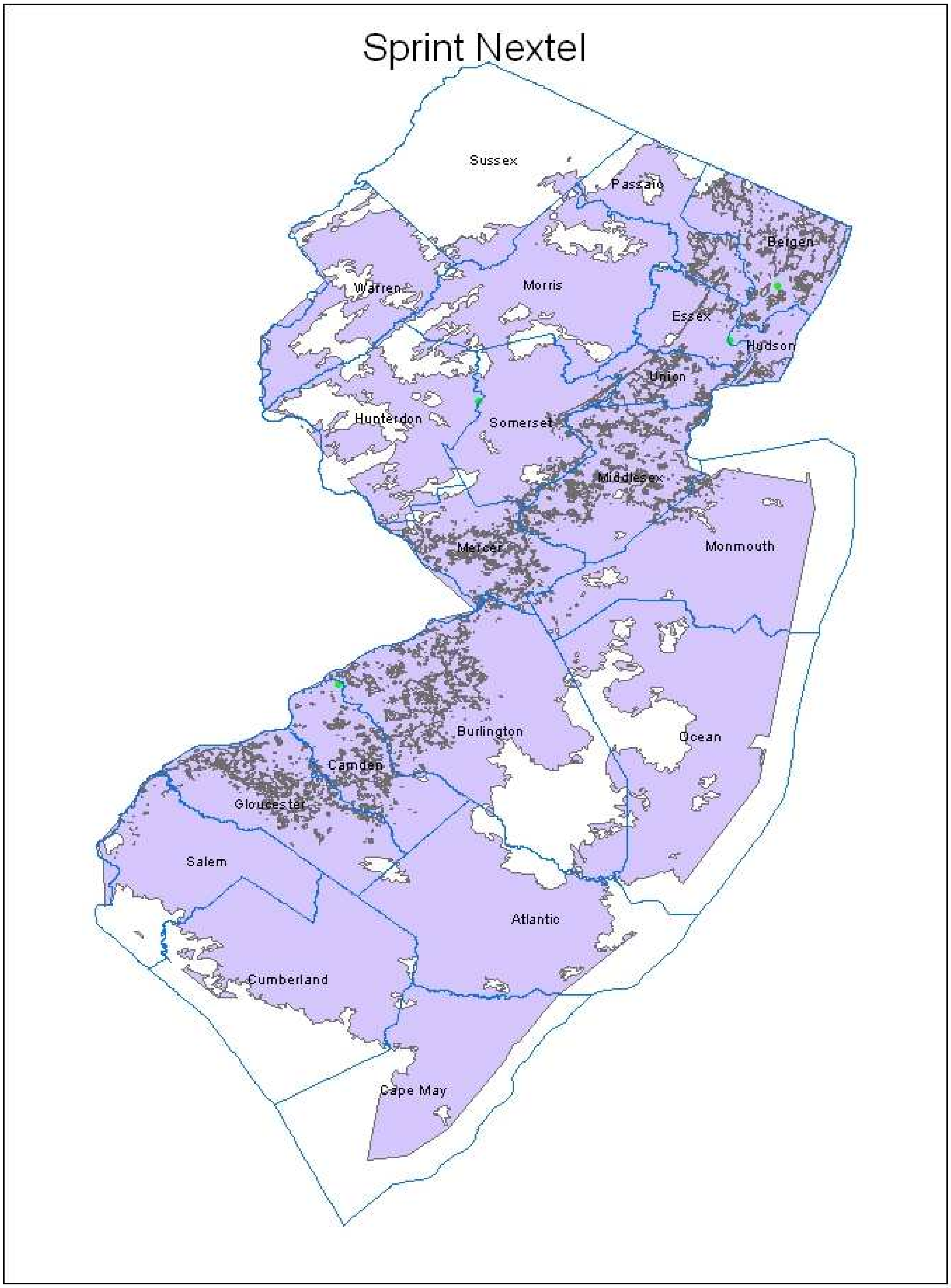
Section 6: Clarification Questions and Responses

None.

NB: In June 2010 we questioned why the max advertised speed codes and the typical speed codes are always the same. Sprint confirmed that data.

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Provider: Starband

Submission date: October 2011

This report presents details on processing broadband data for delivery to the National Telecommunications and Information Administration (NTIA).

This is a stub report, since data from the previous submission was reused unchanged. The complete report from the previous submission begins on the next page. Notable differences from the processing done on the previous submission are listed next.

NTIA Table BB_Service_Wireless

Total rows loaded: 21 (each county in New Jersey)

Provider Interactions

Received note from Lesley Cooper on 7/12/2011 indicating that they had no new data to report.

Connecting New Jersey - Broadband Provider Data Report

Provider: StarBand Communications Inc.
Received: March 2011
Submission date: April 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Section 1: NDA Status

NONE

Section 2: Submission Overview

<table>
<tr><td colspan="5">AVAILABILITY DATA</td></tr>
<tr><td rowspan="3">ID</td><td colspan="3">Provider name</td><td>StarBand Communications Inc.</td></tr>
<tr><td colspan="3">“Doing business as” name</td><td>Not provided</td></tr>
<tr><td colspan="3">FRN</td><td>0005087457</td></tr>
<tr><td colspan="5">FOR WIRELINE</td></tr>
<tr><td>Filetypes</td><td colspan="4"></td></tr>
<tr><td>File size</td><td colspan="4"></td></tr>
<tr><td rowspan="7">Speeds</td><td>Type</td><td></td><td>Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)</td><td rowspan="7">Max advertised up is Code 2 (256 Kbps), down is Code 3 (1.5 Mbps)</td></tr>
<tr><td>Typical-upstream</td><td></td><td>Not provided</td></tr>
<tr><td>Typical-downstream</td><td></td><td>Not provided</td></tr>
<tr><td>Advertised-upstream</td><td></td><td></td></tr>
<tr><td>Advertised-downstream</td><td></td><td></td></tr>
<tr><td>Subscriber-weighted-up</td><td></td><td>256Kbps</td></tr>
<tr><td>Subscriber-weighted-down</td><td></td><td>1.5Mbps</td></tr>
<tr><td>Technology Type</td><td colspan="4">Code 60 (Satellite)</td></tr>
<tr><td>End-user specification</td><td colspan="4">Not provided</td></tr>
<tr><td colspan="5">Comments:</td></tr>
<tr><td colspan="5">INTERCONNECTION DATA</td></tr>
</table>

ID	
File size	
Ownership	
Transport Type	
Data Rates/Capacity	
Location	
Comments: Not provided	

Section 3: Submission File Details

Received email explaining their service offering. Satellite service is provided in all of New Jersey.

On subscriber weighted values, they say:
"Since we have only 1 service that meets the definition of broadband service, the weighted average is the same as the average for that service. Upload speed is 256 Kbps and download speed is 1.5Mbps."

Section 4: Validations and Results

No rows of data need to be validated.

Section 5: Data Transformation and Loading

NTIA Table BB_Service_Wireless

Loaded county shapes from reference data for counties in the State of New Jersey based on emailed statements that all counties are covered. The following table explains the transformations that were applied.

Table Column	Data Source / Transformation
PROVNAME	Set to "StarBand Communications Inc."
DBANAME	Set to "StarBand"
FRN	Set to 0005087457
TRANSTECH	Set to 60
SPECTRUM	Set to 7 per translation shown below
MAXADDOWN	Set to 4, see below.
MAXADUP	Set to 2, see below.

TYPICDOWN	Not provided, set to null
TYPICUP	Not provided, set to null
STATEABBR	Set to “NJ”
SHAPE	County shape read from reference data.

Internal notes on processing:

1. Spectrum: No statement was provided. The NTIA data model has a single column for spectrum. Satellite corresponds to NTIA “SPECTRUM USED” code value 7.
2. Speeds: The maximum advertised speeds provided in the emailed brochure are as discussed above For max adv speeds we encoded the submitted down speed as value 4 (range 1.5-3 Mbps) and encoded the submitted up speed as value 2 (range 200 Kbps -- 768 Kbps).

Section 6: Clarification Questions and Responses

1. What is DBA name if different than provider name?

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Friday, March 18, 2011 10:51 AM
To: 'Lesley Cooper - McLean'
Cc: 'NJ Broadband Data Collection'
Subject: Starband NJBB CLarification

Lesley,
One quick clarification: we have your provider name as Starband Communications Inc. Do you have any other “doing-business-as” name that we should include in the submission to the NTIA?

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: Lesley Cooper - McLean [mailto:Lesley.Cooper@Spacenet.com]
Sent: Tuesday, March 22, 2011 5:48 PM
To: ConnectingNJ@research.telcordia.com
Subject: RE: Starband NJBB CLarification

John,

No, we do not. StarBand is the provider of consumer broadband. StarBand is a part of another company, Spacenet Inc., but Spacenet is not a provider of consumer broadband services.

Please let me know if you have any further questions.

Lesley

From: Lesley Cooper - McLean [mailto:Lesley.Cooper@Spacenet.com]
Sent: Tuesday, July 12, 2011 11:54 AM
To: ConnectingNJ@research.telcordia.com
Subject: RE: NJ Broadband Data Collection

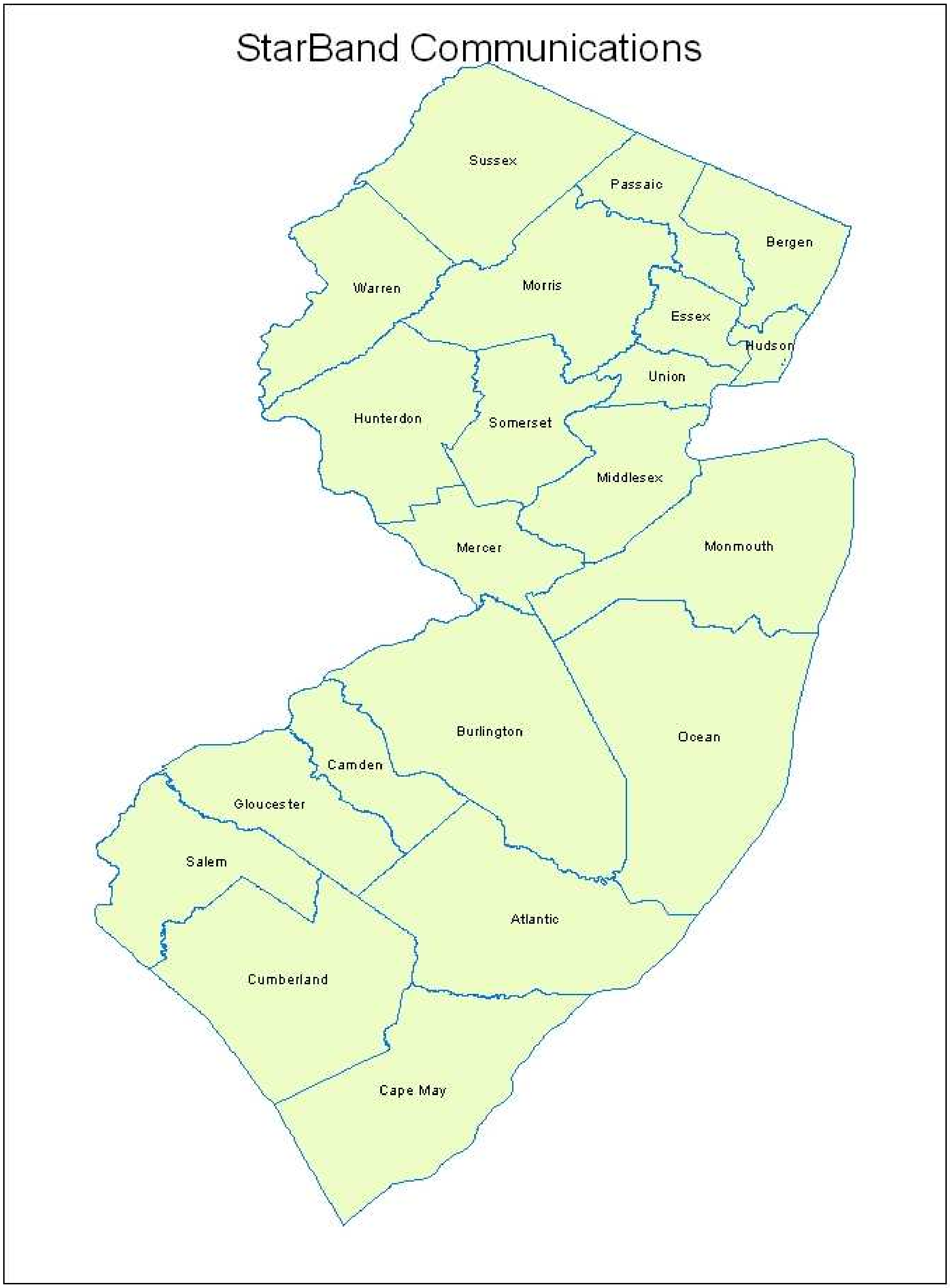
This is to advise you that StarBand Communications does not have any changes to report.

Regards,

Lesley Cooper
Senior Counsel
StarBand Communications

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Provider: Time Warner

Received: August 2011
Submission date: October 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Section 1: NDA Status

NDA established with NJ OIT.

Section 2: Submission Overview

AVAILABILITY DATA		
ID	PROVIDER NAME	Time Warner Cable, LLC
	DBA NAME	Time Warner Cable
	FRN	0013430244
	Holding company name	Time Warner Cable Inc.
	Holding company number	131352

FOR WIRELINE		
File types	Time Warner supplied 2 pdf files and a shapefile showing coverage on FIPS census block level.	

Speeds

Type	Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode)	
Upstream max adv	yes (code 5). census block.	
Downstream max adv	yes (code 9). census block	
Upstream typical	not provided.	
Downstream typical	not provided	
Subscriber-weighted	not provided	

Technology Type	40	
Comments:		

INTERCONNECTION DATA: INSTRUCTED TO USE PREVIOUS DATA	
ID	

File size	
Ownership	
Transport Type	
Data Rates/Capacity	
Location	
Comments: **not provided**.	

Section 3: Submission File Details

Received 1 archive file by EMAIL:

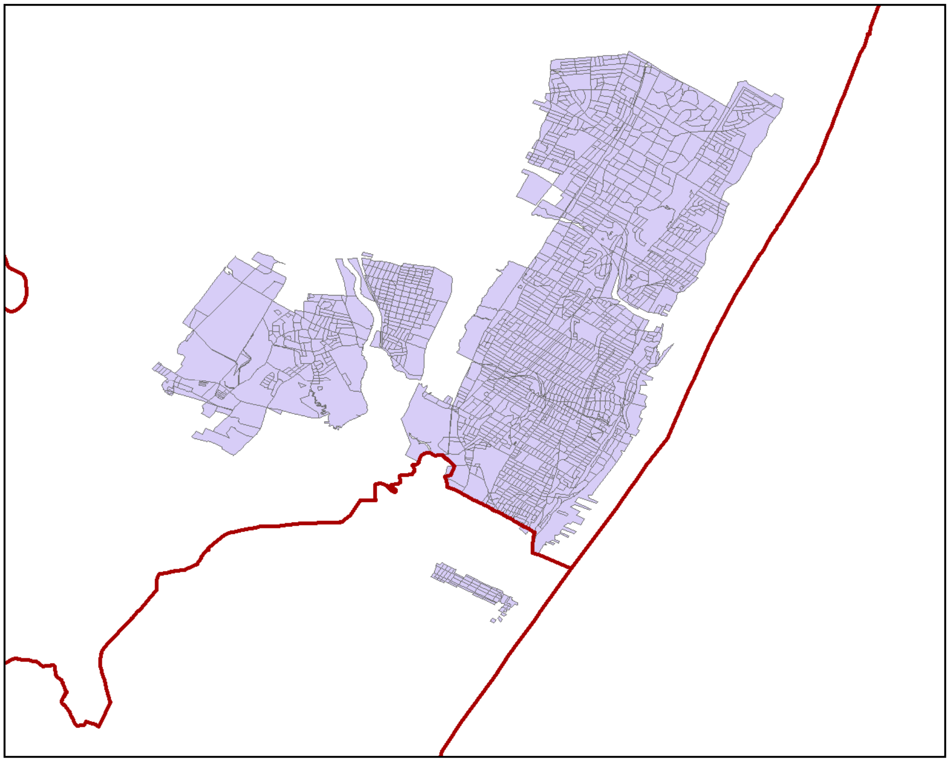
Size	**Name**
489338 Bytes	TWC_0013430244_NJ_063011.zip

This archive contains a shapefile made up of the following 7 files:

Size	**Name**
149,696	NJ Broadband Cltr.pdf
5	TWC_0013430244_CensusBlock_NJ_063011.cpg
658,366	TWC_0013430244_CensusBlock_NJ_063011.dbf
167	TWC_0013430244_CensusBlock_NJ_063011.prj
538,984	TWC_0013430244_CensusBlock_NJ_063011.shp
15,860	TWC_0013430244_CensusBlock_NJ_063011.shx

Quick loading results: 1970 polygons in shapefile, spanning 2 counties in NJ.

Figure 1. Loaded results

Section  4:

Validations and Results

The PDF file does not contain any submission data.

The shapefile TWC_0013430244_CensusBlock_NJ_063011 contains 1970 rows (polygons). See above for a preview picture.

The shapes use XY coordinate system GCS_North_American_1983. Provides census-block shapes and associated speed data. All census block IDs are length 15. All submitted block IDs are unique and were found in Census Bureau Year 2010 reference data. Only technology code 40 is present. Maximum advertised speed codes are present.

NOT PRESENT - SEE PREVOUS DATA REPORTS

- Middle-mile data – as per the cover letter, we will reuse data from the June 2010 submission.
- Typical upstream/downstream values not provided and will not be submitted.

Section 5: Data Transformation and Loading

NTIA Table BB_ConnectionPoint_MiddleMile

Loaded from supplied file “0013430244_middlemile_NJ_06302009.txt” (19 rows, only 1 in New Jersey) received in **June 2010** (and apparently unchanged since) The following table explains the transformations that were applied.

Table Column	Data Source / Transformation
PROVNAME	Set to “Time Warner Cable LLC” (“LLC” was missing)
DBANAME	As supplied in column ”DBAName”
FRN	Set to “0013430244”
OWNERSHIP	As supplied in column ”Ownership”
BHCAPACITY	As supplied in column ”Serving Facility Capacity”
BHTYPE	As supplied in column ”Serving Facility Type”
LATITUDE	As supplied in column “Latitude”
LONGITUDE	As supplied in column “Longitude”
ELEVFEET	As supplied in column “Elevation”
STATEABBR	Set to “NJ”
FULLFIPSID	ID of containing census block from Year 2010 Census Bureau reference data
SHAPE	Point corresponding to Lat, Long created using ESRI

Internal processing notes from prior report:

1. Created an excel sheet and imported to a geodatabase table.
2. Added points corresponding to each Latitude,Longitude pair by creating a feature class from the table using ArcCatalog’s “Create Feature Class from XY Table” option.
3. We dropped all locations outside the New Jersey state boundary, leaving just one. In this row, the elevation value is 30, and we were told in June 2010 that the connection point is on the 7th floor of a building, so we did not change the value.
4. Added a column with the ID of the containing Year 2000 Census block via a spatial join of the points and the census block shapes from reference data.

NTIA Table BB_Service_CensusBlock

Loaded from the supplied shape file. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	Set to “Time Warner Cable LLC” (“LLC” was missing)
DBANAME	As supplied in column ”DBAName”
PROVIDER_TYPE	Set to 1
FRN	Set to “0013430244”
STATEFIPS	Set to “34”
COUNTYFIPS	Populated from cb_fips (digits 3-5)
TRACT	Populated from cb_fips (next 6 digits)

BLOCKID	Populated from cb_fips (next 4 digits)
FULLFIPSID	As supplied in column cb_fips
TRANSTECH	As supplied in column tech_trans
MAXADDOWN	As supplied in column max_ad_dwn
MAXADUP	As supplied in column max_ad_up
TYPICDOWN	Not provided, set to null
TYPICUP	Not provided, set to null
ENDUSERCAT	Not provided, set to null
SHAPE	As supplied

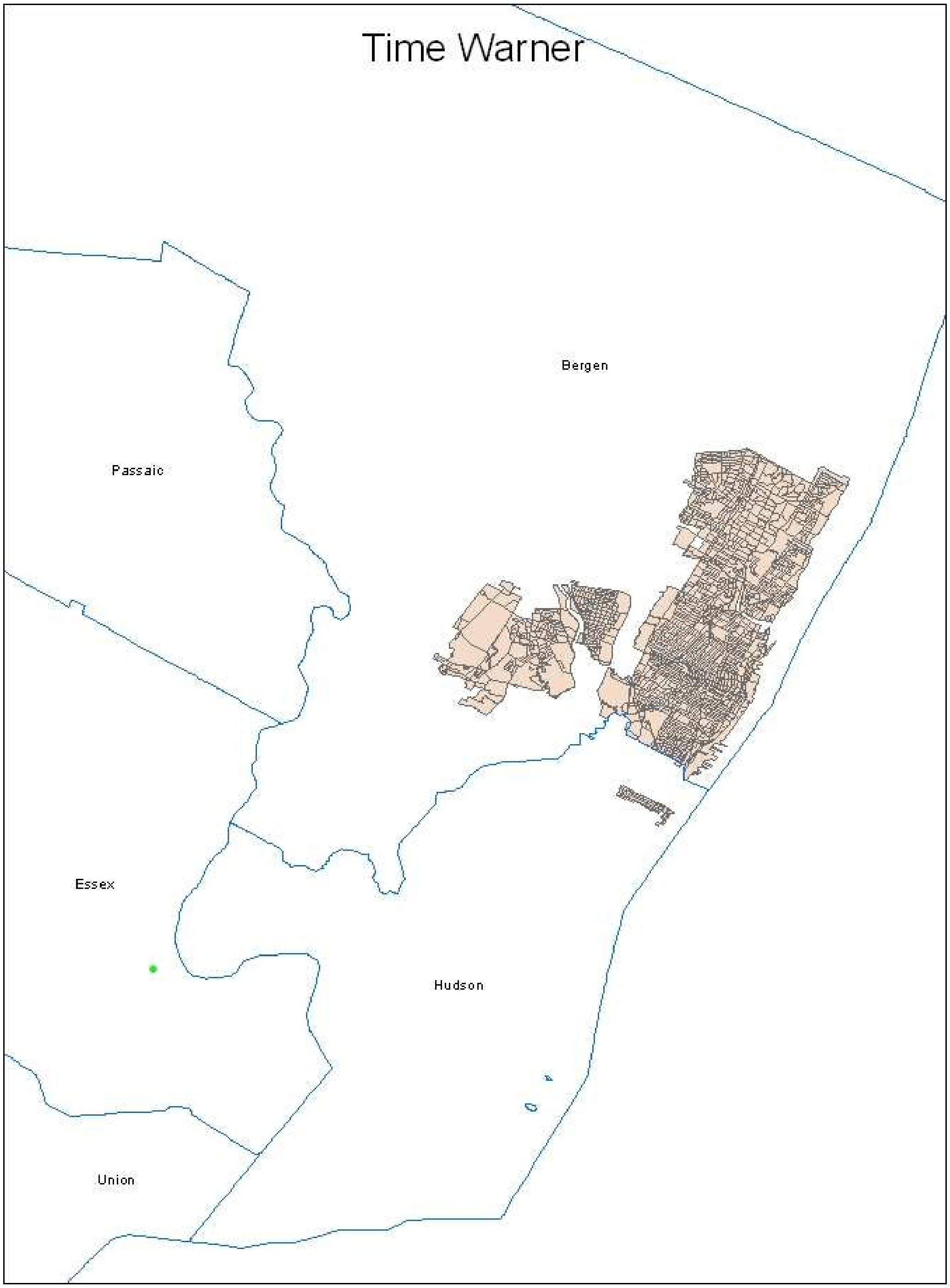
Internal notes on processing

1. Geographic coordinate system: The supplied shape uses geographic coordinate system name GCS_North_American_1983. The NTIA transmittal data model requires coordinate system GCS_WGS_1984. To change the projection we applied the geographic transformation NAD_1983_To_WGS_1984_5 (per ESRI KB article 24159). We also had to load the data into a second feature class such that the tolerance value matches the NTIA transmittal model's value of 0.000000002.

Section 6: Clarification Questions and Responses

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Provider: T-Mobile

Received: 07 August 2011
Submission date: October 2011

This report presents details on processing broadband data for delivery to the National Telecommunications and Information Administration.

Section 1: NDA Status

Executed with NJ OIT.

Section 2: Submission Overview

AVAILABILITY DATA			
ID	PROVIDER NAME	T-Mobile USA, Inc.	
	DBA NAME	T-Mobile	
	FRN	0006945950	
	Holding company name	T-Mobile USA	
	Holding company number	130403	
FOR WIRELESS			
Filetypes	T-mobile supplies .xls, .txt. and shapefiles (availability). They supply 3 sets of shape files: 2 for HSPA+ coverage and another for 3G coverage.		
Speeds	Type	Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode)	**Notes: “T-Mobile submitted three sets of map files for this state. The file names correspond with maximum advertised speed data above. HSPA42 represents increased 4G download speed (it does not affect upload speed).”**
	Upstream max adv	yes (shapefiles for both 3G and 4G)	
	Downstream max adv	yes (shapefiles for both 3G and 4G)	
	Upstream typical	not found.	
	Downstream typical	not found.	
	Subscriber-weighted	Provided as a table of vals in mbps (not kbps) correlated to 21 FIPS codes (code 80)	
Technology Type	Spectrum (Mhz, FCC code)	Advanced Wireless Services spectrum (1710-1755 MHz; 2100-2155)	
Comments:			
INTERCONNECTION DATA			

ID	
File size	5 rows
Ownership	Code 1
Transport Type	Type 1
Data Rates/Capacity	codes 4 and 6
Location	lat/lons given for all (either A or Z end is in NJ)
Comments: seems there were 10 rows at the last iteration? 5 rows this time.	

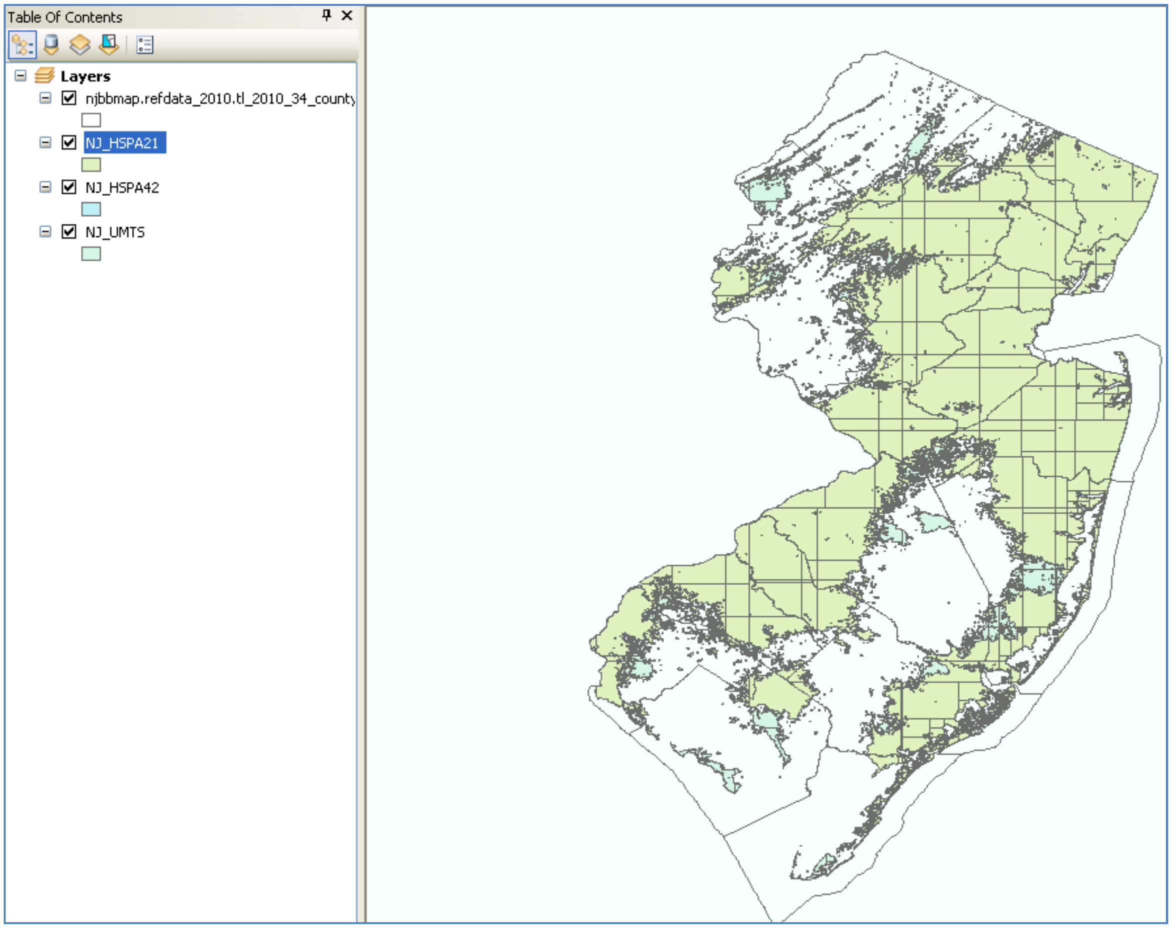


Figure 1. Preview of submitted data in ESRI

Section 3: Submission File Details

The original submission of July 2011 included these 16 data files:

Size	Name
7078KB	Area_availability.zip (contains below shape files)
3KB	Area_availability.txt
10KB	Middle_mile_NJ.xls
10KB	avg_speed_nj.xls
131KB	NJ_HSPA21.dbf
1KB	NJ_HSPA21.prj
12,863KB	NJ_HSPA21.shp
31KB	NJ_HSPA21.shx
36KB	NJ_HSPA42.dbf
1KB	NJ_HSPA42.prj
2675KB	NJ_HSPA42.shp
9KB	NJ_HSPA42.shx
126KB	NJ_UMTS.dbf
1KB	NJ_ UMTS.prj
6710KB	NJ_ UMTS.shp
16KB	NJ_ UMTS.shx

The additional submission of September 2011 provided the following corrected files:

1KB	NJ_HSPA21.dbf
1KB	NJ_HSPA21.prj
2,505KB	NJ_HSPA21.shp
1KB	NJ_HSPA21.shx

Section 4: Validations and Results

We validated the following data items in the original submission.

Geospatial Data

- Received three shape files in July 2011; see above for preview of shapefiles in ESRI.
    - NJ_HSPA21
        - 1958 duplicates found out of 3916 candidates
    - NJ_HSPA42
        - 0 duplicates found out of 1068 candidates
    - NJ_UMTS
        - 0 duplicates found out of 1977 candidates
- All shapes are contained within the state of New Jersey
- The data rows carry no technology, speed, or other broadband data.
- Received one shape file in September 2011
    - NJ_HSPA21

- Has exactly 1 polygon

Middle Mile Data
- File middle_mile_nj.xls lists 5 connections with 2 unique endpoints in New Jersey. Ownership, facility capacity, facility type codes are all valid

Speed/Technology Data
- File area_availability.txt provides technology and spectrum codes that are within the valid set. It also provides maximum-advertised speeds for each wireless technology.
- File avg_speed_nj.xls provides subscriber-weighted nominal speeds, which we will not be using for this round (no overview table required).

Section 5: Data Transformation and Loading

NTIA Table BB_ConnectionPoint_MiddleMile

Loaded from supplied file "middle_mile_NJ.xlsx" (5 rows, 3 unique points). The following table explains the transformations that were applied.

Table Column	**Data Source / Transformation**
PROVNAME	Set to "T-Mobile USA, Inc."
DBANAME	Set to "T-Mobile"
FRN	Set to "0006945950"
OWNERSHIP	As provided in column Ownership (value 1)l
BHCAPACITY	As provided in column Serving Facility Capacity
BHTYPE	As provided in column Serving Facility Type
LATITUDE	Created by geocoding the supplied address
LONGITUDE	Created by geocoding the supplied address
ELEVFEET	Set to "0" (zero)
STATEABBR	As provided in column State
FULLFIPSID	ID of containing census block from Year 2010 Census Bureau reference data
SHAPE	Point created using ESRI tools

Internal notes on processing:
1. Created an excel sheet with the original data and imported to a geodatabase table.
2. Added points corresponding to each Latitude,Longitude pair by creating a feature class from the table using ArcCatalog's "Create Feature Class from XY Table" option.
3. Added a column containing the ID of the containing year 2010 census block via a spatial join of the points and the Year 2010 census block shapes from Tiger Line reference data.

NTIA Table BB_Service_Wireless

Loaded from the supplied shapefiles NJ_HSPA21 (as revised; 1 row), NJ_HSPA42 (1 row), and NJ_UMTS (1 row). The following table explains the transformations that were applied.

Table Column	Data Source / Transformation
PROVNAME	Set to "T-Mobile USA, Inc." per area_availability_NJ.txt
DBANAME	Set to “T-Mobile" per area_availability_NJ.txt
FRN	Set to “0006945950”
TRANSTECH	Set to 80 per area_availability_NJ.txt
SPECTRUM	Set to “4” per translation shown below
MAXADDOWN	Set as follows: HSPA 21 is 6; HSPA 42 is 7; UMTS is 4; as specified in file area_availability_NJ.txt
MAXADUP	Set as follows: HSPA 21 is 4; HSPA 42 is 4; UMTS is 2; as specified in file area_availability_NJ.txt
TYPICDOWN	Set to null (not supplied)
TYPICUP	Set to null (not supplied)
STATEABBR	As supplied in column “state” with “NJ”
SHAPE	As supplied.

Internal notes on processing:

1. Spectrum: NOFA defines 7 spectrum columns. T-Mobile provided a “Y” value in column 4 (Advanced Wireless Services, ranges 1710-1755 MHz; 2100-2155) in file area-availability_NJ.txt, so we coded the value as '4'.
2. The supplied shapes use geographic coordinate system GCS_North_American_1983. The NTIA data model requires coordinate system GCS_WGS_1984. To change the projection we applied the ESRI geographic transformation NAD_1983_To_WGS_1984_5 (per ESRI KB article 24159). The resulting table is named with suffix “_wgs”.
3. The supplied shapes use tolerance values different from the NTIA transmittal model. The transformed feature classes with suitable tolerances are named with suffix “_wgs_tol”.
4. The NJ_HSPA42 and NJ_UMTS shapefiles contained some identical rows as determined by spectrum, technology, and shape; the rows only differed in the maximum advertised speed. To prevent the problem of duplicate shapes in the merged data, we took the following actions:
    a. Merged shapes in NJ_HSPA42_wgs_tol into a single shape, using ArcGIS Dissolve tool. The transformed table is named with suffix "_wgs_tol_dissolve".
    b. Merged the shapes in NJ_UMTS_wgs_tol into a single shape, using ArcGIS Dissolve tool. The transformed table is named with suffix "_wgs_tol_dissolve".

Section 6: Clarification Questions and Responses

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Friday, September 16, 2011 2:08 PM
To: 'jeni.wilcox@t-mobile.com'
Cc: ConnectingNJ@research.telcordia.com
Subject: NJBB Clarification

Jeni,
We have reviewed the data that you submitted to the New Jersey Broadband program and have uncovered a few questions/issues that we'd like your help in addressing.
First, you submitted three shape files, describing HSPA21, HSPA42 and UMTS services. With this, you only provided a single frequency assignment. Do all these service areas make use of the same frequency?
Second, in looking at the HSPA21 shape file, we have found a large number of duplicate shapes (1958 of the total 3916 are duplicates). We were concerned that this might indicate some issue with your process in generating the HSPA21 shape file. (We found no duplicates in the other shape files.) We have been instructed by NTIA not to submit duplicates, so are asking you to examine the data and make the appropriate corrections within the next week. If you cannot meet that deadline, we will drop the duplicates and submit the rest of the shape file.

Thanks for your prompt attention,

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

Hi John,

Thanks for the email. Please see my responses below in red and let me know if you have additional questions.

Thank you,

Jeni Wilcox
Regulatory Specialist
T-Mobile stick together
| Desk: 425.383.6377 | Fax: 425.383.3640 |

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Friday, September 16, 2011 11:08 AM
To: Wilcox, Jeni
Cc: ConnectingNJ@research.telcordia.com
Subject: NJBB Clarification

Jeni,
We have reviewed the data that you submitted to the New Jersey Broadband program and have uncovered a few questions/issues that we'd like your help in addressing.
First, you submitted three shape files, describing HSPA21, HSPA42 and UMTS services. With this, you only provided a single frequency assignment. Do all these service areas make use of the same

frequency? **[JW] Yes, same frequency.**
  Second, in looking at the HSPA21 shape file, we have found a large number of duplicate shapes (1958 of the total 3916 are duplicates). We were concerned that this might indicate some issue with your process in generating the HSPA21 shape file. (We found no duplicates in the other shape files.) We have been instructed by NTIA not to submit duplicates, so are asking you to examine the data and make the appropriate corrections within the next week. If you cannot meet that deadline, we will drop the duplicates and submit the rest of the shape file. **[JW] Attached is the HSPA+21 file without the duplicates.**

Thanks for your prompt attention,

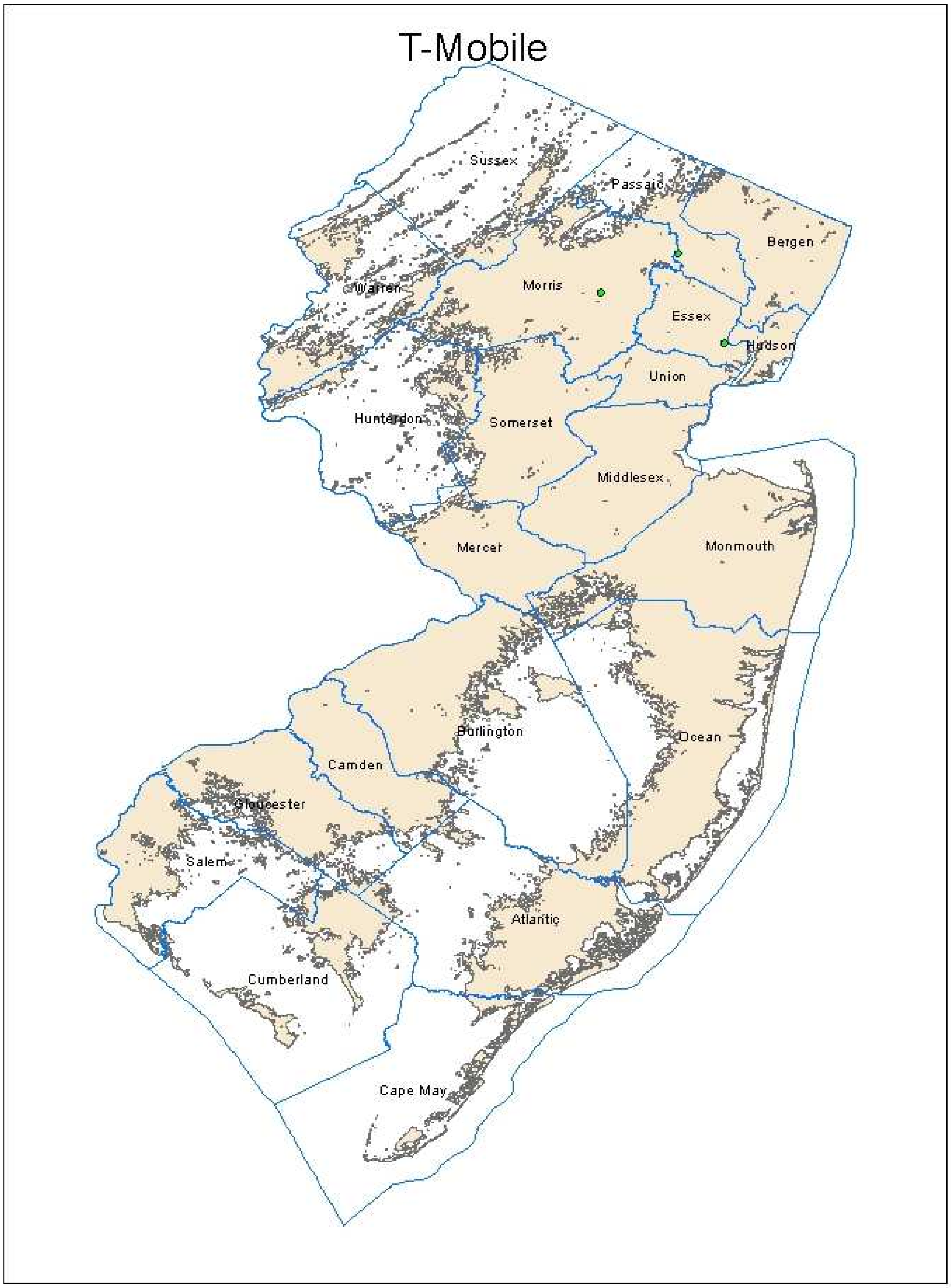
John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

Section 7: Notes and Open Issues

This provider has given us three sets of shapes, one for "HSPA21", one for "HSPA42" and one for "UMTS". All are submitted to us as technology code 80 and all in spectrum code 4. But they have different speeds. The validations complain about duplicate rows, which I assume is based on the shape column and the technology code. Here it seems the technology and spectrum codes do not adequately capture what we have received from the provider.

We addressed the problem by using the ArcGIS “Dissolve” tool to merge all the polygons in each submitted feature class into a single polygon. The submission has exactly three rows, one shape for each speed tier, and presumably will not be flagged as duplicates. Note however that these shapes will have some geo-spatial overlap.

Section 8: Overview Map of Submitted Data



Provider: tw telecom of new jersey l.p.

Submission date: October 2011

This report presents details on processing broadband data for delivery to the National Telecommunications and Information Administration (NTIA).

This is a stub report, since data from the previous submission was reused unchanged. The complete report from the previous submission begins on the next page. Notable differences from the processing done on the previous submission are listed next.

NTIA Table BB_Service_CensusBlock

1. Column "blocksubgroup" was dropped.
2. Column "endusercat" was added; set to null because data was not supplied.

Received 35 input records, discarded 11 due to duplicate census blocks, loaded 24 records.

Notes

To create the “providerInput” table for this submission from the previous version, we removed the 2000 census block ID column and performed a spatial join against the 2010 census block reference data table to add a new column “geoid10” with the Year 2010 census block ID.

Provider Interactions

August 8, 2011: Tammy Chatfield instructed us to use previous data.

Received: March, 2011
Submission date: March 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Section 1: NDA Status

NONE

Section 2: Submission Overview

AVAILABILITY DATA		
ID	Provider name "Doing business as" name FRN Holding company name Holding company number	tw telecom of new jersey l.p. Not provided 0004351417 tw telecom inc. 160153
FOR WIRELINE		
Filetypes	Text	
File size	3419 bytes, 35 records	
Speeds	Type / Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc) Typical-upstream: Not provided Typical-downstream: Not provided Advertised-upstream: Address; values 2..11 Advertised-downstream: Address; values 2..11 Subscriber-weighted-up: Not provided Subscriber-weighted-down: Not provided	
Technology Type	30 (Other copper) and 50 (fiber)	
End-user specification	4 (medium – large enterprise)	
Comments:		
INTERCONNECTION DATA		
ID		

Type		Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)
Typical-upstream		Not provided
Typical-downstream		Not provided
Advertised-upstream		Address; values 2..11
Advertised-downstream		Address; values 2..11
Subscriber-weighted-up		Not provided
Subscriber-weighted-down		Not provided

File size	
Ownership	
Transport Type	
Data Rates/Capacity	
Location	
Comments: None provided	

Section 3: Submission File Details

Received 1 file by secure upload:

Size	**Name**
3419	NJBB_0004351417_AddressLevelAvailability.txt

The file has 35 records. All are addresses; no apartment/suite/unit numbers are provided. Some addresses are repeated, sometimes with different speed numbers, suggesting that these entries are customer service addresses. Several are the addresses of multi-tenant buildings.

Section 4: Validations and Results

All addresses could be geocoded. All coded values in the tech trans and speed columns are valid.

Section 5: Data Transformation and Loading

The standard NDA prohibits us from submitting address-level data to the NTIA. Instead, we discover the census block for each customer address, then report the census block shape drawn from Census Bureau TigerLine reference data.

NTIA Table BB_Service_CensusBlock

Loaded from supplied file "NJBB_0004351417_AddressLevelAvailability.txt". The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	As supplied in column "Provider Name"
DBANAME	Not supplied; set same as PROVNAME
PROVIDER_TYPE	Set to 1
FRN	As supplied in column "FRN", with leading zeroes

STATEFIPS	Set to “34” (NJ)
COUNTYFIPS	Populated from Census Block FIPS Code (first 3 digits)
TRACT	Populated from Census Block FIPS Code (next 6 digits)
BLOCKID	Populated from Census Block FIPS Code
BLOCKSUBGROUP	Set to null
FULLFIPSID	Populated from Census Block FIPS Code
TRANSTECH	As supplied in column Technology of Transmission
MAXADDOWN	For technology 30: Set to 7, the max val in MaxAdDown For technology 50: Set to 11, the max val in MaxAdDown
MAXADUP	For technology 30: Set to 7, the max val in MaxAdDown For technology 50: Set to 11, the max val in MaxAdDown
TYPICDOWN	Set to null, not provided
TYPICUP	Set to null, not provided
SHAPE	Copied from Census Bureau TigerLine 2000, as matched by spatial join on geocoded address

Internal processing notes:

1. Geocoded the addresses using the Google geocoder to obtain a Latitude, Longitude pair for each..
2. Created an excel sheet and imported it to a geodatabase table.
3. Added point shapes corresponding to each Latitude, Longitude pair by creating a feature class from the table using ArcCatalog’s “Create Feature Class from XY Table” option.
4. Added a column containing the ID of the containing year 2000 census block via a spatial join of the point shapes and the census block shapes from reference data.
5. Discarded 11 rows with duplicate census blocks, which means multiple customers are present in the same census block.

The mechanized procedure for the three steps is described in file GeoExcel_proc.txt.

Section 6: Clarification Questions and Responses

1. Based on the prior interactions with the provider, the following was assumed:

DBNAME	- not supplied; set same as PROVNAME
address level data	- need to obfuscate
middle mile	- none
typical speeds	- not provided

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Tuesday, March 08, 2011 8:27 AM
To: 'tammy.chatfield@twtelecom.com'
Cc: ConnectingNJ@research.telcordia.com
Subject: TW Telecom Clarification Questions

Tammy,

We have reviewed the data you submitted to the NJ Broadband data Mapping program and have two clarification questions:

1. During your last submission, you indicated that you did not have any middle mile connection points in NJ. Is that still the case?
2. You provided us with maximum advertised speeds. Would it be possible for you to provide typical speeds experienced by your customers?

Thanks for your participation in the program.

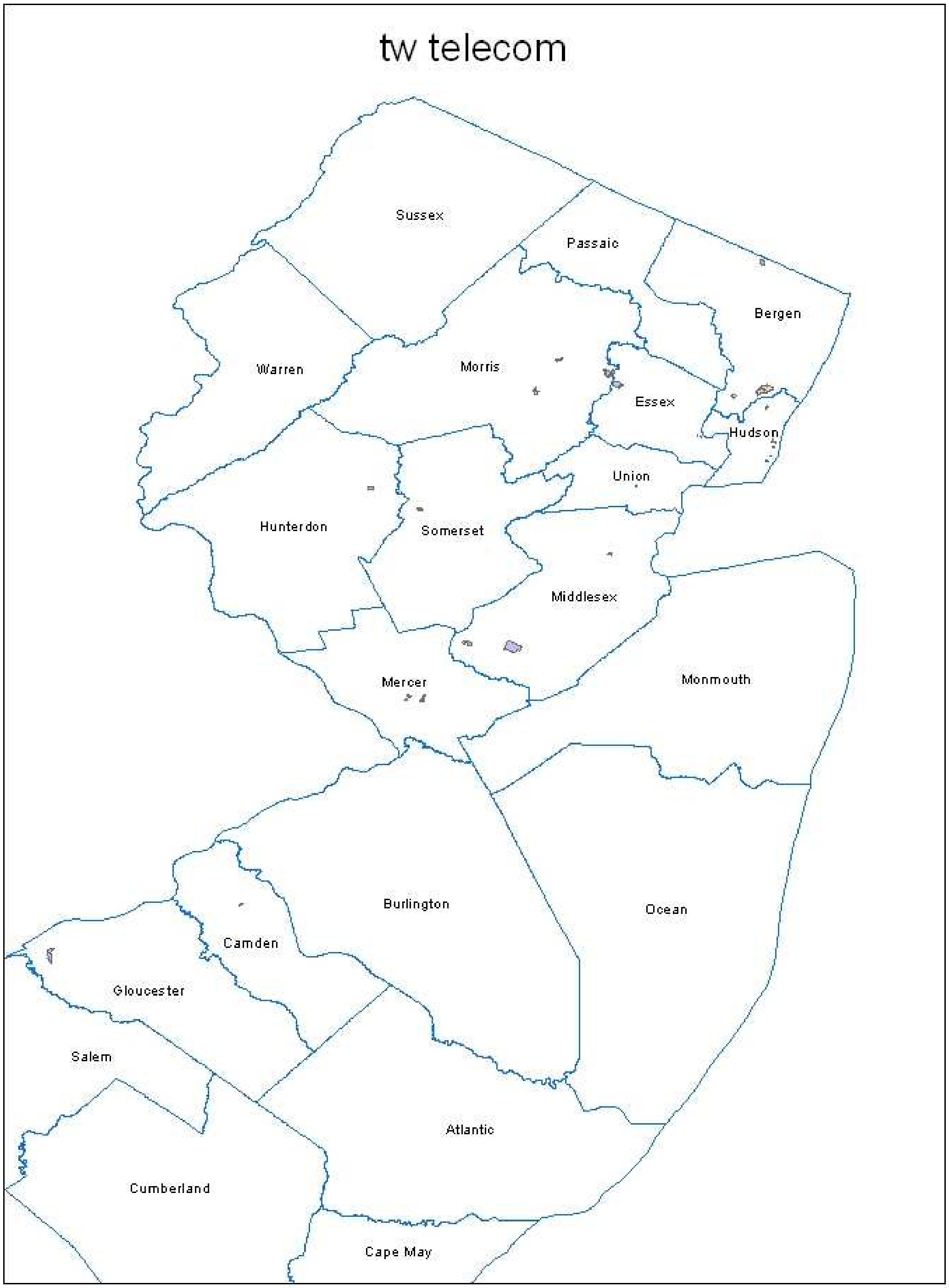
John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: Chatfield, Tammy [mailto:Tammy.Chatfield@twtelecom.com]
Sent: Tuesday, March 08, 2011 8:45 AM
To: ConnectingNJ@research.telcordia.com
Subject: RE: TW Telecom Clarification Questions

1. Correct, we do not have any middle mile facilities in NJ.
2. Unfortunately, we do not have any information on typical speeds.

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Provider: Verizon

Received: August 2011
Submission date: October 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Section 1: NDA Status

Verizon executed an NDA with NJ OIT.

Section 2: Submission Overview

AVAILABILITY DATA		
ID	Provider name “Doing business as” name FRN Holding company name Holding company number	Verizon Online LLC Verizon 0012254363 Verizon Communications Inc. 131425
FOR WIRELINE		
Filetypes	Text and excel	
File size	See below	
Speeds	(see table below)	
Technology Type	DSL (10) and FTTP (50)	
End-user specification	Not provided	
Comments:		

Type		Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)
Typical-upstream		Not provided
Typical-downstream		Not provided
Advertised-upstream		County (code 7)
Advertised-downstream		County (code 9)
Subscriber-weighted-up		Not provided
Subscriber-weighted-down		County

INTERCONNECTION DATA	
ID	
File size	Excel file, 11 POP rows provided, see below
Ownership	Not provided
Transport Type	Not provided
Data Rates/Capacity	Not provided
Location	Address
Comments:	

Section 3: Submission File Details

Received these files initially via CD-ROM, with updated files submitted via email

VZ-NJ-BB(Revised).zip

Size	Name
7062862	NJ - Wireline Service By Census Block - Jun 2011 with Speeds v2.txt
143167	NJ - Wireline Service By Street Segment - Jun 2011 with Speeds v2.txt

Verizon.zip

Size	Name
603	NJ - Advertised Speed by County (Jun 2011).txt
2805	NJ - Pricing (Jun 2011).txt
29184	NJ - POP List (Jun 2011).xls

Section 4: Validations and Results

We validated the following data items in the original submission.

File "NJ - Advertised Speed by County (Jun 2011).txt" (21 data rows)

Lists these columns (* indicates no data): Provider Name*, DBA Name*, FRN*, ID, County FIPS Code, County Name, Maximum Advertised Downstream Speed, Maximum Advertised Upstream Speed.

County codes are valid. Speed codes are valid; every county is listed at 9 (down) and 7 (up). This must be for technology 50 (FTTP); it's not reasonable for technology codes 10 and 20 (ADSL, SDSL).

File "NJ - Wireline Service By Census Block with Speeds (Jun 2011).txt" (159,878 data rows)
Updated File: NJ - Wireline Service By Census Block - Jun 2011 with Speeds v2.txt (159,876 rows) (Update removes records that were associated with large census blocks)

Lists these columns (* indicates no data): ProviderName*, DBAName*, FRN*, ID, Census Block FIPS Code, Census Block Square Miles, Technology of Transmission.

Two technology codes are present, 10 and 50, both are valid. All FIPS codes reflect Year 2010 Census Bureau geometry. According to census block reference data, three census blocks larger than 2 square miles are in the list:

- 340258119001027
- 340297310011001
- 340297381007002

For the latter two, Verizon data indicates an area of zero. For the first, Verizon has an area of 1.959261973 and we have an area of 2.01155747. Sent note to Verizon to clarify on 8/30/2011.

File "NJ - Wireline Service By Street Segment with Speeds (Jun 2011).txt" (1,841 data rows)
Updated File: NJ - Wireline Service By Street Segment - Jun 2011 with Speeds v2.txt (1864 rows) (Update adds streets for blocks that previously were submitted as census blocks)

Lists these columns (* indicates no data): Provider Name*, DBA Name*, FRN*, ID, Census Block FIPS Code, Census Block Square Miles, TLID, Street Name, FRADDL, TOADDL, FRADDR, TOADDR, Technology of Transmission.

TigerLine IDs were matched against Year 2010 Census Bureau TigerLine reference data, all are valid IDs. All TigerLine IDs correspond to roads. All the census blocks included are valid NJ 2010 census blocks.

The input set contains 22 records that are duplicates when checked by county (characters 3-5 of Census Block FIPS Code), TLID and TechTrans. The census blocks are different for the records. The Tiger lines must touch multiple census blocks. We will discard these records to avoid creating duplicate shapes in the submission.

There were 478 TLIDs that do not belong to our table of street segments in large census blocks (tl_2010_34_large_streets_10_wgs). The primary reason is that the table does not contain the full list of streets in large blocks due to poor alignment between the 2010 TIGER lines and Census blocks. To address this, we created a table of valid tigerline IDs by joining tiger shapes with census blocks using a 2 meter buffer. After we did this, there were only 11 TLIDs that do not belong to the resulting table, tl_2010_34_large_streets_10_2m_wgs. These TLIDs were removed from the data.. See section 7 for details.

File “NJ - Pricing (Jun 2011).txt” (53 data rows)

This file provides subscriber-weighted nominal speeds. The columns are not labeled but appear to be as follows: Provider_Name, FRN, County ID (based on odd numbers 1..41), State, Technology of Transmission, Subscriber Weighted Nominal Speed.

The county IDs are valid, the state ID (“34”) is valid, and the technology of transmission codes 10, 20, and 50 are all valid. The Subscriber Weighted Nominal Speed values are plausible for the specified technology of transmission codes; e.g., DSL speeds are about 4,000. However, every FIOS speed is shown at 25,000 or higher. Given the availability of FIOS/FTTP plans at download speeds of less than 25Mbps, it seems extraordinarily unlikely that not a single customer uses one of those plans and/or that so many customers use a 50Mbps plan that the average is brought up so high.

Per NTIA directions we are not submitting the "BB_Service_Overview" table in this submission so will not use this data.

File “NJ - POP List (Jun 2011).xls” (11 rows)

Column names: Address, City, State, Zip.

The data is the same as the last submission.

We geocoded the addresses to obtain latitude, longitude value pairs. All addresses were found. However, Verizon did not supply needed information on the elevation, ownership, serving facility capacity, and service facility type of these addresses. In June 2010 Verizon indicated they had no intention of supplying this information.

File “NJ - Pricing (Jun 2011).txt” (53 rows)

Per NTIA instructions, we will not be submitting pricing dat.

Section 5: Data Transformation and Loading

NTIA Table BB_ConnectionPoint_MiddleMile

Loaded from supplied Excel Spreadsheet “NJ - POP List (Jun 2011).xls”. The following table explains the transformations that were applied.

Table Column	**Data Source / Transformation**
PROVNAME	Set to “Verizon Online LLC””
DBANAME	Set to “Verizon”

FRN	Set to “0012254363”
OWNERSHIP	Set to null
BHCAPACITY	Set to null
BHTYPE	Set to null
LATITUDE	Created by geocoding the supplied address
LONGITUDE	Created by geocoding the supplied address
ELEVFEET	Set to “0” (zero)
STATEABBR	Set to “NJ”
FULLFIPSID	ID of containing census block from Year 2010 Census Bureau TigerLine reference data
SHAPE	Created using ESRI ArcDesktop

Internal notes on processing:

1. To date Verizon has declined to provide information about ownership, backhaul capacity, or backhaul type, so we submit null values.
2. Created an excel sheet and imported to a geodatabase table.
3. Added points corresponding to each Latitude,Longitude pair by creating a feature class from the table using ArcCatalog’s “Create Feature Class from XY Table” option.
4. Added a column containing the ID of the containing year 2010 census block via a spatial join of the points and the census block shapes from reference data.
5. Note that October 2011 was identical to that submitted in October 2009, so we used previously loaded data (steps 2-4).

NTIA Table BB_Service_CensusBlock

Loaded from supplied text file “NJ - Wireline Service By Census Block - Jun 2011 with Speeds v2.txt”. The following table explains the transformations that were applied to load the target table.

Table Column	**Data Source / Transformation**
PROVNAME	Set to “Verizon Online LLC”
DBANAME	Set to “Verizon”
PROVIDER_TYPE	Set to 1
FRN	Set to “0012254363”
STATEFIPS	Set to “34” (NJ)
COUNTYFIPS	Populated from 2010_Census_Block_FIPS_Code (1st 3 digits)
TRACT	Populated from 2010_Census_Block_FIPS_Code (next 6 digits)
BLOCKID	Populated from 2010_Census_Block_FIPS_Code (next 4 digits)
BLOCKSUBGROUP	Set to null
FULLFIPSID	First 15 digits of 2010_Census_Block_FIPS_Code See discussion of Census blocks below.
TRANSTECH	As supplied in column Technology_of_Transmission
MAXADDOWN	Set to 6 or 9, see below.

MAXADUP	Set to 3 or 7; see below
TYPICDOWN	Set to null
TYPICUP	Set to null
SHAPE	Copied from Year 2000 Census Bureau reference data, As matched by Census block 2000 ID

Internal processing notes:

1. Verizon submitted initially 3 census blocks that were significantly larger than 2 square miles in this table. Verizon corrected the 3 very large census blocks with re-submitted data.
2. Verizon submitted two other census blocks that our calculations put just above 2 square miles:.
   a. 340190118002005 (2.00887743 mi^2)
   b. 340270461061026 (2.00118133 mi^2)

   We believe this is a result of variations in the projections used to calculate the areas. In processing, we gathered the entire set of street segments associated with these census blocks and included them in the street segment table.
3. Speeds: We imputed max advertised up and down speeds based on the technology of transmission, the contents of the File “NJ - Advertised Speed by County.txt”, and information on the Verizon web site. Mad adv down for tech code 10 (DSL) is speed code 6, and max adv down for tech code 50 (FIOS) is speed code 9. Max adv up for tech code 10 (DSL) is speed code 3, and max adv up for tech code 50 (FIOS) is speed code 7.

NTIA Table BB_Service_RoadSegment

Loaded from supplied text file “NJ - Wireline Service By Street Segment - Jun 2011 with Speeds v2.txt” and from road segments discovered in large census blocks our calculations put at slightly larger than two square miles (See item 2 above). The following table explains the transformations that were applied to load the target table.

Table Column	**Data Source / Transformation**
PROVNAME	Set to “Verizon Online LLC”
DBANAME	Set to “Verizon”
PROVIDER_TYPE	Set to 1
FRN	Set to “0012254363”
ADDMIN	Set to the least of the address numbers, if any
ADDMAX	Set to the greatest of the address numbers, if any
PREDIR	Set to null (no value supplied)
STREETNAME	As supplied (has all street components, not just name)
STREETTYPE	Set to null (no value supplied)
SUFFDIR	Set to null (no value supplied)
CITY	Set to null (no value supplied)
STATECODE	Set to “NJ”
ZIP5	Set to null (no value supplied)

ZIP4	Set to null (no value supplied)
TRANSTECH	As supplied
MAXADDOWN	Set to 6 or 9, see below.
MAXADUP	Set to 3 or 7; see below
TYPICDOWN	Set to null (no value supplied)
TYPICUP	Set to null (no value supplied)
TLID	As supplied
SHAPE	Copied from Census Bureau TigerLine 2000, As matched by County + Tiger Line ID

Internal notes on processing:

1. All rows were supplemented with a line-segment shape from the Census Bureau's TigerLine data set.
2. We removed 100 records from the Verizon submitted data that were duplicates, based on county and tlid.
3. We removed 11 records from the Verizon submitted data that had entries in the tlid field that did not match our list of street segments in large census blocks.
4. Speeds: : We imputed max advertised up and down speeds based on the technology of transmission, the contents of the File "NJ - Advertised Speed by County.txt", and information on the Verizon web site. Max adv up for tech code 10 (DSL) is speed code 3, and max adv up for tech code 50 (FIOS) is speed code 7. Mad adv down for tech code 10 (DSL) is speed code 7, and max adv down for tech code 50 (FIOS) is speed code 9.

Section 6: Clarification Questions and Responses

We confirmed that 2010 census blocks were used.

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Friday, August 26, 2011 2:25 PM
To: 'douglas.w.schoenberger@verizon.com'
Cc: 'Clemons, Keefe B'
Subject: NJBB Data Clarification

Douglas,
We have reviewed the data that Verizon submitted to the New Jersey Broadband mapping program and have one clarification question: Did you use the 2010 census block geometry as the basis for your submission?

Thanks for your participation,

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: Wullert, John R II [mailto:jwullert@telcordia.com]
Sent: Monday, August 29, 2011 5:53 PM
To: Schoenberger, Douglas W.
Cc: Clemons, Keefe B; connectingnj@research.telcordia.com
Subject: Re: NJBB Clarification

Douglas,
An additional clarification issue: We proceeded assuming these were 2010 census blocks. We came across three census blocks that you have as being smaller than 2 square miles that we have as over two square miles. For two of these, you have a area of zero, which is clearly incorrect. For the third one, 340258119001027, you have an area of 1.959261973 and we have an area of 2.01155747. Could you please check your data on these census blocks?

Thanks,

John

-----Original Message-----
From: Schoenberger, Douglas W. [mailto:douglas.w.schoenberger@verizon.com]
Sent: Tuesday, August 30, 2011 9:54 AM
To: Wullert, John R II
Cc: Clemons, Keefe B; connectingnj@research.telcordia.com
Subject: RE: NJBB Clarification

John,

In response to your questions:

1) We did use the 2010 census block geometry to prepare the Verizon NJ broadband data.

2) Could you identify the two specific 2010 census blocks that we have as zero area that you have as over two square miles?

Thanks,
Doug

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Tuesday, August 30, 2011 3:20 PM
To: 'Schoenberger, Douglas W.'
Cc: Clemons, Keefe B; connectingnj@research.telcordia.com
Subject: FW: NJBB Clarification

Doug,
The census blocks that your data indicates zero area are 340297310011001 and 340297381007002. We have areas of 2.47 and 2.54 square miles, respectively.

John

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Tuesday, August 30, 2011 4:47 PM
To: 'NJ Broadband Data Collection'; 'Schoenberger, Douglas W.'
Cc: 'Clemons, Keefe B'
Subject: RE: NJBB Clarification

Doug,
A couple more census blocks that we have as larger than 2 square miles. (These are so close that the difference may be attributable to rounding error):
a. 340190118002005 (2.00887743 mi2)
b. 340270461061026 (2.00118133 mi2)

John

From: Schoenberger, Douglas W. [mailto:douglas.w.schoenberger@verizon.com]
Sent: Friday, September 23, 2011 3:28 PM
To: Wullert, John R II
Cc: Clemons, Keefe B; connectingnj@research.telcordia.com
Subject: Revised NJ Broadband Dataset
Importance: High

Confidential

Hi John,

Attached is a revised broadband data for NJ that should replace the data set we provided earlier. This data set corrects for the 0 square mile issue that you identified. This data is confidential and being made available pursuant to the terms of the non-disclosure agreement.

Please let me know if you have any questions.

Thanks,

Doug Schoenberger
973-649-0552

Section 7: Notes and Open Issues

This section provides detail on the line segments that we believe are mistakenly associated with large census blocks.

There are 11 line segments that do not belong to large census blocks.
Here are three examples, for the following tlids:

624803467
203769459
203790565

Row 1:

Census	Block Square Miles	TLID	Street Name
340090219002007	2.059921127	624803467	Pond Creek la

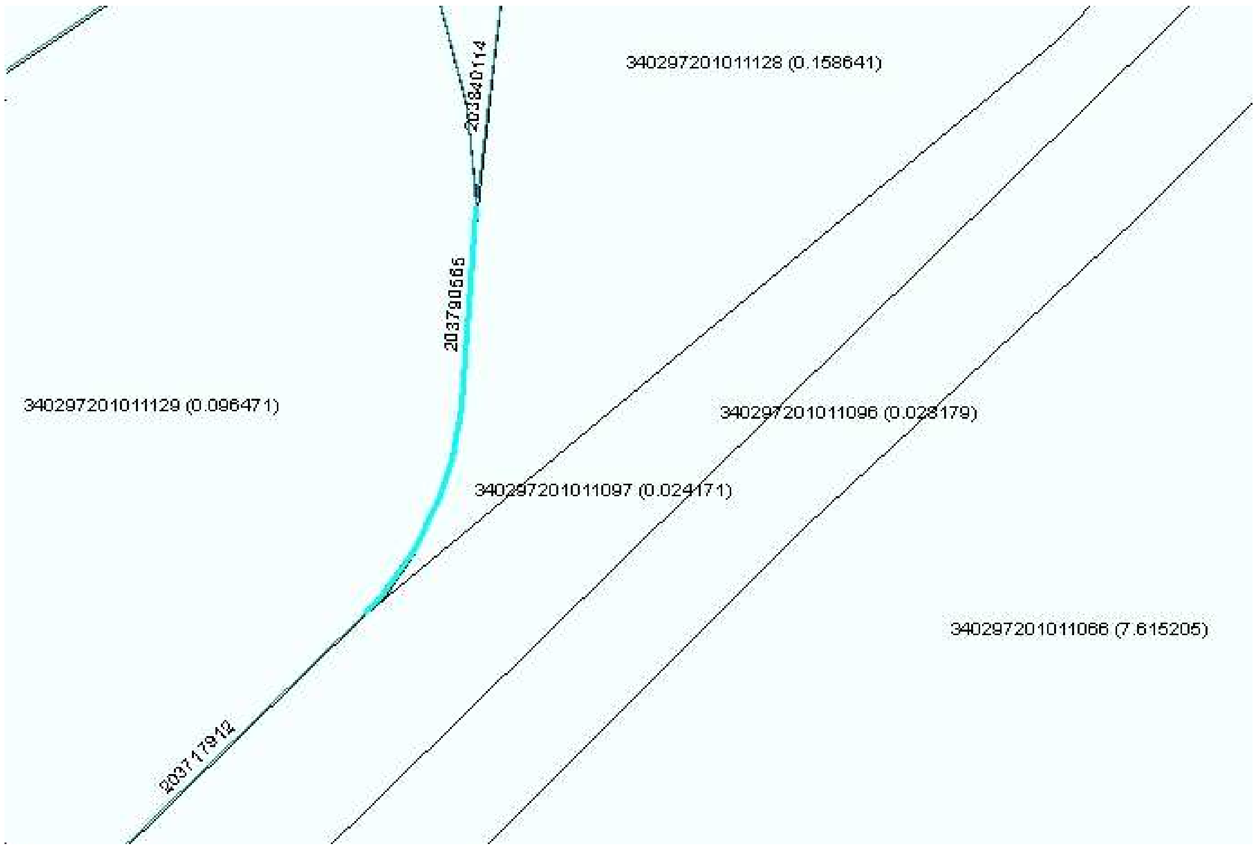
Row 2:

Census	Block Square Miles	TLID	Street Name	
340297360021058	5.580632034	203769459	Main St	601

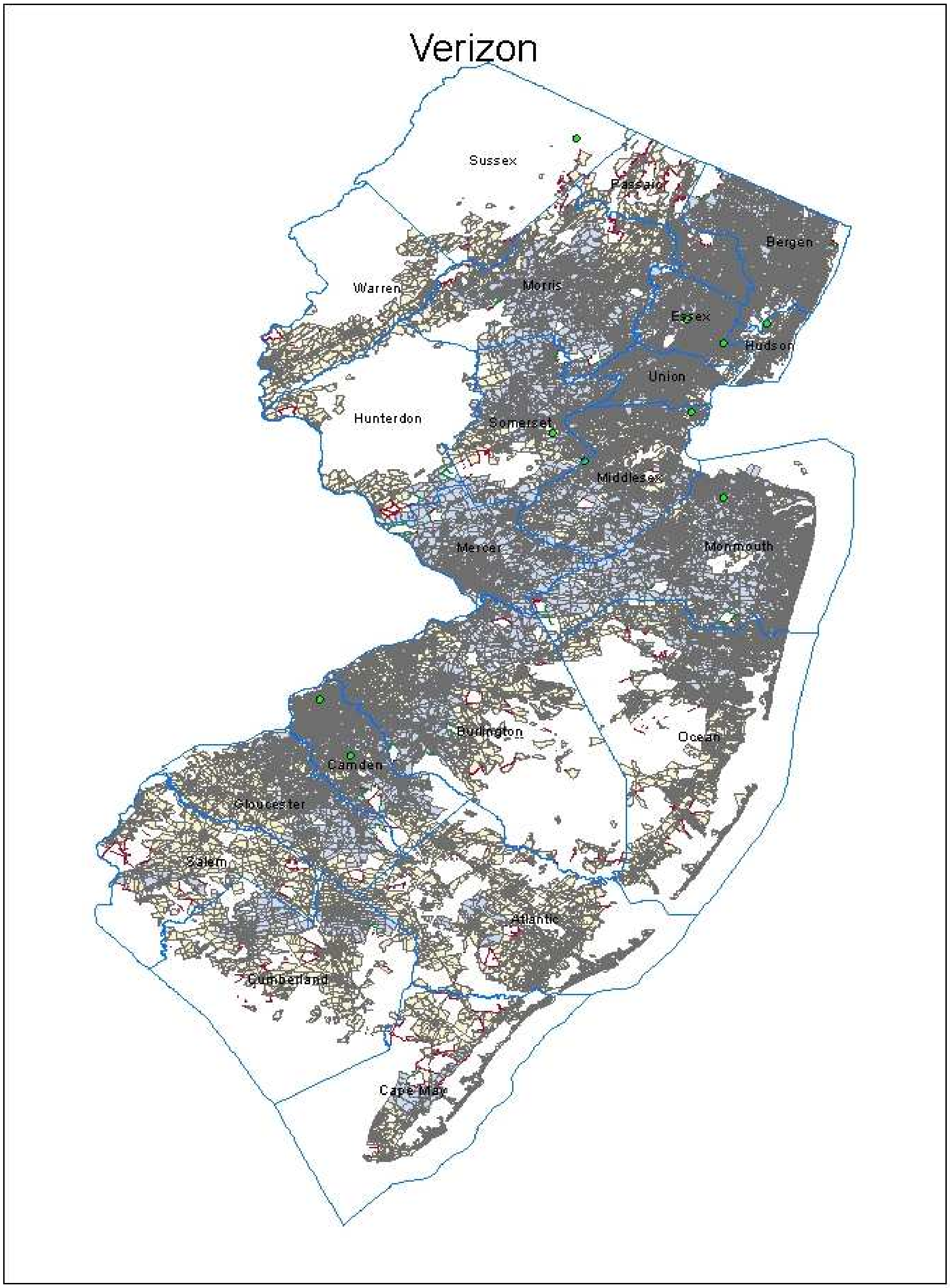

340297360021066 (0.00502
203769480
203769461
340297360021048 (0.669056)
203814756
203838887
203769459
203705155
340297360021057 (0.070871)
340297360021058 (5.593556)

Row 3:

Census	Block Square Miles	TLID	Street Name
340297201011066	7.354582338	203790565	Manchester Blvd



Section 8: Overview Map of Submitted Data



Provider: Netlogic DBA Voxitas

Submission date: October 2011

This report presents details on processing broadband data for delivery to the National Telecommunications and Information Administration (NTIA).

This is a stub report, since data from the previous submission was reused unchanged. The complete report from the previous submission begins on the next page. Notable differences from the processing done on the previous submission are listed next.

NTIA Table BB_Service_CensusBlock

1. Column " blocksubgroup" was dropped.
2. Column "endusercat" was added; set to null because data was not supplied.

Total rows loaded: 2

Notes

To create the “providerInput” table for this submission, we removed the 2000 census block column from the old providerInput table and performed a spatial join against the 2010 census block reference data table.

Provider Interactions

None.

Connecting New Jersey - Broadband Provider Data Report

Provider: Voxitas
Received: August 2010
Submission date: October 2010

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Section 1: NDA Status

Executed.

Section 2: Submission Overview

<table>
<tr><th colspan="4">AVAILABILITY DATA</th></tr>
<tr><td>ID</td><td colspan="2">Provider name
“Doing business as” name
FRN</td><td>Netlogic, Inc.
Voxitas
0006825954</td></tr>
<tr><th colspan="4">FOR WIRELINE</th></tr>
<tr><td>Filetypes</td><td colspan="3">Excel spreadsheet</td></tr>
<tr><td>File size</td><td colspan="3">9767 bytes, 4 data rows</td></tr>
<tr><td rowspan="7">Speeds</td><td>Type</td><td>Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)</td><td rowspan="7">Address rows with speed entries were provided, probably the speed promised to the customer. Not averaged over an area so not typical; no advertised speeds provided.</td></tr>
<tr><td>Typical-upstream</td><td>Not provided</td></tr>
<tr><td>Typical-downstream</td><td>Not provided</td></tr>
<tr><td>Advertised-upstream</td><td>Not provided</td></tr>
<tr><td>Advertised-downstream</td><td>Not provided</td></tr>
<tr><td>Subscriber-weighted-up</td><td>Not provided</td></tr>
<tr><td>Subscriber-weighted-down</td><td>Not provided</td></tr>
<tr><td>Technology Type</td><td colspan="3">Not provided; guess at copper – other (“DS1”)</td></tr>
<tr><td>End-user specification</td><td colspan="3">Not provided</td></tr>
<tr><td colspan="4">Comments:</td></tr>
<tr><th colspan="4">INTERCONNECTION DATA</th></tr>
</table>

ID	
File size	
Ownership	
Transport Type	
Data Rates/Capacity	
Location	
Comments: Not provided	

Section 3: Submission File Details

Received 1 file by secure upload.

Size	**Name**
9767	NJBroadband.xlsx

The file has 4 (four) rows of data. All have customer names and addresses. Three records describe DS1 service, one describes something else. Speeds listed are probably the provisioned speeds, not typical or advertised. No cover letter with DBA name, FRN, or other company data is present. No coded representations of data such as end user type, technology of transmission, etc. are provided.

Section 4: Validations and Results

No codes etc. were provided; the only possible validations are to check the addresses, and all four appear valid.

Section 5: Data Transformation and Loading

The standard NDA prohibits us from submitting address-level data to the NTIA. Instead, we discover the census block for each customer address, then report the census block shape drawn from Census Bureau TigerLine reference data.

NTIA Table BB_Service_CensusBlock

Loaded from supplied file "NJBroadband.xlsx" (4 rows). The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	Set to "Netlogic, Inc."

DBANAME	Set to "Voxitas"
RESELLER	Set to "N"
FRN	Set to "0006825954"
STATEFIPS	Set to "34" (NJ)
COUNTYFIPS	Populated from Census Block FIPS Code (first 3 digits)
TRACT	Populated from Census Block FIPS Code (next 6 digits)
BLOCKID	Populated from Census Block FIPS Code
BLOCKSUBGROUP	Set to null
FULLFIPSID	Populated from Census Block FIPS Code
TRANSTECH	Set to "30"
MAXADDOWN	As supplied in column Downstream
MAXADUP	As supplied in column Upstream
TYPICDOWN	Set to null, not provided
TYPICUP	Set to null, not provided
SHAPE	Copied from Census Bureau TigerLine 2000, as matched by spatial join on geocoded address

Internal processing notes:

1. Geocoded the addresses using the Google geocoder.
2. Created an excel sheet and imported to a geodatabase table.
3. Added point shapes corresponding to each Latitude,Longitude pair by creating a feature class from the table using ArcCatalog's "Create Feature Class from XY Table" option.
4. Added a column containing the ID of the containing year 2000 census block via a spatial join of the point shapes and the census block shapes from reference data.
5. Discarded NN rows with duplicate census blocks.

The mechanized procedure for the geocoding steps is described in file GeoExcel_proc.txt.

Section 6: Clarification Questions and Responses

1. Do you strictly resell access to line owned by other companies?
2. What is your DBA name?
3. What is your FRN?
4. Are all services provided on copper? We must submit details about "Technology of Transmission" per the NOFA.
5. You have submitted address data, but the NDA prohibits us from submitting address-level details to the NTIA. We will report in terms of census blocks, unless you choose to direct us to report address data.
6. The data look like provisioned speeds. Is this correct? We are expected to report maximum advertised up and down speeds in your service area, as well as typical up and down speeds. Please tell us how you wish the speeds that you submitted to be reported.

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Wednesday, August 25, 2010 1:47 PM
To: Kirk Deyer
Cc: 'NJ Broadband Data Collection'
Subject: NJBB Clarification Questions

Kirk,

We have been reviewing the data you submitted to the New Jersey Broadband mapping program. Based on our initial review, we have some questions for you that will help us better understand the data and process it accurately.

1. You provided data for a small set of addresses, raising two questions:

a. Do you own the access facilities that connect to those addresses? (If not, you would be classified as a "reseller" and would not have to report data at this time.)

b. If we are to report this data, is it acceptable to report it at address level?

From: Kirk Deyer [mailto:kdeyer@appiaservices.com]
Sent: Wednesday, August 25, 2010 1:57 PM
To: ConnectingNJ@research.telcordia.com
Subject: RE: NJBB Clarification Questions

We lease the lines that connect to those addresses. Reporting it at the address level is acceptable.

Kirk Deyer
Finance Manager
Appia Communications, Inc.
231-929-0970 x140
Fax: 231-946-8954
U.S. Eastern Time

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Wednesday, August 25, 2010 5:08 PM
To: Kirk Deyer
Cc: 'NJ Broadband Data Collection'
Subject: RE: NJBB Clarification Questions

Kirk,

Thanks for your quick response. One other clarification - what should we use for the "Provider Name" and "Doing Business As" names?

John

From: Kirk Deyer [mailto:kdeyer@appiaservices.com]
Sent: Wednesday, August 25, 2010 5:40 PM
To: ConnectingNJ@research.telcordia.com
Subject: RE: NJBB Clarification Questions

Netlogic, Inc. DBA Voxitas

Kirk Deyer
Finance Manager
Appia Communications, Inc.
231-929-0970 x140
Fax: 231-946-8954
U.S. Eastern Time
www.appiaservices.com<http://www.appiaservices.com>

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Friday, August 27, 2010 4:25 PM
To: Kirk Deyer
Subject: Additional NJBB Clarifications

Kirk,
Upon further review, we identified a few other questions that will help us understand and accurately report your data:

1. What is your FRN?
2. Are all services provided on copper? We must submit details about "Technology of Transmission" per the NOFA.
3. The data look like provisioned speeds. Is this correct? We are expected to report maximum advertised up and down speeds in your service area, as well as typical up and down speeds. Please tell us how you wish the speeds that you submitted to be reported.

We appreciate your continued support of this program!

John Wullert
Manager – NJ BB Data Collection

Telcordia Technologies
732-699-2687

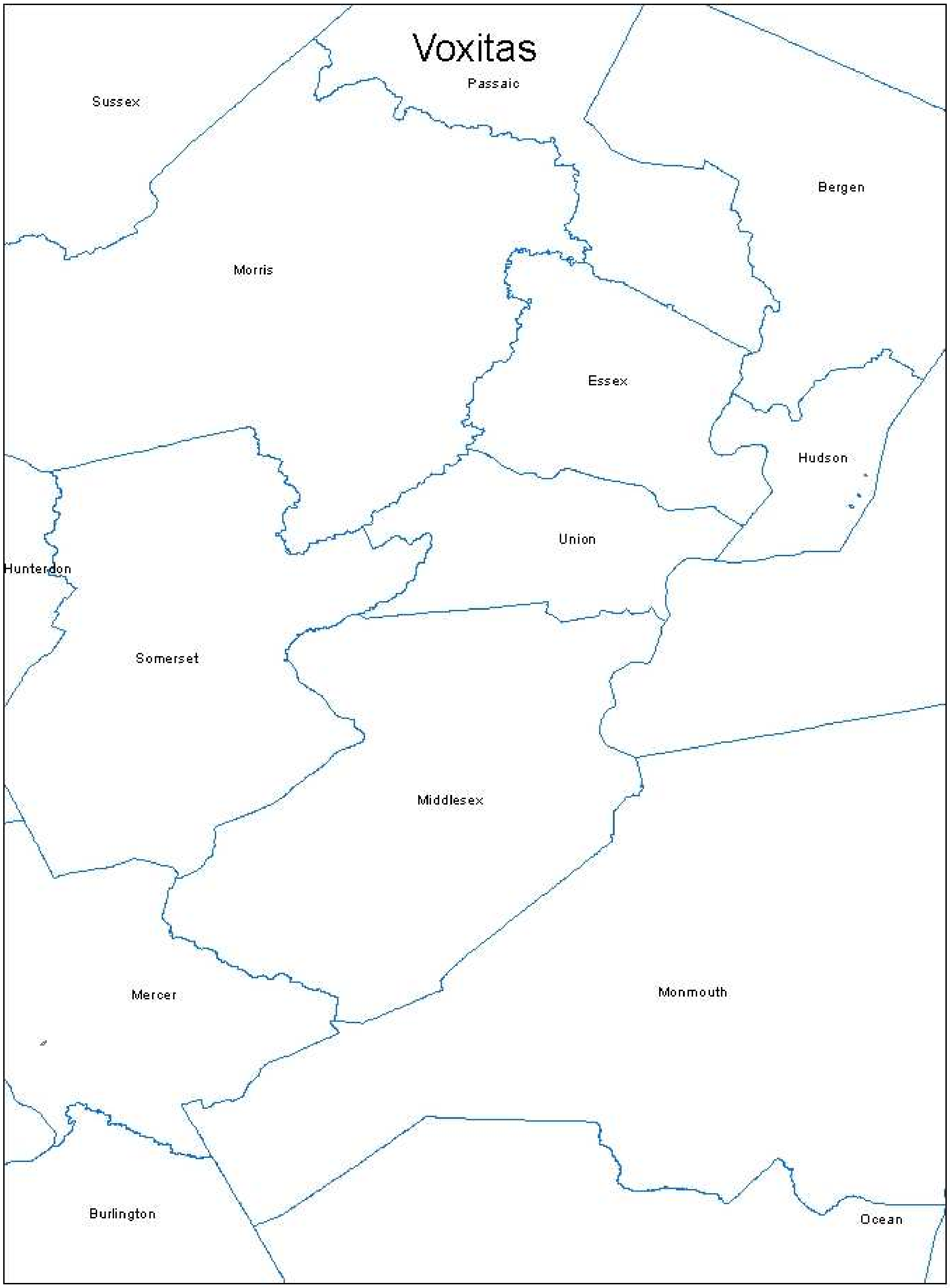
From: Kirk Deyer [mailto:kdeyer@appiaservices.com]
Sent: Wednesday, August 25, 2010 5:40 PM
To: ConnectingNJ@research.telcordia.com
Subject: RE: NJBB Clarification Questions

Our FRN is 0006825954. The services are provided on copper and they are provisioned speeds.

Kirk Deyer
Finance Manager
Appia Communications, Inc.
231-929-0970 x140
Fax: 231-946-8954
U.S. Eastern Time
www.appiaservices.com

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Provider: Wave2Wave

Submission date: October 2011

This report presents details on processing broadband data for delivery to the National Telecommunications and Information Administration (NTIA).

This is a stub report, since data from the previous submission was reused unchanged. The complete report from the previous submission begins on the next page. Notable differences from the processing done on the previous submission are listed next.

NTIA Table BB_Service_CensusBlock

1. Column " blocksubgroup" was dropped.
2. Column "endusercat" was added; set to null because data was not supplied.
3. Discarded 1 record for address that could not be geocoded in New Jersey (in Pennsylvania)
4. Discarded 55 records with duplicate census blocks (i.e., multiple addresses in the same census block)

Total rows loaded: 63

NTIA Table BB_Service_Wireless

1. No column changes
2. See discards above.

Total rows loaded: 105

Notes

To create the “providerInput” table for this submission, we removed the 2000 census block column from the old providerInput table and performed a spatial join against the 2010 census block reference data table.

Provider Interactions

Connecting New Jersey - Broadband Provider Data Report

Provider: Wave2Wave Communications, Inc.
Received: March 2011
Submission date: April 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Section 1: NDA Status

NDA executed with NJ OIT.

Section 2: Submission Overview

AVAILABILITY DATA		
ID	Provider name "Doing business as" name FRN	Wave2Wave Communications, Inc. Wave2Wave Communications 0015329394
FOR WIRELINE		
Filetypes	XLS	
File size	229 rows	
Speeds	Type / Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc): Typical-upstream: Address Typical-downstream: Address Advertised-upstream: Address Advertised-downstream: Address Subscriber-weighted-up: Not provided Subscriber-weighted-down: Not provided	
Technology Type	30 (other copper - probably Ethernet) and 70 (Terrestrial Fixed Wireless)	
End-user specification	Codes 3 and 4	
Comments:		
INTERCONNECTION DATA		

Type		Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)
Typical-upstream		Address
Typical-downstream		Address
Advertised-upstream		Address
Advertised-downstream		Address
Subscriber-weighted-up		Not provided
Subscriber-weighted-down		Not provided

ID	None provided
File size	
Ownership	
Transport Type	
Data Rates/Capacity	
Location	
Comments:	

Section 3: Submission File Details

Received 1 file by SECURE UPLOAD:

Size	**Name**
76800	NJBB_0015329394_AddressLevelAvailability_03.08.2011.xls

Section 4: Validations and Results

The submitted file has 229 rows with street addresses, tech transmission, max adv speeds, and typical speeds. The codes are reasonable, but the high variety in maximum advertised speeds is most likely an artifact, rather than a representation of the actual capabilities. Of the original rows, 223 could be geocoded successfully and 6 could not. The input address set yielded 163 unique census blocks.

Section 5: Data Transformation and Loading

NTIA Table BB_Service_CensusBlock

Loaded from supplied XLS file. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	As supplied in column "ProvName"
DBANAME	As supplied in column "DBAName"
PROVIDER_TYPE	Set to 1
FRN	As supplied in column "FRN"
STATEFIPS	Set to "34" (NJ)
COUNTYFIPS	Populated from Census Block FIPS Code (first 3 digits)
TRACT	Populated from Census Block FIPS Code (next 6 digits)

BLOCKID	Populated from Census Block FIPS Code
BLOCKSUBGROUP	Set to null
FULLFIPSID	Populated from Census Block FIPS Code
TRANSTECH	As supplied in column TransTech
MAXADDOWN	As supplied in column MaxAdvDown
MAXADUP	As supplied in column MaxAdvUp
TYPICDOWN	Set to null
TYPICUP	Set to null
SHAPE	Copied from Census Bureau 2000 reference data, as matched by spatial join on geocoded address

Internal processing notes:

1. Geocoded the addresses using the Google geocoder.
2. Created an excel sheet and imported to a geodatabase table.
3. Added point shapes corresponding to each Latitude,Longitude pair by creating a feature class from the table using ArcCatalog's "Create Feature Class from XY Table" option.
4. Added a column containing the ID of the containing year 2000 census via a spatial join of the point shapes and the census block shapes from reference data.
5. Copied the Census Block shape from reference data.
6. Discarded 60 rows with duplicate census blocks, leaving 63 for technology 30.

NTIA Table BB_Service_Wireless

Loaded using census block shapes from reference data for the records with transmission technology 70. The following table explains the transformations that were applied.

Table Column	**Data Source / Transformation**
PROVNAME	As supplied in column "ProvName"
DBANAME	As supplied in column "DBAName"
FRN	As supplied in column "FRN"
TRANSTECH	As supplied
SPECTRUM	Set to 6, Unlicensed
MAXADDOWN	Set to 10, the largest value submitted for this tech
MAXADUP	Set to 10, the largest value submitted for this tech
TYPICDOWN	Set to null
TYPICUP	Set to null
STATEABBR	Set to "NJ"
SHAPE	Year 2000 Census Block shape obtained from reference data.

Internal processing notes:

1. See above for discussion of geocoding addresses and finding the containing census block.
2. Spectrum: Imputed the code for unlicensed spectrum.

Section 6: Clarification Questions and Responses

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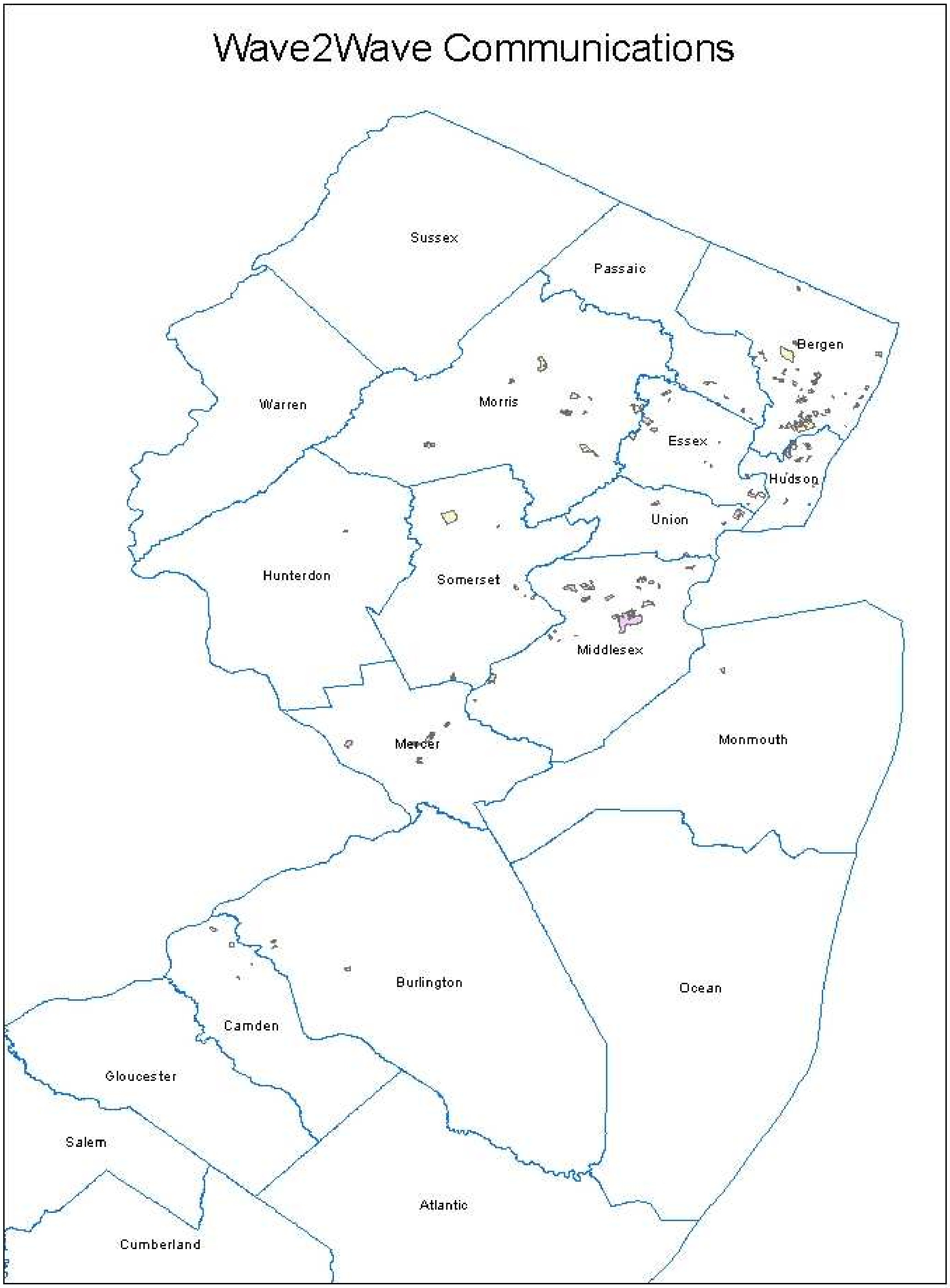
Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Provider: Wildblue

Submission date: October 2011

This report presents details on processing broadband data for delivery to the National Telecommunications and Information Administration (NTIA).

This is a stub report, since data from the previous submission was reused unchanged. The complete report from the previous submission begins on the next page. Notable differences from the processing done on the previous submission are listed next.

NTIA Table BB_Service_Wireless

Total rows loaded: 21 (each county in New Jersey)

Provider Interactions

From: Stauthamer, Roz [mailto:Roz.Stauthamer@viasat.com]
Sent: Wednesday, July 20, 2011 12:45 PM
To: connectingNJ@research.telcordia.com
Subject: RE: NJ Broadband Data Collection

Dear Shelley Bates and Map Team:

In response to the request for an updated submission, WildBlue Communications, Inc. notifies you as follows:

There are no changes to the submission WildBlue previously provided to your office. WildBlue has not had any changes in service coverage area or service offerings, nor have there been any administrative changes.

Best wishes,

Roz

From: connectingNJ@research.telcordia.com
Sent: Monday, July 25, 2011 1:22 PM
To: Stauthamer, Roz [mailto:Roz.Stauthamer@viasat.com]
Subject: RE: NJ Broadband Data Collection

Roz,
Thanks for the response. We will use the data you submitted previously for the upcoming delivery to NTIA. Note that we will be applying some additional validation tests to the data this round. We will get back to you if we run into any issues with the data.

Thanks,

Connecting New Jersey - Broadband Provider Data Report

Provider: WildBlue Communications Inc.
Received: March 2011
Submission date: April 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Section 1: NDA Status

NONE

Section 2: Submission Overview

AVAILABILITY DATA				
ID	Provider name "Doing business as" name FRN		WildBlue Communications, Inc. WildBlue 0007843766	
FOR WIRELESS				
Filetypes	text file, shape file			
File size				
Speeds	Type		Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)	Submitted shape file describing the entire state of NJ with attributes for
	Typical-upstream		Not provided ('0')	
	Typical-downstream		Not provided ('0')	
	Advertised-upstream		yes. Entire state.	
	Advertised-downstream		yes. Entire state	
	Subscriber-weighted-up		Not provided?	
	Subscriber-weighted-down		By county	
Technology Type	Code 60 (Satellite)			
End-user specification	Voice message indicated that the referenced plans are consumer-focused.			
Comments: From the provider's input package: "The subscriber-weighted nominal speed information has been calculated using only the service tiers that meet the NTIA definition of broadband speed, and is based on subscriber data for active				

subscribers as of March 17, 2011	
INTERCONNECTION DATA: NONE	
ID	
File size	
Ownership	
Transport Type	
Data Rates/Capacity	
Location	
Comments: Not provided	

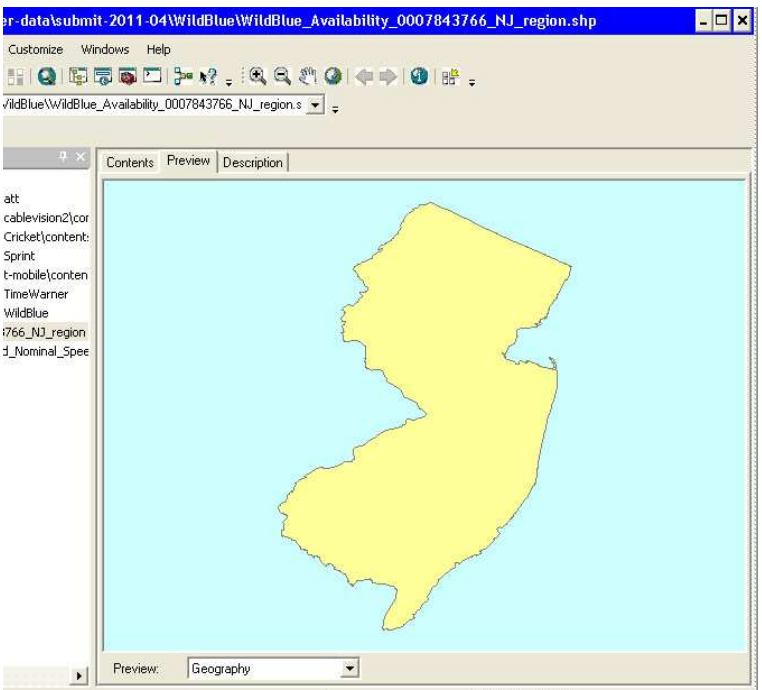


Figure 1. The shape submitted by the provider (the entire state of NJ)

Section 3: Submission File Details

Size (kb)	**Name**
2	WildBlue_Subscriber_Weighted_Nominal_speed_By_County_NJ.txt
1	WildBlue_Availability_0007843766_NJ_region.shx
1	WildBlue_Availability_0007843766_NJ_region.dbf
1	WildBlue_Availability_0007843766_NJ_region.prj
19	WildBlue_Availability_0007843766_NJ_region.shp

Section 4: Validations and Results

WildBlue notes that of the possible ‘Spectrum Used’ options provided, none listed Ka-Band as an option for Satellite Providers. WildBlue uses Ka-Band spectrum (uplink in the 29.5 – 30 gigahertz band and downlink in the 19.7 – 20.2 gigahertz band). WildBlue has not provided Typical Upstream Speed and Typical Downstream Speed values. WildBlue does not track speeds on a state-by-state basis, but instead primarily monitors overall network speeds. WildBlue has begun the process of recording more granular data relating to the speeds normally experienced by subscribers on a spot-beam basis. WildBlue believes that it will be able to provide this data in the coming months.

The map and supporting data are for one singular service area polygon that equals the entire State of New Jersey. The WildBlue service data values provided do not vary across any county or region within the state; therefore, there is only one service area polygon, namely the entire State of New Jersey

Section 5: Data Transformation and Loading

NTIA Table BB_Service_Wireless

We did not load the shapefile as submitted. Instead we loaded county shapes from reference data for counties in the State of New Jersey based on emailed statements that all counties are covered. The following table explains the transformations that were applied.

Table Column	**Data Source / Transformation**
PROVNAME	Set to "WildBlue Communications, Inc."
DBANAME	Set to "WildBlue"
FRN	Set to 0007843766
TRANSTECH	Set to 60
SPECTRUM	Set to 7 per translation shown below
MAXADDOWN	Set to 4, see below.
MAXADUP	Set to 2, see below.
TYPICDOWN	Not provided, set to null
TYPICUP	Not provided, set to null
STATEABBR	Set to “NJ”
SHAPE	County shape read from reference data.

Internal notes on processing:

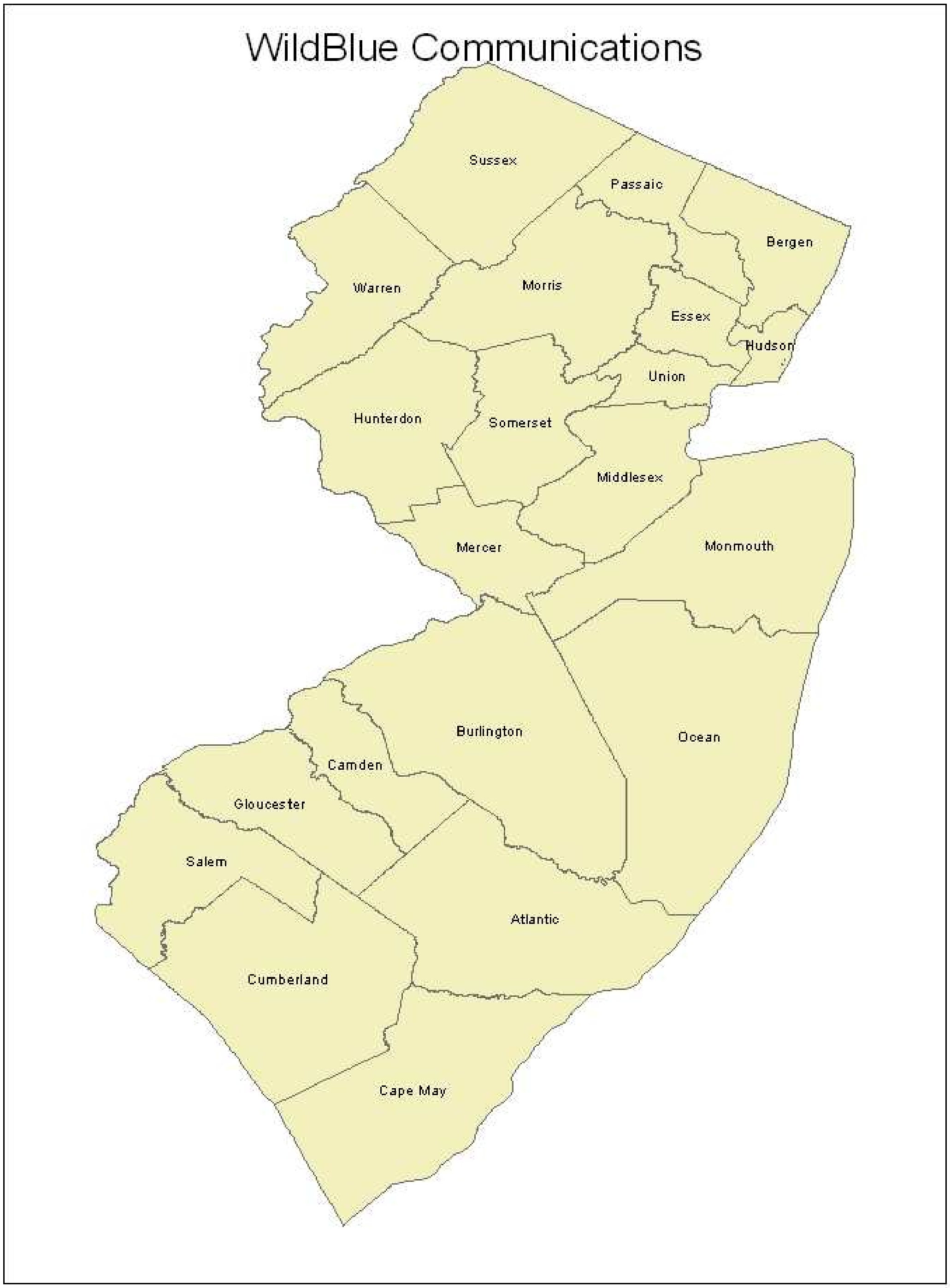
1. Spectrum: No statement was provided. The NTIA data model has a single column for spectrum. Satellite corresponds to NTIA “SPECTRUM USED” code value 7.
2. Speeds: The maximum advertised speeds provided in the emailed brochure are as discussed above For max adv speeds we encoded the submitted down speed as value 4 (range 1.5-3 Mbps) and encoded the submitted up speed as value 2 (range 200 Kbps -- 768 Kbps).

3. Did not use the supplied shapefile because it was faster to copy over reference data that's already in the right XY coordinate system and tolerance value.

Section 6: Clarification Questions and Responses

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Provider: Xchange Telecom

Submission date: October 2011

This report presents details on processing broadband data for delivery to the National Telecommunications and Information Administration (NTIA).

This is a stub report, since data from the previous submission was reused unchanged. The complete report from the previous submission begins on the next page. Notable differences from the processing done on the previous submission are listed next.

NTIA Table BB_Service_CensusBlock

1. Column " blocksubgroup" was dropped.
2. Column "endusercat" was added; set to null because data was not supplied.

Total rows loaded: 1,012

Notes

No large census blocks were found in Lakewood, so no street-segment records were loaded.

Provider Interactions

The Service providers told us to use the April 2011 data.

Last time, they told us they cover the entire city of lakewood. We sent email back to him to confirm that is still the case.

From: Duvid Rottenberg [drottenberg@xchangetele.com]
Sent: Wednesday, August 10, 2011 2:54 PM
To: ConnectingNJ@research.telcordia.com; shelley.bates@oit.state.nj.us
Cc: 'Mordy Gross'; DBECK@xchangetele.com
Subject: RE: Reminder - NJ Broadband Data Collection

Hi,

I don't have this data available on the census tract level, however we provide broadband service for all customers served by the LKWDNJLKDS5 switch. Our advertised broadband speed for this area is 2 Mbps Up and 10 Mbps down. We service both business & residential.

Back in March, you were able to use this info to get the census tracts, please let me know if this OK for now too.

Thank You,
Duvid Rottenberg
Xchange Telecom, Corp.
drottenberg@xchangetele.com
(646) 722-7258

Connecting New Jersey - Broadband Provider Data Report

Provider: Xchange Telecom
Received: March 2011
Submission date: April 2011

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Section 1: NDA Status

None

Section 2: Submission Overview

<table>
<tr><th colspan="5">AVAILABILITY DATA</th></tr>
<tr><td rowspan="3">ID</td><td colspan="2">Provider name</td><td colspan="2">Xchange Telecom Corp</td></tr>
<tr><td colspan="2">“Doing business as” name</td><td colspan="2">Xchange Telecom</td></tr>
<tr><td colspan="2">FRN</td><td colspan="2">0006831713</td></tr>
<tr><th colspan="5">FOR WIRELINE</th></tr>
<tr><td>Filetypes</td><td colspan="4"></td></tr>
<tr><td>File size</td><td colspan="4"></td></tr>
<tr><td rowspan="6">Speeds</td><td>Type</td><td></td><td>Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)</td><td rowspan="6">Information provided via email exchange (see below).

Provider originally indicated that their coverage was limited to the area supported by a single central office. In further exchanges, the provider indicated that their coverage is limited to city of Lakewood and that they cover the entire city limits.</td></tr>
<tr><td>Typical-upstream</td><td></td><td></td></tr>
<tr><td>Typical-downstream</td><td></td><td></td></tr>
<tr><td>Advertised-upstream</td><td></td><td>2 Mbps (code 4)</td></tr>
<tr><td>Advertised-downstream</td><td></td><td>10 Mbps (code 7)</td></tr>
<tr><td>Subscriber-weighted-nominal speed</td><td></td><td></td></tr>
<tr><td>Technology Type</td><td colspan="4">ADSL (code 10)</td></tr>
<tr><td>End-user specification</td><td colspan="4">In response to inquiry, provider reported residential and small business.</td></tr>
<tr><td colspan="5">Comments:</td></tr>
<tr><th colspan="5">INTERCONNECTION DATA</th></tr>
<tr><td>ID</td><td colspan="4"></td></tr>
<tr><td>File size</td><td colspan="4"></td></tr>
</table>

Ownership	
Transport Type	
Data Rates/Capacity	
Location	
Comments:	

Section 3: Submission File Details

Received no file submission, only statements by email.

Section 4: Validations and Results

No data was submitted, so no additional validation was required.

Section 5: Data Transformation and Loading

NTIA Table BB_Service_CensusBlock

Loaded based on the emailed statement of service to all of Lakewood Township, Ocean county, New Jersey. We submitted all census blocks less than 2 square miles in this municipality. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	Set to “Xchange Telecom Corp” per email response
DBANAME	Set to “Xchange Telecom”
PROVIDER_TYPE	Set to 1
FRN	Set to “0006831713” per email response
STATEFIPS	Set to “34” (NJ)
COUNTYFIPS	Populated from Census Block FIPS Code (first 3 digits)
TRACT	Populated from Census Block FIPS Code (next 6 digits)
BLOCKID	Populated from Census Block FIPS Code
BLOCKSUBGROUP	Set to null
FULLFIPSID	Populated from Census Block FIPS Code
TRANSTECH	Set to 10 (ADSL) per email
MAXADDOWN	Set to code 7 per email
MAXADUP	Set to code 4 per email
TYPICDOWN	Set to null, not provided
TYPICUP	Set to null, not provided
SHAPE	Copied from Census Bureau TigerLine 2010

Internal processing notes:

1. Created a file with a municipality name that matches exactly the “name” column in the Year 2010 Census Bureau TigerLine database.
2. Joined against reference data to discover census blocks, for a total of 681 blocks.
3. All of the census blocks discovered for Lakewood Township are smaller than 2 square miles, so no road segments were loaded.

Section 6: Clarification Questions and Responses

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Wednesday, March 09, 2011 8:34 AM
To: 'Duvid Rottenberg'; 'ConnectingNJ@research.telcordia.com'
Cc: 'Shelley Bates'
Subject: RE:

Duvid,

We can work with that information as far as geography and mapping into Census blocks. What we would need then is information on your speeds and middle-mile interconnection points. In terms of speeds, we are requesting the maximum upstream and downstream speeds you advertise in Lakewood, and the typical upstream and speeds experienced by your customers. For middle-mile interconnection points, we are requesting the address, and the technology and bandwidth you have available and whether you own or lease the trunks.

There is also a small amount of general information we need. Specifically, we need you official company name, and other names you do business as and your FCC FRN number.

Thanks for your participation in the program!

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: Duvid Rottenberg [mailto:drottenberg@xchangetele.com]
Sent: Tuesday, March 08, 2011 3:36 PM
To: ConnectingNJ@research.telcordia.com
Cc: 'Shelley Bates'
Subject: RE:

John,
We are a UNE-L company, we lease the loop from Verizon and provide broadband for the end user on the leased circuits. I believe we do cover the whole city of Lakewood.

Duvid Rottenberg
Xchange Telecom, Corp.
drottenberg@xchangetele.com
(646) 722-7258

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Tuesday, March 08, 2011 3:21 PM
To: drottenberg@xchangetele.com
Cc: ConnectingNJ@research.telcordia.com; 'Shelley Bates'
Subject:

Duvid,
I received the note that you sent to Shelley Bates regarding the questions you have about submitting your broadband availability data. Rather than attempting to answer your question, let me first ask another question that will help determine if you are required to report data at this time. We are currently only collecting data from "facilities-based" providers. NTIA definition is:

An entity is a ''facilities-based'' provider of broadband service connections to end user locations if any of the following conditions are met: (1) It owns the portion of the physical facility that terminates at the end user location; (2) it obtains unbundled network elements (UNEs), special access lines, or other leased facilities that terminate at the end user location and provisions/equips them as broadband; or (3) it provisions/equips a broadband wireless channel to the end user location over licensed or unlicensed.

If you fit the definition, then we would be looking to collect data from you. In that case, we need to come up with a method of determining your coverage area. We do not have a clean way of mapping from COs to census blocks. We do have a couple options:

1. If you could estimate your coverage area in terms of governmental boundaries, we could map that into census blocks. For example, if you know that you cover the entire town/city of Lakewood, we could handle the rest.
2. If you were to send us a list of addresses, we could geo-code those locations. This is less desirable, as where you have customers does not fully represent the locations where you could offer service, but we have done it in some cases.

Let me know how I can help you in determining an approach.

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: Duvid Rottenberg [mailto:drottenberg@xchangetele.com]
Sent: Tuesday, March 08, 2011 11:41 AM
To: Bates, Shelley
Cc: Michael Robinson
Subject: Xchange Telecom Broadband Service

Hi Shelley,

I am working on providing the data you requested from Michael. Our broadband service is currently available for all customers served by the LKWDNJLKDS5 CO, I'm not sure how to map that into census tracts. I have tried setting up an account at http://connectingnj.state.nj.us but I got an error stating that Xchange Telecom is not a recognized provider.

Thank You,

Duvid Rottenberg
Xchange Telecom, Corp.
drottenberg@xchangetele.com
(646) 722-7258

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Tuesday, March 08, 2011 3:21 PM
To: drottenberg@xchangetele.com
Cc: ConnectingNJ@research.telcordia.com; 'Shelley Bates'
Subject:

Duvid,
I received the note that you sent to Shelley Bates regarding the questions you have about submitting your broadband availability data. Rather than attempting to answer your question, let me first ask another question that will help determine if you are required to report data at this time. We are currently only collecting data from "facilities-based" providers. NTIA definition is:

An entity is a ''facilities-based'' provider of broadband service connections to end user locations if any of the following conditions are met: (1) It owns the portion of the physical facility that terminates at the end user location; (2) it obtains unbundled network elements (UNEs), special access lines, or other leased facilities that terminate at the end user location and provisions/equips them as broadband; or (3) it provisions/equips a broadband wireless channel to the end user location over licensed or unlicensed.

If you fit the definition, then we would be looking to collect data from you. In that case, we need to come up with a method of determining your coverage area. We do not have a clean way of mapping from COs to census blocks. We do have a couple options:

1. If you could estimate your coverage area in terms of governmental boundaries, we could map that into census blocks. For example, if you know that you cover the entire town/city of Lakewood, we could handle the rest.
2. If you were to send us a list of addresses, we could geo-code those locations. This is less desirable, as where you have customers does not fully represent the locations where you could offer service, but we have done it in some cases.

Let me know how I can help you in determining an approach.

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: Duvid Rottenberg [mailto:drottenberg@xchangetele.com]
Sent: Tuesday, March 08, 2011 3:36 PM
To: ConnectingNJ@research.telcordia.com
Cc: 'Shelley Bates'
Subject: RE:

John,
We are a UNE-L company, we lease the loop from Verizon and provide broadband for the end user on the leased circuits. I believe we do cover the whole city of Lakewood.

Duvid Rottenberg

Xchange Telecom, Corp.
drottenberg@xchangetele.com
(646) 722-7258

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Wednesday, March 09, 2011 8:34 AM
To: 'Duvid Rottenberg'; 'ConnectingNJ@research.telcordia.com'
Cc: 'Shelley Bates'
Subject: RE:

Duvid,
We can work with that information as far as geography and mapping into Census blocks. What we would need then is information on your speeds and middle-mile interconnection points. In terms of speeds, we are requesting the maximum upstream and downstream speeds you advertise in Lakewood, and the typical upstream and speeds experienced by your customers. For middle-mile interconnection points, we are requesting the address, and the technology and bandwidth you have available and whether you own or lease the trunks.

There is also a small amount of general information we need. Specifically, we need you official company name, and other names you do business as and your FCC FRN number.

Thanks for your participation in the program!

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Monday, March 14, 2011 4:16 PM
To: 'NJ Broadband Data Collection'; 'Duvid Rottenberg'
Cc: 'Shelley Bates'
Subject: RE:

Duvid,
I am sending this again to request data from you on the types of service you advertise. I attempted to gain this information from your Web site, but was unable to get any information on the plans you offer. Could please send me information on the maximum upstream and downstream speeds you advertise in Lakewood? If you have information on the typical upstream and speeds experienced by your customers, that would be useful as well.
Please feel free to call me if you have any questions.

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: Duvid Rottenberg [mailto:drottenberg@xchangetele.com]
Sent: Monday, March 14, 2011 4:31 PM
To: ConnectingNJ@research.telcordia.com

Cc: 'Shelley Bates'
Subject: RE:

2 Mbps Upstream and 10 Mbps downstream.

Duvid Rottenberg

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Monday, March 14, 2011 4:46 PM
To: 'Duvid Rottenberg'; 'ConnectingNJ@research.telcordia.com'
Cc: 'Shelley Bates'
Subject: RE:

Thanks for this.

One other question – do you serve both residential and business customers?

John

From: Duvid Rottenberg [mailto:drottenberg@xchangetele.com]
Sent: Monday, March 14, 2011 4:57 PM
To: ConnectingNJ@research.telcordia.com
Cc: 'Shelley Bates'
Subject: RE:

Yes we do.

Duvid Rottenberg

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Friday, March 18, 2011 10:41 AM
To: 'Duvid Rottenberg'
Cc: 'NJ Broadband Data Collection'
Subject: Xchange NJ BB Clarification

Duvid,
We need to report data using Provider Name, Doing-Business-As Name and FCC Registration number. The information we retrieved from the FCC is:

Provider Name: XCHANGE TELECOM CORP.
FRN: 0006831713

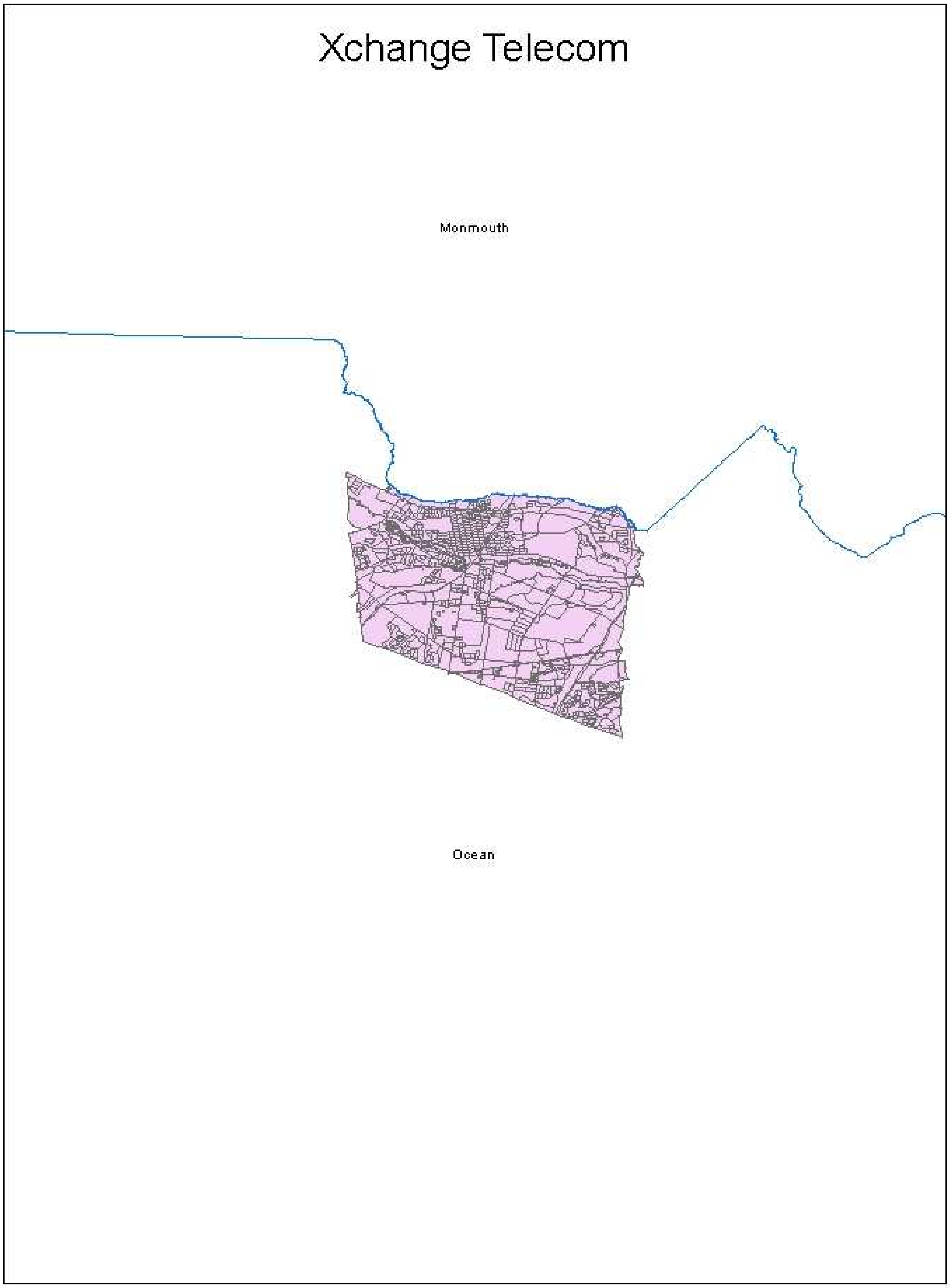
Are these correct? Also, do you have another "doing-business-as" name?

Thanks,

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



Provider: XO Communications

Submission date: October 2011

This report presents details on processing broadband data for delivery to the National Telecommunications and Information Administration (NTIA).

This is a stub report, since data from the previous submission was reused unchanged. The complete report from the previous submission begins on the next page. Notable differences from the processing done on the previous submission are listed next.

A specific challenge in this case is mapping from the Year 2000 census block geometry used in the April 2011 submission to the Year 2010 census block IDs required for October 2011.

NTIA Table BB_Service_CensusBlock

1. Column " blocksubgroup" was dropped.
2. Column "endusercat" was added; set to null because data was not supplied.

Notes

1. Discarded 28 records with missing or slow maximum download speed codes.
2. Used Census Bureau reference data to build a list of Year 2010 census blocks for each submitted Year 2000 census block. The 419 valid Year 2000 blocks resulted in 879 unique Year 2010 blocks.
3. Total rows loaded: 879

Provider Interactions

July 7, 2011: Sharon Adams instructed us to use previous data.

Connecting New Jersey - Broadband Provider Data Report

Provider: XO Communications
Submission date: April 2011

This report presents details on processing broadband data for delivery to the National Telecommunications and Information Administration (NTIA).

This is a stub report, since data from the previous submission was reused unchanged. The complete report from the previous submission begins on the next page. Notable differences from the processing done on the previous submission are listed next.

NTIA Table BB_Service_CensusBlock

1. Column "reseller" was dropped.
2. Set the new column "provider_type" to value 1 ("Broadband provider as described in the NOFA")
3. Set the max advertised speed code values (down and up) to 9, which is the maximum value among all records provided to us.
4. Dropped non-measured typical up/down speed code values.

Provider Interactions

From: Adams, Sharon E [mailto:Sharon.E.Adams@xo.com]
Sent: Tuesday, March 01, 2011 4:11 PM
To: ConnectingNJ@research.telcordia.com
Subject: RE: NJ BB Data Collection - Spring 2011

Hi John,

I don't have any new data to report.

Thanks,
Sharon Adams

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Tuesday, March 01, 2011 4:23 PM
To: Adams, Sharon E
Cc: ConnectingNJ@research.telcordia.com
Subject: RE: NJ BB Data Collection - Spring 2011

Sharon,
Are you saying that we can use the data you submitted last time (that it reflects your network capabilities as of 12/31/2011)?

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies

732-699-2687

From: Adams, Sharon E [mailto:Sharon.E.Adams@xo.com]
Sent: Tuesday, March 01, 2011 4:41 PM
To: ConnectingNJ@research.telcordia.com
Subject: RE: NJ BB Data Collection - Spring 2011

Yes, the previous data can be used again.

Thanks,
Sharon Adams

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Friday, March 18, 2011 9:34 AM
To: 'Adams, Sharon E'
Cc: 'NJ Broadband Data Collection'
Subject: XO NJBB Data Clarification

Sharon,
We have performed our initial review of your data and have a clarification question:

> We see several locations where your download speeds are a tier 2, which the NTIA does not consider broadband. This appears that it might be the provisioned speed sold to the customer. Is there a higher, advertised speed that you could provision to these locations if the customer asked? One option would be for us to use the highest speed you deliver in a larger area as the maximum advertised speed. Would that accurately represent your ability to deliver service?

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: Adams, Sharon E [mailto:Sharon.E.Adams@xo.com]
Sent: Thursday, July 07, 2011 9:56 AM
To: ConnectingNJ@research.telcordia.com
Subject: NJ Broadband Data Collection

Good morning,

Neither XO Communications Services, Inc. nor Nextlink Wireless, Inc. have any updates to previously submitted data. Please advise what steps need to be taken in order to ensure these companies compliance.

Kind regards,
Sharon Adams

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Thursday, July 07, 2011 11:13 AM
To: 'Adams, Sharon E'
Cc: 'connectingNJ@research.telcordia.com'

Subject: RE: NJ Broadband Data Collection

Sharon,
Thanks for the quick response. Your email message is sufficient notification for us to proceed using the data you have already submitted.

Note that we will be applying additional validation and verification procedures during this round and will get back to you if any issues arise with the data you supplied.

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

Connecting New Jersey - Broadband Provider Data Report

Provider: XO Communications
Received: August, 2010
Submission date: October 2010

This report presents details on processing of the broadband data for delivery to the National Telecommunications and Information Administration.

Section 1: NDA Status

Executed.

Section 2: Submission Overview

AVAILABILITY DATA		
ID	Provider name "Doing business as" name FRN	XO Communications, LLC Provided, but looks weird 0006275945
FOR WIRELINE		
Filetypes		
File size		
Speeds	see table below	
Technology Type	Entered codes 1, 2, and 3, which are not valid NOFA TechTrans codes.	
End-user specification	Business (444 entries), Residence (5 entries)	
Comments:		
INTERCONNECTION DATA		

Type		Spatial Resolution (address, street seg, census block, RSA/MSA, zipcode,etc)
Typical-upstream		census block
Typical-downstream		census block
Advertised-upstream		census block
Advertised-downstream		census block
Subscriber-weighted-up		Not provided
Subscriber-weighted-down		Not provided

ID	
File size	
Ownership	
Transport Type	
Data Rates/Capacity	
Location	
Comments: Not provided	

Section 3: Submission File Details

Received 1 file by SECURE UPLOAD.

Size	**Name**
41358	NJBroadbandData63009.xlsx

Section 4: Validations and Results

The spreadsheet provides census block IDs and associated max adv and typical speeds. The last two rows of the sheet are different from the 447 data rows proceeding them, and one of those last two is in New York. The DBA name looks unusual and the technology of transmission codes are not valid. After receiving clarification by email we created a corrected spreadsheet based on the original submission as follows:

1. Dropped the last two rows that have addresses instead of provider name, DBA name, etc.
2. Changed DBA Name entries to "XOCSI"
3. Changed technology of transmission codes: 1 to 10, 2 to 20, and 3 to 30.

Section 5: Data Transformation and Loading

NTIA Table BB_Service_CensusBlock

Loaded from the supplied spreadsheet. The following table explains the transformations that were applied to load the target table.

Table Column	Data Source / Transformation
PROVNAME	As supplied in column "Provider Name"
DBANAME	As supplied in column "DBA Name"
RESELLER	Set to "N"
FRN	As supplied in column "FRN", after adding leading zeros

STATEFIPS	Set to “34” (NJ)
COUNTYFIPS	Populated from column census_block (1st 3 digits)
TRACT	Populated from column census_block (next 6 digits)
BLOCKID	Populated from column census_block (last 4 digits)
BLOCKSUBGROUP	Set to null
FULLFIPSID	As supplied in column census_block
TRANSTECH	As supplied in column Tech Code
MAXADDOWN	As supplied in column MaxDownload
MAXADUP	As supplied in column MaxUpload
TYPICDOWN	As supplied in column TypDownload
TYPICUP	As supplied in column TypUpload
SHAPE	Copied from Census Bureau TigerLine 2010, As matched by Census block ID

Internal processing notes:

1. No duplicate census blocks were found.

Section 6: Clarification Questions and Responses

From: NJ Broadband Data Collection [mailto:ConnectingNJ@research.telcordia.com]
Sent: Tuesday, September 13, 2011 4:07 PM
To: 'Adams, Sharon E'
Cc: ConnectingNJ@research.telcordia.com
Subject: RE: NJ Broadband Data Collection

Sharon,

We realized that we have a potential issue with processing the data you submitted previously. The NTIA has transitioned from using the 2000 census block geometry to the 2010 census block geometry. While it is possible for us to translate your prior data, there is a high risk of overstating or understating your actual coverage area due to the many-to-many mappings between the two sets of census blocks.

Is it possible for you to provide your data using the 2010 geometry?

John Wullert
Manager – NJ BB Data Collection
Telcordia Technologies
732-699-2687

From: Adams, Sharon E [mailto:Sharon.E.Adams@xo.com]
Sent: Tuesday, September 13, 2011 4:10 PM
To: ConnectingNJ@research.telcordia.com
Subject: RE: NJ Broadband Data Collection

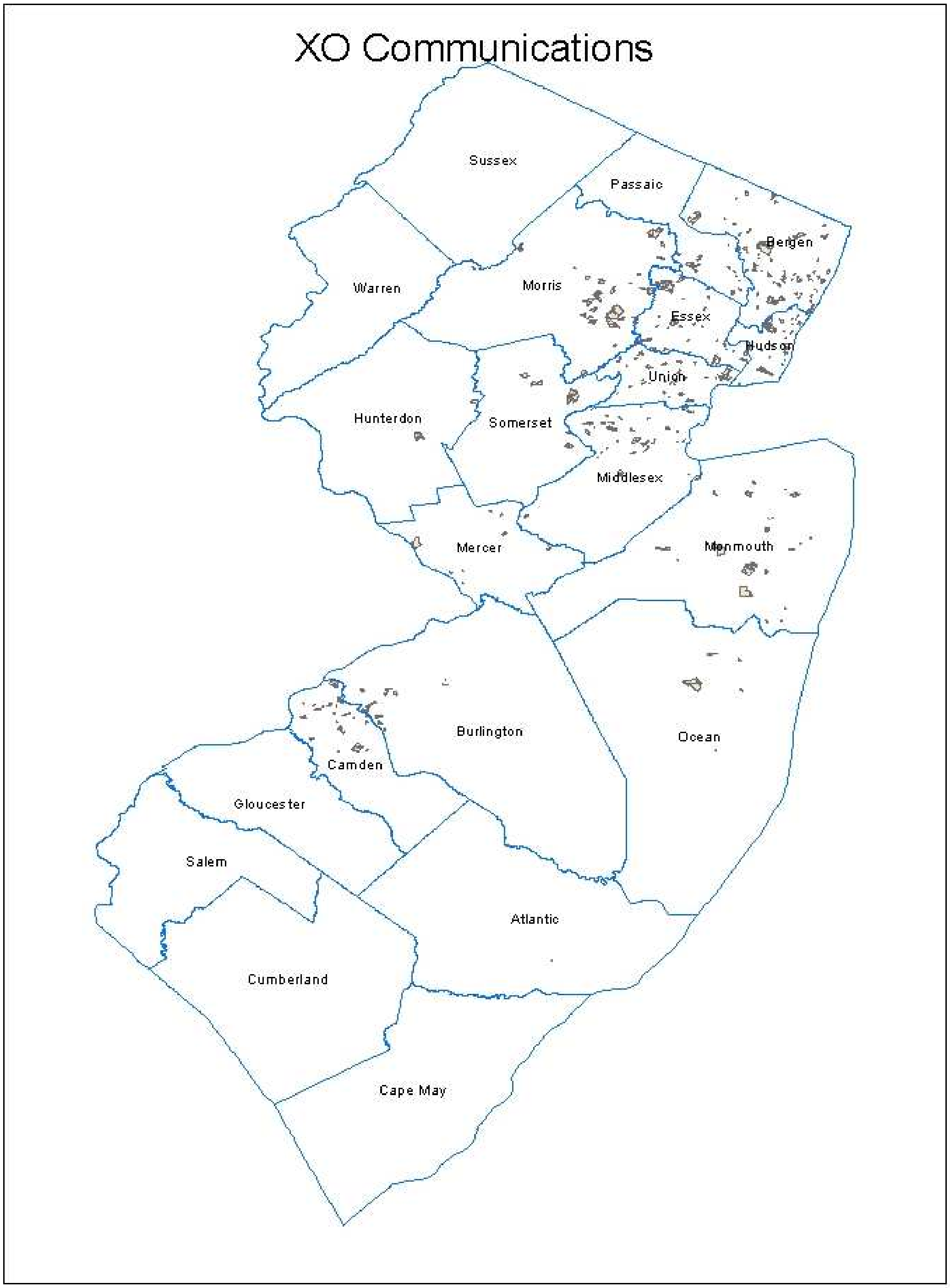
Hi John,

It’s fine to restate our data with the new census block geometry. I do not have the new 2010 geometry to restate the data.

Thanks,
Sharon Adams

Section 7: Notes and Open Issues

Section 8: Overview Map of Submitted Data



New Jersey Broadband Mapping Project:

Community Anchor Institution Processing

September 30, 2011

Grantee:

New Jersey Office of Information Technology

200/300 Riverview Plaza

PO Box 212

Trenton, NJ 08625

Contact:

Shelley Bates

shelley.bates@oit.state.nj.us

609-633-9605

Contractor:

Telcordia Technologies, Inc.

1 Telcordia Drive

Piscataway, NJ 08854

Contact:

John R. Wullert, II

jwullert@telcordia.com

732-699-2687

Table of Contents

Summary

For each category of community anchor institution, we generally obtained data from two sources. One source was a reference source that provided a list of institutions with name, address and ID number where applicable. This reference source was expected to be nearly complete, representing all the institutions of the specified type in the state. The other source provided the broadband information. In most cases, the broadband information was supplied by the institutions via our Web site.

There were exceptions, however, to these guidelines. In the case of Higher Education, we obtained the broadband access information from NJEdge, an organization that collects data via its own survey. In the case of State Government, we obtained a list of broadband circuits provided to the state by Verizon; there was no reference list for comparison. We similarly had no reference list for local government and non-governmental organizations; we used only data from collected via our Web site for these classes of institution.

For each CAI category, t he following table provides the number of records we obtained from the reference source, the number of broadband access records we obtained, the total number of records we submitted to the NTIA and the number of complete records, with verified address information and broadband access information.

CAI Category	Reference Records	Broadband Records	Total Records Submitted	Complete Records Submitted
School K-12 (Public)	2603	796 (Web) 478 (eRate)	2598	175
School K-12 (Private)	1260 (NCES)		1267	169
Libraries	465 (IMLS)	89	472	50
Medical/Healthcare	1107 (NJ-HHS)	5	1108	5
Public Safety	343 (NJ 911 Comm.)	120	349	104
University	158 (NCES IPEDS)	39 (NJEdge)	158	39
Other – State Government		2007	1947	1947
Other – Local Government	0	54	54	54
Other – Non Government	0	8	8	8
Total			6964	2551

Local Government and Non-Government Organizations

1. Accepted data submitted by 54 local government and 8 non-governmental organizations via specially designed Web site. We merged data submitted to Web site for April 2011 delivery with that submitted between April and September. (Files lib_20110323.xml and lib_20110907.xml) Data collected included:
    i. Community Anchor Institution Category
    ii. Community Anchor Institution Name (System, Branch)
    iii. Address: Street, City, State, Zip, County
    iv. Contact info: Name, Phone, Email, Web address
    v. Wi-Fi access
    vi. Broadband info: Provider, Technology, Upstream and Downstream speeds
    vii. Comment
2. Generated Latitude and Longitude via geo-coding using Yahoo geocoder API.
    a. Ensured no errors were present, that at least on entry was returned and that quality metric was over 75. Also ensured that result was in New Jersey and that city and zip were not both blank.
       Output is in file Submitted_GovNGO_CAIs.xls.
3. Manually edited results to add street numbers in those places where it was missing via Google search for the institution name.

State Government

1. Obtained a listing of 2007 connections provided by the primary broadband service provider to the state. List of connections included the following data:
    a. Service address
        i. This field included an indication of the office or department being served and an extremely abbreviated version of the address
        ii. e.g.: "(SPNL)STATE OF NJ-TLS 19 LANDIS AV, UP DRFLD T"
    b. Speed (single value, 1.5 to 1000 Mbps)
    c. Technology (ATM, Ethernet, Frame Relay, PRI, Point-to-Point
2. Used an automated process to expand the town names in the Service Address field (flow for steps 2-6 is in file VerizonList_Geocode.arroyo; input file is Broadband Mapping Prod Sum 2500 Feb 11_Addressed_Ida_Murray3.xlsx)
    a. For example, replaced "PRSPY" with "Parsippany" and "FR LN" with "Fair Lawn"
3. Extracted address information from Service Address field by removing the following:
    a. Digits following and including a pound sign (e.g., NJ STATE PAROLE DIST **#6** 210 S BROAD)
    b. "P.O Box NNNN",
    c. Anything in parentheses (e.g., **(SPNL)**STATE OF NJ:OIT 90 STATE HWY NO 183)

   d. Any string consisting solely of letters, backslashes, colons, dashes, ampersands and spaces prior to the first number string in the address (e.g., **SONJ:DOE** 7 GLENWOOD AV, E O BLDG FLR 4;DES SUITE 401-402)
   e. Any string after the first comma (e.g., 7 GLENWOOD AV, **E O BLDG FLR 4;DES SUITE 401-402**
   f. Text prior to and including an ampersand (e.g., **NJ STATE DOT @** ROUTE 23)
   g. Replacing "AV," with "AVE,"
   h. Any text between commas (e.g., 3810 NEW JERSEY AV, **WILD DES DEPT LABOR,**)
4. Extracted CAI Name information using the following rules:
   a. Extract text between four characters in parentheses and the last number to appear
   b. Remove any number and text following it
   c. Remove any ampersand and the text following it
   d. Replace empty strings with SONJ
5. Merged city information and state information with extracted addresses.
6. Generated Latitude and Longitude via geo-coding using Yahoo geocoder API.
   a. Ensured no errors were present, that at least on entry was returned
   b. Ensured that state was New Jersey and that city and state values were populated.
7. For those that failed test with Yahoo geocoder API, attempted to match with Google geocoder API
   a. Ensured no errors were present, that at least on entry was returned
   b. Ensured that state was New Jersey and that city and state values were populated.
8. Results in successful geocoding of 1917 of the 2007 entries
   a. Results are in file NJ_State_Verizon_Geocoded.xls

Hospitals

1. Obtained a listing of 1107 hospitals from NJ Department of Health and Human Services . List of connections included the following data:
   a. Facility Name
   b. Address: Street, City, State, Zip
2. Generated Latitude and Longitude via geo-coding using Google geocoder API.
   a. Ensured that at least on entry was returned, that state was New Jersey and that city or zip were present in recognized address. (Used Arroyo flow HHS_Hospital_Process.arroyo)
      Output of this stage is in file Hospitals_Geocoded2.csv.
3. Merged NJ-HHS data with data collected from 5 hospitals via our hosted Web site to merge address and ID information with speed and Wi-Fi availability information. We merged data submitted to Web site for April 2011 delivery with that submitted between April and September. (Files lib_20110323.xml and lib_20110907.xml)
   a. Performed exact match between NJ-HHS and submitted data on institution name

i. Facilitated matching by Converting names to upper case, removing certain common words (THE, HOSPITAL, MEDICAL, CENTER, SYSTEM, HEALTHCARE), removing double spaces and trimming leading and trailing spaces.

This portion of the process occurs in SubmittedCAI_Hospital_Process.arroyo. Output is in file Hosp_Submitted_Matched.xls.

4. Manually matched inserted last hospital into list.

Higher Education

1. Obtained the following data from the named sources
   a. List of higher education institutions from National Center for Education Statistics IPEDS Data Center (http://nces.ed.gov/collegenavigator/?s=NJ). Table included information on 158 institutions with the following fields:
      i. Institution Name
      ii. Address: Street, City, County, State, ZIP
      iii. IPEDS ID

      Final input data, including a few manual edits (see below) is in file CollegeNavigator_NJ_20110909_fixed2.xlsx

   b. Generated Latitude and Longitude via geo-coding using Yahoo geocoder API (flow IPEDS_HigherEd_Geocode.arroyo).
      i. Ensured no errors were present, that at least on entry was returned
      ii. Ensured that state was New Jersey and that city and state values were populated.
   c. For those that failed test with Yahoo geocoder API, attempted to match with Google geocoder API (Flow IPEDS_HigherEd_Geocode.arroyo)
      i. Ensured no errors were present, that at least on entry was returned
      ii. Ensured that state was New Jersey and that city and state values were populated.
   d. Manually updated a few addresses that failed to produce maps. Result was that 156 of 158 institutions were properly geocoded.
2. List of members of NJEdge (Format-edited version is in file Mapping Bandwidth_Mb_07112011_edit.xlsx). Table included information on 50 institutions, most of which (39) were unique state, community or private institutions of higher learning. Information from NJEdge included:
      i. Institution Name
      ii. Address
      iii. Technology Type
      iv. Upstream and downstream speeds
3. Merged IPEDS and NJEdge data to match institution data with broadband access information
   a. Performed exact match on institution name

        i. Facilitated matching by Converting names to upper case and trimming excess spaces
    b. Of those NJEdge data entries that did not match, used approximate matching based on institution name
        i. Preprocess prior to approximate match involved
            1. Removing strings COLLEGE, UNIVERSITY, NEW JERSEY
            2. Removing any punctuation
        ii. Matched using Levenshtein Distance metric with threshold of 4.
    c. Reviewed unmatched NJEdge data manually and identified three additional matches.
4. Successfully merged data from all 39 NJEdge institutions into IPEDS data for total of 158 institutions
    a. Note that remaining NJEDGE institution (Fairleigh Dickenson) has different address than either of the campuses in the IPEDS data.

    Final output is in file HigherEd_Geocoded_RateMatched.xls
5. Manually edited results to add street numbers in those places where it was missing via Google search for the institution name.

Libraries

1. Obtained the following data from the named sources
    a. Obtained the file "Public Libraries Survey Fiscal Year 2009" from http://harvester.census.gov/imls/data/pls/index.asp. Used file puout09.txt
        i. Manually extracted 465 records for the state of New Jersey
        ii. Used the following data items:
            1. FSCSKEY
            2. FSCS_SEQ
            3. LIBNAME
            4. ADDRESS
            5. CITY
            6. ZIP
            7. LATITUDE
            8. LONGITUDE
    b. Data submitted by 89 library organizations via specially designed Web site. Data collected included same fields listed above for Local Governmental organizations
2. Merged library survey data with data collected from libraries via our hosted Web site to merge address and ID information with speed and Wi-Fi availability information.
    a. Performed exact match between survey and submitted data on library name
        i. Facilitated matching by Converting library names to upper case, cutting submitted names to fixed-field length of survey data (60 characters) and trimming excess spaces
    b. For those submitted data entries that did not match, performed an approximate match based on library name

            i. Preprocess prior to approximate match involved
                1. Removing strings "P.L.", "FREE", "PUBLIC", "LIBRARY", TOWNSHIP, TSWP, PUB, LIB, THE, SYSTEM
                2. Removing any punctuation
                3. Converting "NO"/"SO" at start of line to NORTH and SOUTH respectively
            ii. Matched using Levenshtein Distance metric with threshold of 3.
    c. Successfully matched all but twelve submitted entries to Library Survey Data
        i. Manual comparison showed that two of those libraries were not present in the survey data.
        ii. Remaining ten were branches of Newark Public Library, but all were submitted with the same address, so they could not be successfully geocoded.

    Results (LibraryPlusSubmitted.xls) include 472 Library entries. This is larger than the 465 from the survey because some libraries submitted more than one broadband provider.
3. Manually edited results to add street numbers in those places where it was missing via Google search for the institution name.
    a. During manual edit, also removed entries that were labeled "bookmobile" as not indicating a valid anchor institution able to receive broadband.

Private K-12 Schools

1. Obtained the following data from the named sources:
    a. List of private K-12 education institutions from National Center for Education Statistics Private School Universe Survey (http://nces.ed.gov/surveys/pss/pssdata.asp). Table included information on 1260 institutions with the following fields:
        i. Name
        ii. Address: Street, City, State, ZIP
        iii. NCES_ID
        iv. Latitude/Longitude
    b. Data submitted by schools via specially designed Web site. Data collected included same fields listed above for Local Governmental organizations. Total number of Public and Private schools submitting information was 796.
    c. Data from the USAC eRate program, listing schools that have obtained subsidized Internet access, including following relevant fields
        i. Name
        ii. Address: Street, City, State, ZIP
        iii. Provider

    There were 478 records that corresponded to schools and Internet access.
2. Merged NCES private school with data collected from private schools via our hosted Web site to merge address and ID information with speed information.
    a. Performed exact match between NCES and submitted data on institution name and zip code
        i. Facilitated matching by:

            1. Converting school names to upper case
            2. Removing string “, NJ”
            3. Converting string SAINT to ST
    b. For those submitted data entries that did not match NCES data, performed an approximate match based on institution name
        i. Preprocess prior to approximate match involved
            1. Replacing string SCHOO or SCHO with SCHOOL
            2. Replacing string “HIGH SCHOOL” with HS and string “ELEMENTARY” with ELEM
            3. Removing strings SCHOOL, THE, REGIONAL, HIGH and ACADEMY
            4. Trimming excess spaces
        ii. Matched using Levenshtein Distance metric with threshold of 3.
    c. Successfully merged data from 71 submitted private school into 1260 NCES institutions
        i. Manual comparison resulted in matching of two additional institutions
        ii. Remaining institutions were ambiguous or not present in the NCES data.
3. Combined results of step 2 with eRate data to merge address and ID information with access and provider data. (Flow in file K-12_eRateProcess.arroyo, handles both public and private schools)
    a. Performed exact match between step-2 results and eRate data on institution name and zip code
    b. Verified uniqueness of results based on institution name, zip code and provider
    c. When a match was detected, set the Availability flag to “y” and filled in provider name from eRate data. (Unless provider name was already present from Web-submitted data)
    d. Filled in an 128 additional records
4. Generated 1267 records to submit. Note that some schools had more than one service provider and thus include multiple records.
    a. Output file is PrivateSchool_GeoMatched.xls
5. Manually edited results to add street numbers in those places where it was missing via Google search for the institution name. Note that not all schools have a street number – some list an intersection and others simply list the street as their address.

Public K-12 Schools

1. Obtained the following data from the named sources:
    a. List of public K-12 education institutions from National Center for Education Statistics Public School Universe Survey. (Went to http://nces.ed.gov/ccd/schoolsearch/ , searched for schools in New Jersey, then selected option at bottom of results page to download an Excel file: ncesdata_DE2476A3.xls.) Table included information on 2603 institutions with the following fields:
        i. Name
        ii. Address: Street, City, State, ZIP

        iii. NCES_ID

   b. Data submitted by schools via specially designed Web site. This was entries in the school category that did not match any of the NCES private schools. Total number of Public and Private schools submitting information was 796. Of those, 673 did not match private schools.
   c. Data from the USAC eRate program, listing schools that have obtained subsidized Internet access, including following relevant fields
      i. Name
      ii. Address: Street, City, State, ZIP
      iii. Provider

      There were 478 records that corresponded to schools and Internet access.

2. Merged NCES private school with data collected from private schools via our hosted Web site to merge address and ID information with speed information. (Flow in file PublicK-12Process.arroyo)
   a. Performed exact match between NCES and submitted data on institution name and zip code
      i. Facilitated matching by:
         1. Removing SCHOOL and all truncated versions of the word from the ends of any string
         2. Performing the following conversions
            a. "SENIOR HIGH" and HIGH to HS
            b. "MIDDLE", "M S", "MID" and "MIDD" to MS
            c. "ELEMENTARY" to ELEM
            d. CHARTER to CS
            e. BOROUGH to BORO
            f. AVENUE to AVE
            g. TOWNSHIP to TWP
            h. STREET to ST
         3. Removing the strings REGIONAL, " REG" and ACADEMY
         4. Removing punctuation and double spaces
         5. Trimming any leading or trailing spaces
   b. For those submitted data entries that did not match NCES data, performed an approximate match based on concatenation of institution name and zip code
      i. Preprocess prior to approximate match involved
         1. Removing the following phrases
            a. "BOARD OF EDUCATION" and all truncated versions
            b. BOE
            c. DISTRICT and all truncated versions
            d. PRIMARY, INTERMEDIATE, ELEM, MS, HS, SR, JR
            e. # or any digits
            f. PUBLIC
         2. Trimming excess spaces

            3. Submitted entries that were blank after these operations were removed.
        ii. Matched using Levenshtein Distance metric with threshold of 2.
    c. Successfully merged data from 169 submitted entries into 2595 NCES institutions
        i. Dropped 8 NCES institutions as incomplete
        ii. Recurring issue was information submitted for districts that did not correspond to a specific school
3. Combined results of step 2 with eRate data to merge address and ID information with access and provider data. (Flow in file K-12_eRateProcess.arroyo, handles both public and private schools)
    a. Performed exact match between step-2 results and eRate data on institution name and zip code
    b. Verified uniqueness of results based on institution name, zip code and provider
    c. When a match was detected, set the Availability flag to "y" and filled in provider name from eRate data. (Unless provider name was already present from Web-submitted data)
    d. Filled in nine additional records
4. Generated Latitude and Longitude via geo-coding using Yahoo geocoder API.
    a. Ensured no errors were present, that at least on entry was returned and that quality metric was over 75.
    b. Ensured that state was New Jersey and that city and/or zip value was populated.
5. Generated 2598 records to submit. Note that some schools had more than one service provider and thus include multiple records.
    a. Output file is PublicSchool_GeoMatched.xls
6. Manually edited results to add street numbers in those places where it was missing via Google search for the institution name. This was only attempted for a portion of those with missing street numbers. Of those attempted, only 25% were producing a valid street number, so the manual step was not deemed worthwhile.

Public Safety Organizations

1. Obtained the following data from the named sources:
    a. List of local and state public safety organizations obtained from NJ State 911 Commission. (Reused data from April 2011 - PSAP's & PSDP's_Geocoded.xls) Table included information on 343 institutions with the following fields:
        i. Name
        ii. Address: Street, City, State, ZIP, County
        iii. NCES_ID
    b. Data submitted by 120 public safety organizations via specially designed Web site. Data collected included same fields listed above for Local Governmental organizations
2. Generated on 911 Commission Data Latitude and Longitude via geo-coding using Yahoo geocoder API.

    a. Ensured no errors were present, that at least on entry was returned and that quality metric was over 75.
3. Merged 911 Commission data with PSAP data collected from via our hosted Web site (99 entries) to merge address and ID information with speed information.
    a. Performed exact match between 911 and submitted data on institution name
        i. Facilitated matching by:
            1. Converting names to upper case
            2. Removing the Strings DEPARTMENT, DEPT, TOWNSHIP, TWP
            3. Removing punctuation and double-spaces
            4. Replacing string PD with POLICE and string BOROUGH with BORO
    b. Performed manual merging to integrate additional submitted records that were not matched.
        i. Successfully merged 104 submitted PSAP entries with 911 Commission data. Output in file PSAP_911_Matched.xls
4. Manually edited results to add street numbers in those places where it was missing via Google search for the institution name.

CAI Load Processing

Submission date: October 2011

This report presents details on processing data about Community Anchor Institutions for delivery to the National Telecommunications and Information Administration.

For each location submitted to us we report a street address, details about the data service at the Institution (if known), a point shape corresponding to the street address, and the ID of the enclosing Year 2010 Census Block.

Overview of Transfer Model Table

The following table lists the columns in the NTIA data-transfer table.

Table Column	**Null?**	**Data Source / Transformation**
ANCHORNAME	NO	
ADDRESS	NO	
BLDGNBR	NO	
PREDIR	YES	Usually set to null

STREETNAME	NO	
STREETTYPE	YES	Usually set to null
SUFFDIR	YES	Usually set to null
CITY	NO	
STATECODE	NO	Set to "NJ"
ZIP5	NO	
ZIP4	YES	Set to null
LATITUDE	NO	Submitted or geocoded from street address
LONGITUDE	NO	Submitted or geocoded from street address
CAICAT	NO	Set to appropriate category
BBSERVICE	NO	
PUBLICWIFI	NO	
URL	YES	
TRANSTECH	YES	Note: set to “0” if unknown.
FULLFIPSID	NO	ID of enclosing Year 2010 Census Block
CAIID	YES	
SUBSCRBDOWN	YES	
SUBSRBUP	YES	Note missing “C” in name
SHAPE	NO	Created for the latitude, longitude value pair

Overview of Data Load Process

In general all data went thru the following processing steps:

1. Geocoded the addresses using an Arroyo flow and either the Google or the Yahoo geocoder, leaving the result with address and (lat, long) pairs in an Excel spreadsheet.
2. Imported the spreadsheet to the geodatabase. During this step it was essential to

import latitude and longitude columns as type Double (ESRI will convert if they are stored as Text and the target type is specified). The result is a simple table (not a feature class) with a name “catN_name”; e.g., “cat3_hosp”.

3. Created a feature class with point shapes corresponding to each (lat, long) pair from the table using ArcCatalog’s “Create Feature Class from XY Table” option. Remember, X is Longitude, Y is Latitude, and use WGS 1984 as the coordinate system. The result is a feature class with a name like “catN_name_point”.
4. Created a feature class with the same content as the previous step but with the geographic coordinate tolerance value the same as the transfer model. The result is a feature class with a name like “catN_name_point_tol”.
5. Created a new feature class with a column containing the ID of the containing year 2010 Census Block ID using ArcCatalog's spatial join feature. The result is a feature class with a name like “catN_name_point_tol_cb”.
6. Copied the data to the bb_service_cainstitutions table

Category 1: Schools

Private school source file is “PrivateSchool_GeoMatched.xls”, tab “Matched” with 1,267 rows.

Public school source file is “PublicSchool_GeoMatched.xls”, tab “Matched” with 2,598 rows.

Internal processing notes:

1. The private-school spreadsheet has a column “OBJECTID” that should be imported, or if it is, it must be renamed first.
2. The school names often are sharply abbreviated; e.g., “Woodside”, with no indication of whether it is an elementary, secondary, high school, etc.

Category 2: Public Libraries

Source file is “LibraryPlusSubmitted.xls”, tab “SurveyPlusSubmitted”, with 472 rows.

Internal processing notes: None.

Category 3: Hospitals

Source file is “Hosp_Submitted_Matched.xls”, tab “NJHA plus Survey Matched”, with 1108 rows.

Internal processing notes: None.

Category 4: Public Safety

Source file is “PSAP_911_Matched.xls”, tab “911 with Matched”, with 351 rows.

Internal processing notes: File had some rows shifted off by one position, which resulted in discarding “public wifi” field.

Category 5: Higher Education

Source file is “HigherEd_Geocoded_RateMatched.xls”, tab NCES+NJEDGE”, with 157 rows.

Internal processing notes: None.

Category 6: Local Government

Source file is “NJ_State_Verizon_Geocoded.xls”, tab “GoodGeocoding”, with 1,947 rows.

Internal processing notes: Excel sheet yielded several empty rows when loaded to a simple table. Ignored these, they will fail in the spatial join and will be excluded during the final load operation.

Categories 6 and 7: Other Community Support

Source file is “Submitted_GovNGO_CAIs.xls”, tab “Sheet0”, with 62 rows.

Internal processing notes: None.

Validation

Discarded records that did not meet transfer model requirements:

No zip code: 4

No building number: 328

No street name: 1

No city: 19

State outside NJ: 3

Successfully Loaded: 7221

Our investigation revealed that many institutions, particularly public schools, do not post or use street/building numbers. Therefore, the requirement for a street number is causing us to discard many otherwise valid records.

New Mexico State Broadband Initiative
Methodology: October 1, 2011

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New Mexico State Broadband Initiative
Methodology: October 1, 2011

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New Mexico State Broadband Initiative
Methodology: October 1, 2011

Introduction

The State of New Mexico (hereafter, NM or State), through its agents Earth Data Analysis Center (EDAC) at The University of New Mexico and NM Department of Information Technology (DoIT), submitted the October 1, 2011 New Mexico Broadband (NMBB) Program data package, in compliance with the National Telecommunications and Information Administration (NTIA) State Broadband Initiative Program (SBI).

Data Submittal Description

The NMBB October 1, 2011 data submission included:

- Data Transmittal Memo (PDF). This document described NMBB data submittal components, state-restricted data fields, and contact information.
- Provider Data Request Template (XLS). The data-request spreadsheet contained an overview and upload instructions in addition to eight worksheets for different types of service, subscriber speed, and community anchor institutions.
- FCC-prepared Data Package Spreadsheet (XLS). The data-package spreadsheet consisted of three worksheets for overview and checklist, record count, and provider table.
- NTIA-compliant Geodatabase with FGDC-compliant Metadata (GDB). The NMBB geodatabase was created to NTIA standards and included metadata for the database layers.
- Check Submission Receipt (TXT). This document listed pass/fail for received data-submission layer and field entries.
- NM Methodology 20111001 (PDF). This Methodology document is included in the submitted package.
- Changes and Corrections 20111001 (PDF). The document corresponds to a readme document, especially for Internet Service Provider (ISP) information.

All files were zipped together and submitted as NM_SBDD_20111001 (ZIP).

SBDD Geodatabase Layer	Number of Records: October 1, 2011
BB_Service_Address	0*
BB_Service_Road_Segment	4158
BB_Service_CensusBlock	157454
BB_Service_CAInstitutions	2606
BB_Service_Wireless	77
BB_Service_Overview	115
BB_ConnectionPoint_LastMile	0*
BB_ConnectionPoint_MiddleMile	424

***** Due to restrictions in the Non-disclosure Agreement (NDA) with New Mexico Internet Service Providers (ISPs), New Mexico cannot populate the Service Address and Last-Mile feature classes in the NMBB Geodatabase.

Provider Participation

The NMBB Program requested broadband data from seventy NM Internet Service Providers (ISPs) in July 2011. A total of forty-two different ISPs provided data to the NMBB Program, representing thirty-seven companies. Seven providers did not submit new data for the October 2011 submittal, and two companies (Cyber Mesa Computer Systems Incorporated and Higher-Speed Internet, LLC) were reluctant to further participate in the program. Six ISPs confirmed that they currently do not provide broadband services in New Mexico.

CenturyLink replaced Qwest Corporation as a Provider in New Mexico, and the NMBB Program negotiated and executed an NDA with CenturyLink before this October 2011 data submittal.

Internet Service Providers	Number: October 1, 2011
Contacted	70
Responded: Provided Data	42*
Responded: Will Provide Data	3
Responded: Will not Participate	2
Responded: Not Broadband Provider	6**
Did Not Respond	22

***** 5 ISPs of 42 provided data as 2 distinct companies/subsidiaries; 1 ISP would not provide data but directed NMBB to data on their Web site.
****** These ISPs are not broadband providers for New Mexico.

Participating New Mexico Internet Service Providers: NTIA Data Submittal, October 1, 2011	
360networks (USA) Inc.	PTCI (Panhandle Telephone Cooperative, Inc.)
Agavue Broadband LLC	PVT Networks
AT&T Mobility LLC	Sacred Wind Communications, Inc.
Baca Valley Telephone Company, Inc.	Sierra Communications (a subsidiary of Baca Valley Telephone)
Baja Broadband	Southwestern Wireless
Cable ONE	Sprint
CenturyLink (replaced Qwest Corporation)	Suddenlink Communications
Comcast	T-Mobile
Cricket Communications, Inc.	Time Warner Cable
Cyber Mesa Telecom	Tularosa Communications, Inc.
Dell Telephone Cooperative, Inc.	TW Telecom of New Mexico, LLC
DIECA Communications, Inc. (Covad Communications Company)	US Cable
ENMR Plateau Telecommunications	Valley TeleCom Group (Copper Valley Telephone, Inc.)
Frontier Navajo Communications (Navajo Communications Company, Inc.)	Valley TeleCom Group (Valley Telephone Cooperative, Inc.)
Higher-Speed Internet, LLC	Verizon Wireless
La Jicarita Rural Telephone Cooperative	Windstream Communications SouthWest
Leaco Rural Telephone Cooperative	WNM Communications
Level 3 Communications, LLC	Yucca Telecom (Roosevelt County Rural Telephone Cooperative, Inc.)
MATI Networks (Mescalero Apache Telecom, Inc.)	Yucca Telecom

	(Yucca Telecommunication Systems, Inc.)
Penasco Valley Telecommunications	Spacenet, Inc. (StarBand Communications, Inc.)
Plateau Telecommunications, Inc.	WildBlue Communications, Inc.

Workflow Processing Scheme

New Mexico acknowledges the importance of understanding data reliability and integrity as the Provider data are processed for NTIA submittal. The NMBB Data Workflow and Processing Scheme include four broad stages:

1. Obtain – Acquire raw Provider data.
2. Validate – Check for internal data consistency and for consistency with external data sources.
3. Process – Develop Geographic Information System (GIS) data and update NTIA Geodatabase.
4. Report – Submit the final Geodatabase to NTIA.

These stages and their relationships are depicted in the diagram below, and are discussed in the following sections. The October 1, 2011 Data Workflow and Processing Scheme did not change from the April 2011 scheme and so retained the V3.0 designation.

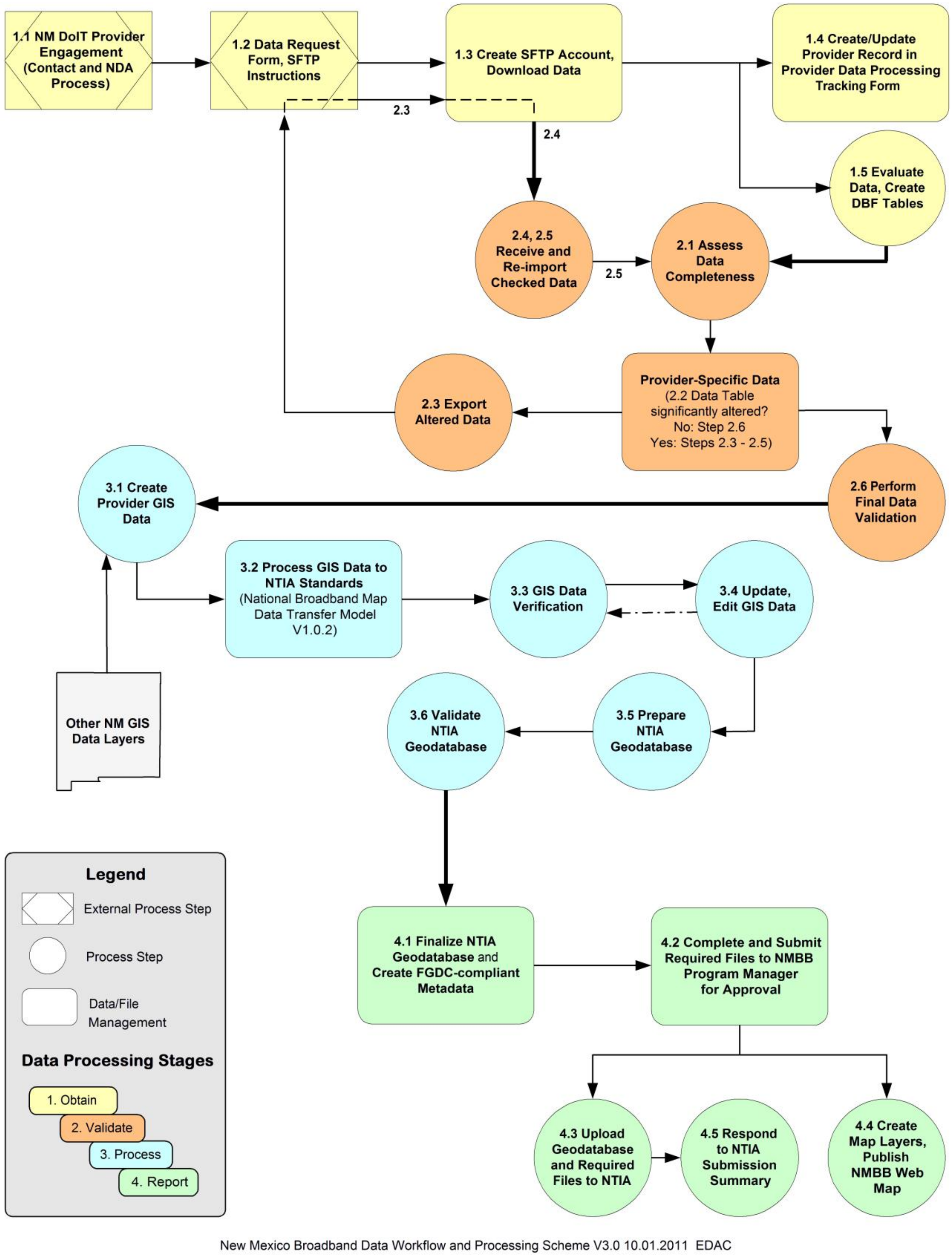

Figure 1 New Mexico Broadband Workflow and Processing Scheme

Data Collection

Provider Engagement

The NM Department of Information Technology established contact with each New Mexico Broadband Provider and negotiated a signed NDA with the State and with EDAC, if required. NM DoIT negotiated and executed a new NDA with CenturyLink, which replaced Qwest Corporation.

Data Request

EDAC sent an e-mail requesting broadband data to seventy NM Internet Service Providers in July 2011, and a reminder e-mail in August to those who had not responded. In addition to an NMBB Program overview and formal request for data, the message included a Web link for the NM Broadband Data Request Form (MS Excel Worksheet); this form included instructions for completing the eight data worksheets and for securely uploading Provider data to the EDAC Secure FTP site.

Data Receipt

EDAC created a Secure File Transfer Protocol (SFTP) site for broadband data upload, and created an account on the site for each NM Provider. Each Provider was assigned a unique username and password; this account information is stored in the NMBB SFTP Account Management form.

Provider data arrive in numerous formats, including NMBB or Provider spreadsheets, shapefiles, CAD files, and text files. These data are downloaded from the SFTP site to the EDAC network.

Provider and Data Tracking

EDAC creates or updates the specific Provider record in a Provider Data Processing Tracking Form. Throughout the data process, each Tracking Form step is recorded with analyst initials and date of task completion. Steps include:

- Record Provider name information and the assigned 2-digit Primary Key (PKey).
- Record the Holding Company Name, DBA Name, FRN (if available), and whether Community Anchor Institutions data are provided.
- Record type of files submitted; date of data submission and the initials of the receiving GIS analyst; and how data were submitted (e.g., FTP or physical medium).

Provider Database

EDAC evaluates the uploaded Provider data for consistency with the NTIA data model and creates database-format tables.

Data Validation

Data Assessment

EDAC assesses the submitted data for completeness according to the National Broadband Map Data Transfer Model V1.0.2:

- Identify fields (names, types);
- Fill in missing data, if possible; and
- Check field codes, and standardize the values where appropriate.

Data Export

If the data are incomplete, based upon the above assessment steps, EDAC performs the *If required* steps, below; otherwise, EDAC proceeds with data validation. Changes and assumptions are documented.

If required:

- Return data in standardized format to the Provider for completion.
- Receive modified data back from Provider.
- Re-import data.

Data Validation

EDAC performs the final data validation for each Provider's data set: all missing data filled in; all field codes checked and standardized where appropriate.

Data Processing

GIS Data

EDAC creates and verifies Provider-specific GIS data, using ArcGIS 10 software and third-party data sets:

- New Mexico Road Centerline (NM RCL) data files.
- NM Telephone Exchange Boundaries 911.
- U.S. Census TIGER/Line shapefiles.
- TomTom MultiNet Road shapefiles.
- NAVTEQ Road data files.
- ESRI Road shapefiles.
- ESRI Cable Boundaries data file.

Ancillary consistency checks include comparison with other data sources that are available through the New Mexico geospatial clearinghouse – Resource Geographic Information System (RGIS; http://rgis.unm.edu).

EDAC processes the GIS data according to the National Broadband Map Data Transfer Model V1.0.2.

Middle Mile Points

- ISPs provide the geographic coordinates for Middle Mile points. Those points are exported as shapefiles and a spatial join is performed against Census 2010 Blocks to obtain FULLFIPSID.
- Data sets are further processed by adding required fields based on the NTIA Data Model.

Census Blocks

- ISP data were requested for the Census 2010 Blocks, rather than the Census 2000 Blocks.
- If an ISP provides the Census Block IDs, then those tables are spatially joined with the Census 2010 Data and the blocks are extracted. Then, the Census Blocks (Area < 2 sq mi) are extracted.
- If the ISP provides address-specific data, those addresses are geocoded against the New Mexico Road Centerline (NM RCL) address locator. Unmatched addresses are processed against third-party data sets, such as the TomTom MultiNet and NAVTEQ Road data, which were purchased by the State as a part of the NMBB project, and ESRI Road data. All of those matched records are appended together to obtain a single address data set. The address points are aggregated spatially to the Census Blocks, and the Census Blocks (Area < 2 sq mi) are extracted.

- If an ISP provides shapefiles of Census Blocks, EDAC verifies those to make sure they are less than 2 sq. mi. in area.
- If an ISP provides their telephone exchange boundaries instead of addresses, then those boundaries are verified with the NM Telephone Exchange Boundaries 911 data set, and Census Blocks (Area < 2 sq mi) that lie within those boundaries are extracted. If an ISP provides the CO/RT locations, then a buffer of 1800 ft is drawn, and the Census Blocks (Area < 2 sq mi) that intersect with the buffer area are extracted.
- If an ISP provides service areas instead of addresses for Cable, then the service areas are verified with the ESRI Cable Boundaries data file. Census Blocks (Area < 2 sq mi) that lie within the boundaries are extracted.
- If an ISP does not provide data for this data-submittal round, Crosswalk tables from the U.S. Census Bureau are used to convert the previously-submitted Census 2000 Blocks to Census 2010 Blocks. Extracted Census 2010 data are overlaid on the original Census 2000 data to confirm that the ISP-provided area from the previous round is covered. In cases of differences, where the areas are not covered, Census 2010 Blocks are manually selected and added to the other extracted Blocks to complete the data set.
  Crosswalk tables are downloaded from
  http://www.census.gov/geo/www/2010census/rel_blk_download.html.
- Data sets are further processed by adding required fields based on the NTIA Data Model.

Road Segments

- If an ISP provides address-specific data, EDAC geocodes those points (using a process similar to that explained above in *Census Blocks*). The address points are aggregated spatially to Census Blocks, and the blocks with area greater than 2 sq mi (Area > 2 sq mi) are extracted. NM RCL roads within those Census Blocks are exported, and the geocoded address points are spatially joined with adjacent road segments within a distance of 25 ft (or 30 ft for rural areas). The road segments with joined address points are selected and exported.
- If an ISP provides road segment data with address ranges, any one of the address range values (TO/FROM) for the road is taken and the data are geocoded. Or, if no address ranges are provided, the address file is joined with the NM RCL roads, based on Street Name, City, and Postal Code and the matched records are extracted.
- If an ISP provides Tiger/Line roads data, those roads are extracted from the U.S. Census Tiger/Line shapefile by joining them based on the TLID (Tiger/Line ID). NM RCL road data that match the Tiger/Line roads are exported.
- If an ISP provides Telephone Exchange Boundaries or CO/RT locations or Cable service area boundaries, road segments for these data sets are not processed due to uncertainty about the NMBB procedures for these cases. EDAC checks for ISP-provided address-specific data and, if those data are present, processes the data using the first-listed *Road Segments* step. Otherwise, those roads are not further processed. NM DoIT and EDAC will request clarification from NTIA.
- Data sets are further processed by adding required fields based on the NTIA Data Model.

Community Anchor Institutions

- EDAC created an Anchor Geodatabase that has data on all the Community Anchor Institutions, such as Schools, Libraries, Health Care, Higher Education, Public Safety Facilities, Government Agencies, and Non-governmental Institutions throughout the State of New Mexico. These data were obtained from different sources, including the Public Schools Facilities Authority (PSFA),

New Mexico State Library, Homeland Security Information Program (HSIP), and NM Resource Geographic Information System Program (RGIS).
- The Anchor Geodatabase is further processed to meet the NTIA requirements. NCES IDs for schools, IPEDS IDs for higher education, and IMLS IDs for libraries are obtained from the respective Web sites and are joined with records in the geodatabase.
- Broadband data provided by the ISPs are also included in the geodatabase. EDAC uses the third-party USAC (Universal Service Administrative Company) data set for broadband information for Schools and the NM State Library data set for broadband information for Libraries.
- Data sets are further processed by adding required fields based on the NTIA Data Model.

Wireless
- If an ISP has multiple spectra, the provided polygon is duplicated for each spectrum and then appended together to obtain a single shapefile with stacked geometry.
- If an ISP provides tower location (address or coordinates) and transmit radius instead of shapefiles, those locations are mapped and a buffer is drawn with the transmit radius.
- Data sets are further processed by adding required fields based on the NTIA Data Model.

Overview
- This set of notes applies to wire-line data, only.
- If an ISP provides the Subscriber Weighted Nominal (SWNOM) Speed of respective technology types for the counties it serves, those values are joined with the County boundary file from the U.S. Census Tiger/Line shapefiles.
- If an ISP provides the technology of transmission, number of subscribers, and the maximum advertised speed for the Counties it serves, the SWNOM Speed is calculated and the values are joined with the County boundaries shapefile.
- These county files from each ISP are appended together to obtain a statewide stacked geometry. Data are further processed by adding required fields based on the NTIA Data Model.

GIS Data Verification, Updates, and Edits

Processed data are developed as Provider-specific spreadsheet and GeoPDF products. As the first step in New Mexico's Provider feedback loop, EDAC places each Provider's products on the SFTP site and requests that Providers verify accuracy and identify needed edits and corrections. Seven (7) ISPs responded to the verification request in the October 1, 2011 data submission cycle.

GIS data are updated and edited, based on Provider feedback, and modified data products (spreadsheet and GeoPDF) are delivered to the Provider through the SFTP site for final verification and to complete the feedback loop.

NTIA Geodatabase Preparation

EDAC produces a final "clean" GIS data set from the processed and Provider-specific, versioned feature data sets, and then prepares the NTIA Geodatabase from these finalized GIS data. Crowd sourced data were not used for preparation or validation.

NTIA Geodatabase Validation

EDAC validates the geodatabase by performing the validation checks provided below and by running the geodatabase through the SBDD_CheckSubmission tool. EDAC then assigns Quality Assurance/Quality Control (QA/QC) values.

- Repair Geometry.
- Validate Topology.
- Check Provider identification fields by Frequency tool and Summarize tool.
- Check for Null values in Transmission Technology codes, PROVIDER_TYPE, FULLFIPSID, STATEFIPS, COUNTYFIPS, TRACT, BLOCKID fields.
- Check for Null values in TRANSTECH, ANCHORNAME, ADDRESS (BLDGNBR, STREETNAME), CITY, ZIP5, STATE, GEOUNITTYPE, STATECOUNTYFIPS fields.
- Check Maximum advertised and typical down/upload speed fields for null values and for valid domain values. MAXADDOWN/TYPDOWN < MAXADUP/TYPUP; MAXADDOWN < '0' OR MAXADDOWN > '9'.
- Check for SPECTRUM values <1 and >10.

NMBB Report and Submittal

Finalized NTIA Geodatabase and Metadata

EDAC finalizes the Geodatabase per NTIA standards (National Broadband Map Data Transfer Model V1.0.2) and creates the associated metadata.

NMBB Program Manager

The NMBB Program Manager receives the finalized Geodatabase through the SFTP site and approves the files for submittal to NTIA. The finalized Geodatabase was uploaded for review and approved on September 26.

EDAC completes and delivers all files to the NMBB Program Manager, as required by the Program. Files include correspondence logs with NM Providers, documentation for Web mapping activities, and the Provider-specific Data Processing Tracking Form.

NTIA Submittal

The Geodatabase and required files (data transmittal memorandum, Provider data request template [not a required file], data package spreadsheet, check-submission receipt, methodology, and changes and corrections) are uploaded, using the FCC/NTIA SFTP site.

NMBB Map Layers

EDAC creates GIS map layers from the Geodatabase and publishes them to the New Mexico Broadband Program Mapping site, www.nmbbmapping.org/mapping/.

Response: NTIA Submission Summary

NM DoIT and EDAC developed a document template to respond to the NTIA Submission Summary, both to address NTIA-identified issues or gaps and to request clarification and additional information. New Mexico responds within one week of receiving NTIA's Submission Summary.

NMBB System Security

System Security

The NM Broadband Server is a fully patched Windows Server 2008. The server is protected by Symantec Endpoint Protection and a double firewall.

The first layer of firewall protection is a Cisco hardware firewall that protects the Server from any intrusion from outside the EDAC network. This firewall only allows connections on Ports 80 and 22.

- Port 80 allows Web browsing.
- Port 22 allows Secure FTP. SFTP service is fully encrypted with SHA1 stored passwords.

The Windows software firewall is configured to allow access on Ports 80, 22, 443, and 3389.

- Port 443 gives EDAC developers the ability to configure ArcGIS Server from within the EDAC network.
- Port 3389 gives EDAC system administrators the ability to configure the base Windows server from within the EDAC network.

Server Connections

Connect to the Server from the outside:

- HTTP: No authentication (simple Web browsing).
- SFTP: Authentication required and fully encrypted.

Connect to the Server from within the EDAC network:

- HTTPS: Authentication required and fully encrypted.
- RDP: Authentication required and fully encrypted.
- SMB: Port 445, Windows file-share port.

Virtual Machine and Networked Drive Back-ups

The NMBB Virtual Machine (VM) is a dedicated server.

Back-up: Development Networked Drive (not published)

- Daily: A differential back-up to a tape server is performed; the tape server is connected to a secure tape library.
- Friday/Weekend: A full back-up of the networked drive is performed to the secure tape server.

Back-up: Virtual Machine (published)

- Daily: The entire VM is backed up by VDR (VMware Data Recovery [application]) to a secure, self-contained data store.

Physical Security

NM Broadband Server physical security is accomplished through:

- Controlled-environment floor space in a locked, code-protected room for system servers, and
- An uninterrupted power supply (UPS).

Lessons Learned

Provider Feedback Loop

During the April-2011 submittal process, EDAC identified and implemented several measures for more effective data collection. These included:

- Developing and formalizing an interaction process between data providers and EDAC.
- Modifying the data request template, based on the updated NTIA data model.
- Setting deadlines for receiving data from ISPs. This allowed EDAC sufficient time for processing and submitting feedback maps to ISPs for their verification.

These measures were successful with respect to efficient data processing and validation and for ISP engagement.

Data Validation and Processing

EDAC continued to address issues regarding data validation and processing. These included:

- Updating data validation procedures to meet the requirements of the data model.
- Researching and learning the propagation models for processing Satellite and Wireless data.

NMBB Web Map

The New Mexico Broadband Map (www.nmbbmapping.org/mapping/) is developed as part of the NMBB Program for the State of New Mexico. This Web map displays all of the processed ISP broadband data that are submitted to NTIA for the National Broadband Map, and the processed statewide satellite-service data.

Figure 2, below, is a screen-capture image of the New Mexico Broadband Map V 2.0 showing DSL, Cable, and Copper Wire broadband-coverage layers on the Streets base map. Satellite and Mobile Wireless layers are not displayed. Tools include: layer selection; base map selection; dynamic legend; slider-bar and custom zoom; drag-and-drop and directional pan; full, previous, and next extent; identify; find address; scale bar; and print map. Additionally, a feedback tool, help (online user guide), program information, and New Mexico’s disclaimer are provided.

Version 2.0 includes enhancements to the Identify tool, which allow the user to identify ISPs by technology type, and addition of the Data Update: <data submittal date> in the application title.

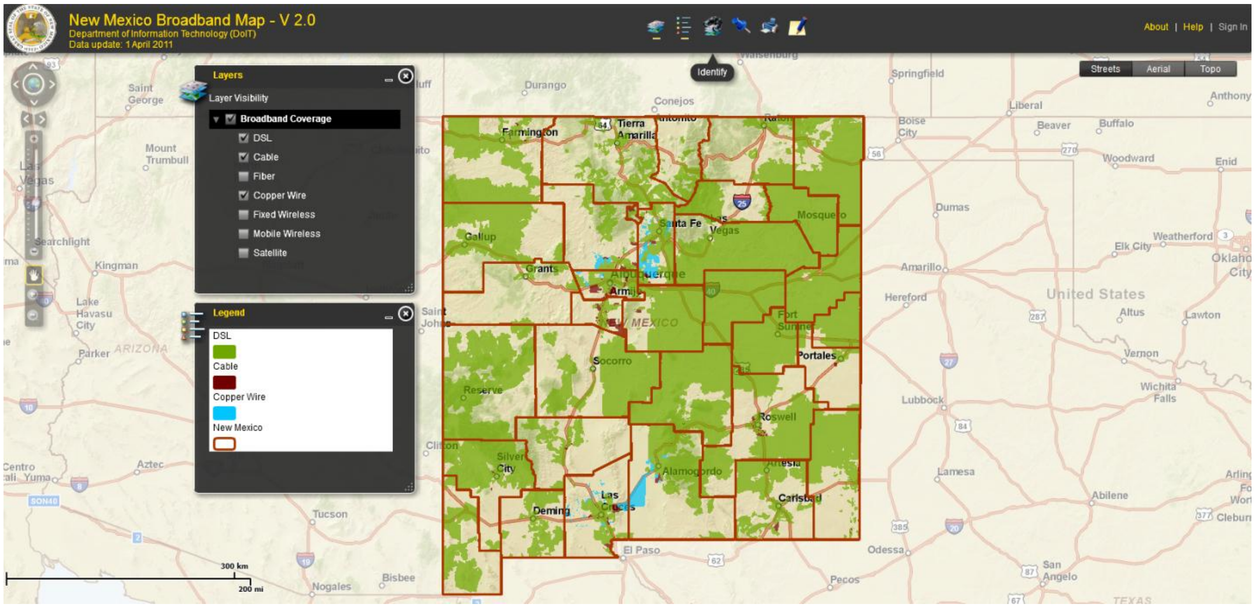

Figure 2 NMBB Program: New Mexico Broadband Map, www.nmbbmapping.org/mapping/; accessed 27 September 2011

Table of Abbreviations and Acronyms

API	Application Programming Interface
BB	broadband
CAD	Computer-aided Design
CO/RT	Central Office/Rural Terminal
DBA	Doing Business As
DoIT	[NM] Department of Information Technology
DSL	Digital Subscriber Line
EDAC	[UNM] Earth Data Analysis Center
FCC	Federal Communications Commission
FGDC	Federal Geographic Data Committee
FRN	FCC Registration Number
ft	foot
FTP	File Transfer Protocol
GDB, gdb	Geodatabase; Geodatabase file extension
GIS	Geographic Information Systems
HSIP	Homeland Security Information Program
HTTP	Hypertext Transfer Protocol
HTTPS	Hypertext Transfer Protocol Secure
ID	[unique] identifier
IE	[Microsoft] Internet Explorer
ISP	Internet Service Provider
NDA	Non-Disclosure Agreement
NM	New Mexico, State of New Mexico
NMBB	New Mexico Broadband Program
NM DoIT	New Mexico Department of Information Technology
NOFA	Notice of Funding Availability
NTIA	National Telecommunications and Information Administration
PDF, pdf	[Adobe] Portable Document Format and file extension
QA/QC	Quality Assurance/Quality Control
RCL	[NM] Road Centerlines
RDP	Remote Desktop Protocol
SBI	State Broadband Initiative
SFTP	Secure File Transfer Protocol
SHA1, sha1	Secure Hash Algorithm 1
SMB	Server Message Block
sq mi	square mile(s)
SWNOM	Subscriber Weighted Nominal [Speed]
TIGER	[U.S. Census] Topologically Integrated Geographic Encoding and Referencing (system)
TXT, txt	Text file extension
UNM EDAC	The University of New Mexico Earth Data Analysis Center
UPS	uninterrupted power supply
USAC	Universal Service Administrative Company
VDR	VMware Data Recovery (application)
VM	Virtual Machine
Web	World Wide Web
XLS, xls	Microsoft Excel file extension
ZIP, zip	Zipped file extension

OFFICIAL OCTOBER 2011 UPDATE SUBMISSION TO THE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION UNDER THE STATE BROADBAND INITIATIVE GRANT PROGRAM FOR THE STATE OF NEVADA

October 1, 2011

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NEVADA COVER LETTER

October 1, 2011

Ms. Anne W. Neville
SBI Grant Program Director
National Telecommunications and Information Administration
U.S. Department of Commerce
1401 Constitution Avenue, NW Room 4716
Washington, DC 20230

Dear Ms. Neville:

As the State Broadband Designated Entity, in partnership with the Nevada Broadband Task Force, please accept this submission from Connected Nation on behalf of the state of Nevada's State Broadband Initiative (SBI) Grant Program, known as Connect Nevada.

These artifacts should be found to be compliant with the October 1, 2011, deadline for the semi-annual data update and in accordance with the terms of the July 1, 2009, Notice of Funds Availability (NOFA) and all subsequent clarifications pertaining to delivery of state-level mapping of broadband service availability. This packet includes:

Inventory of Deliverables, Connect Nevada: October 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing
Appendix A: 4	n/a	Community Anchor Institutions-Narratives
VII.A.1(a)	n/a	Accuracy and Verification Report
n/a	DataPackage.xlsx	Worksheets of Contact Information, Record Count, and Provider Summary Table

n/a	n/a	List of Changes and Corrections to the Dataset
n/a	n/a	Non-Participating Provider Narratives
n/a	n/a	Broadband Provider Roster and Participation Status

In addition, this data update submission should be found to be compliant with the additional program requirements instituted by the National Telecommunications and Information Administration since the time of the April 2011 SBI data submission for the Connect Nevada program. Specifically, these new requirements are:

SBI Data Transfer Model
The submission of the broadband dataset for October 1, 2011, is contained within the SBI Data Transfer Model as released on the Grantee Workspace on June 30, 2011. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information on each provider as possible.

Additional Submission Guidance
This submission also includes a list of changes and corrections made to the dataset between the April 2011 submission and the October 2011 submission. This represents a summary of why data displays and/or supplied speeds, etc. are different from the previous submission. Changes can include upgrades to infrastructure to allow for higher throughput speeds for customers, an expansion of the service area (e.g. additional fixed wireless towers, recently activated DSLAMs, etc.), or a new provider in the marketplace. Corrections can include revisions to speed tier information that was previously reported incorrectly or the addition of a previously existing provider that has not yet been submitted in a semi-annual dataset.

Another addition in this submission is a narrative describing the data and coverage estimation of a non-participating provider. While Connect Nevada continues outreach to all providers prior to each submission period, the need to submit broadband service data for all providers regardless of their participation is evident as the SBI program continues into this fourth round of data submissions. The submission of this estimated broadband service area for a provider that has not supplied data to Connect Nevada is essential in being able to portray a more accurate depiction of the current broadband landscape.

This October 2011 semi-annual data update under the State Broadband Initiative Grant Program continues to demonstrate our dedication to implementing the joint purposes of the Recovery Act and the Broadband Data Improvement Act (BDIA) by gathering comprehensive and accurate state-level broadband mapping data, developing state-level broadband maps, aiding in the development and maintenance of the National Broadband Map, and undertaking statewide initiatives for broadband planning.

Broadband Service Availability — Provider Outreach and Verification

This data update submission under the SBI program includes datasets for approximately 91.38 percent of the Nevada provider community, or 53 of 58 total providers. There are 52 participating providers and 1 additional non-participating provider whose estimated coverage areas have been submitted. Of the 52 participating providers, 28 supplied an update to their network or coverage area(s), while 21 have reported no change. The remaining 3 represent providers who previously supplied data but were non-responsive in the October 2011 update effort; therefore their previous dataset is being put forward as part of this compilation. A complete roster by provider depicting participation status and contact record is contained herein. Of the 5 providers that are not represented in the attached datasets, 4 have refused to participate in the voluntary program or were non-responsive to multiple contact attempts, and 1 provider is currently in some form of progress toward data submission but was not able to submit coverage areas at the time of this submission.

As the aforementioned roster and attached methodology documentation will attest, it is the collective opinion of the Connect Nevada principals that all commercially reasonable efforts were made to account for 100 percent of the known Nevada broadband provider community, pursuant to this semi-annual data update submission.

Connect Nevada has also continued to perform broadband verification activities through several means. In addition to confirmation of service area(s) by each provider, Connect Nevada conducts field validation efforts. To date, 37 (63.79 percent) providers have been validated through field verification activities. Additional details on verification activities are contained within the Field Validation Methodology.

The Connect Nevada website, www.connectnv.org, continues to serve a prominent role in the outreach and data collection effort. This program asset provides a way for the general public to participate in the process by offering interactive tools for users to test their connection speed, submit broadband inquiries, or contact a program representative.

As an indicator of stakeholder penetration, the Connect Nevada website encountered 1,951 unique visits during this reporting period (5,467 total to date for the life of the grant awarded on December 20, 2009). Additionally, this pronounced Web activity netted 2 broadband inquiries over this same reporting period (26 grant inception to date). The website also provides the BroadbandStat application, which allows the consumer to confirm or dispute the coverage represented on the broadband inventory map. These consumer-initiated actions are facilitated through the Connect Nevada website and the Connect Nevada interactive mapping tool (BroadbandStat) that offer the citizens the vehicles to provide information regarding availability in their respective service area, either in affirmation or contest of the reported data represented in the Connect Nevada mapping artifacts. Since the initial data collection and release of corresponding maps, feedback in the form of broadband inquiries has allowed Connected Nation to identify additional areas that are in need of field validation, which is scheduled as soon as possible.

Community Anchor Institutions

Connect Nevada has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBI NOFA Technical Appendix.

In conjunction with the Nevada Broadband Task Force, outreach was conducted during this data update reporting period by Connect Nevada to continue identification of existing, centralized sources for CAI connectivity data. Connect Nevada has specifically focused efforts during this reporting period on the education and library sectors through our coordination with the Nevada Department of Education and the Nevada State Library and Archives. Additionally, a CAI survey continues to be made available for all institutions on the Connect Nevada website and has been utilized for our outreach to schools and libraries. During this reporting period Connect Nevada has developed a number of new relationships with statewide associations such as the State Health IT Director and the Clark County Library District to promote the importance of broadband connectivity at anchor institutions and participation in this data collection process. Connect Nevada will continue to build upon these new relationships over the coming months and utilize its contacts throughout the state to collect data and raise awareness of this project.

During this reporting period a Connect Nevada CAI newsletter was developed and distributed to contacts throughout the state to assist with outreach and highlight Duckwater School, a small, rural, one-room school utilizing broadband to provide unique opportunities for its students. From our work in Nevada, as well as other states, we recognize the great value of this data to future collaboration efforts within the state as well as its value to the National Broadband Map. We plan to continue to bring best practices to the Connect Nevada efforts, along with an investment of both human and technical resources required to reach our goal of increasing the data that is secured and reported as part of this process.

In acquiring both broadband availability and CAI data within the state of Nevada, Connected Nation continues engagement with all federally recognized native communities in the area covered by the Connect Nevada SBI grant. During the last reporting period Connect Nevada was invited to present to the Inter-Tribal Council of Nevada and requested participation by the tribes with completing the Nevada CAI survey. Connect Nevada has distributed the CAI survey to the Council's participating members and will continue outreach throughout the next reporting period. Connect Nevada understands the connectivity challenges facing these communities, and we have identified a need to include their data as part of our upcoming submissions.

The Connect Nevada program exists to improve data on the deployment and adoption of broadband services and to assist in the extension of broadband technology across all regions of the great state of Nevada, as well as the United States through contribution to the National Broadband Map. We look forward to the continuing work ahead.

Respectfully submitted,

Thomas W. Ferree
Chief Operating Officer
Connected Nation, Inc.

DATA ACQUISITION: NEVADA COMMUNITY ANCHOR INSTITUTIONS METHODOLOGY

In this fourth reporting period of the SBI, Connect Nevada, working in close coordination with the Nevada Broadband Task Force, has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBI NOFA Technical Appendix. During this reporting period Connect Nevada has continued to focus efforts on conducting outreach and raising awareness of this important project.

Connect Nevada has continued to identify and process CAI data obtained through an ongoing statewide outreach campaign. Physical address information continues to be augmented through manual sourcing and geocoded by Connect Nevada through ESRI ArcGIS software.

Connect Nevada continues to utilize a customized online survey hosted through SurveyMonkey, with a landing page on the Connect Nevada website that was developed during the first reporting period. This survey, in combination with a customized data-gathering spreadsheet, was distributed to a targeted list of CAI throughout the state. Connect Nevada will continue to use these data-gathering tools for future targeted outreach efforts throughout the coming months leading up to the next reporting period. These materials are customized to fit the CAI categories as defined in the SBI NOFA.

The survey can be accessed at this link using the following password:
http://connectnv.org/mapping/Community_Anchor_Institution_Data_Collection.php
Password: CAI_NV_6549

During this reporting period Connect Nevada conducted research with the Nevada Broadband Task Force to identify existing, centralized sources for CAI connectivity data. One source that was identified within the state for this data for the healthcare sector is the Nevada State HIT Coordinator's Office. This office provided Connect Nevada with a database of broadband connectivity for thousands of healthcare providers throughout the state. This data is included within the submission and we will continue to work with this office over the upcoming reporting period.

In tandem with these efforts to identify existing data, Connect Nevada continues to identify key CAI contacts in an effort to distribute and promote the online survey and raise awareness of the importance of CAI broadband connectivity. Connect Nevada continues to work closely with statewide organization and government agencies such as the Nevada State Library and Archives and the Nevada Department of Education to distribute the CAI survey to contacts throughout the state.

Connect Nevada has an ongoing mission to educate CAI throughout the state on the importance of participating in the project. Participation by these institutions will raise awareness about the importance of broadband connectivity and the need to report the requested data for inclusion on the National Broadband Map. During this reporting period Connect Nevada developed and distributed a CAI newsletter to CAI contacts throughout the state across all CAI sectors with the assistance of the Nevada Broadband Task Force. This newsletter highlights Duckwater School, a one-room school in Nevada utilizing broadband Internet to connect its students with other students across the county. Additionally, the newsletter encourages institutions to share their data by participating in the

CAI online survey and highlights the release of the National Broadband Map. This newsletter will continue to be utilized for outreach, be made available on the CAI page of the Connect Nevada website, and be updated over the next reporting period.

The greatest challenge with collecting this data continues to be the difficulty in securing CAI broadband connectivity data for K-12 schools and public safety facilities. Connect Nevada is overcoming this challenge through developing a relationship with the Nevada Superintendent's Association and working with the group to jointly distribute our CAI survey. Additionally, we are investigating similar partnerships in the public safety sector. Connect Nevada expects noted progress to occur over the coming months leading up to the April 2012 submission and will continue to work in close coordination with the Nevada Broadband Task Force to raise awareness of this important project.

In acquiring both broadband availability and CAI data within the state of Nevada, Connect Nevada has previously engaged all federally recognized native communities in the area covered by the Connect Nevada grant and reported that outreach as part of past submissions. During this reporting period Connect Nevada continued to engage directly with these communities through a partnership with the Nevada Indian Commission. Connect Nevada, in a joint presentation with the Nevada Indian Commission, provided an overview of the CAI data collection efforts during a meeting of the Nevada Inter-Tribal Council. As a result of this outreach, Connect Nevada was provided an updated contact list for tribes throughout the state and created a customized survey that was distributed through multiple methods including utilizing the online survey and a paper survey. Connect Nevada understands the connectivity challenges facing these communities, and we have identified a need to include their data as part of our upcoming submissions.

A CAI summary of all processed and submitted data is provided below:

CAI Type	Total	Physical Address	Lat/Long	Technology of Transmission	Download Speed	Upload Speed
K-12	866	866	866	141	139	136
Libraries	91	91	91	44	42	42
Healthcare	5,004	5,004	5,004	26	4,965	4,965
Public Safety	108	108	108	4	9	9
Higher Ed Institutions	57	57	56	40	39	39
Other Government	836	836	834	48	97	97
Other Non-Government	1,706	1,706	1,705	15	550	551
Total	**8,668**	**8,668**	**8,664**	**318**	**5,841**	**5,839**

SBI Data Submission Methodology

The submission of the broadband dataset for October 1, 2011, is contained within the SBI Data Transfer Model and additional components as released on the Grantee Workspace on June 30, 2011. Connected Nation has reviewed all literature that relates to the release and use of this data transfer model and recognizes that it does not replace or dictate how data is stored, processed, or displayed for the state, as it is meant primarily as a means to transfer the broadband data from all states and territories and populate the National Broadband Map in a seamless fashion. Guidance from the

Technical Mapping Guide, as released on the Grantee Workspace on March 24, 2011, was also followed to ensure the completeness and validity of the submission through completion steps and checklists, completing the DataPackage spreadsheet, uploading broadband datasets into the Data Transfer Model, and checking the dataset using the SBDD_CheckSubmission receipt process.

As part of the ongoing review and analysis process, NTIA has requested further information in the submission of the DataPackage spreadsheet. In addition to the information on providers whose coverage and accompanying attributes are submitted in the SBI Data Transfer Model, information on other providers that are considered to be non-viable is also included in the DataPackage. Providers deemed non-viable that have been excluded from continued outreach may have been eliminated for reasons such as (i) the company offers Internet service but at speeds below the current definition of broadband; (ii) the company was listed in advertisements as a broadband provider, but is actually a network solution or consulting firm, etc.; (iii) the company may build or install network infrastructure, but does not actually provide the broadband service to consumers; and (iv) the company has gone out of business. The submitted DataPackage includes any relevant information that has been obtained through the course of due diligence and/or direct provider outreach, such as a Federal Registration Number (if applicable), the company's URL, the existence of an executed Nondisclosure Agreement, and brief notations regarding the status of the company.

In addition to the methodologies contained herein, as well as the DataPackage.xls containing contact information, the data dictionary, and a provider summary table, the following feature classes are submitted within the SBI Data Transfer Model for the state of Nevada.

Inventory of Deliverables, Connect Nevada: October 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area.
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles.
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address.
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points.
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing.

The provider data collected by Connected Nation on behalf of the state of Nevada have been formatted per the given specifications and uploaded into the appropriate feature classes of the SBI Data Transfer Model. Wireline availability is contained within census blocks and road segments, wireless availability is contained as polygons of coverage areas, and middle-mile connections and

Community Anchor Institutions are contained as point data. All speed data is contained at the census block, road segment, or wireless polygon level of availability. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information as possible.

Connected Nation has continued outreach to satellite providers on their availability, technology, and speed information, but granular coverage is not yet available. Submitted within the wireless feature class are the satellite companies providing service to Nevada as a polygon of the state boundary. Efforts will continue to collect, process, or otherwise create more granular satellite data based on availability analyses and guidance received from NTIA.

PROVIDER CHANGES AND CORRECTIONS FOR OCTOBER 2011

As requested by the SBI Program Office, a listing of the changes and/or corrections to the datasets between the April 2011 and October 2011 submissions is included in this narrative. This information is presented in this section as well as in the Broadband Provider Log. Changes to the data include expansion of service area(s), activation of new wireless towers, and upgrades to the network to provide higher download speeds to consumers. Corrections to the dataset include the addition of previously existing providers whose coverage has never been submitted, revision of coverage or speed information that was incorrect, and any other items that were misrepresented in the April 2011 dataset.

Changes

- Above All Communications, LLC (fixed wireless): New WISP provider.
- Above All Communications, LLC (DSL) New DSL provider.
- Arizona Nevada Tower Corporation (fixed wireless): Provider added a new tower, expanded coverage.
- AT&T Inc. (mobile wireless): Provider expanded coverage area.
- Baja Broadband Holding Company, LLC (cable): Provider upgraded its speeds to tier 7.
- CC Communications (fiber): Provider expanded coverage area and increased download speeds to tier 8.
- Filer Mutual Telephone Company (DSL): Provider upgraded infrastructure and can now offer download speeds in some areas of tier 7.
- Fort Mojave Telecommunications, Inc. (DSL): New provider in the market.
- Great Basin Internet Services, Inc. (fixed wireless): Provider added two new towers.
- KeyOn Communications, Inc. (fixed wireless): KeyOn took over WREC's towers. Coverage expanded.
- Moapa Valley Telephone (DSL): Provider upgraded infrastructure and can now offer download speeds of tier 7 in additional areas.
- Moapa Valley Telephone (fiber): Provider upgraded max download speed to tier 9.
- Rio Virgin Telephone Company (DSL): Provider upgraded infrastructure and can now offer tier 7 download speeds.
- Rio Virgin Telephone Company (fiber): Provider upgraded infrastructure and can now provide tier 10 download speeds.

- Robinson Communications Corporation (DSL): Provider upgraded infrastructure and can now offer tier 6 download speeds.
- Satview Broadband LTD (cable): Expanded coverage area.

Corrections

- Avant Wireless LLC (fixed wireless): Provider refused to participate. Coverage area and attributes extracted from its website.
- CC Communications (DSL): Provider revised service area extent.
- DISH Network Corporation (satellite): Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data.
- Hughes Network Systems, LLC (satellite): Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data.
- LasVegas.Net LLC (fixed wireless): Propagations were created to replace generalized polygons.
- ViaSat, Inc. (satellite): Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data.

Changes and/or Corrections – Entirely New Dataset Submitted

- AT&T Inc. (DSL)
- Cellco Partnership (mobile wireless)
- CenturyLink (DSL)
- Charter Communications, Inc. (cable)
- Citizens Telecommunications Company of Nevada (DSL)
- Clearwire Corporation (fixed wireless, mobile wireless)
- CoxCom Inc. (cable)
- Leap Wireless International, Inc. (mobile wireless)
- Sprint Nextel Corporation (mobile wireless)
- T-Mobile USA, Inc. (mobile wireless)

Nevada Field Validation Methodology

Connected Nation focused a portion of its time on specific validation processes such as:

- conducting random spectrum analysis studies throughout the state using an Avcom PSA-37-XP spectrum analyzer;
- conducting mobile speed tests throughout the state using an iPhone, Android (or other smart phone) as well as provider-specific aircards (Sprint 3G/4G, Clearwire et al);

- identifying pre-selected, provider-submitted wireless transmit tower sites and cross-referencing data about that tower against the Federal Communications Commission (FCC) databases such as Antenna Structure Registration and/or the Universal Licensing System;
- cross-referencing Federal Registration Number data against available FCC Form 477 data as well as the FCC **CO**mmission **RE**gistration **S**ystem (CORES);
- validating provider submitted data (for example: latitude/longitude) using a handheld Garmin eTrex Summit GPS unit or GPS enabled software such as Microsoft Streets and Trips;
- locating physical wire-line attributes (such as Remote Terminals, CATV plant, etc.) and comparing them against provider submitted data; and
- conducting on-net and off-net speed tests using the FCC portal at http://www.broadband.gov/qualitytest/about/ or using the Ookla Net Metrics enabled speed test utility located on each of Connected Nation's state specific websites.

Additionally, Connected Nation cross-referenced numerous public documents in order to ensure that all known broadband providers were located and contacted. This included searching membership logs from the trade associations (WISPA, WCAI, PCIA, etc.), the Cable Television Fact Book, Public Utility Commission records, Public Service Commission records, Chamber of Commerce, etc.

To date, Connected Nation's staff conducted on-site validation tests in Nevada on the following providers: A & J Hardy Enterprises, Inc. (d.b.a. Comnett Computer Services, Peak Internet Services) Arizona Nevada Tower Corporation; AT&T, Inc.; Baja Broadband LLC; Beehive Telephone Company, Inc.; CalNeva Broadband LLC; CC Communications; CenturyLink; Charter Communications; Citizens Telecommunications Company of Nevada (d.b.a. Frontier Communications of Nevada); Clearwire Corporation; Cox Communications; ETAN Industries (d.b.a. Clark Cablevision, CMA Cablevision); Great Basin Internet Services; High Desert Internet Services; High Speed Networks-Mound House LLC; KeyOn Wireless; Las Vegas.Net; Leap (d.b.a. Cricket License Company LLC); Lincoln County Telephone; Moapa Valley Telephone Company; Mount Wheeler Power; Nextweb-Covad; Oasis Online, Inc.; Oregon-Idaho Utilities, Inc. (d.b.a. Humboldt Telephone Company); Performance Computing Internet Reliance Connects (d.b.a. Virgin Telephone & Cablevision); Satview Broadband LTD; Schatnet Internet LLC; Sprint Nextel Corporation; United Cable Management; Vegas Wi-Fi Communications LLC; Verizon Wireless; Wells Rural Electric Telephone; and Yonder Media.

From program initiation through this reporting period, Connected Nation has completed in-the-field validation testing against 37 companies (out of a universe of 58 viable providers) totaling 63.79 percent within the state of Nevada.

Connected Nation has also continued to review provider datasets for accurate speed information, platform listings, and other intricacies that may fall outside of the standard SBI Data Transfer Model parameters. Any providers whose submitted coverage and attributes are anticipated to come into question have been further reviewed and confirmed; details on a case-by-case basis are presented below.

CalNeva Broadband
Issue: Technology of transmission 40 with maximum advertised download speed in tier 4, lower than expected value range for the technology.
Resolution: Additional information on the technology in use was not received and the dataset is submitted as-is; work will continue on the technology clarification.

Charter
Issue: Technology of transmission 41 with maximum advertised download speed in tier 8, higher than expected value range for the technology.
Resolution: Provider representative confirmed that speed tier 8 is available without the use of DOCSIS 3.0 technology.

Great Basin Internet Services
Issue: Fixed wireless platform with a maximum advertise download speed in tier 7, higher than expected value range for the technology.
Resolution: Provider's website advertises 12 Mbps; screenshot available below.

STARTER		
	1 x 1 (down vs. up mbps speed)	$24.95 (monthly)
	2 x 1 (down vs. up mbps speed)	$29.95 (monthly)
	4 x 2 (down vs. up mbps speed)	$39.95 (monthly)
	8 x 2 (down vs. up mbps speed)	$49.95 (monthly)
	12 x 3 (down vs. up mbps speed)	$69.95 (monthly)

DATA SUBMISSION AND COVERAGE ESTIMATION OF NON-PARTICIPATING PROVIDER

Avant Wireless, LLC

As part of its ongoing broadband mapping efforts, Connected Nation (CN) has developed a series of processes with the goal of submitting mapping data to NTIA for every known and qualifying broadband provider, regardless of whether the provider has chosen to support and participate in the SBI mapping initiative.

The following narrative provides detail regarding the recent data collection activities related to Avant Wireless, LLC, a wireless Internet service provider (WISP), located in Carson, Nevada, with a service area around Reno, Washoe Valley, Spanish Springs, Palomino Valley, Pleasant Valley, and Stead Airport. The narrative will include information regarding how and where CN obtained publicly available data.

Background
CN staff members have continued trying to obtain the participation of the provider with seven instances of communication via telephone and e-mail sessions since February 11, 2010, through August 4, 2011. Provider replies on April 17, 2011, and August 4, 2011, have clearly indicated this provider has no interest in participating.

The Issue
Avant Wireless, LLC, by its lack of responsiveness since February 11, 2010, has predicated its unwillingness to participate in the Nevada broadband mapping initiative.

Identification of Provider's Service Plans, Service Area, Legal Name, d.b.a., FRN, and Licensing
CN began building a file based on research information and, as time progressed, enriched the file with information obtained through the public domain. For example, CN reviewed the provider's website (www.avantwireless.com) to determine the residential service plans **(Exhibit A)** and the service area **(Exhibit B)** of the provider's wireless network. A search for a Federal Registration Number ("FRN") on the FCC **CO**mmission **RE**gistration **S**ystem ("CORES") system for Avant Wireless, LLC, Avant Wireless, and Avant * and yielded no FRN. Exhibit A is presented on the following page.

Exhibit A: Service Plans

Avant Wireless, LLC

Typical Residential service is $45.95/month and $150 Installation fee
1 Install Rate
Basic One-time Installation $150 standard $200-$400 for special/business installations, $300 typical • If customer purchases equipment (not recommended*) installation is free • If customer purchases equipment monthly, one time installation fee is $75 • Beyond Basic Installation contact us for details
2 Equipment Purchase Price (Not Recommended*)
• Radio, antenna, power supply and cable $249.99 + tax
3 Equipment Lease Price
• Radio, antenna, power supply and cable $17 + tax for 12 months
Choose Only One of the above 3 options
Monthly Service Fees (Residential) this is guaranteed rate, speed will typically be around Max speed. Our outbound speeds are the same as the inbound speeds.
1. 128 kilobits/sec min rate - **7** megabits/sec Max $45.95/month $60/month Mt Rose area
2. 1 megabit/sec min rate - **10** megabits/sec Max $60/month

Exhibit B: Service Area

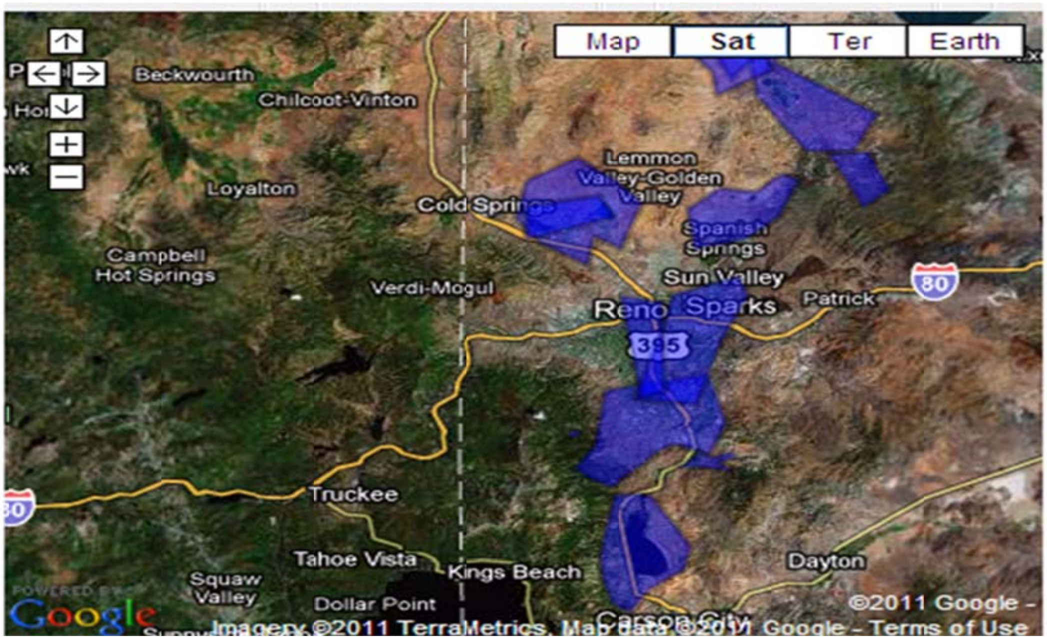


Exhibit C: Federal Registration Number Search Results

FCC Registration

FCC > FCC Registration

Search Public Information

Return to FCC Registration Home

Displaying Records 1-10 (of 19)

Page: PREVIOUS 1 2 NEXT

FRN	Registrant	Contact	Address	City	State
0001881929	Avant Construction Company Inc		2035 Wolfe Creek Rd	Walterboro	SC
0002504603	Avant Ministries	Shaner, Mr. Ricky L	210608	Auke Bay	AK
0007345952	Avante International Technology, inc.	Chu, Cynthia	70 Washington Road	Princetion Junction	NJ
0010078038	Avanti Hearth Products	Packard, Mr. Loren C	204 So. Avon Street, suite 200	Gastonia	NC
0010181345	Avant Fire Dept	Soule, Mr. Dale M	P.O. Box 147, 100 S. Broadway	AVANT	OK
0010314615	Avantair, Inc.	Gancarz, Eric J	27 Wight Way, Suite 10	Fairfield	NJ
0010582351	Avant Fire Department		26941 Cabot Rd #134	Laguna Hills	CA
0012035226	Avant Public School	Frazier, Ms. Susan G	207 E. Main	Hominy	OK
0012709010	AVANTI HIGH SCHOOL	Morsette, Ron	1113 LEGION WAY S.E.	OLYMPIA	WA
0013594890	Avantic Corporation	Nihill, Mr. Julian D	4514 Cole Avenue, Suite 806	Dallas	TX

Page: PREVIOUS 1 2 NEXT

REFINE SEARCH

Preliminary Identification of Provider's Coverage Area

Connected Nation extracted the Avant Wireless, LLC service area map polygons from its website. The degree of accuracy of the image overlay was maintained at less than .2 mile (1058 ft.) to establish a minimum search criteria of a given access point.

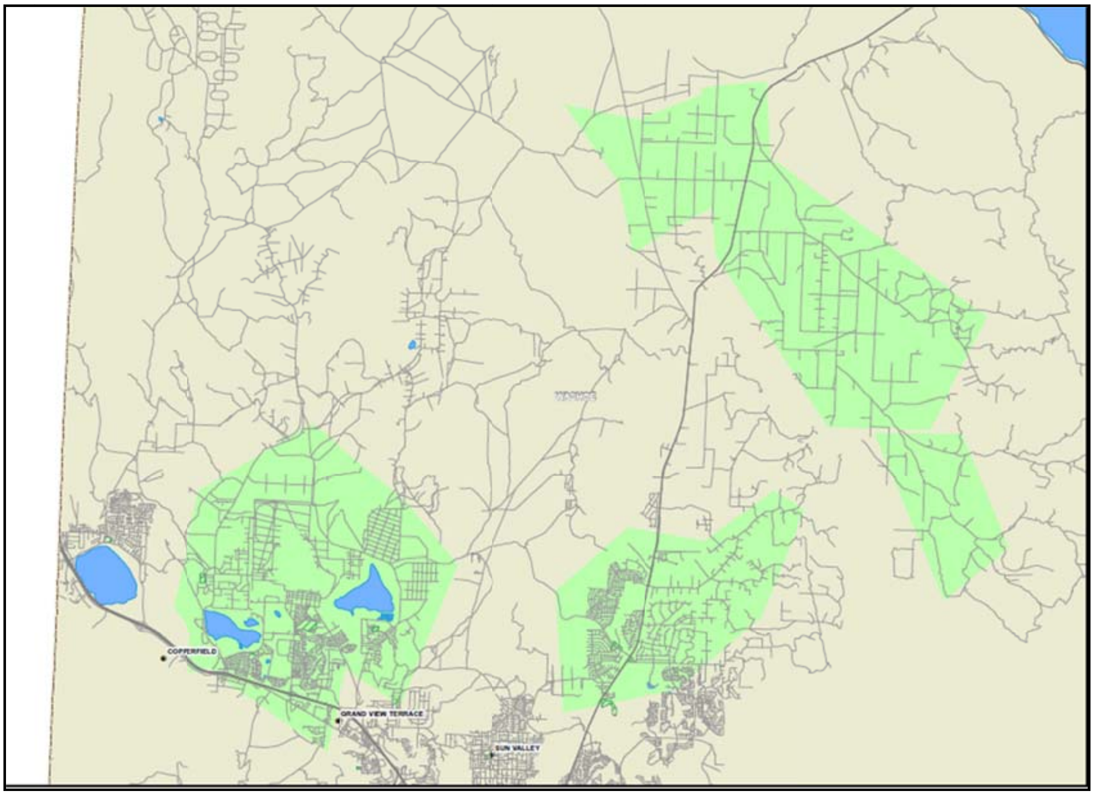
Testing Techniques

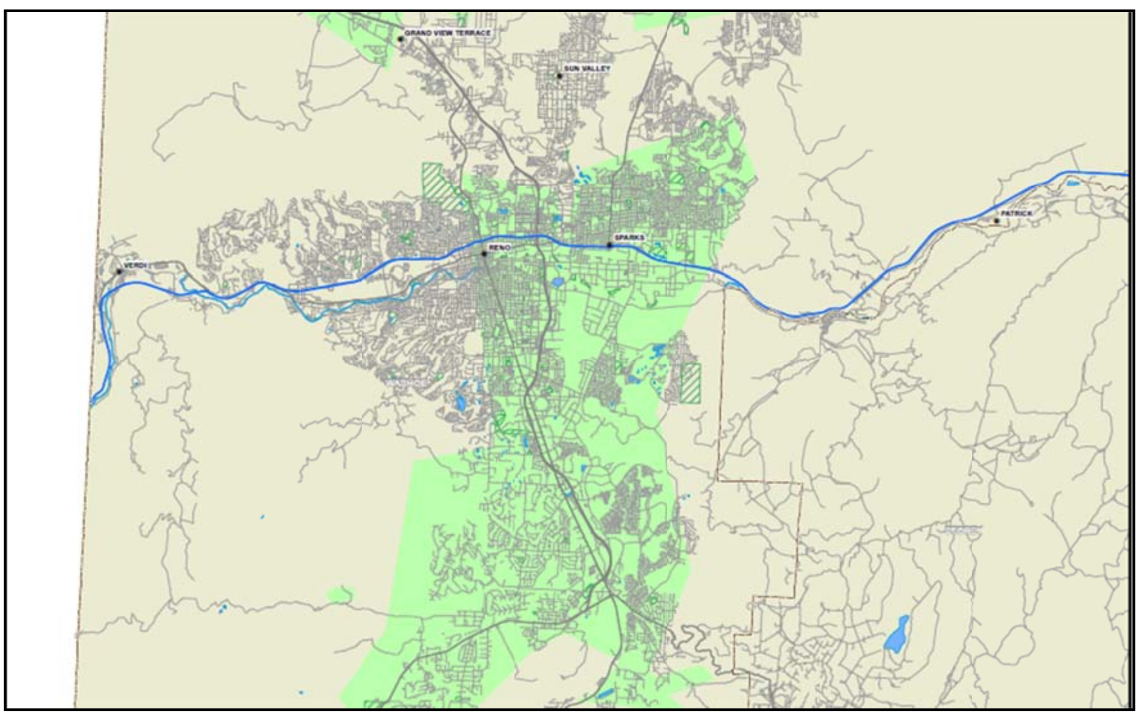
Connected Nation staff will develop a site validation plan of action based on data established with the Google Earth image overlay and publicly available data through the FCC ULS database for Avant Wireless, LLC. Such plan of action will seek to identify each transmitting location and frequency. Once this information is gathered, a Connected Nation engineer will develop propagation maps for each frequency emanating from each transmit site to validate the provider's service area. The CN wireless engineer will be equipped with an AVCOM PSA-37XP analyzer with RF detection from 1MHz to 6GHz and an array of antennas tuned specifically for the 900 MHz, 2.4 GHz, 3.65 GHz, and 5 GHz frequency bands. Each validation point will be scrutinized for frequency of operation to ascertain if multiple frequencies are being utilized by the provider. A screen image of the operating frequency (or frequencies) will be captured; general notes will be recorded for each location – approximate antenna height, frequency of operation, antenna type (omni or sectored), and photographs will be taken of the access points.

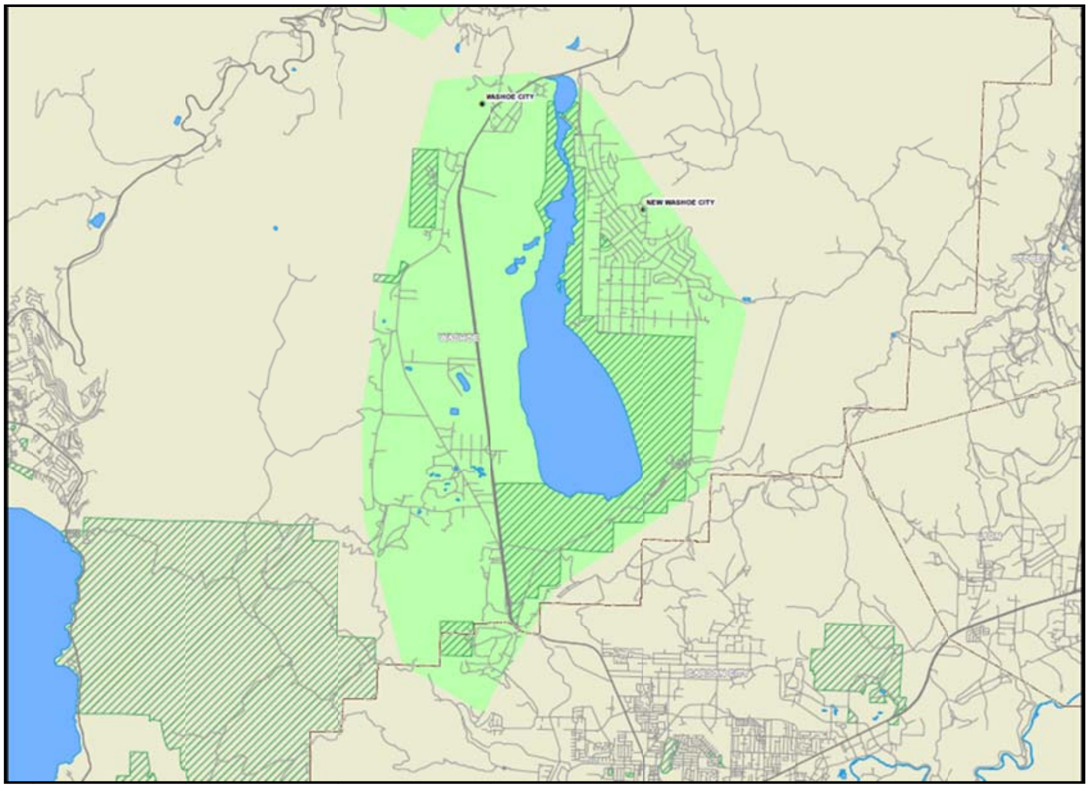
Results and Submission for October 2011

The publicly available data was transferred to the Connected Nation Provider Information file. A composite propagation study was completed based the service area map polygons extracted from the provider's website **(Exhibit D)** and is presented on the following pages.

Exhibit D: Avant Wireless, LLC Composite Coverage







ACCURACY AND VERIFICATION: PROVIDER VALIDATION METHODOLOGY

Broadband providers maintain their service area data in many different formats, all in varying levels of complexity and granularity. In order to ensure that the data required by the NTIA is standardized across all providers and that it is as accurate as possible, Connected Nation translates and formats the data that providers are able to supply into a GIS shapefile and produces maps for the provider to review. The resulting map(s) and review process allow for providers to see their service area in a geographic format – for some providers, this is the first time they have seen maps of their broadband service area. Having the mapped service area allows providers to quickly identify any issues that appear in the data representation, whether the issue is in the data translation into a GIS format or from the original data collection and submission. Often data is provided from various sources and through the review and revision process, local engineers who operate the networks and work in the field are able to ensure that the tabular data that has been submitted is accurate and represents the real-world network extent. Any issues in how the service area is represented on the map(s) are remedied by Connected Nation, whether they are additions, removal of service, or any other revisions. Revised maps of service area representations are sent to the provider for review and approval; Connected Nation will revise data and return maps as many times as necessary until the provider is in agreement that the map represents their service area as accurately as possible. Once the review process has been completed and final approval of the data is provided, the data is deemed ready for NTIA submission.

Once the data collection has been aggregated at a statewide level, static maps of statewide and county-level availability are produced and made publicly available. In addition, consumers can visit the interactive online tool, BroadbandStat, to create customized views of broadband service areas and analyze corresponding demographic information. Leveraging broadband service data on various platforms allows for public users, providers, and other stakeholders to review, scrutinize, and provide feedback on the represented data. This feedback becomes a validation method in itself as consumers submit inquiries to Connected Nation either affirming where service is not available or identifying areas where broadband service is shown on the map, but in actuality is not available. This allows for a follow-up to providers regarding revisions to the data as it is represented; it also allows for Connected Nation to identify locations where on-site visits may be necessary to complete field validation of available services. Public feedback on all forms of mapping products serves as a localized validation method for provider-supplied information and allows Connected Nation to resolve inaccuracies as they are identified to ensure that only the highest quality information is provided to stakeholders.

Estimates derived from provider-validated data indicate that approximately 1.07 percent of Nevada households do not have terrestrial fixed broadband service available, and approximately 0.22 percent[1] of Nevada households have neither mobile nor fixed broadband service available.[2]

Within rural areas of the state, results derived from provider-validated data indicate that approximately 7.04 percent of rural Nevada households do not have terrestrial fixed broadband service available, and approximately 1.61 percent[3] of rural Nevada households have neither mobile nor fixed broadband service available.[4] Please note that the availability estimates presented are based on Census 2000 household information; these figures will be updated in the near future with Census 2010 household information.

WIRELESS METHODOLOGY

Broadband Service Availability in Provider's Service Area
Wireless Services Not Provided to a Specific Address

Data solicited from a fixed wireless provider to create propagation models include, but are not limited to:

1. The name of the structure
2. Whether the transmitting device is operational or proposed
3. The maximum advertised downstream speed, the maximum advertised upstream speed
4. The typical downstream speed, the typical upstream speed (peak periods for both)

[1] In accordance with NTIA's definition of available broadband service as specified in the SBI NOFA, this estimate includes both terrestrial fixed *and* mobile broadband service, if the service offers download speeds of at least 768 Kbps and upload speeds greater than 200 Kbps.

[2] Due to the nature of the SBI data collection methodology as defined by the NTIA and based on both census block geographic units and street segment data, the estimates of broadband availability derived from provider-validated data may include an overstatement of the actual number of households with broadband availability. Under the census block-based data collection method, a provider will typically report broadband availability for an entire census block whether its network is present across the whole or only a subset of that census block. This potential overestimation at the census block level can be amplified as the data is aggregated across the entire state.

[3] See footnote 1.

[4] See footnote 2.

5. The frequency range of spectrum being used (as prescribed by NTIA)
6. The primary population center(s) being served (for geopolitical boundary reference)
7. The physical address of the transmit site (in the event latitude/longitude is unavailable from the provider this allows a quick reference point for geocoding)
8. Latitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
9. Longitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
10. Antenna pattern (e.g. omni-directional, 180°, 120°, 90°, etc.)
11. Azimuth of antenna (e.g. 360° with magnetic declination if known)
12. Approximate transmit radius (in feet, miles, or kilometers)
13. Polarity of transmit antenna (Vertical or Horizontal)
14. Transmit antenna gain (in dBi)
15. Line loss (applicable only to providers using coax, heliax, waveguide or other forms of cabling – excludes power-over-Ethernet devices)
16. Mechanical and/or Electrical beam tilt (if applicable)
17. Equipment Manufacturer (allows easy cross-reference against manufacturer's specification sheet)
18. Power output of the transmitting device (if unknown, FCC standards or manufacturer specifications are applied)
19. AMSL at base of tower site
20. Antenna centerline AGL (height of antenna above ground level measured at the centerline of the actual antenna)
21. Foliage factors (Evergreens/Deciduous and percent of ground cover)
22. Ground Clutter (primarily used in rural areas to account for foliage and in metropolitan areas to account for types and heights of buildings if known)
23. Average gain of receive antenna
24. Receive antenna is estimated at height above average terrain (HAAT) of 6.2 meters/20 feet
25. Federal Registration Numbers (if applicable) which may allow opportunities to cross-reference and/or obtain additional data from the Federal Communications Commission Universal Licensing System and the **CO**mmission **RE**gistration **S**ystem

Propagation modeling is an empirical mathematical formulation for the characterization of radio wave propagation as a function of frequency, distance, and other conditions. Propagation software(s) typically use the Irregular Terrain Model (also known as Longley-Rice) of radio propagation for frequencies between 20 MHz and 20 GHz. This model is based on electromagnetic theory and statistical analyses of the combination of terrain features and radio measurements, then predicting the median attenuation of a radio signal as a function of distance and the variability of the signal in time and in space. For metropolitan areas, the software can typically be adjusted to use the Okumura-Hata model which accounts for predicting the behavior of cellular transmissions in areas where buildings are the primary obstructions. The resulting product from either model depicts a graphical illustration of the theoretical propagation characteristics of a selected frequency range based on defined variables (receiver sensitivity of the home/mobile device, foliage factor, and digital elevation terrain input).

After converting propagation models into a geospatial format, additional processing is completed to remove the small pixels representing service present in the resulting dataset. These areas are initially created based on the parameters entered in the software from the provider equipment information, the underlying data parameters of elevation, hillshade, etc., and the limitations of the software itself to display a broadband service area as accurately as possible. Generally, these random pixel striations appear as a result of signal levels reaching the highest elevated points within the prescribed radius. Typically, while this pixilation anomaly shows legitimate areas where signals can be received, these highly elevated points may have exceedingly sparse populations or are entirely void of population. As a result, and congruent to the *Wireless Technology Methodologies and Business Logic* white paper submitted to NTIA on January 20, 2011, all independent pixels representing service that are less than 0.125 square miles in area have been removed from the geospatial representation of each wireless provider.

BROADBAND INQUIRIES METHODOLOGY

Connected Nation collects consumer feedback in the form of broadband inquiries (BBIs). These inquiries represent any type of communication received from the public regarding broadband service. Once BBIs are received across the state, this information is overlaid with the broadband availability information which was collected through the SBI program. This allows for a real-world comparison of the broadband landscape to the information received from broadband inquiries. Consumers submitting these inbound comments and/or inquiries are able to provide information regarding three categories: 1) residents who do not have broadband but want it; 2) residents who have broadband but want a different provider; and 3) residents who do not have broadband, but the broadband inventory maps indicate that they do.

BBIs are submitted frequently by consumers via the Connect Nevada website. Inquiries often seek help to identify local broadband provider options, or to learn when a specific provider may be able to provide service to that consumer. Consumer comments also provide information which may help modify maps with actual service area information. The primary objectives of Connected Nation regarding these inquiries are 1) to improve the accuracy of the state maps with submitted consumer information and follow-up field research; 2) to provide broadband options to consumers through cooperation with mapped providers and by facilitating new broadband service options; and 3) to map and analyze information from consumers about areas of unmet broadband demand and alternatives to currently mapped services.

New BBIs are assigned to either the GIS department or the Engineering & Technical Services (ETS) team depending on the category entered by the consumer on the website submission form. The GIS or ETS team members respond to each inquiry according to the information requested by the consumer. Many BBIs can be resolved through desktop research; however, if a BBI requires research in the field, the assigned ETS team member conducts such research when performing field validations in the area of the inquiry, or at other such time as is practical and appropriate. GIS and ETS team members respond to and conclude BBIs via telephone contact and/or e-mail communication.

The broadband inquiry process has been implemented in each of the Connected Nation state programs with successful results. Altogether Connected Nation has received over 17,000 broadband inquiries since 2007, allowing the state programs to evaluate each inquiry for broadband demand and data verification. These inquiries are continuously examined against current broadband availability, updated every six months, to determine if previously unserved households have been expanded to and can now receive broadband at their residence. This database of broadband inquiries has also allowed the Connected Nation state programs to aggregate demand in concentrated areas to show providers the exact locations where the population has made it clear that they would purchase broadband if it was made available to them. Providers in the states have responded to this process and have expanded to areas knowing that their investment will be worthwhile. Data verification methods have also proven successful, as the state programs have been able to show those inquiries that indicate the broadband service areas are misrepresented on the map to providers, who then verify where service cannot reach in regard to that residence(s). The broadband coverage in these states has been altered to create a more accurate map based on the inquiries submitted by the public.

During this reporting period, the Connect Nevada project has received a total of 2 inquiries (26 grant inception to date). As more inquiries are submitted to Connect Nevada, a more thorough validation of the broadband landscape can be performed, while also allowing providers to see which areas have a high demand for broadband adoption.

BroadbandStat Methodology

BroadbandStat is an online, interactive mapping tool for viewing, analyzing, and validating broadband data. Developed through a partnership with ESRI, the market leader in geographic information system (GIS) software, BroadbandStat is a multi-functional, user-friendly way for local leaders, policymakers, consumers, and technology providers to devise a plan for the expansion and adoption of broadband.

First and foremost, BroadbandStat allows consumers to locate their residence and identify providers that offer broadband Internet service to that location. The interactive platform allows for users to build and evaluate broadband expansion scenarios using a wealth of data, including education and population demographics, broadband availability, and research about the barriers to adoption.

New functionality in BroadbandStat allows the consumer to provide feedback on the broadband data displayed on the interactive map. Through the collection of this feedback, a visual demand for broadband is presented. This visualization allows the Connected Nation state programs the ability to validate the broadband availability for accuracy. If residents within a region state they are without broadband, but the interactive map shows otherwise, this allows Connected Nation to approach the providers within that area in an effort to trim down their coverage to more accurately represent real-world availability on the ground.

The Connect Nevada project launched BroadbandStat on June 3, 2010, and has received a total of 1,386 visits to date, of which 332 occurred this reporting period.

SPEED TEST METHODOLOGY

The 262 speed tests that are represented in the Connect Nevada Speed Test Report during this reporting period (522 grant inception to date) are the result of a partnership between Connected Nation and Ookla Net Metrics. Utilizing this relationship increases the level of confidence in the data being collected and provides for a far greater sample size than could be collected by a single testing site.

Ookla owns and operates Speedtest.net, as well as develops and deploys speed tests, such as the Connect Nevada speed test website, for partners around the world. This network of sites that is developed and run on its testing technology provides Ookla with a vast dataset that, due to the variability of geographic information collected across the varying speed test sites, is geocoded utilizing Geo-IP technology. This technology allows for tests to be geocoded to points of aggregation, typically larger nodes across provider networks. While there are hundreds of thousands of tests that have been conducted, the level of aggregation is only sufficient for county-level detail due to the test results being located at these larger nodes and not at an absolute location for each speed test.

In an effort to validate broadband data from the Connect Nevada project, speed test information is collected throughout the state. Speed tests provide speed information on the path taken through all networks (a provider's network as well as additional networks) a local machine must connect to in order to reach the host test. The benefit of this collection of speed information is two-tiered. First, it allows for a comprehensive dataset of speeds, while also providing Connect Nevada with the information on where broadband services are available. Second, unlike theoretical speed information which was received through the data collection process, the use of speed tests provide real-world information on the speeds that currently exist within the state of Nevada.

Broadband Provider Log

Complete	70
Non-Responsive/Refused	4
In Progress	2
Count of Datasets by Status	**76**
Total Unique Providers Represented	**58**

Provider Name	Platform	Status	NDA Execution Date	Notes
Above All Communications, LLC	DSL	Data Added to Statewide Inventory		[SEP-12-11 Jess Cary] Change: New DSL Provider.
Above All Communications, LLC	Fixed Wireless	Data Added to Statewide Inventory		[SEP-13-11 Jess Cary] Change: New WISP provider.
Arizona Nevada Tower Corporation	Fixed Wireless	Data Added to Statewide Inventory	3/8/2010	[SEP-13-11 Jess Cary] Change: Provider added a new tower, expanded coverage.
AT&T Inc.	DSL	Data Added to Statewide Inventory	12/16/2009	[SEP-12-11 Jess Cary] Changes and/or Corrections: possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
AT&T Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/16/2009	[SEP-12-11 Jess Cary] Change: Provider expanded coverage area.
Baja Broadband Holding Company, LLC	Cable	Data Added to Statewide Inventory	2/22/2010	[SEP-12-11 Jess Cary] Change: Provider upgraded their speeds to tier 7.
CC Communications	Fiber	Data Added to Statewide Inventory	6/11/2010	[SEP-12-11 Jess Cary] Change: Provider expanded coverage area and increased download speeds to tier 8.
CC Communications	DSL	Data Added to Statewide Inventory	6/11/2010	[SEP-12-11 Jess Cary] Correction: Provider revised service area extent.
Cellco Partnership	Mobile Wireless	Data Added to Statewide Inventory	12/14/2009	[SEP-12-11 Jess Cary] Changes and/or Corrections: possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
CenturyTel, Inc.	DSL	Data Added to Statewide Inventory	12/4/2009	[SEP-12-11 Jess Cary] Changes and/or Corrections: possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Charter Communications, Inc.	Cable	Data Added to Statewide Inventory	12/15/2009	[SEP-12-11 Jess Cary] Changes and/or Corrections: possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Citizens Telecommunications Company of Nevada	DSL	Data Added to Statewide Inventory	1/22/2010	[SEP-16-11 Jess Cary] Changes and/or Corrections: possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Clearwire Corporation	Mobile Wireless	Data Added to Statewide Inventory	3/3/2010	[SEP-12-11 Jess Cary] Changes and/or Corrections: possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Clearwire Corporation	Fixed Wireless	Data Added to Statewide Inventory	3/3/2010	[SEP-12-11 Jess Cary] Changes and/or Corrections: possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
CoxCom Inc.	Cable	Data Added to Statewide Inventory	2/3/2010	[SEP-12-11 Jess Cary] Changes and/or Corrections: possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Filer Mutual Telephone Company	DSL	Data Added to Statewide Inventory	2/9/2010	[SEP-13-11 Jess Cary] Change: Provider upgraded infrastructure and can now offer download speeds in some areas of tier 7.
Fort Mojave Telecommunications, Inc.	DSL	Data Added to Statewide Inventory		[SEP-12-11 Jess Cary] Change: New provider in the market.
Great Basin Internet Services, Inc.	Fixed Wireless	Data Added to Statewide Inventory	4/6/2010	[SEP-12-11 Jess Cary] Change: Provider added two new towers.
LasVegas.Net LLC	Fixed Wireless	Data Added to Statewide Inventory		[SEP-13-11 Jess Cary] Correction: Propagations were created to replace generalized polygons.
Leap Wireless International, Inc.	Mobile Wireless	Data Added to Statewide Inventory	4/6/2010	[SEP-12-11 Jess Cary] Changes and/or Corrections: possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Moapa Valley Telephone	Fiber	Data Added to Statewide Inventory	2/22/2010	[SEP-12-11 Jess Cary] Change: Provider upgraded max download speed to tier 9.
Moapa Valley Telephone	DSL	Data Added to Statewide Inventory	2/22/2010	[SEP-13-11 Jess Cary] Change: Provider upgraded infrastructure and can now offer download speeds of tier 7 in additional areas.

Rio Virgin Telephone Company	Fiber	Data Added to Statewide Inventory		[SEP-13-11 Jess Cary] Change: Provider upgraded infrastructure and can now provide tier 10 download speeds.
Rio Virgin Telephone Company	DSL	Data Added to Statewide Inventory		[SEP-12-11 Jess Cary] Change: Provider upgraded infrastructure and can now offer tier 7 download speeds.
Robinson Communications Corporation	DSL	Data Added to Statewide Inventory	2/25/2010	[SEP-12-11 Jess Cary] Change: Provider upgraded infrastructure and can now offer tier 6 download speeds.
Satview Broadband LTD	Cable	Data Added to Statewide Inventory	1/11/2010	[SEP-12-11 Jess Cary] Change: Expanded coverage area.
Sprint Nextel Corporation	Mobile Wireless	Data Added to Statewide Inventory	1/14/2010	[SEP-12-11 Jess Cary] Changes and/or Corrections: possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
T-Mobile USA, Inc.	Mobile Wireless	Data Added to Statewide Inventory	1/8/2010	[SEP-12-11 Jess Cary] Changes and/or Corrections: possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Vegas Wifi Communications LLC	Fixed Wireless	Data Added to Statewide Inventory	4/7/2010	[SEP-13-11 Jess Cary] Change: New tower added, coverage area expanded.
360networks	Backhaul	Backhaul Provider Only Processing Complete	1/19/2010	
CenturyTel, Inc.	Backhaul	Backhaul Provider Only Processing Complete	12/4/2009	
CoxCom Inc.	Backhaul	Backhaul Provider Only Processing Complete	2/3/2010	
Level 3 Communications, Inc.	Backhaul	Backhaul Provider Only Processing Complete	12/14/2009	
MegaPath Inc.	Backhaul	Backhaul Provider Only Processing Complete	2/15/2010	
Sprint Nextel Corporation	Backhaul	Backhaul Provider Only Processing Complete	1/14/2010	
T-Mobile USA, Inc.	Backhaul	Backhaul Provider Only Processing Complete	1/8/2010	
U.S. TELEPACIFIC CORP	Backhaul	Backhaul Provider Only Processing Complete	2/25/2010	
Zayo Bandwidth, LLC	Backhaul	Backhaul Provider Only Processing Complete		
Avant Wireless LLC	Fixed Wireless	Estimated Coverage Submitted for Non-Participating Provider		[APR-17-11 Charlie Roodenburg] Received reply from company representative stating they are not interested in participating due to bad experiences with previous big business methodology. Indicated they have a public map. [SEP-13-11 Jess Cary] Correction: Provider refused to participate. Coverage area and attributes extracted from their website.
Arizona Nevada Tower Corporation	Fixed Wireless	No Update to Provide	3/8/2010	
Beehive Telephone Co., Inc. NV	Fixed Wireless	No Update to Provide	4/5/2010	
Beehive Telephone Co., Inc. NV	DSL	No Update to Provide	4/5/2010	
CalNeva Broadband, LLC	Cable	No Update to Provide	4/8/2010	
Cellco Partnership	Backhaul	No Update to Provide	12/14/2009	
CenturyTel, Inc.	Backhaul	No Update to Provide	12/4/2009	
Citizens Telecommunications Company of Nevada	Backhaul	No Update to Provide	1/22/2010	
DISH Network Corporation	Satellite	No Update to Provide	1/27/2010	[SEP-16-11 Jess Cary] Correction: Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data.
ETAN Industries	Cable	No Update to Provide		
High Desert Internet Services	Fixed Wireless	No Update to Provide		
Highlands Wireless Inc.	Fixed Wireless	No Update to Provide		
Hot Spot Broadband, Inc.	Fixed Wireless	No Update to Provide		
Hughes Network Systems, LLC	Satellite	No Update to Provide	2/5/2010	[SEP-16-11 Jess Cary] Correction: Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data.
InfoWest, Inc.	Fixed Wireless	No Update to Provide		
Lincoln County Telephone System	DSL	No Update to Provide	3/5/2010	
Lincoln County Telephone System	Fiber	No Update to Provide	3/5/2010	
Martell Telecommunications	DSL	No Update to Provide	3/23/2010	
Mt. Wheeler Power	DSL	No Update to Provide	4/5/2010	
Mt. Wheeler Power	Fixed Wireless	No Update to Provide	4/5/2010	
NextWeb, Inc.	Backhaul	No Update to Provide	1/19/2010	
Oasis Online, Inc.	Fixed Wireless	No Update to Provide		
Schatnet Internet LLC	Fixed Wireless	No Update to Provide		
SMS Computing, Inc.	Fixed Wireless	No Update to Provide	3/19/2010	
Tele-NET.net LLC	Fixed Wireless	No Update to Provide		
tw telecom of nevada, llc	Backhaul	No Update to Provide	4/27/2010	
ViaSat, Inc.	Satellite	No Update to Provide	1/8/2010	[SEP-16-11 Jess Cary] Correction: Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data.
XO Communications, Inc.	Backhaul	No Update to Provide	6/2/2010	
Yonder Media	Fixed Wireless	No Update to Provide		
Cogent Communications, Inc.	Backhaul	No Update Provided - Use Last Submission Data		
KeyOn Communications, Inc.	Fixed Wireless	No Update Provided - Use Last Submission Data	10/15/2009	[SEP-12-11 Jess Cary] Change: KeyOn took over WREC's towers. Coverage expanded.

Nevada System of Higher Education	Backhaul	No Update Provided - Use Last Submission Data		
American Wireless Networks, Inc.	Fixed Wireless	Solicited Initial Data		
U.S. TELEPACIFIC CORP	Fixed Wireless	Other	2/25/2010	[AUG-30-11 Ashley Littell] Covad Wireless (dba under NextWeb) was acquired by TelePacific and operation is now as a business provider and no longer residential.
Pyramid Net	DSL	Refused to Participate		[AUG-5-2011 Charlie Roodenburg] A representative of the company replied to a request for participation by asking that they be removed from our list.
ACI, Inc.	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to contact attempts made on July 1, 2010 and January 5, 2011, 2 additional attempts were made this period.
Air-Internet, Inc.	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to contact attempts made on July 1, 2010 and January 5, 2011, 2 additional attempts were made this period.
Ezznet, Inc.	Fixed Wireless	Non-Responsive to Multiple Attempts		5 contact attempts were made between April 17, 2011 and August 8, 2011.

"White Paper" from *New York* describing Round 4 (Fall, 2011) Data Submission to the NTIA under the SBDD

October 1, 2011

Executive Summary

The Broadband Mapping Team at the New York State Office of Cyber Security (OCS) is pleased to submit our Round 4 (Fall 2011) data for the State Broadband Initiative (SBI).

Our goals for Round 4 were to: 1) maintain the very high level of participation from New York providers, 2) Add to and enhance our data verification methods and, 3) improve the completeness and quality of the data delivered. We believe we have met those goals.

We had 82 providers participate in the spring 2011, Round 3 submission. That number has risen to 87. We anticipate an increase in that number in the future as we continue to reach out to small fixed wireless companies. We believe mapping these provider's serviceable areas is a very important component required to fine tune NYS's served and un-served boundaries.

We are very pleased with the enhancements to our verification methods implemented this round and are energized to continue to find innovative ways to use disparate data available from commercial, government and public sources to validate and identify inconsistencies in provider reported availability data.

Lastly, we made small but significant steps in improving the Community Anchor Institution data (attributes and location), middle mile points and, by working even closer with our providers, we were able to improve the quality of the availability data using the new 2010 Census geography.

The remainder of this paper provides a summary of our data collection results; describes our methodology for performing data verification; summarizes the progress made on all our Round 4 goals and identifies our focus for Round 5.

Provider Participation Summary Tables:

87	**Total Participating Providers**
72	Wireline Providers
17	Wireless Providers (2 are both Wireless & Wireline)
1	Provider is middle-mile only
44	Providers submitted Middle Mile Data

Technology Type	Wireline Census Block Provider Count	Wireline Service Availability by Census Block	Wireline Street Segment Provider Count	Service Availability by Street Segment	Wireless Provider Count	Wireless Services by Shapefile	Middle Mile Provider Count	Middle Mile Points
Asymetric xDSL	43	307,636	35	26,945	0	0	28	1,704
Symetric xDSL	6	66,616	2	81	0	0	0	0
Other Copper Wireline	7	93,947	4	235	0	0	1	4
Cable Modem - DOCSIS 3.0	8	197,110	6	15,069	0	0	3	10
Cable Modem Other	13	173,283	11	21,022	0	0	1	1
Optical Carrier/Fiber to the End User	23	120,961	14	2,129	0	0	7	652
Satellite	0	0	0	0	3	3	0	0
Terrestrial Fixed Wireless - Unlicensed	0	0	0	0	7	12	1	10
Terrestrial Fixed Wireless - Licensed	0	0	0	0	1	1	0	0
Terrestrial Mobile Wireless	0	0	0	0	6	13	2	14
Other (middle-mile only)	0	0	0	0	0	0	1	2

A note regarding New York's Provider Table in Data Package XLS:

In the July 13, 2011 "NY December 2010 Data Feedback' conference call, the program office requested that New York include in its submission any company that we had researched in order to determine if they met the "provider" definition of the program and provide services in NYS. For this submission, we have included an exhaustive list of providers that we have captured information on from Rounds 1 through 4.

In our Provider Table, companies are listed by order of participation status with those that "Provided Data" listed first, followed by companies that said they "Will Provide Data", those that were "Non-Responsive", and finally those that "Will Not Provide Data." Providers that were contacted in Round 4 are contained within the top 3 statuses and include all known facilities based providers.

Companies that received a "Will Not Provide Data" status include the following:

Company Type	Code
Providers that do not serve New York	3
Companies who are not broadband providers	4
Broadband equipment companies	3
Resellers	2

Because of the sheer number of resellers in New York and their questionable ability to provide service within 7 to 10 days, resellers were a low priority for Round 4 outreach.

The companies that populate the Provider Table were gleaned from the FCC list provided in the "NY SBDD Submission Summary.xls" as well as from our own research in Rounds 1 through 4. We hope that this list is useful for the program office and provides some clarity on the volume of providers New York has researched.

Verification:

Automated verification was accomplished via the following methods:

1. Business rules built into the SBI data transfer model (catching problems on the way in)
2. Repeatedly running the NTIA supplied Python script
3. ESRI 'Check Geometry' and 'Fix Geometry' tools

Non-automated verification methods ranged from the very simple to complex, multi-step procedures. They were:

1. **Provider Website Research:** For Round 4, a careful study was made of the websites of New York State's 80+ broadband providers. The goal was verify the technology and data transfer speeds that were voluntarily self-reported to the OCS broadband mapping team.

   Upon this review, a few generalizations can be posited and some interesting facts can be gleaned. First, it has to be noted that although there are at least 83 separate companies offering DSL, cable, fiber, or wireless technologies, there were actually only 67 differing websites to examine. This is due to the fact that some of the smaller companies have the same parent company. Thus, there is one uniform website for all of the parent company's subsidiaries. For example, when searching for the main website of Berkshire Cable Corporation, Berkshire Telephone Corporation, Chautauqua and Erie Telephone Company, or Taconic Telephone Company, the same exact FairPoint Communications website will pop up. If there is some disparity in the products and speeds per individual company, it cannot be discerned from the catch-all corporate website.

   This study exposed some noteworthy details. 12 of the companies provide no specific information on the actual data transfer speeds of their broadband products. Two of them, Castle Communications of Willsboro, and Fishers Island Telephone Corporation, did not even have a working website! Of the remaining 71 companies that did provide speeds, only 29 of them provided both downstream and upstream speeds.

   Once all the website speed data was collected from the websites, the maximum download and upload speeds offered were reclassified and coded into speed tiers between 1 and 11. The vast majority corresponded to self-reported speeds; however, there were some notable discrepancies.

   Most discrepancies were within one or two code numbers. For example, Verizon reported to us that they offered "6" speed broadband at Tech Code 10 (ADSL), and their website indicated it was "7" level speed. There were a handful of companies though that reported much higher speeds than what was found on the internet. Often, they were companies that offered broadband at a Tech Code of 50, which indicated optical carriers/fiber to the end user. Thus, they offered high-end technology or specialized technology producing higher speeds that was not detailed on their site. For example, DFT Local Service Corp reported to us they have "11" speed technology, but it is not detailed on their website, as we have uncovered only code"7" level speed, which is what their fastest DSL service registers.

   There were approximately 26 cases where speed code differences ranging from minor to significant occurred. In half the cases, the max speed advertised on the company's internet site was less than what they reported to us. Therefore, the other half of the cases involved the internet sites boasting higher speeds than what we were aware of, so it is difficult to ascertain a pattern. In 8 of the 26 instances, there were speed code disparities of 3 or more. For example, Hometown Online, Inc. reported to us maximum speeds in the 8 speed tier range, but their website indicates speeds up to 2 mbps, which is only within the 4 speed tier. It should be noted that this data is just comparing maximum download speeds, because so few maximum upload speeds were advertised on the websites.

While the results on this study were not conclusive enough to permit significant revisions to the providers' self-report speed data, this study will serve to generate constructive discussion with our providers and assist with future refinements to our speed data to more accurately portray the diverse palette of broadband coverage offerings.

2. **Use of crowd-sourced data:**
   a. NYS Speed Test data points and attributes were used to verify provider reported availability. The NYS speed test website includes a data collection form which requests:
      i. Street address at which the test was taken
      ii. Service provider
      iii. Service technology

   After satellite provider records and sub-broadband speed records were removed, 5624 records were successfully geocoded and used for verification. Four levels of verification were established for points that fell within areas of reported service availability. They are:

   Code 1 = Provider and technology matched
   Code 2 = Provider matched and technology unknown
   Code 3 = Provider matched but technology is mismatched
   Code 5 = Provider and technology unknown but Broadband is available in the location

   Each census block and street segment availability record involved with this verification activity was assigned one of the above codes.

   b. FCC speed test records were used to verify provider reported availability. FCC speed test records lack provider information but we were able to successfully establish the provider via a publically available IP Address search engine (the APNIC Whois Database). Those records were then used to verify provider reported availability in the same manner as was used with the NYS speed test points. Because the technology was not known, the highest verification code assigned was 2 (Provider Matched and Technology = 'Unknown'). Here is a statistical summary:

	Number	**Percentage**
Total Number of FCC Wireline Speed Test Points	62,642	N/A
Total Number / Percentage Successfully Geo-coded	32,621 / 62,642	52%
Total Number / Percentage Successfully IP Searched	21,766 / 32,621	67%

c. <u>NYS Broadband Map feedback:</u> After receiving an email through the "Is This Correct" link on the NYS broadband map, the details were logged in a tracking spreadsheet and investigated on our map. The address, census block, or street segment was then further investigated in ArcMap using provider submitted data to confirm reported availability. If we confirmed that the provider submitted availability data for that location, the next step was to use the provider's own website to attempt to verify that availability.

If available, the public responder's address was used along with address point datasets from New York State and Navteq. In a census block or street segment, addresses were identified at both ends of the bounding features. These addresses were entered into an availability search on the provider's website and the results were logged. In Frontier's case, the address points were used to perform a reverse lookup and identify phone numbers at those addresses. The phone number was then entered on Frontier's site.

If an address within the block or segment was identified by the provider's site as potentially served, that block or segment retained that provider's coverage on our map. If no addresses within the block or segment were identified as potentially served, we removed coverage of that block or street segment for that provider from our map.

This round, for the first time, we investigated <u>surrounding</u> "suspect" blocks and segments. These are areas that were submitted as served by providers, but contradicted some of the "on the ground" knowledge we received from the public. These were also areas that stood out spatially (i.e. non-contiguous or "island" coverage) against the type of technology in question (i.e. wireline technologies that run along roadway).

Here are summary statistics for this feedback activity:

		Number
Public emails received during Round 4		102
	Block Records	**Street Records**
Number of locations investigated and verified	87	4
Number of locations investigated and removed	130	212

3. **Use of newly identified government data sources:** The NYS Department of Motor Vehicles supplied three new datasets for our verification activities. Satellite Offices, Dealer Locations and Inspection Station Locations were used to verify provider reported availability. *All of these facilities have broadband connections.* The Dealer and Inspection Location datasets did not have provider or technology information associated with the locations. Therefore, the highest verification code assigned was a 5 because we were only able to confirm that there was broadband at those locations. However, the DMV Satellite Offices dataset came with provider information, so those locations were assigned a verification code of 2.

4. **Use of newly identified commercial data source:** TomTom data was used to verify provider reported availability. The TomTom data included boundaries for many of the broadband providers we have received data from. The TomTom boundary for each provider included in the dataset was overlaid onto the provider footprint from our SBI data transfer model. This was done to ensure that the availability data sent to us by the providers was within the respective boundary in the commercially available TomTom data. All of the provider footprints that had matching boundaries in the TomTom data fell within their respective boundary.

5. **Select CAI locations** were used to verify provider reported availability for the first time this round. We selected Colleges, Hospitals, Federal Correctional Facilities, State Prisons and State Police Stations from our total collection of previously identified CAIs as an additional verification data source because we strongly believe all have broadband connections. Since the provider and technology are still unknown at this time, the highest verification code assigned was 5 (Provider and technology unknown but Broadband is available in the location). All but 12 of the 887 points used confirmed provider reported availability. The 12 conflicts are currently being researched. Results will be reflected in Round 5 data.

6. **Provider verification:** For providers with significant changes from the previous round, we created review maps showing Round 4 availability aggregated to census blocks and street segments. There providers were given at least five days to respond and initiate any changes or corrections. Changes were made based on provider feedback. Changes were documented for future reference. These OCS generated maps were later compared to the provider footprints in the geodatabase to ensure that the data loaded in correctly. Many of the providers have multiple review maps, so each of these maps had to be examined and compared to the corresponding area in the data. During the comparison process, four provider's footprints were discovered to have some missing data and were corrected. The rest of the provider's footprints matched their respective review maps.

7. **Verizon NY (wire-line) specific scrubbing:** Verizon New York submitted data in 2010 TIGER/Line Census Blocks and Edge Files as text delimited files.
    a. <u>Street segments</u> in the original data were highly fragmented and discontinuous in census blocks greater than 2 square miles. An infill process was used to select segments 100 meters or less where availability was not reported by Verizon but that segment fell in between two street segments with Verizon reported availability. Addresses from a sampling of the new street segments were checked through Verizon's website and broadband availability was verified. A total of 920 segments were added to Verizon's availability and assigned the max advertised speed attributes of the nearest street segment. 312 Street segments that were discontinuous with any other reported availability or fell more than one mile outside Verizon's service footprint were checked for availability through Verizon's website and subsequently deleted.
    b. <u>Census blocks</u> in the original data contained outliers. 122 Census blocks reported by Verizon fell more than one mile outside their exchange boundary and were discontinuous with any other Verizon reported availability. Addresses sampled in these blocks were checked for availability

through Verizon's website. Through this process, it was verified that there is no Verizon service in these blocks, and the census blocks were deleted.

8. **Clipping all data to the NYS boundary file**

Round 4 Anticipated Focus and Current Status:

The six items below describe work we believed, at the time of our last submission, warranted special emphasis during the next round of data collection, processing and verification. The current status is provided after each description.

1. *From April 1, 2011 methodology paper:* Further attribution and enhanced spatial accuracy of our Community Anchor Institution (CAI) data: To date, collection of the broadband service attributes for our CAIs remains one of our activities in need of the most improvement. To that end, we are nearing a final version of a proposed scope of work for our partner, the Center for Technology in Government (CTG), to expand their data collection activities beyond speed test data to include CAI broadband service attributes. The speed test data collection website and CTG's outreach network will be further leveraged.

   Current Status: We amended our Memorandum of Understanding with CTG to expand their outreach and data collection activities to include broadband service attributes for schools, libraries, colleges/ universities, medical /healthcare facilities and municipal halls (Other community support – government category). CTG successfully used their outreach network to bring the State Education Department (which governs schools, colleges/universities and libraries) to the table and agree to begin a joint broadband data collection effort once per year. This will consolidate three separate survey efforts that collected basically the same information and should result in a very high rate of participation within these sectors of CAIs. This first joint collection is scheduled for October 2011. OCS was provided earlier survey results from these sectors and we were able to extract partial SBI required attributes for use in this submission. CTG will also focus on municipal halls and medical/healthcare institutions for the next submission, OCS will focus on the public safety sector. While it took a great deal of time to get this far, this is a significant step in the right direction for this area of focus with collateral benefits for the State Education Department as well as the individual institutions that must complete state surveys.

2. *From April 1, 2011 methodology paper:* Identifying and working with fixed wireless providers: We believe we have yet to identify some existing providers and new companies will be starting up to fill small pockets of underserved or un-served.

   Current Status: In Round 4 we reached out to 8 companies we identified as fixed wireless providers in New York. In most cases these companies were non-responsive. Two companies, Logical Net Corp. and NY Air, expressed willingness to participate. However, after our initial exchanges, both companies became non-responsive. We had a similar occurrence in Round 3 with the fixed wireless company Plexicomm. We believe that the small sizes of these companies, as well as the perceived amount of effort to provide data, are the greatest hurdles. New York plans to keep reaching out to these providers as they are seen as a viable alternative to wired broadband in underserved areas and areas previously thought to be unserved.

3. *From April 1, 2011 methodology paper:* Adding verification methods: We intend to pursue the use of additional crowd sourced, commercial, and public data source and the aggregated FCC supplied 477 data.

   Current Status: As noted above, the use of the crowd sourced data received via our state broadband map was extended to verify “surrounding suspect areas”. This resulted in additional corrections that would have otherwise not been realized. No new crowd sourced data sets were identified or created this round. We also utilized a newly discovered commercially available TomTom data product to further verify provider footprints DMV (see details in verification section above).

   We researched InfoGroup (formerly InfoUSA) data. One cut of data they offered contained “marketing” records with a single broadband related attribute (email addresses that in some cases could be associated with technology). They also offered to query their data store using NAICs codes in attempt to identify CAIs and provide contact info, location address and email address. After reviewing sample data, we decided neither offering was going to be very helpful.

   We obtained and utilized three new datasets obtained from the NYS DMV (see details in verification section above). Most of this information is publically available but the DMV provided it to us in a “ready to use” format. Lastly, we are nearing the end to the process of agreeing to and satisfying the conditions for obtaining the aggregated FCC 477 data. We will be able to utilize this data for verification of Round 5 data. We will develop methods using Round 4 data.

   Overall, use of additional data sets and extending our verification methods have allowed us to get closer to our goal of eventually having record level verification of all data within the SBI data transfer model deliverable. To ever reach that level though, we will need to automate at least some of our currently manual methods but we continue to get new, innovative ideas each round.

4. *From April 1, 2011 methodology paper:* Migration to 2010 Census data layers: This will involve the realignment of new Census geography to NYS basemap layers and migrating the previous round’s data to Census blocks that have entirely new id numbers.

   Current Status: A migration to US Census Dept. provided 2010 geography was completed. All block level data delivered in the SBI data transfer model is attached to 2010 census blocks. Street level data is attached to the most current version of the NYS streets geography. OCS will likely contract out the work to have the Census supplied geography aligned to NYS streets and other NYS base map layers. We receive an estimate from Navteq to perform this realignment and conflation work in time to use these results for this Round 4 deliverable. Navteq is currently under contract with OCS and there was the potential to leverage that existing procurement vehicle. We felt the cost was too high, in large part because of the “rush” nature of our request. We declined and will likely have to do a competitive procurement to obtain an “affordable” price.

5. *From April 1, 2011 methodology paper:* Improvements to the NYS Broadband Map and increasing the number of ‘visits’: We see our state map as an area where we can provide value to our provider partners. We have already met with some providers to discuss displaying multiple ‘speed package’ offerings. Time Warner Cable has agreed to work with us to pilot that enhancement. We are also in discussions with CTG in order to have them perform outreach work to increase the visits to the site and specifically encourage visitors to provide feedback regarding the accuracy of the availability data. We already have a detailed verification workflow in place to effectively utilize this data.

   Current Status: We made changes that we believe enhance the user-friendliness of our State Broadband Map, including a homepage redesign (www.broadbandmap.ny.gov). We also added provider footprints to the map. With our October 2011 release of the Round 4 data, we will be adding functionality to view multiple speed offerings data voluntarily given to us by 11 providers (including Time Warner, a major NYS provider). We will also be adding a composite max advertised speed layer and discrete single speed tier layers. Functionality allowing the public to identify unserved addresses is planned for release before the end of this year. CTG has agreed to expand their scope of work to include marketing our mapping site and feedback tools. A second amendment to our MOU with CTG is nearing completion.

6. *From April 1, 2011 methodology paper:* Further development of a project plan for our address point development work: We are already using address points for geocoding service delivery addresses and for verification work. For Round 4, we envision our use of address points for verification to increase and for their use in enhancing our ability to estimate household availability, underserved areas and uninhabited lands. Needs assessment discussions are already underway with E911 and key government agency stakeholders.

   Current Status: The Address File portion of our project plan was expanded and approved along with our entire project plan, budget and timeline package required under our supplement grant award. We have recruited two county 9-1-1 organizations to work with us on a pilot to develop address point mapping standards and define data workflows. Work on that pilot is expected to begin before year’s end. We also completed work with a professional demographer reviewing our methods for calculating household units with broadband availability. A final report was produced and posted to PBWORKS.

Round 5 Focus

1. One of our primary focuses will be to develop methods to reduce the upward bias in our calculation of household units with broadband availability. We will continue to work with the demographer we have under contract as well as further explore our own ideas. When NY availability percentages are

presented at public forums, we consistently get feedback that our numbers are inaccurate. At the most recent event attended, Congressmen Gibson's Rural Broadband Symposium (9/29/11, NY's 20th District), US Department of Agriculture staff were also presenters. When discussing their Rural Development Community Connect grant program, they stated that in 100% of over 40 instances where an applicant's claim of being unserved was in conflicted with the data on the NBM, the applicant's claim was substantiated by Dept. of Ag. local field staff investigations. Clearly the granularity of data collection is insufficient to produce accurate mapping in rural areas of the country. We see improvement here as paramount to the continued success of our state's program. We anticipate increased use of public feedback and other crowd sourced data playing a significant role in improving the accuracy of the availability data.

2. CAI attribution: Collaboration agreements with multiple units within the NYS State Education Department and a refinement of our CAI definition have laid the ground work for significant advancement is this area.

3. Advancement of our Address Point Mapping Standards pilot and additional use of address point data for data verification: Our work to date with the NY 9-1-1 Coordinators Association and a related pilot project currently being planned with US Census Bureau has set the stage for significant advancement of our Address File project.

4. Additional enhancement of our verification activities: This will include the addition of "unserved address" functionality to our state broadband map; the use of the aggregated 477 data and the use of yet to be identified new data sources.

OFFICIAL OCTOBER 2011 UPDATE SUBMISSION TO THE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION UNDER THE STATE BROADBAND INITIATIVE GRANT PROGRAM FOR THE STATE OF OHIO

CONNECT OHIO®

October 1, 2011

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OHIO COVER LETTER

October 1, 2011

Ms. Anne W. Neville
SBI Grant Program Director
National Telecommunications and Information Administration
U.S. Department of Commerce
1401 Constitution Avenue, NW Room 4716
Washington, DC 20230

Dear Ms. Neville:

Please accept this submission from Connected Nation on behalf of the state of Ohio's State Broadband Initiative (SBI) Grant Program, known as Connect Ohio.

These artifacts should be found to be compliant with the October 1, 2011, deadline for the semi-annual data update and in accordance with the terms of the July 1, 2009, Notice of Funds Availability (NOFA) and all subsequent clarifications pertaining to delivery of State-Level Mapping of Broadband Service Availability. This packet includes:

Inventory of Deliverables, Connect Ohio: October 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing
Appendix A: 4	n/a	Community Anchor Institutions-Narratives
VII.A.1(a)	n/a	Accuracy and Verification Report

n/a	DataPackage.xlsx	Worksheets of Contact Information, Record Count, and Provider Summary Table
n/a	n/a	List of Changes and Corrections to the Dataset
n/a	n/a	Non-Participating Provider Narratives
n/a	n/a	Broadband Provider Roster and Participation Status

In addition, this data update submission should be found to be compliant with the additional program requirements instituted by the National Telecommunications and Information Administration since the time of the April 2011 SBI data submission for the Connect Ohio program. Specifically, these new requirements are:

SBI Data Transfer Model
The submission of the broadband dataset for October 1, 2011, is contained within the SBI Data Transfer Model as released on the Grantee Workspace on June 30, 2011. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information on each provider as possible.

Additional Submission Guidance
This submission also includes a list of changes and corrections made to the dataset between the April 2011 submission and the October 2011 submission. This represents a summary of why data displays and/or supplied speeds, etc. are different from the previous submission. Changes can include upgrades to infrastructure to allow for higher throughput speeds for customers, an expansion of the service area (e.g. additional fixed wireless towers, recently activated DSLAMs, etc.), or a new provider in the marketplace. Corrections can include revisions to speed tier information that was previously reported incorrectly or the addition of a previously existing provider that has not yet been submitted in a semi-annual dataset.

This October 2011 semi-annual data update under the State Broadband Initiative Grant Program continues to demonstrate our dedication to implementing the joint purposes of the Recovery Act and the Broadband Data Improvement Act (BDIA) by gathering comprehensive and accurate state-level broadband mapping data, developing state-level broadband maps, aiding in the development and maintenance of the National Broadband Map, and undertaking statewide initiatives for broadband planning.

Broadband Service Availability — Provider Outreach and Verification

This data update submission under the SBI program includes datasets for approximately 87.22 percent of the Ohio provider community, or 116 of 133 total providers. There are 115 participating providers and 1 additional non-participating provider whose estimated coverage areas have been submitted. Of the 115 participating providers, 39 supplied an update to their network or coverage area(s), while 46 have reported no change. The remaining 30 represent providers who previously supplied data but were non-responsive in the October 2011 update effort; therefore their previous dataset is being put forward as part of this compilation. A complete roster by provider depicting participation status and contact record is contained herein. Of the 17 providers that are not represented in the attached datasets, 15 have refused to participate in the voluntary program or were non-responsive to multiple contact attempts, and 2 providers are currently in some form of progress toward data submission but were not able to submit coverage areas at the time of this submission.

As the aforementioned roster and attached methodology documentation will attest, it is the collective opinion of the Connect Ohio principals that all commercially reasonable efforts were made to account for 100 percent of the known Ohio broadband provider community, pursuant to this semi-annual data update submission.

Connect Ohio has also continued to perform broadband verification activities through several means. In addition to confirmation of service area(s) by each provider, Connect Ohio conducts field validation efforts. To date, 59 (44.36 percent) providers have been validated through field verification activities. Additional details on verification activities are contained within the Field Validation Methodology.

The Connect Ohio website, www.connectohio.org, continues to serve a prominent role in the outreach and data collection effort. This program asset provides a way for the general public to participate in the process by offering interactive tools for users to test their connection speed, submit broadband inquiries, or contact a program representative.

As an indicator of stakeholder penetration, the Connect Ohio website encountered 31,230 unique visits during this reporting period (97,040 total to date for the life of the grant awarded on December 20, 2009). Additionally, this pronounced Web activity netted 304 broadband inquiries over this same reporting period (1,178 grant inception to date). The website also provides the BroadbandStat application, which allows the consumer to confirm or dispute the coverage represented on the broadband inventory map. These consumer-initiated actions are facilitated through the Connect Ohio website and the Connect Ohio interactive mapping tool (BroadbandStat) that offer the citizens the vehicles to provide information regarding availability in their respective service area, either in affirmation or contest of the reported data represented in the Connect Ohio mapping artifacts. Since the initial data collection and release of corresponding maps, feedback in the form of broadband inquiries has allowed Connected Nation to identify additional areas that are in need of field validation, which is scheduled as soon as possible.

Community Anchor Institutions

Connect Ohio has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBI NOFA Technical Appendix.

Outreach was conducted during this data update reporting period by Connect Ohio to continue identification of existing, centralized sources for CAI connectivity data. Additionally, outreach was coordinated to distribute a CAI survey to institutions throughout the state through multiple methods including a customized online survey available on the Connect Ohio website. During this reporting period Connect Ohio has developed a number of new relationships with statewide associations such as the Ohio Fire Marshal's Office and eTech Ohio to promote the importance of broadband connectivity at anchor institutions and participation in this data collection process. Connect Ohio will continue to build upon these new relationships over the coming months and utilize its contacts throughout the state to collect data and raise awareness of this project.

From our work in Ohio, as well as other states, we recognize the great value of this data to future collaboration efforts within the state as well as its value to the National Broadband Map. We plan to continue to bring best practices to the Connect Ohio efforts, along with an investment of both human and technical resources required to reach our goal of increasing the data that is secured and reported as part of this process.

The Connect Ohio program exists to improve data on the deployment and adoption of broadband services and to assist in the extension of broadband technology across all regions of the great state of Ohio, as well as the United States through contribution to the National Broadband Map. We look forward to the continuing work ahead.

Respectfully submitted,

Thomas W. Ferree
Chief Operating Officer
Connected Nation, Inc.

Data Acquisition: Ohio Community Anchor Institutions Methodology

In this fourth reporting period of the SBI, Connect Ohio has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBI NOFA Technical Appendix. During this reporting period Connect Ohio has continued to focus efforts on conducting outreach and raising awareness of this important project.

Connect Ohio has continued to identify and process CAI data obtained through an ongoing statewide outreach campaign. Physical address information continues to be augmented through manual sourcing and geocoded by Connect Ohio through ESRI ArcGIS software.

Connect Ohio continues to utilize a customized online survey hosted through SurveyMonkey that was developed during the first reporting period. This survey, in combination with a customized data-gathering spreadsheet, was distributed to a targeted list of CAI throughout the state. Connect Ohio will continue to use these data-gathering tools for future targeted outreach efforts throughout the coming months leading up to the next reporting period. These materials are customized to fit the CAI categories as defined in the SBI NOFA.

The survey can be accessed at this link using the following password:

http://www.surveymonkey.com/s/R3RLVNG
Password: CAI_OH_3210

During this reporting period Connect Ohio conducted research, specifically within the education sector, to identify existing, centralized sources for CAI connectivity data. Connect Ohio has established a relationship with eTech Ohio, a statewide agency that provides a telecommunications infrastructure that links classrooms and public broadcasting affiliates to each other and the Internet. eTech Ohio is currently gathering data for all K-12 schools that utilize its network, and Connect Ohio will report these results during the April 2012 submission.

In tandem with these efforts to identify existing data, Connect Ohio continues to identify key CAI contacts in an effort to distribute and promote the online survey and raise awareness of the importance of CAI broadband connectivity. Connect Ohio has formed a number of new relationships this reporting period with key CAI associations including the Ohio State Fire Marshal. The Office of the Fire Marshal has partnered with Connect Ohio to promote the importance of gathering connectivity data from all fire stations throughout the state, particularly in rural areas. This data-gathering effort will continue leading up to the April 2012 submission.

Connect Ohio has an ongoing mission to educate CAI throughout the state on the importance of participating in the project. Participation by these institutions will raise awareness about the importance of broadband connectivity and the need to report the requested data for inclusion on the National Broadband Map. Connect Ohio will continue to build off the relationships that are already being developed with existing BTOP projects within the state and release a targeted CAI newsletter to assist with outreach during Q42011.

The greatest challenge with collecting this data continues to be the difficulty in securing CAI broadband connectivity data. Connect Ohio is overcoming this challenge through new relationships that are being formed, our coordination with existing projects in the state, and the upcoming release of a CAI newsletter. Connect Ohio expects noted progress to occur over the coming months leading up to the April 2012 submission and will continue to work diligently in the state to raise awareness of this important project.

A CAI summary of all processed and submitted data is provided below:

CAI Type	Total	Physical Address	Lat/Long	Technology of Transmission	Download Speed	Upload Speed
K-12	8,606	8,606	8,606	11	7	5
Libraries	757	757	757	687	588	7
Healthcare	1,954	1,954	1,954	5	5	5
Public Safety	3,834	3,834	3,834	6	4	4
Higher Ed Institutions	615	615	615	12	7	7
Other Government	583	583	583	13	7	7
Other Non-Government	3,683	3,683	6,683	28	19	14
Total	**20,032**	**20,032**	**23,032**	**762**	**637**	**49**

SBI Data Submission Methodology

The submission of the broadband dataset for October 1, 2011, is contained within the SBI Data Transfer Model and additional components as released on the Grantee Workspace on June 30, 2011. Connected Nation has reviewed all literature that relates to the release and use of this data transfer model and recognizes that it does not replace or dictate how data is stored, processed, or displayed for the state, as it is meant primarily as a means to transfer the broadband data from all states and territories and populate the National Broadband Map in a seamless fashion. Guidance from the Technical Mapping Guide, as released on the Grantee Workspace on March 24, 2011, was also followed to ensure the completeness and validity of the submission through completion steps and checklists, completing the DataPackage spreadsheet, uploading broadband datasets into the Data Transfer Model, and checking the dataset using the SBDD_CheckSubmission receipt process.

As part of the ongoing review and analysis process, NTIA has requested further information in the submission of the DataPackage spreadsheet. In addition to the information on providers whose coverage and accompanying attributes is submitted in the SBI Data Transfer Model, information on other providers that are considered to be non-viable is also included in the DataPackage. Providers deemed non-viable that have been excluded from continued outreach may have been eliminated for reasons such as (i) the company offers Internet service but at speeds below the current definition of broadband; (ii) the company was listed in advertisements as a broadband provider, but is actually a network solution or consulting firm, etc.; (iii) the company may build or install network infrastructure, but does not actually provide the broadband service to consumers; and (iv) the company has gone out of business. The submitted DataPackage includes any relevant information that has been obtained through the course of due diligence and/or direct provider outreach, such as a Federal Registration Number (if applicable), the company's URL, the existence of an executed Nondisclosure Agreement, and brief notations regarding the status of the company.

In addition to the methodologies contained herein, as well as the DataPackage.xls containing contact information, the data dictionary, and a provider summary table, the following feature classes are submitted within the SBI Data Transfer Model for the state of Ohio.

Inventory of Deliverables, Connect Ohio: October 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area.
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles.
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address.
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points.
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing.

The provider data collected by Connected Nation on behalf of the state of Ohio have been formatted per the given specifications and uploaded into the appropriate feature classes of the SBI Data Transfer Model. Wireline availability is contained within census blocks and road segments, wireless availability is contained as polygons of coverage areas, and middle-mile connections and community anchor institutions are contained as point data. All speed data is contained at the census block, road segment, or wireless polygon level of availability. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information as possible.

Connected Nation has continued outreach to satellite providers on their availability, technology, and speed information, but granular coverage is not yet available. Submitted within the wireless feature class are the satellite companies providing service to Ohio as a polygon of the state boundary. Efforts will continue to collect, process, or otherwise create more granular satellite data based on availability analyses and guidance received from NTIA.

PROVIDER CHANGES AND CORRECTIONS FOR OCTOBER 2011

As requested by the SBI Program Office, a listing of the changes and/or corrections to the datasets between the April 2011 and October 2011 submissions is included in this narrative. This information is presented in this section as well as in the Broadband Provider Log. Changes to the data include expansion of service area(s), activation of new wireless towers, and upgrades to the network to provide higher download speeds to consumers. Corrections to the dataset include the addition of previously existing providers whose coverage has never been submitted, revision of coverage or speed information that was incorrect, and any other items that were misrepresented in the April 2011 dataset.

Changes

- Amplex Internet (fixed wireless): New fixed wireless tower in operation.
- Bascom Mutual Telephone Company (fixed wireless): New fixed wireless tower in operation.
- DuplexCom of Ohio, LLC (fixed wireless): New fixed wireless provider in the market.
- Freund Enterprises Inc. (fixed wireless): New fixed wireless towers in operation.
- Frontier Communications Corporation (DSL): Upgrade to network, additional DSLAMs added expanding service area.
- Imagine Networks, LLC (fixed wireless): New fixed wireless provider in the market.
- JB-Nets, LLC (fixed wireless): New fixed wireless towers in operation.
- Massillon Cable TV, Inc. (cable): Upgrade to network, expansion of service area.
- MetaLINK Technologies, Inc. (fixed wireless): New fixed wireless towers in operation.
- New Knoxville Telephone Company (fixed wireless): New fixed wireless towers in operation.
- Ottoville Mutual Telephone Company (fiber): Upgrade to network, provider now offers FTTH.
- Wavelinc Communications (fixed wireless): Provider activated five new towers and upgraded network to offer higher speeds.

Corrections

- Block Communications, Inc. (cable): Speeds changed from speed tier 9 max down and speed tier 5 max up to speed tier 7 max down and speed tier 3 max up. The higher speed tiers are currently being tested, but not yet advertised.
- BluSky Wireless (fixed wireless): Fixed wireless coverage was revised.
- Champaign Telephone Company (fixed wireless): Fixed wireless coverage changed to actual propagations to replace the concentric circle polygon used previously.
- Clearwire Corporation (fixed wireless): Propagations were created to represent the fixed wireless system to replace the less accurate coverage used previously.
- Country Connections LLC (fixed wireless): Fixed wireless coverage was revised.
- DISH Network Corporation (satellite): Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
- Eagle Communications, LLC (fixed wireless): Provider was included for the first time in the October 2011 submission because we did not have their participation previously.
- Erie County Cablevision, Inc. (cable): Speeds changed from speed tier 9 max down and speed tier 5 max up to speed tier 7 max down and speed tier 3 max up. The higher speed tiers are currently being tested, but not yet advertised.
- Hughes Network Systems, LLC (satellite): Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.

- Insight Communications of Central Ohio, LLC (cable): Provider is being included for the first time in the October 2011 submission because it has been non-responsive previously. Finalized coverage dataset for Insight based on website listings and broadband inquiries received from consumers regarding available service in the area. Advertised speed data acquired from Insight website. Since company is being acquired by Time Warner, data will likely be submitted under that name in the next submission.
- KeyOn Communications, Inc. (fixed wireless): Previously unreported coverage was added to the service area from the April 2011 submission.
- Omnicity, Inc. (fixed wireless): Provider was included for the first time in the October 2011 submission because we did not receive a full dataset previously.
- OneCommunity (fixed wireless): Provider is being included for the first time in the October 2011 submission because we didn't have its participation previously.
- Ottoville Mutual Telephone Company (DSL): Provider corrected its speed information from the April 2011 submission.
- UDATAnet (fixed wireless): Provider was included for the first time in the October 2011 submission because we did not have its participation previously.
- Wavelinc Communications (fixed wireless): Provider removed one tower from previous submission because it is not active.
- WideOpenWest Finance, LLC (cable): Provider was included for the first time in the October 2011 submission because we did not have its participation previously.
- WildBlue Communications, LLC (satellite): Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.

Changes and/or Corrections – Entirely New Dataset Submitted

- AT&T (DSL, mobile wireless)
- CenturyLink (DSL)
- Cequel Communications (cable)
- Clearwire Corporation (mobile wireless)
- Comcast Cable Communications, LLC (cable)
- CoxCom Inc. (cable)
- FairPoint Communications (DSL): Germantown exchange only.
- Leap Wireless International, Inc. (mobile wireless)
- Sprint Nextel Corporation (mobile wireless)
- T-Mobile USA, Inc. (mobile wireless)
- TDS Telecommunications Corporation (DSL)
- Time Warner Cable LLC (cable)
- Verizon Communications, Inc. (mobile wireless)
- Windstream Communications (DSL): Also of note, coverage was completely removed from Ashtabula, Hardin, and Lucas Counties where coverage was reported previously.

OHIO FIELD VALIDATION METHODOLOGY

Connected Nation focused a portion of its time on specific validation processes such as:

- conducting random spectrum analysis studies throughout the state using an Avcom PSA-37-XP spectrum analyzer;
- conducting mobile speed tests throughout the state using an iPhone, Android (or other smart phone) as well as provider-specific aircards (Sprint 3G/4G, Clearwire et al);
- identifying pre-selected, provider-submitted wireless transmit tower sites and cross-referencing data about that tower against the Federal Communications Commission (FCC) databases such as Antenna Structure Registration and/or the Universal Licensing System;
- cross-referencing Federal Registration Number data against available FCC Form 477 data as well as the FCC **CO**mmission **RE**gistration **S**ystem (CORES);
- validating provider submitted data (for example: latitude/longitude) using a handheld Garmin eTrex Summit GPS unit or GPS enabled software such as Microsoft Streets and Trips;
- locating physical wire-line attributes (such as Remote Terminals, CATV plant, etc.) and comparing them against provider submitted data; and
- conducting on-net and off-net speed tests using the FCC portal at http://www.broadband.gov/qualitytest/about/ or using the Ookla Net Metrics enabled speed test utility located on each of Connected Nation's state specific websites.

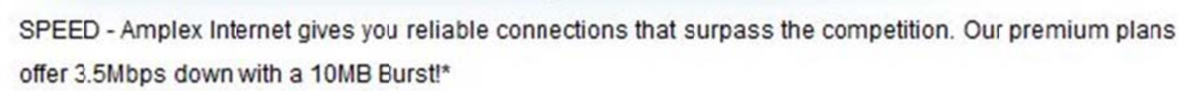
Additionally, Connected Nation cross-referenced numerous public documents in order to ensure that all known broadband providers were located and contacted. This included searching membership logs from the trade associations (WISPA, WCAI, PCIA, etc.), the Cable Television Fact Book, Public Utility Commission records, Public Service Commission records, Chamber of Commerce, etc.

To date, Connected Nation's staff conducted on-site validation tests in Ohio on the following providers: Altius Broadband; Access Ohio Valley; Amplex Internet; AT&T, Inc.; Avolve; Bascom Mutual Telephone (d.b.a. BrightNet-Bascom); Benton Ridge Telephone (d.b.a. W.A.T.C.H. TV); Buckeye Cablevision, Inc.; Cavalier Telephone; Celerity Networks; CenturyLink; Champaign Telephone; Cincinnati Bell Telephone Company LLC; City Net Fiber; Clearwire Corporation; Comcast; Computers4U; ConnectLink; Country Connections LLC; Coyote Wireless; Dark Horse Wireless; Databit Solutions; Frontier Communications Corporation (d.b.a. Citizens Communications); g Wireless; GMN Wireless; Horizon Telecom, Inc.; Intelliwave LLC; JB-Nets LLC; Jenco Wireless; Just Micro Digital Services, Inc.; Leap; Level 3 Communications LLC; LightSpeed Technologies; MetaLINK; Mikulski Communications LLC; New Era Broadband LLC; New Knoxville Telephone; NextGEn Access; nTelos (d.b.a. Ohio FiberNet); OmniCity; One Communications Corporation; R.A.A. Services; Redbirds Internet Services; Sciotowireless; SkyMax Broadband; Southern Ohio Communications Services, Inc.; Sprint Nextel Corporation; Stratus Wave; Talk America, Inc.; Telephone Service Company; T-Mobile; UData; Verizon Communications, Inc.; Wavelinc Communications; Wilkshire Wireless; Windstream; XO Communications; and Zayo Group LLC.

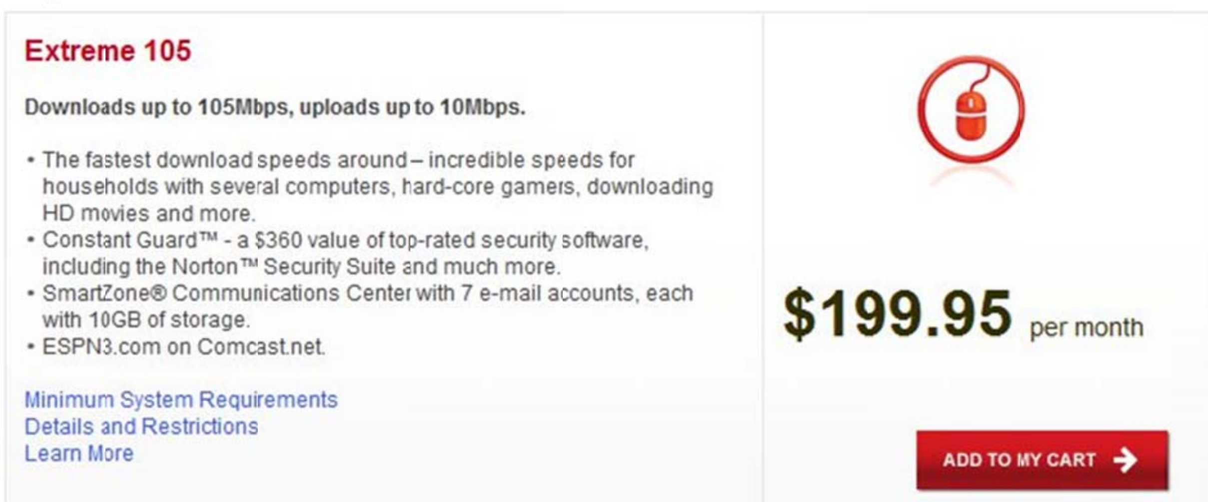
From program initiation through this reporting period, Connected Nation has completed in-the-field validation testing against 59 companies (out of a universe of 133 viable providers) totaling 44.36 percent within the state of Ohio.

Connected Nation has also continued to review provider datasets for accurate speed information, platform listings, and other intricacies that may fall outside of the standard SBI Data Transfer Model parameters. Any providers whose submitted coverage and attributes are anticipated to come into question have been further reviewed and confirmed; details on a case-by-case basis are presented below.

Amplex Wireless
Issue: Fixed wireless platform with maximum advertised download speed in tier 7, higher than expected value range for the technology.
Resolution: Provider website advertises 10 Mbps; screenshot available below.



Comcast
Issues: 1) Technology of transmission 40 with maximum advertised download speed in tier 7, lower than expected value range for the technology; and 2) technology of transmission 40 with a maximum advertised download speed in tier 10.
Resolution: Provider website advertises 105 Mbps; screenshot available below. However, additional input from provider on the technology listings and corresponding speed tiers was not received prior to the submission; dataset submitted as-is and work will continue to provide more accurate dataset in April 2012.



Massillon Cable
Issue: Technology of transmission 40 with maximum advertised download speed in tier 7, lower than expected value range for the technology.
Resolution: Provider website advertises download speed tier 7 using DOCSIS 3.0; screenshot available below.

- DOCSIS 3.0 High- Speed Data- Maximize your online experience with download speeds up to 10 Mbps, upload speeds up to 1.5 Mbps and 3 email addresses included for only $159.95/month.

New Knoxville and NKTelco
Issue: Technology of transmission 40 with maximum advertised download speed in tier 6, lower than expected value range for the technology.
Resolution: Additional information on technology in use was not received prior to this submission; dataset is submitted as-is and work will continue on the technology clarification.

S. Bryer Cable TV Corp.
Issue: Technology of transmission 40 with maximum advertised download speed in tier 4, lower than expected value range for the technology.
Resolution: This provider was acquired by Armstrong Utilities, Inc. during this round of outreach, but did not clear the transfer stage prior to this submission. Additional information on the technology in use was not received and the dataset is submitted as-is; work will continue on the technology clarification.

Suddenlink
Issue: Technology of transmission 40 with a maximum advertised download speed in tier 7, lower than expected value range for the technology.
Resolution: Additional information on the technology in use was not received and the dataset is submitted as-is; work will continue on the technology clarification.

Windstream
Issue: Large provider with the same maximum advertised speeds across the entire state; more granular speed information requested.
Resolution: Additional information on available speeds was not received prior to this submission; dataset is submitted as-is and work will continue on a clarification.

DATA SUBMISSION AND COVERAGE ESTIMATION OF NON-PARTICIPATING PROVIDER

Insight Communications

As part of its ongoing broadband mapping efforts, Connected Nation (CN) has developed a series of processes with the goal of submitting mapping data to NTIA for every known and qualifying broadband provider, regardless of whether the provider has chosen to support and participate in the SBI mapping initiative.

The following narrative provides detail regarding the recent data collection activities related to Insight Communications, a cable broadband Internet provider, located in Central Ohio, with a service area around Columbus. The narrative will include information regarding how and where CN obtained publicly available data and the consumer-provided validation techniques that support the underlying data.

<u>Background</u>
CN staff members have continued trying to obtain the participation of the provider with 24 instances of communication via telephone and e-mail sessions since December 22, 2009, through July 26, 2011. Provider representatives indicated concerns existed with the standard Connected Nation nondisclosure agreement and that even customization by the Insight legal team would not yield results with which they are comfortable. Without an NDA in place, the provider indicated that they would not participate in the mapping project. CN staff members continued outreach to discuss concerns with the NDA and data collection with no results.

<u>The Issue</u>
Insight Communications, by its lack of responsiveness since January 20, 2011, has predicated its unwillingness to participate in the Ohio broadband mapping initiative.

<u>Identification of Provider's Service Plans, Service Area, Legal Name, d.b.a., and FRN</u>
CN began building a file based on research information and, as time progressed, enriched the file with information obtained through the public domain. For example, CN reviewed the provider's website (www.myinsight.com) to determine the residential service plans **(Exhibit A)** and the service area **(Exhibit B)** of the provider's cable network. A search for a Federal Registration Number ("FRN") on the FCC **CO**mmission **RE**gistration **S**ystem ("CORES") system yielded an FRN of 0003748324 **(Exhibit C)** with contact information relative to the owner of the company. (These Exhibits begin on the following page.)

Exhibit A: Service Plans

Need for Speed

Up to 7 Meg Internet.
Surf at High-Speed.

$35.00 /mo

Continue

What's Included:

Road Runner

- Fast Internet with download speeds up to **7 Meg**.
- Upload speeds up to **512Kbps**.
- Includes Wireless Home Networking
- FREE security software.
- 1 year price guarantee
- 1 year contract required

Up to Twice as Fast

Up to 15 Meg Internet.
Perfect for Wireless.

$45.00 /mo

Continue

What's Included:

Road Runner Turbo

- Fast Internet with download speeds up to **15 Meg**.
- Upload speeds up to **768Kbps**.
- Includes Wireless Home Networking
- FREE security software.
- 1 year price guarantee
- 1 year contract required(Must maintain at least RoadRunner)

Exhibit B: Service Area

Indiana | Kentucky | Ohio

Alexandria	43001	Columbus	43223	Lancaster	43130
Amanda	43102	Columbus	43224	Lewis Center	43035
Ashville	43103	Columbus	43227	Lithopolis	43136
Baltimore	43105	Columbus	43229	Lockbourne	43137
Blacklick	43004	Columbus	43231	Millersport	43046
Brice	43109	Columbus	43232	New Albany	43054
Canal Winchester	43110	Columbus	43235	Pataskala	43062
Carroll	43112	Columbus	43240	Pickerington	43147
Columbus	43209	Delaware	43015	Powell	43065
Columbus	43211	Etna	43018	Reynoldsburg	43068
Columbus	43213	Gahanna	43230	Sunbury	43074
Columbus	43215	Galena	43021	Westerville	43081
Columbus	43216	Groveport	43125	Westerville	43082
Columbus	43217	Johnstown	43031	Worthington	43085
Columbus	43219	Kilbourne	43032		
Columbus	43222				

Exhibit C: Federal Registration Number

Registration Detail	
FRN:	0003748324
Registration Date:	08/30/2000 04:20:35 PM
Last Updated:	03/06/2009 01:28:31 PM
Business Name:	Insight Communications of Central, Ohio, LLC
Business Type:	Private Sector , Limited Liability Corporation
Contact Organization:	Insight Communications Company
Contact Position:	
Contact Name:	Daniel Mannino
Contact Address:	810 7th Avenue, 40th Floor New York, NY 10019 United States
Contact Email:	mannino.d@insight-com.com
ContactPhone:	(917) 286-2257
ContactFax:	(917) 286-2303

<u>Preliminary Identification of Provider's Coverage Area</u>

Connected Nation extracted the Insight Communications service area listing from its website based on the zip code listings provided. Each ZIP Code was checked for cable broadband availability and information entered into a spreadsheet for reference **(Exhibit D)**. Each ZIP Code has a website listing as to whether cable broadband Internet is available in addition to the basic cable TV offering, or if only cable TV is available. If cable broadband Internet was determined to be available in the ZIP Code, the available service plan packages were reviewed for maximum advertised download and upload speeds (Exhibit A). All ZIP Codes with cable broadband available indicated a maximum download speed of 15 Mbps and a maximum upload speed of 768 Kbps.

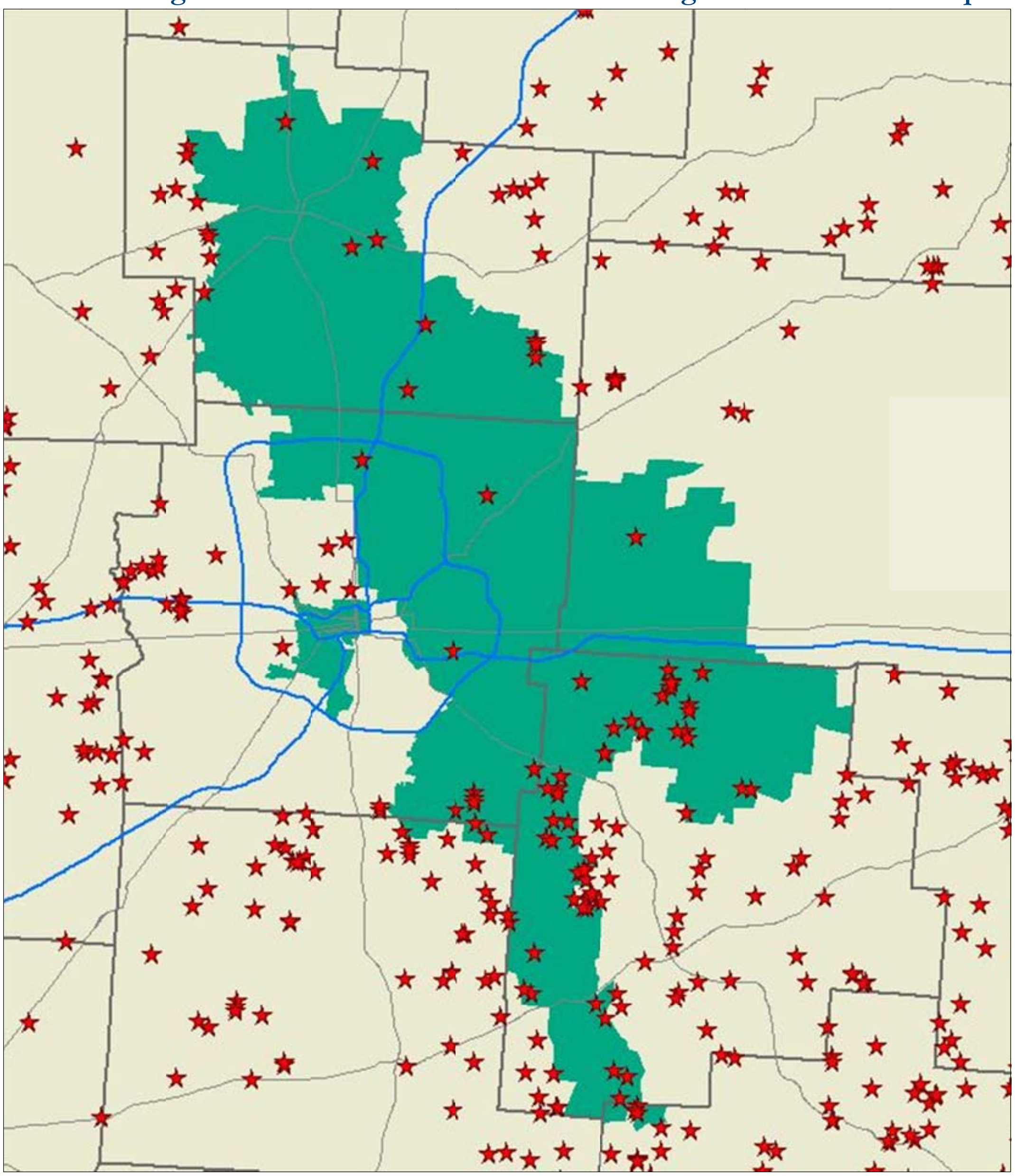
Exhibit D: ZIP Code Availability of Cable Broadband

City	ZipCode	Cable Broadband	Download Speed	Upload Speed	City	ZipCode	Cable Broadband	Download Speed	Upload Speed
Alexandria	43001	no			Columbus	43240	yes	15 Mbps	768 Kbps
Amanda	43102	yes	15 Mbps	768 Kbps	Delaware	43015	yes	15 Mbps	768 Kbps
Ashville	43103	no			Etna	43018	yes	15 Mbps	768 Kbps
Baltimore	43105	yes	15 Mbps	768 Kbps	Gahanna	43230	yes	15 Mbps	768 Kbps
Blacklick	43004	yes	15 Mbps	768 Kbps	Galena	43021	yes	15 Mbps	768 Kbps
Brice	43109	yes	15 Mbps	768 Kbps	Groveport	43125	yes	15 Mbps	768 Kbps
Canal Winchester	43110	yes	15 Mbps	768 Kbps	Johnstown	43031	no		
Carroll	43112	no			Kilbourne	43032	yes	15 Mbps	768 Kbps
Columbus	43209	yes	15 Mbps	768 Kbps	Lancaster	43130	no		
Columbus	43211	yes	15 Mbps	768 Kbps	Lewis Center	43035	yes	15 Mbps	768 Kbps
Columbus	43213	yes	15 Mbps	768 Kbps	Lithopolis	43136	yes	15 Mbps	768 Kbps
Columbus	43215	yes	15 Mbps	768 Kbps	Lockbourne	43137	no		
Columbus	43216	yes	15 Mbps	768 Kbps	Millersport	43046	yes	15 Mbps	768 Kbps
Columbus	43217	yes	15 Mbps	768 Kbps	New Albany	43054	yes	15 Mbps	768 Kbps
Columbus	43219	yes	15 Mbps	768 Kbps	Pataskala	43062	yes	15 Mbps	768 Kbps
Columbus	43222	yes	15 Mbps	768 Kbps	Pickerington	43147	yes	15 Mbps	768 Kbps
Columbus	43223	yes	15 Mbps	768 Kbps	Powell	43065	yes	15 Mbps	768 Kbps
Columbus	43224	yes	15 Mbps	768 Kbps	Reynoldsburg	43068	yes	15 Mbps	768 Kbps
Columbus	43227	yes	15 Mbps	768 Kbps	Sunbury	43074	no		
Columbus	43229	yes	15 Mbps	768 Kbps	Westerville	43081	yes	15 Mbps	768 Kbps
Columbus	43231	yes	15 Mbps	768 Kbps	Westerville	43082	yes	15 Mbps	768 Kbps
Columbus	43232	yes	15 Mbps	768 Kbps	Worthington	43085	yes	15 Mbps	768 Kbps
Columbus	43235	yes	15 Mbps	768 Kbps					

Broadband Inquiries and Consumer Feedback

The estimated coverage created by the ZIP Codes that were confirmed to have cable broadband available per the Insight Communications website were then refined through the review of broadband inquiries. Broadband inquiries are a set of crowdsourced data where consumers provide feedback on the available, or more importantly, unavailable, broadband services in their area. This information allowed Connected Nation to refine the estimated coverage by reviewing which inquiries indicated broadband service was not available at their location in Central Ohio **(Exhibit E)**.

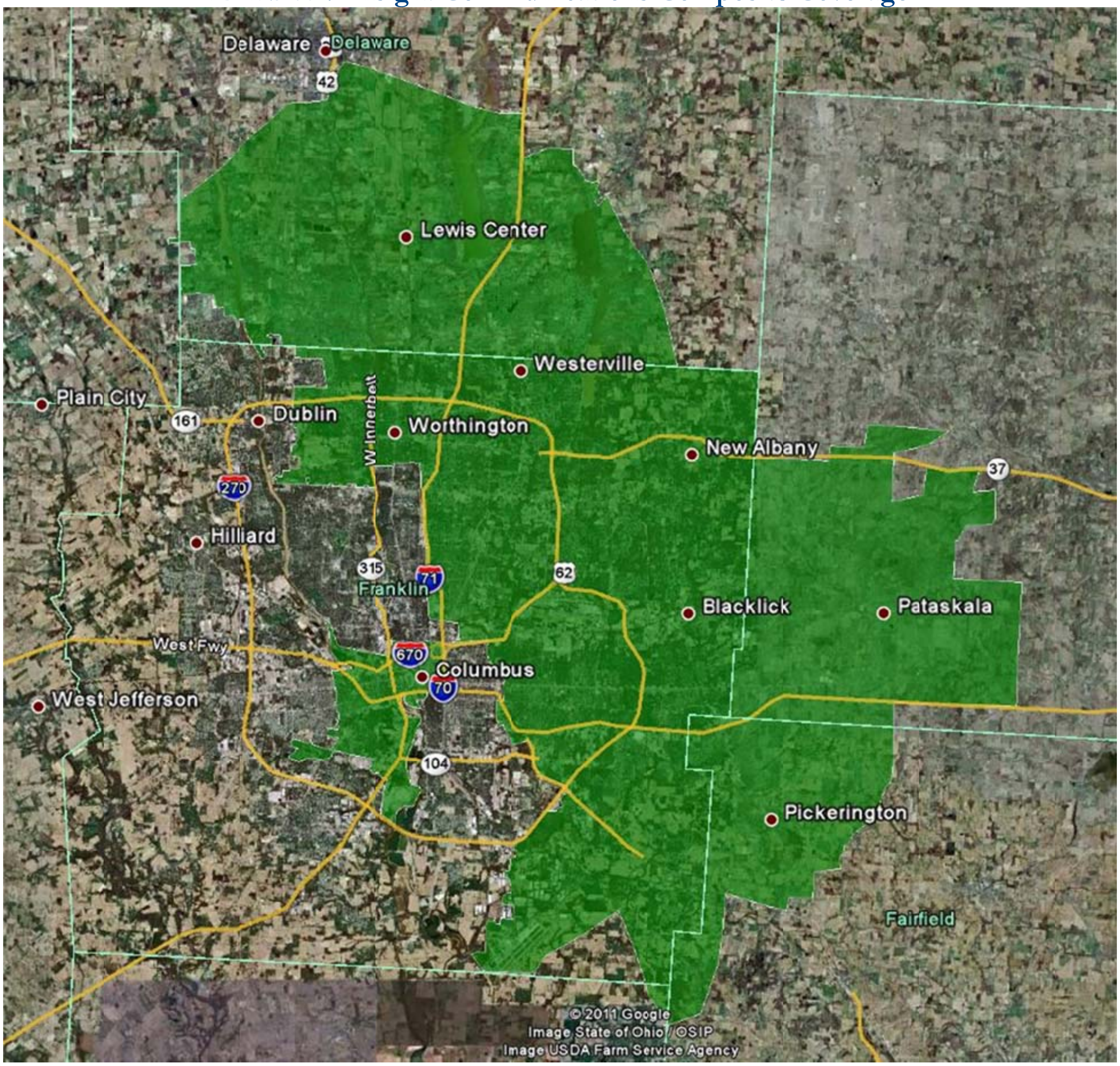
Exhibit E: Insight Communications Estimated Coverage and Broadband Inquiries



<u>Results and Submission for October 2011</u>

Based on the broadband inquiries submitted by consumers, the estimated coverage area for Insight Communications was refined to a display that Connected Nation felt better represented the actual cable broadband service area. A composite map was created based on all information acquired on the service area of this provider in Central Ohio **(Exhibit F)**. A map of the estimated cable broadband coverage was forwarded to Insight Communications and provider representatives were advised the information will be submitted to Connect Ohio and the NTIA broadband mapping project for processing if there are no discrepancies of the estimated coverage received from the provider within a 48-hour period.

Exhibit F: Insight Communications Composite Coverage



Accuracy and Verification: Provider Validation Methodology

Broadband providers maintain their service area data in many different formats, all in varying levels of complexity and granularity. In order to ensure that the data required by the NTIA is standardized across all providers and that it is as accurate as possible, Connected Nation translates and formats the data that providers are able to supply into a GIS shapefile and produces maps for the provider to review. The resulting map(s) and review process allow for providers to see their service area in a geographic format – for some providers, this is the first time they have seen maps of their broadband service area. Having the mapped service area allows providers to quickly identify any issues that appear in the data representation, whether the issue is in the data translation into a GIS format or from the original data collection and submission. Often data is provided from various sources and through the review and revision process, local engineers who operate the networks and work in the field are able to ensure that the tabular data that has been submitted is accurate and represents the real-world network extent. Any issues in how the service area is represented on the map(s) are remedied by Connected Nation, whether they are additions, removal of service, or any other revisions. Revised maps of service area representations are sent to the provider for review and approval; Connected Nation will revise data and return maps as many times as necessary until the provider is in agreement that the map represents their service area as accurately as possible. Once the review process has been completed and final approval of the data is provided, the data is deemed ready for NTIA submission.

Once the data collection has been aggregated at a statewide level, static maps of statewide and county-level availability are produced and made publicly available. In addition, consumers can visit the interactive online tool, BroadbandStat, to create customized views of broadband service areas and analyze corresponding demographic information. Leveraging broadband service data on various platforms allows for public users, providers, and other stakeholders to review, scrutinize, and provide feedback on the represented data. This feedback becomes a validation method in itself as consumers submit inquiries to Connected Nation either affirming where service is not available or identifying areas where broadband service is shown on the map, but in actuality is not available. This allows for a follow-up to providers regarding revisions to the data as it is represented; it also allows for Connected Nation to identify locations where on-site visits may be necessary to complete field validation of available services. Public feedback on all forms of mapping products serves as a localized validation method for provider-supplied information and allows Connected Nation to resolve inaccuracies as they are identified to ensure that only the highest quality information is provided to stakeholders.

Estimates derived from provider-validated data indicate that approximately 2.10 percent of Ohio households do not have terrestrial fixed broadband service available, and approximately 0.47 percent[1] of Ohio households have neither mobile nor fixed broadband service available.[2]

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[1] In accordance with NTIA's definition of available broadband service as specified in the SBI NOFA, this estimate includes both terrestrial fixed *and* mobile broadband service, if the service offers download speeds of at least 768 Kbps and upload speeds greater than 200 Kbps.

[2] Due to the nature of the SBI data collection methodology as defined by the NTIA and based on both census block geographic units and street segment data, the estimates of broadband availability derived from provider-validated data may include an overstatement of the actual number of households with broadband availability. Under the census block-based data collection method, a provider will typically report broadband availability for an entire census block whether its network is present across the whole or only a subset of that census block. This potential overestimation at the census block level can be amplified as the data is aggregated across the entire state.

Within rural areas of the state, results derived from provider-validated data indicate that approximately 4.62 percent of rural Ohio households do not have terrestrial fixed broadband service available, and approximately 1.02 percent[3] of rural Ohio households have neither mobile nor fixed broadband service available.[4] Please note that the availability estimates presented are based on Census 2000 household information; these figures will be updated in the near future with Census 2010 household information.

WIRELESS METHODOLOGY

Broadband Service Availability in Provider's Service Area
Wireless Services Not Provided to a Specific Address

Data solicited from a fixed wireless provider to create propagation models include, but are not limited to:

1. The name of the structure
2. Whether the transmitting device is operational or proposed
3. The maximum advertised downstream speed, the maximum advertised upstream speed
4. The typical downstream speed, the typical upstream speed (peak periods for both)
5. The frequency range of spectrum being used (as prescribed by NTIA)
6. The primary population center(s) being served (for geopolitical boundary reference)
7. The physical address of the transmit site (in the event latitude/longitude is unavailable from the provider this allows a quick reference point for geocoding)
8. Latitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
9. Longitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
10. Antenna pattern (e.g. omni-directional, 180°, 120°, 90°, etc.)
11. Azimuth of antenna (e.g. 360° with magnetic declination if known)
12. Approximate transmit radius (in feet, miles, or kilometers)
13. Polarity of transmit antenna (Vertical or Horizontal)
14. Transmit antenna gain (in dBi)
15. Line loss (applicable only to providers using coax, heliax, waveguide or other forms of cabling – excludes power-over-Ethernet devices)
16. Mechanical and/or Electrical beam tilt (if applicable)
17. Equipment Manufacturer (allows easy cross-reference against manufacturer's specification sheet)
18. Power output of the transmitting device (if unknown, FCC standards or manufacturer specifications are applied)

[3] See footnote 1.
[4] See footnote 2.

19. AMSL at base of tower site
20. Antenna centerline AGL (height of antenna above ground level measured at the centerline of the actual antenna)
21. Foliage factors (Evergreens/Deciduous and percent of ground cover)
22. Ground Clutter (primarily used in rural areas to account for foliage and in metropolitan areas to account for types and heights of buildings if known)
23. Average gain of receive antenna
24. Receive antenna is estimated at height above average terrain (HAAT) of 6.2 meters/20 feet
25. Federal Registration Numbers (if applicable) which may allow opportunities to cross-reference and/or obtain additional data from the Federal Communications Commission Universal Licensing System and the **CO**mmission **RE**gistration **S**ystem

Propagation modeling is an empirical mathematical formulation for the characterization of radio wave propagation as a function of frequency, distance, and other conditions. Propagation software(s) typically use the Irregular Terrain Model (also known as Longley-Rice) of radio propagation for frequencies between 20 MHz and 20 GHz. This model is based on electromagnetic theory and statistical analyses of the combination of terrain features and radio measurements, then predicting the median attenuation of a radio signal as a function of distance and the variability of the signal in time and in space. For metropolitan areas, the software can typically be adjusted to use the Okumura-Hata model which accounts for predicting the behavior of cellular transmissions in areas where buildings are the primary obstructions. The resulting product from either model depicts a graphical illustration of the theoretical propagation characteristics of a selected frequency range based on defined variables (receiver sensitivity of the home/mobile device, foliage factor, and digital elevation terrain input).

After converting propagation models into a geospatial format, additional processing is completed to remove the small pixels representing service present in the resulting dataset. These areas are initially created based on the parameters entered in the software from the provider equipment information, the underlying data parameters of elevation, hillshade, etc., and the limitations of the software itself to display a broadband service area as accurately as possible. Generally, these random pixel striations appear as a result of signal levels reaching the highest elevated points within the prescribed radius. Typically, while this pixilation anomaly shows legitimate areas where signals can be received, these highly elevated points may have exceedingly sparse populations or are entirely void of population. As a result, and congruent to the *Wireless Technology Methodologies and Business Logic* white paper submitted to NTIA on January 20, 2011, all independent pixels representing service that are less than 0.125 square miles in area have been removed from the geospatial representation of each wireless provider.

BROADBAND INQUIRIES METHODOLOGY

Connected Nation collects consumer feedback in the form of broadband inquiries (BBIs). These inquiries represent any type of communication received from the public regarding broadband service. Once BBIs are received across the state, this information is overlaid with the broadband availability information which was collected through the SBI program. This allows for a real-world comparison of the broadband landscape to the information received from broadband inquiries. Consumers submitting these inbound comments and/or inquiries are able to provide information regarding three categories: 1) residents who do not have broadband but want it; 2) residents who have broadband but want a different provider; and 3) residents who do not have broadband, but the broadband inventory maps indicate that they do.

BBIs are submitted frequently by consumers via the Connect Ohio website. Inquiries often seek help to identify local broadband provider options, or to learn when a specific provider may be able to provide service to that consumer. Consumer comments also provide information which may help modify maps with actual service area information. The primary objectives of Connected Nation regarding these inquiries are 1) to improve the accuracy of the state maps with submitted consumer information and follow-up field research; 2) to provide broadband options to consumers through cooperation with mapped providers and by facilitating new broadband service options; and 3) to map and analyze information from consumers about areas of unmet broadband demand and alternatives to currently mapped services.

New BBIs are assigned to either the GIS department or the Engineering & Technical Services (ETS) team depending on the category entered by the consumer on the website submission form. The GIS or ETS team members respond to each inquiry according to the information requested by the consumer. Many BBIs can be resolved through desktop research; however, if a BBI requires research in the field, the assigned ETS team member conducts such research when performing field validations in the area of the inquiry, or at other such time as is practical and appropriate. GIS and ETS team members respond to and conclude BBIs via telephone contact and/or e-mail communication.

The broadband inquiry process has been implemented in each of the Connected Nation state programs with successful results. Altogether Connected Nation has received over 17,000 broadband inquiries since 2007, allowing the state programs to evaluate each inquiry for broadband demand and data verification. These inquiries are continuously examined against current broadband availability, updated every six months, to determine if previously unserved households have been expanded to and can now receive broadband at their residence. This database of broadband inquiries has also allowed the Connected Nation state programs to aggregate demand in concentrated areas to show providers the exact locations where the population has made it clear that they would purchase broadband if it was made available to them. Providers in the states have responded to this process and have expanded to areas knowing that their investment will be worthwhile. Data verification methods have also proven successful, as the state programs have been able to show those inquiries that indicate the broadband service areas are misrepresented on the map to providers, who then verify where service cannot reach in regard to that residence(s). The broadband coverage in these states has been altered to create a more accurate map based on the inquiries submitted by the public.

During this reporting period, the Connect Ohio project has received a total of 304 inquiries (1,178 grant inception to date). As more inquiries are submitted to Connect Ohio, a more thorough validation of the broadband landscape can be performed, while also allowing providers to see which areas have a high demand for broadband adoption.

BROADBANDSTAT METHODOLOGY

BroadbandStat is an online, interactive mapping tool for viewing, analyzing, and validating broadband data. Developed through a partnership with ESRI, the market leader in geographic information system (GIS) software, BroadbandStat is a multi-functional, user-friendly way for local leaders, policymakers, consumers, and technology providers to devise a plan for the expansion and adoption of broadband.

First and foremost, BroadbandStat allows consumers to locate their residence and identify providers that offer broadband Internet service to that location. The interactive platform allows for users to build and evaluate broadband expansion scenarios using a wealth of data, including education and population demographics, broadband availability, and research about the barriers to adoption.

New functionality in BroadbandStat allows the consumer to provide feedback on the broadband data displayed on the interactive map. Through the collection of this feedback, a visual demand for broadband is presented. This visualization allows the Connected Nation state programs the ability to validate the broadband availability for accuracy. If residents within a region state they are without broadband, but the interactive map shows otherwise, this allows Connected Nation to approach the providers within that area in an effort to trim down their coverage to more accurately represent real-world availability on the ground.

The Connect Ohio project launched BroadbandStat on February 24, 2010, and has received a total of 8,255 visits to date, of which 2,727 occurred this reporting period.

SPEED TEST METHODOLOGY

The 3,818 speed tests that are represented in the Connect Ohio Speed Test Report during this reporting period (8,743 grant inception to date) are the result of a partnership between Connected Nation and Ookla Net Metrics. Utilizing this relationship increases the level of confidence in the data being collected and provides for a far greater sample size than could be collected by a single testing site.

Ookla owns and operates Speedtest.net, as well as develops and deploys speed tests, such as the Connect Ohio speed test website, for partners around the world. This network of sites that is developed and run on its testing technology provides Ookla with a vast dataset that, due to the variability of geographic information collected across the varying speed test sites, is geocoded utilizing Geo-IP technology. This technology allows for tests to be geocoded to points of aggregation, typically larger nodes across provider networks. While there are hundreds of thousands of tests that have been conducted, the level of aggregation is only sufficient for county-level detail due to the test results being located at these larger nodes and not at an absolute location for each speed test.

In an effort to validate broadband data from the Connect Ohio project, speed test information is collected throughout the state. Speed tests provide speed information on the path taken through all networks (a provider's network as well as additional networks) a local machine must connect to in order to reach the host test. The benefit of this collection of speed information is two-tiered. First, it allows for a comprehensive dataset of speeds, while also providing Connect Ohio with the information on where broadband services are available. Second, unlike theoretical speed information which was received through the data collection process, the use of speed tests provide real-world information on the speeds that currently exist within the state of Ohio.

Broadband Provider Log

Complete	160
Non-Responsive/Refused	16
In Progress	4
Count of Datasets by Status	**180**
Total Unique Providers Represented	**133**

Provider Name	Platform	Status	NDA Execution Date	Notes
AT&T Inc.	DSL	Data Added to Statewide Inventory	12/16/2009	[AUG-26-11 Amanda Bentley] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
AT&T Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/16/2009	[AUG-16-11 Amanda Bentley] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Bascom Mutual Telephone Company	Fixed Wireless	Data Added to Statewide Inventory	3/22/2010	[SEP-02-11 Amanda Bentley] Change: New fixed wireless tower in operation.
Block Communications, Inc.	Cable	Data Added to Statewide Inventory	2/8/2010	[AUG-11-11 Amanda Bentley] Correction: Speeds changed from speed tier 9 max down and speed tier 5 max up to speed tier 7 max down and speed tier 3 max up. The higher speed tiers are currently being tested, but not yet advertised.
BluSky Wireless	Fixed Wireless	Data Added to Statewide Inventory	2/24/2010	[SEP-02-11 Amanda Bentley] Correction: Fixed wireless coverage was revised.
CenturyLink	DSL	Data Added to Statewide Inventory	12/4/2009	[AUG-17-11 Amanda Bentley] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Cequel Communications	Cable	Data Added to Statewide Inventory	12/15/2009	[AUG-17-11 Amanda Bentley] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Clearwire Corporation	Mobile Wireless	Data Added to Statewide Inventory	3/3/2010	[AUG-10-11 Amanda Bentley] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Clearwire Corporation	Fixed Wireless	Data Added to Statewide Inventory	3/3/2010	[AUG-11-11 Amanda Bentley] Correction: Propagations were created to represent the fixed wireless system to replace the less accurate coverage used previously.
Comcast Cable Communications, LLC	Cable	Data Added to Statewide Inventory	12/7/2009	[AUG-24-11 Amanda Bentley] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
CoxCom Inc.	Cable	Data Added to Statewide Inventory	1/29/2010	[AUG-29-11 Amanda Bentley] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
DuplexCom of Ohio, LLC	Fixed Wireless	Data Added to Statewide Inventory		[SEP-02-11 Amanda Bentley] Change: New fixed wireless provider in the market.
Eagle Communications, LLC	Fixed Wireless	Data Added to Statewide Inventory		[AUG-29-11 Amanda Bentley] Correction: Provider was included for the first time in the October 2011 submission because we did not have their participation previously.
Erie County Cablevision, Inc.	Cable	Data Added to Statewide Inventory	2/8/2010	[AUG-10-11 Amanda Bentley] Correction: Speeds changed from speed tier 9 max down and speed tier 5 max up to speed tier 7 max down and speed tier 3 max up. The higher speed tiers are currently being tested, but not yet advertised.
FairPoint Communications	DSL	Data Added to Statewide Inventory	12/22/2009	[AUG-19-11 Amanda Bentley] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided (Germantown exchange only) for October 2011 submission.
Frontier Communications Corporation	DSL	Data Added to Statewide Inventory	1/22/2010	[AUG-22-11 Amanda Bentley] Change: Upgrade to network, additional DSLAMs added expanding service area.
Imagine Networks, LLC	Fixed Wireless	Data Added to Statewide Inventory	7/13/2011	[AUG-11-11 Amanda Bentley] Change: New fixed wireless provider in the market.
JB-Nets, LLC	Fixed Wireless	Data Added to Statewide Inventory	4/5/2010	[AUG-31-11 Amanda Bentley] Change: New fixed wireless towers in operation.
KeyOn Communications, Inc.	Fixed Wireless	Data Added to Statewide Inventory	10/15/2009	[AUG-15-11 Amanda Bentley] Correction: Previously unreported coverage was added to the service area from the April 2011 submission.

Leap Wireless International, Inc.	Mobile Wireless	Data Added to Statewide Inventory	4/6/2010	[AUG-16-11 Amanda Bentley] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Massillon Cable TV, Inc.	Cable	Data Added to Statewide Inventory	2/9/2010	[AUG-11-11 Amanda Bentley] Change: Upgrade to network, expansion of service area.
MetaLINK Technologies, Inc.	Fixed Wireless	Data Added to Statewide Inventory	3/22/2010	[AUG-11-11 Amanda Bentley] Change: New fixed wireless towers in operation.
New Knoxville Telephone Company	Fixed Wireless	Data Added to Statewide Inventory	3/12/2010	[AUG-23-11 Amanda Bentley] Change: New fixed wireless towers in operation.
Omnicity, Inc.	Fixed Wireless	Data Added to Statewide Inventory		[AUG-11-11 Amanda Bentley] Correction: Provider was included for the first time in the October 2011 submission because we did not receive a full dataset previously.
OneCommunity	Fixed Wireless	Data Added to Statewide Inventory	4/14/2010	[AUG-29-11 Amanda Bentley] Correction: Provider is being included for the first time in the October 2011 submission because we didn't have their participation previously.
Ottoville Mutual Telephone Company	DSL	Data Added to Statewide Inventory	12/22/2009	[AUG-15-11 Amanda Bentley] Correction: Provider corrected their speed information from the April 2011 submission.
Ottoville Mutual Telephone Company	Fiber	Data Added to Statewide Inventory	12/22/2009	[AUG-15-11 Amanda Bentley] Change: Upgrade to network, provider now offers FTTH.
Sprint Nextel Corporation	Mobile Wireless	Data Added to Statewide Inventory	1/14/2010	[AUG-10-11 Amanda Bentley] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
T-Mobile USA, Inc.	Mobile Wireless	Data Added to Statewide Inventory	1/8/2010	[AUG-10-11 Amanda Bentley] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
TDS Telecommunications Corporation	DSL	Data Added to Statewide Inventory	1/27/2010	[AUG-15-11 Amanda Bentley] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Time Warner Cable LLC	Cable	Data Added to Statewide Inventory	12/21/2009	[AUG-22-11 Amanda Bentley] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
UDATAnet	Fixed Wireless	Data Added to Statewide Inventory		[AUG-29-11 Amanda Bentley] Correction: Provider was included for the first time in the October 2011 submission because we did not have their participation previously.
Verizon Communications, Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/14/2009	[AUG-10-11 Amanda Bentley] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Wavelinc Communications	Fixed Wireless	Data Added to Statewide Inventory		[AUG-26-11 Ashley Littell] Changes and Correction: Provider activated five new towers and upgraded network to offer higher speeds; also removed one tower from previous submission because it is not active.
WideOpenWest Finance, LLC	Cable	Data Added to Statewide Inventory		[AUG-11-11 Amanda Bentley] Correction: Provider was included for the first time in the October 2011 submission because we did not have their participation previously.
Windstream Communications	DSL	Data Added to Statewide Inventory	1/28/2010	[AUG-23-11 Amanda Bentley] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission. Coverage was completely removed from Ashtabula, Hardin, and Lucas Counties where coverage was reported previously.
CenturyLink	Backhaul	Backhaul Provider Only Processing Complete	12/4/2009	
ConnectLink, Inc.	Backhaul	Backhaul Provider Only Processing Complete	3/15/2010	
Level 3 Communications, LLC	Backhaul	Backhaul Provider Only Processing Complete	12/14/2009	
T-Mobile USA, Inc.	Backhaul	Backhaul Provider Only Processing Complete	1/8/2010	
Windstream Communications	Backhaul	Backhaul Provider Only Processing Complete	1/28/2010	
Zayo Group, LLC	Backhaul	Backhaul Provider Only Processing Complete		
Insight Communications of Central Ohio, LLC	Cable	Estimated Coverage Submitted for Non-Participating Provider		[SEP-08-11 Ashley Littell] Correction: Finalized coverage dataset for Insight based on website listings and broadband inquiries received from consumers regarding available service in the area. Advertised speed data acquired from Insight website. Since company is being acquired by Time Warner, data will likely be submitted under that name in the next submission.
Amplex Internet	Fixed Wireless	Approval for Update Not Received – Data Still Submitted	3/26/2010	[AUG-30-11 Amanda Bentley] Change: New fixed wireless tower in operation.
Country Connections LLC	Fixed Wireless	Approval for Update Not Received – Data Still Submitted	2/15/2010	[SEP-02-11 Amanda Bentley] Correction: Fixed wireless coverage was revised.
Freund Enterprises Inc.	Fixed Wireless	Approval for Update Not Received – Data Still Submitted	3/2/2010	[SEP-16-11 Amanda Bentley] Change: New fixed wireless towers in operation.
Armstrong Utilities, Inc.	Cable	No Update to Provide	3/11/2010	
Arthur Mutual Telephone Company	DSL	No Update to Provide	12/22/2009	

AT&T Inc.	Backhaul	No Update to Provide	12/16/2009	
Ayersville Telephone Company	DSL	No Update to Provide	3/22/2010	
Bascom Mutual Telephone Company	Cable	No Update to Provide	3/22/2010	
Bascom Mutual Telephone Company	Fiber	No Update to Provide	3/22/2010	
Bascom Mutual Telephone Company	Backhaul	No Update to Provide	3/22/2010	
Bryan Municipal Utilities	Cable	No Update to Provide		
Bryan Municipal Utilities	Fiber	No Update to Provide		
Buckland Telephone Co.	Fiber	No Update to Provide	4/10/2010	
Cable Co-op, Inc.	Cable	No Update to Provide	4/9/2010	
CenturyLink	Backhaul	No Update to Provide	12/4/2009	
Champaign Telephone Company	DSL	No Update to Provide		
Champaign Telephone Company	Fiber	No Update to Provide		
Champaign Telephone Company	Fixed Wireless	No Update to Provide		[SEP-02-11 Amanda Bentley] Correction: Fixed wireless coverage changed to actual propagations to replace the concentric circle polygon used previously.
Cincinnati Communications, LLC	Backhaul	No Update to Provide	1/6/2011	
Cincinnati Communications, LLC	BPL	No Update to Provide	1/6/2011	
City of Wadsworth	Cable	No Update to Provide	7/19/2010	
Citynet, LLC	Backhaul	No Update to Provide	4/5/2010	
Com Net, Inc.	Backhaul	No Update to Provide		
Computers4U	Fixed Wireless	No Update to Provide		
Conneaut Telephone Company	Cable	No Update to Provide	12/22/2009	
Conneaut Telephone Company	DSL	No Update to Provide	12/22/2009	
CoxCom Inc.	Backhaul	No Update to Provide	1/29/2010	
Coyote Wireless Broadband LLC	Fixed Wireless	No Update to Provide	4/19/2010	
Dark Horse Networks, LLC	Fixed Wireless	No Update to Provide	3/15/2010	
DataBit Solutions Corp	Fixed Wireless	No Update to Provide		
DISH Network Corporation	Satellite	No Update to Provide	1/27/2010	[SEP-16-11 Amanda Bentley] Correction: Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
East Cleveland Cable TV and Communications, LLC	Cable	No Update to Provide	4/13/2010	
FairPoint Communications	Cable	No Update to Provide	12/22/2009	
Farmers Mutual Telephone Company	DSL	No Update to Provide	12/22/2009	
Farmers Mutual Telephone Company	Fixed Wireless	No Update to Provide	12/22/2009	
Freund Enterprises Inc.	Backhaul	No Update to Provide	3/2/2010	
Frontier Communications Corporation	Backhaul	No Update to Provide	1/22/2010	
Gateway Telecom LLC	Fixed Wireless	No Update to Provide	3/22/2010	
Glandorf Telephone Company, Inc.	DSL	No Update to Provide	3/9/2010	
Glandorf Telephone Company, Inc.	Cable	No Update to Provide	3/9/2010	
Horizon Telcom, Inc.	DSL	No Update to Provide	3/27/2010	
Horizon Telcom, Inc.	Fiber	No Update to Provide	3/27/2010	
Hughes Network Systems, LLC	Satellite	No Update to Provide	2/5/2010	[SEP-16-11 Amanda Bentley] Correction: Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
Intelliwave, LLC	Fixed Wireless	No Update to Provide		
Jefferson County Cable TV, Inc.	Cable	No Update to Provide	2/1/2010	
Jenco Speed Web	Fixed Wireless	No Update to Provide	4/28/2010	
Kalida Telephone Company, Inc.	DSL	No Update to Provide	3/8/2010	
McClure Telephone Company	DSL	No Update to Provide	4/5/2010	
McClure Telephone Company	Fiber	No Update to Provide	4/5/2010	
Mediacom Indiana LLC	Cable	No Update to Provide	1/12/2010	
MegaPath Inc.	Backhaul	No Update to Provide	2/15/2010	
Mikulski Communications LLC	Fixed Wireless	No Update to Provide	4/13/2010	
Minford Telephone Company	DSL	No Update to Provide	3/3/2010	
New Era Broadband, LLC	Fixed Wireless	No Update to Provide	7/12/2010	
New Knoxville Telephone Company	DSL	No Update to Provide	3/12/2010	
New Knoxville Telephone Company	Cable	No Update to Provide	3/12/2010	
New Knoxville Telephone Company	Fiber	No Update to Provide	3/12/2010	
New Knoxville Telephone Company	Backhaul	No Update to Provide	3/12/2010	
NexGenAccess Inc.	Fixed Wireless	No Update to Provide	4/16/2010	
North West Net, Inc.	Fixed Wireless	No Update to Provide	4/6/2010	
One Communications Corporation	Backhaul	No Update to Provide	3/18/2010	
OneCommunity	Backhaul	No Update to Provide	4/14/2010	
Ottoville Mutual Telephone Company	Backhaul	No Update to Provide	12/22/2009	
SAA bright.net, Inc.	Fixed Wireless	No Update to Provide	3/23/2010	
Slane Telecom	Fixed Wireless	No Update to Provide	4/9/2010	
Sprint Nextel Corporation	Backhaul	No Update to Provide	1/14/2010	
Sycamore Telephone Company	DSL	No Update to Provide	12/22/2009	
Sycamore Telephone Company	Backhaul	No Update to Provide	12/22/2009	
TDS Telecommunications Corporation	Backhaul	No Update to Provide	1/27/2010	
The City of Dover	Backhaul	No Update to Provide	4/9/2010	
tw telecom of ohio, llc	Backhaul	No Update to Provide	4/21/2010	
Vaughnsville Telephone Company, Inc	DSL	No Update to Provide	12/22/2009	
Verizon Communications, Inc.	Backhaul	No Update to Provide	12/14/2009	
Wabash Mutual Telephone Company	DSL	No Update to Provide	3/30/2010	
Wabash Mutual Telephone Company	Fiber	No Update to Provide	3/30/2010	
Wabash Mutual Telephone Company	Fixed Wireless	No Update to Provide	3/30/2010	

WildBlue Communications, Inc.	Satellite	No Update to Provide	1/8/2010	[SEP-16-11 Amanda Bentley] Correction: Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
XO Communications, LLC	Backhaul	No Update to Provide	2/12/2010	
YES Learning and Computer Center Inc.	Backhaul	No Update to Provide	4/24/2010	
Avolve, Inc.	Fixed Wireless	No Update Provided - Use Last Submission Data	2/17/2011	
Benton Ridge Telephone Company	DSL	No Update Provided - Use Last Submission Data	4/13/2010	
Benton Ridge Telephone Company	Fixed Wireless	No Update Provided - Use Last Submission Data	4/13/2010	
Cincinnati Bell Telephone Company LLC	DSL	No Update Provided - Use Last Submission Data	3/16/2010	
Cincinnati Bell Telephone Company LLC	Cable	No Update Provided - Use Last Submission Data	3/16/2010	
Cincinnati Bell Telephone Company LLC	Fiber	No Update Provided - Use Last Submission Data	3/16/2010	
Cincinnati Bell Telephone Company LLC	Mobile Wireless	No Update Provided - Use Last Submission Data	3/16/2010	
Cogent Communications, Inc.	Backhaul	No Update Provided - Use Last Submission Data		
Doylestown Telephone Company	DSL	No Update Provided - Use Last Submission Data	4/14/2010	
Doylestown Telephone Company	Cable	No Update Provided - Use Last Submission Data	4/14/2010	
Doylestown Telephone Company	Fiber	No Update Provided - Use Last Submission Data	4/14/2010	
Fort Jennings Telephone Company	DSL	No Update Provided - Use Last Submission Data	4/2/2010	
Fort Jennings Telephone Company	Fiber	No Update Provided - Use Last Submission Data	4/2/2010	
g wireless, Inc.	Fixed Wireless	No Update Provided - Use Last Submission Data	3/15/2010	
GMN Wireless Broadband	Fixed Wireless	No Update Provided - Use Last Submission Data	3/15/2010	
Hometown Cable Company	Fiber	No Update Provided - Use Last Submission Data	4/15/2010	
King Office Service, Inc.	Fixed Wireless	No Update Provided - Use Last Submission Data	4/9/2010	
LightSpeed Technologies	Fixed Wireless	No Update Provided - Use Last Submission Data	2/9/2010	
Mango Bay Internet	Fixed Wireless	No Update Provided - Use Last Submission Data	2/23/2010	
Mechcom Dot Net	Fixed Wireless	No Update Provided - Use Last Submission Data	4/22/2010	
Middle Point Home Telephone Company	DSL	No Update Provided - Use Last Submission Data	1/19/2010	
Nelsonville TV Cable, Inc.	Cable	No Update Provided - Use Last Submission Data	4/7/2010	
North Coast Wireless Communications	Fixed Wireless	No Update Provided - Use Last Submission Data	4/14/2010	
Nova Telephone Company	DSL	No Update Provided - Use Last Submission Data	4/5/2010	
nTelos, Inc.	DSL	No Update Provided - Use Last Submission Data		
RAA Services	Fixed Wireless	No Update Provided - Use Last Submission Data	3/12/2010	
Redbird Internet Services	Fixed Wireless	No Update Provided - Use Last Submission Data	3/22/2010	
Ridgeville Telephone Company	DSL	No Update Provided - Use Last Submission Data	3/12/2010	
RTEC Communications, Inc.	Cable	No Update Provided - Use Last Submission Data	4/13/2010	
RTEC Communications, Inc.	Fiber	No Update Provided - Use Last Submission Data	4/13/2010	
S. Bryer Cable TV Corp.	Cable	No Update Provided - Use Last Submission Data	8/16/2010	
Sherwood Mutual Telephone Association	DSL	No Update Provided - Use Last Submission Data	3/25/2010	
Skymax Broadband, Inc.	Fixed Wireless	No Update Provided - Use Last Submission Data	2/11/2010	
Southern Ohio Communication Services, Inc.	Fixed Wireless	No Update Provided - Use Last Submission Data	4/20/2010	
Telephone Service Company	DSL	No Update Provided - Use Last Submission Data	4/6/2010	
Telephone Service Company	Cable	No Update Provided - Use Last Submission Data	4/6/2010	
Telephone Service Company	Fiber	No Update Provided - Use Last Submission Data	4/6/2010	
US Signal Company, LLC	Backhaul	No Update Provided - Use Last Submission Data	6/17/2010	
Waldron Communication Company	Fixed Wireless	No Update Provided - Use Last Submission Data	3/19/2010	
Waldron Communication Company	Backhaul	No Update Provided - Use Last Submission Data	3/19/2010	

Wilkshire Communications, Inc.	Fixed Wireless	No Update Provided - Use Last Submission Data	3/16/2010	
Open Range Communications, Inc.	Fixed Wireless	Solicited Initial Data	5/5/2011	
PAETEC Communications, Inc.	DSL	Other		[SEP-08-11 Wes Kerr] Multiple outreach attempts were conducted but no response was received. Paetec was bought out during the collection phase of this round by Windstream and we intend to be able to include the Paetec coverage as a part of the Windstream footprint during the next round.
PAETEC Communications, Inc.	DSL	Other		[SEP-08-11 Wes Kerr] Multiple outreach attempts were conducted but no response was received. Paetec was bought out during the collection phase of this round by Windstream and we intend to be able to include the Paetec coverage as a part of the Windstream footprint during the next round.
Southern Ohio Communication Services, Inc.	Fixed Wireless	Other	4/20/2010	[SEP-16-11 Amanda Bentley] Scioto Wireless LTD has been acquired by Southern Ohio Communication Services, Inc. Coverage is still operational as Scioto Wireless and is submitted as such.
Just Micro Digital Services, Inc.	Fixed Wireless	Refused to Participate	4/13/2010	[JAN-26-11 Chip Spann] Received 1 e-mail from the provider stating his refusal to participate, followed by 1 email requesting to have his coverage area removed from the map.
Advanced Computer Connections	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to contact attempts made on July 1, 2010 and January 25, 2011, 2 additional attempts were made this period.
Bellaire Television Cable Co. Inc.	Cable	Non-Responsive to Multiple Attempts		In addition to contact attempts made on July 1, 2010 and February 10, 2011, 3 additional attempts were made this period.
Firewire Internet	DSL	Non-Responsive to Multiple Attempts		3 contact attempts were made between June 2, 2011 and August 9, 2011.
Firewire Internet	Fixed Wireless	Non-Responsive to Multiple Attempts		3 contact attempts were made between June 2, 2011 and August 9, 2011.
First Communications, LLC	Fiber	Non-Responsive to Multiple Attempts		In addition to contact attempts made in July 2010 and January 2011, 2 additional attempts were made this period.
Global Crossing Telecommunications, Inc.	Backhaul	Non-Responsive to Multiple Attempts		In addition to contact attempts made between July 1, 2010 and February 17, 2011, 3 additional attempts were made this period.
GLW Broadband	Cable	Non-Responsive to Multiple Attempts		In addition to contact attempts made between July 1, 2010 and February 18, 2011, 3 additional attempts were made this period.
Hocking Internet Technologies, Ltd	Fixed Wireless	Non-Responsive to Multiple Attempts	8/12/2010	In addition to contact attempts made between July 1, 2010 and February 14, 2011, 3 additional attempts were made this period.
Linked Communications, LLC	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to contact attempts made between July 1, 2010 and February 11, 2011, 3 additional attempts were made this period.
New Albany Net	Fiber	Non-Responsive to Multiple Attempts		3 contact attempts were made between May 6, 2011 and July 26, 2011.
Practical Support, Ltd.	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to contact attempts made between July 1, 2010 and January 19, 2011, 3 additional attempts were made this period.

Oklahoma Broadband Mapping

Data Submission Report

4th Submission (October 1, 2011)

October 1, 2011

Sanborn
1935 Jamboree Drive
Suite 100
Colorado Springs, CO 80920

Oklahoma Broadband Mapping

4th Data Submission Report

Table of Contents

1 Introduction

This report is submitted along with the fourth data submission for the Oklahoma Broadband Mapping Project. This submission includes all data collected sofar per the requirements of the National Telecommunications and Information Administration (NTIA) State Broadband Data and Development Grant Program (Docket No. 0660-ZA29) Notice of Funds Availability (NOFA) and formal and informal clarifications to it. Specifically, it includes broadband data collected from broadband providers and Community Anchor Institutions data compiled from various sources for the State of OK. The State of Oklahoma has retained a mapping contractor, The Sanborn Map Company to performthe work related to the Mapping Grant for this project.Data from the previous submission is now publicly accessible via the Oklahoma Broadband Program (http://www.ok.gov/broadband/).

This document is a supplement to the three previous reports submitted with previous data submissions on May 1, 2010, October 1, 2010, and April 1, 2011 respectively. Therefore, it builds on the document provided with those submissions. Rather than repeat the contents of the previous report, this document makes incremental updates on various topics where changes have been made in the methodology or reiterates the methodology used. Please refer to the previous documents for further details.

1 Overall Project Status

DATA COLLECTION

This section details data collection related to NTIA deliverables which include broadband data and community anchor institution data.

1.1.1 Broadband Data

For this submission, Sanborn began data collection efforts on July 12th2011by sending out data update requests and technical data specifications to all providers. This incorporated all the NTIA changes released on June 30th, 2011. These were sent to a large list of companies which were compiled from past collection efforts, the revised FCC 477 (dated June 30th, 2010),alist of providers from the NTIA's Wireless Internet Service Providers Association (WISPA) and from any providers that were identified through other sources such as web research, planning meetings, etc. We then actively followed up with the providers and as we had discovered in the past, many of the providers listed on the FCC 477 list are either resellers, or not involved in the actual delivery of broadband. (Many are VOIP or teleconference service providers that utilize existing broadband connections.)

In our technical document, we highlighted the transformation of data from Census 2000 to Census 2010 and given that change, we requested all providers to submit data in the Census 2010 format. Due to the change in census geography new data was requested whenever possible. Sanborn also uploaded the final data for each provider in NTIA format to the Sanborn Provider Portal. The providers were encouraged to use the provider portal and update their information on it. More and more providers are participating through the use of the provider portal and appreciate the ease of being able to see and validate their data through this process.

During our solicitation for data updates, we told providers that if we didn't hear from them by a certain date, we would default to using their data from Submission 3. However, we still contacted them a few times after the due date but eventually used Submission 3 data (converting it to census 2010) if they did not respond.

We followed the same contact and follow-up protocols as the previous submissions. The following are some of the important changes or no changes:

1. All census blocks and road segments are mapped based on 2010 census data set. Any data submitted in 2000 or 2009 format was converted to 2010 for this submission.

2. We continued to not collect data from resellers

3. We are submitting data for satellites in this submission based on NTIA clarifications. All satellite providers who have provided speed, FRN number and other technology information have been mapped to serve the full state. At present, Oklahomareceived acceptable files from two companies (Hughes and Wildblue). Weanticipate receivingcoveragefrom the other satellite providers (Starband and Stratos) in our next delivery to NTIA (Submission 5, due to NTIA on April 1, 2012) both of which did not provide adequate attribute information in order to be included in this submission.
    1) Four satellite providers have been identified in Oklahoma – Hughes, Starband, Wildblue, and Stratos.

4. Due to NDA restrictions and our inability to accurately flag service by "category of end user", address points are not included in this submission to NTIA for any commercial provider.

5. Some providers did not submit middle mile elevation or backhaul capacity, particularly when they asked us to reuse previous submission data. Wherever possible, we went back to providers to obtain that information, but it is not available for every record.

6. Terrestrial Mobile Wireless and Terrestrial Fixed Wireless (licensed and unlicensed) were treated as wireless coverage and were delivered as a shape file. In cases where a provider served using the same technology and spectrum but with different speeds, overlapping areas were removed and the higher speed was assigned.

7. If a cable based wireline provider provides both DOCIS 2.0 and DOCIS 3.0 service to the same area, the block or road was listed only once with a technology code of 40.

8. Providers were only willing to indicate on a general level if they served business, residential or both, so we did not get any providers that broke down the type of service by block. Only if the provider stated they only serve business to business customers did we fill in the "category of end user" with a code of 2, otherwise this field was left blank.

9. The submission 4 provider data model is currently based on the NTIA data model as of 6/30/11.

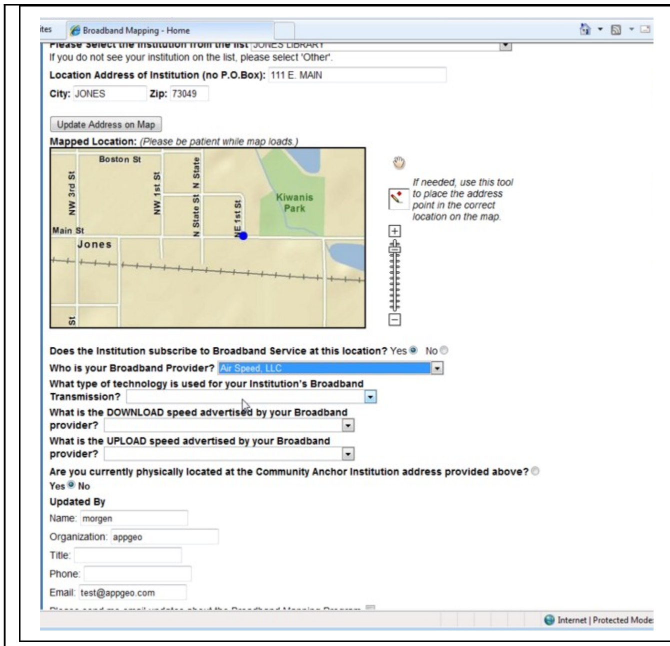
We added 6 new providers in this submission – SkyBeam/Jab Broadband (terrestrial fixed wireless unlicensed), AirLink Internet Services (terrestrial fixed wireless unlicensed), Cellular Network Partnership / CNP (terrestrial fixed wireless licensed), Ozark Telephone Company (aDSL), Seneca Telephone Company (aDSL), and Dobson Telephone, McLoud Division / Dobson Telephone Company (aDSL).

In this submission, 41% of the providers submitted new or updated data whereas for 59% of the providers we reused data from their previous submissions. Jab bought Partnership Broadband and also bought out Rhino as of July 1, 2011.

1.1.2 Community Anchor Institutions Data

The community anchor institutions data continues to be crowd-sourced through the online data gathering application created by the Sanborn Team. The State of Oklahoma is undertaking the PR around this data collection and contacting the relevant agencies to request their participationin filling out the data survey. This has been a slow process and we are getting to a point of diminishing returns with this effort. The State of Oklahoma is also preparingto implement additional planning tasks to try to increase these numbers for future submissions. The current totals for community anchor institutions that have responded so farthrough this submission areprovided below:

Category	Name	Total	Total with Broadband Information in Submission 4
1	School - K through 12	1956	112
2	Library	210	71
3	Medical/healthcare	444	29
4	Public Safety	1793	8
5	University, college, other post-secondary	79	16
6	Other community support - government	490	20
7	Other community support - nongovernmental	16	1



Community Anchor Institution: Crowdsourcing Portal

DATA PROCESSING

1.1.3 General Overview

In general, submission 4processes followed the same basic approach asprevious submissions except for the conversion of Census 2000 to Census 2010. The following sections outline the modifications made to the initial processing in order to meet the submission 4requirements as defined by NTIA.

In summary they can be divided into the following categories:

- Processing of Provider Data
- Conversion from Census 2000 to Census 2010 format
- Reference Data Creation
- NTIA Submission Data Model Schema Changes

1.1.4 Processing of Provider Data

All data received went through the following processing steps:

1. **Triage:** All new data was quickly reviewed to understand what was received, and in what format. We also made sure we had all the required components for NTIA's data model, such as their FRN and advertised speed information. We also screened for any known issues that we might have seen before (such as Excel 2003 spreadsheets that cut off at 32k row).
2. **Ingest:** At this time the data is actually brought into our systems. Each provider is set up with a unique file geodatabase to store their information. Record counts of what was received is logged so that we can validate we did not drop anything in processing.
3. **Data Processing:** This is where the data goes through a number of ETL routines to convert the raw proprietary information into a format similar to the NTIA format. The exact routine utilized depends on how the data is received
    1) When a provider submits a service boundary, we select all the blocks and roads inside that shape.
    2) If a provider submits a customer address list, the points are geocoded, and then the appropriate block or road segment is selected.
    3) If a provider submits block and road information using Census data, we just make sure everything is formatted to the appropriate specifications.
    4) If the provider submits any type of road or line data that does not direct correlate to the TIGER data set, we convert the lines to TIGER by selecting the road centroid and spatially selecting the closed segment in our data set. If

the road is in a block less than 2sqmi, than the block is selected. Some manual cleanup is also applied to make sure we do not accidentally drop any road segments that should have been processed.

5) After each round of processing, we make sure that we only keep unique records. A unique record is defined as having a unique combination of FRN, Block/Road ID, and technology type. If there are multiple records with different speeds, but all else is equal, than we select the maximum of the advertised speeds.

4. **QC Review:** All data is then sent to a different analyst to perform a through quality control review on the processed data set. Record counts are compared to what was submitted. The QC staff also made sure the ETL scripts and routines populated all of the right fields.
5. **QA Review:** Data is then sent to another team for Quality Assurance Review. In this step the data is not only double checked against what was originally submitted, but it is also brought up inside standardized MXD templates that allow us to make sure our results make sense. This often involves comparing the new data set with prior submissions, as well as looking for any possible technology or speed anomalies.
6. **Provider Review:** Processed data is all posted to a customized web-mapping tool we commonly refer to as the Provider Portal. All providers were notified once their data was available on the site, and they were always given 3-5 business days to review the data and respond. In this site, providers can log on and visually see their processed data in a map format. It also allows them to overlay their raw data to help them validate that we did indeed process things correctly. The provider portal also has a suite of markup tools that will allow the providers to edit their data, including adding or removing service areas, and making changes to the data attributes.
7. **Comment Processing:** All comments and feedback received from the provider portal, is then reviewed, and applied to the processed data set. This updated data set goes back through our QA and QC processes, and if time allows, back out to the Provider Portal, for the provider to review and sign off on.
8. **Data Append:** After all of the individual data sets are processed and approved, we run an append process which merges all of the individual provider data sets into one geodatabase. This is also the point where our team will do any final transformations to get our working data model into the latest NTIA publishing format.
9. **Final QA/QC:** A series of quality checks are run on the final appended data sets to ensure it is ready for submission to NTIA. We also run the NTIA receipt tool at this time. Any last issues are corrected, and the data is sent to the state for their review.
10. **Submission to NTIA.**

1.1.5 Conversion Process of Data from Census 2000 to 2010

Due to the changes in census geography, all providers were asked to submit new data. In those instances when a provider A) submitted new data in Census 2000 format, or B) instructed us to reuse their last data submission, we had to convert the blocks and roads into 2010 format.

Basic 2000 to 2010 Conversion Process:

1. For the blocks, take the 2000 block ID, and select all the corresponding 2010 block id's
    1) using census crosswalk table – not an actual spatial process, since this was faster
2. Look at the new 2010 block ids, and filter on greater than or less than 2 sq. miles.
    1) If less than or equal to 2 --> bring in the 2010 geometry and add that record to the blocks table
    2) If greater than 2 --> select any roads in that area – spatial select (using roads gt2 table)
3. For the roads, take the 2000 or 2009 TLID and try to match it to the 2010 TLID's
    1) If there is a match, add that record to the roads table
    2) If there is not a match, select centroid of existing 2000/2009 segment, and select closest 2010 road
    3) If the road is now in a block LT2, select the block(s) instead and drop the road
4. Remove any duplicate records in both tables
5. Run some automated checks to catch missed features (i.e. add le2smi blocks surrounded by roads that have not already been added)
6. Manual review (QC) and corrections.
    1) There will be some blocks that are selected inappropriately (especially at town edges for CT providers, where we know their franchise ends at a town line.)
    2) There are some holes in the census crosswalk table
    3) The road conversion process may only select one portion of the road if it has now been broken into multiple segments

Assumptions

1. If a road was in an area greater than 2smi in s3, and due to census re-drawing, is now in an area less than 2smi, we will grab blocks (le2smi) on both sides of that road and add them to the provider data:
2. If a new 2010 block, that is less than 2smi, is completely surrounded by roads and/or blocks served by that provider, than we will add the block to the provider service area.

1.1.6 Submission 4: ReferenceData Creation

This section describes the reference data used in submission 4.

BLOCK REFERENCE

For s4, Census 2010 data was utilized. The data was set up as follows:

1. Block size (AREA) is calculated combining the 2000 land area (ALAND) and water area (AWATER)
2. AREA is converted from square meters to square miles to calculate square mileage (SMI).
3. If the SMI of a block is less than or equal to 2, then the less than or equal to 2 square mile indicator (LE2SMI) is set to true.

ROAD REFERENCE

2010 Tiger Line IDs (TLID) were used for data processing in s4. The data was set up as follows:

1. The GT2SMI (Greater Than 2 Square Mile) indicator is set to True when:
   1) The 2010 road segment is completely within a block that is NOT less than 2 square miles
2. Only minimum and maximum address ranges and a single zip code for each road segment is maintained.

1.1.7 Submission4: NTIA Submission Data Model Schema Changes

The data model released on June 30, 2011 contained the following changes from the s4 data model:

- The Category of End user field was added back in to the block and road tables. In addition the domain values were changed. 1 still represents residential, but a 2 now represents all non-residential uses.
    - This field is not required, and for many providers, was left blank since the data was not provided.

DATA VALIDATION

Sanborn has continued to perform the same validation on the data as the previous threesubmissions(details in previous reports). Some minor updates to the validation process are discussed below.

1) QC of the data at various steps

2) Spatial checks against public and commercial datasets

a. For OK, we continued to use the following datasets for validation:

   i. Exchange Boundaries: for DSL boundaries

   ii. MediaPrints: for Cable boundaries

   iii. Speedtest.net data

3) Verification by providers

4) In this Submission, along with the standard verification by providers using the Provider Portal, we also identified for providers issues that they needed to focus on regarding the findings of our validation team. This also included validation and feedback we received through our website – this submission we have incorporated and integrated several feedback tools in the Interactive Map and information sourced from users is evaluated with respect to provider data and any noted discrepancies are passed back to the provider for correction. In addition, in this round, we incorporated any feedback provided by NTIA for Submission 3. All of these were done by sending providers a letter that identified issues using screenshots and explaining to them what the error was and then asking them to go fix those errors using the secure provider portal. If providers disagreed with the feedback, we have documented their response.

5) Speedtest data collection and other data collection for verification

   a. We continue to use speedtest data and community anchor data crowd sourced for validation purposes.

6) Planning workshops and local validation

   a. During this submission, local validation was undertaken by an independent group, the Center for Spatial Analysis at the University of Oklahoma (OU). OU performed an independent survey gathering data points from CAI's and the GIS community for the State of Oklahoma.WithinSanborn's validation process, OU's points werecompared against provider's data. Those data points found in question were taken back to the providers for correction. OU is increasing their efforts to gather more data points and this process will be performed throughout Submission 5.

Oregon Broadband Mapping Project: Product Release White Paper

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Submitted By:	Kristin Rousseau
Contact E-mail:	**kristin.rousseau@broadmap.com**

Product Specification:	Fall 2011 NTIA Data Model
Product/Process:	NTIA—October 1, 2011 Data Deliverable
Dataset Submission QC:	NTIA—SBDD_CheckSubmission.py

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OVERVIEW

This white paper highlights the **Submission Summary** for this deliverable, as well as describes the **Data Gathering**, **Data Integration**, **Data Validation and Verification** and **Quality Control** processes used to create the Broadband Mapping Project's October 1, 2011 data submission. To support varying levels of technical and program knowledge, both a **high-level summary** and a **detailed process review** are supplied.

SUBMISSION SUMMARY

PROVIDER DETAILS

PROVIDER PARTICIPATION

- Providers Included (listed by Provider and Holding Company name)

360networks
AboveNet Communications Inc.
Alyrica
AT&T Communications of the Pacific Northwest Inc
Axxis Communications
Bend Cable Communications, LLC
Broadband Cable Telecommunications LLC Beaver Creek Telephone Company
Cal-Ore Communications Inc.
Canby Telephone Association
Cascade Networks, Inc.
Cascade Utilities
Casco Communications
CenturyLink
Chambers Cable
Charter Fiberlink OR - CCVII LLC
City of Sandy
Clear Creek Telephone & TeleVision
Clearwire
Colton Telephone
Comcast Cable Communications, LLC
Comspan Communications, Inc.
Country Vision Cable
Covad Communications Company
CP NW 1 LLC (Broadstripe)
Crestview Cable
Cricket Communications
Douglas Services, Inc/Douglas Cooperative
Eastern Oregon Telecom
Freewire Broadband

Frontier Communications of America
Gervais Telephone Company
Gorge Networks
Helix Telephone Company
Hughes Network Systems
Integra Telecom of Oregon Inc
J & N Cable Systems, Inc.
Level 3 Communications LLC
Lightspeed Networks Inc.
McMinnville Access Company (OnlineNW)
Molalla Communications
Monitor Cooperative Telephone Company
Monmouth Independence Networks (MINet)
Monroe Telephone Company
Mount Angel Telephone
Nehalem Telecommunications Inc (RTI)
North-State Telephone Co.
Oregon-Idaho Utilities Inc
Oregon Telephone Company
Oregonfast.net
Peoples Telephone Co
Pine Telephone Systems, Inc.
Pioneer Consolidated, Inc.
PocketiNet Communications, Inc.
Qlife
Quantum Communications
Qwest Communications Corp
Roome Telecommunications, Inc.
Rural Network

SCIO Mutual Telephone Assn.
SCS Communications and Security Inc
Sprint Nextel Corp
St Paul Telephone
Starband Communications Inc / Spacenet
Stayton Cooperative Telephone Co (SCTC)
Stephouse Holdings Company llc
T-Mobile
Tanager Telecommunucations (Sawnet)
TDS Telecom
Tillamook - CoastCom, Inc
Trans-Cascades Telephone
TW Telecom of Oregon LLC
Umpqua Indian Development (Rio Net)
Upward Access Support
Verizon Wireless
Warm Springs Telecommunications
Wave Division Holdings LLC
Webformix
Whiz to Coho Inc
WildBlue Communications Inc.
Wtechlink Wireless Broadband
XO Communications Services Inc.

- New Providers Since Last Data Submission
    - Hughes Network Systems – Satellite
    - Oregon-Idaho Utilities, Inc.
    - Silver Star Telecom LLC
    - Windwave Technologies, Inc.

- Non-Responsive Providers
    - Air Speed LLC
    - Bendtel Inc.
    - Eagle Telephone System, Inc.
    - Eaglecap.Net LLC
    - Hunter Communications Inc.
    - Nextnet Telecom Inc
    - Preferred Connections Inc NW
    - Tillamook Lightwave
    - Vertex Group Inc.
    - X5 PDX LLC
    - Yellow Knife Wireless

- Non-Cooperative Providers
    - Blue Mt TV Cable Co
    - Cogent Communications Group
    - Comspan Communications, Inc.
    - Gorge Ventures Inc
    - Meritel Group Inc
    - NextGen Internet Systems, Inc.

- Other Provider Changes
    - CenturyLink and Qwest have merged and submitted separate data for this round with the same FRN. Data was aggregated into one footprint and the Qwest provider name was removed.

COVERAGE AREA CHANGES

- Coverage Footprint Reductions/Map Refinement –
  - Douglas Services, Inc. (TT-50)
  - Integra – TT-10, 20 and 30
  - J & N Cable Systems, Inc. (TT-30)
  - Tanager – TT-70

- Coverage Footprint Expansion –
  - 360 Networks (USA) Inc. – Increase in Middle Mile
  - Ashland Fiber Network (TT-41 and TT-50)
  - Beaver Creek Telephone Company (TT-41 and TT-50)
  - Cableone (TT-41)
  - Cal-Ore Communications Inc. (TT-50)
  - Canby Telcom (TT-10, TT-20, TT-30, TT-50)
  - CenturyLink (TT-10)
  - Chambers Cable (TT-41)
  - Comcast (TT-40)
  - Covad Communications Company (TT-10, TT-20, TT-30)
  - Crestview Cable (TT-41)
  - Datavision Communications (TT-50)
  - Eastern Oregon Telecom (TT-10)
  - Frontier Communications Northwest Inc. (TT-10)
  - Integra Telecom (TT-10, TT-20, TT-30)
  - LS Networks (TT-30 and TT-50)
  - Mount Angel Telephone Company (TT-10)
  - New Edge Network (TT-30)
  - North-State Telephone Co. (TT-50)
  - Pine Telephone Systems, Inc. (TT-10 and TT-50)
  - QualityLife Intergovernmental Agency (TT-50)
  - Quantum Communications (TT-20, TT-30, TT-50)
  - SCIO Mutual Telephone (TT-10 and TT-50)
  - SawNet (TT-50)
  - Stayton Cooperative Telephone Company (TT10 and TT-50)
  - TW Telecom of Oregon LLC (TT-30 and TT-50)
  - Verizon Wireless (TT-80)
  - Wave Broadband (TT-41)
  - XO Communications Services, Inc. (Affiliated Entity) (TT-30)

DATA CORRECTIONS

- Comcast coverage data included in the spring data submission did not represent its complete coverage area, which was corrected with receipt of census block data from Comcast. Coverage has been validated by provider for dataset 4 submission.

COMMUNITY ANCHOR INSTITUTION (CAI) DETIALS

OVERALL STATISTICS

Community Anchor Institution - Categories	Overall Count	Broadband Subscriber (1 or 2)	Trans Tech	Advertised Speed Down	Advertised Speed Up
Category 1 - School K through 12	1616	359	349	318	318
Category 2 - Library	189	185	185	177	177
Category 3 - Medical/Healthcare	342	12	9	5	5
Category 4 - Public Safety	1135	238	114	65	65
Category 5 - Universities/Colleges	69	38	37	34	34
Category 6 - Other: Government	227	43	38	34	34
Category 7 - Other: Non-Government	19	3	1	1	1
Total	**3597**	**878**	**733**	**634**	**634**

CAI CHANGES

- The overall inventory was reviewed and updated to include institutions that were previously missed or that are new and to remove or add institutions to correctly represent categories 6 or 7 as defined by Oregon.
- Additional broadband attribution was collected and mapped mainly for Schools and Libraries; although broadband attribution improved within all categories.
- Another change was the inclusion of CAIIDs to the CAI Inventory for Category 1: K-12 Schools, Category 2: Libraries and Category 5: Colleges, which were extracted from the three databases communicated by NTIA. These databases are as follows:
  - For K-12 institutions (CAI type 1) please add the NCES ID CCD ID value found here: **http://nces.ed.gov/ccd/bat/**
  - For Higher Education (CAI type 5) please add the NCES IPEDS ID value found here: **http://nces.ed.gov/ipeds/datacenter/**
  - For Libraries (CAI type 2) please. Combine (do not add) "FSCSKey" and "FSCs_SEQ" from the "puout08av2000" file and place them here: **http://harvester.census.gov/imls/data/pls/index.asp** (FYI the LIBID is your state's unique ID for libraries)

SUBMISSION RECEIPT

SUBMISSION RECEIPT RESULTS

- Attached are the results from the NTIA data submission receipt quality script.

OR_2011_10_01.txt

- Error Report
    - The only item flagged in the submission receipt output is the following error, which has been verified as containing correct entries within the data submission.

    - Field Check: FAILED CAInstitutions_TRANSTECH has 2679 UNEXPECTED VALUES for query: TRANSTECH <> 0 AND TRANSTECH <> 10 AND TRANSTECH <> 20 AND TRANSTECH <> 30 AND TRANSTECH <> 40 AND TRANSTECH <> 41 AND TRANSTECH <> 50 AND TRANSTECH <> 60 AND TRANSTECH <> 70 AND TRANSTECH <> 71 AND TRANSTECH <> 80 AND TRANSTECH <> 90 AND TRANSTECH <> 0

    - This was flagged due to an inconsistency between the data model and the submission receipt script, which has also been communicated by other Grantees on PBWorks.

    Hyperlink to Grantee Workspace in which the same issues were identified by other Grantees:
    https://sbdd-granteeworkspace.pbworks.com/w/page/42442088/Data%20Model%20Issues-June2011

HIGH-LEVEL SUMMARY

DATA GATHERING

BROADBAND SERVICE AREAS, MIDDLE MILE AGGREGATION POINTS AND BROADBAND SERVICE OVERVIEW

The collection of Broadband Service Areas, Middle Mile Aggregation Points and Broadband Service Overview information is handled through the following Provider Outreach Process:

- Build and maintain an inventory of Broadband providers through research and State inputs.
- Update provider material that describes the data requirements and logistics for data transfer.
- Update Non-Disclosure Agreement (NDA) for use in project, where applicable.
- Maintain multiple protocols for the provider to submit data, including Secure File Transfer Protocol (SFTP) technology when desired.
- Conduct one-on-one informational discussions with each provider to communicate the following:
    - Requirements of this project;
    - Broadband data required to support the product data model;
    - Submission protocols available;
    - Capability to validate how the supplied data is aggregated.
- Download/receive provider data.
- Establish a repeatable process with provider. Maintain provider communication, transaction and data handling records throughout the project (dates contacted, data received, etc.).

COMMUNITY ANCHOR INSTITUTION (CAI)

The collection of CAI information is handled through the following CAI Collection Process:

- Collect and maintain an inventory of current CAIs through Grantee input and data mining,
- Collect and maintain CAI inventory attribution through anchor institution input using a web-based CAI portal, CAIID databases and state agencies. Upload data from the CAI portal to Core Database for standardization to NTIA data model, where needed.
- Perform internal data cleansing, such as removing duplicate records, identifying gaps or errors in broadband attribution and verifying category.
- Geocode CAI locations.
- Translate Core Database data to deliverable-ready format.
- Continued dialog with Grantee on accuracy of inventory and the collection of broadband attribution from non-responsive institutions.

DATA INTEGRATION PROCESS

The data integration and processing mechanisms currently used allow for multiple types of inputs and result in a standardized output that meets the NTIA deliverable requirements. This flexible process supports data model changes and project-requested enhancements.

- Receive inputs from providers via submission protocols; upload into Sourcing Database and catalog with provider information.
- Review provider-supplied data for completeness and for potential discrepancies that require resolution prior to processing and flag as necessary.
- Categorize input into data-type category (addresses, block lists, paper maps, etc.).
- Standardize input based on data type within Staging Database.
- Create Compact Polygons (CP)—(internal methodology for generating area-based feature for coverage in Staging Database).
- Apply broadband attribution to CP; apply metadata to CP.
- Perform quality analysis of the CP against the source supplied to identify any completeness or accuracy issues.
- Request additional information from the provider if elements of coverage are missing or contain discrepancies. This is a second manual quality check to ensure data is complete.
    - Process coverage area to build the required NTIA data model layers.
- Process CAI data input into internal standardized format, as discussed above in the **Community Anchor Institution (CAI) subsection**, based on NTIA and State-level requirements.

DATA VALIDATION AND VERIFICATION

Following the creation of the product, process steps within Data Validation and Verification occur. To ensure the data collected and processed is as accurate and comprehensive as possible, provider validation and internal verification activities are employed. After the initial mapping of providers' coverage areas and serviceability claims, additional reviews are performed using the methods described in the subsections below (**Third-Party Data Verification**, **Broadband Provider Validation**, **Confidence Values**).

THIRD-PARTY DATA VERIFICATION

The coverage is visually and programmatically compared against third-party data. Pitney Bowes and American Roamer data are used in cases where a coverage area is questionable. All anomalies identified during this analysis are reviewed with the providers.

BROADBAND PROVIDER VALIDATION—PROVIDER PORTAL APPLICATION

Providers are trained on and requested to use a secure interactive web application to review their current coverage area(s) and supporting broadband attribution and validate their data or submit change requests to update their data. All provider change requests go through the **Data Integration Process** and are reviewed with the provider to complete validation.

CONFIDENCE VALUES

All verification, validation and manual quality review results are tracked by provider/technology type and stored and maintained within a **Validation table**. A confidence value is assigned, based on internal assessments of the collected information, to highlight the provider coverage areas and/or attributions that would benefit from further investigation and/or enhancements.

QUALITY CONTROL

Following collection, processing and analysis of the provider and CAI data, the product is checked manually and algorithmically against the NTIA data model. Some of the items included within these checks are:

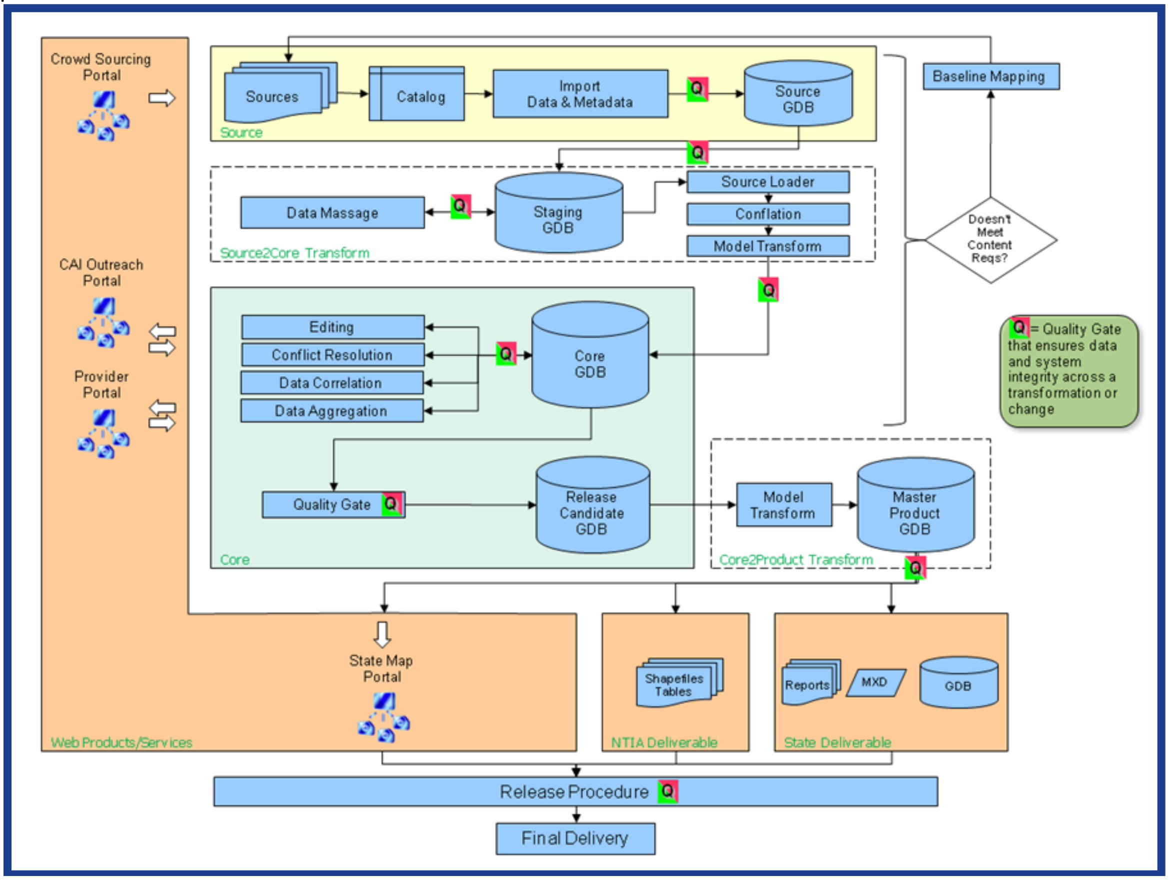
- Format correctness;
- Table and field structure;
- Valid values, including default values, where applicable;
- Geographic extent and topology errors.

Prior to data submission, another quality control script supplied by NTIA is run. This script, SBDD_CheckSubmission.py, creates an output in text form that is required to be submitted along with the final deliverable. All errors must come up clean, unless otherwise specified by NTIA. Exceptions to the script as noted by NTIA on the SBDD Workspace on 03/25/11 can be found at the following link: **https://sbdd-granteeworkspace.pbworks.com/w/page/38218329/CheckSubmissionExceptions**

- Longitude values for States outside the lower 48 (any table);
- CAI results for Transtech, MaxAdUp, MaxAdDown if BBService is “No” or “Unknown”;
- Overview MaxAdDown, MaxAdUp if 100% of record-level data has MaxAdDown or MaxAdUp populated.

DETAILED PROCESS REVIEW

A detailed review of the data collection, integration and quality control points within the broadband data gathering and mapping process are discussed in the subsections that follow. In addition, a diagram showing the overall process can be seen below.



PROVIDER OUTREACH

For the October 2011 data submission, an e-mail notification was sent to all providers with supporting deliverable dates. The providers mainly used the Provider Portal web application to submit changes to and/or validate their current coverage area(s).

In support of the data collection effort, providers that did not timely respond to the outreach were contacted by phone.

OUTREACH MATERIALS

The original provider packet sent via e-mail to the providers included the following documents and files:

- Letter from the State inviting them to participate in the program;
- Copy of the Non-Disclosure Agreement (NDA);
- Copy of the Mapping NOFA from the NTIA;
- Copy of the NOFA Clarification from the NTIA;
- Broadband service address example file in CSV format;
- Word document describing service address example file;
- Broadband service block example file in CSV format;
- Word document describing service block example file;
- Broadband service street example file in CSV format;
- Word document describing service street example file;
- Broadband subscriber example file in CSV format;
- Word document describing subscriber example file;
- Broadband wireless coverage area sample shapefile;
- Word document describing wireless coverage area sample shapefile;
- Instructions for downloading, installing and using the WinSCP SFTP application.

OUTREACH PROCESS

The provider outreach process is comprised of the following general steps:

- Send the provider package and introduction letter to the main point of contact for the provider.
- Follow up with e-mail and telephone to verify that the main point of contact is correct.
- If necessary, discuss the NDA further and resolve any redlines.
- Once the correct primary contact is established, set up a telephone call, if necessary, to learn more about the provider's offerings and direct them to the appropriate outreach materials.
- If providers are unable to be contacted (non-responsive) or indicate that they are not interested in participating (non-cooperative), mark them as such on the provider tracking sheet. These providers will be escalated to the State for further action.
- As the providers are collecting the required data, provide instructions on downloading, installing and using the WinSCP SFTP application, if required.
- Arrange with the providers to transfer the data in whatever way they are comfortable: some providers will find regular email acceptable; others will want to use the SFTP application.
- After data is received and reviewed, it may be necessary to contact a provider for clarification or to address incomplete datasets. In the interest of building and maintaining relationships, care is given not to push the provider but to work with it to obtain accurate data in the best possible format.

DATA COLLECTION

DATA TRANSFER PROCEDURES

There are three primary ways data is collected from providers. These are:

- Secure FTP (SFTP) using the WinSCP application;
- Regular e-mail;
- Mail.

INITIAL DATA REVIEW AND QUALITY ASSURANCE

The initial data review and quality assurance process consists of the following general steps:

1) Access the data from the SFTP site or e-mail.
   a. If e-mailed, place copy of original dataset in the appropriate provider folder on the SFTP site.
2) Place copy of raw data on local computer in a working directory.
3) Review data and determine course of action based on type of data received.
4) Ensure data is complete and contact provider to address any gaps.

NOTE:
The goal is to get as many providers as possible to provide subscriber address data in the correct format. Obviously, this will not be possible with all providers so we will continue to have to process various types of provider-supplied data.

DATA INGESTION

DATA INGESTION OVERVIEW

The following subsections outline the process steps taken based on the type of input supplied by the data provider:

- **Point Data**:
  - Subscriber location;
  - DSLAM location;
  - Central Office location;
  - Broadcast Tower location.
- **Linear Data**:
  - TIGER® street segments.
- **Polygonal Data**:
  - Census Blocks;
  - Coverage Area.

Overall, the process is geared toward taking the provider data supplied and creating polygon shapes to append to the bb_cov feature class. The bb_cov feature class is the interim dataset that is then processed using the makeDeliverable.py Python script to create the MapConnect™ data layers that will be delivered to the State and, ultimately, to the NTIA. Detailed instructions used in this process can be found in the subsections below.

POINT DATA

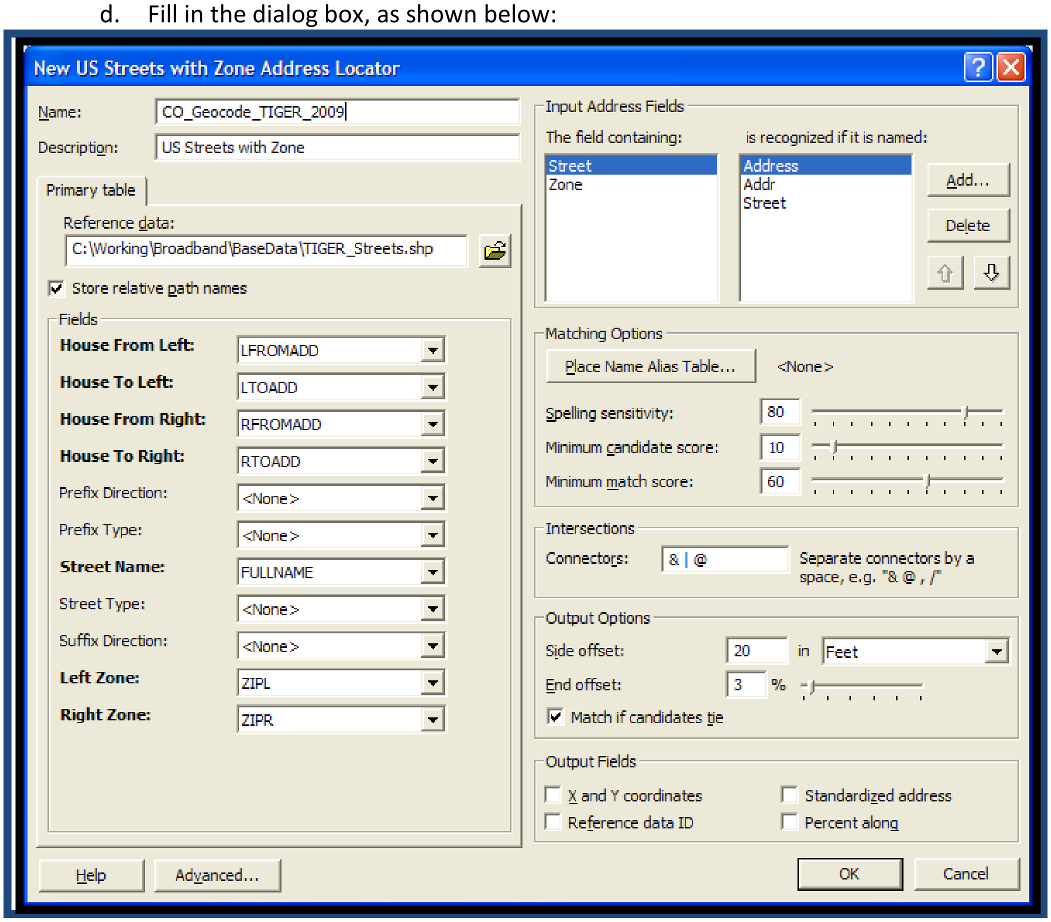
SUBSCRIBER LOCATION—ADDRESS DATA

In the event that the data provider supplies subscriber address data, the steps are as follows:

1) First, convert the address data to a clean Excel spreadsheet in an appropriate address data format.
   a. Usually, this has the following columns: street address (number, pre-directional, pre-modifier, street name, street type, post-directional and post-modifier concatenated), city, state, ZIP.
2) Configure the ArcGIS® geocoding tool to use the TIGER® 2009 streets dataset.
   a. In ArcCatalog®, create a new Address Locater by right-clicking in the white space of the appropriate directory and selecting **New>Address Locater** from the dropdown menu.
   b. Select **US Streets with Zone** and click **OK**.

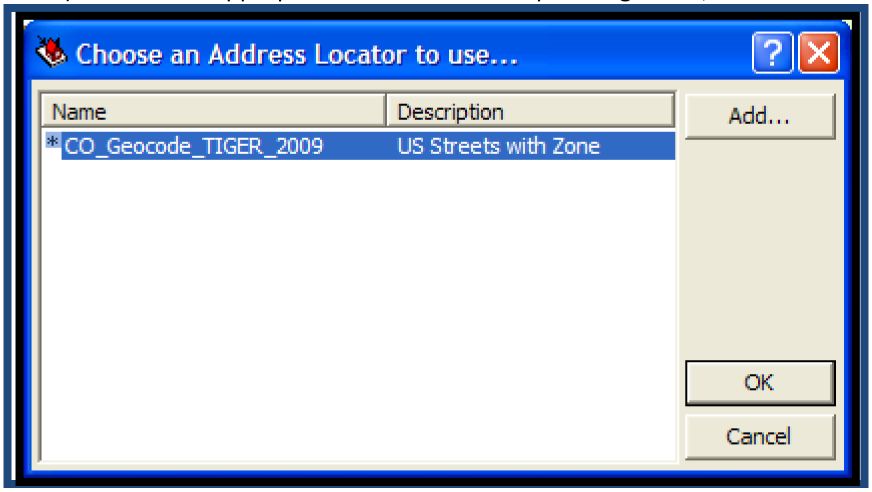
NOTE:
It is likely that multiple Address Locators will have to be set up to handle the variety of provider address data received.

   c. Navigate to the **TIGER Streets 2009 file** and click **OK**.
   d. Fill in the dialog box, as shown below:

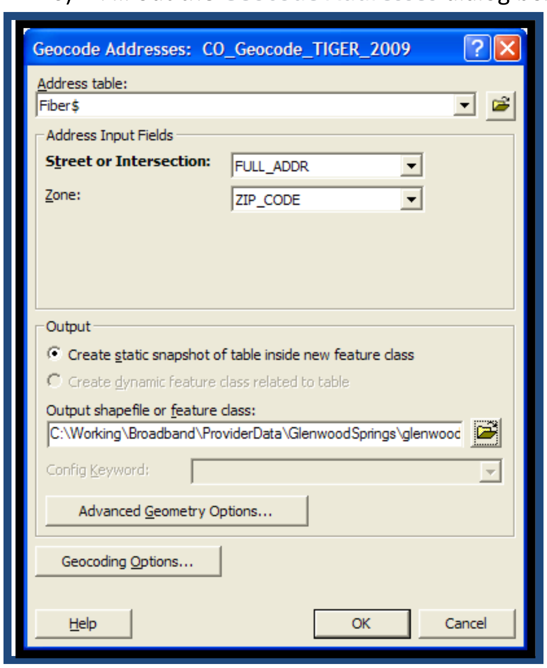


e. Click **OK**.

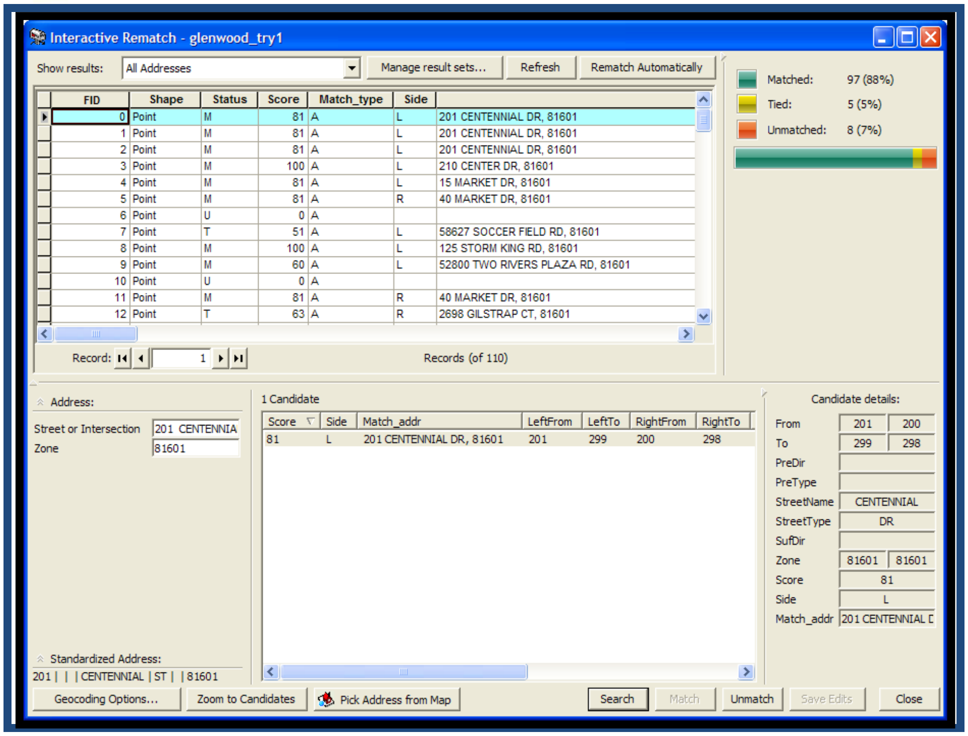
3) Open ArcMap® and add the Excel spreadsheet with the address information.
4) Right-click on the Excel spreadsheet and select **Geocode Addresses** from the dropdown menu.
5) Select the appropriate address locator by clicking **Add…**, then **OK**.



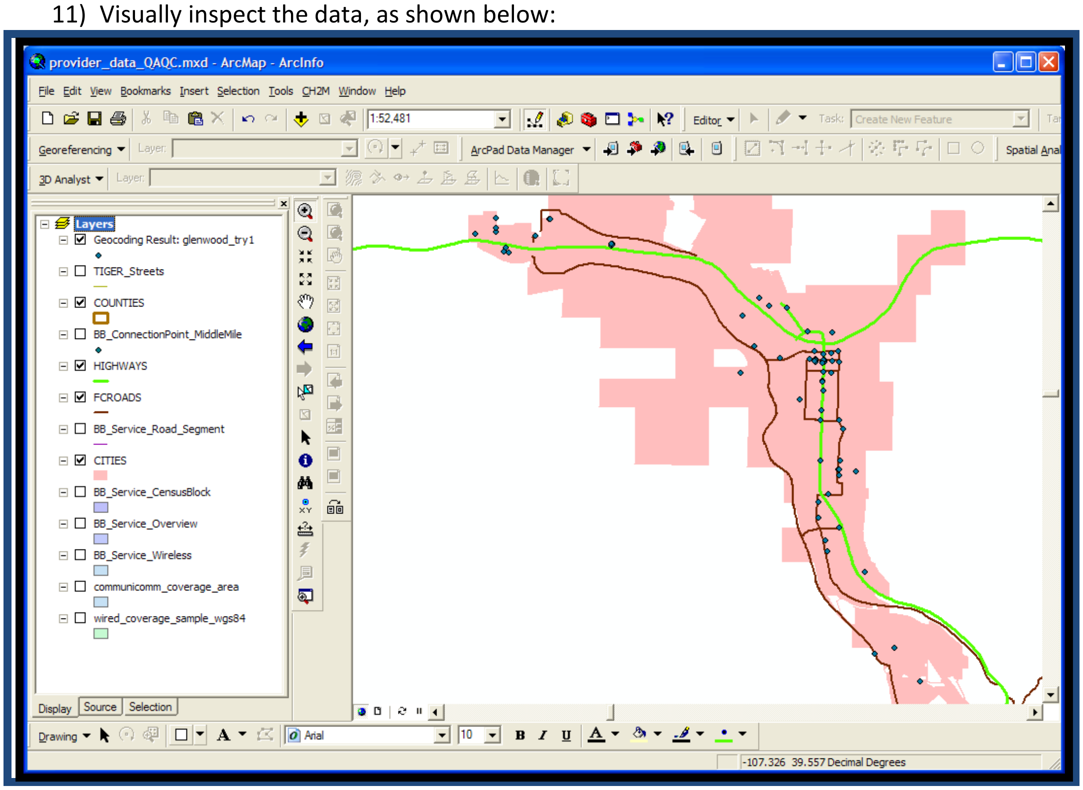
6) Fill out the **Geocode Addresses** dialog box, as shown below:



7) Geocode the list in batch mode using the geocode service set up in **Step 2** above, accepting all the default parameters.
8) Review results. See example below.



9) Adjust geocoding parameters accordingly and repeat batch to resolve issues.
10) Manually geocode unmatched addresses until target hit rate achieved, generally 90%.
11) Visually inspect the data, as shown below:



12) Follow the steps detailed in **Subscriber Location—GIS Data** below.

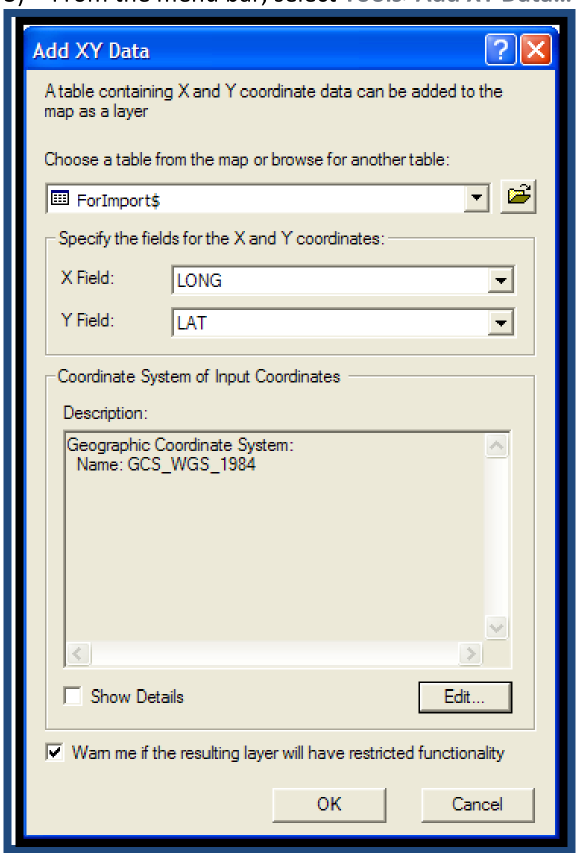
SUBSCRIBER LOCATION—XY DATA

If the provider supplies a list of subscriber data with accompanying XY data such as latitude and longitude, the steps are as follows:

1) Refine the format in Excel so that the data can be opened easily using ArcMap®.
   a. Remove all font color, highlighting, cell colors and borders, clean up column headers and make certain there are no merged cells.
   b. Make certain that XY locations are in decimal degrees.
      (i.) To convert from degrees, minutes, seconds (39º 26' 45.67") to decimal degrees, use the following formula: DD + (MM/60) + (SS.SSS/3600).

NOTE:
If XY locations from some other coordinate system are provided, you can use those in the process below but you must know what the coordinate system is.

2) Open the Excel worksheet in ArcMap®.
3) From the menu bar, select **Tools>Add XY Data…**

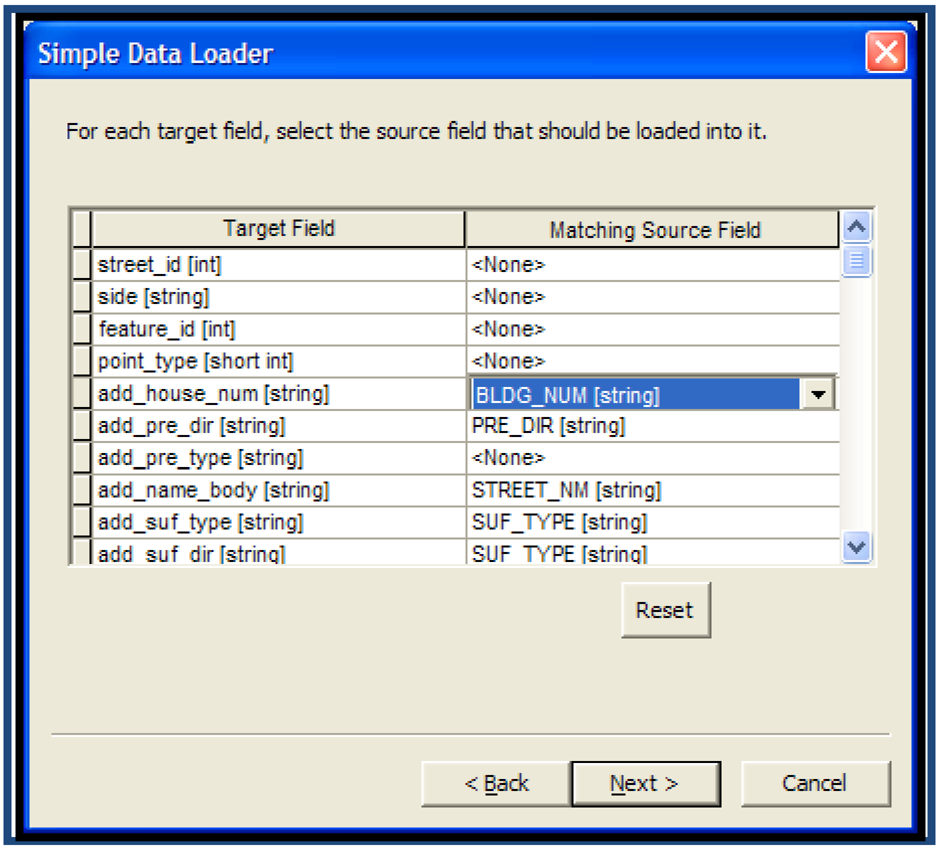


4) Supply the appropriate fields for the X and Y coordinates, choose the appropriate coordinate system and click **OK**.
5) Results are an event layer, not a true spatial layer. Export the data by right-clicking the event layer and selecting **Data>Export Data…** from the dropdown menu.
6) Follow the steps detailed in **Subscriber Location—GIS Data below**.

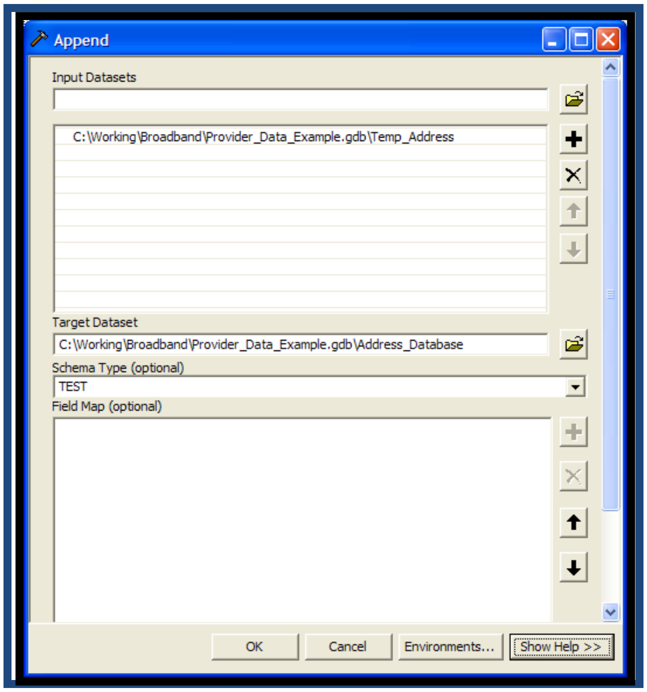
SUBSCRIBER LOCATION—GIS DATA

If the provider supplies subscriber location in GIS format, the only process step is to load that data into the appropriate data schema and it will be ready for processing.

1) First, load the data into the Point Address database schema (please see Appendix D for an example of the Point Address database schema.) using an empty feature class in that schema.
2) In ArcCatalog®, right-click on the empty feature class and select **Load** from the dropdown menu.
3) Navigate to the provider address GIS dataset and then map the attribute fields accordingly, as shown below:



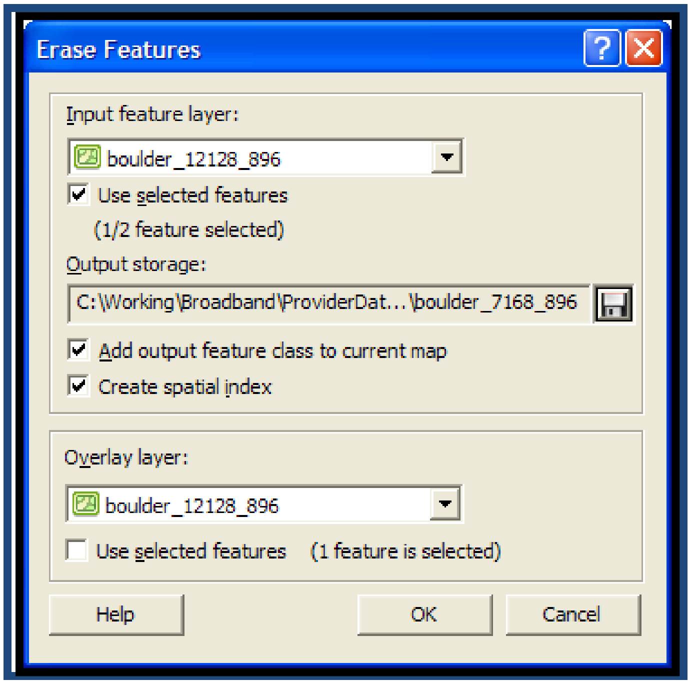
4) Once you have successfully loaded the provider address data into the temporary database with the correct schema, you now will append that data to the overall Point Address database.
5) In ArcToolbox®, use the **Append** command (**Data Management Tools>General> Append***)* to add the features into the overall Point Address database, as shown below:



6) Since the data is already in the Point Address database schema, there is no need to alter the Field Map in the Append tool.
7) After appending, calculate metadata reflecting geometry source and representation values.
8) Break provider-specific points into separate county feature classes and perform the following steps per county feature class:
   a. Within ArcGIS®:
      (i.) Summarize download and upload speeds [first,last] to determine all speeds available for county.
         (1) This will save as a DBF table. Keep track of location for future reference.
      (ii.) Buffer county address point featureclass to 150'.
         (1) During buffer command, dissolve on ad_down; ad_up; provider; dba; frn; tt; all metadata fields; stctyfips. Save as…. county_fastestdown_fastestup.
         (2) Example using Qwest data: boulder_40128_20128, where boulder=county; 40128=ad_down; 20128=ad_up.

NOTE:
These attribute fields are specific to the Point Address database.

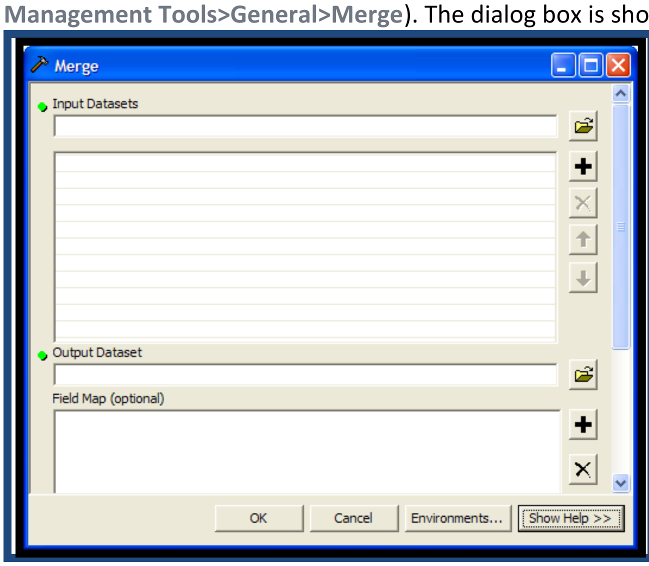
      (iii.) Select the features that represent the lowest speeds.
   b. Using XtoolsPro (***http://www.xtoolspro.com/***):
      (i.) In the XTools Pro toolbar, select **XTools Pro>Layer Operations>Erase Features.**
      (ii.) Use the same feature class for Input and Overlay.
      (iii.) Check **Use selected features** on the **Input** feature, as shown below.
      (iv.) Repeat and erase slowest speeds one speed at a time. Save each new feature class as the next slowest speed, using the same naming convention as shown in **a.(ii.)(1)** above. A general example is shown below:



c. <u>Return to ArcGIS®</u>:

(i.) Edit/delete speeds from the attribution table of each feature class, so each remaining feature class has only one speed value.

(ii.) Merge individual speed feature classes using the **Merge** command in ArcToolbox® (**Data Management Tools>General>Merge**). The dialog box is shown below:



(iii.) Merge individual county feature classes using the **Merge** command in ArcToolbox (**Data Management Tools>General>Merge**).

(iv.) Since the county files are all in the same schema, DO NOT alter the Field Map portion of the command interface.

(v.) When all the county files are merged into one dataset, use the **Append** command in ArcToolbox® (**Data Management Tools>General>Append**) to add the features to the bb_cov interim dataset. Use the **Field Map** portion of the **Append** tool to map the appropriate field values to their corresponding fields in the bb_cov feature class.

DSLAM OR CENTRAL OFFICE LOCATION—ADDRESS DATA

In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office address data, the steps are as follows:

1) Follow the process for geocoding points in **Subscriber Location—Address Data** above.
2) Follow the steps detailed in **DSLAM or Central Office Location—GIS Data** below.

DSLAM OR CENTRAL OFFICE LOCATION—XY DATA

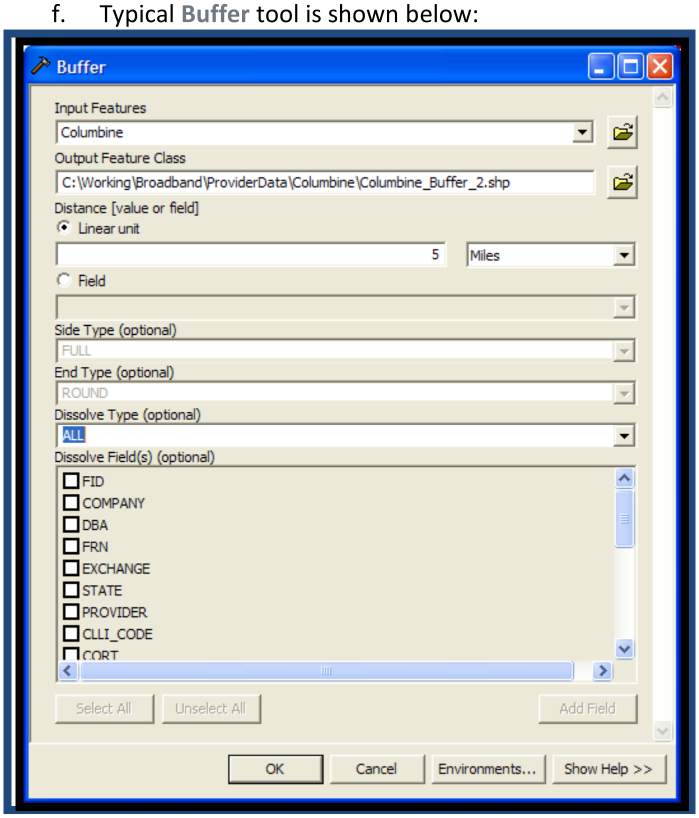
In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office XY data, the steps are as follows:

1) Follow the process for creating points from XY data in **Subscriber Location—XY Data** above.
2) Follow the steps detailed in **DSLAM or Central Office Location—GIS Data** below.

DSLAM OR CENTRAL OFFICE LOCATION—GIS DATA

In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office GIS data, the steps are as follows:

1) Buffer the DSLAM/Central Office points feature class.
    a. Add the point feature class to ArcMap®.
    b. Open the ArcToolbox® and go to **Analysis Tools>Proximity>Buffer**.
    c. Set the buffer distance to 5 miles.
    d. Set the dissolve type to **ALL**.
    e. Name the output feature class.
    f. Typical **Buffer** tool is shown below:



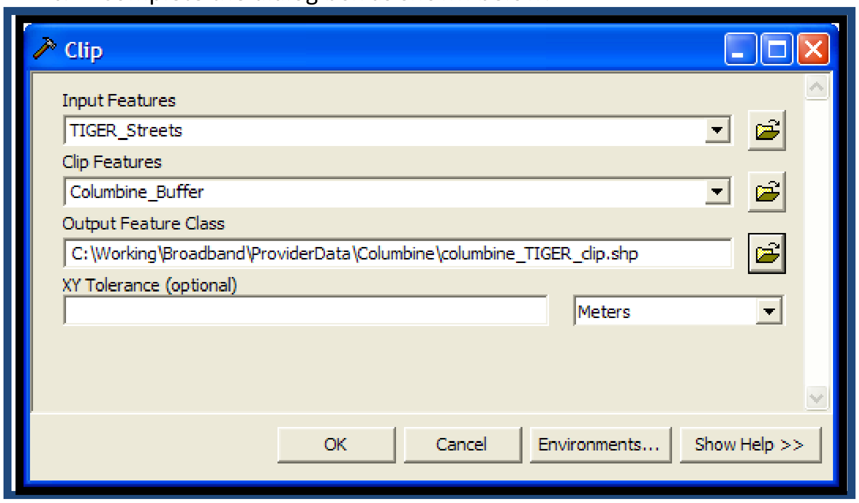
g. Click **OK**.

2) Use the resulting buffer feature class to clip the TIGER® street layer:

   a. Add TIGER® street layer to ArcMap®.

   b. Open the ArcToolbox® and go to **Analysis Tools>Extract>Clip**.

   c. Complete the dialog box as shown below:



   d. Click **OK**.

3) Using ArcCatalog® and within the file geodatabase:

   a. Right-click and create a new Feature Dataset.

      (i.) For the Feature Dataset settings:

         (1) Name the feature dataset accordingly.

         (2) Select horizontal coordinate system by importing the coordinate system associated with the clipped TIGER® street layer by selecting **Import** and navigating to the location of that feature class.

         (3) No vertical coordinate system needed.

         (4) Leave all x,y,z,m values at default.

         (5) Click **Finish**.

4) Import previously created street feature class into new **Feature Dataset**.

5) Right-click **Feature Dataset** and create new Network Dataset—accept all default setting for the Network Dataset.

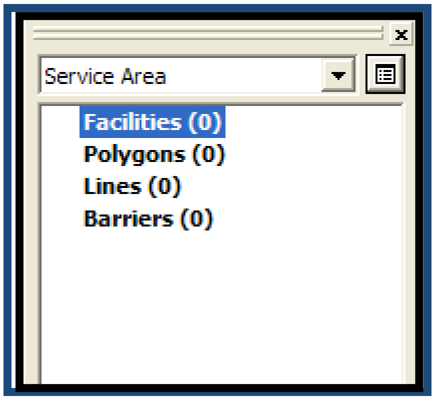
NOTE:
The Network Analyst extension must be turned on.

6) In ArcMap® turn on the **Network Analyst Toolbar** by going to **View>Toolbars>Network Analyst**.

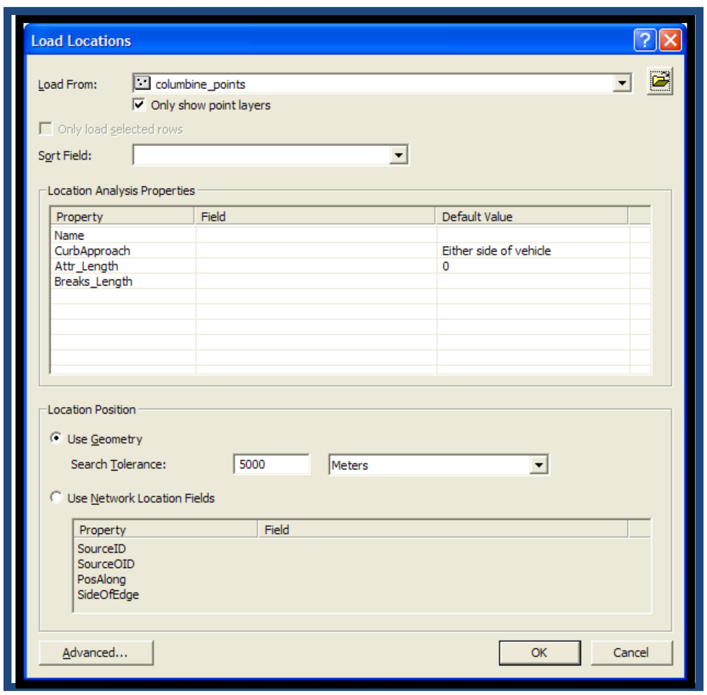
7) Add the Network Dataset created in **Step 5** to ArcMap.

8) Using the **Network Analyst Toolbar** dropdown, create **New Service Area**.

9) Open the **Network Analyst Window** by selecting the button. See below.



10) Right-click **Facilities** layer, select **Load Locations** and navigate to the DSLAM/Central Office facilities feature class.



11) Click **OK**.

12) Click the **Service Area Properties** button .

13) For the following tabs, change the following properties:

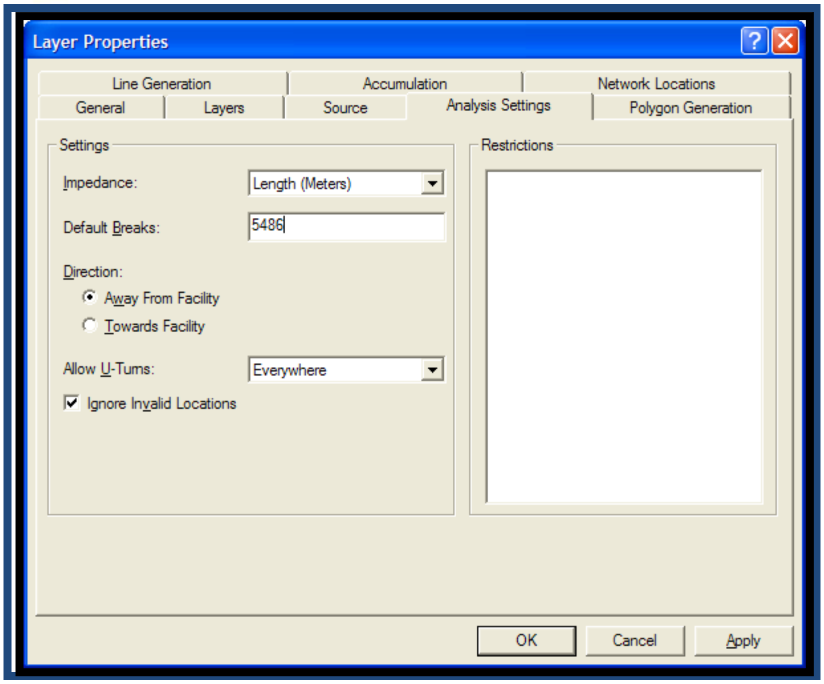
a. **Polygon Generation** tab:

(i.) Select **Merge by break value**.

(ii.) Also disable the **Trim Polygons** option.

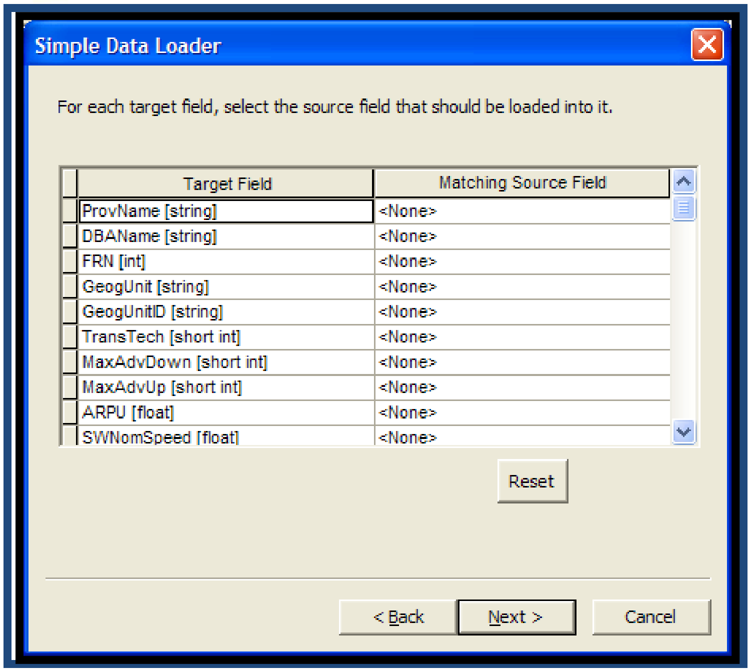
b. **Analysis Settings** tab—using and converting the specified DSLAM buffer distance from feet to meters—input buffer distance value in meters into the **Default Breaks** location.

(i.) Generally, 18,000 feet (5486 meters) from DSLAM or Central Office location is used as the buffer distance. See below.



   c. Click **OK**.

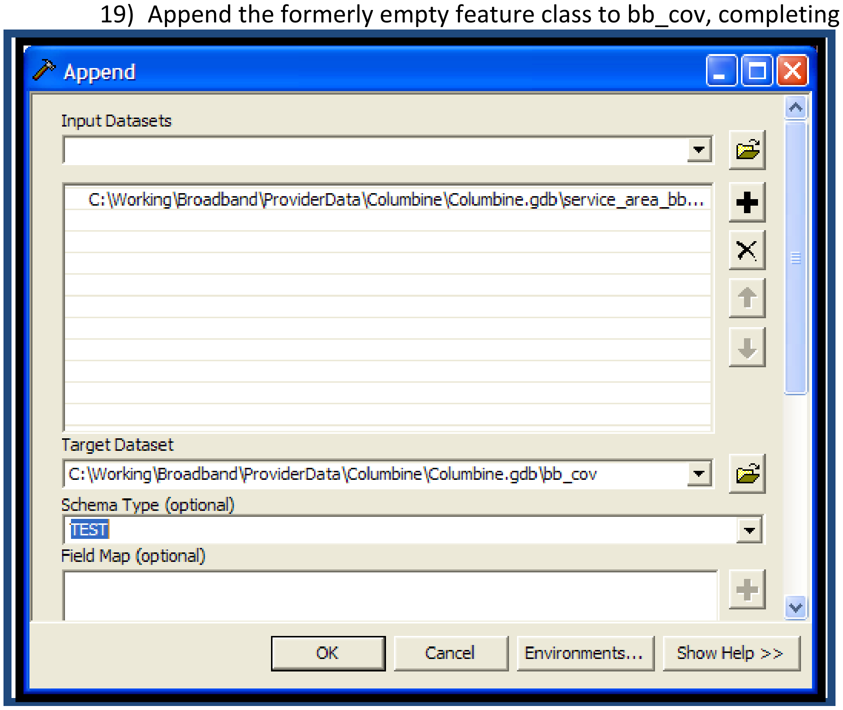
14) On the **Network Analyst Toolbar**, click the **Solve** button to create service area polygons.
15) Right-click on the created service area polygon in the layer list, and select **Data>Export Data** from the dropdown list.
16) Export to a feature class in the file geodatabase you created earlier.
17) In ArcCatalog®, create an empty feature class with the schema of the bb_cov feature class and load the feature class created in **Step 16** into it.
    a. Right-click on the empty feature class, select **Load>Load Data** from the dropdown menu and navigate to the location of the service area feature class.
    b. Click the **Add** button, then click **Next**.
    c. Accept the defaults and click **Next**.
    d. DO NOT attempt to map any fields, as shown below:



e. Click **Next**, then **Next** again, then **Finish**.

18) In ArcToolbox®, go to **Data Management Tools>General>Append**.

19) Append the formerly empty feature class to bb_cov, completing the dialog box, as shown below:



20) Leave the **Schema Type** as TEST.

21) Click **OK**.

22) In ArcMap®, open bb_cov for editing and manually input associated attribution.

BROADCAST TOWER LOCATION—ADDRESS DATA

In the event that the provider supplies wireless broadcast tower location address data, the steps are as follows:

1) Follow the process for geocoding points in **Subscriber Location—Address Data** above.
2) Follow the steps detailed in **Broadcast Tower Location—GIS Data** below.

BROADCAST TOWER LOCATION—XY DATA

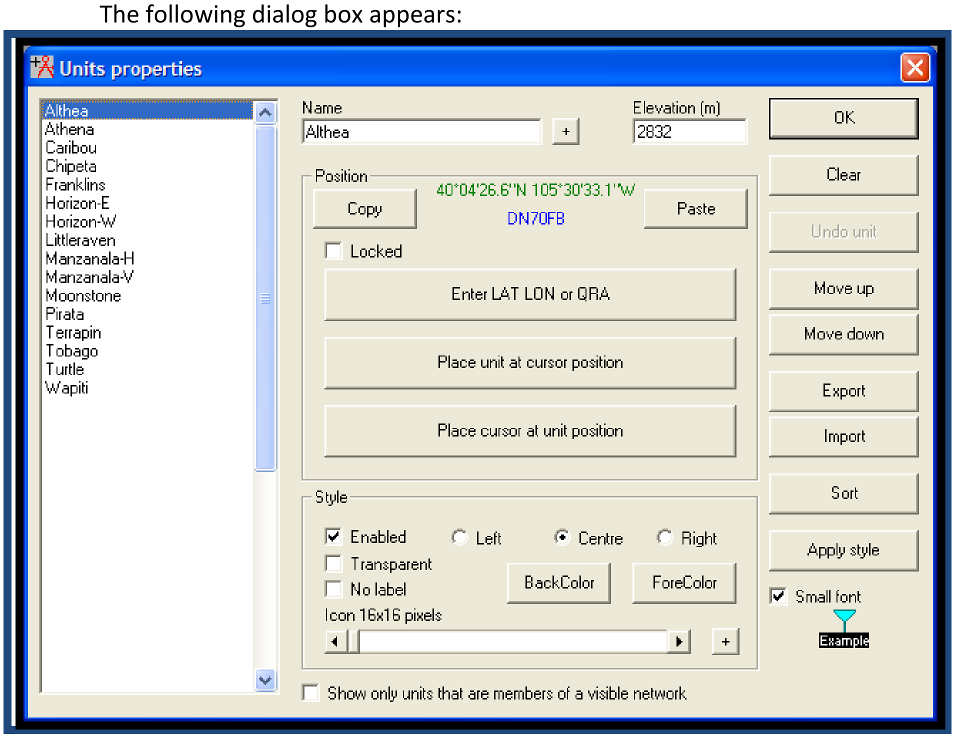
In the event that the provider supplies wireless broadcast tower location XY data, the steps are as follows:

1) Follow the process for creating points from XY data in **Subscriber Location—XY Data** above.
2) Follow the steps detailed in **Broadcast Tower Location—GIS Data** below.

BROADCAST TOWER LOCATION—GIS DATA

In the event that the provider supplies wireless broadcast tower location GIS data, the steps are as follows:

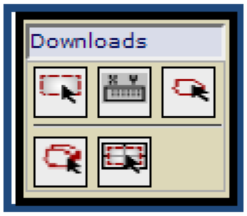
1) Download the required software (Radio Mobile) from the website: **http://www.cplus.org/rmw/english1.html**
2) Install the software according to the standard directions, found here: **http://www.cplus.org/rmw/download/download.php?S=1**
3) Open the application.
4) Load the broadcast tower location and elevation information by selecting **File>Unit properties**. The following dialog box appears:



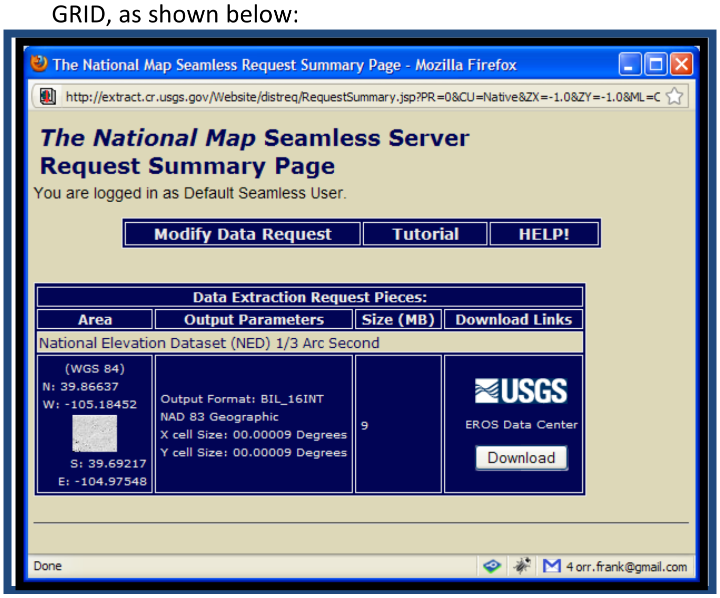
5) Add the information for all the towers supplied by the WISP data provider, including the elevation. If provider does not supply elevation, this information can be obtained from Google Earth.
   a. If available, use the **Import** button to import a Google Earth KML of the tower locations.
6) Go to the National Map Seamless Server (**http://seamless.usgs.gov/**) and download elevation data sufficient to contain the tower locations.

a. At least the 1/3" NED data is needed. Select this by clicking the **Download** button in the upper right of the website and checking the box next to **1/3" NED**.

b. Zoom to the area of interest and use the **Download** tools to define the area to download:

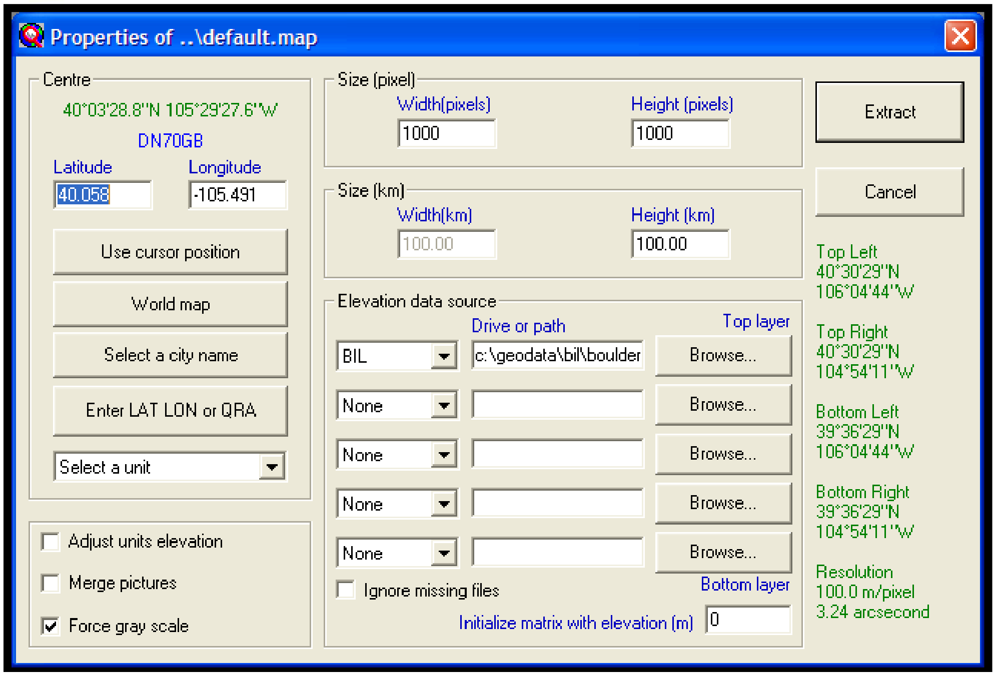


c. Click the **Modify Data Request** button to request the data in BIL_16INT format, not ESRI GRID, as shown below:

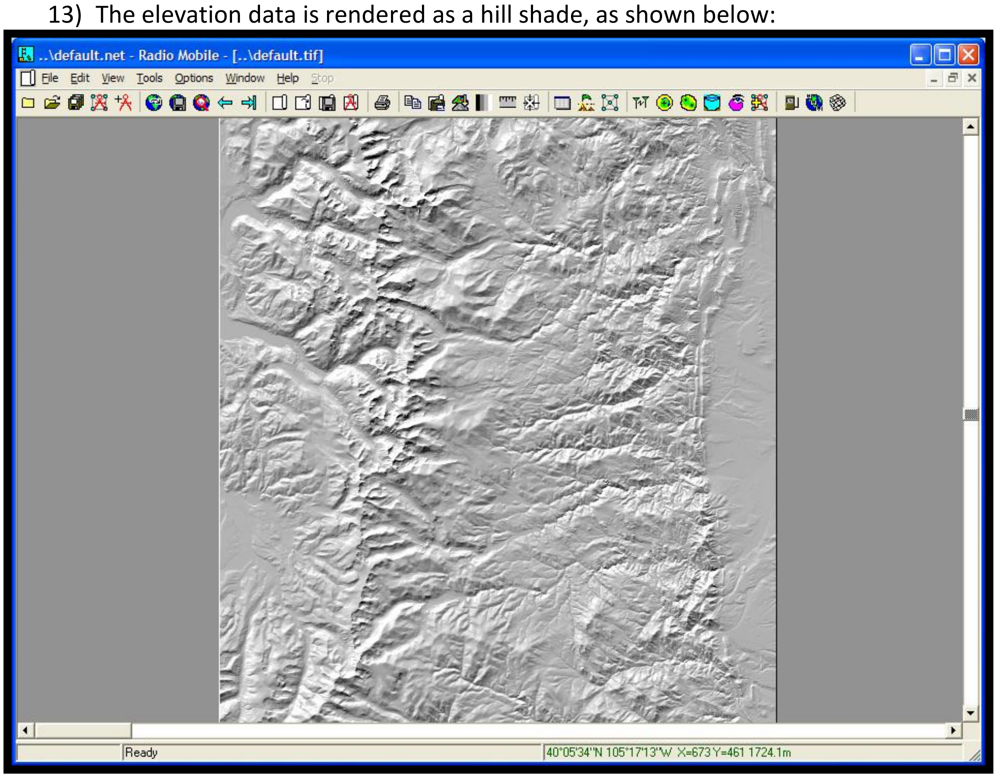


d. Download the data and unzip it.

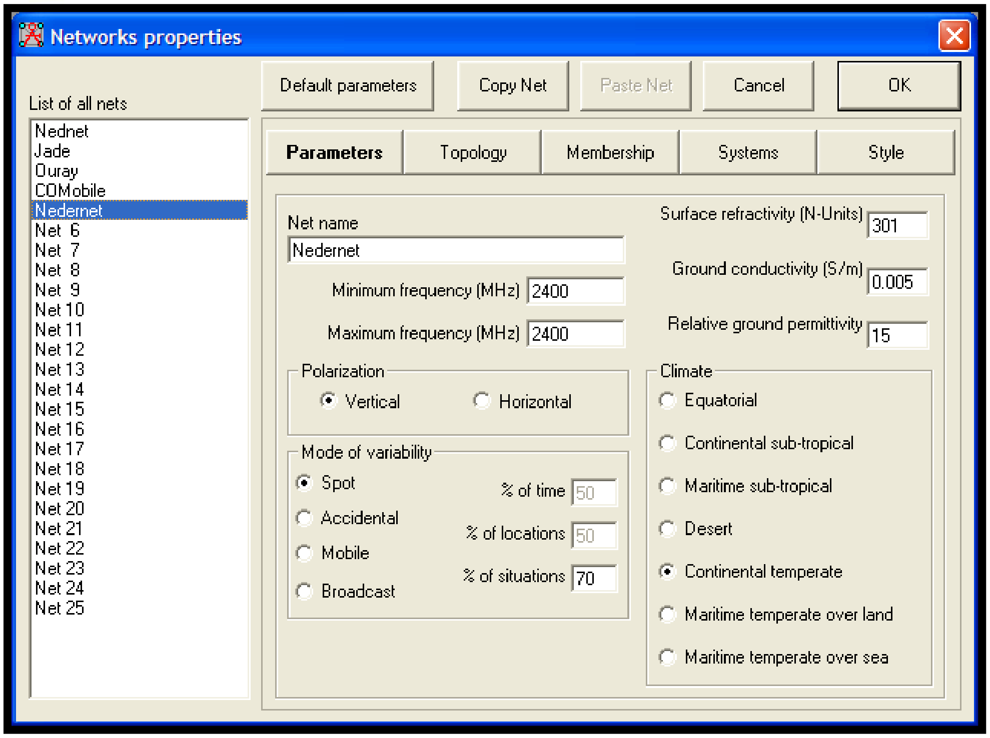
7) Select **File>Map Properties** to define the map.
8) Enter a latitude and longitude in the center of the tower locations.
9) Set the size (in pixels) and the size (in kilometers) of the map.
10) Set the directory path leading to the BIL elevation data just downloaded.
11) The dialog box is shown below:



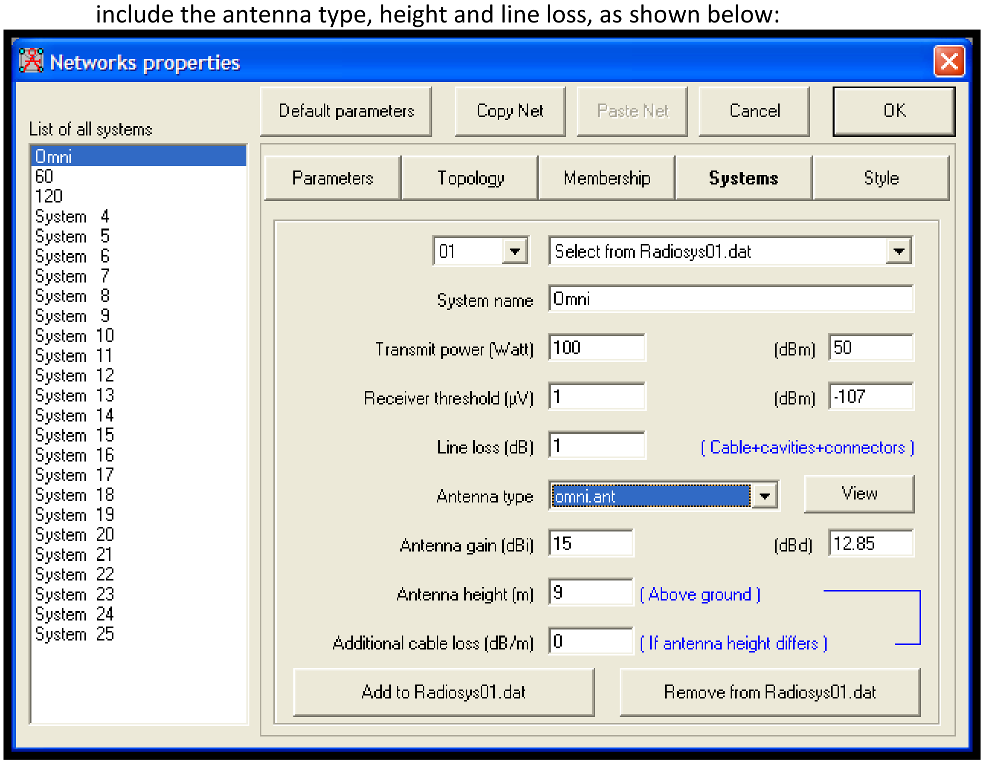
12) Click **Extract**.
13) The elevation data is rendered as a hill shade, as shown below:



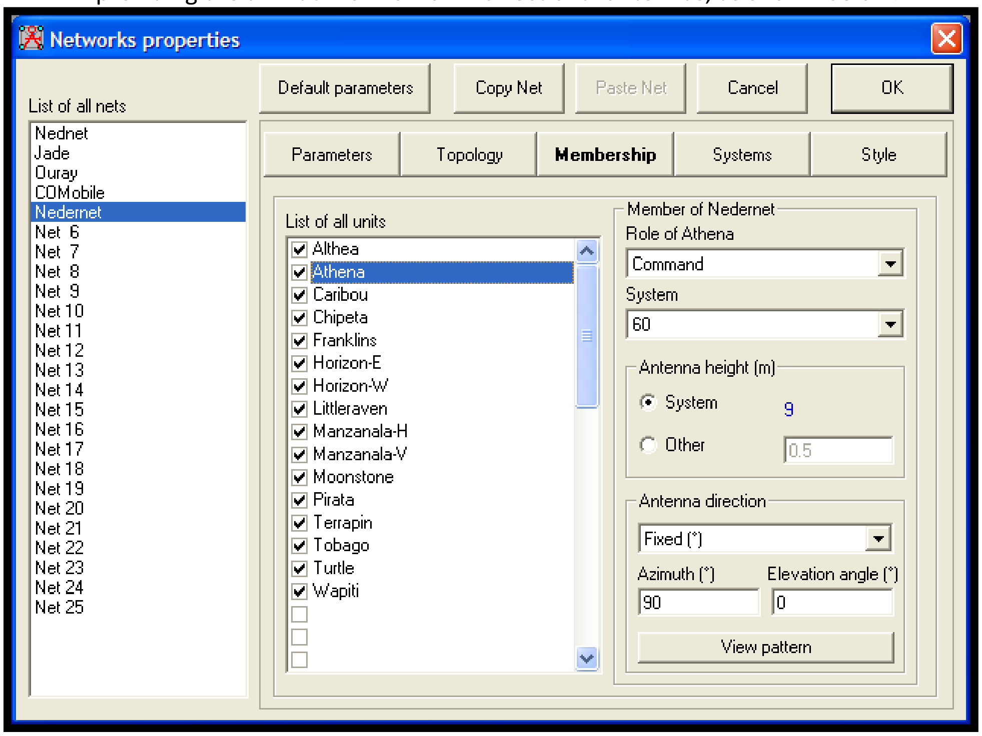
14) Select **File>Network properties** from the main menu.
15) Create a new network and enter in the frequency range under the **Parameters** tab, as shown below:



16) Leave all the other values as they appear, and select the **Systems** tab.
17) Create enough systems to cover all the varieties of equipment in the provider network. This will include the antenna type, height and line loss, as shown below:



18) Now click on the **Membership** tab, and assign the individual towers to their respective systems, providing the azimuth for non-omnidirectional antennas, as shown below:

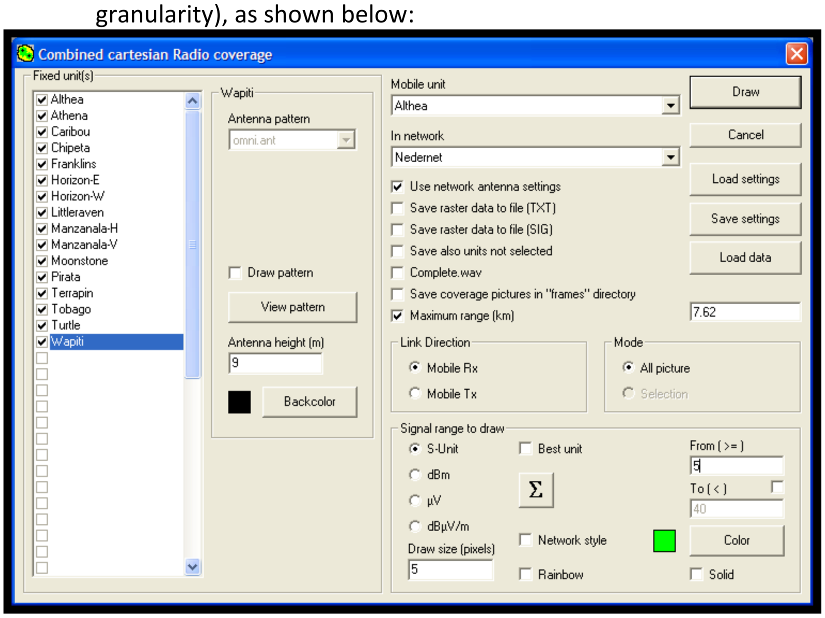


19) Click **OK**.

20) Select **Tools>Radio Coverage>Combined Cartesian** from the main menu.

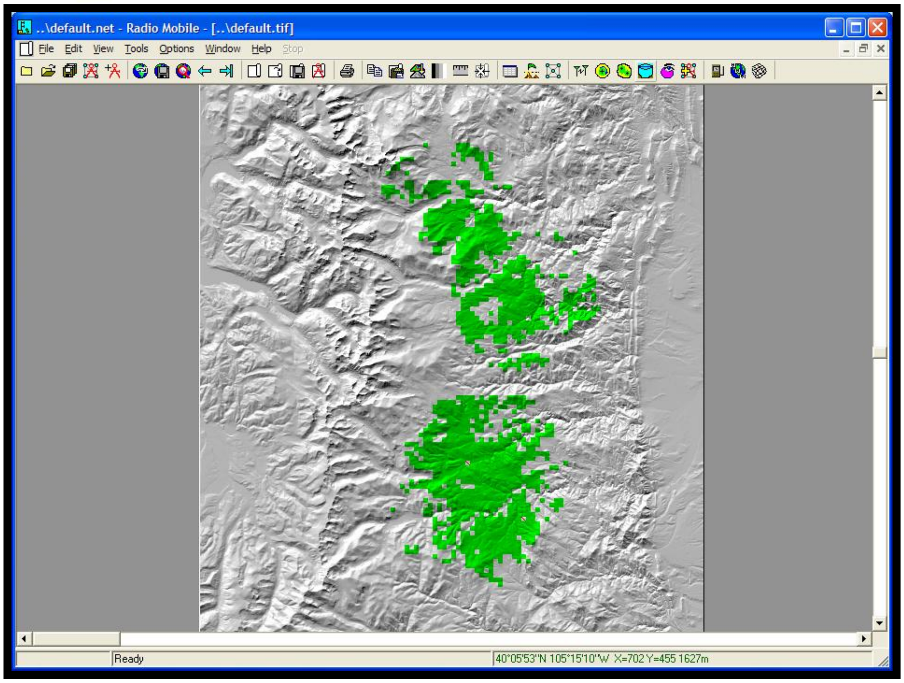
21) Complete the dialog box as shown below, providing the **Maximum Range** from the highest tower beam radius supplied by the provider.

22) Set the **Pixel Size** at 5 (experiment depending on the area covered to get the right level of granularity), as shown below:

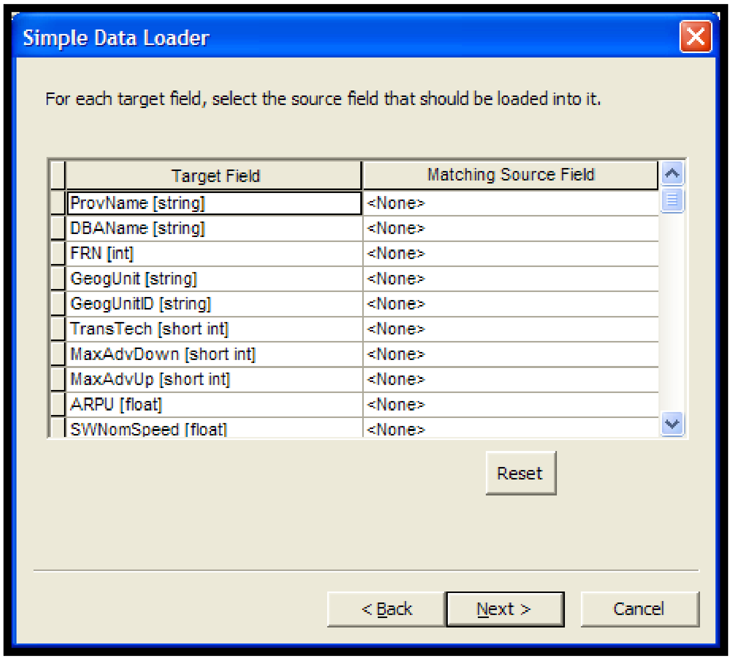


23) Set the **Signal range to draw** to S-Unit and type 5 in the **From (>=)** box.

24) Click on **Draw**. See below.



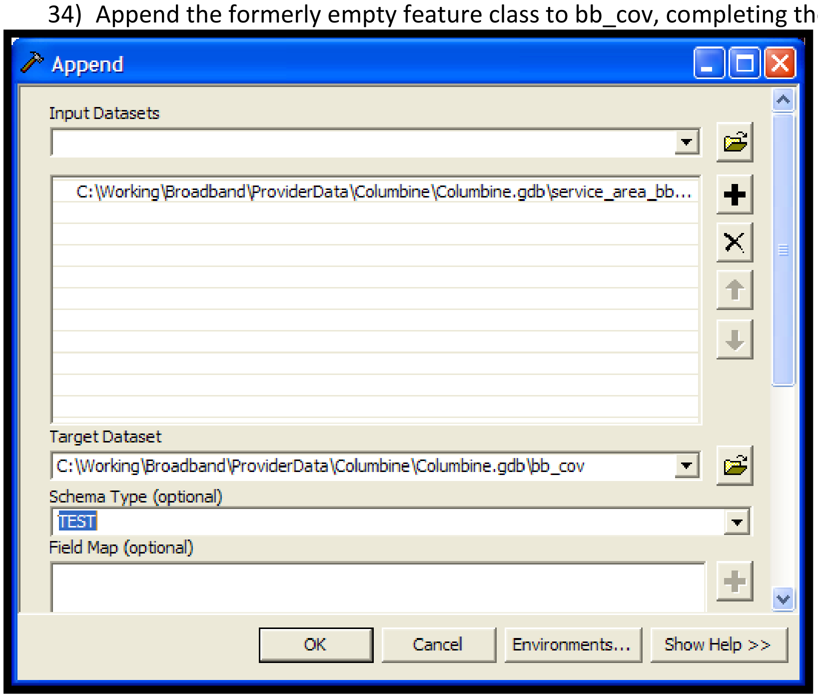
25) Save the resulting image as a TIF by selecting **File>Save Picture as**.
26) Open ArcMap® and load the BIL elevation data you used in Radio Mobile.
27) Load the TIF image you created and georeference it using the corners of the BIL data.
    a. The corners of the data can be seen in the TIF image.
28) Follow the georeferencing directions from the **Coverage Area—PDF/JPG/Other Image Format** section below.
29) Use the **Georeferencing Toolbar** to **Update the Georeferencing** for the TIF dataset.
30) In ArcToolbox®, select **Data Transformations>From Raster>Raster to Polygon** and input the georeferenced TIF you just created, as shown below:
31) Open the resulting polygon feature class for editing using the **Editing** toolbar in ArcMap® and clean up as necessary.
32) In ArcCatalog®, create an empty feature class with the schema of the bb_cov feature class and load the feature class created above into it.
    a. Right-click on the empty feature class, select **Load>Load Data** from the dropdown menu and navigate to the location of the service area feature class.
    b. Click the **Add** button, then click **Next**.
    c. Accept the defaults and click **Next**.
    d. DO NOT attempt to map any fields, as shown below:



e. Click **Next**, then **Next** again, then **Finish**.

33) In ArcToolbox®, go to **Data Management Tools>General>Append**.

34) Append the formerly empty feature class to bb_cov, completing the dialog box, as shown below:



35) Leave the **Schema Type** as TEST.

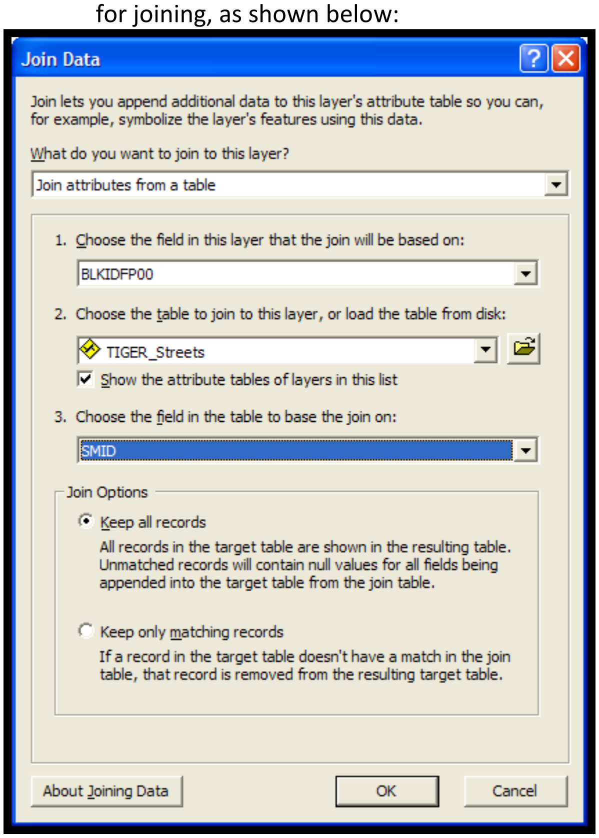
36) Click **OK**.

37) In ArcMap®, open bb_cov for editing and manually input associated attribution.

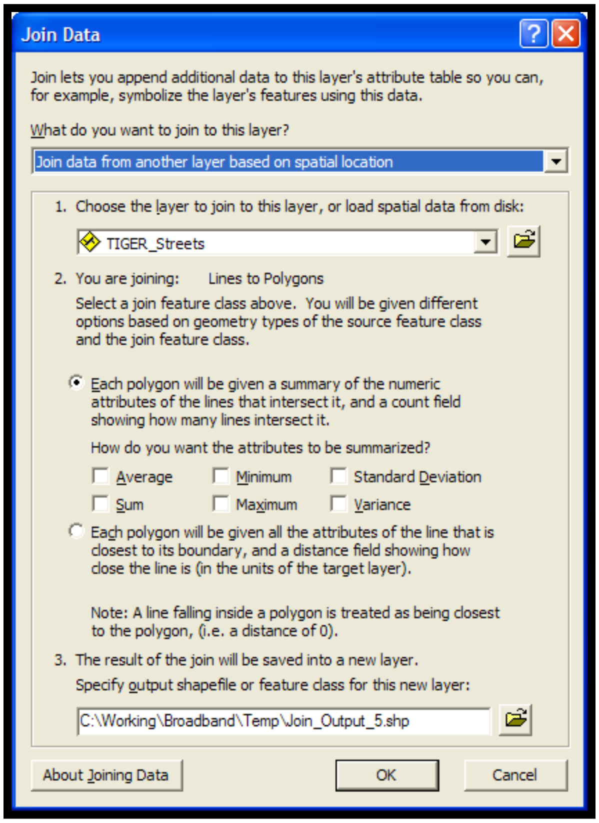
TIGER® STREET SEGMENTS—LIST, SPREADSHEET OR GIS DATA

In the event that the provider supplies TIGER® street segments in list or spreadsheet format, the steps are as follows:

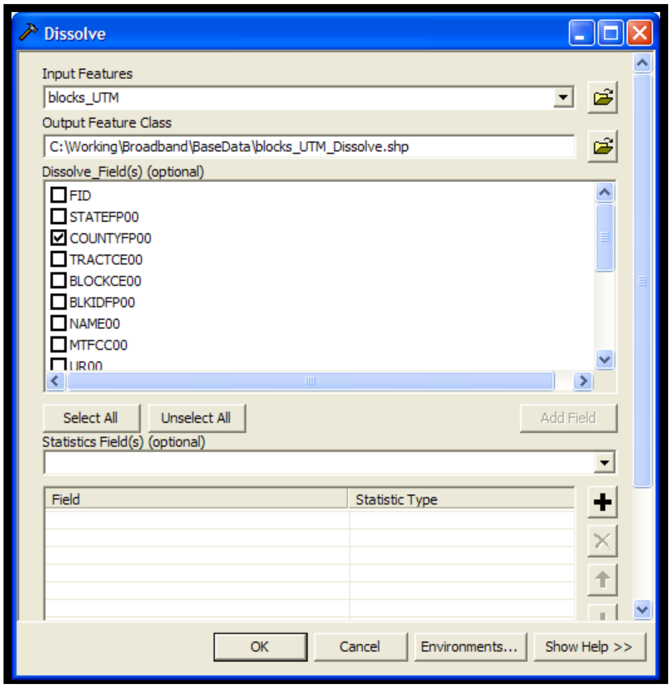
1) Join TIGER® road segments to 2000 census blocks feature class using one of two methods based on how the data is provided:
   a. If the TIGER® data is provided with a Census Block ID, then join the segments to the Census Block geometry based on that ID:
      (i.) Load both datasets into ArcMap®;
      (ii.) In the layer list, right-click on the 2000 census block feature class and select **Joins and Relates>Join**;
      (iii.) In the dialog box, select the TIGER® road segments data and the proper attribute fields for joining, as shown below:



      (iv.) Click **OK**.
   b. If the data provided is a list containing TLIDs, then join to the TIGER®/Line data using the TLID, and use a spatial join to associate the TIGER® segment with the coterminous block based on the block ID:
      (i.) Load both datasets into ArcMap®;
      (ii.) In the layer list, right-click on the 2000 census block feature class and select **Joins and Relates>Join**;
      (iii.) Select **Join data from another layer based on spatial location** from the dropdown menu;
      (iv.) Complete the dialog box, as shown below and click **OK**.

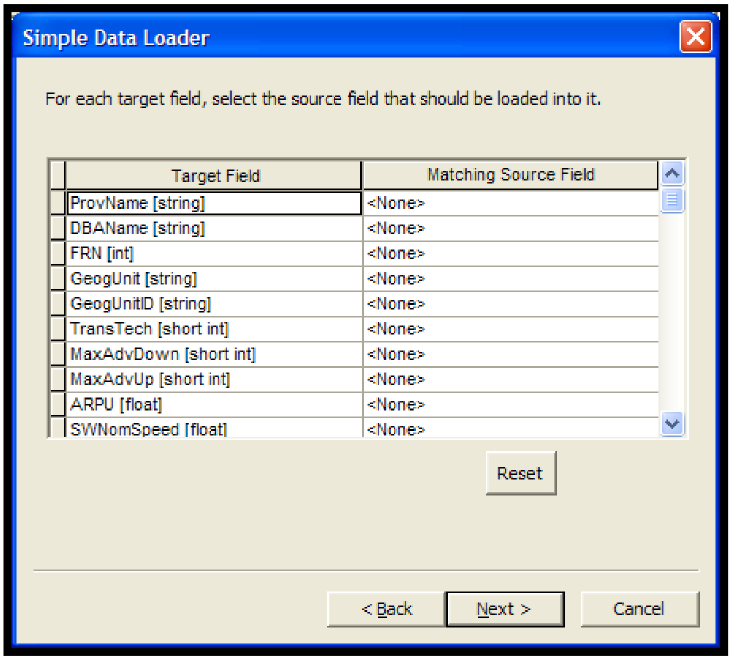


2) Export joined records into a temporary feature class.
3) If joined Census Block geometry is confined to one specific area, then dissolve blocks into one record. If joined Census Block geometry is distributed throughout a particular State, then dissolve sub-selections of census blocks for each county.
   a. Use the County FIPS code to dissolve by county.
   b. In ArcToolbox®, select **Data Management Tools>Generalization>Dissolve**.
   c. Complete the **Dissolve** dialog box, as shown below:



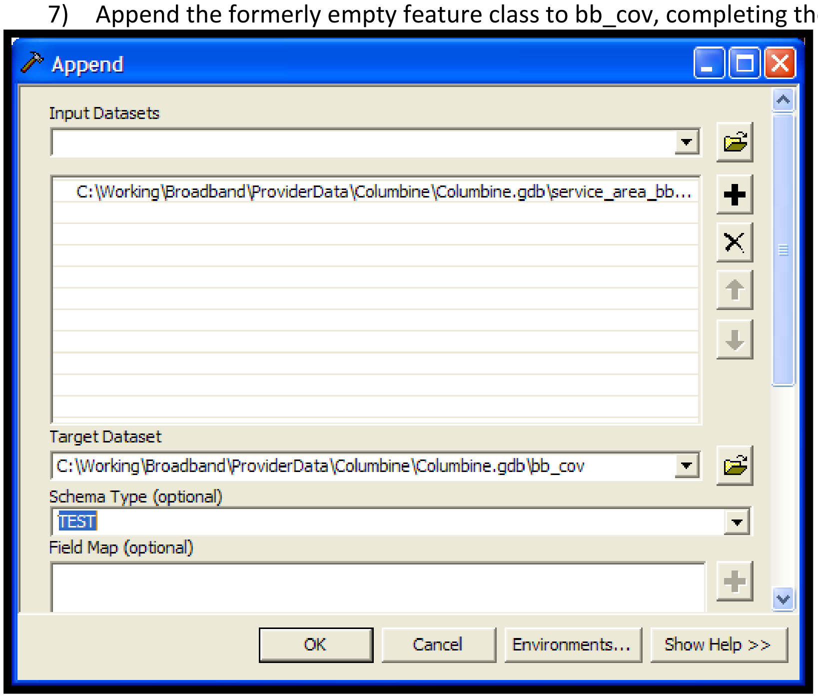
   d. Click **OK**.

4) For each dissolved region, open the feature class for editing using the **Editing** tool in ArcMap® and remove unnecessary slivers and other small holes. For general guidance on editing features in ArcMap®, see **http://webhelp.esri.com/arcgisdesktop/9.3/pdf/Editing_Tutorial.pdf**
5) In ArcCatalog®, create an empty feature class with the schema of the bb_cov feature class and load the feature class created above into it.
   a. Right-click on the empty feature class, select **Load>Load Data** from the dropdown menu and navigate to the location of the service area feature class.
   b. Click on the **Add** button, then click **Next**.
   c. Accept the defaults and click **Next**.
   d. DO NOT attempt to map any fields, as shown below:



e. Click **Next**, then **Next** again, then **Finish**.

6) In ArcToolbox®, go to **Data Management Tools>General>Append**.
7) Append the formerly empty feature class to bb_cov, completing the dialog box, as shown below:



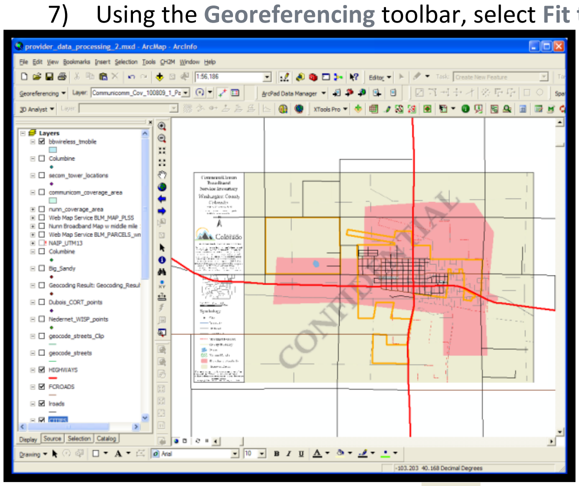
8) Leave the **Schema Type** as TEST.
9) Click **OK**.
10) In ArcMap®, open bb_cov for editing and manually input associated attribution if necessary.

POLYGONAL DATA

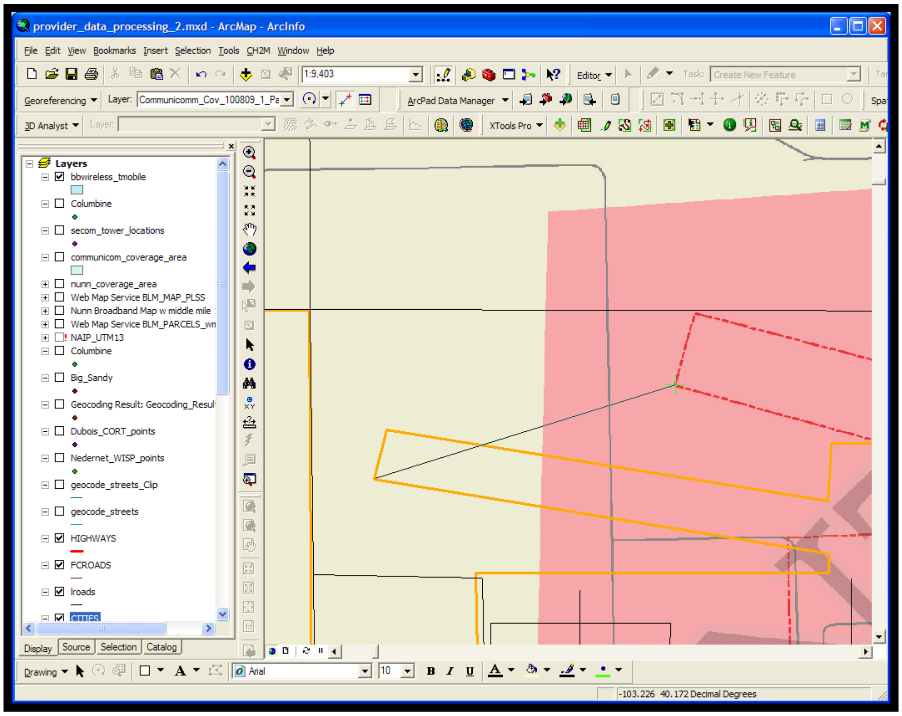
COVERAGE AREA—PDF/JPG/OTHER IMAGE FORMAT

In the event that the provider supplies coverage area data in some image format such as PDF or JPG format, the steps are as follows:

1) If in PDF format, open in Adobe Acrobat and **Save As…** JPG format.
2) Open the JPG image in ArcMap®.
3) Add the required base map vector data for georeferencing.
    a. This generally will be either the CDOT data or TIGER® data.
4) Change the coordinate system of the data frame to the desired end coordinate system.
5) Zoom to the general location of the JPG map image.
    a. This is the location based on the vector data, not the JPG image itself. For example, if you know that the JPG image represents an area around the town of Limon, zoom to the town of Limon in your vector data.
6) Open the **Georeferencing** toolbar by selecting **View>Toolbars>Georeferencing** from the main menu bar.
7) Using the **Georeferencing** toolbar, select **Fit to Display**; results are shown below:



8) Use the **Control Point** button to add control points to the map.
9) Use common points in the base dataset and the JPG image.
    a. For example, find major street intersections, county/city boundaries, etc.
    b. Try to distribute the points more or less in the four corners on the image for the best transformation.
10) Click on the location on the image first, then click on the corresponding location on the vector database map, as shown in the image below:



11) After placing each control point, the image transformation will update automatically.
12) Repeat until satisfied with the transformation.

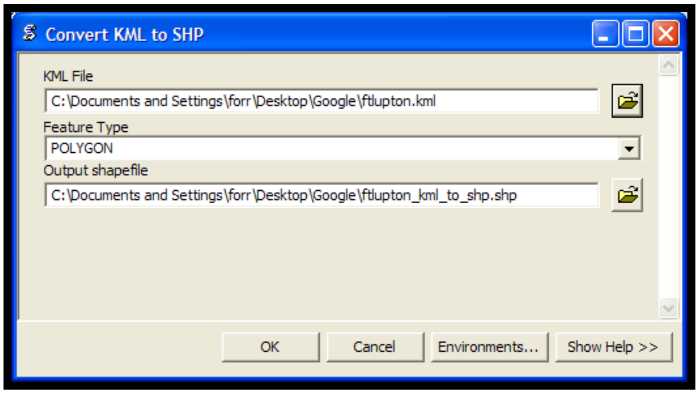
NOTE:
The transformation may take up to four points, although sometimes only two are necessary.

13) When satisfied with the transformation, select **Update Georeferencing** from the **Georeferencing** toolbar dropdown.
    a. This will create a "world" file (.jgw in the case of JPGs) in the same directory as the image file.
14) In ArcCatalog®, create a new polygon shapefile with the appropriate data schema for a provider coverage area, which can be found in Appendix D.
15) Add the shapefile to ArcMap®.
16) Using the **Editor** toolbar, select **Start Editing**. Set the **Task** to **Create New Feature**.
17) Use the **Sketch Tool**  to digitize a new coverage polygon using the coverage area outline from the georeferenced JPG and add the required attributes manually.
18) Repeat the above steps for all subscriber speed coverage areas provided.
19) Follow the steps detailed in **Coverage Area—GIS Data** below.

COVERAGE AREA—KML/KMZ

In the event that the provider supplies coverage area data in Google Earth KML or KMZ format, the steps are as follows:

1) Use a KML to SHP converter to translate file into an Esri® format.
2) **http://arcscripts.esri.com/details.asp?dbid=15603**
3) Download the script and follow the provided instructions for installing it in ArcToolbox®.
4) Double-click on the script in ArcToolbox® and navigate to the location of the KML file, as shown below:



5) Add the new shapefile to ArcMap®. Repeat for all KML files provided.
6) Follow the steps detailed in **Coverage Area—GIS Data** below.

COVERAGE AREA—CAD DATA

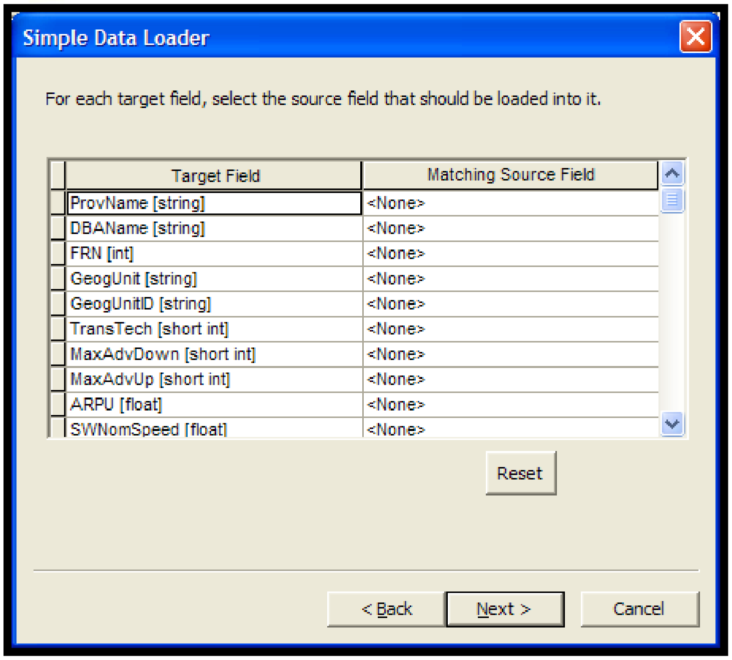
In the event that the provider supplies coverage area data in GIS format, the steps are as follows:

1) Transform the CAD dataset into an Esri® format.
2) **http://webhelp.esri.com/arcgisdesktop/9.2/index.cfm?TopicName=Transforming_CAD_datasets**
3) It may be necessary to contact the provider first to determine the coordinate system of the CAD data.
4) If the CAD data is not in a standard coordinate system, it may be necessary first to use ArcMap® to georeference the CAD data to a known coordinate system.
a) To do so, follow the instructions provided above in **Coverage Area—PDF/JPG/Other Image Format**.
5) In ArcCatalog®, create a new polygon shapefile with the appropriate data schema for a provider coverage area, which can be found in Appendix D.
6) Add the shapefile to ArcMap®.
7) Using the **Editor Toolbar**, select **Start Editing**. Set the **Task** to **Create New Feature**.
8) Use the **Sketch Tool** to digitize a new coverage polygon using the coverage area outline from the georeferenced CAD file and add the required attributes manually.
9) Follow the steps detailed in **Coverage Area—GIS Data** below.

COVERAGE AREA—GIS DATA

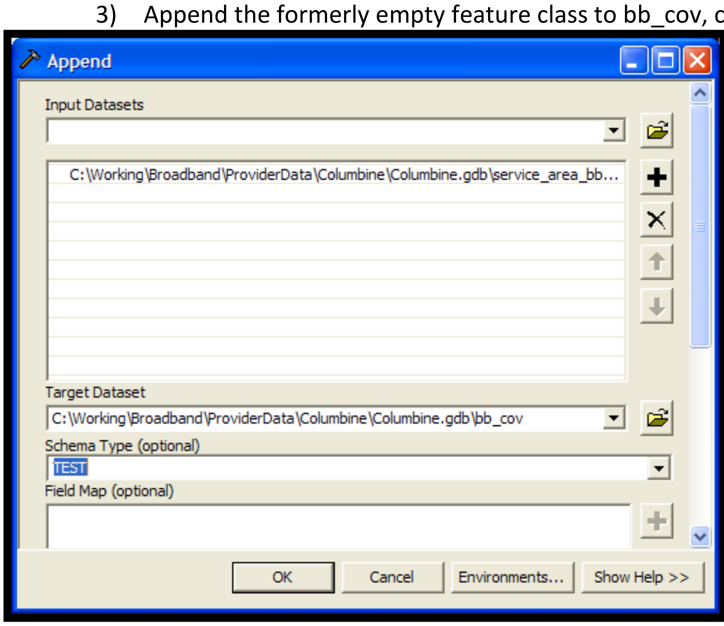
In the event that the provider supplies coverage area data in GIS format, the steps are as follows:

1) In ArcCatalog®, create an empty feature class with the schema of the bb_cov feature class and load the GIS feature class either created above or supplied by the provider into it.
    a. Right-click on the empty feature class, select **Load>Load Data** from the dropdown menu and navigate to the location of the service area feature class.
    b. Click on the **Add** button, then click **Next**.
    c. Accept the defaults and click **Next**.
    d. DO NOT attempt to map any fields, as shown below:



e. Click **Next**, then **Next** again, then **Finish**.

2) In ArcToolbox®, go to **Data Management Tools>General>Append**.
3) Append the formerly empty feature class to bb_cov, completing the dialog box, as shown below:



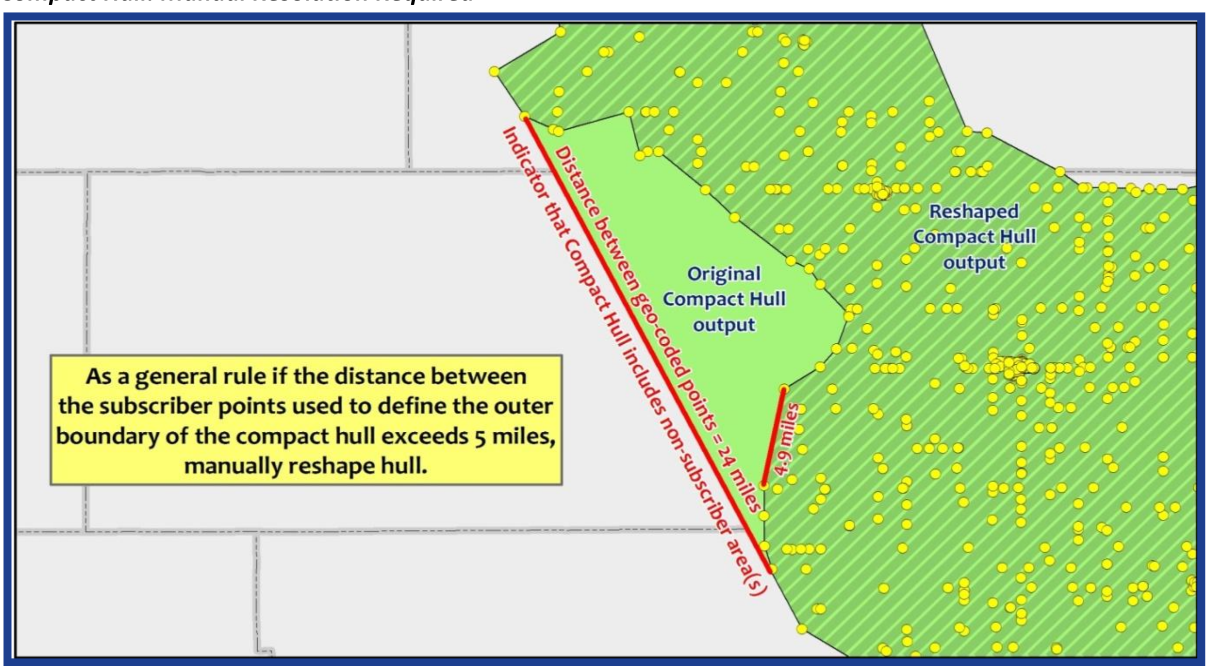
4) Leave the **Schema Type** as TEST.
5) Click **OK**.
6) In ArcMap®, open bb_cov for editing and manually input associated attribution, if necessary.

<u>COMPACT POLYGON FROM SUBSCRIBER POINTS</u>

1) Geocode address list using latest **State Composite Locator**.
2) Verify that your geocoded file has only one TT (Technology Type). If not, export individual geocoded layers for each Technology Type.
3) For each TT, check for differences in speed values or speed tiers and create separate layers for each speed value/tier.

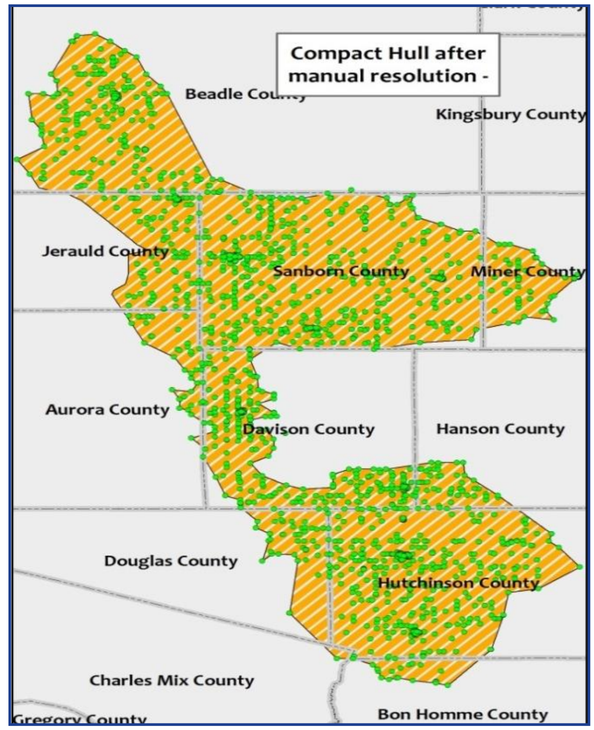
4) Clean your geocoding results: remove any points that geocode to accuracy levels below ZIP+4 (ZIP centroids, carrier route centroids, etc). Also, verify that outliers with acceptable accuracy levels are legitimate, i.e., fall in correct city and Zip.
5) Perform spatial join between county polygons (using stcnyfips field) and the cleaned geocoded subscriber points in order to carry the county name and stcnty fips.
6) Summarize the number of subscribers by county and use the subscriber counts by county to populate the Rate Tier table.
7) Un-join the county data from the geocode subscribers list.
8) Create Compact Polygon using cleaned geocoded layer or sub-selection of XtoolsPro—ConvexHull-DetailedHull option. A sub-selection of geocoded points will be used in areas where more than one polygon will need to be created for one provider's service area.
9) Evaluate output Hull carefully, looking for areas that should not be covered by hull polygon.
   a. If it is determined that an area or areas should not be represented in coverage area, manually reshape hull polygon until coverage area is adequate.
   b. When not obvious and as a general rule, manually resolve compact polygon when the distance between the subscriber points used to define the outer boundary of the compact polygon exceeds 5 miles . When reshaping the hull polygon, snap to the outermost geocoded points. See the three figures below for examples.

Compact Hull: Manual Resolution Required



Compact Hull: Manual Resolution Required

Compact Hull: After Manual Resolution



10) To attribute the compact polygon, perform a spatial join where your Target Feature Class is the compact polygon and the Join Feature Class is your geocoded point layer. Export compact hull with joined attributes and name file appropriately.
11) Append attributed compact polygon to Broadband TT template Feature Class and, if required, manually input any provider attribution that may not have carried over in the append process.
12) Intersect compact polygon with county boundaries to create unique records by county and use the state-county-fips field to populate stcty_fips field. Also use the county name field to populate the BBCov_Name field.
    a. Exception: where a provider's coverage is distributed throughout more than one area of any given county where the BBcov_Name should be populated using an appropriate city or other logical name based on geographical location.
13) Export/load into appropriate BB TT model dataset.

CENSUS BLOCKS—LIST OR SPREADSHEET

In the event that the provider supplies census block data in a list or spreadsheet, the steps are as follows:

1) Ensure block polygons supplied by the provider are 2000 currency.
2) If other currency, convert to 2000 currency before proceeding.
    a. To do this, remove the trailing letter (a, b, etc.) from the block ID.
    b. You will now have two blocks that equate to one block in the 2000 block geometry.
    c. Delete duplicate block IDs, retaining the higher service tier in each case.
3) Prepare the block list in clean Excel format, removing all Excel-only formatting, merged cells, colors, borders, etc.
4) Import the spreadsheet into ArcMap®.
5) Right-click on the 2000 census block feature class in the layer list in ArcMap® and select **Joins and Relates>Join** from the dropdown menu. Join the census block list to the 2000 census blocks feature class using the block ID and export joined records in a new feature class. The **Join** dialog

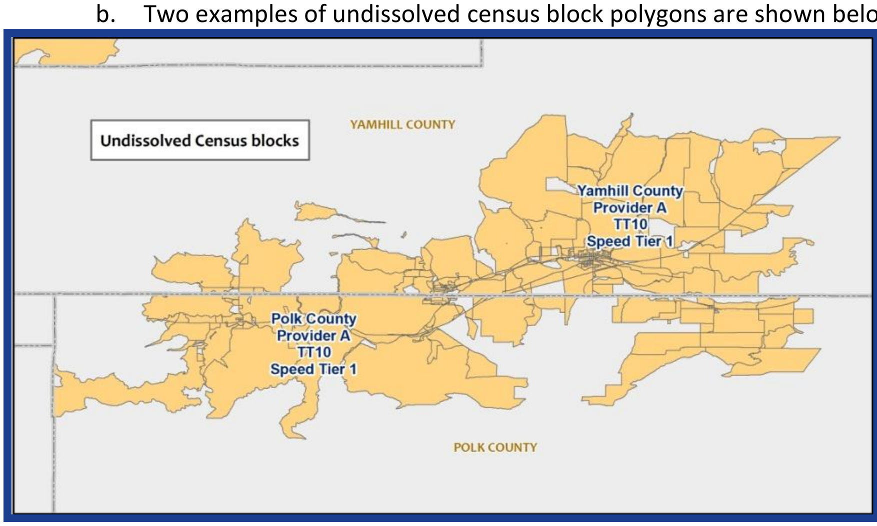
box and process can be seen above in the **TIGER® Street Segments—List, Spreadsheet or GIS Data** subsection.

6) Follow the steps in **Census Blocks—GIS Data** below.

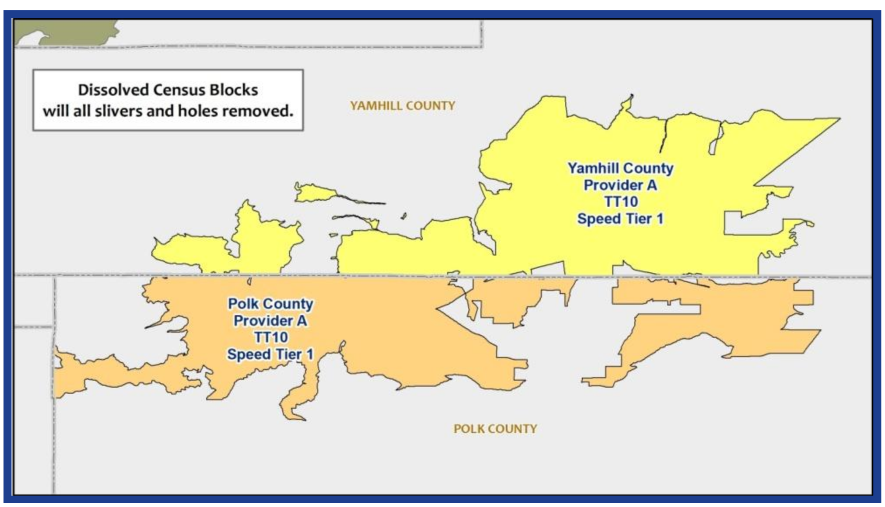
CENSUS BLOCKS—GIS DATA

In the event that the provider supplies census block GIS data, the steps are as follows:

1) Ensure that the blocks supplied by the provider are in the required data schema and are complete as far as required attribution.
    a. If not, manually enter the required attribution or contact the provider to fill gaps.
2) If census block geometry is distributed throughout more than one county, then select **Data Management Tools>Generalization>Dissolve** in ArcToolbox® and dissolve based on County/Provider/TT/Speed Tier so that unique records are created for each unique combination.
    a. The **Dissolve** dialog box is shown above in the **TIGER® Street Segments—List, Spreadsheet or GIS Data** section.
    b. Two examples of undissolved census block polygons are shown below:



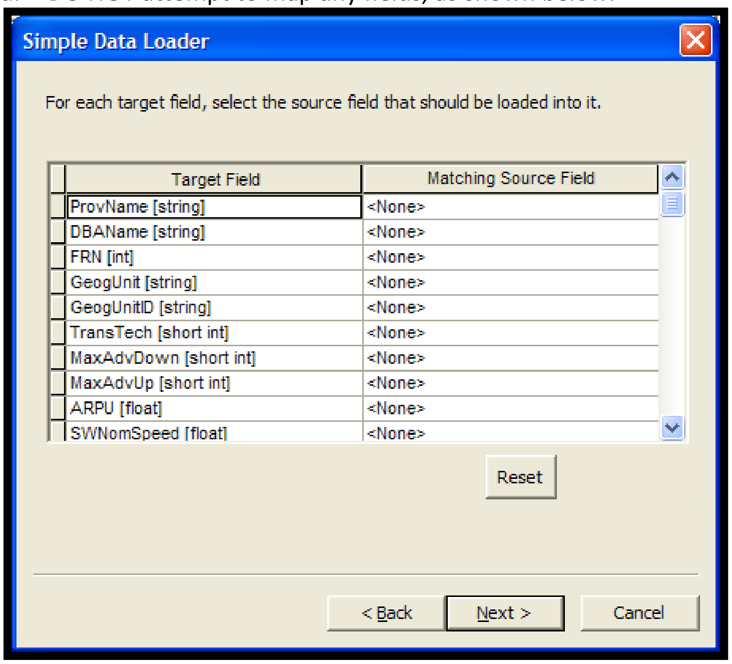
Undissolved census block polygons



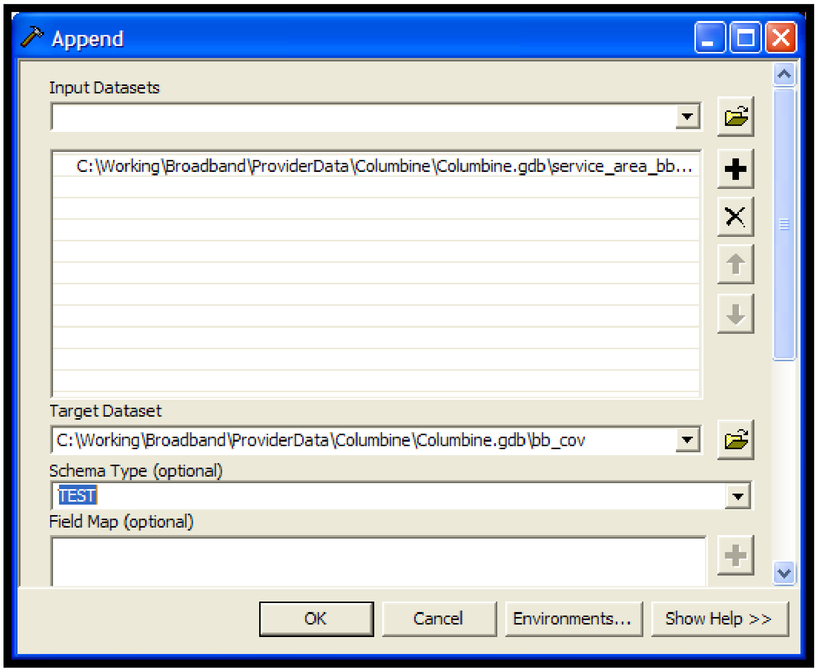
Census block polygons dissolved by county

3) For each dissolved region use the **Editing** toolbar in ArcMap® to remove unnecessary slivers and other small holes.

4) In ArcToolbox®, select **Data Management Tools>General>Merge** and merge the processed polygons into a single layer.
5) The merged census blocks will need to have the subscriber's frn field added and populated.
6) In ArcCatalog®, create an empty feature class with the schema of the bb_cov feature class and load the GIS feature class either created above or supplied by the provider into it.
   a. Right-click on the empty feature class, select **Load>Load Data** from the dropdown menu and navigate to the location of the service area feature class.
   b. Click the **Add** button, the click **Next.**
   c. Accept the defaults and click **Next.**
   d. DO NOT attempt to map any fields, as shown below:



   e. Click **Next**, then **Next** again, then **Finish**.
7) In ArcToolbox®, go to **Data Management Tools>General>Append**.
8) Append the formerly empty feature class to bb_cov, completing the dialog box, as shown below:



9) Leave the **Schema Type** as TEST.
10) Click **OK**.
11) In ArcMap®, open bb_cov for editing and manually input associated attribution, if necessary.

METADATA TRANSACTIONS

Following any updates or changes completed within the file geodatabase (fGDB) stored on the GIS-Analysts staging environment, the GIS-Analyst runs transactions to compare that fGDB with the one stored on the Core server to ensure metadata on all changes is recorded.

The steps taken to run transactions on the updated Core database are outlined below:

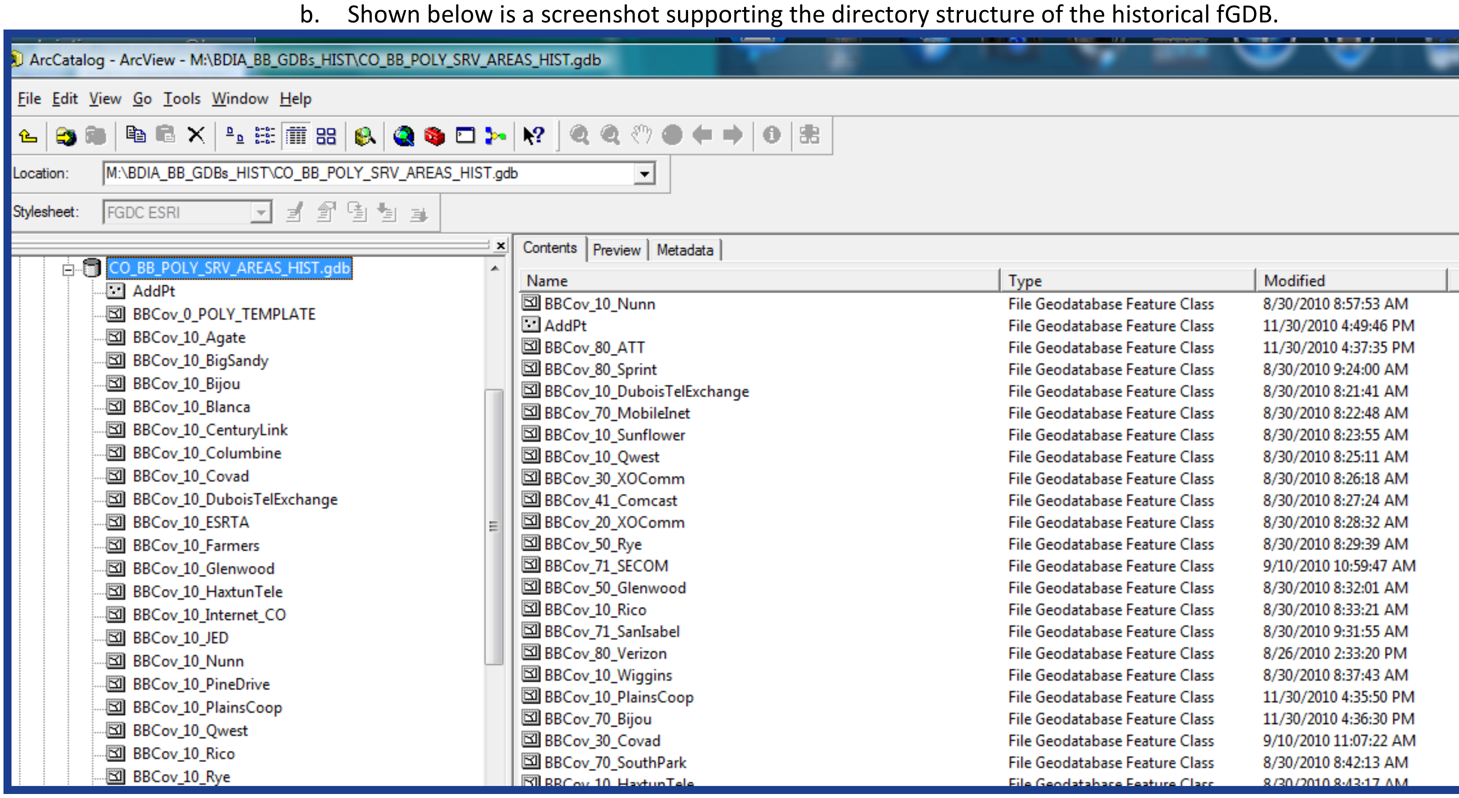
1) Open a command line window and run generateTransactions.py:
   a. Usage: **generateTransactions.py [Core fGDB] [Staging Environment fGDB]**
   b. Example of command line:

<path>**generateTransactions.py** <path>**ST_BB_POLY_SRV_AREAS.gdb** <path>**ST_BB_POLY_SRV_AREAS.gdb**

2) Shown below is an example of the output screen that will be displayed:

```
-----------  Collecting Transactions  ----------------


Calculating rec_id field for BBCov_0_BB_POLY_TEMPLATE
value can not be 0 or less
Trouble creating the progress meter


Calculating rec_id field for BBCov_10_CenturyLink

%   10   20   30   40   50   60   70   80   90   100

----|----|----|----|----|----|----|----|----|----|      Goal = 8

Merging change: X:\BDIA_BB_GDBs\MS_BB_POLY_SRV_AREAS.gdb\AddPt
Calculating Transaction fields for AddPt

%   10   20   30   40   50   60   70   80   90   100

----|----|----|----|----|----|----|----|----|----|      Goal = 1
**************************************************
X:\BDIA_BB_GDBs\MS_BB_POLY_SRV_AREAS.gdb\AddPt...changes is complete.


Your transaction FeatureClasses are in:
\\michigan\AllAccess\BDIA_BB_GDBs_HIST\MS_BB_POLY_SRV_AREAS_HIST.gdb
--------------------------------------------------------------------------------
------------
elapsed time = 2994.4 seconds
```

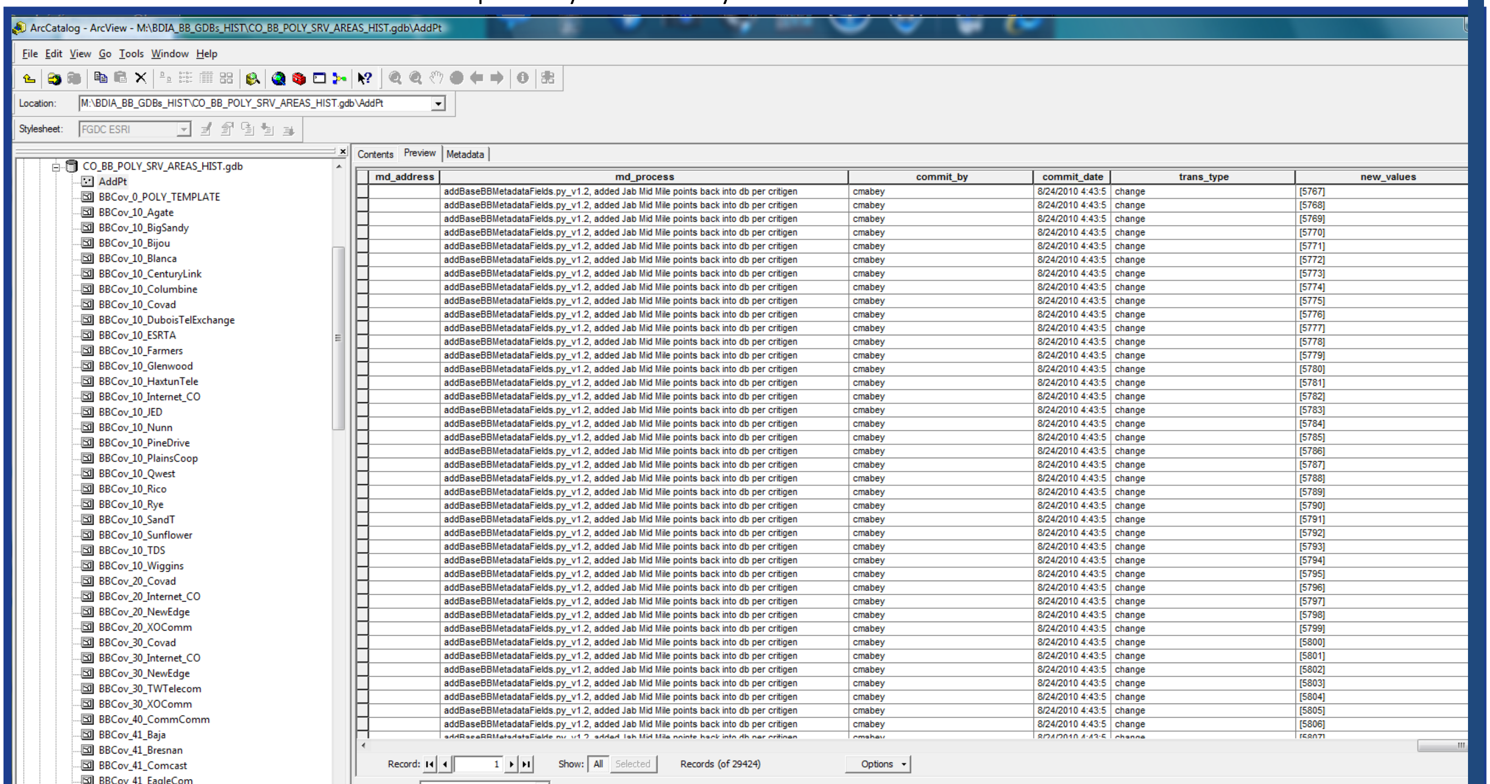
3) After the process has completed, results can be found in the ST_BB_POLY_SRV_AREAS_HIST.gdb:
   a. The transactions scripts records changes at a feature level.
   b. Shown below is a screenshot supporting the directory structure of the historical fGDB.



   c. Attribution associated with each added/removed/changed feature is tracked, including the following additional columns appended to the end of each:

(i.) Commit_by
  (1) Records the GIS-Analyst who committed the changes to the historical fGDB.
(ii.) Commit_date
  (1) Records the date and time stamp on which the changes were committed.
(iii.) Trans_type
  (1) This field reflects the type of change recorded;
  (2) Categorized by: Adds/Change/Deletes.
(iv.) New_values
  (1) Records the new values when a change was completed on a feature. Example: Name or speed change.

d. MD_Process also is transferred from the edited fGDB to the historical fGDB, which states the actions completed by the GIS-Analyst.



DATA PROCESSING

DATA PROCESSING OVERVIEW

The following subsections detail the steps and layout required to process the service provider data further to meet NTIA requirements:

- **Weighted Nominal Speed**;
- **Middle Mile**;
- **Broadband Coverage Template**.

WEIGHTED NOMINAL SPEED

The weighted nominal speed is populated in one of the following two ways: **subscriber data supplied by provider** or **value supplied by provider**.

SUBSCRIBER DATA SUPPLIED BY PROVIDER

Where the data provider supplies subscriber speed information, the following formula from the NOFA is used:

$$\frac{(\text{speed tier-1 in kbps} \times \text{no. of tier-1 subscribers}) + (\text{speed tier-2 in kbps} \times \text{no. of tier-2 subscribers}) + (\text{etc.})}{\text{Total average monthly subscribers}}$$

Data is initially broken up in the following order:

1) Stcty_fips;
2) Transmission technology type;
3) Subscriber tiers.

VALUE SUPPLIED BY PROVIDER

Some providers will supply their weighted nominal speed. In these cases, the data supplied will be populated instead of using the NOFA formula. These obtained or calculated values are used to update the service overview layer.

This can be done manually or by creating a table with the provider's FRN and average weighted speed and joining it to the service overview table in ArcMap®.

1) To join, right-click on the layer to join to and select **Joins and Relates>Join** from the dropdown menu.
2) Then navigate to the table to join to and select the join fields from the dropdown list.
3) Then open the source table (the table in ArcMap®) and right-click on the header of the **Average Weighted Speed** field and select **Calculate Field** from the dropdown menu.
4) Use the value of the average weighted speed from the joined table.

MIDDLE MILE

Middle mile information generally is provided in spreadsheet or text file format. The process is to take what is supplied by the provider and translate it into the required data schema.

1) If the data is supplied with address information, follow the process outlined above in **Subscriber Location—Address Data**.
2) If the data is supplied with associated XY coordinates, follow the process outlined above in **Subscriber Location—XY Data**.
3) Once the data is in GIS format, use the **Append** (**Data Management Tools>General>Append**) command in ArcToolbox® to append the data to the overall middle mile dataset.
4) Set the schema type to NO_TEST and use the Field Map to map the attribute fields from the source to the target dataset.

BROADBAND COVERAGE TEMPLATE

The table below lists descriptions of the fields within the bb_cov layer, which is the interim dataset used to create the final product deliverable.

NAME	ALIAS	DESCRIPTION
objectid	OBJECTID	Internal Object ID
shape	SHAPE	Internal Shape storage
prov_id	PROVIDER_ID	Unique numeric identifier for each provider
prov_name	PROVIDER_NAME	Unique name for each provider
dba_name	DOING_BUSINESS_AS	An alternative "Doing-Business-As" name for the provider
frn	FCC_REGISTRATION_NUMBER	Provider FCC Registration Number
bbcov_name	BBCOV_NAME	BroadMap Broadband Coverage name
trans_code	TRANSMISSION_CODE	Unique code for the transmission technology type described by this layer
trans_name	TRANSMISSION_NAME	Name for the transmissions technology type
trans_desc	TRANSMISSION_DESC	Description for the transmissions technology type
spect_code	SPECTRUM_CODE	Unique code for the spectrum [WIRELESS ONLY]
spect_name	SPECTRUM_NAME	Name for the spectrum [WIRELESS ONLY]
spect_desc	SPECTRUM_DESC	Description for the spectrum [WIRELESS ONLY]
mad_dwn_t	MAX_AD_DOWN_TIER	Maximum advertised downstream speed available within given area (speed tier)
mad_up_t	MAX_AD_UP_TIER	Maximum advertised upstream speed available within given area (speed tier)
typ_dwn_t	TYPICAL_DOWN_TIER	Typical downstream speed available within given area (speed tier)
typ_up_t	TYPICAL_UP_TIER	Typical upstream speed available within given area (speed tier)
mad_dwn_k	MAX_AD_DOWN_KBPS	Maximum advertised downstream speed available within given area (kbps)
mad_up_k	MAX_AD_UP_KBPS	Maximum advertised upstream speed available within given area (kbps)
typ_dwn_k	TYPICAL_DOWN_KBPS	Typical downstream speed available within given area (kbps)
typ_up_k	TYPICAL_UP_KBPS	Typical upstream speed available within given area (kbps)
subs	SUBSCRIBERS	Total average monthly subscribers for this provider for this technology for this coverage polygon
md_geom	MD_GEOMETRY	Metadata: Comma separated list of source ids from which the polygon extent was produced
md_exists	MD_EXISTS	Metadata: Comma-separated list of source ids used in understanding and editing the provider data for this polygon

NAME	ALIAS	DESCRIPTION
md_who	MD_WHO	Metadata: Name of the editor who last edited this feature at the time in md_when
md_when	MD_WHEN	Metadata: Date/time that this feature was last edited
md_process	MD_PROCESS	Metadata: Comma-separated list of processes used to create and/or modify this layer
stcty_fips	STATE_COUNTY_FIPS	State/County FIPS code
rec_id	RECORD_ID	Compound Key formed from STCTY_FIPS+"|"+Provider_ID+"|"+Trans_Code+"|"+BBCov_Name
st_area	ST_AREA(SHAPE)	Area in square decimal degrees
st_length	ST_LENGTH(SHAPE)	Length in decimal degrees
Provider_Type	Type of Provider	Has Subtype (1:Broadband provider as described in the NOFA,2:Reseller,3:Unknown), default value=1 (New 04/11 Model)

VERIFICATION AND VALIDATION

PROVIDER VALIDATION—PROVIDER PORTAL/PDF MAP REVIEW

Following the collection and aggregation of provider data, the aggregated data is validated by the provider to ensure it is an accurate representation of their coverage area and supporting broadband information.

- This validation is completed through the Provider Portal web application, which is a secure interactive map that displays the provider's coverage areas and allows the provider to validate, submit feedback or request changes.
    - If changes are requested, then the features on the portal are updated and an automatic request is sent to the provider to complete the validation process.
- Providers that did not use the Provider Portal are asked to validate a PDF map displaying their coverage area(s). This is accomplished via e-mail notification.

PROVIDER VERIFICATION—THIRD PARTY SOURCE REVIEW

After the provider has validated its coverage areas, a third-party source comparison and analysis is performed.

- Where anomalies or discrepancies are identified, a "SCAN" point is dropped and descriptive comments are applied to be reviewed later with the provider.
- During the provider review, the map is displayed along with the "SCAN" points and potential refinement is completed based on input from the provider.

The table below shows third-party sources used:

THIRD-PARTY SOURCE NAME	SOURCE TYPE	VERIFICATION TYPE
InfoUSA	Consumer and Business Listings	Community Anchor Institutions; Can also be used for demographic information supporting the State websites.
Pitney Bowes (PBBI)	Exchange Info Plus (Central Office Locations)	Exchange datasets are used to verify the following Transmission Technologies (TT): Asymmetric xDSL (10), Symmetric xDSL (20), Other Copper Wireline (30), and Optical Carrier/Fiber to the End User (50).

THIRD-PARTY SOURCE NAME	SOURCE TYPE	VERIFICATION TYPE
Media Prints	Cable Boundaries	Used to verify the following TT: Cable Modem—DOCSIS 3.0 (40) and Cable Modem—Other (41).
American Roamer	Wireless Coverage Patterns (EVDO, GPRS, WISP, HSPA)	Used to verify the following TT: Terrestrial Fixed Wireless—Unlicensed (70), Terrestrial Fixed Wireless—Licensed (71) and Terrestrial Mobile Wireless (80).
ComSearch	Wireless Spectrum Holdings and Tower Data	Used to verify the following TT: Terrestrial Fixed Wireless—Unlicensed (70), Terrestrial Fixed Wireless—Licensed (71) and Terrestrial Mobile Wireless (80).

ASSIGNING CONFIDENCE VALUES

All findings and results from the abovementioned **validation and verification activities**, plus internal peer quality reviews, are captured and tracked in a **Validation table** (see example on the following page) and form the basis of the confidence value assigned for each provider and then each technology.

CONFIDENCE VALUE	DESCRIPTION
0	Coverage area has not been reviewed.
10	Extremely Low: Single Source QC.
20	Very Low: Needs additional validation\verification. Coverage has not been validated by provider and is not found in third-party sources.
30	Low: Even with validation\verification, coverage still is suspect.
40	Presentable: Meets NTIA/State's standards, broadband attribution (technology vs. speeds) is questionable and needs to be validated by provider.
50	Acceptable: Meets NTIA/State's standards, display is generalized or doesn't align completely with technology capability. Okay for shipment, but requires further review.
60	Moderate: Meets NTIA/State's standards and is representative of the Technology Type (TT).
70	High: Accurate representation of coverage based upon TT and aligns with a third-party source.
80	Very High: Multiple validation\verification with most third-party sources.
90	Extremely High: Multiple validation\verification sources.
100	Perfect: Multiple validation\verification sources, with complete alignment with sources and ground truth verification activities.

The **Validation table** is maintained as updates or changes occur for each provider, down to technology type, with the overall goal to improve the confidence values and overall map representation. An example of the Validation table is shown below:

Contents | Preview | Metadata

OBJECTID *	BBCOV	CONFIDENCE_CODE	PROVIDER_ID	PEER_QC	PROVIDER_QC	THIRD_PARTY_VERIFICATION	THIRD_PARTY_ID	S	C
1	BBCov_10_Axxis	40	771	11/4/2010	9/27/2010	11/4/2010	3070		Axxis doesn't exist in PitneyBowes exchange data. Geometry and attribution are ok.
2	BBCov_10_BeaverTelCo	80	850	10/18/2010	3/9/2011	6/7/2010	2010		BeaverTelCo tt10 boundary has general shape of overlaying pitneybowes exchange boundary but not a perfect 1:1,030911 confidence raise
3	BBCov_10_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010		Canby Telcom boundary is roughly the shape of two exchanges but not 1:1
4	BBCov_10_CascadeUtil	70	3005	11/4/2010		11/4/2010	3070		CascadeUtil still needs provider validation. This bbcov exists in PitneyBowes exchange boundaries. Areas where they do not correspond s
5	BBCov_10_CenturyLink	70	710	11/4/2010	9/23/2010	11/4/2010	3070		CenturyLink BBCov overlays PitneyBowes exchange boundaries in some places, and not in others. Geometry and attribution represenative o
6	BBCov_10_ColtonTel	80	713	11/4/2010	9/16/2010	11/4/2010	3070		ColtonTel overlays with PitneyBowes Exchange boundary. Where it doesn't a scan pt was dropped. Geometry and attribution are ok.
7	BBCov_10_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070		Covad does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
8	BBCov_10_DataVision	30	767	11/4/2010		11/4/2010	3070		Still needs Provider QC. DataVision does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
9	BBCov_10_EasternOregonTelcom	60	899	11/4/2010	9/20/2010	11/4/2010	3070		Eastern Oregon Telcom does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
10	BBCov_10_Frontier	70	784	11/4/2010	9/16/2010	11/4/2010	3070		Frontier is partially overlaid by PitneyBowes exchange boundaries. Areas of difference have scan pts dropped. geometry and attribution are
11	BBCov_10_Gervais	90	767	10/18/2010	9/22/2010	6/7/2010	2010		Main portion of boundary is general shape of corresponding exchange boundary
12	BBCov_10_Helix	70	726	11/4/2010	9/22/2010	11/4/2010	3070		Helix BBCov resides mostly within PitneyBowes exchange boundary of the same name. Scan Pts dropped where different. Geometry and a
13	BBCov_10_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010		Many BBCov polys roughly align to 3rd party exchange boundaries in areas
14	BBCov_10_McMinnville	60	732	11/5/2010	9/27/2010	11/5/2010	3070		BBCov McMinnville resides wholely within the McMinnville Exchange boundary (in pitneybowes dataset which is attributed as Verizon NW).
15	BBCov_10_Molalla	50	734	10/18/2010	9/8/2010	6/7/2010	2010		Northern part of BBCov roughly aligns to northern part of 3rd party exchange boundary
16	BBCov_10_MonitorCOOP	70	1100	10/18/2010	9/17/2010	6/7/2010	2010		Coverage area larger than overlying exchange boundary but overall shape roughly resembles the exchange boundary
17	BBCov_10_Monroe_Telephone	80	736	10/18/2010	9/20/2010	6/7/2010	2010		3rd party exchange boundary very similar to BBCov
18	BBCov_10_MtAngel	90	707	10/18/2010	3/9/2011	6/7/2010	2010		3rd party exchange boundary very similar to BBCov,030911 provider feedback via portal confirmed geometry and max speed and added typ
19	BBCov_10_Nehalem	80	795	10/18/2010	9/28/2010	6/7/2010	2010		Large portion of BBCov roughly aligns to underlying 3rd party exchange but not all
20	BBCov_10_NorthStateTel	40	738	3/15/2011	3/15/2011	11/5/2010	3070		BBcov resides mostly within the Pitneybowes exchange boundary. Geometry is suspect. Attribution is ok. Provider validated via portal.
21	BBCov_10_OregonTeleCo	20	739	11/5/2010	9/14/2010	11/5/2010	3070		Very generalized bbcov partially overlaying PitneyBowes exchange boundaries. Geometry suspect. Attribution is ok.
22	BBCov_10_People	80	1012	11/5/2010	9/17/2010	11/5/2010	3070		People's BBCov mostly resides within PitneyBowes Exchange boundary of same name. Scan Pts dropped where differ. Geometry and Attrib
23	BBCov_10_PineTelephone	70	757	10/15/2010	3/17/2011	6/9/2010	2010		BBCov area has general shape as underlying exchange boundary here. Coverage areas based off of Census Tracts.,031711 Provider valid
24	BBCov_10_Pioneer	70	740	11/5/2010	9/20/2010	11/5/2010	3070		BBCov Pioneer resides mostly within PitneyBowes exchange boundaries of same name. Scan Pts dropped where differ. Geometry and attri
25	BBCov_10_Qwest	80	1102	11/8/2010	5/7/2010	11/8/2010	3070		BBCov_10_Qwest falls within the extents of PitneyBowes Exchange boundaries, but do not cover 1 for 1. Geometry and attribution are ok.
26	BBCov_10_Rionet	50	807	11/8/2010	9/27/2010	11/8/2010	3070		Rionet (UIDC telecom) doesn't exist in PitneyBowes exchange dataset. Geometry and attribution are ok.
27	BBCov_10_Roome	90	746	10/18/2010	9/10/2010	6/7/2010	2010		3rd party exchange boundary very similar to BBCov
28	BBCov_10_Sandy	60	873	11/8/2010	9/17/2010	11/8/2010	3070		BBCov for city of Sandy does not exist in PitneyBowes exchange dataset. Geometry and attribution are good for TT.
29	BBCov_10_Scio	90	800	10/15/2010	3/17/2011	6/9/2010	2010		3rd party exchange boundary roughly aligns to BBCov in this area,031711 Provider validated coverage confidence high
30	BBCov_10_SCS	60	1030	11/8/2010	9/17/2010	11/8/2010	3070		BBCov for SCS does not exist in PitneyBowes exchange dataset. Geometry and attribution are good for TT.
31	BBCov_10_SCTC	70	803	10/18/2010	9/17/2010	11/10/2010	3070		SCTC TT50 resides within pitneybowes exchange area. Geometry and attribution ok.
32	BBCov_10_StPaulTel	80	750	3/15/2011	3/15/2011	6/7/2010	2010		BBCov roughly aligns to two 3rd party exchange boundaries not perfect 1:1. Provider validated via portal.
33	BBCov_10_TDS	40	752	10/18/2010		6/7/2010	2010		BBCov partially aligns with overlying 3rd party exchange boundary
34	BBCov_10_TransCascade	40	709	11/8/2010	9/21/2010	11/8/2010	3070		BBCov resides in part of PitneyBowes Exchange boundary of the same provider name. BBCov also spills into two other PB exchange areas
35	BBCov_20_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010		Canby Telcom boundary is roughly the shape of two exchanges but not 1:1
36	BBCov_20_ClearCreek	80	712	10/18/2010	9/17/2010	6/7/2010	2010		BBCov area very similar to 3rd party exchange here
37	BBCov_20_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070		Covad does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
38	BBCov_20_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010		Many BBCov polys roughly align to 3rd party exchange boundaries in areas
39	BBCov_20_NewEdge	20	798	11/8/2010		11/8/2010	3070		Still needs Provider Validation. Business Only provider's coverage areas do not exist in PitneyBowes exchange datasets. Geometry and attri
40	BBCov_20_QuantumComm	60	1021	11/8/2010	9/23/2010	11/8/2010	3070		QuantumCom coverage areas do not exist in PitneyBowes Exchange datasets. Geometry and attribution are ok for TT.
41	BBCov_20_Rionet	50	807	11/8/2010	9/27/2010	11/8/2010	3070		Rionet (UIDC telecom) doesn't exist in PitneyBowes exchange dataset. Geometry and attribution are ok.
42	BBCov_30_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010		Canby Telcom boundary is roughly the shape of two exchanges but not 1:1
43	BBCov_30_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070		Covad does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
44	BBCov_30_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010		Many BBCov polys roughly align to 3rd party exchange boundaries in areas
45	BBCov_30_Lightspeed	20	793	11/8/2010		11/8/2010	3070		Still needs Provider Validation. Business Only provider's coverage areas do not exist in PitneyBowes exchange datasets. Geometry and attri
46	BBCov_30_McMinnville	40	732	11/5/2010	9/27/2010	11/5/2010	3070		BBCov is a single record buffered point residing in a Pitneybowes exchange boundary attributed for another municipality and provider. Geom

Record: 1 Show: All Selected Records (of 122) Options

Preview: Table

COMMUNITY ANCHOR INSTITUTION (CAI) DATA

DATA COLLECTION

The CAI data was initially collected from the State to create the baseline inventory. All location information and broadband coverage data supplied also was ingested into the data deliverable. Additional collection of CAI information was done via data mining and/or webscraping to build out the inventory further. For example: Collection of additional CAIs and location information.

The State-agency-provided CAI inventory was comprehensive but the challenge is collecting broadband related data: service provider(s), technology and speed data for each CAI. Availability of the CAI portal has not significantly increased submission of this data. Additional promotion to CAIs to use the CAI portal will be needed to increase this data for subsequent deliverables.

INSTITUTION DATA

Institution data is obtained from a variety of sources and almost always provided in Excel spreadsheet format. The general process for incorporating this data is as follows:

1) If the data is provided in Excel or some similar format:
    a. Clean and standardize the Excel spreadsheet, removing any cell formats, merged cells, etc.
    b. Standardize the address format as defined in the staging CAI database.
    c. If the spreadsheet includes X and Y values, such as latitude and longitude, use the **Add XY Data** tool in ArcMap® to create a spatial data layer.
    d. If there are only addresses, then follow the geocoding steps outlined above to create spatial data points for each of the institutions.
        (i.) Institutions that do not geocode based on the TIGER® 2009 dataset will have to be located manually using Google Maps, Google Earth or some other information source.
2) If the CAI source data is in GIS format, add the Latitude and Longitude fields and use the **Calculate Geometry** tool to populate them, using the WGS 84 coordinate system.
3) Using ArcCatalog®, load the new data into the staging CAI database.

4) This database is ready for the makeDeliverable.py script to process the information into the final State and NTIA deliverables.

COMMUNITY ANCHOR INSTITUTION (CAI) PORTAL UPDATES

A web application has been released to allow for further data collection and validation of anchor institution location information, broadband coverage and speed test data. Information collected from the CAI Portal is then ingested into the overall inventory and will be compared later against the provider coverage areas mapped to locate any potential discrepancies.

PRODUCT EXTRACT

PYTHON SCRIPTS

The following subsections make use of Python scripts. In general, to use a Python script you must have Python installed on your computer. To download the latest version of Python, go to **http://www.python.org/download/** and download the latest stable version. As of August 2010, this was version 2.7. Once this is installed, the general way to run a script is to type the following at a command prompt: C:\Python27\python.exe C:\<location of script>. Many of the scripts provided have environment variables that must be set before they can be run.

The Python code for BroadMap's product extract has been incorporated into a Hudson CI System, which is detailed in the **Process Operation and Monitoring** section of this document. This was a process improvement activity so that all processes can be monitored, controlled and will contain historical tracking on each process.

PRODUCT EXTRACT PROCESS

NOTE:
Specific Python scripts are called out in **red** font in the subsections below.

The MapConnect™ product extract process, makeDeliverable.py, uses the BB_Cov and BROADMAP_POINTS interim datasets to create the following layers according to the current specifications:

- BB_Service_Road_Segment
  - This layer contains all broadband services associated with specific street segments for census 2000 blocks larger in area than two square miles.
- BB_ServiceCensusBlock
  - Contains all broadband services associated with census blocks of no greater than two square miles.
- BB_Service_Wireless
  - This layer contains all wireless services not associated with specific addresses.
- BB_ServiceOverview
  - This layer contains subscriber-weighted nominal speed for each provider's service area at a county level and is meant to act as a summarized view.
- BB_ConnectionPoint_MiddleMile
  - This layer contains middle-mile and backbone interconnection points.
- BB_Service_CAInstitutions
  - Broadband Service at Community Anchor Institutions (CAI).

- Community Anchor Institutions consist of schools, libraries, medical and healthcare providers, public safety entities, community colleges and other institutions of higher education as well as other community support organizations and entities.

Because of a NTIA model change for the October 2010 data deliverable, an addition to this code was created to support both models in case a comparison is later desired or a request is made to revert to the original model. This script name is bdia2ntia.py and creates the following layers in addition to the layers mentioned above, rolled up to NATL_Broadband_Map.

- BB_ConnectionPoint_LastMile
  - This layer contains last mile infrastructure points, which is populated only if data cannot be provided at a more granular level.
- BB_Service_Address
  - Represents broadband availability for service address points. Address Point availability refers to those individual addresses at which each facilities-based provider of broadband service can provide broadband services of minimal characteristics within 7-10 business days.
- State_Boundary
  - State boundary supporting topological validation of point feature classes.
- NATL_Broadband_Topology
  - Supports basic topology quality checking. Example: No CAIs or Middle Mile points outside of the State boundary.

The following process flow provides a view of how the Core fGDB is extrapolated to the NTIA final deliverable via the makeDeliverable.py script. Following that, the bdia2ntia.py script is run, which limits what is placed in the final layers based on the NTIA modeling standards.

The product scripts and supporting extract were originally created separately per request, in case data model comparisons were to be completed.

PRODUCT STATISTICS

Following the completion of a product extract, the product statistics script (BDIA_ReleaseNotesStats.py) extracts the following information supporting that product deliverable.

- Provider Statistics:
  - Collects all provider information, listing by Provider Name.
  - Provides output of FRN.
  - Counts the number of features supported within the following layers:
    - Census Block;
    - Street Segment;
    - Max Upstream;
    - Wireless Services;
    - Infrastructure Points.
  - These updates were made to support the Data Package required to accompany every NTIA product deliverable.
- Community Anchor Institution (CAI) Statistics:
  - Breaks down CAI to the eight categories:
    - 1: School: K through 12;
    - 2: Library;
    - 3: Medical/Healthcare;
    - 4: Public Safety;
    - 5: University/College;
    - 6: Other Government;

- 7: Other Community non-government;
- None: Unknown Category. In cases where this occurs, further investigation is completed prior to product shipment to ensure all CAIs are categorized accurately.

- Reports out the following counts:
  - Total CAIs within that category;
  - Total CAIs that contain partial BB coverage. Contains any of the following information for a given CAI: BB Subscriber, Transmission Technology, Speed Down Speed Up;
  - Total CAIs that contain full BB coverage. Contains all of the abovementioned BB information for a given CAI.

The output of this script is two CSV files: AnchorInstitutions.csv and Providers.csv. These files then can be inspected to ensure that there are the expected number of CAIs and providers for every release.

QUALITY ASSURANCE

Quality assurance is supported manually and algorithmically on the interim data, BB_Cov file geodatabase and on the final product. For scheduled product releases, a test product extract and subsequent manual and algorithmic QC run is completed along with a release review. The product specifications, project status reports and previous product release notes are used as references throughout this review.

The following parameters are tested using the methodology listed below each:

- Product Deliverable Format:
  - Correct names and format of data deliverables.
    - BDIA_QC_SUITES (please see below for details).
  - Correct Projections/Datum.
    - Manual interaction with product.
  - Metadata Present and Correct.
    - Manual interaction with product.
- Table Structure:
  - All required tables included.
    - BDIA_QC_SUITES.
  - Extraneous tables identified.
    - BDIA_QC_SUITES.
- Field Structure:
  - All fields included.
    - BDIA_QC_SUITES.
  - Extraneous fields identified.
    - BDIA_QC_SUITES.
  - Correct field names, types and widths.
    - BDIA_QC_SUITES.
- Field Domains:
  - Values in all tables are constrained to the specified values specified:
    - This action is accomplished via BDIA_QC_SUITES and manual review of the product;
    - This tends to identify project completeness issues as fields with a null value are identified.
- Geometric Representation:
  - Identify if all layers have the correct geometric representation:
    - Manual review of the BB_ServiceOverview layer;
    - Dependent on NTIA and client requirements.
- Geographic Extent:
  - Product includes the necessary Geography associated with Product?
    - Manual Review—ArcGIS®.

- Is there extraneous geography included in Product?
  - Manual Review—ArcGIS®.
- Completeness:
  - Products contain the expected amount of data?
    - Manual review of product statistics relative to weekly State reports and defined expectations.
- Accuracy:
  - Product meets the stated accuracy requirements for the deliverable?
    - Sampling procedure to manually review source material to resulting product;
    - Provider Validation;
    - Verification using Third-Party Data;
    - Verification against reality, where applicable.
- Data Regression:
  - Any unexplainable data loss or change?
    - This action is accomplished by comparing results within product statistics script (BDIA_ReleaseNotesStats.py) from previous releases, as well as manual review of the product.
- Confidentiality:
  - Any unauthorized confidential information included in the delivery?
    - Review of NDAs and delivery expectations.
- Prior Issues Resolved:
  - Have expected internal issues been resolved?
    - Manual review of data against previous product release notes.
  - Have agreed-upon customer issues been resolved?
    - Manual review of data against previous product release notes, status report and client feedback.
- Delivery Medium:
  - Has the product medium been verified?
    - Manual review.
  - All files present.
    - Manual review of SFTP site to ensure all files are copied correctly, including file/directory size.
  - Correct location.
    - Manual review—confirmation of SFTP link, username and password.

QC SUITE

The BDIA_QC_SUITES consists of four main types of scripts supporting the overall QC process. These scripts are all run in concert and are called from the test_runner script and the test_BDIAProductGDB script.

CONFIGURATION

These scripts establish the configuration for the test_BDIAProductGDB script, which is the core of the QC Suite.

update_test_config
active_config
config_PROCESS01_automated
config_PROCESS01_manual
set_active_config

LIBRARIES

These scripts provide additional functionality that is called from with the test_BDIAProductGDB script.

bb_unittest_fixture
bbcov_structure

BC_XmlWriter
file_folder
search_and_replace
unittst_fixture
validate_BB_DB
validate_BB_GDB
xmlrunner_gui

QC SUITE

This is the core script for performing automated QA/QC on the interim and final data deliverables.
test_BDIAProductGDB

OTHER

These scripts perform other functions detailed below:
test_runner—this is the main script that runs all the other QC scripts and imports all the necessary scripts and libraries.
which_build—this determines the current build and passes information to the configuration scripts.

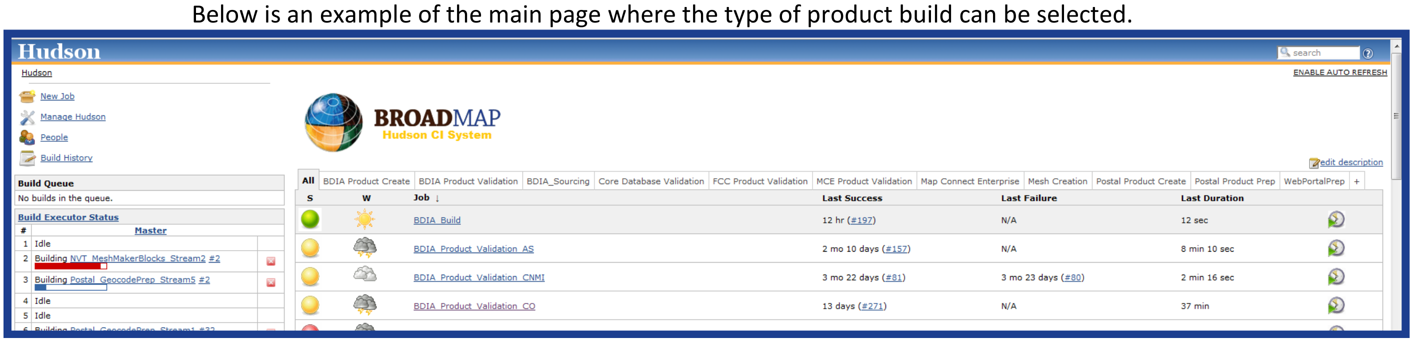
PROCESS OPERATION AND MONITORING

Product Extract, makeDeliverable.py and bdia2ntia.py, is run within BroadMap using a platform called Hudson that has been enhanced to support BDIA product extraction, process monitoring, as well as product validation. The same platform can be planned for implementation for the State, if desired.

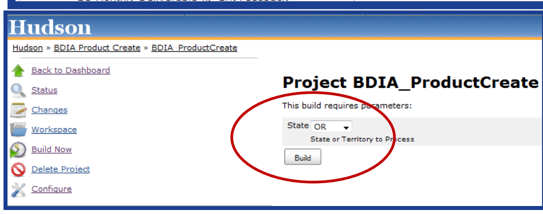
Below are examples of the product create, product validation, product statistics and monitoring processes that are managed within the BroadMap Hudson CI-System. All of the **abovementioned Python scripts**, with the exception of metadata transactions script, are run via this system.

BDIA PRODUCT CREATE

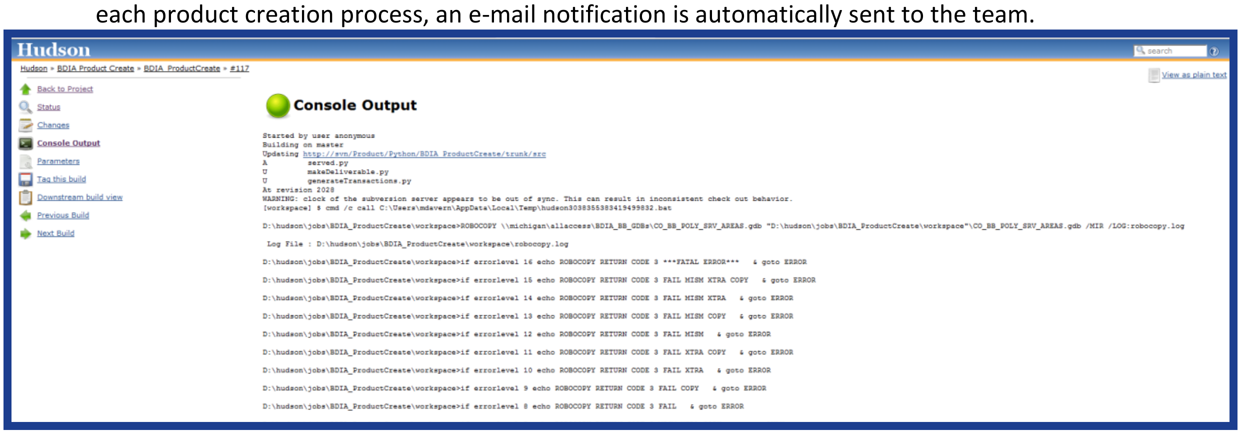
Below is an example of the main page where the type of product build can be selected.



Selecting based on the type of process that will be initiated is shown below:



The Console Output can be reviewed to see the progress of product create. Following the completion of each product creation process, an e-mail notification is automatically sent to the team.



All processes run via the BroadMap Hudson CI-System are stored for historical reporting. Each process can be reviewed, including the Console Output and Build Artifacts from that run.

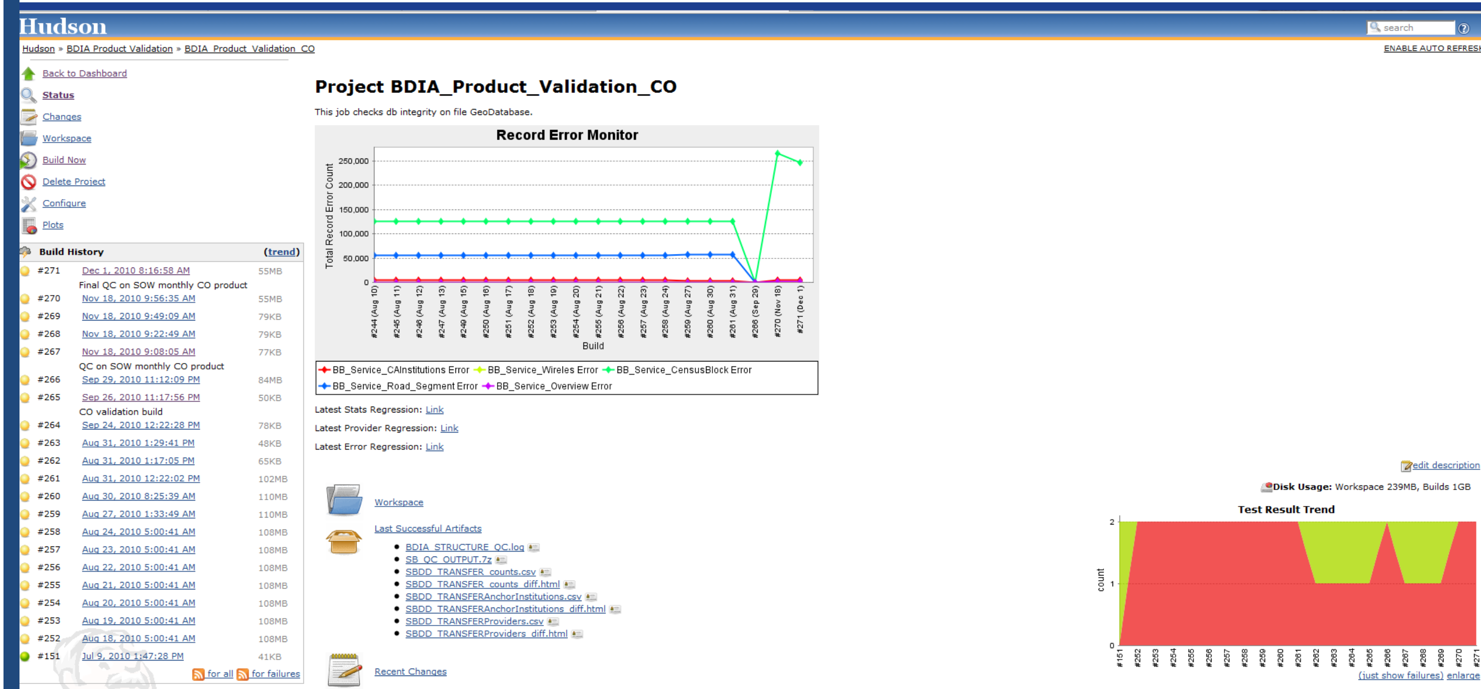

Hudson
search
Hudson » BDIA Product Create » BDIA ProductCreate » #161
ENABLE AUTO REFRESH
Back to Project
Status
Changes
Console Output
Parameters
Tag this build
Downstream build view
Previous Build
Next Build
Build #161 (Mar 28, 2011 9:44:40 PM)
Delete this build
Started 1 day 1 hr ago
Took 3 hr 31 min on Alaska
edit description
OR Pre-Release Build
Build Artifacts
bdia2ntia.log
makeDeliverable.log
robocopy.log
Revision: 3099
No changes.
Started by user anonymous

PRODUCT VALIDATION AND STATISTICS

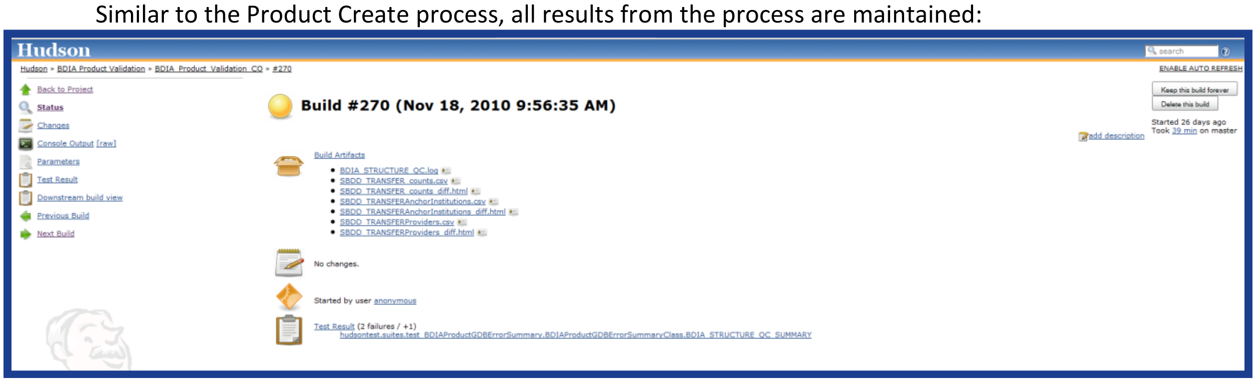
Once the product creation process is complete, Product Validation and Statistics are then initiated. These support the BDIA_ReleaseNotesStats.py script and the BDIA_QC_SUITES scripts detailed above.

All statistics and reports are stored for historical review with the capability to place violation criticality on each quality control check, allowing the identification of errors because of project status/completeness verses project correctness. Example: Typical Speeds populated.

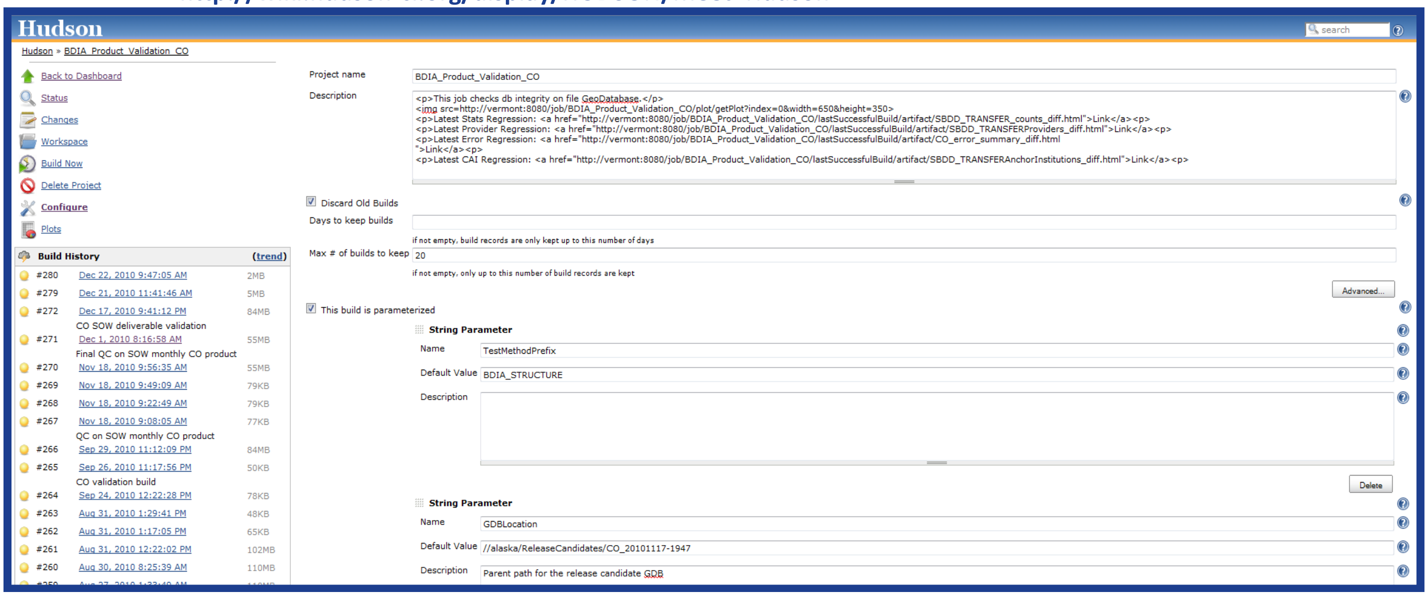
Below is an example of the report provided based on various control points running over a specified period:



Similar to the Product Create process, all results from the process are maintained:



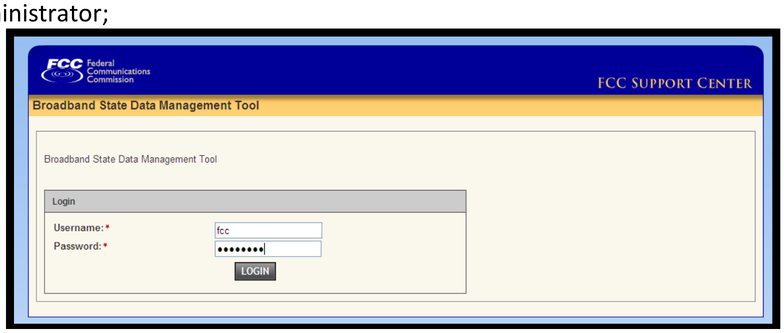
Results are then reviewed manually to ensure no errors reported are critical or in violation of the NTIA data model or project completion statements. Any errors of concern are communicated ahead of product delivery and included within the product release notes. Further detail on the Hudson-CI System environment can be found by navigating to the following link:
http://wiki.hudson-ci.org/display/HUDSON/Meet+Hudson



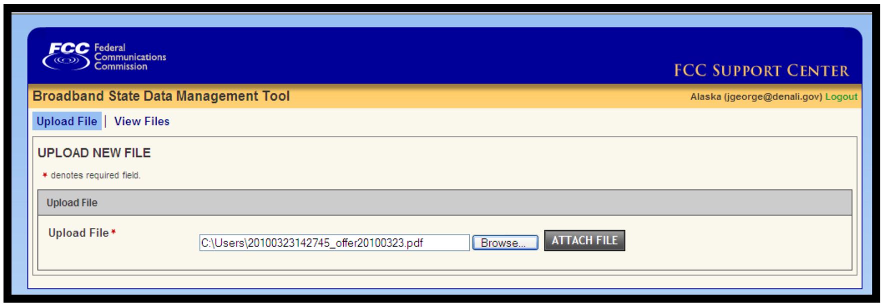
PRODUCT EXTRACT DATA DELIVERY

Product delivery for MapConnect™ Broadband is handled two ways, depending on client requirements:

1) State Submittal:
   a. Data is submitted via SFTP site;
   b. Product Release Notes and QC Test Report accompany the delivery.
2) NTIA Submittal:
   a. Directions for using the NTIA State Broadband Data file submission tool:
      (i.) Go to the following website: **https://esupport.fcc.gov/statedata**;
      (ii.) Enter your **username and password** as provided to you from the NTIA program administrator;



      (iii.) Click in **Upload a file** field;
      (iv.) Browse to local file for submission using the **Browse** button. Select file, then select **ATTACH FILE**. See example below.



(v.) **Logout/Receipt** using the **Logout** button in the top right of the screen;

(vi.) A receipt of submission is e-mailed to username e-mail address.

pennsylvania broadband initiative

pennsylvania
DEPARTMENT OF COMMUNITY
ECONOMIC DEVELOPMENT

DATA DEVELOPMENT & VALIDATION METHODOLOGIES WHITE PAPER

Commonwealth of Pennsylvania
State Broadband Initiative (SBI)
Broadband Mapping Project

NTIA Data Submittal
October 1, 2011

Baker

Table of Contents

Introduction

The following sections of this document provide an overview of the process used for the SBI Broadband Mapping data development for the Commonwealth of Pennsylvania. The following narrative is depicted in Appendix A, Commonwealth of Pennsylvania SBI Process Workflow, and Appendix B, State Broadband Data Validation Workflow, included at the end of this document.

Broadband Provider Outreach

The following outreach procedure provides the framework for communicating with Broadband Service Providers (providers). The primary goals of the outreach approach documented herein are to:

- Promote provider understanding and acceptance of the Broadband Mapping process, results, and benefits
- Clarify NTIA Broadband Mapping requirements
- Facilitate data confidentiality agreements as required
- Minimize the submittal of invalid data
- Enhance provider understanding of the semi-annual update process
- Work with providers to evaluate submittal options to facilitate data submittals

Data Submission Guidelines

Guidelines for the providers' submission of Broadband Mapping Data are documented in the "Data Submission Guidelines". These Guidelines define technical requirements, submission specifications, and coordination and documentation activities.

Pennsylvania Broadband Providers Website

A URL was deployed (http://www.bakergis.com/PABroadbandProvider/) to communicate and distribute NTIA NOFA requirements to providers along with outreach and data submittal materials including:

- NTIA NOFA and subsequent clarification
- Outreach letters to providers
- Draft Non-Disclosure/Data Sharing Agreement
- Quick Start Guides
- Data Submission Guidelines
- Data Transmittal Letter
- Broadband Data Submittal Templates
- Census TIGER Data
- Data Submittal Assistance Contact Information

Outreach Delivery Vehicles

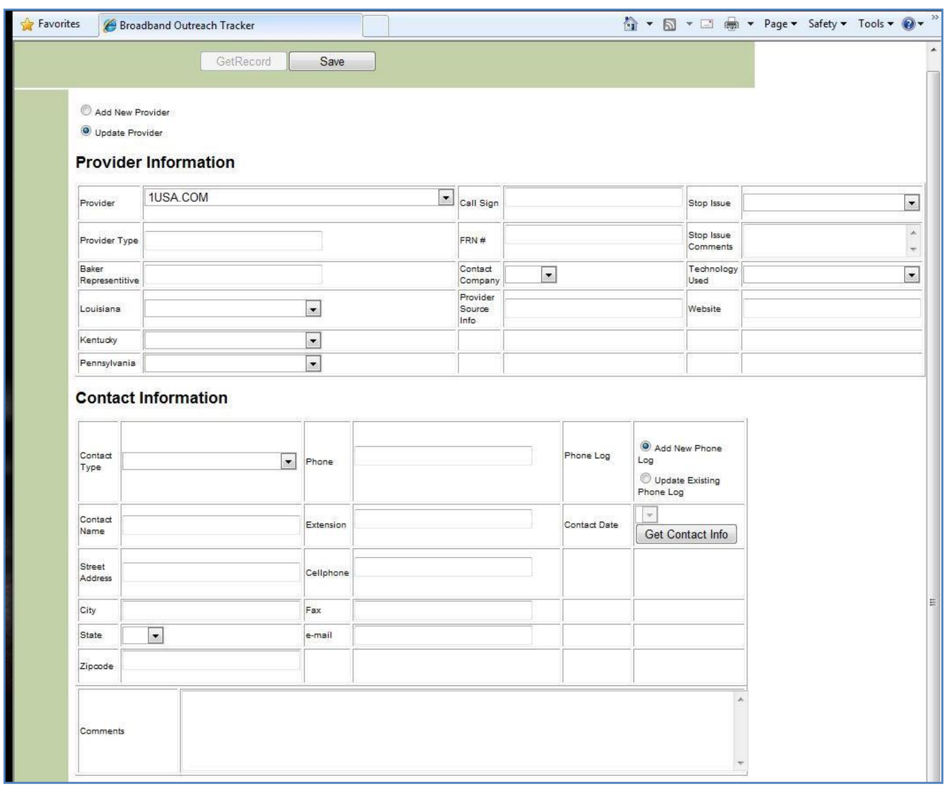
- A State Broadband Mapping Initiative Call for Data letter from the Commonwealth of Pennsylvania Department of Community and Economic Development (DCED) was emailed to all providers in the Commonwealth. This initial provider contact letter described the program and the role of Michael Baker Jr., Inc. (Baker) acting on behalf of the DCED for Broadband Data Collection and Mapping.

- Baker distributed a follow-up letter to all providers describing the data submittal requirements and material and help available to aid with the data submittals.
- Submittal assistance was provided to providers that needed help with data submittals.
- Presentations were conducted with various broadband provider associations to present the data submittal requirements and answer questions.
- Email communication and electronic transfer of data was encouraged to facilitate a faster delivery of data and information.
- A URL was deployed and promoted to distribute outreach material and information concerning the Broadband Mapping Project.
- A secure FTP URL was provided for submittal of broadband data by providers.

Broadband Outreach Tracker Application

The Tracker application (Figure 1) was utilized to collect all correspondence with providers and feedback on the effectiveness of the outreach activities by tracking items such as:

- The number and content of incoming e-mails and letters submitted from the providers
- The number and source of comments, questions, and suggestions made by providers
- The number and source of comments, questions, and suggestions made by attendees at provider meetings and conference calls
- Provider contact information and data submittal status.



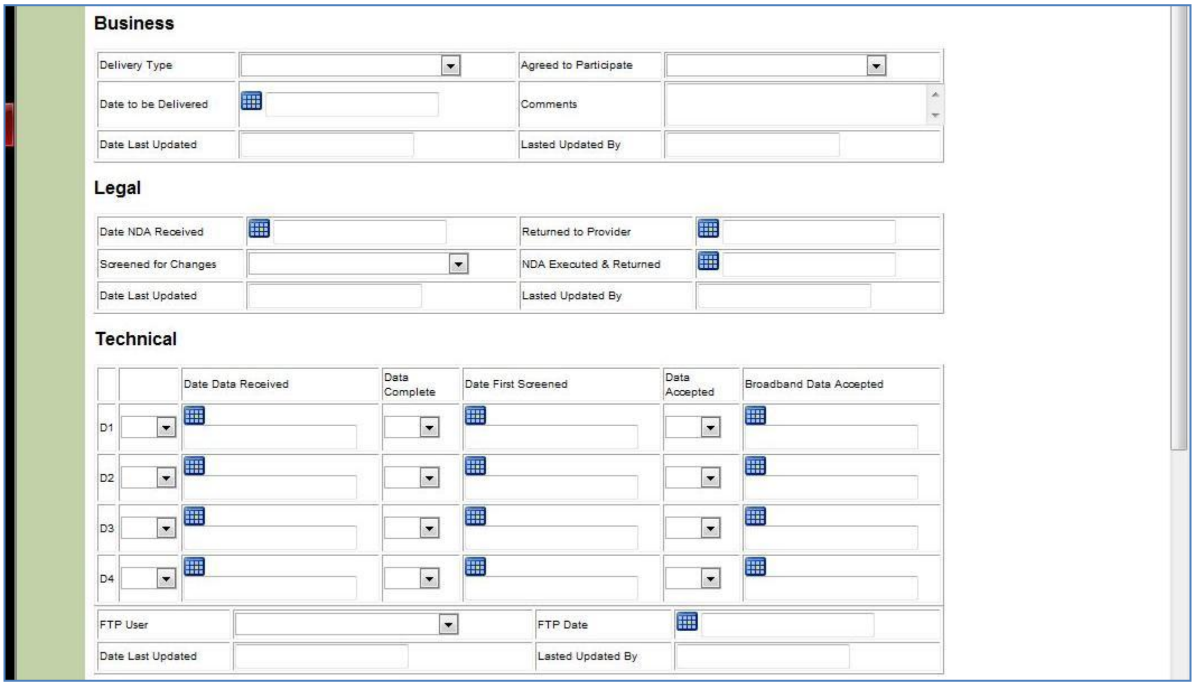


Figure 1 Broadband Outreach Tracker

Provider Submittal Validation

When a data submittal is received from a broadband service provider, it is updated in the Broadband Outreach Tracker and run through an initial validation process to assure that it meets the submittal guidelines.

Validation Checklist

The following items are part of this initial data validation process:

- Verify provider's transmittal letter requested in Data Submission Guideline with is complete and matches submitted data
- Verify the file naming conventions
- Verify each file is machine readable
- Verify data is in the correct GIS or Tabular format/file type
- Verify each field is populated and no empty or NULL values are present for mandatory fields
- Verify all ID (record number points) are unique within the submittal
- Verify all attribute data is formatted according to the submittal guidelines
- Verify topology for all geospatial submissions
- Verify Metadata for all submissions
- Verify the required contact information is included
- Verify adherence to Data Submittal Guidelines (see http://www.bakergis.com/PABroadbandProvider/ to access Data Submittal Guidelines)

  Broadband Service Availability (at least one)

  - Individual Street Addresses (Sec 3.1 & 4.1)

- Census Blocks < 2 sq mi (Sec 3.3 & 4.3)
- Street Segments for Census Blocks > 2 sq mi (Sec 3.2 & 4.2)
- Service Overview (Sec 3.4 & 4.4)
- Polygonal Boundary Area(s) (Sec 3.8 & 4.8)

Middle-mile Points (Sec 3.5 & 4.5)
Community Anchor Institutions (Sec 3.7 & 4.7)
Last Mile Connection Points (Sec 3.6 & 4.6)
WISP Antennas (Sec 4.9)

Data Usability Determination

The validation results are evaluated by the outreach and aggregation persons to determine the usability of the data. If the data meets the submission specifications, it is forwarded on for data aggregation. If it is determined to be unusable, it is returned to the provider for resolution. If the data can be manipulated to get it into a usable format, it is manipulated as required, and then forwarded on for data aggregation.

SBI Data Development

Data from the providers may be submitted in various formats as defined in the Data Submittal Guidelines, or in some cases unspecified formats may be accepted to help facilitate provider participation. Depending on the format of the submitted data, it is processed through one of the following processes to upgrade it to the NTIA SBI data standards.

2000 to 2010 Census Data Translation

Many providers indicated there were no changes to their previous data submission that was compiled to 2000 census information and they did not have the capacity to upgrade their data to 2010 census information. Therefore, the Broadband Mapping team has translated the April 2011 data for these providers using the workflow shown in Appendix C.

Spatial Data

After validation and any required manipulation of any spatial data submitted by the providers, it is georeferenced and simply loaded into the appropriate NTIA geodatabase feature class.

Address Data Geocoding

If not already in the standard address point template, the provider tabular address data is first loaded into that template. The data is then exported to a geodatabase table using the ArcGIS Conversion Tools. ArcGIS geocoding tools are then utilized geospatially locate the address points for the tabular records. Interactive address rematching is performed against two additional street centerline datasets as needed to increase geocoding matching results. The NTIA deliverable is the geocoded address point geodatabase table. The geocoded address points are also subsequently aggregated to the census block or road segment feature class for public web map display.

Census Block Aggregation

If not already in the standard census block template, the provider tabular census block data is first loaded into that template. The data is then exported to a geodatabase table using the ArcGIS Conversion Tools. The provider tabular census block records are then joined to the geodatabase 2010 U.S. Census Block. This join is performed as many times as necessary for multiple Trans Tech values for each Provider/Census Block combination. The NTIA deliverable is the census block geodatabase table.

If the list of census blocks contains blocks > 2 sq. miles then these blocks are used to select all the 2010 U.S. Census TIGER centerlines that intersect those blocks. The Census Block record data is aggregated to each Road Segment within the Census Block. This process is performed as many times as necessary for multiple Trans Tech values for each Provider/Census Block combination.

Road Segment Aggregation

If not already in the standard road segment template, the provider road segment data is first loaded into that template. The data is then exported to a geodatabase table using the ArcGIS Conversion Tools. If the provider submittal included graphic centerline segments, these are migrated into the delivery geodatabase along with the linked attribute records. If the provider submittal was tabular road segment records only, they are then joined to the geodatabase 2010 U.S. Census TIGER centerline feature class. This join is performed as many times as necessary for multiple Trans Tech values for each Provider/Road Segment combination. The NTIA deliverable is the road segment geodatabase table.

If the provider road segment data lie within census blocks <= 2 sq. miles then the road segment data is aggregated to the census block. This process is performed as many times as necessary for multiple Trans Tech values for each Provider/Road Segment combination. The NTIA deliverable is the road segment geodatabase table.

Overview Data Aggregation

Provider Service Availability Areas submitted for entire county areas are loaded into the NTIA geodatabase Overview table. If not already in the standard template, the provider data is first loaded into that template. The data is then exported to a geodatabase table using the ArcGIS Conversion Tools. The provider overview records are then joined to the geodatabase 2010 U.S. Census County feature class. This join is performed as many times as necessary for multiple Trans Tech values for each Provider/County Area combination.

Polygonal Boundary Aggregation/Integration

Providers submitting polygonal service area data are handled in two ways. Wireline Provider data is aggregated to the census block feature class for areas where census blocks <= 2 sq. mi., or road segment feature class for areas where census blocks > 2 sq. mi. Wireless Provider Service Availability Areas submitted by polygonal area are simply loaded into the NTIA geodatabase Poly_Bndry feature class.

Wireline Provider

The polygonal data is georeferenced and loaded into the Poly_Bndry feature class. The polygon is then attributed, manually if necessary. Depending on the area, census blocks < or => 2 sq. mi., a selection set of either census blocks or road segments that intersect the polygon boundary is created. The attributed polygon boundary is then joined with census blocks or road segments table to attribute accordingly. This join is performed as many times as necessary for multiple Trans Tech values for each Provider/County Area combination. The NTIA deliverable is the census block or road segment geodatabase table.

Wireless Provider

The polygonal data is georeferenced and loaded into the Poly_Bndry feature class. The polygon is then attributed, manually if necessary. Multiple Poly_Bndry records are created for multiple Trans Tech values for each provider. The NTIA deliverable is the polygon boundary geodatabase table.

Middle/Last Mile Data Integration

If not already in the standard template, the data is first loaded into that template. The data is then exported to a geodatabase table using the ArcGIS Conversion Tools. The point features are geo-located utilizing the lat/long information provided. The NTIA deliverable is the middle or last mile geodatabase table.

Community Anchor Institution Integration

Providers supplied some Community Anchor Institution (CAI) data with the data submittals. But the majority of the data was collected from existing GIS Layers maintained by the Commonwealth of Pennsylvania, outreaching to CAIs through state agencies and their contacts, and having CAIs complete an online survey at http://www.bakerbb.com/pa_institution_survey/.

Provider CAIs

If not already in the standard template, the data is first loaded into that template. The data is then exported to a geodatabase table using the ArcGIS Conversion Tools. The point features are geo-located utilizing the lat/long information provided. Address data is used to geocode locations only when lat/long data is not provided.

Commonwealth CAIs

CAI shapefiles were provided through the Commonwealth’s other geospatial efforts. The shapefiles were then exported to the NTIA geodatabase CAI feature class. Various sources for obtaining broadband information for the CAIs were utilized. Various state agencies provided some of the information, i.e. Pennsylvania Department of Education (PDE) provided tabular broadband information for schools, PDE provided tabular broadband information for libraries, and Pennsylvania State Police provided tabular broadband information for their facilities. A CAI data survey website was also deployed and the URL distributed by various state agencies to the CAI contacts. Data from all of these sources were then aggregated into the CAI geodatabase table for the NTIA deliverable.

Provider Validation

After data development, service availability maps are generated and submitted to the providers to validate their mapping results. This provides a “sign off” on the interpretation of the submitted data and extends the outreach efforts by providing a visual representation of the data to be delivered to the State and the NTIA.

Types of Provider Maps

Provider maps generally consist of the following types.

Outreach Maps

Often, providers will send data which does not contain all the information needed for a NTIA compliant dataset. In such cases, as an aid to the outreach communication, it may be necessary to produce a map to help the provider locate their service area or verify data they have provided. These maps may take many forms, but generally are of two types:

- General Location Maps – these maps are often produced when the provider does not have a list of address or other standard submittal data and needs help defining their service area. A typical map will show counties, major roads, and towns of the general area the provider has stated as their service area. The intent of the map is to give the provider a way to markup or delineate their service area. If a provider has not provided required attribute information such as Technology of Transmission, Speed Data, etc. then it may be necessary to add a visual clue to this data like an information stamp on the map that they can easily fill out. If the provider sends the map back with a service area boundary, this can then be digitized and sent back to the provider for verification.
- Verification of Provider Supplied Boundaries – these maps are produced when the provider has sent service area boundary information which is confusing or otherwise unclear. Often these are produced when providers send CAD maps, hand drawn maps that need digitization, or lists of zip codes or counties served. A typical map will place the interpreted boundary over a location map so the provider can verify the service area. As with the General Location Map, information stamps or other visual clues may be placed on the map.

Initial Verification Maps

Once the provider data has been processed and the census block and road segment feature classes created, an Initial Verification Map (Figure 2) is produced to give the provider a visual representation of their service area by census block. These maps enable the provider to verify their service area and make changes if necessary. Initial Verification Maps are produced using a set of standards and produced at the highest resolution necessary to convey the map information to the provider. Initial Verification Maps are also produced for Wireless Polygon areas.

Detailed Verification Maps

Providers who have questions about their service areas may request additional information to help clarify issues. In these cases, it may be necessary to create a Detailed Verification Map to highlight the areas in question. Detailed Verification Maps provide the same information as Initial Verification Maps only at a higher resolution. Several maps may be needed to accurately portray an area in question.

Revised Maps

Revised maps take two forms:

- Initial or Detailed Verification Maps which have been annotated or marked-up by the provider
- Outreach produced Initial or Detailed Verification Maps incorporating provider changes

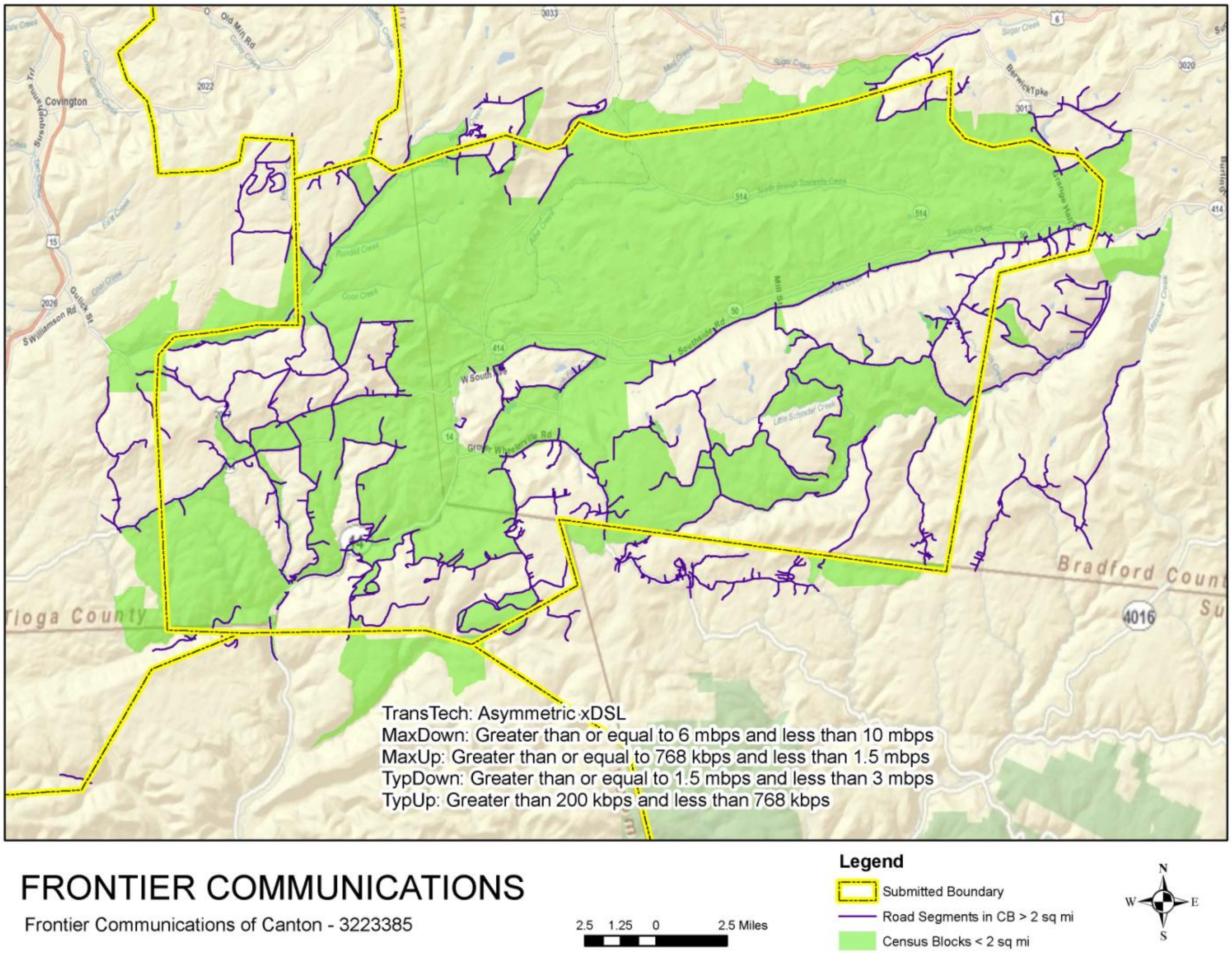


Figure 2 Provider Map

Data Validation

A critical component of the project is the validation of the data submitted by the broadband service providers. Data from various sources, as described in more detail in the following sections, is utilized to develop a level of confidence in the data received from the broadband providers.

Validation Data Set Collection and Development

This validation process employs data sets developed or acquired from different sources as described in the following sections.

<u>Provider Feedback Loop</u>: Maps of completed provider service areas and data are furnished back to the providers for confirmation of the processed/aggregated information. Feedback is integrated into the each provider’s dataset.

Telogical Systems Wireline Market Intelligence Data: This commercially available dataset was developed using a methodology that incorporates deep web crawling and additional means, including direct mail harvesting and advertising collaterals (including door to door) to gather cable and telecommunication provider information. This dataset is used as a validation source for wireline provider service area coverage, Technology of Transmission, and Speed.

American Roamer Wireless Market Intelligence Data: This commercially available dataset is used as an independent source to verify information submitted by providers of wireless broadband service. This dataset is used as a validation source for wireless provider service area coverage.

Prior Commonwealth Broadband Mapping Dataset: Under the requirements of the Commonwealth's Act 183 of 2004 legislation, broadband coverage data was previously collected by the Commonwealth. These datasets are used as a validation source for provider service area coverage and Technology of Transmission.

FCC Speed Test: The FCC speed test data includes the IP addresses for each specific speed test conducted. This IP address is queried against a web search engine to determine the provider assigned to that address and is used as a validation source for the provider service coverage and typical speeds.

Fixed Wireless Line of Sight Analysis: Utilizing the existing PAMAP LiDAR for topography generation and determining tower/antennae heights, line of sight analysis is performed to determine areas of reported fixed wireless broadband coverage that is questionable.

Field Data Acquisition: Broadband technicians visited a sampling of census block locations to gather broadband data to be used for validation. The following criteria were taken into account when developing the census block sampling dataset:

- urban vs. rural census block characteristic
- censes block grouping
- land vs. water census block characteristic

The overarching mission of the Federal broadband stimulus program is to expand Broadband service to areas that are currently unserved and underserved. Also, the market intelligence validation sources typically represent some rural, but more urban areas. Thus, our field data collection efforts were targeted more towards the rural areas; split 90% rural, 10% urban.

Additionally, a study by Penn State University (Glasmeier 2002) notes that a large number of census block groups typically fit within any given cable or telephone company service areas. Therefore, our field sample was also based on selection of one census block per block group and a land mass greater than 50% to avoid field visiting areas covered mostly by water. There are a total of 10,387 block groups in PA. Using a statistical sample size calculator based upon the number of block groups in the state and +/- 4% margin of error at a 95% confidence level, the sample size is 568 census block locations statewide. The procedure for selecting the calculated field verification census blocks is provided below.

1. Select one census block per census block group
    a. Convert the census block groups polygon to label points.

   b. Select the census block polygon by doing a spatial selection using census block groups label points.

2. Select from the current selection where the census block land mass is 50% or greater and the block is rural.
3. Export the selected blocks to a new shapefile. This reset the FID for the next step.
4. Select every 2nd, 3rd, 4th, or so on to get the desired number of blocks. Query used to select: MOD("FID",2) = 0. This will select every other record.

The planned census block field locations are shown in Figure 3.

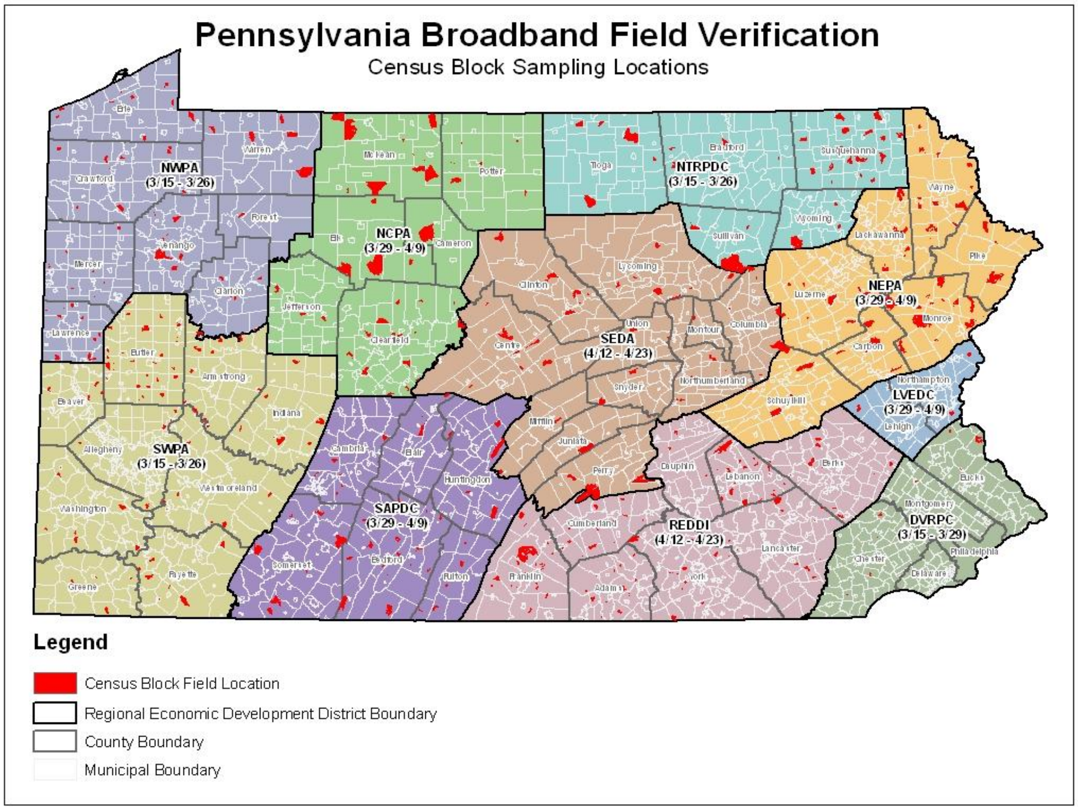


Figure 3 Planned Field Verification Census Block Locations

For each census block in the sample set, broadband technicians collected data using Panasonic Toughbook computers, loaded with MapPoint mapping software, and a customized Microsoft Access data collection form with the ability to automatically import GPS coordinates. The sample census blocks were pre-loaded and directly accessible from MapPoint. Two types of data collection were conducted (infrastructure observation and wireless speed testing) and the results were recorded and linked to the corresponding field location coordinates within the designated sample census block. The information collected by the field broadband technicians includes:

<u>Wireline</u>:

- GPS coordinates
- circuit infrastructure feeding the area (copper, fiber, cable)

- local distribution hut equipment inspection, where allowed/possible
- witness access circuit speed tests, where allowed/possible
- facility elevation (measurement relative to grade), where allowed/possible
- distance from DSLAM measurement where applicable and determine access speed capability with an accuracy within 500ft using mapping software
- collect site pictures

Wireless:

- GPS coordinates
- internet speed test

The map in Figure 4 shows the locations (blue points) of the census block field surveys that were performed.

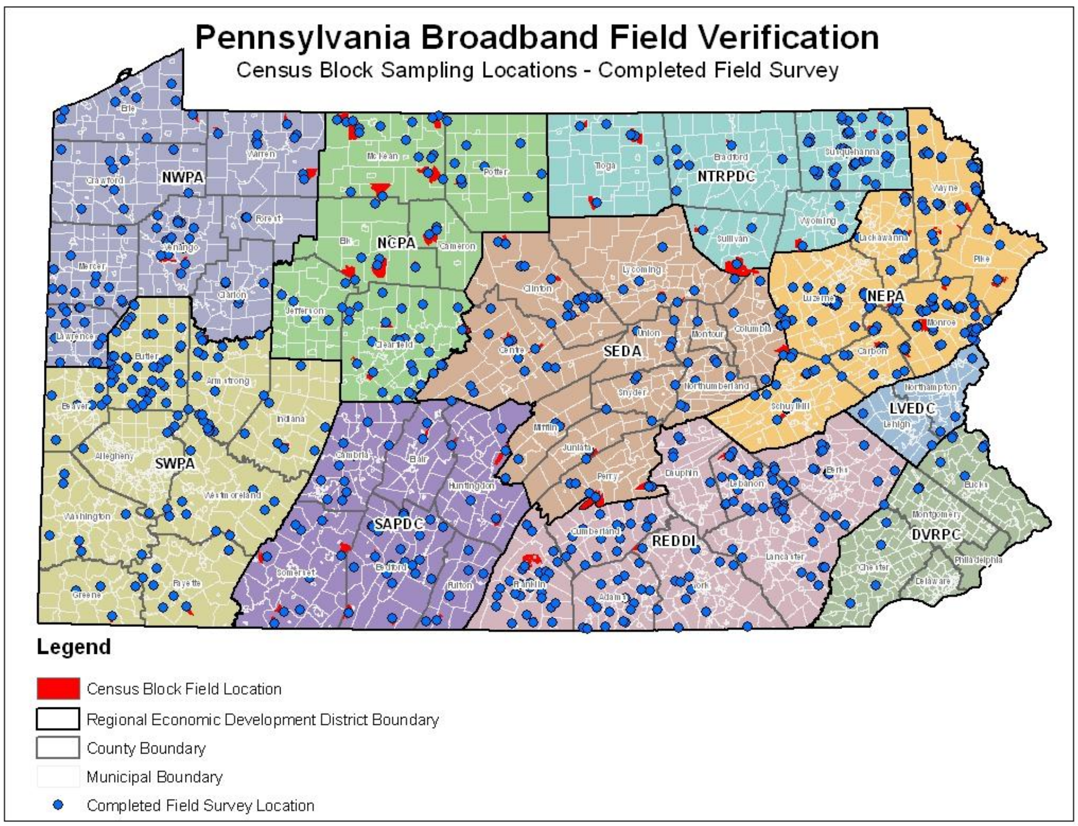


Figure 4 Completed Field Verification Locations

For the 568 census blocks that were visited, 2821 individual wired/wireless data elements were recorded and 3666 pictures were taken at those locations. This field collected dataset is used as a validation source primarily for wireline and wireless technology of transmission, middle mile, and wireless speed.

Provider Data Validation Process

Provider Feedback Loop: Feedback received from the providers is visually inspected and integrated directly in the mapping GIS database.

Service Area Validation Data: The Telogical wireline service area data is tabular and contains a separate record for each provider/technology of transmission combination with an associated census block or TIGER road segment, depending on the whether the size of the census block area (=/< or > 2 sq. mi.). This data is exported into an ArcGIS data format. The American Roamer wireless service area data is already in and ArcGIS data format. The validation data is then joined to the provider service area data by census block or TIGER road segment ID. Any database records in the provider or validation tables that cannot be joined are output to a separate layer that indicates the areas of discrepancy between the two datasets. The joined tables are then queried to detect any speed discrepancies which are also output to a separate discrepancy layer.

Field Validation Data: The field data are also collected in tabular database format, and represent a specific lat/long spatial location for each record. This data is also exported into an ArcGIS data format, joined to the provider data, queried to validate pertinent attribution. Again, records not joined and/or with detected attribution discrepancies are output to separate GIS layers.

Topology: The ArcGIS Validate Topology Tool is used to flag any topology issues in the broadband data. Flagged issues are reviewed to identify false positives and update true errors as required.

SBI Check Submission: The NTIA-provided SBI Check Submission tool is utilized to validate that the deliverable broadband data is consistent with the business logic rules set forth by the NTIA and a passing receipt is provided with the data submittal to NTIA.

Stakeholder Feedback: The state broadband mapping website includes a feedback function. Comments received from stakeholders such as the regional Economic Development Districts and the public are reviewed and used to validate the provider data submissions.

Validation and Confidence Level Reporting

To facilitate validation and confidence level reporting, Baker deployed a validation application called Statistical Evaluation and Assessment System (SEAS), shown in Figure 5, which automatically compares the multiple independent validation datasets against the broadband service provider supplied information. The SEAS application uses statistical methodologies to report the confidence level in the spatial and attribute accuracy of the information. Appendix B shows the validation workflow.

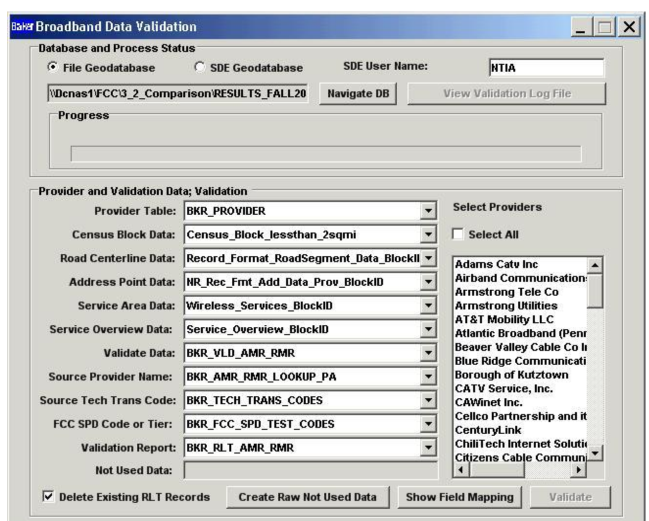


Figure 5 SEAS

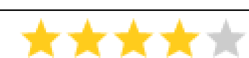
The SEAS comparison is a three-part validation process:

1. Comparison of the collected validation source against the aggregated broadband provider data.
2. Match percentage calculation for each provider reported in the DataPackage.xls, “Provider Table” tab, “Comments” column.
3. Confidence score calculation displayed on the state broadband website.

After completing all validation data source collections, SEAS is used to automatically compare the multiple validation datasets against the aggregated broadband data which came from the providers. Through the SEAS accumulation table, it produces a match percentage per broadband service record based upon the number of matches that record has against each validation source. The matched percentage for each record is the result of the total count of the matched validations for the record divided by the total validation source being compared against the record. Validation confidence rating/score is assigned on a scale of 1 to 5 based upon the percentage of validation source matches as per the following score results:

- 1 Star = 0% - 19% Match
- 2 Stars = 20% - 39% Match
- 3 Stars = 40% - 59% Match
- 4 Stars = 60% = 79% Match
- 5 Stars = 80% - 100% Match
- “No Analytics” = No validation source available for that provider

The Commonwealth’s public broadband mapping website (www.broadbandinpa.com) is updated with the confidence level results at the record level based upon the queried geographic location and the following shows an example of this representation.

Provider Name	Transmission Technology	Max Download Speed	Max Upload Speed	Confidence Score
AT&T Mobility	Mobile Wireless	Greater than or e…	Greater than or e…	
Verizon	Asymmetric xDSL	Greater than or e…	Greater than or e…	NO ANALYTICS
Comcast	Cable Modem – Other	Greater than or e…	Greater than or e…	

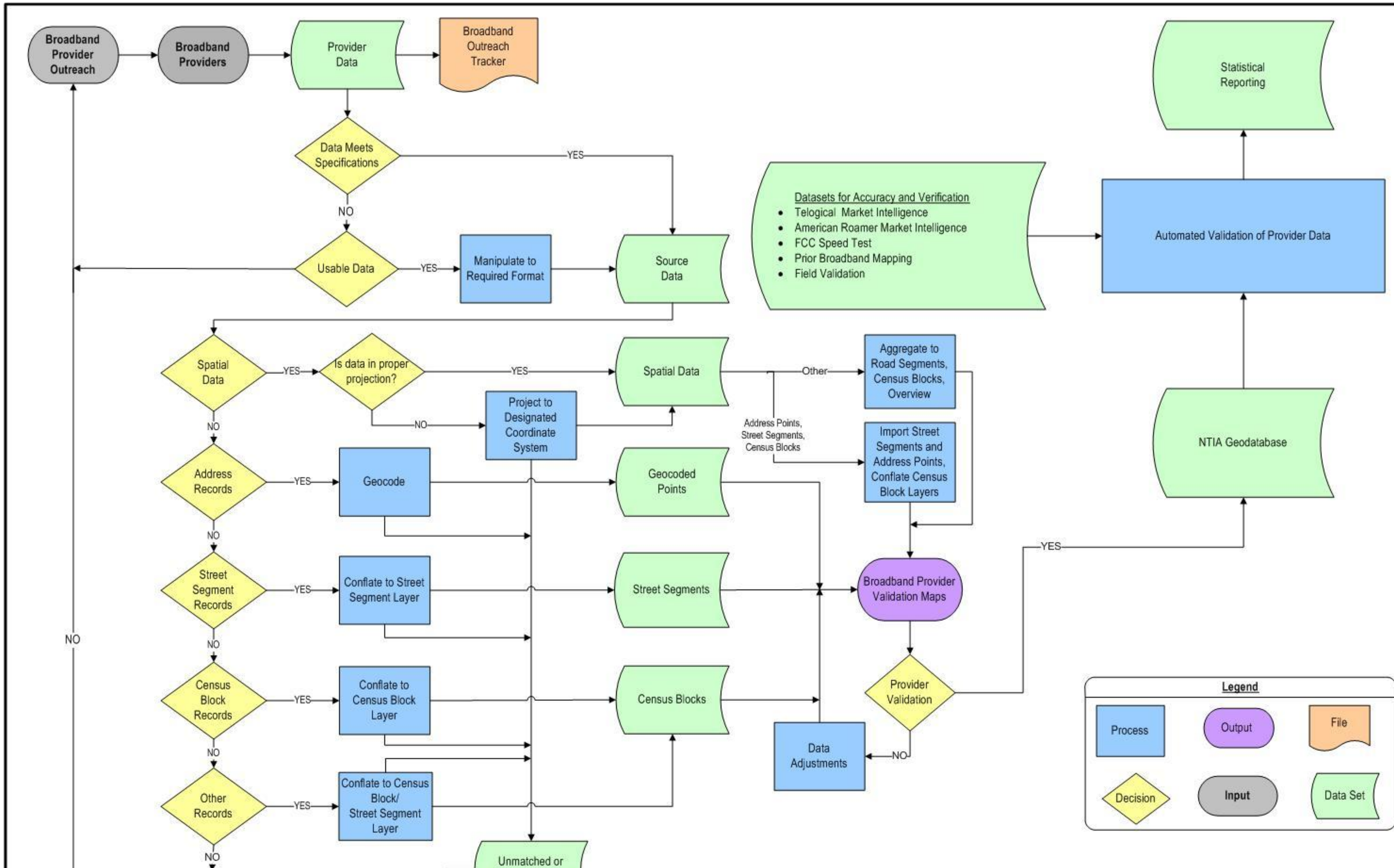
The matched percentage for the records for each provider are summarized and then divided by the total count of the records to create the final matched percentage for the specific provider. These percentages are included in DataPackage.xls on the Provider Table tab in the Comments column.

Low Confidence Provider Feedback

Provider data which is assigned a low confidence (1 or 2 stars) through the SEAS process is communicated back to the provider through a feedback loop. Generally, the low confidence feedback and reconciliation is a continuous refinement process and usually occurs between update cycles. The goal is to provide this feedback through the Provider Update Portal via a web connection that will be available and rolled out to provider in early 2012.

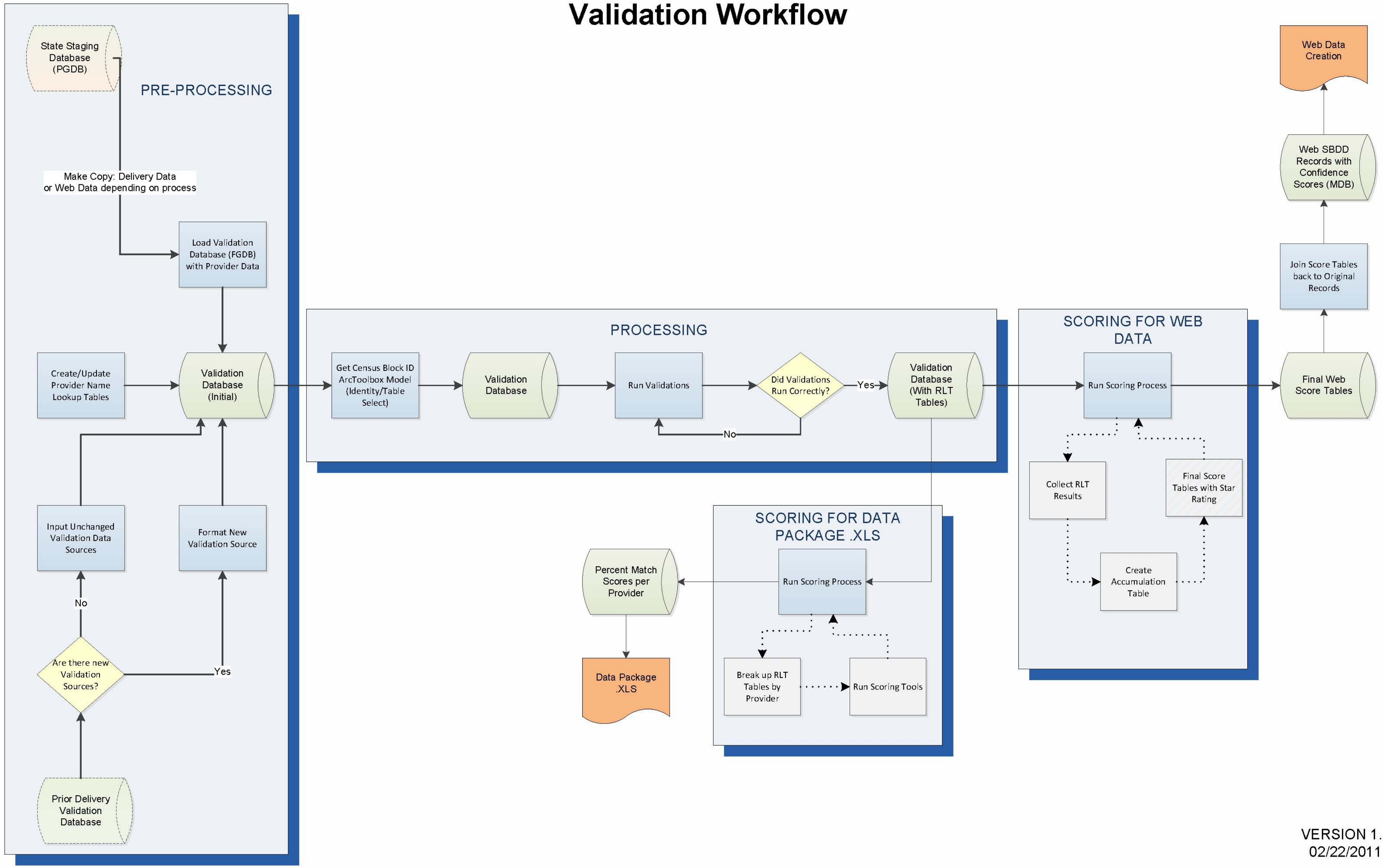
Changes and Corrections Documentation

With each semi-annual NTIA data submittal, changes and corrections documentation is provided. Significant changes in a provider's status or data, corrections to previously supplied data, providers supplying data for the first time, etc. are specified by Provider name in the Changes and Corrections document.



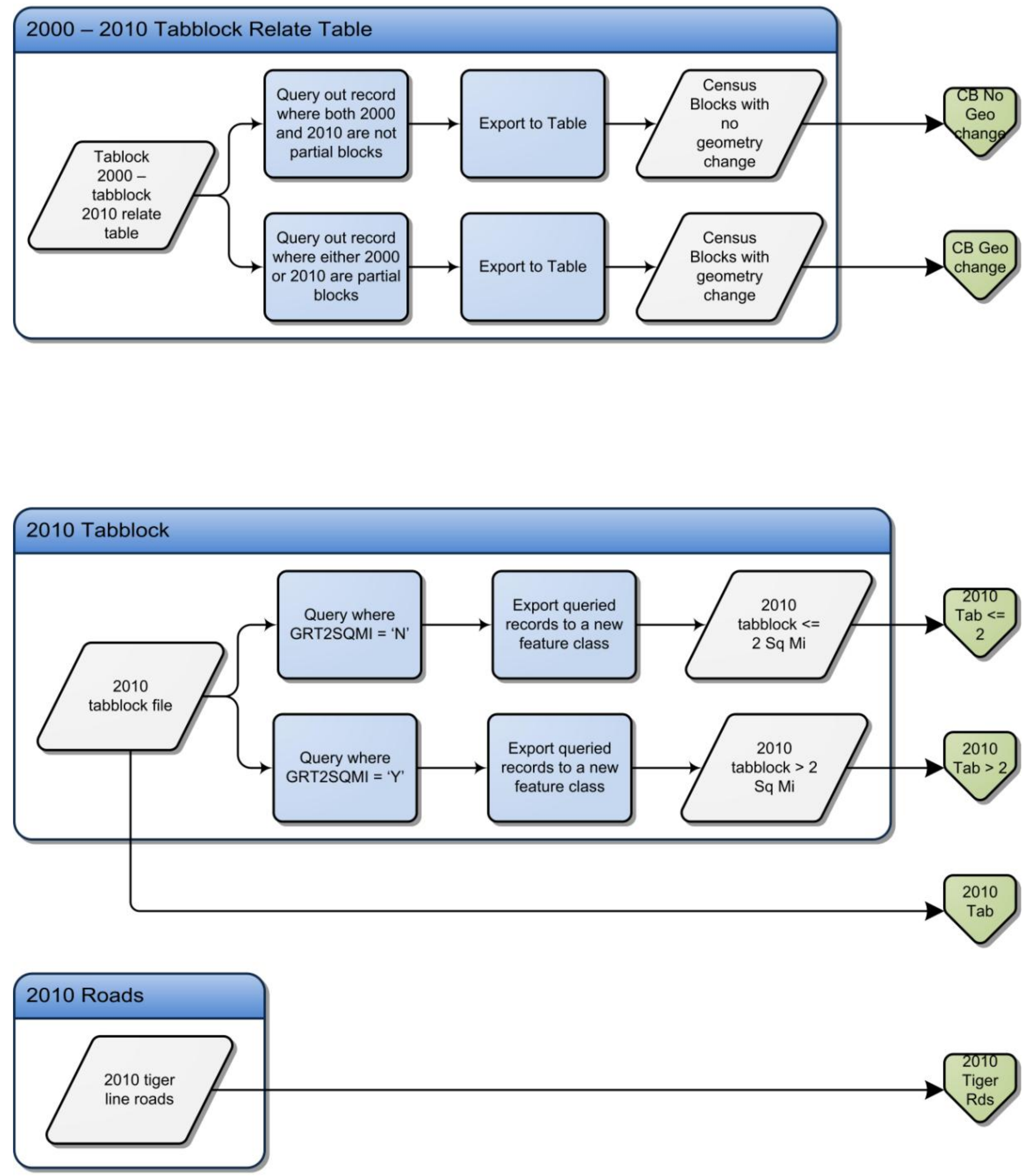
Appendix A: Commonwealth of Pennsylvania SBI Process Workflow

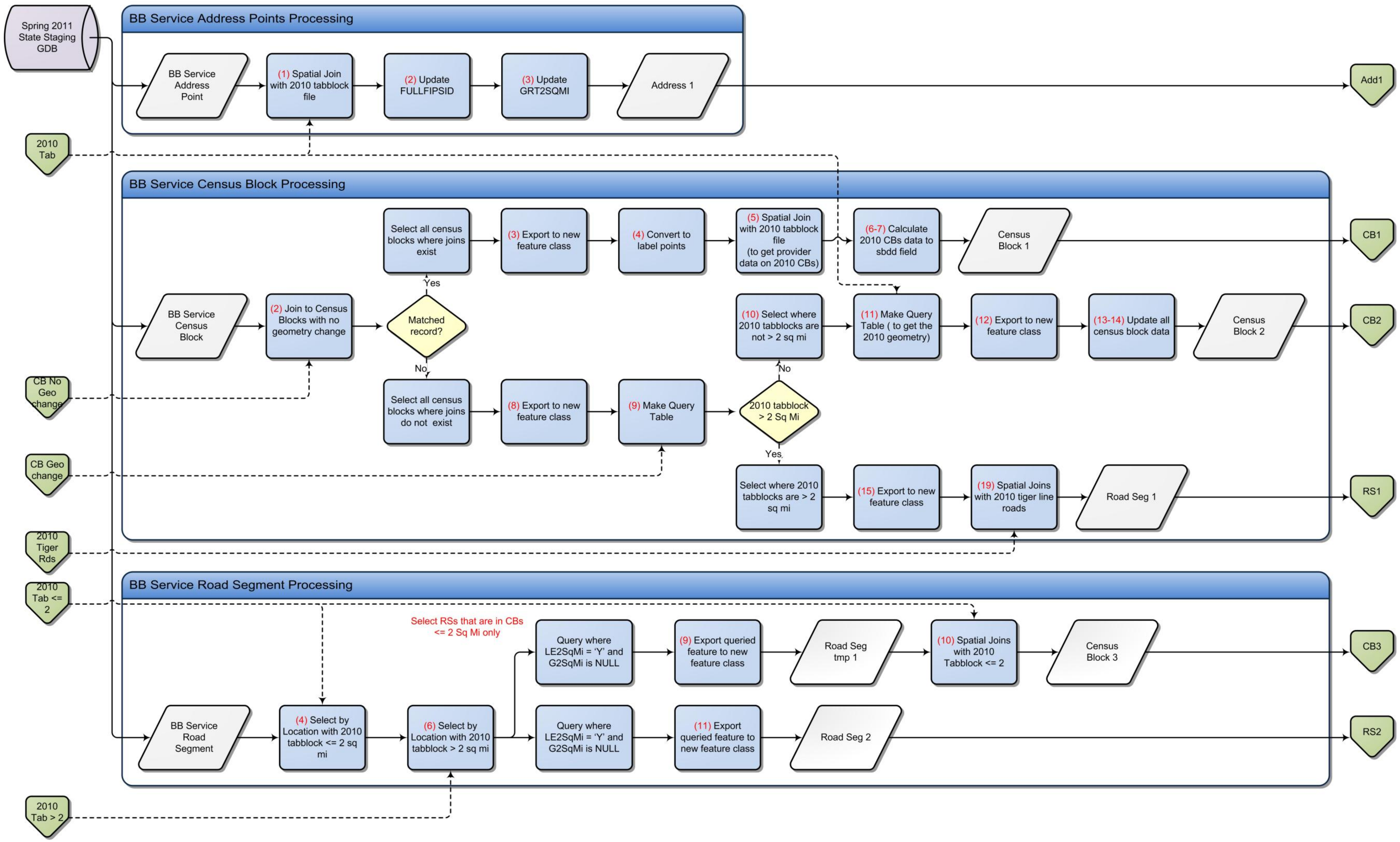
Appendix B: State Broadband Data Validation Workflow

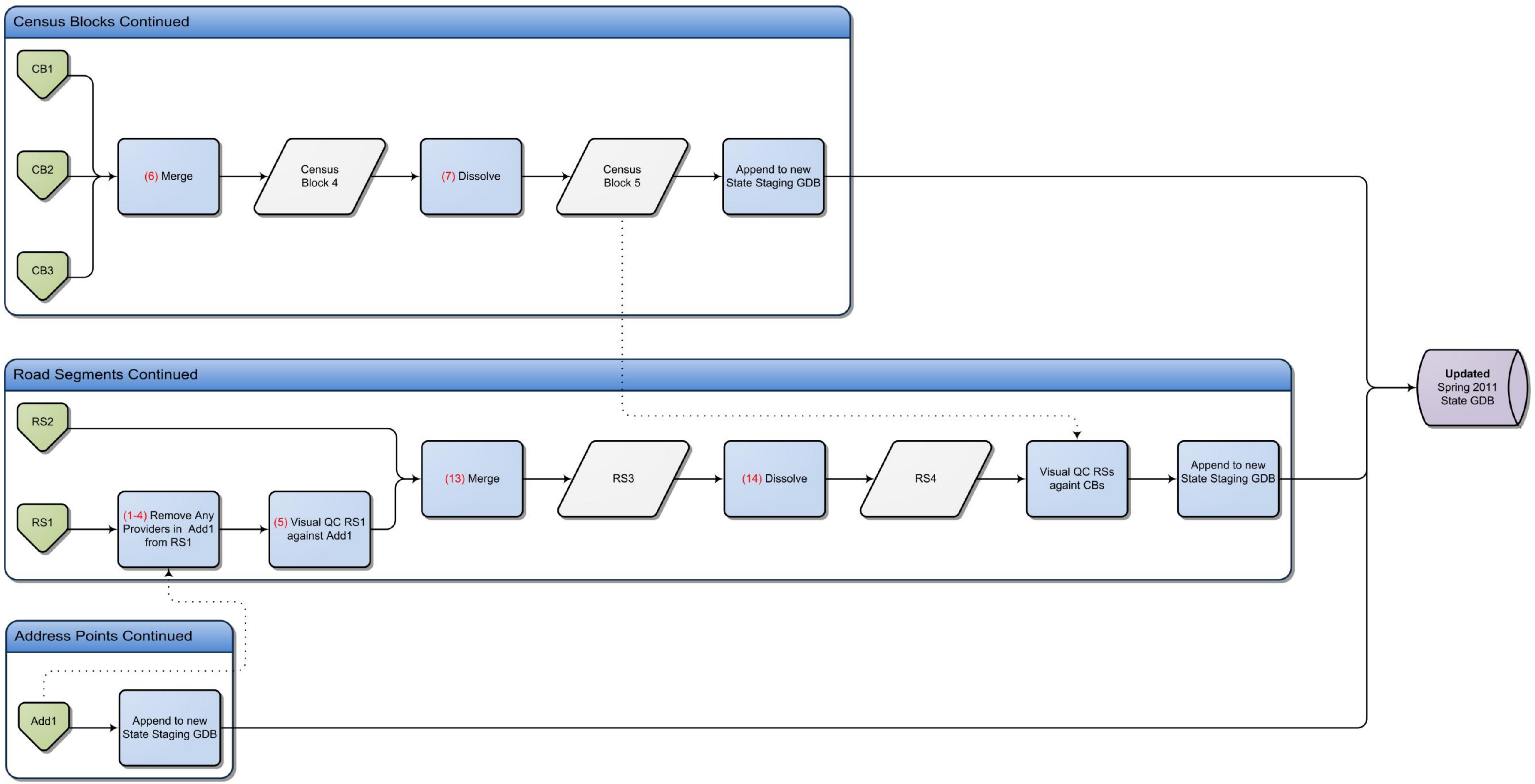


VERSION 1.1
02/22/2011

Appendix C: 2000 to 2010 Census Data Translation Workflow




Spring 2011 State Staging GDB
BB Service Address Points Processing
BB Service Address Point
(1) Spatial Join with 2010 tabblock file
(2) Update FULLFIPSID
(3) Update GRT2SQMI
Address 1
Add1
2010 Tab
BB Service Census Block Processing
Select all census blocks where joins exist
(3) Export to new feature class
(4) Convert to label points
(5) Spatial Join with 2010 tabblock file (to get provider data on 2010 CBs)
(6-7) Calculate 2010 CBs data to sbdd field
Census Block 1
CB1
Yes
BB Service Census Block
(2) Join to Census Blocks with no geometry change
Matched record?
(10) Select where 2010 tabblocks are not > 2 sq mi
(11) Make Query Table (to get the 2010 geometry)
(12) Export to new feature class
(13-14) Update all census block data
Census Block 2
CB2
No
No
CB No Geo change
Select all census blocks where joins do not exist
(8) Export to new feature class
(9) Make Query Table
2010 tabblock > 2 Sq Mi
Yes
CB Geo change
Select where 2010 tabblocks are > 2 sq mi
(15) Export to new feature class
(19) Spatial Joins with 2010 tiger line roads
Road Seg 1
RS1
2010 Tiger Rds
2010 Tab <= 2
BB Service Road Segment Processing
Select RSs that are in CBs <= 2 Sq Mi only
Query where LE2SqMi = 'Y' and G2SqMi is NULL
(9) Export queried feature to new feature class
Road Seg tmp 1
(10) Spatial Joins with 2010 Tabblock <= 2
Census Block 3
CB3
BB Service Road Segment
(4) Select by Location with 2010 tabblock <= 2 sq mi
(6) Select by Location with 2010 tabblock > 2 sq mi
Query where LE2SqMi = 'Y' and G2SqMi is NULL
(11) Export queried feature to new feature class
Road Seg 2
RS2
2010 Tab > 2


Census Blocks Continued
CB1
CB2
CB3
(6) Merge
Census Block 4
(7) Dissolve
Census Block 5
Append to new State Staging GDB
Road Segments Continued
RS2
RS1
(1-4) Remove Any Providers in Add1 from RS1
(5) Visual QC RS1 against Add1
(13) Merge
RS3
(14) Dissolve
RS4
Visual QC RSs againt CBs
Append to new State Staging GDB
Address Points Continued
Add1
Append to new State Staging GDB
Updated Spring 2011 State GDB

OFFICIAL OCTOBER 2011 UPDATE SUBMISSION TO THE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION UNDER THE STATE BROADBAND INITIATIVE GRANT PROGRAM FOR THE COMMONWEALTH OF PUERTO RICO

CONNECT
PUERTO RICO®

October 1, 2011

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PUERTO RICO COVER LETTER

October 1, 2011

Ms. Anne W. Neville
SBI Grant Program Director
National Telecommunications and Information Administration
U.S. Department of Commerce
1401 Constitution Avenue, NW Room 4716
Washington, DC 20230

Dear Ms. Neville:

Connected Nation is pleased to present this submission on behalf of the Designated Entity, the Puerto Rico Office of the Chief Information Officer, and the Commonwealth of Puerto Rico's State Broadband Initiative (SBI) Grant Program, known as Connect Puerto Rico.

These artifacts should be found to be compliant with the October 1, 2011, deadline for the semi-annual data update and in accordance with the terms of the July 1, 2009, Notice of Funds Availability (NOFA) and all subsequent clarifications pertaining to delivery of Territory-Level Mapping of Broadband Service Availability. This packet includes:

Inventory of Deliverables, Connect Puerto Rico: October 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing
Appendix A: 4	n/a	Community Anchor Institutions-Narratives

VII.A.1(a)	n/a	Accuracy and Verification Report
n/a	DataPackage.xlsx	Worksheets of Contact Information, Record Count, and Provider Summary Table
n/a	n/a	List of Changes and Corrections to the Dataset
n/a	n/a	Non-Participating Provider Narratives
n/a	n/a	Broadband Provider Roster and Participation Status

In addition, this data update submission should be found to be compliant with the additional program requirements instituted by the National Telecommunications and Information Administration since the time of the April 2011 SBI data submission for the Connect Puerto Rico program. Specifically, these new requirements are:

SBI Data Transfer Model
The submission of the broadband dataset for October 1, 2011, is contained within the SBI Data Transfer Model as released on the Grantee Workspace on June 30, 2011. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information on each provider as possible.

Additional Submission Guidance
This submission also includes a list of changes and corrections made to the dataset between the April 2011 submission and the October 2011 submission. This represents a summary of why data displays and/or supplied speeds, etc. are different from the previous submission. Changes can include upgrades to infrastructure to allow for higher throughput speeds for customers, an expansion of the service area (e.g. additional fixed wireless towers, recently activated DSLAMs, etc.), or a new provider in the marketplace. Corrections can include revisions to speed tier information that was previously reported incorrectly or the addition of a previously existing provider that has not yet been submitted in a semi-annual dataset.

This October 2011 semi-annual data update under the State Broadband Initiative Grant Program continues to demonstrate our dedication to implementing the joint purposes of the Recovery Act and the Broadband Data Improvement Act (BDIA) by gathering comprehensive and accurate state-level broadband mapping data, developing state-level broadband maps, aiding in the development and maintenance of the National Broadband Map, and undertaking statewide initiatives for broadband planning.

Broadband Service Availability — Provider Outreach and Verification

This data update submission under the SBI program includes datasets for approximately 88.89 percent of the Puerto Rico provider community, or 16 of 18 total providers. There are 15 participating providers and 1 additional non-participating provider whose estimated coverage areas have been submitted. Of the 15 participating providers, 9 supplied an update to their network or coverage area(s), while 6 have reported no change. A complete roster by provider depicting participation status and contact record is contained herein. The 2 providers that are not represented in the attached datasets were non-responsive to multiple contact attempts.

As the aforementioned roster and attached methodology documentation will attest, it is the collective opinion of the Connect Puerto Rico principals that all commercially reasonable efforts were made to account for 100 percent of the known Puerto Rico broadband provider community, pursuant to this semi-annual data update submission.

Connect Puerto Rico has also continued to perform broadband verification activities through several means. In addition to confirmation of service area(s) by each provider, Connect Puerto Rico conducts field validation efforts. To date, 12 (66.67 percent) providers have been validated through field verification activities. Additional details on verification activities are contained within the Field Validation Methodology.

The Connect Puerto Rico website, www.connectpr.org, continues to serve a prominent role in the outreach and data collection effort. This program asset provides a way for the general public to participate in the process by offering interactive tools for users to test their connection speed, submit broadband inquiries, or contact a program representative.

As an indicator of stakeholder penetration, the Connect Puerto Rico website encountered 5,419 unique visits during this reporting period, which includes 1,289 visits to the English website and 4,130 visits to the Spanish website (9,078 total to date for the life of the grant awarded on December 20, 2009, which includes 3,984 to the English website and 5,094 to the Spanish website). Additionally, this pronounced Web activity netted 38 broadband inquiries over this same reporting period (62 grant inception to date). The website also provides the BroadbandStat application, which allows the consumer to confirm or dispute the coverage represented on the broadband inventory map. These consumer-initiated actions are facilitated through the Connect Puerto Rico website and the Connect Puerto Rico interactive mapping tool (BroadbandStat) that offer the citizens the vehicles to provide information regarding availability in their respective service area, either in affirmation or contest of the reported data represented in the Connect Puerto Rico mapping artifacts. Since the initial data collection and release of corresponding maps, feedback in the form of broadband inquiries has allowed Connected Nation to identify additional areas that are in need of field validation, which is scheduled as soon as possible.

Community Anchor Institutions

Connect Puerto Rico has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBI NOFA Technical Appendix.

In conjunction with the Puerto Rico Office of the Chief Information Officer, outreach was conducted during this data update reporting period by Connect Puerto Rico to continue identification of existing, centralized sources for CAI connectivity data. Additionally, a CAI survey continues to be made available for all institutions on the Connect Puerto Rico website. During this reporting period Connect Puerto Rico has continued developing relationships with territory-wide associations to promote the importance of broadband connectivity at anchor institutions and participation in this data collection process. Connect Puerto Rico will continue to build upon these relationships over the coming months and utilize its contacts throughout the territory to collect data and raise awareness of this project.

Connect Puerto Rico is beginning to coordinate our outreach through the newly formed Puerto Rico Broadband Task Force and through the distribution of press releases to local island newspapers. From our work in Puerto Rico, as well as other states, we recognize the great value of this data to future collaboration efforts within the commonwealth as well as its value to the National Broadband Map. We plan to continue to bring best practices to the Connect Puerto Rico efforts, along with an investment of both human and technical resources required to reach our goal of increasing the data that is secured and reported as part of this process.#

The Connect Puerto Rico program exists to improve data on the deployment and adoption of broadband services and to assist in the extension of broadband technology across all regions of the Commonwealth of Puerto Rico, as well as the United States through contribution to the National Broadband Map. We look forward to the continuing work ahead.

Respectfully submitted,

Thomas W. Ferree
Chief Operating Officer
Connected Nation, Inc.

cc: Juan Eugenio Rodriguez de Hostos, CIO
Government of Puerto Rico

DATA ACQUISITION: PUERTO RICO COMMUNITY ANCHOR INSTITUTIONS METHODOLOGY

In this fourth reporting period of the SBI, Connect Puerto Rico, working in close coordination with the Puerto Rico Office of the Chief Information Officer (OCIO), has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBI NOFA Technical Appendix. During this reporting period Connect Puerto Rico has continued to focus efforts on conducting outreach and raising awareness of this important project.

Connect Puerto Rico has continued to identify and process CAI data obtained through an ongoing territory-wide outreach campaign. Physical address information continues to be augmented through manual sourcing and geocoded by Connect Puerto Rico.

Connect Puerto Rico continues to utilize a customized online survey hosted through SurveyMonkey in both Spanish and English, with a landing page on the Connect Puerto Rico website that was developed during the first reporting period. This survey, in combination with a customized data-gathering spreadsheet, was distributed to a targeted list of CAI throughout the island. Connect Puerto Rico will continue to use these data-gathering tools for future targeted outreach efforts throughout the coming months leading up to the next reporting period. These materials are customized to fit the CAI categories as defined in the SBDD NOFA.

The survey can be accessed at this link in both English and Spanish:
http://connectpr.org/mapa/recopilacion_de_datos__de_instituciones_comunitarias_ancla.php

During this reporting period Connect Puerto Rico conducted research, specifically within the education sector, to identify existing, centralized sources for CAI connectivity data. Connect Puerto Rico made contact with numerous contacts across the island across all CAI sectors but was unable to locate any additional centralized sources for CAI data.

In tandem with these efforts to identify existing data, Connect Puerto Rico continues to identify key CAI contacts in an effort to distribute and promote the online survey and raise awareness of the importance of CAI broadband connectivity. Connect Puerto Rico is establishing relationships with key CAI associations that are participating in the Puerto Rico Broadband Task Force and will continue to utilize the contacts of these associations leading up to the April 2012 submission period. As part of this outreach Connect Puerto Rico is specifically working with key healthcare contacts on the island to distribute a customized joint survey that will target healthcare facilities. This survey will be released within the coming months, and data will be reported for the April 2012 submission.

Connect Puerto Rico has an ongoing mission to educate CAI throughout the territory on the importance of participating in the project. Participation by these institutions will raise awareness about the importance of broadband connectivity and the need to report the requested data for inclusion on the National Broadband Map. Connect Puerto Rico will continue to build off the relationships that are already being developed through the work of the Puerto Rico Broadband Task

Force and work with the OCIO to release a targeted CAI newsletter to assist with outreach during the Q42011. Additionally Connect Puerto Rico and the OCIO have made plans to target outreach to small island newspapers with a CAI press release that would promote the value of providing CAI data for this project.

The greatest challenge with collecting this data continues to be the difficulty in securing CAI broadband connectivity data. Connect Puerto Rico is overcoming this challenge through new relationships that are being formed and our work with the OCIO and the Puerto Rico Broadband Task Force. Connect Puerto Rico expects noted progress to occur over the coming months leading up to the April 2012 submission.

A CAI summary of all processed and submitted data is provided below:

CAI Type	Total	Physical Address	Lat/Long	Technology of Transmission	Download Speed	Upload Speed
K-12	1,992	1,992	1,687	1,501	1	1
Libraries	154	154	153	3	2	2
Healthcare	621	620	139	0	0	0
Public Safety	279	278	277	21	11	11
Higher Ed Institutions	549	549	88	21	16	16
Other Government	6	6	1	0	0	0
Other Non-Government	1,508	1,448	979	8	5	5
Total	**5,109**	**5,047**	**3,324**	**1,554**	**35**	**35**

SBI Data Submission Methodology

The submission of the broadband dataset for October 1, 2011, is contained within the SBI Data Transfer Model and additional components as released on the Grantee Workspace on June 30, 2011. Connected Nation has reviewed all literature that relates to the release and use of this data transfer model and recognizes that it does not replace or dictate how data is stored, processed, or displayed for the territory, as it is meant primarily as a means to transfer the broadband data from all states and territories and populate the National Broadband Map in a seamless fashion. Guidance from the Technical Mapping Guide, as released on the Grantee Workspace on March 24, 2011, was also followed to ensure the completeness and validity of the submission through completion steps and checklists, completing the DataPackage spreadsheet, uploading broadband datasets into the Data Transfer Model, and checking the dataset using the SBDD_CheckSubmission receipt process.

As part of the ongoing review and analysis process, NTIA has requested further information in the submission of the DataPackage spreadsheet. In addition to the information on providers whose coverage and accompanying attributes are submitted in the SBI Data Transfer Model, information on other providers that are considered to be non-viable is also included in the DataPackage. Providers deemed non-viable that have been excluded from continued outreach may have been eliminated for reasons such as (i) the company offers Internet service but at speeds below the current definition of broadband; (ii) the company was listed in advertisements as a broadband provider, but is actually a network solution or consulting firm, etc.; (iii) the company may build or install network infrastructure, but does not actually provide the broadband service to consumers; and (iv) the company has gone out of business. The submitted DataPackage includes any relevant information that has been obtained through the course of due diligence and/or direct provider outreach, such as a Federal Registration Number (if applicable), the company's URL, the existence of an executed Nondisclosure Agreement, and brief notations regarding the status of the company.

In addition to the methodologies contained herein, as well as the DataPackage.xls containing contact information, the data dictionary, and a provider summary table, the following feature classes are submitted within the SBI Data Transfer Model for the Commonwealth of Puerto Rico.

Inventory of Deliverables, Connect Puerto Rico: October 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area.
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles.
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address.
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points.
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing.

The provider data collected by Connected Nation on behalf of the Commonwealth of Puerto Rico have been formatted per the given specifications and uploaded into the appropriate feature classes of the SBI Data Transfer Model. Wireline availability is contained within census blocks and road segments, wireless availability is contained as polygons of coverage areas, and middle-mile connections and community anchor institutions are contained as point data. All speed data is contained at the census block, road segment, or wireless polygon level of availability. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information as possible.

Connected Nation has continued outreach to satellite providers on their availability, technology, and speed information, but granular coverage is not yet available. Submitted within the wireless feature class are the satellite companies providing service to Puerto Rico as a polygon of the territory boundary. Efforts will continue to collect, process, or otherwise create more granular satellite data based on availability analyses and guidance received from NTIA.

Provider Changes and Corrections for October 2011

As requested by the SBI Program Office, a listing of the changes and/or corrections to the datasets between the April 2011 and October 2011 submissions is included in this narrative. This information is presented in this section as well as in the Broadband Provider Log. Changes to the data include expansion of service area(s), activation of new wireless towers, and upgrades to the network to provide higher download speeds to consumers. Corrections to the dataset include the addition of previously existing providers whose coverage has never been submitted, revision of coverage or speed information that was incorrect, and any other items that were misrepresented in the April 2011 dataset.

Corrections

- Ayustar Corporation (fixed wireless): No prior participation. Provider supplied data for October 2011 submission.
- Critical Hub Networks (fixed wireless): No prior participation. Provider supplied data for October 2011 submission.
- Hughes Network Systems, LLC (satellite): Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire territory boundary, work continues on having more granular data available.
- Liberty Global, Inc. (cable): Provider supplied corrections to previous dataset.
- Puerto Rico Cable Acquisition Company, Inc. (cable): Did not provide approval for April 2011 submission or October 2011 submission but will be included in the October 2011 submission.
- Puerto Rico Telephone Company Inc. (mobile wireless): Provider has not participated in past submissions but made data available for the October 2011 submission.

Changes and/or Corrections – Entirely New Dataset Submitted

- AT&T Mobility LLC (mobile wireless)
- Puerto Rico Telephone Company Inc. (DSL)
- Sprint Nextel Corporation (mobile wireless)
- T-Mobile USA, Inc. (mobile wireless)

PUERTO RICO FIELD VALIDATION METHODOLOGY

Connected Nation focused a portion of its time on specific validation processes such as:

- conducting random spectrum analysis studies throughout the territory using an Avcom PSA-37-XP spectrum analyzer;
- conducting mobile speed tests throughout the territory using an iPhone, Android (or other smart phone) as well as provider-specific aircards (Sprint 3G/4G, Clearwire et al);
- identifying pre-selected, provider-submitted wireless transmit tower sites and cross-referencing data about that tower against the Federal Communications Commission (FCC) databases such as Antenna Structure Registration and/or the Universal Licensing System;
- cross-referencing Federal Registration Number data against available FCC Form 477 data as well as the FCC **CO**mmission **RE**gistration **S**ystem (CORES);
- validating provider submitted data (for example: latitude/longitude) using a handheld Garmin eTrex Summit GPS unit or GPS enabled software such as Microsoft Streets and Trips;
- locating physical wire-line attributes (such as Remote terminals, CATV plant, etc.) and comparing them against provider submitted data; and
- conducting on-net and off-net speed tests using the FCC portal at http://www.broadband.gov/qualitytest/about/ or using the Ookla Net Metrics enabled speed test utility located on each of Connected Nation's state-specific websites.

Additionally, Connected Nation cross-referenced numerous public documents in order to ensure that all known broadband providers were located and contacted. This included searching membership logs from the trade associations (WISPA, WCAI, PCIA, etc.), the Cable Television Fact Book, Public Utility Commission records, Public Service Commission records, Chamber of Commerce, etc.

To date, Connected Nation's staff conducted on-site validation tests in Puerto Rico on the following providers: Areonet Wireless; AT&T, Inc.; Choice Communications; Critical Hub Networks; Data@ccess; Liberty Cablevision of Puerto Rico Ltd.; Neptuno Media; OneLink; Puerto Rico Telephone Company; Sprint Nextel Corporation; T-Mobile; and Worldnet.

From program initiation through this reporting period, Connected Nation has completed in-the-field validation testing against 12 companies (out of a universe of 18 viable providers) totaling 66.67 percent within the Commonwealth of Puerto Rico.

Connected Nation has also continued to review provider datasets for accurate speed information, platform listings, and other intricacies that may fall outside of the standard SBI Data Transfer Model parameters. Any providers whose submitted coverage and attributes are anticipated to come into question have been further reviewed and confirmed; details on a case-by-case basis are presented below.

Choice Cable
Issue: Technology of transmission 40 with a maximum advertised download speed in tier 7, lower than expected value range for the technology.
Resolution: Provider representative confirmed that DOCSIS 3.0 is in use throughout their service area, including at the 12 Mbps download speed offering.

DATA SUBMISSION AND COVERAGE ESTIMATION OF NON-PARTICIPATING PROVIDER

San Juan Cable, LLC (d.b.a. OneLink)

As part of its ongoing broadband mapping efforts, Connected Nation has developed a series of processes with the goal of submitting mapping data to NTIA for every known and qualifying broadband provider, regardless of whether the provider has chosen to support and participate in the SBDD mapping initiative.

The following narrative will discuss the recent data collection activities related to San Juan Cable, LLC (d.b.a. OneLink), a cable television and cable modem provider in the San Juan, Puerto Rico area, explaining how and where CN obtained publicly available data and the "on-the-ground" validation techniques that support the underlying data.

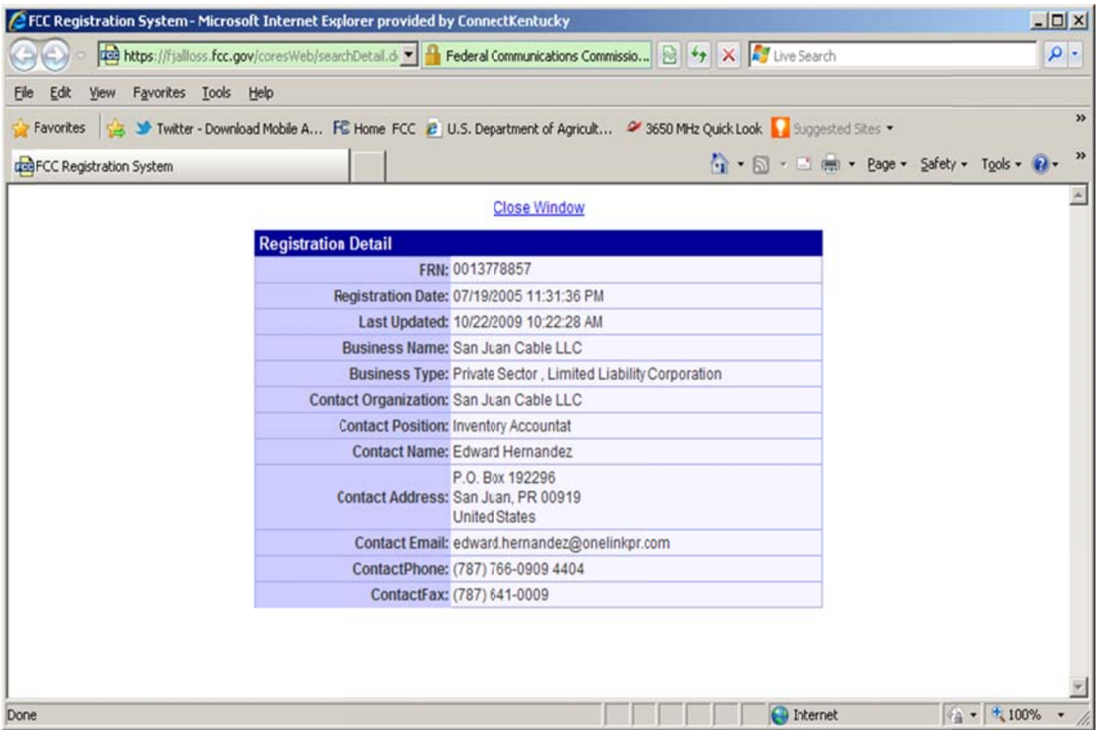
Background
CN staff members attended meetings in Puerto Rico from September 21-25, 2009, for a series of one-on-one provider meetings, which had been scheduled by Maria Pou, Special Assistant to the OCIO, to discuss the SBDD grant program. OneLink was scheduled to attend a meeting on September 24 at 10:00 a.m.; however, no one from the company arrived (nor did they notify Maria of their intent to cancel). Outreach efforts conducted from September 2009 through July 2011 has failed to motivate OneLink into either responding or participating in the mapping initiative.

The Issue
OneLink, by its lack of actions, indicated its unwillingness to participate in the island-wide mapping initiative. This surfaced as a problem during the first two stages of mapping; the lack of data for this provider will continue to threaten to skew future research and planning activities under the direction of the OCIO.

Identification of Provider's Legal Name, d.b.a., and FRN
CN began building a file based on anecdotal information and, as time progressed, enriched the file with information obtained through the public domain. For example, CN received information from the Junta Reglamentadora de Telecomunicaciones de Puerto Rico ("JRT") indicating that territory once operated by Adelphia was the same territory now operated by OneLink. A search for a Federal Registration Number ("FRN") on the FCC **CO**mmission **RE**gistration **S**ystem ("CORES") system did not yield results. It was later discovered that the entity of record with the JRT was, in fact, San

Juan Cable, LLC. A new search on the FCC CORES site yielded an FRN of 0013778857 **(Exhibit A)** and additional contact data. This was later confirmed when NTIA provided CN with a submission summary comparison against FCC Form 477 filers **(Exhibit B)**.

Exhibit A: FRN

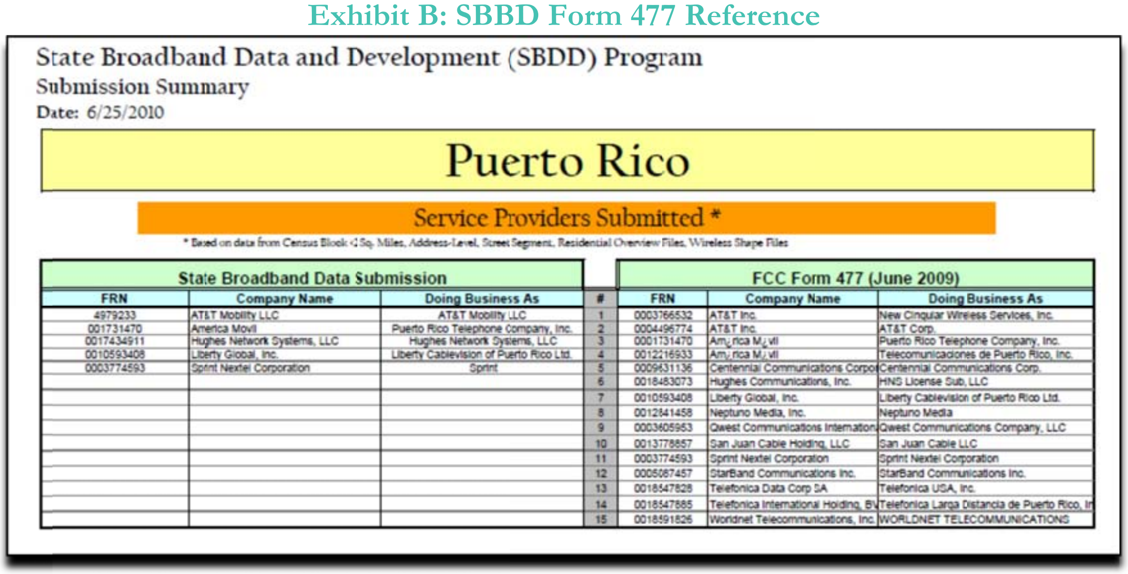


FCC Registration System - Microsoft Internet Explorer provided by ConnectKentucky

Close Window

Registration Detail	
FRN:	0013778857
Registration Date:	07/19/2005 11:31:36 PM
Last Updated:	10/22/2009 10:22:28 AM
Business Name:	San Juan Cable LLC
Business Type:	Private Sector , Limited Liability Corporation
Contact Organization:	San Juan Cable LLC
Contact Position:	Inventory Accountat
Contact Name:	Edward Hernandez
Contact Address:	P.O. Box 192296 San Juan, PR 00919 United States
Contact Email:	edward.hernandez@onelinkpr.com
ContactPhone:	(787) 766-0909 4404
ContactFax:	(787) 641-0009

Exhibit B: SBBD Form 477 Reference



State Broadband Data and Development (SBDD) Program
Submission Summary
Date: 6/25/2010

Puerto Rico

Service Providers Submitted *

* Based on data from Census Block <2 Sq. Miles, Address-Level, Street Segment, Residential Overview Files, Wireless Shape Files

State Broadband Data Submission				FCC Form 477 (June 2009)		
FRN	Company Name	Doing Business As	#	FRN	Company Name	Doing Business As
4979233	AT&T Mobility LLC	AT&T Mobility LLC	1	0003766532	AT&T Inc.	New Cingular Wireless Services, Inc.
001731470	America Movil	Puerto Rico Telephone Company, Inc.	2	0004496774	AT&T Inc.	AT&T Corp.
0017434911	Hughes Network Systems, LLC	Hughes Network Systems, LLC	3	0001731470	Am¿rica M¿vil	Puerto Rico Telephone Company, Inc.
0010593408	Liberty Global, Inc.	Liberty Cablevision of Puerto Rico Ltd.	4	0012216933	Am¿rica M¿vil	Telecomunicaciones de Puerto Rico, Inc.
0003774593	Sprint Nextel Corporation	Sprint	5	0009631136	Centennial Communications Corpo	Centennial Communications Corp.
			6	0018483073	Hughes Communications, Inc.	HNS License Sub, LLC
			7	0010593408	Liberty Global, Inc.	Liberty Cablevision of Puerto Rico Ltd.
			8	0012841458	Neptuno Media, Inc.	Neptuno Media
			9	0003605953	Qwest Communications Internation	Qwest Communications Company, LLC
			10	0013778857	San Juan Cable Holding, LLC	San Juan Cable LLC
			11	0003774593	Sprint Nextel Corporation	Sprint Nextel Corporation
			12	0005087457	StarBand Communications Inc.	StarBand Communications Inc.
			13	0018547828	Telefonica Data Corp SA	Telefonica USA, Inc.
			14	0018547885	Telefonica International Holding, BV	Telefonica Larga Distancia de Puerto Rico, In
			15	0018591826	Worldnet Telecommunications, Inc.	WORLDNET TELECOMMUNICATIONS

<u>Identification of Provider's Coverage Area</u>

Connected Nation extracted the municipio boundaries from OneLink's publicly available website **(Exhibit C)** and used the company's published boundaries to create a GIS shapefile **(Exhibit D)** of the greatest advertised extent of OneLink's service area.

Exhibit C: Municipal Boundaries

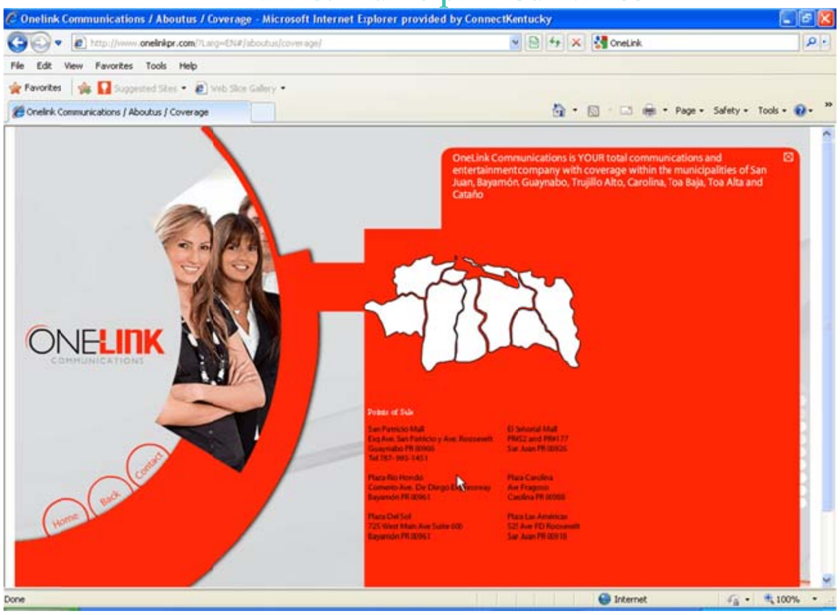
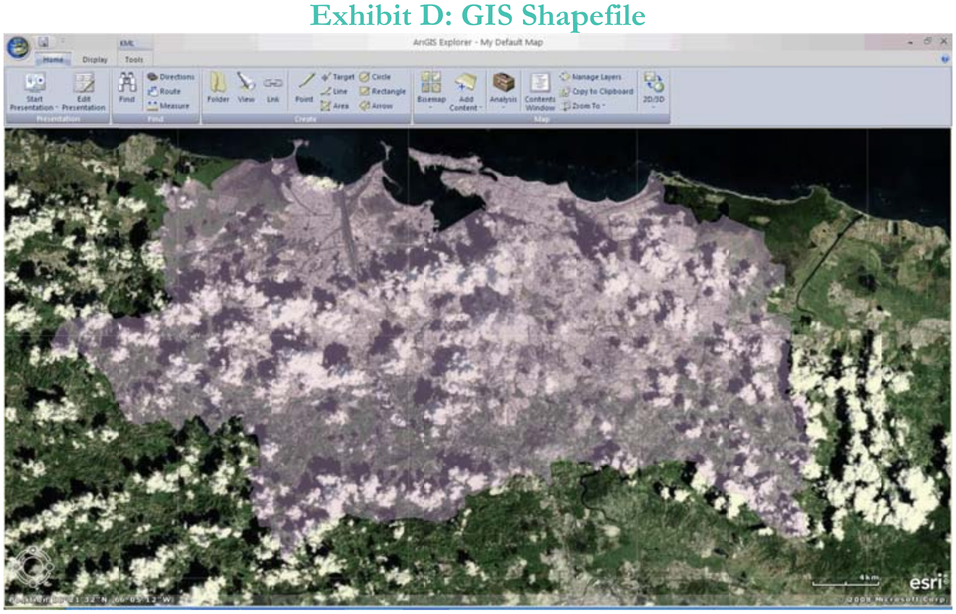
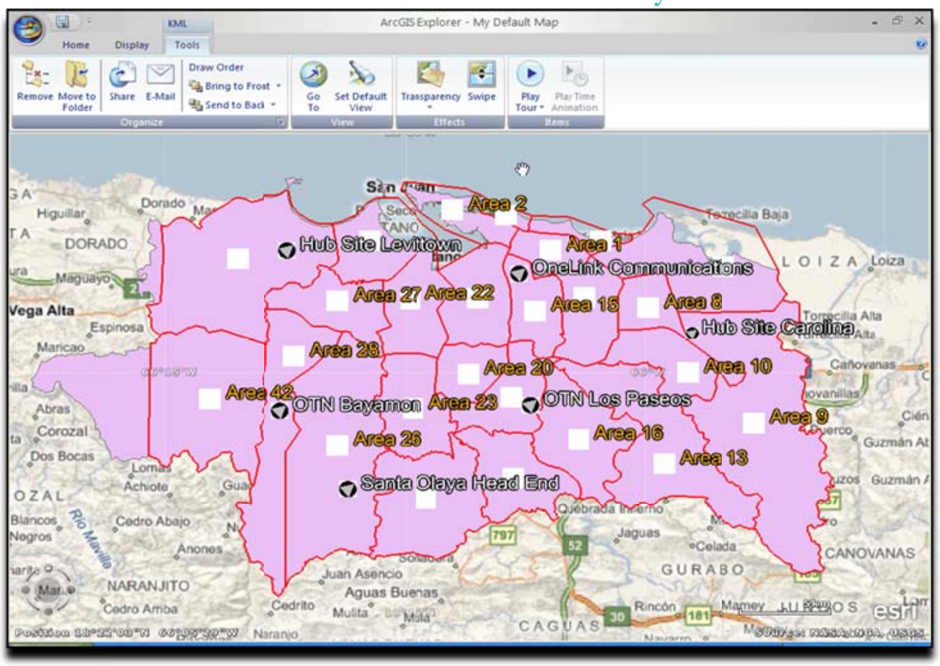


Exhibit D: GIS Shapefile



These polygons were then compared against *the only* data supplied by OneLink during the course of attempted communication **(Exhibit E)**. The purple-shaded area was the CN coverage polygon extracted from OneLink's website, and the red outlines illustrate the franchisee boundaries submitted by OneLink.

Exhibit E: OneLink Franchise Boundary Submission

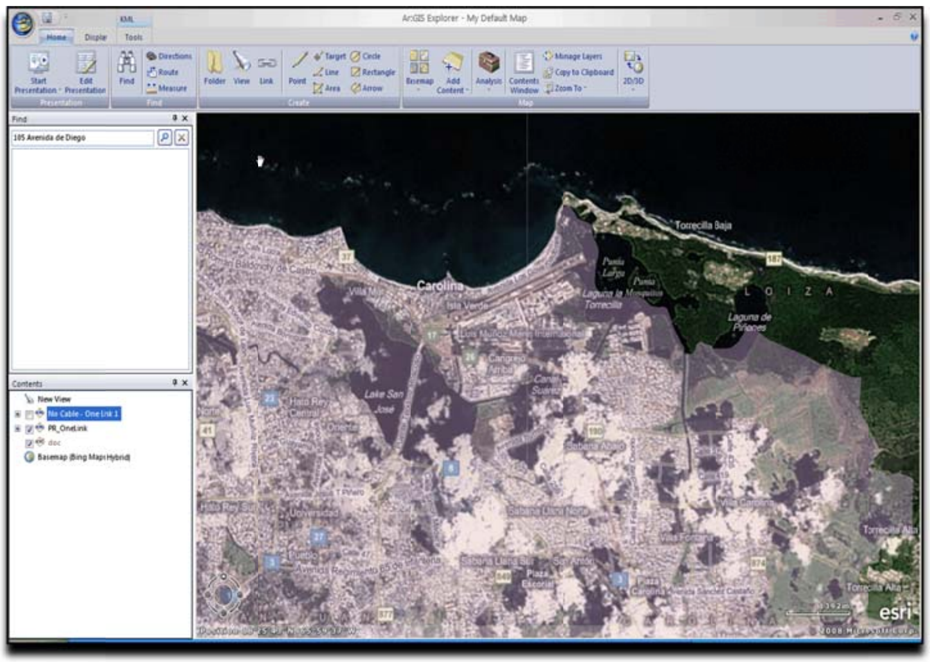


Using this combined coverage polygon as the basis for further investigation, Connected Nation set out on an exploratory "drive test" to determine where cable plant existed and estimate where cable modems likely existed in the greater San Juan area. During the period of February 7-11, 2011, Connected Nation deployed five staff members (all highly trained, former telecommunications operators) to conduct a thorough analysis of OneLink's alleged coverage area.

<u>Testing Techniques</u>

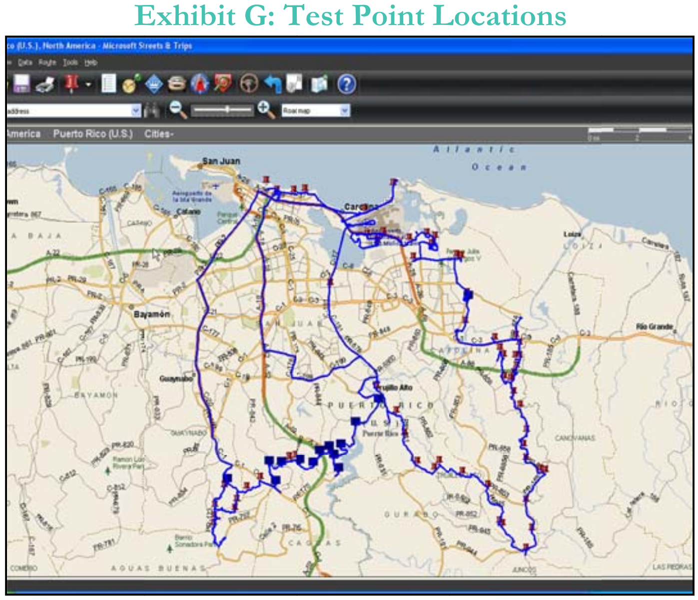
Specific quadrants **(Exhibit F)** were assigned to each of the validation teams on a daily basis. The goal was to drive through each of the areas and determine the existence (or lack thereof) of CATV plant – whether fiber or coaxial.

Exhibit F: Sample Quadrant



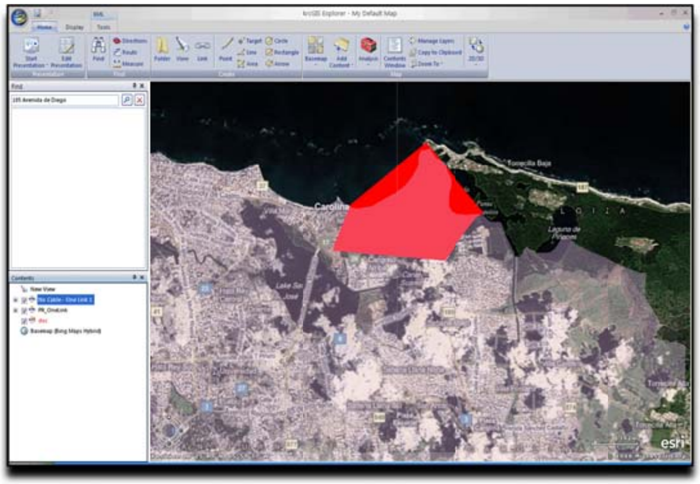
Test points were pre-selected and entered into Microsoft's *Streets & Trips* software **(Exhibit G)**, which also created a GPS-enabled "trace route" of each day's drive testing activities. As cable plant was identified, markers were placed within *Streets & Trips*, pinpointing the areas where service was likely to exist. Connected Nation staff members then proceeded to stop at points along the way and conducted random interviews with residents within the area querying the actual availability of cable modem service.

Exhibit G: Test Point Locations



Based on the lack of visible or traceable cable plant, polygons were created in ArcGIS Explorer to specify the population areas where the Connected Nation staff believed coverage gaps existed. The illustration below **(Exhibit H)** represents one such gap area identified during the drive test.

Exhibit H: Coverage Gap Polygon



Visual identification of physical CATV plant **(Exhibit I)** was relatively easy and straightforward. The Connected Nation team members, many of whom were former CATV operators, found very little difficulty in identifying aerial (above ground) CATV plant or in locating plant that traveled below the earth's surface (underground plant) based simply on looking for specific cable routes.

Exhibit I: OneLink Service Truck

The images below demonstrates that the Connected Nation team could, in fact, locate aerial plant **(Exhibit J)** and identify CATV plant moving from a pole to an area where underground vaults or above-ground pedestals **(Exhibit K)** were easily traced and identified.

Exhibit J: Aerial Plant

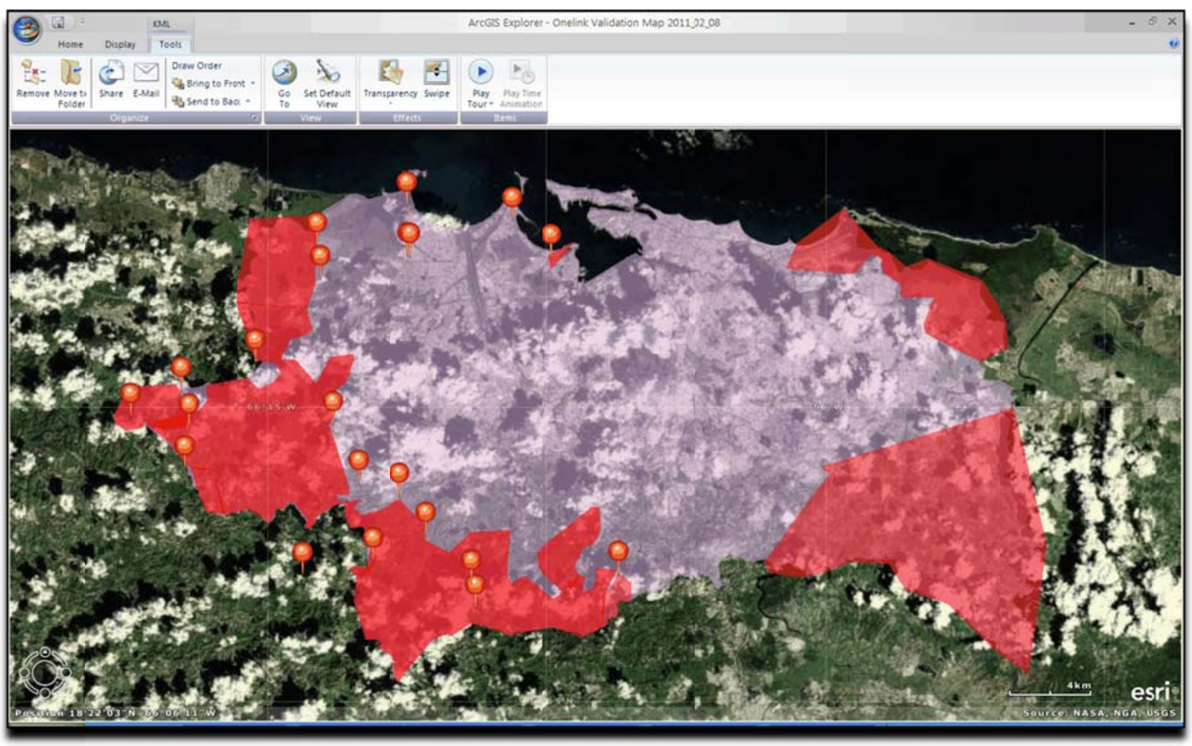
Exhibit K: Above Ground Pedestal

At the conclusion of this week-long exercise, Connected Nation had driven through several hundred miles of the OneLink franchise area, located above-ground and underground plant, visited with and surveyed numerous local residents, obtained collateral material from OneLink's local offices (to determine maximum advertised connection speeds), and created a polygon that illustrates the identified and likely coverage area of OneLink.

Results and Submission for October 2011

As a result of the collection of publicly available information and the on-the-ground validation efforts, Connected Nation is submitting on behalf of the Commonwealth of Puerto Rico, the cable modem broadband service area of OneLink. Without provider participation and support of the SBDD mapping initiative, CN has proceeded with developing a relevant and feasible methodology for collecting and validating the service area of a currently non-participating broadband provider. The image below **(Exhibit L)** shows the exact results of the validation efforts in terms of the revisions made to the advertised cable broadband availability in the San Juan area. Polygons in red demonstrate areas where the CN staff reasonably believes "gaps" exist in the franchise area. The remaining purple-shaded areas are included, along with full attributes, in the Puerto Rico broadband data submission for the October 1, 2011, deliverable to NTIA for the SBI grant program.

Exhibit L: Validation Results



Sample OneLink Cable Modem Collateral Material

Accuracy and Verification: Provider Validation Methodology

Broadband providers maintain their service area data in many different formats, all in varying levels of complexity and granularity. In order to ensure that the data required by the NTIA is standardized across all providers and that it is as accurate as possible, Connected Nation translates and formats the data that providers are able to supply into a GIS shapefile and produces maps for the provider to review. The resulting map(s) and review process allow for providers to see their service area in a geographic format – for some providers, this is the first time they have seen maps of their broadband service area. Having the mapped service area allows providers to quickly identify any issues that appear in the data representation, whether the issue is in the data translation into a GIS format or from the original data collection and submission. Often data is provided from various sources and through the review and revision process, local engineers who operate the networks and work in the field are able to ensure that the tabular data that has been submitted is accurate and represents the real-world network extent. Any issues in how the service area is represented on the map(s) are remedied by Connected Nation, whether they are additions, removal of service, or any other revisions. Revised maps of service area representations are sent to the provider for review and approval; Connected Nation will revise data and return maps as many times as necessary until the provider is in agreement that the map represents their service area as accurately as possible. Once the review process has been completed and final approval of the data is provided, the data is deemed ready for NTIA submission.

Once the data collection has been aggregated at a territory-wide level, static maps of territory-wide and municipality-level availability are produced and made publicly available. In addition, consumers can visit the interactive online tool, BroadbandStat, to create customized views of broadband service areas and analyze corresponding demographic information. Leveraging broadband service data on various platforms allows for public users, providers, and other stakeholders to review, scrutinize, and provide feedback on the represented data. This feedback becomes a validation method in itself as consumers submit inquiries to Connected Nation either affirming where service is not available or identifying areas where broadband service is shown on the map, but in actuality is not available. This allows for a follow-up to providers regarding revisions to the data as it is represented; it also allows for Connected Nation to identify locations where on-site visits may be necessary to complete field validation of available services. Public feedback on all forms of mapping products serves as a localized validation method for provider-supplied information and allows Connected Nation to resolve inaccuracies as they are identified to ensure that only the highest quality information is provided to stakeholders.

Estimates derived from provider-validated data indicate that approximately 14.01 percent of Puerto Rico[1] households do not have terrestrial fixed broadband service available, and approximately 0.35 percent of Puerto Rico households have neither mobile nor fixed broadband service available.[2]

[1] In accordance with NTIA's definition of available broadband service as specified in the SBI NOFA, this estimate includes both terrestrial fixed *and* mobile broadband service, if the service offers download speeds of at least 768 Kbps and upload speeds greater than 200 Kbps.

[2] Due to the nature of the SBI data collection methodology as defined by the NTIA and based on both census block geographic units and street segment data, the estimates of broadband availability derived from provider-validated data

Within rural areas of the territory, results derived from provider-validated data indicate that approximately 21.82 percent of rural Puerto Rico households do not have terrestrial fixed broadband service available, and approximately 0.48 percent[3] of rural Puerto Rico households have neither mobile nor fixed broadband service available.[4] Please note that the availability estimates presented are based on Census 2000 household information; these figures will be updated in the near future with Census 2010 household information.

WIRELESS METHODOLOGY

Broadband Service Availability in Provider's Service Area
Wireless Services Not Provided to a Specific Address

Data solicited from a fixed wireless provider to create propagation models include, but are not limited to:

1. The name of the structure
2. Whether the transmitting device is operational or proposed
3. The maximum advertised downstream speed, the maximum advertised upstream speed
4. The typical downstream speed, the typical upstream speed (peak periods for both)
5. The frequency range of spectrum being used (as prescribed by NTIA)
6. The primary population center(s) being served (for geopolitical boundary reference)
7. The physical address of the transmit site (in the event latitude/longitude is unavailable from the provider this allows a quick reference point for geocoding)
8. Latitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
9. Longitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
10. Antenna pattern (e.g. omni-directional, 180°, 120°, 90°, etc.)
11. Azimuth of antenna (e.g. 360° with magnetic declination if known)
12. Approximate transmit radius (in feet, miles, or kilometers)
13. Polarity of transmit antenna (Vertical or Horizontal)
14. Transmit antenna gain (in dBi)
15. Line loss (applicable only to providers using coax, heliax, waveguide or other forms of cabling – excludes power-over-Ethernet devices)

may include an overstatement of the actual number of households with broadband availability. Under the census block-based data collection method, a provider will typically report broadband availability for an entire census block whether its network is present across the whole or only a subset of that census block. This potential overestimation at the census block level can be amplified as the data is aggregated across the entire state or territory.

[3] See footnote 1.

[4] See footnote 2.

16. Mechanical and/or Electrical beam tilt (if applicable)
17. Equipment Manufacturer (allows easy cross-reference against manufacturer's specification sheet)
18. Power output of the transmitting device (if unknown, FCC standards or manufacturer specifications are applied)
19. AMSL at base of tower site
20. Antenna centerline AGL (height of antenna above ground level measured at the centerline of the actual antenna)
21. Foliage factors (Evergreens/Deciduous and percent of ground cover)
22. Ground Clutter (primarily used in rural areas to account for foliage and in metropolitan areas to account for types and heights of buildings if known)
23. Average gain of receive antenna
24. Receive antenna is estimated at height above average terrain (HAAT) of 6.2 meters/20 feet
25. Federal Registration Numbers (if applicable) which may allow opportunities to cross-reference and/or obtain additional data from the Federal Communications Commission Universal Licensing System and the **CO**mmission **RE**gistration **S**ystem

Propagation modeling is an empirical mathematical formulation for the characterization of radio wave propagation as a function of frequency, distance, and other conditions. Propagation software(s) typically use the Irregular Terrain Model (also known as Longley-Rice) of radio propagation for frequencies between 20 MHz and 20 GHz. This model is based on electromagnetic theory and statistical analyses of the combination of terrain features and radio measurements, then predicting the median attenuation of a radio signal as a function of distance and the variability of the signal in time and in space. For metropolitan areas, the software can typically be adjusted to use the Okumura-Hata model which accounts for predicting the behavior of cellular transmissions in areas where buildings are the primary obstructions. The resulting product from either model depicts a graphical illustration of the theoretical propagation characteristics of a selected frequency range based on defined variables (receiver sensitivity of the home/mobile device, foliage factor, and digital elevation terrain input).

After converting propagation models into a geospatial format, additional processing is completed to remove the small pixels representing service present in the resulting dataset. These areas are initially created based on the parameters entered in the software from the provider equipment information, the underlying data parameters of elevation, hillshade, etc., and the limitations of the software itself to display a broadband service area as accurately as possible. Generally, these random pixel striations appear as a result of signal levels reaching the highest elevated points within the prescribed radius. Typically, while this pixilation anomaly shows legitimate areas where signals can be received, these highly elevated points may have exceedingly sparse populations or are entirely void of population. As a result, and congruent to the *Wireless Technology Methodologies and Business Logic* white paper submitted to NTIA on January 20, 2011, all independent pixels representing service that are less than 0.125 square miles in area have been removed from the geospatial representation of each wireless provider.

BROADBAND INQUIRIES METHODOLOGY

Connected Nation collects consumer feedback in the form of broadband inquiries (BBIs). These inquiries represent any type of communication received from the public regarding broadband service. Once BBIs are received across the commonwealth, this information is overlaid with the broadband availability information which was collected through the SBI program. This allows for a real-world comparison of the broadband landscape to the information received from broadband inquiries. Consumers submitting these inbound comments and/or inquiries are able to provide information regarding three categories: 1) residents who do not have broadband but want it; 2) residents who have broadband but want a different provider; and 3) residents who do not have broadband, but the broadband inventory maps indicate that they do.

BBIs are submitted frequently by consumers via the Connect Puerto Rico website. Inquiries often seek help to identify local broadband provider options, or to learn when a specific provider may be able to provide service to that consumer. Consumer comments also provide information which may help modify maps with actual service area information. The primary objectives of Connected Nation regarding these inquiries are 1) to improve the accuracy of the territory maps with submitted consumer information and follow-up field research; 2) to provide broadband options to consumers through cooperation with mapped providers and by facilitating new broadband service options; and 3) to map and analyze information from consumers about areas of unmet broadband demand and alternatives to currently mapped services.

New BBIs are assigned to either the GIS department or the Engineering & Technical Services (ETS) team depending on the category entered by the consumer on the website submission form. The GIS or ETS team members respond to each inquiry according to the information requested by the consumer. Many BBIs can be resolved through desktop research; however, if a BBI requires research in the field, the assigned ETS team member conducts such research when performing field validations in the area of the inquiry, or at other such time as is practical and appropriate. GIS and ETS team members respond to and conclude BBIs via telephone contact and/or e-mail communication.

The broadband inquiry process has been implemented in each of the Connected Nation state programs with successful results. Altogether Connected Nation has received over 17,000 broadband inquiries since 2007, allowing the state programs to evaluate each inquiry for broadband demand and data verification. These inquiries are continuously examined against current broadband availability, updated every six months, to determine if previously unserved households have been expanded to and can now receive broadband at their residence. This database of broadband inquiries has also allowed the Connected Nation state programs to aggregate demand in concentrated areas to show providers the exact locations where the population has made it clear that they would purchase broadband if it was made available to them. Providers in the states and the territory of Puerto Rico have responded to this process and have expanded to areas knowing that their investment will be worthwhile. Data verification methods have also proven successful, as the state programs have been able to show those inquiries that indicate the broadband service areas are misrepresented on the map to providers, who then verify where service cannot reach in regard to that residence(s). The broadband coverage in these states has been altered to create a more accurate map based on the inquiries submitted by the public.

During this reporting period, the Connect Puerto Rico project has received a total of 38 inquiries (62 grant inception to date). As more inquiries are submitted to Connect Puerto Rico, a more thorough validation of the broadband landscape can be performed, while also allowing providers to see which areas have a high demand for broadband adoption.

BroadbandStat Methodology

BroadbandStat is an online, interactive mapping tool for viewing, analyzing, and validating broadband data. Developed through a partnership with ESRI, the market leader in geographic information system (GIS) software, BroadbandStat is a multi-functional, user-friendly way for local leaders, policymakers, consumers, and technology providers to devise a plan for the expansion and adoption of broadband.

First and foremost, BroadbandStat allows consumers to locate their residence and identify providers that offer broadband Internet service to that location. The interactive platform allows for users to build and evaluate broadband expansion scenarios using a wealth of data, including education and population demographics, broadband availability, and research about the barriers to adoption.

New functionality in BroadbandStat allows the consumer to provide feedback on the broadband data displayed on the interactive map. Through the collection of this feedback, a visual demand for broadband is presented. This visualization allows the Connected Nation state programs the ability to validate the broadband availability for accuracy. If residents within a region state they are without broadband, but the interactive map shows otherwise, this allows Connected Nation to approach the providers within that area in an effort to trim down their coverage to more accurately represent real-world availability on the ground.

The Connect Puerto Rico project launched BroadbandStat on September 17, 2010, and has received a total of 1,336 visits to date (846 to the English website and 490 to the Spanish website), of which 849 occurred this reporting period (477 to the English website and 372 to the Spanish website).

Speed Test Methodology

The 478 speed tests that are represented in the Connect Puerto Rico Speed Test Report during this reporting period (876 grant inception to date) are the result of a partnership between Connected Nation and Ookla Net Metrics. Utilizing this relationship increases the level of confidence in the data being collected and provides for a far greater sample size than could be collected by a single testing site.

Ookla owns and operates Speedtest.net, as well as develops and deploys speed tests, such as the Connect Puerto Rico speed test website, for partners around the world. This network of sites that is developed and run on its testing technology provides Ookla with a vast dataset that, due to the variability of geographic information collected across the varying speed test sites, is geocoded utilizing Geo-IP technology. This technology allows for tests to be geocoded to points of aggregation, typically larger nodes across provider networks. While there are hundreds of thousands of tests that have been conducted, the level of aggregation is only sufficient for municipality-level detail due to the test results being located at these larger nodes and not at an absolute location for each speed test.

In an effort to validate broadband data from the Connect Puerto Rico project, speed test information is collected throughout the territory. Speed tests provide speed information on the path taken through all networks (a provider's network as well as additional networks) a local machine must connect to in order to reach the host test. The benefit of this collection of speed information is two-tiered. First, it allows for a comprehensive dataset of speeds, while also providing Connect Puerto Rico with the information on where broadband services are available. Second, unlike theoretical speed information which was received through the data collection process, the use of speed tests provide real-world information on the speeds that currently exist within the Commonwealth of Puerto Rico.

CONNECT PUERTO RICO

Broadband Provider Log

Complete	16
Non-Responsive/Refused	3
In Progress	0
Count of Datasets by Status	**19**
Total Unique Providers Represented	**18**

Provider Name	**Platform**	**Status**	**NDA Execution Date**	**Notes**
AT&T Mobility LLC	Mobile Wireless	Data Added to Statewide Inventory	12/16/2009	[SEP-15-11 Jess Cary] Changes and/or Corrections: possible service expansion or corrections to previous dataset: entirely new dataset provided for October 2011 submission.
Liberty Global, Inc.	Cable	Data Added to Statewide Inventory	10/19/2009	[SEP-15-11 Jess Cary] Corrections: Provider supplied corrections to previous dataset.
Puerto Rico Telephone Company Inc.	Mobile Wireless	Data Added to Statewide Inventory	4/23/2010	[SEP-15-11 Jess Cary] Correction: Provider has not participated in past submissions but made data available for Oct 2011 submission.
Puerto Rico Telephone Company Inc.	DSL	Data Added to Statewide Inventory	4/23/2010	[SEP-15-11 Jess Cary] Changes and/or Corrections: possible service expansion or corrections to previous dataset: entirely new dataset provided for October 2011 submission.
Sprint Nextel Corporation	Mobile Wireless	Data Added to Statewide Inventory	1/14/2010	[SEP-15-11 Jess Cary] Changes and/or Corrections: possible service expansion or corrections to previous dataset: entirely new dataset provided for October 2011 submission.
T-Mobile USA, Inc.	Mobile Wireless	Data Added to Statewide Inventory	1/8/2010	[SEP-15-11 Jess Cary] Changes and/or Corrections: possible service expansion or corrections to previous dataset: entirely new dataset provided for October 2011 submission.
Aeronet Wireless Broadband Corp.	Backhaul	Backhaul Provider Only Processing Complete		
Sprint Nextel Corporation	Backhaul	Backhaul Provider Only Processing Complete	1/14/2010	
San Juan Cable Holding, LLC, OneLink Communications	Cable	Estimated Coverage Submitted for Non-Participating Provider		[SEP-16-11 Jess Cary] Provider is still non-responsive to participation outreach and the same coverage as April 2011 is being submitted again.
Ayustar Corporation	Fixed Wireless	Approval for Update Not Received – Data Still Submitted	7/12/2010	[SEP-15-11 Jess Cary] Corrections: No prior participation. Provider supplied data for Oct 2011 submission.
Critical Hub Networks	Fixed Wireless	Approval for Update Not Received – Data Still Submitted	9/30/2010	[SEP-15-11 Jess Cary] Corrections: No prior participation. Provider supplied data for Oct 2011 submission.
Puerto Rico Cable Acquisition Company, Inc.	Cable	Approval for Update Not Received – Data Still Submitted	9/27/2010	[SEP-15-11 Jess Cary] Correction: Did not provide approval for April 2011 submission or Oct 2011 submission but will be included in the Oct 2011 submission.
Critical Hub Networks	Backhaul	No Update to Provide	9/30/2010	
Data@ccess Communications	Backhaul	No Update to Provide	9/29/2009	
Hughes Network Systems, LLC	Satellite	No Update to Provide	2/5/2010	[SEP-16-11 Jess Cary] Correction: Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire territory boundary, work continues on having more granular data available.
MCI Communications Services, Inc.	Backhaul	No Update to Provide	12/14/2009	
Neptuno Media, Inc.	Backhaul	No Update to Provide	4/29/2010	
PREPA Networks Corp	Backhaul	No Update to Provide	4/21/2010	
Worldnet Telecommunications Inc.	Backhaul	No Update to Provide	4/19/2010	
Aeronet Wireless Broadband Corp.	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to contact attempts made between July 1, 2010 and February 21, 2011, 5 additional attempts were made this period.
Orizon Wireless Corp	Backhaul	Non-Responsive to Multiple Attempts	1/28/2011	In addition to contact attempts made between July 1, 2010 and February 17, 2011, 3 additional attempts were made this period.
Telefonica International Holding, BV	Backhaul	Non-Responsive to Multiple Attempts		In addition to contact attempts made between July 1, 2010 and February 17, 2011, 4 additional attempts were made this period.

Rhode Island
Broadband Mapping Project
September 2011 Data Submission - Summary and Processes

Prepared By:

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Section A: The Broadband Rhode Island Mapping Team Overview

In support of the national broadband initiatives being undertaken by President Obama and the Federal Government through the American Recovery & Reinvestment Act of 2009 (Recovery Act), Public Law No. 111-5, and the Broadband Data Improvement Act (BDIA), title I of Public Law No. 110-385, 122 Stat. 4096, the Rhode Island Economic Development Corporation (RIEDC), as the entity assigned by Governor Donald Carcieri, has filed to the United States Department of Commerce – National Telecommunications and Information Administration (NTIA) a request for grant funds from the State Broadband Data and Development Grant Program.

Project Description
EA Engineering, Science, and Technology, Inc. (EA), has been selected by RIEDC for the through their Broadband Initiative for Rhode Island (BBRI) to provide a data management and retrieval system for RIEDC. RIEDC and EA entered into a contractual agreement on January 15, 2010 for a base period of 2 (two) years with 3 (three) option years. The work assignment consists of negotiating non disclosure agreements (NDA) with the State's broadband providers, collecting provider broadband data, verifying data submitted, combining and updating data collected, developing and implementing a broadband website with mapping application, and reporting findings to RIEDC and the NTIA.

This program will create a statewide broadband map which will be maintained for five (5) years, that assesses broadband infrastructure in Rhode Island and distinguishes between served, underserved and un-served communities as per the definition specified by NTIA. The data will be made available to the public, with certain restrictions to account for confidentiality of supplier information, through a state website and will also be linked to a Federal Department of Commerce webpage. The goal of this project is to meet the RIEDC's broadband mapping needs and in doing so provide maps and information that will be used to lend guidance and assistance in the planning of future broadband infrastructure development, as well as provide numerous broadband options to the end users.

The BBRI is a comprehensive effort aimed at producing a high level of detailed inventory of broadband services provided to residential, government and business consumers within the State of Rhode Island. The project is not only a Geographical Information Systems (GIS) mission but a project that needs expertise in GIS, contracting and legal issues, Quality Assurance/Quality Control (QAQC), and project management. In order to acquire, collect, process, analyze and display the data that represents these services it was necessary to combine the resources of several professional firms. Each team member provides unique set of strengths and capabilities needed to create the system that is in place. The team is made up of Rhode Island Economic Development Corporation (RIEDC), EA Engineering (EA), University of Rhode Island (URI), Adler Pollock & Sheehan P.C. (AP&S), Eastern Shore Regional GIS Cooperative (ESRGC), and Mapping

& Planning Services (M&PS). The following paragraphs provide information on each team member and their role the project.

The RIEDC is leading the project efforts for the State of Rhode Island (RI). Led by Mr. Stuart Freiman, they oversee all facets of the project and teams involved. The RIEDC coordinates schedules, communicates directly with the National Telecommunications Information Agency (NTIA), reviews and approves all project deliverables, and ensure all project deadlines are met. With their high visibility in the RI business community they are instrumental in arranging meetings between broadband providers and BBRI Team members. The relationship and communication RIEDC has with the State's providers was and continues to be instrumental in making the process of collecting and verifying information from the providers as effortless as possible.

EA is the prime contractor selected to lead the State's data collection, verification, reporting, and mapping efforts. EA has been providing scientific and engineering technical solutions to a wide range of government and industrial clients since 1973. Serving IT and GIS solutions via the web has become a standard business solution for EA's clients. As the prime contractor EA works closely with the RIEDC on all phase of the BBRI project. Included in the work EA has done to date, is the creation of the State's broadband website and mapping application (Digital Atlas). The website provides information on the project, links to related sites, custom mapping capabilities, and user speed test and feedback forms. The site can be viewed at the following address; http://broadband.ri.gov/.

M&PS has been providing GIS consulting services in RI for over 20 years. For the RI Broadband Mapping project, M&PS assisted in the development of a verification and analysis process which is used to perform the QA/QC of the data prior to submitting to the NTIA. Prior to each bi-annual NTIA submittal M&PS uses this process to review and check the data. During this process MP&S checks for positional and attribute accuracy of the data by using a random sampling methodology. The service MP&S provides insures data going to the NTIA is of the highest accuracy and precision. Additional M&PS provides data analysis and static maps displaying the data status at each delivery date.

The GIS laboratory in the URI's Department of Natural Resources is the center of technical expertise in the GIS field for the State of RI. On this project URI manages all GIS data report by EA to the RIEDC. They also serve as an additional tier of QA/QC on the data that is collected and submitted to the NTIA. URI provides technical input to the data processes and the types of maps and data to be displayed on the website. Additionally, several data layers including Community Anchor Institute locations and base map layers being used on the Digital Atlas are provided by URI.

The Eastern Shore Regional GIS Cooperative (ESRGC) is an organization that provides technical support, training, and GIS services to local governments on the Eastern Shore of Maryland. In addition to supporting the BBRI project, ESRGC is leading the broadband mapping efforts for the state of Maryland. For the BBRI project, the ESRGC's provides the project team technical advisor support. They provide guidance on the project's technical approach and peer review support based on knowledge gained from their work in Maryland. ESRGC provided assistance in defining requirements for the QA/QC process, database design, and data verification tasks. The ESRGC provides the Team with a "lessons learned" from the Maryland Broadband project which guided the BBRI Team around common mistakes made on broadband mapping projects.

AP&S is a local RI law firm providing legal advice and representation and has been servicing RI residents and firms for 50 years. The role AP&S plays on this project is providing the necessary legal advice and contracting that is necessary between the RIEDC and the broadband providers. To date, AP&S has brokered the Non-Disclosure Agreements (NDA's) between the RIEDC and 16 broadband providers. These agreements were imperative and had to be in place before any data was submitted by the broadband providers. All provider broadband information that is made public is based on what the NDAs state. AP&S became the State's expert as to what information was legal for the team to make available to the public and modeled the NDAs off of the guidance provided in the NOFA.

Project Contacts

Contact	Project Role	Phone	Email
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BROADBAND PROVIDER DATA VERIFICATION REPORT
RHODE ISLAND DATA SUBMITTAL #3
SEPTEMBER 30, 2011

General Findings:

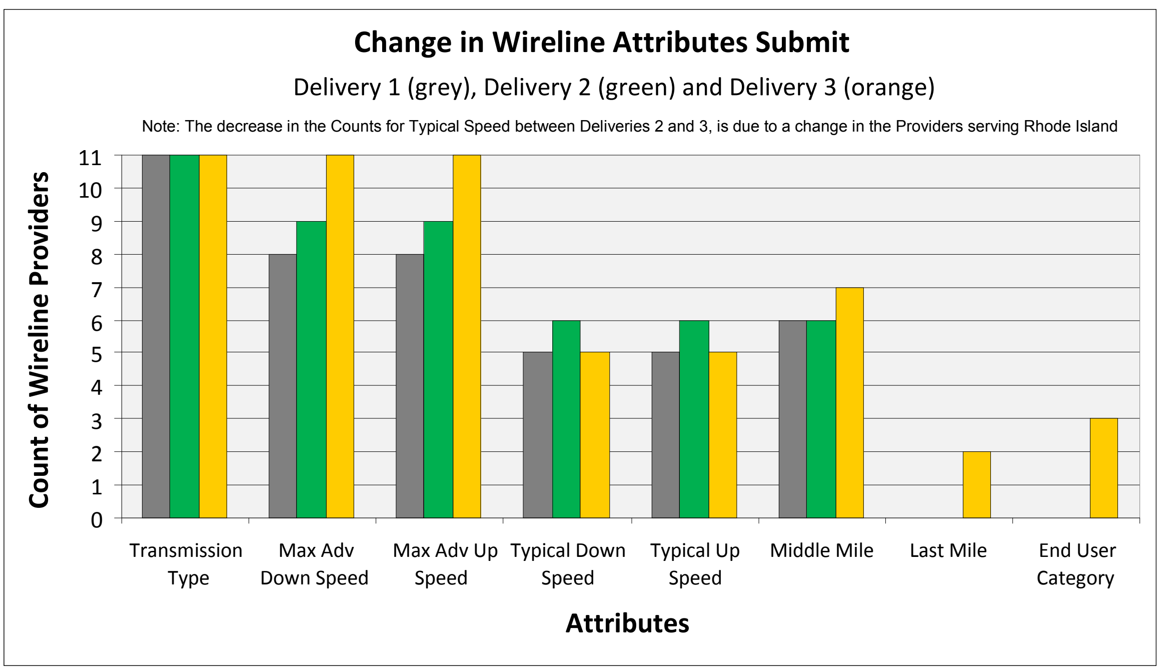
- Rhode Island has extensive broadband coverage from 19 providers. Collectively, these 19 providers offer broadband coverage for the entire state of Rhode Island.

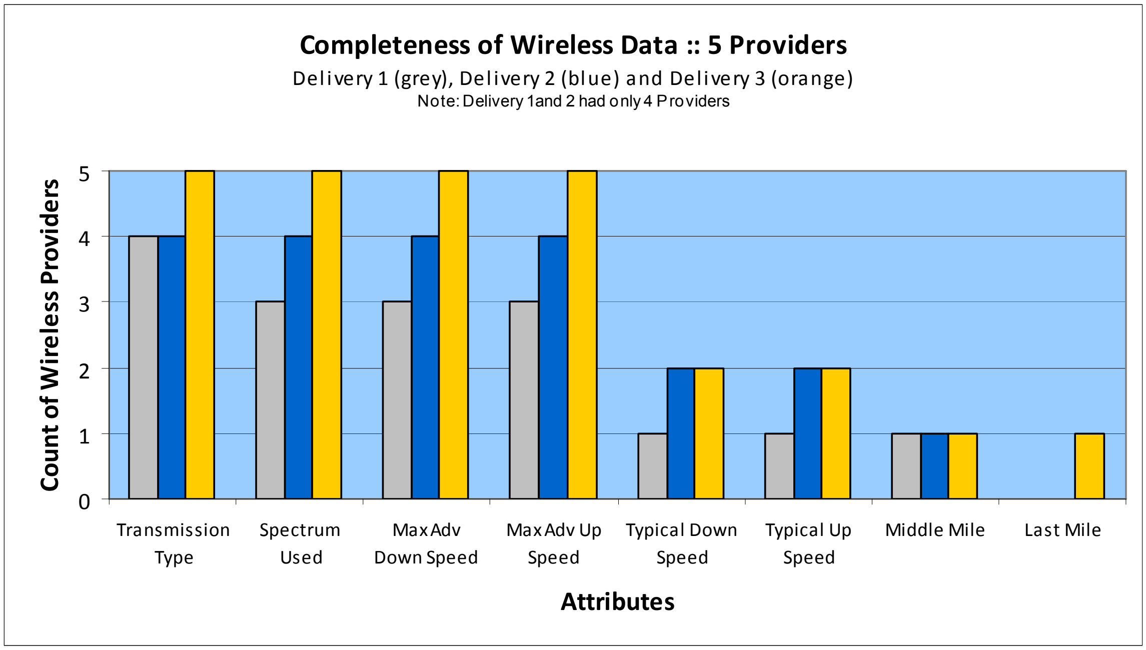
- Broadband availability on a census block basis is summarized in the Figure below:

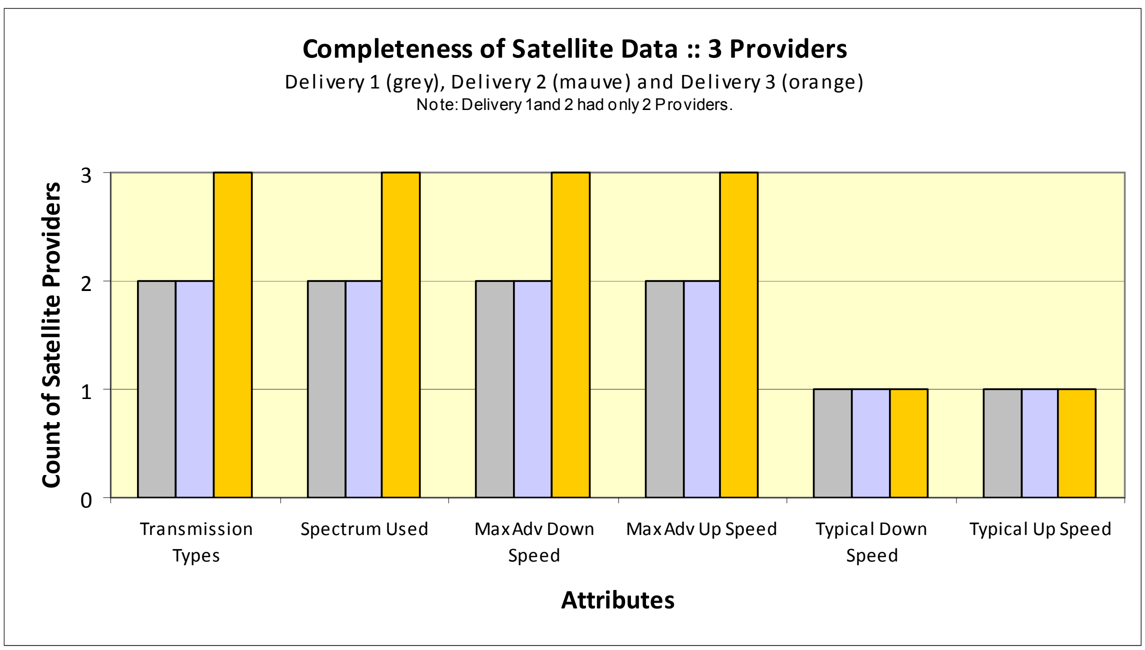
Broadband Availability	**Census Blocks**	**% of Total**
Unserved; census block has no access to broadband	0	0
Underserved: One to Two broadband providers	28	<1
Competitive: Three to Four broadband providers	127	<1
Five to Nine broadband providers	9,789	39
Ten to Thirteen broadband providers	15,013	60
Fourteen to Sixteen broadband providers	224	<1
Total	**25,181**	**100**

Note: Several of the Provider datasets do not show coverage of some census blocks in Rhode Island coastal waters (for example, the satellite providers). This results in some over-reporting of the availability results at the low end, in particular, the underserved figures. Broadband is defined as being wireline, wireless and satellite service for this table.

- A total of 19 broadband Providers submitted data; 11 wireline, 5 wireless, and 3 satellite. The completeness of the attributes in the 19 providers' datasets is summarized in the Figures below. (Statistics for NTIA Delivery 1 and 2 are included for comparison purposes).







- Middle Mile data was provided by 8 broadband providers. There were a total of 40 facilities (16 owned and 24 leased).
- Last Mile data was provided by 2 broadband providers.

- A total of 984 Community Anchor Institutions (CAIs) are identified. These were verified with available Rhode Island Geographic Information System (RIGIS) datasets and 529 RIEDC and FCC speed tests.

- The RIEDC has collected 4,385 speed tests in 1,403 (5.6%) of the census blocks within the State. These tests are for the period 3/23/10 to 9/5/11. There is a continued growth both in the number and distribution of the RIEDC speed tests.

- A total 1,904 wireline speed tests from FCC are used for the verification. These tests are for the period 3/11/10 to 6/30/11 and cover 948 (4%) of the census blocks within the State. Tests were collected by OOKLA and MLAB.

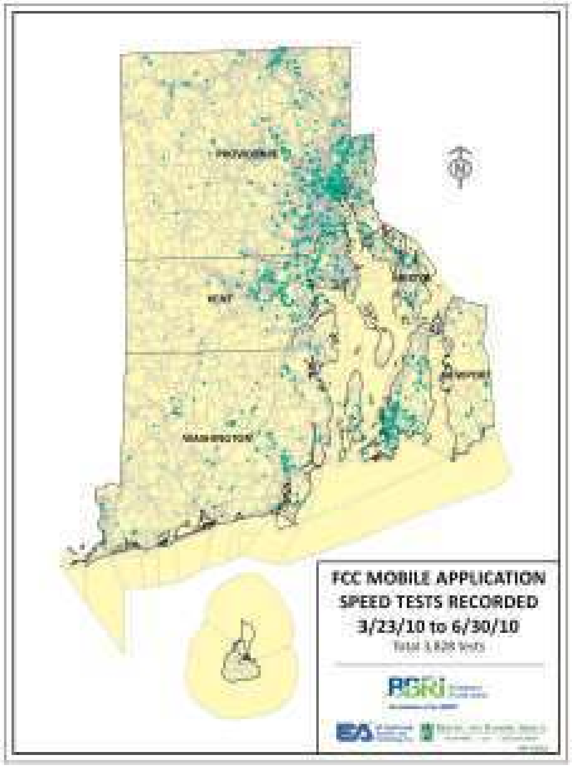
- FCC tests for Mobile Applications (accessing Cellular and Wi-Fi) are also used for the verification. These 3,828 speed tests are recorded for the period 3/11/10 to 6/30/11 and cover 1,036 (4%) of the census blocks within the State. These tests were all collected by OOKLA.

- A total of 10,117 speed tests (RIEDC, FCC, and FCC Mobile Applications) were used for verification purposes. These were distributed within 2,910 (12%) of the 2010 US Census Bureau's 25,181 census blocks in the state. The distribution of each of these sources/types of tests is similar and follows population and household patterns across the State. The distribution of the speed tests are shown in the Figures on the following page.

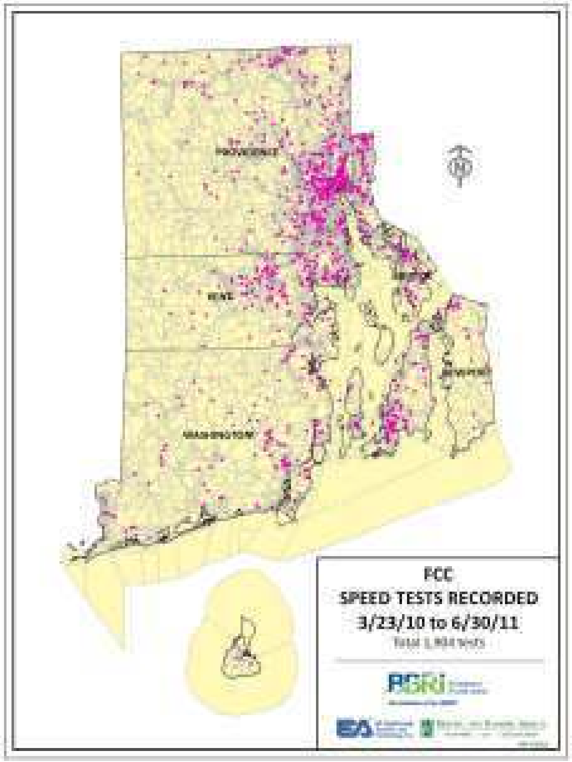
- A total of 56 census blocks are greater than 2 sq. miles, with 28 over land and 28 over open water. Road Segment data was provided by 1 provider. Service Address data was provided by 1 provider. There was one census block (greater than 2 sq miles) with no road segment or service address data (440070133003013 in Foster, RI).

The Figures below show the distribution of speed tests used for verification purposes.

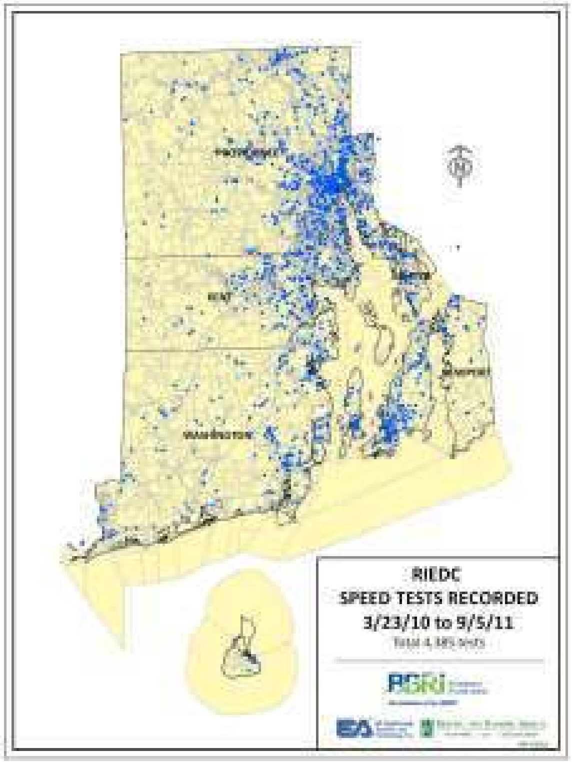
FCC Collected Speed Test - Mobile



FCC Collected Speed Test - Wireline

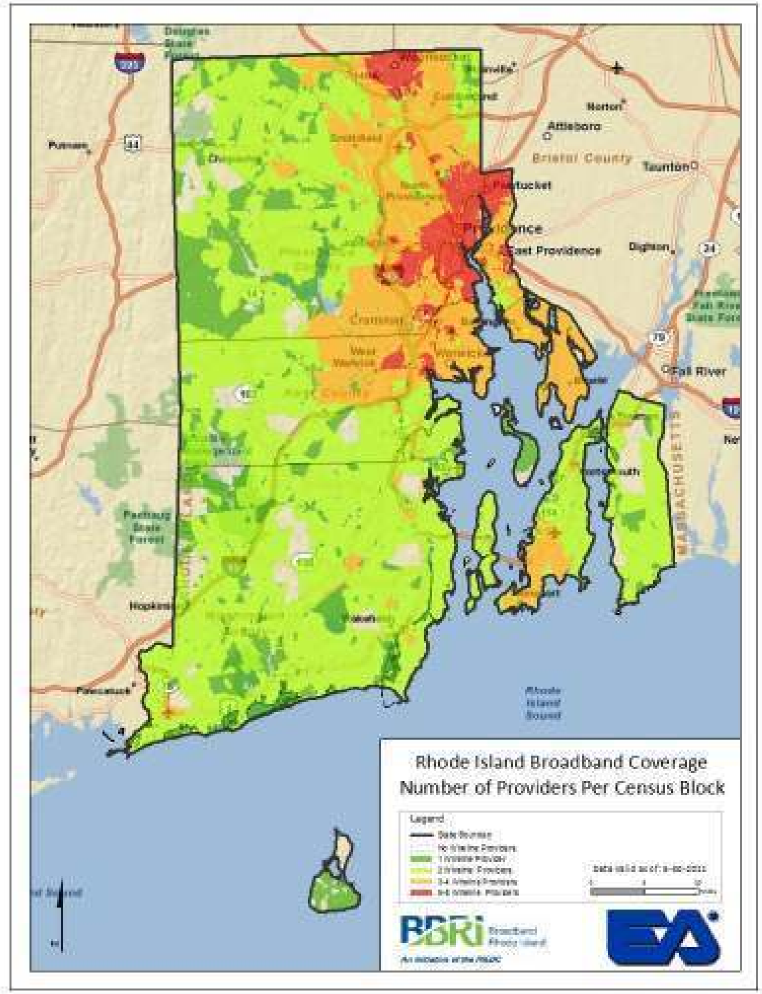


RIEDC Collected Speed Test



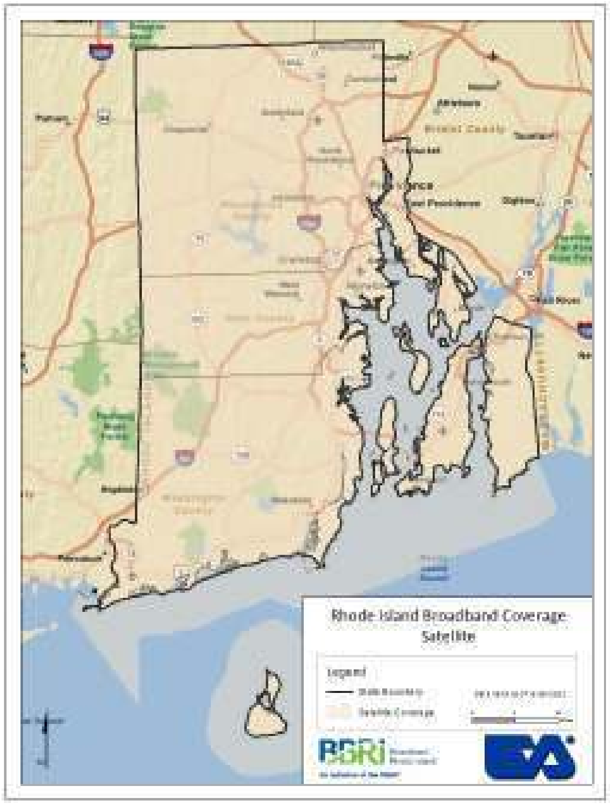
The Figures below display the wireline and wireless coverage areas reported in Rhode Island and the number of providers available per census block.

Rhode Island Broadband Coverage Map



Number of Providers Available Per Census Block

The Figures below display the availability of each technology types offered in Rhode Island.

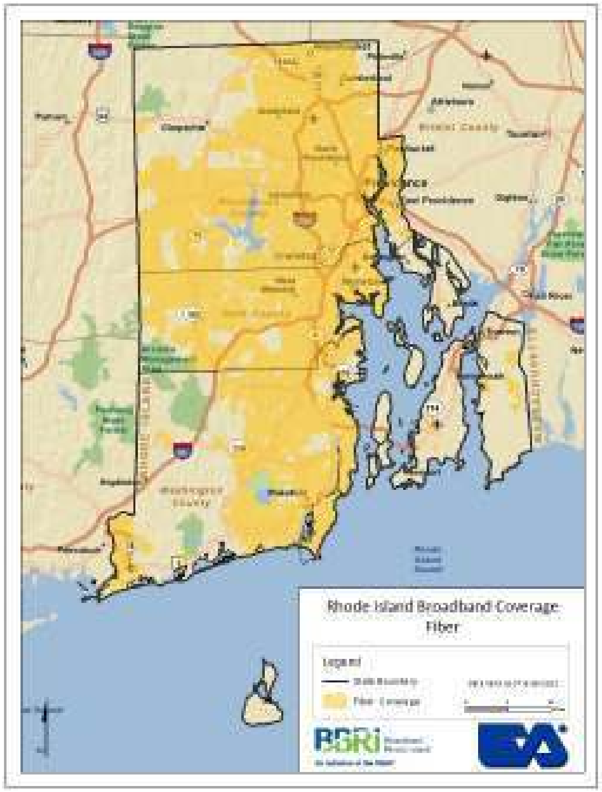


Satellite Coverage

Copper Wireline Coverage

Cable Coverage

The Figures below display the availability of each technology types offered in Rhode Island.



Fiber Optic Coverage

Wireless Coverage

DSL Coverage

Provider Name: Above Net Communications Inc.
DBA: AboveNet

Data Characteristics

FRN:	0000820598
Type of Data Submitted:	Census Blocks
Census Block Count (unique):	2
Provided Technology of Transmission:	YES
Provided Max Advertised Download Speed:	YES
Provided Max Advertised Upload Speed:	YES
Provided Typical Download Speed:	NO
Provided Typical Upload Speed:	NO
Provided Middle Mile:	YES
Provided Last Mile:	YES
Provided End User Category:	YES

Maximum advertised down/upload speeds reported by provider:

Max Download Category	Max Upload Category
11	11

Typical down/upload speeds reported by provider: Not provided

Number of technology transmission types reported by provider: 1

Count of Middle Mile Facilities: 1

Count and Capacity of Last Mile Facilities: 1, 9

End user Category: 2

Data Verification:

Counties served by provider and number of census blocks with service. A total of 2 census blocks are served.

County	Census Block per County
Bristol	0
Kent	0
Newport	0
Providence	2
Washington	0

Greatest down/upload speed from Historical [1] speed tests: No speed tests were taken
Greatest down/upload speed from RIEDC [2] speed tests: No speed tests were taken
Greatest down/upload speed from FCC [3] speed tests: No speed tests were taken
Greatest down/upload speed from FCC Mobile Application speed tests: No speed tests were taken

Count of Historical speed tests: 0
Count of RIEDC [2] speed tests: 0
Count of FCC [3] speed tests: 0
Count of FCC Mobile Application [4] speed tests: 0

RIEDC and FCC speed tests outside of reported service area: 0

Middle Mile facilities outside of reported service area: Facility is located within the reported service area.

Last Mile facilities outside of reported service area: Facility is located within the reported service area.

%/# of census blocks verified by RIEDC & FCC speed tests:

Confirmation of census block served	0
Census blocks served, not reported by provider	0
Total number of served census blocks reported by provider	2
% of served census blocks confirmed by speed test	0

Footnotes:
1 Historical Date Range: 3/23/2009 to 3/22/2010
2 RIEDC Date Range: 3/23/2010 to 9/5/2011
3 FCC Date Range: 3/11/2010 to 6/30/2011
4 FCC Mobile Application Date Range: 3/11/2010 to 6/30/2011

Provider Name: AT&T Mobility LLC
DBA: AT&T Mobility LLC

Data Characteristics

FRN:	0004979233
Type of Data Submitted:	Wireless
Census Block Count (unique):	N/A
Provided Technology of Transmission:	YES
Provided Spectrum Used:	YES
Provided Max Advertised Download Speed:	YES
Provided Max Advertised Upload Speed:	YES
Provided Typical Download Speed:	NO
Provided Typical Upload Speed:	NO
Provided Middle Mile:	NO
Provided Last Mile:	NO

Maximum advertised down/upload speeds reported by provider:

Max Download Category	Max Upload Category
4	3

Typical down/upload speeds reported by provider: Not provided

Number of technology of transmission types and spectrums reported by provider: 1, with 2 spectrums

Data Verification:

Counties served by provider and number of census blocks with service. A total of 24,993 census blocks are served.

County	Census Blocks per County
Bristol	1,087
Kent	4,177
Newport	2,343
Providence	13,148
Washington	4,238

Greatest down/upload speed from Historical [1] speed tests: 9, 8
Greatest down/upload speed from RIEDC [2] speed tests: 9,8
Greatest down/upload speed from FCC [3] speed tests: No FCC speed tests were taken
Greatest down/upload speed from FCC [4] Mobile Application speed tests: 7, 7

Count of Historical speed tests: 1,010
Count of RIEDC speed tests: 8
Count of FCC speed tests: 0
Count of FCC Mobile Application speed tests: 51

Speed tests outside of reported service area: 0

%/# of census blocks verified by RIEDC and FCC speed tests:

Confirmation of census blocks served	23
Census blocks served, not reported by provider	0
Total number of served census blocks reported by provider	24,993
% of served census blocks confirmed by speed test	<1%

Middle mile facilities outside of reported service area: No middle mile facilities.

Footnotes:

1 Historical Date Range: 3/23/2009 to 3/22/2010
2 RIEDC Date Range: 3/23/2010 to 9/5/2011
3 FCC Date Range: 3/11/2010 to 6/30/2011
4 FCC Mobile Application Date Range: 3/11/2010 to 6/30/2011

Provider Name: Broadview Networks, Inc.
DBA: Broadview Networks, Inc.

Data Characteristics

FRN:	0003775285
Type of Data Submitted:	Census Blocks
Census Block Count (unique):	9,952
Provided Technology of Transmission:	YES
Provided Max Advertised Download Speed:	YES
Provided Max Advertised Upload Speed:	YES
Provided Typical Download Speed:	YES
Provided Typical Upload Speed:	YES
Provided Middle Mile:	YES
Provided Last Mile:	NO
Provided Road Segments for census blocks greater than 2 sq miles:	NO
Provided Address Points for census block greater than 2 sq miles:	NO
Provided End User Category:	NO

Maximum advertised down/upload speeds reported by provider:

Technology	Max Download Category	Max Upload Category	Count
10	5	5	3
20	5	5	7
30	10	10	7,149
50	11	11	4,755

Typical down/upload speeds reported by provider:

Technology	Max Download Category	Max Upload Category	Count
10	4	2	3
20	4	4	1
30	N/A	N/A	7,149
50	5	5	11

Number of technology transmission types reported by provider: 4

Count of Middle Mile Facilities: 8

End user Category: Not provided

Data Verification:

Counties served by provider and number of census blocks with service. A total of 9,952 census blocks are served.

County	Census Block per County
Bristol	4
Kent	1,110
Newport	959
Providence	7,872
Washington	7

Greatest down/upload speed from Historical [1] speed tests: 4, 4
Greatest down/upload speed from RIEDC [2] speed tests: 4, 4
Greatest down/upload speed from FCC [3] speed tests: 4, 4
Greatest down/upload speed from FCC Mobile Application speed tests: No FCC Mobile speed tests were taken

Count of Historical speed tests: 64
Count of RIEDC [2] speed tests: 5
Count of FCC [3] speed tests: 2
Count of FCC Mobile Application [4] speed tests: 0

RIEDC and FCC speed tests outside of reported service area: 0

Middle mile facilities outside of reported service area: All are centrally located within the reported census blocks.

%/# of census blocks verified by RIEDC & FCC speed tests:

Confirmation of census block served	7
Census blocks served, not reported by provider	0
Total number of served census blocks reported by provider	9,952
% of served census blocks confirmed by speed test	<1%

Footnotes:

5. Historical Date Range: 3/23/2009 to 3/22/2010
6. RIEDC Date Range: 3/23/2010 to 9/5/2011
7. FCC Date Range: 3/11/2010 to 6/30/2011
8. FCC Mobile Application Date Range: 3/11/2010 to 6/30/2011

Provider Name: Cellco Partnership
DBA: Verizon Wireless

Data Characteristics

FRN:	0003290673
Type of Data Submitted:	Wireless
Census Block Count:	N/A
Provided Technology of Transmission:	YES
Provided Spectrum Used:	YES
Provided Max Advertised Download Speed:	YES
Provided Max Advertised Upload Speed:	YES
Provided Typical Download Speed:	YES
Provided Typical Upload Speed:	YES
Provided Middle Mile:	NO
Provided Last Mile:	NO

Maximum advertised down/upload speeds reported by provider:

Max Download Category	Max Upload Category
5	4

Typical down/upload speeds reported by provider: 3, 3

Number of technology of transmission types and spectrums reported by provider: 1, with 3 spectrums

Data Verification:

Counties served by provider and number of census blocks with service. A total of 24,929 census blocks are served.

County	Census Blocks per County
Bristol	1,088
Kent	4,150
Newport	2,318
Providence	13,145
Washington	4,228

Greatest down/upload speed from Historical [1] speed tests: No Historical speed tests were reported
Greatest down/upload speed from RIEDC [2] speed tests: 3, 2
Greatest down/upload speed from FCC [3] speed tests: 4,2 and 3, 3
Greatest down/upload speed from FCC Mobile Application [4] speed tests: 7,4 and 6,5

Count of Historical speed tests: 0
Count of RIEDC [2] speed tests: 10
Count of FCC [3] speed tests: 10
Count of FCC Mobile Applications [4] speed tests: 334

RIEDC and FCC speed tests outside of reported service area: 0

%/# of census blocks verified by RIEDC and FCC speed tests:

Confirmation of census blocks served	76
Census blocks served, not reported by provider	0
Total number of served census blocks reported by provider	24,929
% of served census blocks confirmed by speed test	<1%

Footnotes:

1 Historical Date Range: 3/23/2009 to 3/22/2010
2 RIEDC Date Range: 3/23/2010 to 9/5/2011
3 FCC Date Range: 3/11/2010 to 6/30/2011
4 FCC Mobile Application Date Range: 3/11/2010 to 6/30/2011

Provider Name: Clearwire
DBA: Clearwire

Data Characteristics

FRN:	0017775628
Type of Data Submitted:	Wireless
Census Block Count:	N/A
Provided Technology of Transmission:	YES
Provided Spectrum Used:	YES
Provided Max Advertised Download Speed:	YES
Provided Max Advertised Upload Speed:	YES
Provided Typical Download Speed:	YES
Provided Typical Upload Speed:	YES
Provided Middle Mile:	NO
Provided Last Mile:	NO

Maximum advertised down/upload speeds reported by provider:

Max Download Category	Max Upload Category
5	3

Typical down/upload speeds reported by provider: Not provided

Number of technology of transmission types and spectrums reported by provider: 1, with 1 spectrum

Data Verification:

Counties served by provider and number of census blocks with service. A total of 11,670 census blocks are served.

County	Census Blocks per County
Bristol	136
Kent	3,018
Newport	7
Providence	8,427
Washington	82

Greatest down/upload speed from Historical [1] speed tests: No Historical speed tests were reported
Greatest down/upload speed from RIEDC [2] speed tests: 5, 3
Greatest down/upload speed from FCC [3] speed tests: No FCC speed tests were taken
Greatest down/upload speed from FCC Mobile Application [4] speed tests: 6, 3

Count of Historical speed tests: 0
Count of RIEDC [2] speed tests: 2
Count of FCC [3] speed tests: 0
Count of FCC Mobile Applications [4] speed tests: 1

RIEDC and FCC speed tests outside of reported service area: 0

%/# of census blocks verified by RIEDC and FCC speed tests:

Confirmation of census blocks served	3
Census blocks served, not reported by provider	0
Total number of served census blocks reported by provider	11,670
% of served census blocks confirmed by speed test	<1%

Footnotes:

1 Historical Date Range: 3/23/2009 to 3/22/2010
2 RIEDC Date Range: 3/23/2010 to 9/5/2011
3 FCC Date Range: 3/11/2010 to 6/30/2011
4 FCC Mobile Application Date Range: 3/11/2010 to 6/30/2011

Provider Name: Cogent Communication, Inc.
DBA: Cogent Communication

Data Characteristics

FRN:	0004654042
Type of Data Submitted:	Census Blocks
Census Block Count (unique):	2
Provided Technology of Transmission:	YES
Provided Max Advertised Download Speed:	YES
Provided Max Advertised Upload Speed:	YES
Provided Typical Download Speed:	NO
Provided Typical Upload Speed:	NO
Provided Middle Mile:	YES
Provided Last Mile:	NO
Provided Road Segments for census blocks greater than 2 sq miles:	NO
Provided Address Points for census block greater than 2 sq miles:	NO
Provided End User Category:	YES

Maximum down/upload speeds reported by provider:

Max Download Category	Count	Max Upload Category	Count
11	2	11	2

Typical down/upload speeds reported by provider: Not Provided

Number of technology of transmission types reported by provider: 1

Count of Middle Mile Facilities: 1

End User Category: 2

Data Verification:

Counties served by provider and number of census blocks with service. A total of 2 census blocks are served.

County	Census Blocks per County
Bristol	0
Kent	0
Newport	0
Providence	2
Washington	0

Greatest down/upload speed from Historical [1] speed tests: No speed tests were taken
Greatest down/upload speed from RIEDC [2] speed tests: No speed tests were taken
Greatest down/upload speed from FCC [3] speed tests: No speed tests were taken
Greatest down/upload speed from FCC Mobile Applications [4] speed tests: No speed tests were taken

Count of Historical speed tests: 0
Count of RIEDC [2] Speed tests: 0
Count of FCC [3] speed tests: 0
Count of FCC Mobile Applications [4] speed tests: 0

RIEDC and FCC speed tests outside of reported service area: No speed tests were taken

Middle mile facilities outside of reported service area: Facility is within the reported census blocks.

%/# of census blocks verified by RIEDC and FCC speed tests:

Confirmation of census block served	0
Census blocks served, not reported by provider	0
Total number of served census blocks reported by provider	2
% of served census blocks confirmed by speed test	0%

Footnotes:

1 Historical Date Range: 3/23/2009 to 3/22/2010
2 RIEDC Date Range: 3/23/2010 to 9/5/2011
3 FCC Date Range: 3/11/2010 to 6/30/2011
4 FCC Mobile Application Date Range: 3/11/2010 to 6/30/2011

Provider Name: CoxCom, Inc.
DBA: Cox Communications, Inc.

Data Characteristics

FRN:	0001524461
Type of Data Submitted:	Census Blocks, Address Points
Census Block Count (unique):	24,424
Service Address Point Count (unique):	2,267
Provided Technology of Transmission:	YES
Provided Max Advertised Download Speed:	YES
Provided Max Advertised Upload Speed:	YES
Provided Typical Download Speed:	NO
Provided Typical Upload Speed:	NO
Provided Middle Mile:	YES
Provided Last Mile:	NO
Provided Road Segments for census blocks greater than 2 sq miles:	NO
Provided Address Points for census block greater than 2 sq miles:	YES
Provided End user Category:	NO

Maximum advertised down/upload speeds reported by provider:

Data Type	Max Download Category	Max Upload Category	Count
Census Blocks	9	5	24,424
Service Address Points	9	5	2,267

Typical down/upload speeds reported by provider: Not provided

Number of technology of transmission types reported by provider: 1

Count of Middle Mile Facilities: 1

End User Category: Not provided

Data Verification:

Counties served by provider and number of census blocks with service. A total of 24,447 census blocks are served (24,424 by census block data and 23 by service address data).

County	Census Blocks per County
Bristol	1,086
Kent	4,113
Newport	2,285
Providence	12,885
Washington	4,055

Greatest down/upload speed from Historical [1] speed tests: 9, 9 and 10, 6
Greatest down/upload speed from RIEDC [2] speed tests: 10, 4 and 9, 9
Greatest down/upload speed from FCC [3] speed tests: 9, 8
Greatest down/upload speed from FCC Mobile Applications [4] speed tests: 7, 6

Count of Historical speed tests: 98,305
Count of RIEDC [2] speed tests: 2,597
Count of FCC [3] speed tests: 928
Count of FCC Mobile Applications [4] speed tests: 1,286

RIEDC and FCC speed tests outside of reported service area: 2 of 4,811 speed tests were recorded outside of the coverage area reported by provider.

Middle mile facilities outside of reported service area: All are located within the reported census blocks.

%/# of census blocks verified by RIEDC and FCC speed tests:

Confirmation of census block served	1,707
Census blocks served, not reported by provider	2
Total number of served census blocks reported by provider	24,447
% of served census blocks confirmed by speed test	7%

Footnotes:

1 Historical Date Range: 3/23/2009 to 3/22/2010
2 RIEDC Date Range: 3/23/2010 to 9/5/2011
3 FCC Date Range: 3/11/2010 to 6/30/2011
4 FCC Mobile Application Date Range: 3/11/2010 to 6/30/2011

Provider Name: DIECA Communications, Inc.
DBA: Covad Communications Company

Data Characteristics

FRN:	0003753753
Type of Data Submitted:	Census Blocks
Census Block Count: (unique)	10,610
Provided Technology of Transmission:	YES
Provided Max Advertised Download Speed:	YES
Provided Max Advertised Upload Speed:	YES
Provided Typical Download Speed:	YES
Provided Typical Upload Speed:	YES
Provided Middle Mile:	NO
Provided Last Mile:	NO
Provided Road Segments for census blocks greater than 2 sq miles:	NO
Provided Address Points for census block greater than 2 sq miles:	NO
Provided End User Category:	NO

Maximum advertised down/upload speeds reported by provider:

Technology	Max Download Category	Max Upload Category	Count
10	6	3	2,554
20	5	5	1,582
30	5	5	6,028

Typical down/upload speeds reported by provider:

Technology	Max Download Category	Max Upload Category	Count
10	5	3	3,628
20	4	4	2,879
30	5	5	6,016

Number of technology of transmission types reported by provider: 3

Count of Middle Mile Facilities: 0

End User Category: Not provided

Data Verification:

Counties served by provider and number of census blocks with service. A total of 10,610 census blocks are served.

County	Census Blocks per County
Bristol	2
Kent	2,606
Newport	2
Providence	8,000
Washington	0

Greatest down/upload speed from Historical [1] speed tests: 9, 3
Greatest down/upload speed from RIEDC [2] speed tests: No speed tests were taken
Greatest down/upload speed from FCC [3] speed tests: No speed tests were taken
Greatest down/upload speed from FCC Mobile Applications [4] speed tests: No speed tests were taken

Count of Historical speed tests: 57
Count of RIEDC [2] speed tests: 0
Count of FCC [3] speed tests: 0
Count of FCC Mobile Applications [4] speed tests: 0

RIEDC and FCC speed tests outside of reported service area: No speed tests were taken

%/# of census blocks verified by RIEDC and FCC speed tests:

Confirmation of census block served	0
Census blocks served, not reported by provider	0
Total number of served census blocks reported by provider	10,610
% of served census blocks confirmed by speed test	0%

Footnotes:
1 Historical Date Range: 3/23/2009 to 3/22/2010
2 RIEDC Date Range: 3/23/2010 to 9/5/2011
3 FCC Date Range: 3/11/2010 to 6/30/2011
4 FCC Mobile Application Date Range: 3/11/2010 to 6/30/2011

Provider Name: Fiber Technologies Networks, LLC.
DBA: FiberTech

Data Characteristics

FRN:	0006797849
Type of Data Submitted:	Census Blocks
Census Block Count (unique):	11
Provided Technology of Transmission:	YES
Provided Max Advertised Download Speed:	YES
Provided Max Advertised Upload Speed:	YES
Provided Typical Download Speed:	NO
Provided Typical Upload Speed:	NO
Provided Middle Mile:	NO
Provided Last Mile:	NO
Provided Road Segments for census blocks greater than 2 sq miles:	NO
Provided Address Points for census block greater than 2 sq miles:	NO
Provided End User Category:	YES

Maximum advertised down/upload speeds reported by provider:

Max Download Category	Max Upload Category	Count
10	10	7

Typical down/upload speeds reported by provider: Not provided

Number of technology of transmission types reported by provider: 1

Count of Middle Mile Facilities: 0

End User Category: 4

Data Verification:

Counties served by provider and number of census blocks with service. A total of 11 census blocks are served.

County	Census Block s per County
Bristol	0
Kent	2
Newport	0
Providence	9
Washington	0

Greatest down/upload speed from Historical [1] speed tests: 7, 5
Greatest down/upload speed from RIEDC [2] speed tests: 8,6
Greatest down/upload speed from FCC [3] speed tests: No FCC speed tests were taken
Greatest down/upload speed from FCC Mobile Applications [4] speed tests: No FCC speed tests were taken

Count of Historical speed tests: 3
Count of RIEDC [2] speed tests: 1
Count of FCC [3] speed tests: 0
Count of FCC Mobile Applications [4] speed tests: 0

RIEDC and FCC speed tests outside of reported service area: 0

%/# of census blocks verified by RIEDC and FCC speed tests:

Confirmation of census block served	1
Census blocks served, not reported by provider	0
Total number of served census blocks reported by provider	11
% of served census blocks confirmed by speed test	9%

Footnotes:

1 Historical Date Range: 3/23/2009 to 3/22/2010
2 RIEDC Date Range: 3/23/2010 to 9/5/2011
3 FCC Date Range: 3/11/2010 to 6/30/2011
4 FCC Mobile Application Date Range: 3/11/2010 to 6/30/2011

Provider Name: Full Channel TV, Inc.
DBA: Full Channel

Data Characteristics

FRN:	0004973731
Type of Data Submitted:	Census Blocks
Census Block Count (unique):	1,089
Provided Technology of Transmission:	YES
Provided Max Advertised Download Speed:	YES
Provided Max Advertised Upload Speed:	YES
Provided Typical Download Speed:	YES
Provided Typical Upload Speed:	YES
Provided Middle Mile:	YES
Provided Last Mile:	NO
Provided Road Segments for census blocks greater than 2 sq miles:	NO
Provided Address Points for census block greater than 2 sq miles:	NO
Provided End User Category:	NO

Maximum advertised down/upload speeds reported by provider:

Max Download Category	Max Upload Category	Count
6	4	1,089

Typical down/upload speeds reported by provider: 6, 4

Number of technology of transmission types reported by provider: 1

Count of Middle Mile Facilities: 1

End User Category: Not provided

Data Verification:

Counties served by provider and number of census blocks with service. A total of 1,089 census blocks are served.

County	Census Blocks per County
Bristol	1,089
Kent	0
Newport	0
Providence	0
Washington	0

Greatest down/upload speed from Historical [1] speed tests: 10, 3 and 9, 9
Greatest down/upload speed from RIEDC 2010 [2] speed tests: 6, 4
Greatest down/upload speed from FCC 2010 [3] speed tests: 6, 4
Greatest down/upload speed from FCC 2010 [4] Mobile Applications speed tests: 6, 4

Count of Historical speed tests: 1,819
Count of RIEDC [2] speed tests: 17
Count of FCC [3] speed tests: 11
Count of FCC Mobile Applications [4] speed tests: 17

RIEDC and FCC speed tests outside of reported service area: 1

%/# of census blocks verified by RIEDC and FCC speed tests:

Confirmation of census block served	26
Census blocks served, not reported by provider	1
Total number of served census blocks reported by provider	1,089
% of served census blocks confirmed by speed test	2%

Footnotes:

1 Historical Date Range: 3/23/2009 to 3/22/2010
2 RIEDC Date Range: 3/23/2010 to 9/5/2011
3 FCC Date Range: 3/11/2010 to 6/30/2011
4 FCC Mobile Application Date Range: 3/11/2010 to 6/30/2011

Provider Name: Hughes Network Systems, LLC
DBA: Hughes

Data Characteristics

FRN:	0009559881
Type of Data Submitted:	Satellite
Census Block Count (unique):	N/A
Provided Technology of Transmission:	YES
Provided Spectrum Used:	YES
Provided Max Advertised Download Speed:	YES
Provided Max Advertised Upload Speed:	YES
Provided Typical Download Speed:	YES
Provided Typical Upload Speed:	YES

Maximum advertised down/upload speeds reported by provider:

Max Download Category	Max Upload Category
5	2

Typical down/upload speeds reported by provider: 5, 1

Number of technology of transmission types reported by provider: 1, with 1 spectrum

Data Verification:

Counties served by provider and number of census blocks with service. A total of 24,999 census blocks are served.

County	Census Blocks per County
Bristol	1,087
Kent	4,180
Newport	2,342
Providence	13,150
Washington	4,240

Greatest down/upload speed from Historical [1] speed tests: No speed tests were taken
Greatest down/upload speed from RIEDC [2] speed tests: No speed tests were taken
Greatest down/upload speed from FCC [3] speed tests: No speed tests were taken
Greatest down/upload speed from FCC Mobile Application [4] speed tests: 3, 2

Count of Historical speed tests: 0
Count of RIEDC [2] speed tests: 0
Count of FCC [3] speed tests: 0
Count of FCC Mobile Applications [4] speed tests: 3

RIEDC and FCC speed tests outside of reported service area: 0

%/# of census blocks verified by RIEDC and FCC speed tests:

Confirmation of census block served	3
Census blocks served, not reported by provider	0
Total number of served census blocks reported by provider	24,999
% of served census blocks confirmed by speed test	<1%

Footnotes:

1 Historical Date Range: 3/23/2009 to 3/22/2010
2 RIEDC Date Range: 3/23/2010 to 9/5/2011
3 FCC Date Range: 3/11/2010 to 6/30/2011
4 FCC Mobile Application Date Range: 3/11/2010 to 6/30/2011

Provider Name: Level 3 Communications, LLC
DBA: Broadwing

Data Characteristics

FRN:	0003723822
Type of Data Submitted:	Census Blocks
Census Block Count (unique):	6
Provided Technology of Transmission:	YES
Provided Max Advertised Download Speed:	YES
Provided Max Advertised Upload Speed:	YES
Provided Typical Download Speed:	YES
Provided Typical Upload Speed:	YES
Provided Typical Download Speed:	YES
Provided Middle Mile:	YES
Provided Last Mile:	NO
Provided Road Segments for census blocks greater than 2 sq miles:	NO
Provided Address Points for census block greater than 2 sq miles:	NO
Provided End User Category:	NO

Maximum advertised down/upload speeds reported by provider:

Max Download Category	Max Upload Category	Count
11	11	6

Typical down/upload speeds reported by provider: 11, 11

Number of technology of transmission types reported by provider: 1

Count of Middle Mile Facilities: 8

End User Category: Not provided

Data Verification:

Counties served by provider and number of census blocks with service. A total of 6 census blocks are served.

County	Census Block s per County
Bristol	0
Kent	0
Newport	0
Providence	6
Washington	0

Greatest down/upload speed from Historical [1] speed tests: 4, 4
Greatest down/upload speed from RIEDC [2] speed tests: 4, 4
Greatest down/upload speed from FCC [3] speed tests: 7,5
Greatest down/upload speed from FCC Mobile Applications [4] speed tests: No FCC Mobile speed tests were taken

Count of Historical speed tests: 30
Count of RIEDC [2] speed tests: 4
Count of FCC [3] speed tests: 1
Count of FCC Mobile Applications [4] speed tests: 0

RIEDC and FCC speed tests outside of reported service area: 5 of 5 speed tests were recorded outside the coverage area reported by provider

Middle mile facilities outside of reported service area: None of the 8 facilities reported are located within the reported service areas. The closest is within 400 ft, the furthest is 30 miles.

%/# of census blocks verified by RIEDC and FCC speed tests:

Confirmation of census blocks served	0
Census blocks served, not reported by provider	4
Total number of served census blocks reported by provider	6
% of served census blocks confirmed by speed test	0%

Footnotes:
1 Historical Date Range: 3/23/2009 to 3/22/2010
2 RIEDC Date Range: 3/23/2010 to 9/5/2011
3 FCC Date Range: 3/11/2010 to 6/30/2011
4 FCC Mobile App Date Range: 3/11/2010 to 6/30/2011

Provider Name: Lightower Fiber Networks
DBA: Lightower Fiber Networks

Data Characteristics

FRN:	00017625567
Type of Data Submitted:	Census Blocks
Census Block Count (unique):	8,186
Provided Technology of Transmission:	YES
Provided Max Advertised Download Speed:	YES
Provided Max Advertised Upload Speed:	YES
Provided Typical Download Speed:	YES
Provided Typical Upload Speed:	YES
Provided Middle Mile:	NO
Provided Last Mile:	NO
Provided Road Segments for census blocks greater than 2 sq miles:	NO
Provided Address Points for census block greater than 2 sq miles:	NO
Provided End User Category:	NO

Maximum advertised down/upload speeds reported by provider:

Max Download Category	Max Upload Category	Count
11	11	8,186

Typical down/upload speeds reported by provider: 11, 11

Number of technology of transmission types reported by provider: 1

Count of Middle Mile Facilities: 0

End User Category: Not provided

Data Verification:

Counties served by provider and number of census blocks with service. A total of 8,186 census blocks are served.

County	Census Blocks per County
Bristol	0
Kent	406
Newport	0
Providence	7,780
Washington	0

Greatest down/upload speed from Historical [1] speed tests: No speed tests were taken
Greatest down/upload speed from RIEDC [2] speed tests: No speed tests were taken
Greatest down/upload speed from FCC [3] speed tests: No speed tests were taken
Greatest down/upload speed from FCC Mobile Applications [4] speed tests: No speed tests were taken
Count of Historical speed tests: 0

Count of RIEDC [2] speed tests: 0
Count of FCC [3] speed tests: 0
Count of FCC Mobile Application [4] speed tests: 0

RIEDC and FCC speed tests outside of reported service area: No speed tests were taken

%/# of census blocks verified by RIEDC and FCC speed tests:

Confirmation of census block served	0
Census blocks served, not reported by provider	0
Total number of served census blocks reported by provider	8,186
% of served census blocks confirmed by speed test	0%

Footnotes:

1 Historical Date Range: 3/23/2009 to 3/22/2010
2 RIEDC Date Range: 3/23/2010 to 9/5/2011
3 FCC Date Range: 3/11/2010 to 6/30/2011
4 FCC Mobile App Date Range: 3/11/2010 to 6/30/2011

Provider Name: One Communications Corp.
DBA: One Communications

Data Characteristics

FRN:	0015337702
Type of Data Submitted:	Census Blocks
Census Block Count (unique):	452
Provided Technology of Transmission:	YES
Provided Max Advertised Download Speed:	YES
Provided Max Advertised Upload Speed:	YES
Provided Typical Download Speed:	NO
Provided Typical Upload Speed:	NO
Provided Middle Mile:	YES
Provided Last Mile:	NO
Provided Road Segments for census blocks greater than 2 sq miles:	NO
Provided Address Points for census blocks greater than 2 sq miles:	YES
Provided End User Category:	NO

Maximum advertised down/upload speeds reported by provider:

Technology	Max Download Category	Max Upload Category	Count
10	7	7	1
20	8	8	1
30	7	7	1

Typical down/upload speeds reported by provider: Not provided

Number of technology of transmission types reported by provider: 3

Total count of Middle Mile facilities: 17

End User Category: Not provided

Data Verification:

Counties served by provider and number of census blocks with service. A total of 452 census blocks are served.

County	Census Block per County
Bristol	13
Kent	40
Newport	38
Providence	338
Washington	23

Greatest down/upload speed from Historical [1] speed tests: 5, 5
Greatest down/upload speed from RIEDC [2] speed tests: 8, 8
Greatest down/upload speed from FCC [3] speed tests: 3, 2
Greatest down/upload speed from FCC Mobile Applications [4] speed tests: 3, 2

Count of Historical speed tests: 889
Count of RIEDC [2] speed tests: 42
Count of FCC [3] speed tests: 3
Count of FCC Mobile Application [4] speed tests: 3

Speed tests outside of reported service area: 14 of 48 speed tests were reported outside the coverage area reported by the provider.

Middle mile facilities outside of reported service area: All facilities are in the general area of served areas.

%/# of census blocks verified by RIEDC and FCC speed tests:

Confirmation of census block served	17
Census blocks served, not reported by provider	12
Total number of served census blocks reported by provider	452
% of served census blocks confirmed by speed test	4%

Footnotes:

1 Historical Date Range: 3/23/2009 to 3/22/2010
2 RIEDC Date Range: 3/23/2010 to 9/5/2011
3 FCC Date Range: 3/11/2010 to 6/30/2011
4 FCC Mobile Application Date Range: 3/11/2010 to 6/30/2011

Provider Name: Sprint Nextel Corporation
DBA: Sprint

Data Characteristics

FRN:	0003774593
Type of Data Submitted:	Wireless
Census Block Count (unique):	N/A
Provided Technology of Transmission:	YES
Provided Spectrum Used:	YES
Provided Max Advertised Download Speed:	YES
Provided Max Advertised Upload Speed:	YES
Provided Typical Download Speed:	YES
Provided Typical Upload Speed:	YES
Provided Middle Mile:	NO
Provided Last Mile:	NO

Maximum advertised down/upload speeds reported by provider:

Max Download Category	Max Upload Category
5	3

Typical down/upload speeds reported by provider: 5, 3

Number of technology of transmission types reported by provider: 1, with 2 spectrums

Data Verification:

Counties served by provider and number of census blocks with service. A total of 24,048 census blocks are served.

County	Census Blocks per County
Bristol	1,092
Kent	4,004
Newport	2,264
Providence	12,821
Washington	3,867

Greatest down/upload speed from Historical [1] speed tests: 6, 3
Greatest down/upload speed from RIEDC [2] speed tests: 8, 7
Greatest down/upload speed from FCC [3] speed tests: 7, 6
Greatest down/upload speed from FCC Mobile Applications [4] speed tests: 5, 5

Count of Historical speed tests: 10
Count of RIEDC [2] speed tests: 85
Count of FCC [3] speed tests: 5
Count of FCC Mobile Applications [4] speed tests: 291

RIEDC and FCC speed tests outside of reported service area: 4

%/# of census blocks verified by RIEDC and FCC speed tests:

Confirmation of census blocks served	70
Census blocks served, not reported by provider	1
Total number of served census blocks reported by provider	24,048
% of served census blocks confirmed by speed test	<1%

Footnotes:

1 Historical Date Range: 3/23/2009 to 3/22/2010
2 RIEDC Date Range: 3/23/2010 to 9/5/2011
3 FCC Date Range: 3/11/2010 to 6/30/2011
4 FCC Mobile Application Date Range: 3/11/2010 to 6/30/2011

Provider Name: StarBand Communications, Inc.
DBA: StarBand Communications, Inc.

Data Characteristics

FRN:	0005087457
Type of Data Submitted:	Satellite
Census Block Count:	N/A
Provided Technology of Transmission:	YES
Provided Spectrum Used:	YES
Provided Max Advertised Download Speed:	YES
Provided Max Advertised Upload Speed:	YES
Provided Typical Download Speed:	NO
Provided Typical Upload Speed:	NO

Maximum advertised down/upload speeds reported by provider:

Max Download Category	Max Upload Category
3	2

Typical down/upload speeds reported by provider: Not reported

Number of technology of transmission types reported by provider: 1, with 1 spectrum

Data Verification:

Counties served by provider and number of census blocks with service. A total of 25,181 census blocks are served:

County	Census Block per County
Bristol	1,092
Kent	4,183
Newport	2,452
Providence	13,157
Washington	4,297

Greatest down/upload speed from Historical [1] speed test: No speed tests were taken
Greatest down/upload speed from RIEDC [2] speed test: No speed tests were taken
Greatest down/upload speed from FCC [3] speed test: No speed tests were taken
Greatest down/upload speed from FCC Mobile Applications [4] speed test: No speed tests were taken

Count of Historical speed tests: 0
Count of RIEDC [2] speed tests: 0
Count of FCC [3] speed tests: 0
Count of FCC Mobile Applications [4] speed test: 0

RIEDC and FCC speed tests outside of reported service area: 0

%/# of census blocks verified by RIEDC and FCC speed tests:

Confirmation of census block served	0
Census blocks served, not reported by provider	0
Total number of served census blocks reported by provider	25,181
% of served census blocks confirmed by speed test	0%

Footnotes:

1 Historical Date Range: 3/23/2009 to 3/22/2010
2 RIEDC Date Range: 3/23/2010 to 9/5/2011
3 FCC Date Range: 3/11/2010 to 6/30/2011
4 FCC Mobile Application Date Range: 3/11/2010 to 6/30/2011

Provider Name: T-Mobile USA, Inc.
DBA: T-Mobile

Data Characteristics

FRN:	0006945950
Type of Data Submitted:	Wireless
Census Block Count (unique):	N/A
Provided Technology of Transmission:	YES
Provided Spectrum Used:	YES
Provided Max Advertised Download Speed:	YES
Provided Max Advertised Upload Speed:	YES
Provided Typical Download Speed:	NO
Provided Typical Upload Speed:	NO
Provided Middle Mile:	YES
Provided Last Mile:	NO

Maximum advertised down/upload speeds reported by provider:

Technology	Max Download Category	Max Upload Category
80	7	4

Typical down/upload speeds reported by provider: Not provided

Number of technology of transmission types reported by provider: 1, with 1 spectrum

Total count of Middle Mile facilities: 3

Data Verification:

Counties served by provider and number of census blocks with service. A total of 23,891 census blocks are served.

County	Census Blocks per County
Bristol	1,088
Kent	3,939
Newport	2,303
Providence	12,572
Washington	3,989

Greatest down/upload speed from Historical [1] speed tests: No Historical speed tests were taken
Greatest down/upload speed from RIEDC [2] speed tests: No RIEDC speed tests were taken
Greatest down/upload speed from FCC [3] speed tests: 2, 2
Greatest down/upload speed from FCC Mobile Applications [4] speed tests: 5, 3

Count of Historical speed tests: 0
Count of RIEDC 2010 [2] speed tests: 0
Count of FCC 2010 [3] speed tests: 1
Count of FCC 2010 Mobile Applications [4] speed tests: 62

RIEDC and FCC speed tests outside of reported service area: 0

Middle mile facilities outside of reported service area: The two facilities are within the reported service area, though are located within 280 ft of each other.

%/# of census blocks verified by RIEDC and FCC speed tests:

Confirmation of census blocks served	69
Census blocks served, not reported by provider	0
Total number of served census blocks reported by provider	23,891
% of served census blocks confirmed by speed test	<1%

Footnotes:

1. Historical Date Range: 3/23/2009 to 3/22/2010
2. RIEDC Date Range: 3/23/2010 to 9/5/2011
3. FCC Date Range: 3/11/2010 to 6/30/2011
4. FCC Mobile Application Date Range: 3/11/2010 to 6/30/2011

Provider Name: Verizon New England Inc.
DBA: Verizon

Data Characteristics

FRN:	0003628971
Type of Data Submitted:	Census Blocks, Road Segments
Census Block Count (unique):	18,479
Road Segment Count (unique):	626
Provided Technology of Transmission:	YES
Provided Max Advertised Download Speed:	YES
Provided Max Advertised Upload Speed:	YES
Provided Typical Download Speed:	NO
Provided Typical Upload Speed:	NO
Provided Middle Mile:	NO
Provided Last Mile:	NO
Provided Road Segments for census blocks greater than 2 sq miles:	YES
Provided Address Points for census blocks greater than 2 sq miles:	NO

Maximum advertised down/upload speeds reported by provider:

Technology	Max Download Category	Max Upload Category	Count
10	6	3	2,250
50	9	7	13,763

Typical down/upload speeds reported by provider: Not provided

Number of technology of transmission types reported by provider: 2

Total count of Middle Mile facilities: Not provided

Data Verification:

Counties served by provider and number of census blocks with service. A total of 18,522 census blocks are served (18,479 by census block data and 43 by road segment service data).

County	Census Blocks per County
Bristol	896
Kent	3,235
Newport	1,647
Providence	10,237
Washington	2,507

Greatest down/upload speed from Historical [1] speed tests: 10, 7 and 9, 8
Greatest down/upload speed from RIEDC 2010 [2] speed tests: 10,7
Greatest down/upload speed from FCC 2010 [3] speed tests: 9, 4 and 8, 8
Greatest down/upload speed from FCC 2010 [4] Mobile Application speed tests: 7, 7

Count of Historical speed tests: 44,322
Count of RIEDC [2] speed tests: 1,042
Count of FCC [3] speed tests: 383
Count of FCC Mobile Application [4] speed tests: 775

RIEDC and FCC speed tests outside of reported service area: 82 of the 2,200 speed tests outside of reported area

%/# of census blocks verified by RIEDC and FCC speed tests:

Confirmation of census block served	1,215
Census blocks served, not reported by provider	37
Total number of served census blocks reported by provider	18,479
% of served census blocks confirmed by speed test	4%

Footnotes:

1 Historical Date Range: 3/23/2009 to 3/22/2010
RIEDC Date Range: 3/23/2010 to 9/5/2011
2 FCC Date Range: 3/11/2010 to 6/30/2011
3 FCC Mobile Application Date Range: 3/11/2010 to 6/30/2011

Provider Name: Wild Blue Communications, Inc.
DBA: Wild Blue Communications, Inc.

Data Characteristics

FRN:	0007843766
Type of Data Submitted:	Satellite
Census Block Count (unique):	N/A
Provided Technology of Transmission:	YES
Provided Spectrum Used:	YES
Provided Max Advertised Download Speed:	YES
Provided Max Advertised Upload Speed:	YES
Provided Typical Download Speed:	NO
Provided Typical Upload Speed:	NO

Maximum advertised down/upload speeds reported by provider:

Max Download Category	Max Upload Category
4	2

Typical down/upload speeds reported by provider: Not provided

Number of technology of transmission types reported by provider: 1, and 1 spectrum

Data Verification:

Counties served by provider and number of census blocks with service. A total of 25,181 census blocks are served.

County	Census Blocks per County
Bristol	1,092
Kent	4,183
Newport	2,452
Providence	13,157
Washington	4,297

Greatest down/upload speed from Historical [1] speed tests: 4, 1
Greatest down/upload speed from RIEDC [2] speed tests: No speed tests were taken
Greatest down/upload speed from FCC [3] speed tests: No speed tests were taken
Greatest down/upload speed from FCC Mobile Application [4] speed tests: No speed tests were taken

Count of Historical speed tests: 0
Count of RIEDC [2] speed tests: 0
Count of FCC [3] speed tests: 0
Count of FCC Mobile Application [4] speed tests: 0

RIEDC and FCC speed tests outside of reported service area: 0

%/# of census blocks verified by RIEDC and FCC speed tests:

Confirmation of census block served	0
Census blocks served, not reported by provider	0
Total number of served census blocks reported by provider	25,181
% of served census blocks confirmed by speed test	0%

Footnotes:

4 Historical Date Range: 3/23/2009 to 3/22/2010
5 RIEDC Date Range: 3/23/2010 to 9/5/2011
6 FCC Date Range: 3/11/2010 to 6/30/2011
7 FCC Mobile Application Date Range: 3/11/2010 to 6/30/2011

Community Anchor Institutions: All categories

Data Characteristics

Type of Data Submitted:	Point
Feature Count:	984
Provided Technology of Transmission:	YES, INCOMPLETE (382 of 984)
Provided Subscribe Downstream Speed:	YES, INCOMPLETE (411 of 984)
Provided Subscribe Upstream Speed:	YES, INCOMPLETE (861 of 984)
Provided Street Address:	YES, COMPLETE
Provide Public Wifi:	YES, COMPLETE
Provided URL:	YES, INCOMPLETE (888 of 984)
Provided CAIID:	YES, INCOMPLETE (652 of 984)

Count of Community Anchor Institutions by category:

CAI Category	Count of Features
1 – School K through Grade 12	518
2 - Library	91
3 – Medical/healthcare	56
4 – Public safety	243
5 – Univ., college, other post-secondary	24
6 – Other govt support - govt	48
7 – Other govt support - nongovt	4

Maximum Subscribe down/upstream speeds reported by institutions:

CAI Category	Max Downstream Category	Max Upstream Category	Count
1	10	10	1
2	10	10	1
3	10	10	4
4	10	10	2
5	11	11	2
6	11	11	1
7	7	6	1

Number of technology of transmission types reported by provider: 9

Data Verification:

Greatest down/upload speed from Historical speed test: 10, 10
Greatest down/upload speed from RIEDC [1] speed test: 10, 8
Greatest down/upload speed from FCC [2] speed test: 9, 3 or 8, 8
Greatest down/upload speed from FCC Mobile Applications [3] speed tests: 7, 5

Count of RIEDC speed tests: 398
Count of FCC speed tests: 52
Count of FCC Mobile Applications speed tests: 79

Footnotes:

1 RIEDC Date Range: 3/23/2010 to 9/5/2011

2 FCC Date Range: 3/11/2010 to 6/30/2011

3 FCC Mobile Application Date Range: 3/11/2010 to 6/30/2011

Appendix A
Glossary of Key Terms

RIEDC: The Rhode Island Economic Development Corporation is the full service, official economic development organization for the state of Rhode Island. A quasi-public agency, the Corporation serves as a government and community resource to help streamline the business expansion in, and relocation to, Rhode Island.

BBRI: An initiative of the RIEDC, Broadband Rhode Island funded by the American Recovery and Reinvestment Act and focuses on broadband mapping and broadband planning in the State of Rhode Island.

Community Anchor Institute: Community Anchor Institutions (CAI) include Schools, libraries, medical and healthcare providers, public safety entities, community colleges and other institutions of higher education, and other community support organizations and entities.

NTIA: The National Telecommunications and Information Administration (NTIA) is an agency of the United States Department of Commerce that serves as the President's principal adviser on telecommunications policies pertaining to the United States' economic and technological advancement and to regulation of the telecommunications industry.

FCC: The Federal Communications Commission (FCC) is an independent agency of the United States government, created, Congressional statute, and with the majority of its commissioners appointed by the current President. The FCC works towards six goals in the areas of broadband, competition, the spectrum, the media, public safety and homeland security, and modernizing the FCC.

Census Block: A census block is the smallest geographic unit used by the United States Census Bureau for tabulation of 100-percent data (data collected from all houses, rather than a sample of houses). Several blocks make up block groups, which again make up census tracts.

Up Speed, Upstream Speed, Upload Speed: Measurement that describes how fast your connection can send data from your device.

Down Speed, Downstream Speed, Download Speed: Measurement that describes how fast your connection can deliver data to your device.

Transmission Type, Transmission Technology: Method by which users access broadband.

Types Include

- 10-Asymmetric xDSL
- 20-Symmetric xDSL
- 30-Other Copper Wireline
- 40-Cable Modem – DOCSIS 3.0
- 41-Cable Modem – Other
- 50-Optical Carrier/Fiber to the End User
- 60-Satellite
- 70-Terrestrial Fixed Wireless - Unlicensed
- 71-Terrestrial Fixed Wireless - Licensed
- 80-Terrestrial Mobile Wireless
- 90-Electric Power Line
- 0-All Other

Spectrum Used: From which band range on the radio frequency spectrum the broadband signal is transmitted.

Types Include

1-Cellular spectrum (824-849 MHz; 862-869) used to provide service
2-700 MHz spectrum (698-758 MHz; 775-788 MHz; 805-806 MHz) used to provide service
3-Broadband Personal Communications Services spectrum (1850-1915 MHz; 1930-1995) used to provide service
4-Advanced Wireless Services spectrum (1710-1755 MHz; 2100-2155) used to provide service
5-Broadband Radio Service/Educational Broadband Service spectrum (2496-2690 MHz) used to provide service
6-Unlicensed (including broadcast television white spaces) spectrum used to provide service
7-Specialized Mobile Radio Service (SMR) (817-824 MHz; 862-869 MHz; 896-901 MHz; 935-940 MHz)
8-Wireless Communications Service (WCS) spectrum (2305-2320 MHz; 2345-2360 MHz), 3650-3700 MHz
9-Satellite (L-band, Big LEO, Little LEO, 2 GHz, Ka-Band, Ku-Band)
10-Other
99-Unknown

Middle Mile: The segment of a telecommunications network linking a network operator's core network to the local network plant, typically situated in the central office

Last Mile: The final leg of delivering connectivity from a communications provider to a customer.

Section C: Data Processes and Submission Overview

Submission Summary

The Broadband Rhode Island Mapping Team (BBRI) Team, led by EA Engineering, Science & Technology, Inc. (EA) in its role as primary technical lead for the Rhode Island Broadband Mapping project, contacted 140 potential facilities-based broadband service providers (BSPs) and received data from 19 providers. An overall summary of the data submission is described below:

140 potential facilities-based broadband service providers were contacted
34 BSPs did not respond
3 BSPs responded but did not provide data
84 BSPs were identified as resellers of data
19 BSPs responded and provided data

Of those that provided data:

9 provided only census block information
1 provided census blocks and addresses
1 provided census blocks and road segments
8 provided wireless coverage areas

In addition, 8 of the 19 responsive BSPs provided middle mile infrastructure points and 2 of 19 responsive BSPs provided last mile infrastructure points.

Rhode Island Broadband Mapping Data Processes

Data Received From Providers – The process begins by receiving data from each provider that offers service in the State of Rhode Island (RI). Broadband data is currently received from 19 broadband facility based service providers within the State who have signed Non-Disclosure Agreements with RIEDC. Once all of the available data is received from a provider it is reviewed and archived in its native format. While the same data is requested from each provider the information often comes in different formats and with missing attribute and or spatial data. If attributes are missing from the dataset the provider is contacted to see if the missing information is available.

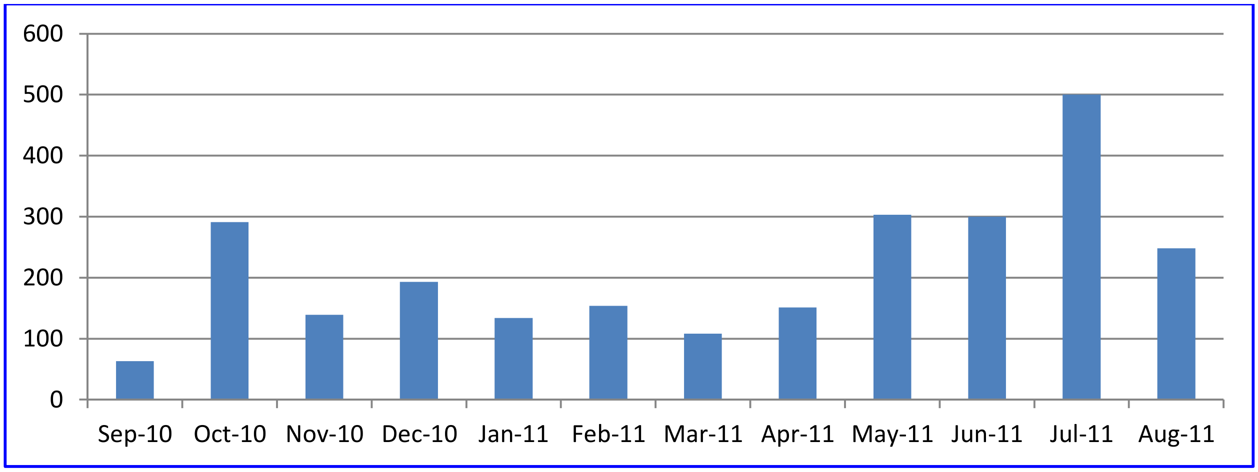
Data Evaluated & Processed – The EA project team gives the data spatial attributes through geocoding to the RI E911 data or by joining the data to the 2010 census block data. The attribute data is then formatted so that the database can easily be entered in the Broadband Rhode Island geodatabase. Speeds reported below broadband levels are removed from the dataset and archived. Data that is located in census blocks great than 2 square miles are loaded into either the address or street segment feature classes. All remaining data is loaded into the census block feature class. The data is loaded using Esri tools and software. The Broadband Rhode Island, or our data analysis geodatabase, stores the most recent broadband information.

Data is extracted from this geodatabase and formatted as needed to be used for the State's web map and our biannual NTIA submittals. Data is pulled from this analysis database, formatted to meet the web and NTIA formatting requirements, and loaded into either the NTIA transfer database or the web mapping database using custom built data extraction and loading tools.

- Community Anchor Institute (CAI) Data: The initial list of CAIs were received from the University of Rhode Island and populated into the BBRI database. This data was then compared to and updated using 3rd party datasets in order to create the most comprehensive CAI list available for RI. In order to collect the broadband data for the CAIs, the BBRI Team utilized a top down approach. The agencies that oversaw a large number of CAIs such as RINET and OSHEAN were contacted regarding the data collection. CAIs that still had missing attribute data after contacting these agencies were contact directly via phone and email. Once contacted, the CAIs were directed to an online survey. The online survey walked the user through a short questionnaire that collected the required CAI broadband data. At the end of the survey the user was directed to take a speed test in order to help with the data collection and verification process.

Data Verification – Once the data is loaded into the geodatabase the verification process can begin. This process is comprised of several steps to ensure that the actual facilities and services provided to the public match the provider's data being reported.

- Compared to Available Datasets -
  - Speed test – Using Ookla's speed test application, EA has been collecting speed test data for RI since March 2010. A breakdown of speed tests collected over the past year by EA, displayed by month, can be found in the table below. EA uses both the FCC speed tests collected for RI and the speed tests collected on the RI broadband website to get a better view of the actual speeds and coverage area providers are offering the public. The speed tests are geocoded and mapped by provider. (FCC speed test providers are identified by the speed test's IP address) Each provider's speed test data is compared to their stated coverage area. Discrepancies are noted and reported back to the provider. The provider either gives a reason for the discrepancy or instructs us to modify their coverage area to match the speed test data.



- User feedback - user feedback information is captured by both the FCC and RI's broadband mapping website. This information is reviewed on a case by case basis. Changes are made as needed to the data and reported to the provider, similar to the speed test data update process.

- Best practices for final data quality checks include the review and comparison to 3rd party datasets (such as the FCC's 477 data) with the information received from the providers. The FCC's data is used to check for previously unknown providers, perform spatial analysis and comparisons on the data, and to give a better understanding of our confidence in the data. Since FCC data is broken out by census tract the provider's data must be converted to the tract level in order to perform a full data comparison.

- Spatial Analysis of Coverage Area– Spatial Analysis is performed on each provider's data set. The analysis checks for small areas in populated sections of the state that are surrounded by coverage areas but do not show coverage. These "donut holes" in the data are reviewed and reported to the provider if we feel they have a high probability of actually being covered by the providers' broadband services.

- Physical Infrastructure Survey - As part of the expanding need to verify broadband coverage within RI, a physical infrastructure survey pilot project was performed for the Town of Foster. The physical infrastructure survey verified the physical broadband facilities present within the Town. EA performed the survey utilizing GPS equipment and industry knowledge to capture the actual location of strategic infrastructure facilities throughout Foster. The data was then mapped and analyzed to determine where wireline broadband service is theoretically available within the town. Structures outside of the identified theoretical service area were mailed surveys to determine if broadband was actually available at their location as well as collect additional broadband usage information from the residents.

- Provider Meetings - The BBRI Team held conference calls with broadband providers that had significant changes in their current data submittals or had identified issues that required a review. These conference calls were used as working sessions to review reasoning behind changes being made, discuss findings, address questions, and review edits being made to the provider's submitted dataset. Following the meetings, edits to the data were made final based on the information agreed upon. The reason for making each edit to the data was documented in case issues or questions arose in the future.

- 3rd Party Verification – A 3rd party, Mapping & Planning Services (M&PS), is used to do provide an independent review and a report on the status of each provider's data. These reports summarize the data collected and provide a second review of the verification steps listed above.

Data Analysis – In addition to the data verification steps, a complete summary of each provider's data and static broadband coverage maps are created for RIEDC. These maps are used to analyze existing data availability and plan for future broadband development and outreach projects.

Geodatabase Checks– Once the data is processed and verified the database is checked prior to submittal to the NTIA. This process is comprised of several steps to ensure that the information in the geodatabase is as accurate and complete and possible.

- Visual Checks - These visual checks inspect the data to ensure completeness, accuracy, and engineering logic. The visual inspection process employs random sampling techniques to validate feature placement and attribution. The random sampling is performed in accordance with ANSI standards for attribute inspection.

- Automated Checks – These checks are performed on 100% of the data. ESRI's Production Line Tool Set (PLTS) and the NTIA's QC toolbox are utilized for the automated check of the data. PLTS check for both schema and logical errors in the data. The following checks are performed on the data.

  - Geodatabase Format - Verify that the geodatabase's name and feature classes are correct per the corresponding RIEDC data model and NOFA requirements.
  - Coordinate System Errors - Check for proper projection definition.
  - Validity Checks - Verify the attribution fields in the tables and field values fall within the domain specified in the geodatabase.
  - Duplicate Item Values - Verify the uniqueness of attribute values within a user-specified item (such as Feature IDs).
  - Invalid Item Values - Checks for invalid codes using discrete values and ranges defined in the appropriate domain tables.
  - Spatial Logic Checks - Checks the geodatabase to validate minimum size polygons, minimum length lines, and dangles in line feature classes.

- If the geodatabase has passed all tests listed above, and has met the acceptance criteria, the dataset is considered passed and can be processed for delivery to RIEDC and the NTIA. If the geodatabase fails any test and does not meet acceptance criteria, the data is considered failed and will be returned with error reports to the data processing team for correction. Additional follow-up with the providers may be necessary to correct the issue(s). Once edits are completed or exceptions are documented, the geodatabase will be returned to the QC team for an additional sequence of all QC procedures. This process will be repeated until all tests have received a passing status or exceptions have been documented.

Section D: Rhode Island's Current Broadband Mapping Issues

This section lists the issues the BBRI Team has encountered and is currently developing mitigation efforts against. These issues are being reviewed by the BBRI Team in conjunction with other States and the NTIA. Recommended solutions to each issue have been or will be presented to the NTIA when they are available.

1. Currently the NTIA requires data at the address or street segment level for census blocks that are greater than 2 square miles in diameter. This is a model that was developed to work for all states. However, in the northeast region and RI in particular, the BBRI Team feels that the size standard for reporting at the address and street segment level should be smaller due to the higher density levels of population. The BBRI Team is currently looking into a size standard that would better fit RI.

2. Speed tests are currently being extensively utilized by the BBRI team. The tests are very good at showing that coverage is available in a given area, but the actual speeds reported vary widely from one test to the next. The speeds are inconsistent even if they are taken at the same location within minutes of one another. Therefore, the speed results taken from this test cannot be used to verify or populate provider's typical speeds.

3. When using the SBDD submission check tool, the CAI TransTech check failed on the basis of "unexpected values." Based on the National Broadband Map message board, this seems to be an issue with the submission check tool and not the database attributes. Therefore, no change was made to correct CAI TransTech value at this time. Updates to the check tool will be required in the future to eliminate this issue.

4. The NTIA's Data Package spreadsheet needs to be updated.
    a. For the "Data Package Home" tab, one of the questions still reference 2000 census blocks instead of 2010.
    b. For the "Providers Table" tab, we are required to list all potential providers that were contacted as part of this project. This means that resellers are listed even if we are not requesting data from them. There is no response in column F – "This Company provided data, will provide data, will not provide data, or is non-responsive" to match this category. The BBRI Team listed these resellers as "will provide data" and noted that no data is being collected from them in the comments column.

OFFICIAL OCTOBER 2011 UPDATE SUBMISSION TO THE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION UNDER THE STATE BROADBAND INITIATIVE GRANT PROGRAM FOR THE STATE OF SOUTH CAROLINA

CONNECT south carolina®

October 1, 2011

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SOUTH CAROLINA COVER LETTER

October 1, 2011

Ms. Anne W. Neville
SBI Grant Program Director
National Telecommunications and Information Administration
U.S. Department of Commerce
1401 Constitution Avenue, NW Room 4716
Washington, DC 20230

Dear Ms. Neville:

As the State Broadband Designated Entity, in partnership with Connect South Carolina, please accept this submission from Connected Nation on behalf of the state of South Carolina's State Broadband Initiative (SBI) Grant Program, known as Connect South Carolina.

These artifacts should be found to be compliant with the October 1, 2011, deadline for the semi-annual data update and in accordance with the terms of the July 1, 2009, Notice of Funds Availability (NOFA) and all subsequent clarifications pertaining to delivery of State-Level Mapping of Broadband Service Availability. This packet includes:

Inventory of Deliverables, Connect South Carolina: October 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing
Appendix A: 4	n/a	Community Anchor Institutions-Narratives
VII.A.1(a)	n/a	Accuracy and Verification Report

n/a	DataPackage.xlsx	Worksheets of Contact Information, Record Count, and Provider Summary Table
n/a	n/a	List of Changes and Corrections to the Dataset
n/a	n/a	Non-Participating Provider Narratives
n/a	n/a	Broadband Provider Roster and Participation Status

In addition, this data update submission should be found to be compliant with the additional program requirements instituted by the National Telecommunications and Information Administration since the time of the April 2011 SBI data submission for the Connect South Carolina program. Specifically, these new requirements are:

SBI Data Transfer Model
The submission of the broadband dataset for October 1, 2011, is contained within the SBI Data Transfer Model as released on the Grantee Workspace on June 30, 2011. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information on each provider as possible.

Additional Submission Guidance
This submission also includes a list of changes and corrections made to the dataset between the April 2011 submission and the October 2011 submission. This represents a summary of why data displays and/or supplied speeds, etc. are different from the previous submission. Changes can include upgrades to infrastructure to allow for higher throughput speeds for customers, an expansion of the service area (e.g. additional fixed wireless towers, recently activated DSLAMs, etc.), or a new provider in the marketplace. Corrections can include revisions to speed tier information that was previously reported incorrectly or the addition of a previously existing provider that has not yet been submitted in a semi-annual dataset.

This October 2011 semi-annual data update under the State Broadband Initiative Grant Program continues to demonstrate our dedication to implementing the joint purposes of the Recovery Act and the Broadband Data Improvement Act (BDIA) by gathering comprehensive and accurate state-level broadband mapping data, developing state-level broadband maps, aiding in the development and maintenance of the National Broadband Map, and undertaking statewide initiatives for broadband planning.

Broadband Service Availability — Provider Outreach and Verification

This data update submission under the SBI program includes datasets for 86 percent of the South Carolina provider community, or 43 of 50 total providers. Of the 43 participating providers, 25 supplied an update to their network or coverage area(s), while 17 have reported no change. The one remaining provider previously supplied data but was non-responsive in the October 2011 update effort; therefore its previous dataset is being put forward as part of this compilation. A complete roster by provider depicting participation status and contact record is contained herein. Of the 7 providers that are not represented in the attached datasets, 5 have refused to participate in the voluntary program or were non-responsive to multiple contact attempts, and 2 providers are currently in some form of progress toward data submission but were not able to submit coverage areas at the time of this submission.

As the aforementioned roster and attached methodology documentation will attest, it is the collective opinion of the Connect South Carolina principals that all commercially reasonable efforts were made to account for 100 percent of the known South Carolina broadband provider community, pursuant to this semi-annual data update submission.

Connect South Carolina has also continued to perform broadband verification activities through several means. In addition to confirmation of service area(s) by each provider, Connect South Carolina conducts field validation efforts. To date, 32 (64 percent) providers have been validated through field verification activities. Additional details on verification activities are contained within the Field Validation Methodology.

The Connect South Carolina website, www.connectsc.org, continues to serve a prominent role in the outreach and data collection effort. This program asset provides a way for the general public to participate in the process by offering interactive tools for users to test their connection speed, submit broadband inquiries, or contact a program representative.

As an indicator of stakeholder penetration, the Connect South Carolina website encountered 3,597 unique visits during this reporting period (9,922 total to date for the life of the grant awarded on December 20, 2009). Additionally, this pronounced Web activity netted 25 broadband inquiries over this same reporting period (97 grant inception to date). The website also provides the BroadbandStat application, which allows the consumer to confirm or dispute the coverage represented on the broadband inventory map. These consumer-initiated actions are facilitated through the Connect South Carolina website and the Connect South Carolina interactive mapping tool (BroadbandStat) that offer the citizens the vehicles to provide information regarding availability in their respective service area, either in affirmation or contest of the reported data represented in the Connect South Carolina mapping artifacts. Since the initial data collection and release of corresponding maps, feedback in the form of broadband inquiries has allowed Connected Nation to identify additional areas that are in need of field validation, which is scheduled as soon as possible.

Community Anchor Institutions

Connect South Carolina has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBI NOFA Technical Appendix.

Outreach was conducted during this data update reporting period by Connect South Carolina to continue identification of existing, centralized sources for CAI connectivity data. Connect South Carolina has worked extensively with the South Carolina Division of State Information Technology to secure robust data for K-12 schools and libraries that subscribe to services provided through its state-managed broadband connectivity contract in addition to other institutions on its MetroE and MPLS connections. Additionally, outreach was coordinated to distribute a CAI survey to institutions throughout the state through multiple methods including a customized online survey available on the Connect South Carolina website. During this reporting period Connect South Carolina has continued to develop relationships with statewide associations such as State Library of South Carolina to promote the importance of broadband connectivity at anchor institutions and participation in this data collection process. Connect South Carolina will continue to build upon these new relationships over the coming months and utilize its contacts throughout the state to collect data and raise awareness of this project.

During this reporting period a Connect South Carolina CAI newsletter has been drafted to assist with outreach and highlight the innovations taking place at libraries within the state. From our work in South Carolina, as well as other states, we recognize the great value of this data to future collaboration efforts within the state as well as its value to the National Broadband Map. We plan to continue to bring best practices to the Connect South Carolina efforts, along with an investment of both human and technical resources required to reach our goal of increasing the data that is secured and reported as part of this process.

The Connect South Carolina program exists to improve data on the deployment and adoption of broadband services and to assist in the extension of broadband technology across all regions of the great state of South Carolina as well as the United States through contribution to the National Broadband Map. We look forward to the continuing work ahead.

Respectfully submitted,

Thomas W. Ferree
Chief Operating Officer
Connected Nation, Inc.

DATA ACQUISITION: SOUTH CAROLINA COMMUNITY ANCHOR INSTITUTIONS METHODOLOGY

In this fourth reporting period of the SBI, Connect South Carolina has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBI NOFA Technical Appendix. During this reporting period Connect South Carolina has continued to focus efforts on conducting outreach and raising awareness of this important project.

Connect South Carolina has continued to identify and process CAI data obtained through an ongoing statewide outreach campaign. Physical address information continues to be augmented through manual sourcing and geocoded by Connect South Carolina through ESRI ArcGIS software.

Connect South Carolina continues to utilize a customized online survey hosted through SurveyMonkey, with a landing page on the Connect South Carolina website that was developed during the first reporting period. This survey, in combination with a customized data-gathering spreadsheet, was distributed to a targeted list of CAI throughout the state. Connect South Carolina will continue to use these data-gathering tools for future targeted outreach efforts throughout the coming months leading up to the next reporting period. These materials are customized to fit the CAI categories as defined in the SBI NOFA.

The survey can be accessed at this link using the following password:
http://www.connectsc.org/mapping_&_research/Community_Anchor_Institution_Data_Collection.php
Password: CAI_SC_3266

During this reporting period Connect South Carolina conducted research in coordination with the state of South Carolina to identify existing, centralized sources for CAI connectivity data. Connect South Carolina has formed a strong partnership with the South Carolina Division of State Information Technology (DSIT) to gather connectivity data across all CAI sectors within the state that utilize the services of its state network. DSIT submitted connectivity information for thousands of CAI during this reporting period, and a large number of those were included in this submission. Connect South Carolina will continue processing this data leading up to the April 2012 submission.

In tandem with these efforts to identify existing data, Connect South Carolina continues to identify key CAI contacts in an effort to distribute and promote the online survey and raise awareness of the importance of CAI broadband connectivity. Connect South Carolina has formed a number of new relationships this reporting period with key CAI associations including the South Carolina State Library. Connect South Carolina and the State Library have been working together to raise awareness about the project across the state and will continue to seek updated data from libraries across the state.

Connect South Carolina has an ongoing mission to educate CAI throughout the state on the importance of participating in the project. Participation by these institutions will raise awareness about the importance of broadband connectivity and the need to report the requested data for inclusion on the National Broadband Map. During this reporting period Connect South Carolina developed and distributed a CAI newsletter to CAI contacts throughout the state across all CAI sectors. This newsletter highlights Fast Forward, a Columbia, South Carolina non-profit that offers technology training and encourages institutions to share their data by participating in the CAI online survey. This newsletter will be utilized for outreach, be made available on the CAI page of the Connect South Carolina website, and be updated over the next reporting period.

A CAI summary of all processed and submitted data is provided below:

CAI Type	Total	Physical Address	Lat/Long	Technology of Transmission	Download Speed	Upload Speed
K-12	1,766	1,766	1,763	1,097	1,096	1,096
Libraries	230	230	230	184	184	184
Healthcare	222	222	222	126	127	127
Public Safety	581	581	581	142	139	138
Higher Ed Institutions	144	144	144	85	83	83
Other Government	461	461	459	411	411	411
Other Non-Government	51	51	51	44	44	44
Total	**3,455**	**3,455**	**3,450**	**2,089**	**2,084**	**2,083**

SBI Data Submission Methodology

The submission of the broadband dataset for October 1, 2011, is contained within the SBI Data Transfer Model and additional components as released on the Grantee Workspace on June 30, 2011. Connected Nation has reviewed all literature that relates to the release and use of this data transfer model and recognizes that it does not replace or dictate how data is stored, processed, or displayed for the state, as it is meant primarily as a means to transfer the broadband data from all states and territories and populate the National Broadband Map in a seamless fashion. Guidance from the Technical Mapping Guide, as released on the Grantee Workspace on March 24, 2011, was also followed to ensure the completeness and validity of the submission through completion steps and checklists, completing the DataPackage spreadsheet, uploading broadband datasets into the Data Transfer Model, and checking the dataset using the SBDD_CheckSubmission receipt process.

As part of the ongoing review and analysis process, NTIA has requested further information in the submission of the DataPackage spreadsheet. In addition to the information on providers whose coverage and accompanying attributes are submitted in the SBI Data Transfer Model, information on other providers that are considered to be non-viable is also included in the DataPackage. Providers deemed non-viable that have been excluded from continued outreach may have been eliminated for reasons such as (i) the company offers Internet service but at speeds below the current definition of broadband; (ii) the company was listed in advertisements as a broadband provider, but is actually a network solution or consulting firm, etc.; (iii) the company may build or install network infrastructure, but does not actually provide the broadband service to consumers; and (iv) the company has gone out of business. The submitted DataPackage includes any relevant information that has been obtained through the course of due diligence and/or direct provider outreach, such as a Federal Registration Number (if applicable), the company's URL, the existence of an executed Nondisclosure Agreement, and brief notations regarding the status of the company.

In addition to the methodologies contained herein, as well as the DataPackage.xls containing contact information, the data dictionary, and a provider summary table, the following feature classes are submitted within the SBI Data Transfer Model for the state of South Carolina.

Inventory of Deliverables, Connect South Carolina: October 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area.
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles.
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address.
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points.
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing.

The provider data collected by Connected Nation on behalf of the state of South Carolina have been formatted per the given specifications and uploaded into the appropriate feature classes of the SBI Data Transfer Model. Wireline availability is contained within census blocks and road segments, wireless availability is contained as polygons of coverage areas, and middle-mile connections and Community Anchor Institutions are contained as point data. All speed data is contained at the census block, road segment, or wireless polygon level of availability. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information as possible.

Connected Nation has continued outreach to satellite providers on their availability, technology, and speed information, but granular coverage is not yet available. Submitted within the wireless feature class are the satellite companies providing service to South Carolina as a polygon of the state boundary. Efforts will continue to collect, process, or otherwise create more granular satellite data based on availability analyses and guidance received from NTIA.

Provider Changes and Corrections for October 2011

As requested by the SBI Program Office, a listing of the changes and/or corrections to the datasets between the April 2011 and October 2011 submissions is included in this narrative. This information is presented in this section as well as in the Broadband Provider Log. Changes to the data include expansion of service area(s), activation of new wireless towers, and upgrades to the network to provide higher download speeds to consumers. Corrections to the dataset include the addition of previously existing providers whose coverage has never been submitted, revision of coverage or speed information that was incorrect, and any other items that were misrepresented in the April 2011 dataset.

Changes

- Chester Telephone Company (DSL): Provider upgraded infrastructure and can now offer speed tier 7 download speeds.
- Chester Telephone Company (cable, fiber): Provider coverage area expanded.
- Farmers Telephone Cooperative, Inc. (mobile wireless): Provider expanded coverage area.
- Frontier Communications Corporation (DSL): Provider expanded coverage area.
- Frontier Communications Corporation (fiber): Provider upgraded part of its infrastructure, and can now provide fiber service to portions of its coverage area.
- Home Telephone Company, Inc. (fiber): Provider expanded coverage area.
- Piedmont Rural Telephone Cooperative, Inc. (mobile wireless): Provider expanded coverage area.
- Rock Hill Telephone (fiber) (d.b.a. Fort Mill Telephone Company): Service expansion.
- Rock Hill Telephone (fiber) (d.b.a. Rock Hill Telephone Company): Service expansion.
- Rock Hill Telephone Company (mobile wireless): Provider expanded coverage area.
- West Carolina Rural Telephone Cooperative, Inc. (fiber): Provider's entire service area upgraded to fiber.

Corrections

- DISH Network Corporation (satellite): Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
- Family View CableVision (cable): Provider submitted initial data for October 2011 submission.
- Hughes Network Systems, LLC (satellite): Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
- Knology of South Carolina, Inc. (cable): Provider submitted initial data for October 2011 submission.
- Rock Hill Telephone (fiber) (d.b.a. Lancaster Telephone): Provider's coverage area reduced slightly for a more accurate representation.
- Rock Hill Telephone (fiber) (d.b.a. Fort Mill Telephone Company): Corrections made to previous dataset.
- Rock Hill Telephone (fiber) (d.b.a. Rock Hill Telephone Company): Corrections made to previous dataset.
- WildBlue Communications, Inc. (satellite): Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.

Changes and/or Corrections – Entirely New Dataset Submitted

- AT&T Inc. (DSL, mobile wireless)
- CenturyLink (DSL)
- Charter Communications, Inc. (cable)
- Clearwire Corporation (mobile wireless)
- Comcast Cable Communications, LLC (cable)
- Horry Telephone Cooperative (cable, DSL, fiber, mobile wireless)
- Leap Wireless International, Inc. (mobile wireless)
- Rock Hill Telephone Company (cable)
- Sprint Nextel Corporation (mobile wireless)
- T-Mobile USA, Inc. (mobile wireless)
- TDS Telecommunications Corporation (DSL)
- Time Warner Cable LLC (cable)
- United States Cellular Corporation (mobile wireless)
- Verizon South, Inc. (mobile wireless)
- Windstream Communications (DSL)

SOUTH CAROLINA FIELD VALIDATION METHODOLOGY

Connected Nation focused a portion of its time on specific validation processes such as:

- conducting random spectrum analysis studies throughout the state using an Avcom PSA-37-XP spectrum analyzer;
- conducting mobile speed tests throughout the state using an iPhone, Android (or other smart phone) as well as provider-specific aircards (Sprint 3G/4G, Clearwire et al);
- identifying pre-selected, provider-submitted wireless transmit tower sites and cross-referencing data about that tower against the Federal Communications Commission (FCC) databases such as Antenna Structure Registration and/or the Universal Licensing System;
- cross-referencing Federal Registration Number data against available FCC Form 477 data as well as the FCC **CO**mmission **RE**gistration **S**ystem (CORES);
- validating provider submitted data (for example: latitude/longitude) using a handheld Garmin eTrex Summit GPS unit or GPS enabled software such as Microsoft Streets and Trips;
- locating physical wire-line attributes (such as Remote Terminals, CATV plant, etc.) and comparing them against provider submitted data; and
- conducting on-net and off-net speed tests using the FCC portal at http://www.broadband.gov/qualitytest/about/ or using the Ookla Net Metrics enabled speed test utility located on each of Connected Nation's state specific websites.

Additionally, Connected Nation cross-referenced numerous public documents in order to ensure that all known broadband providers were located and contacted. This included searching membership logs from the trade associations (WISPA, WCAI, PCIA, etc.), the Cable Television Fact

Book, Public Utility Commission records, Public Service Commission records, Chamber of Commerce, etc.

To date, Connected Nation's staff conducted on-site validation tests in South Carolina on the following providers: Almega Cable; AT&T, Inc.; Atlantic Broadband; CenturyLink; Charter Communications; Chester Telephone Company; Clearwire Corporation; Electronics Service Company of Hamlet LLC; Fairfield Communications; Family View Cable; Farmers Telephone Company Cooperative, Inc. (d.b.a. FTC Communications); Frontier Communications of the Carolinas; Globalvision; Harron Communications; Home Telephone Company, Inc.; Main Street Wireless; NTInet, Inc.; Palmetto Rural Telephone (d.b.a. Low Country); Pee Dee Online; Pee Dee Net; PRT Communications; Rock Hill Telephone (d.b.a. Comporium; PBT Communications); Sandhill Telephone Cooperative; Sky Runner; Southern Coastal Cable LLC; Sprint Nextel Corporation; Time Warner Cable, Inc.; T-Mobile; tw telecom; US Cellular; Verizon South; and Windstream.

From program initiation through this reporting period, Connected Nation has completed in-the-field validation testing against 32 companies (out of a universe of 50 viable providers) totaling 64 percent within the state of South Carolina.

Connected Nation has also continued to review provider datasets for accurate speed information, platform listings, and other intricacies that may fall outside of the standard SBI Data Transfer Model parameters. Any providers whose submitted coverage and attributes are anticipated to come into question have been further reviewed and confirmed; details on a case-by-case basis are presented below.

Charter
Issue: Technology of transmission 41 with maximum advertised download speed in tier 8, higher than expected value range for the technology.
Resolution: Provider representative confirmed that speed tier 8 is available without the use of DOCSIS 3.0 technology.

Comcast
Issues: 1) Technology of transmission 40 with maximum advertised download speed in tier 7, lower than expected value range for the technology, and 2) technology of transmission 41 with maximum advertised download speeds in tiers 9 and 10, higher than expected value range for the technology.
Resolution: Provider website advertises 105 Mbps; screenshot available below. However, additional input from provider on the technology listings and corresponding speed tiers was not received prior to the submission; dataset submitted as-is and work will continue to provide more accurate dataset in April 2012.

Comporium Cable Systems
(Carolina Telecom, Catawba Services, Palmetto Cable TV, and Video Vision)
Issue: Technology of transmission 40 with maximum advertised download speed in tier 7, lower than expected value range for the technology.
Resolution: Provider representative confirmed that DOCSIS 3.0 is in use across entire service area, even with lower speeds.

ACCURACY AND VERIFICATION: PROVIDER VALIDATION METHODOLOGY

Broadband providers maintain their service area data in many different formats, all in varying levels of complexity and granularity. In order to ensure that the data required by the NTIA is standardized across all providers and that it is as accurate as possible, Connected Nation translates and formats the data that providers are able to supply into a GIS shapefile and produces maps for the provider to review. The resulting map(s) and review process allow for providers to see their service area in a geographic format – for some providers, this is the first time they have seen maps of their broadband service area. Having the mapped service area allows providers to quickly identify any issues that appear in the data representation, whether the issue is in the data translation into a GIS format or from the original data collection and submission. Often data is provided from various sources and through the review and revision process, local engineers who operate the networks and work in the field are able to ensure that the tabular data that has been submitted is accurate and represents the real-world network extent. Any issues in how the service area is represented on the map(s) are remedied by Connected Nation, whether they are additions, removal of service, or any other revisions. Revised maps of service area representations are sent to the provider for review and approval; Connected Nation will revise data and return maps as many times as necessary until the provider is in agreement that the map represents their service area as accurately as possible. Once the review process has been completed and final approval of the data is provided, the data is deemed ready for NTIA submission.

Once the data collection has been aggregated at a statewide level, static maps of statewide and county-level availability are produced and made publicly available. In addition, consumers can visit the interactive online tool, BroadbandStat, to create customized views of broadband service areas and analyze corresponding demographic information. Leveraging broadband service data on various platforms allows for public users, providers, and other stakeholders to review, scrutinize, and provide feedback on the represented data. This feedback becomes a validation method in itself as consumers submit inquiries to Connected Nation either affirming where service is not available or identifying areas where broadband service is shown on the map, but in actuality is not available. This allows for a follow-up to providers regarding revisions to the data as it is represented; it also allows for Connected Nation to identify locations where on-site visits may be necessary to complete field validation of available services. Public feedback on all forms of mapping products serves as a localized validation method for provider-supplied information and allows Connected Nation to resolve inaccuracies as they are identified to ensure that only the highest quality information is provided to stakeholders.

Estimates derived from provider-validated data indicate that approximately 4.20 percent of South Carolina households do not have terrestrial fixed broadband service available, and approximately 0.35 percent[1] of South Carolina households have neither mobile nor fixed broadband service available.[2]

Within rural areas of the state, results derived from provider-validated data indicate that approximately 5.60 percent of rural South Carolina households do not have terrestrial fixed broadband service available, and approximately 0.48 percent[3] of rural South Carolina households have neither mobile nor fixed broadband service available.[4] Please note that the availability estimates presented are based on Census 2000 household information; these figures will be updated in the near future with Census 2010 household information.

WIRELESS METHODOLOGY

Broadband Service Availability in Provider's Service Area
Wireless Services Not Provided to a Specific Address

Data solicited from a fixed wireless provider to create propagation models include, but are not limited to:

1. The name of the structure
2. Whether the transmitting device is operational or proposed
3. The maximum advertised downstream speed, the maximum advertised upstream speed
4. The typical downstream speed, the typical upstream speed (peak periods for both)
5. The frequency range of spectrum being used (as prescribed by NTIA)
6. The primary population center(s) being served (for geopolitical boundary reference)
7. The physical address of the transmit site (in the event latitude/longitude is unavailable from the provider this allows a quick reference point for geocoding)
8. Latitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
9. Longitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
10. Antenna pattern (e.g. omni-directional, 180°, 120°, 90°, etc.)
11. Azimuth of antenna (e.g. 360° with magnetic declination if known)

[1] In accordance with NTIA's definition of available broadband service as specified in the SBI NOFA, this estimate includes both terrestrial fixed *and* mobile broadband service, if the service offers download speeds of at least 768 Kbps and upload speeds greater than 200 Kbps.

[2] Due to the nature of the SBI data collection methodology as defined by the NTIA and based on both census block geographic units and street segment data, the estimates of broadband availability derived from provider-validated data may include an overstatement of the actual number of households with broadband availability. Under the census block-based data collection method, a provider will typically report broadband availability for an entire census block whether its network is present across the whole or only a subset of that census block. This potential overestimation at the census block level can be amplified as the data is aggregated across the entire state.

[3] See footnote 1.

[4] See footnote 2.

12. Approximate transmit radius (in feet, miles, or kilometers)
13. Polarity of transmit antenna (Vertical or Horizontal)
14. Transmit antenna gain (in dBi)
15. Line loss (applicable only to providers using coax, heliax, waveguide or other forms of cabling – excludes power-over-Ethernet devices)
16. Mechanical and/or Electrical beam tilt (if applicable)
17. Equipment Manufacturer (allows easy cross-reference against manufacturer's specification sheet)
18. Power output of the transmitting device (if unknown, FCC standards or manufacturer specifications are applied)
19. AMSL at base of tower site
20. Antenna centerline AGL (height of antenna above ground level measured at the centerline of the actual antenna)
21. Foliage factors (Evergreens/Deciduous and percent of ground cover)
22. Ground Clutter (primarily used in rural areas to account for foliage and in metropolitan areas to account for types and heights of buildings if known)
23. Average gain of receive antenna
24. Receive antenna is estimated at height above average terrain (HAAT) of 6.2 meters/20 feet.
25. Federal Registration Numbers (if applicable) which may allow opportunities to cross-reference and/or obtain additional data from the Federal Communications Commission Universal Licensing System and the **CO**mmission **RE**gistration **S**ystem.

Propagation modeling is an empirical mathematical formulation for the characterization of radio wave propagation as a function of frequency, distance, and other conditions. Propagation software(s) typically use the Irregular Terrain Model (also known as Longley-Rice) of radio propagation for frequencies between 20 MHz and 20 GHz. This model is based on electromagnetic theory and statistical analyses of the combination of terrain features and radio measurements, then predicting the median attenuation of a radio signal as a function of distance and the variability of the signal in time and in space. For metropolitan areas, the software can typically be adjusted to use the Okumura-Hata model which accounts for predicting the behavior of cellular transmissions in areas where buildings are the primary obstructions. The resulting product from either model depicts a graphical illustration of the theoretical propagation characteristics of a selected frequency range based on defined variables (receiver sensitivity of the home/mobile device, foliage factor, and digital elevation terrain input).

After converting propagation models into a geospatial format, additional processing is completed to remove the small pixels representing service present in the resulting dataset. These areas are initially created based on the parameters entered in the software from the provider equipment information, the underlying data parameters of elevation, hillshade, etc., and the limitations of the software itself to display a broadband service area as accurately as possible. Generally, these random pixel striations appear as a result of signal levels reaching the highest elevated points within the prescribed radius. Typically, while this pixilation anomaly shows legitimate areas where signals can be received, these highly elevated points may have exceedingly sparse populations or are entirely void of population. As a result, and congruent to the *Wireless Technology Methodologies and Business Logic* white paper submitted to NTIA on January 20, 2011, all independent pixels representing service that are less than 0.125 square mile in area have been removed from the geospatial representation of each wireless provider.

BROADBAND INQUIRIES METHODOLOGY

Connected Nation collects consumer feedback in the form of broadband inquiries (BBIs). These inquiries represent any type of communication received from the public regarding broadband service. Once BBIs are received across the state, this information is overlaid with the broadband availability information which was collected through the SBI program. This allows for a real-world comparison of the broadband landscape to the information received from broadband inquiries. Consumers submitting these inbound comments and/or inquiries are able to provide information regarding three categories: 1) residents who do not have broadband but want it; 2) residents who have broadband but want a different provider; and 3) residents who do not have broadband, but the broadband inventory maps indicate that they do.

BBIs are submitted frequently by consumers via the Connect South Carolina website. Inquiries often seek help to identify local broadband provider options, or to learn when a specific provider may be able to provide service to that consumer. Consumer comments also provide information which may help modify maps with actual service area information. The primary objectives of Connected Nation regarding these inquiries are 1) to improve the accuracy of the state maps with submitted consumer information and follow-up field research; 2) to provide broadband options to consumers through cooperation with mapped providers and by facilitating new broadband service options; and 3) to map and analyze information from consumers about areas of unmet broadband demand and alternatives to currently mapped services.

New BBIs are assigned to either the GIS department or the Engineering & Technical Services (ETS) team depending on the category entered by the consumer on the website submission form. The GIS or ETS team members respond to each inquiry according to the information requested by the consumer. Many BBIs can be resolved through desktop research; however, if a BBI requires research in the field, the assigned ETS team member conducts such research when performing field validations in the area of the inquiry, or at other such time as is practical and appropriate. GIS and ETS team members respond to and conclude BBIs via telephone contact and/or e-mail communication.

The broadband inquiry process has been implemented in each of the Connected Nation state programs with successful results. Altogether Connected Nation has received over 17,000 broadband inquiries since 2007, allowing the state programs to evaluate each inquiry for broadband demand and data verification. These inquiries are continuously examined against current broadband availability, updated every six months, to determine if previously unserved households have been expanded to and can now receive broadband at their residence. This database of broadband inquiries has also allowed the Connected Nation state programs to aggregate demand in concentrated areas to show providers the exact locations where the population has made it clear that they would purchase broadband if it was made available to them. Providers in the states have responded to this process and have expanded to areas knowing that their investment will be worthwhile. Data verification methods have also proven successful, as the state programs have been able to show those inquiries that indicate the broadband service areas are misrepresented on the map to providers, who then verify where service cannot reach in regard to that residence(s). The broadband coverage in these states has been altered to create a more accurate map based on the inquiries submitted by the public.

During this reporting period, the Connect South Carolina project has received a total of 25 inquiries (97 grant inception to date). As more inquiries are submitted to Connect South Carolina, a more thorough validation of the broadband landscape can be performed, while also allowing providers to see which areas have a high demand for broadband adoption.

BroadbandStat Methodology

BroadbandStat is an online, interactive mapping tool for viewing, analyzing, and validating broadband data. Developed through a partnership with ESRI, the market leader in geographic information system (GIS) software, BroadbandStat is a multi-functional, user-friendly way for local leaders, policymakers, consumers, and technology providers to devise a plan for the expansion and adoption of broadband.

First and foremost, BroadbandStat allows consumers to locate their residence and identify providers that offer broadband Internet service to that location. The interactive platform allows for users to build and evaluate broadband expansion scenarios using a wealth of data, including education and population demographics, broadband availability, and research about the barriers to adoption.

New functionality in BroadbandStat allows the consumer to provide feedback on the broadband data displayed on the interactive map. Through the collection of this feedback, a visual demand for broadband is presented. This visualization allows the Connected Nation state programs the ability to validate the broadband availability for accuracy. If residents within a region state they are without broadband, but the interactive map shows otherwise, this allows Connected Nation to approach the providers within that area in an effort to trim down their coverage to more accurately represent real-world availability on the ground.

The Connect South Carolina project launched BroadbandStat on May 21, 2010, and has received a total of 5,189 visits to date, of which 2,609 occurred this reporting period.

Speed Test Methodology

The 91 speed tests that are represented in the Connect South Carolina Speed Test Report during this reporting period (414 grant inception to date) are the result of a partnership between Connected Nation and Ookla Net Metrics. Utilizing this relationship increases the level of confidence in the data being collected and provides for a far greater sample size than could be collected by a single testing site.

Ookla owns and operates Speedtest.net, as well as develops and deploys speed tests, such as the Connect South Carolina speed test website, for partners around the world. This network of sites that is developed and run on its testing technology provides Ookla with a vast dataset that, due to the variability of geographic information collected across the varying speed test sites, is geocoded utilizing Geo-IP technology. This technology allows for tests to be geocoded to points of aggregation, typically larger nodes across provider networks. While there are hundreds of thousands of tests that have been conducted, the level of aggregation is only sufficient for county-level detail due to the test results being located at these larger nodes and not at an absolute location for each speed test.

In an effort to validate broadband data from the Connect South Carolina project, speed test information is collected throughout the state. Speed tests provide speed information on the path taken through all networks (a provider's network as well as additional networks) a local machine must connect to in order to reach the host test. The benefit of this collection of speed information is two-tiered. First, it allows for a comprehensive dataset of speeds, while also providing Connect South Carolina with the information on where broadband services are available. Second, unlike theoretical speed information which was received through the data collection process, the use of speed tests provide real-world information on the speeds that currently exist within the state of South Carolina.

Broadband Provider Log

Complete	99
Non-Responsive/Refused	6
In Progress	3
Count of Datasets by Status	**108**
Total Unique Providers Represented	**50**

Provider Name	Platform	Status	NDA Execution Date	Notes
AT&T Inc.	DSL	Data Added to Statewide Inventory	12/16/2009	[AUG-31-11 Matthew Brunt] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
AT&T Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/16/2009	[AUG-31-11 Matthew Brunt] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
CenturyLink	DSL	Data Added to Statewide Inventory	12/4/2009	[AUG-31-11 Matthew Brunt] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Charter Communications, Inc.	Cable	Data Added to Statewide Inventory	12/15/2009	[AUG-31-11 Matthew Brunt] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Chester Telephone Company	DSL	Data Added to Statewide Inventory	1/25/2010	[AUG-31-11 Matthew Brunt] Change: Provider upgraded infrastructure and can now offer speed tier 7 download speeds.
Chester Telephone Company	Fiber	Data Added to Statewide Inventory	1/25/2010	[AUG-31-11 Matthew Brunt] Change: Provider coverage area expanded.
Chester Telephone Company	Cable	Data Added to Statewide Inventory	1/25/2010	[AUG-31-11 Matthew Brunt] Change: Provider coverage area expanded.
Clearwire Corporation	Mobile Wireless	Data Added to Statewide Inventory	3/17/2011	[AUG-31-11 Matthew Brunt] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Comcast Cable Communications, LLC	Cable	Data Added to Statewide Inventory	12/7/2009	[AUG-31-11 Matthew Brunt] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Family View CableVision	Cable	Data Added to Statewide Inventory		[AUG-31-11 Matthew Brunt] Correction: Provider submitted initial data for October 2011 submission.
Farmers Telephone Cooperative, Inc.	Mobile Wireless	Data Added to Statewide Inventory	1/22/2010	[AUG-31-11 Matthew Brunt] Change: Provider expanded coverage area.
Frontier Communications Corporation	DSL	Data Added to Statewide Inventory	1/22/2010	[AUG-31-11 Matthew Brunt] Change: Provider expanded coverage area.
Frontier Communications Corporation	Fiber	Data Added to Statewide Inventory	1/22/2010	[SEPT-13-11 Matthew Brunt] Change: Provider upgraded part of their infrastructure, and can now provide fiber service to portions of their coverage area.
Home Telephone Company, Inc.	Fiber	Data Added to Statewide Inventory	1/22/2010	[AUG-31-11 Matthew Brunt] Change: Provider expanded coverage area.
Horry Telephone Cooperative, Inc.	Cable	Data Added to Statewide Inventory	1/22/2010	[AUG-31-11 Matthew Brunt] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Horry Telephone Cooperative, Inc.	DSL	Data Added to Statewide Inventory	1/22/2010	[AUG-31-11 Matthew Brunt] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Horry Telephone Cooperative, Inc.	Fiber	Data Added to Statewide Inventory	1/22/2010	[AUG-31-11 Matthew Brunt] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Horry Telephone Cooperative, Inc.	Mobile Wireless	Data Added to Statewide Inventory	1/22/2010	[AUG-31-11 Matthew Brunt] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Knology of South Carolina, Inc.	Cable	Data Added to Statewide Inventory	7/13/2011	[AUG-31-11 Matthew Brunt] Correction: Provider submitted initial data for October 2011 submission.
Leap Wireless International, Inc.	Mobile Wireless	Data Added to Statewide Inventory	4/6/2010	[AUG-31-11 Matthew Brunt] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Piedmont Rural Telephone Cooperative, Inc.	Mobile Wireless	Data Added to Statewide Inventory	1/28/2010	[AUG-31-11 Matthew Brunt] Change: Provider expanded coverage area.

Rock Hill Telephone Company	Cable	Data Added to Statewide Inventory	1/25/2010	[AUG-31-11 Matthew Brunt] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Rock Hill Telephone Company	Cable	Data Added to Statewide Inventory	1/25/2010	[AUG-31-11 Matthew Brunt] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Rock Hill Telephone Company	Cable	Data Added to Statewide Inventory	1/25/2010	[AUG-31-11 Matthew Brunt] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Rock Hill Telephone Company	Cable	Data Added to Statewide Inventory	1/25/2010	[AUG-31-11 Matthew Brunt] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Rock Hill Telephone Company	Fiber	Data Added to Statewide Inventory	1/25/2010	[AUG-31-11 Matthew Brunt] Correction: Provider's coverage area reduced slightly for a more accurate representation.
Rock Hill Telephone Company	Fiber	Data Added to Statewide Inventory	1/25/2010	[AUG-31-11 Matthew Brunt] Changes and Corrections: Service expansion and corrections to previous dataset.
Rock Hill Telephone Company	Fiber	Data Added to Statewide Inventory	1/25/2010	[AUG-31-11 Matthew Brunt] Changes and Corrections: Service expansion and corrections to previous dataset.
Rock Hill Telephone Company	Mobile Wireless	Data Added to Statewide Inventory	1/25/2010	[AUG-31-11 Matthew Brunt] Change: Provider expanded coverage area.
Sprint Nextel Corporation	Mobile Wireless	Data Added to Statewide Inventory	1/14/2010	[AUG-31-11 Matthew Brunt] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
T-Mobile USA, Inc.	Mobile Wireless	Data Added to Statewide Inventory	1/8/2010	[AUG-31-11 Matthew Brunt] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
TDS Telecommunications Corporation	DSL	Data Added to Statewide Inventory	1/27/2010	[AUG-31-11 Matthew Brunt] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Time Warner Cable LLC	Cable	Data Added to Statewide Inventory	12/21/2009	[AUG-31-11 Matthew Brunt] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
United States Cellular Corporation	Mobile Wireless	Data Added to Statewide Inventory	2/15/2011	[AUG-31-11 Matthew Brunt] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Verizon South Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/14/2009	[AUG-31-11 Matthew Brunt] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
West Carolina Rural Telephone Cooperative, Inc.	Fiber	Data Added to Statewide Inventory	1/22/2010	[AUG-31-11 Matthew Brunt] Change: Provider's entire service area upgraded to fiber.
Windstream Communications	DSL	Data Added to Statewide Inventory	1/20/2010	[AUG-31-11 Matthew Brunt] Changes and/or Corrections: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
DeltaCom, Inc.	Backhaul	Backhaul Provider Only Processing Complete	2/16/2010	
Horry Telephone Cooperative, Inc.	Backhaul	Backhaul Provider Only Processing Complete	1/22/2010	
Level 3 Communications, LLC	Backhaul	Backhaul Provider Only Processing Complete	12/14/2009	
Sprint Nextel Corporation	Backhaul	Backhaul Provider Only Processing Complete	1/14/2010	
TDS Telecommunications Corporation	Backhaul	Backhaul Provider Only Processing Complete	1/27/2010	
AT&T Inc.	Backhaul	No Update to Provide	12/16/2009	
ATG Communications, LLC	Backhaul	No Update to Provide	1/14/2010	
Atlantic Broadband, LLC	Cable	No Update to Provide	2/3/2010	
CenturyLink	Backhaul	No Update to Provide	12/4/2009	
Chesnee Telephone Company, Inc.	DSL	No Update to Provide	1/25/2010	
Chesnee Telephone Company, Inc.	Cable	No Update to Provide	1/25/2010	
Chester Telephone Company	Backhaul	No Update to Provide	1/25/2010	
DISH Network Corporation	Satellite	No Update to Provide	1/27/2010	[SEPT-16-11 Matthew Brunt] Correction: Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
Electronics Service Company of Hamlet, LLC	Fixed Wireless	No Update to Provide	3/24/2010	
Farmers Telephone Cooperative, Inc.	DSL	No Update to Provide	1/22/2010	
Farmers Telephone Cooperative, Inc.	Backhaul	No Update to Provide	1/22/2010	
Farmers Telephone Cooperative, Inc.	Backhaul	No Update to Provide	1/22/2010	
Farmers Telephone Cooperative, Inc.	DSL	No Update to Provide	1/22/2010	
Farmers Telephone Cooperative, Inc.	Fiber	No Update to Provide	1/22/2010	
Hargray Communications Group, Inc.	DSL	No Update to Provide	1/25/2010	
Hargray Communications Group, Inc.	DSL	No Update to Provide	1/25/2010	
Hargray Communications Group, Inc.	Cable	No Update to Provide	1/25/2010	
Hargray Communications Group, Inc.	Cable	No Update to Provide	1/25/2010	
Hargray Communications Group, Inc.	Fiber	No Update to Provide	1/25/2010	
Hargray Communications Group, Inc.	Backhaul	No Update to Provide	1/25/2010	

Hargray Communications Group, Inc.	Backhaul	No Update to Provide	1/25/2010	
Hargray Communications Group, Inc.	Backhaul	No Update to Provide	1/25/2010	
Harron Communications LP	Cable	No Update to Provide		
Home Telephone Company, Inc.	Cable	No Update to Provide	1/22/2010	
Home Telephone Company, Inc.	DSL	No Update to Provide	1/22/2010	
Home Telephone Company, Inc.	Backhaul	No Update to Provide	1/22/2010	
Home Telephone Company, Inc.	Backhaul	No Update to Provide	1/22/2010	
Home Telephone Company, Inc.	Cable	No Update to Provide	1/22/2010	
Home Telephone Company, Inc.	Fiber	No Update to Provide	1/22/2010	
Hughes Network Systems, LLC	Satellite	No Update to Provide	2/5/2010	[SEPT-16-11 Matthew Brunt] Correction: Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
Northland Communications Corp.	Cable	No Update to Provide		
Palmetto Rural Telephone Cooperative, Inc.	DSL	No Update to Provide	1/22/2010	
Palmetto Rural Telephone Cooperative, Inc.	DSL	No Update to Provide	1/22/2010	
Pee Dee Net	Fixed Wireless	No Update to Provide	2/23/2010	
Pee Dee Online Consulting	Fixed Wireless	No Update to Provide	2/24/2010	
Piedmont Rural Telephone Cooperative, Inc.	DSL	No Update to Provide	1/28/2010	
Rock Hill Telephone Company	DSL	No Update to Provide	1/25/2010	
Rock Hill Telephone Company	Cable	No Update to Provide	1/25/2010	
Rock Hill Telephone Company	Fiber	No Update to Provide	1/25/2010	
Rock Hill Telephone Company	Backhaul	No Update to Provide	1/25/2010	
Rock Hill Telephone Company	Backhaul	No Update to Provide	1/25/2010	
Rock Hill Telephone Company	Backhaul	No Update to Provide	1/25/2010	
Rock Hill Telephone Company	Fixed Wireless	No Update to Provide	1/25/2010	
Rock Hill Telephone Company	DSL	No Update to Provide	1/25/2010	
Rock Hill Telephone Company	DSL	No Update to Provide	1/25/2010	
Rock Hill Telephone Company	DSL	No Update to Provide	1/25/2010	
Sandhill Telephone Coop., Inc.	DSL	No Update to Provide	1/25/2010	
Sandhill Telephone Coop., Inc.	Backhaul	No Update to Provide	1/25/2010	
Skyrunner, Inc.	Fixed Wireless	No Update to Provide		
Southern Coastal Cable, LLC	Cable	No Update to Provide	6/30/2010	
tw telecom of south carolina, llc	Backhaul	No Update to Provide	4/26/2010	
Verizon South Inc.	Backhaul	No Update to Provide	12/14/2009	
West Carolina Rural Telephone Cooperative, Inc.	DSL	No Update to Provide	1/22/2010	
West Carolina Rural Telephone Cooperative, Inc.	Backhaul	No Update to Provide	1/22/2010	
WildBlue Communications, Inc.	Satellite	No Update to Provide	1/8/2010	[SEPT-16-11 Matthew Brunt] Correction: Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
Windstream Communications	Backhaul	No Update to Provide	1/20/2010	
NTInet, Inc	Fixed Wireless	No Update Provided - Use Last Submission Data	2/9/2010	
Knology of South Carolina, Inc.	Backhaul	Provider Gathering Data	7/13/2011	
Open Range Communications, Inc.	Fixed Wireless	Solicited Initial Data	5/5/2011	
PAETEC Communications, Inc.	Backhaul	Other		[SEP-08-11 Wes Kerr] Multiple outreach attempts were conducted but no response was received. Paetec was bought out during the collection phase of this round by Windstream and we intend to be able to include the Paetec coverage as a part of the Windstream footprint during the next round.
Aero Networks, LLC	Satellite	Refused to Participate	11/22/2010	[JUL-11-11 Wes Kerr] Received a message that they would not provide any data this round.
Birch Communications, Inc.	DSL	Refused to Participate		[JUN-22-11 Daryl Coffey] a company representative sent an e-mail stating they are still not interested in participating.
Birch Communications, Inc.	Backhaul	Refused to Participate		[JUN-22-11 Daryl Coffey] a company representative sent an e-mail stating they are still not interested in participating.
Countrywide Wireless	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to contact attempts made on August 5, 2010 and January 4, 2011, 4 additional attempts were made this period.
Global Crossing Telecommunications, Inc.	Backhaul	Non-Responsive to Multiple Attempts		In addition to contact attempts made between July 1, 2010 and February 17, 2011, 3 additional attempts were made this period.
Main Street Wireless	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to contact attempts made between July 1, 2010 and February 1, 2011, 4 additional attempts were made this period.

South Dakota Broadband Mapping Project: Product Release White Paper

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Product Specification:	Fall 2011 NTIA Data Model
Product/Process:	NTIA—October 1, 2011 Data Deliverable
Dataset Submission QC:	NTIA—SBDD_CheckSubmission.py

Table of Contents

OVERVIEW

This white paper highlights the **Submission Summary** for this deliverable, as well as describes the **Data Gathering**, **Data Integration**, **Data Validation and Verification** and **Quality Control** processes used to create the Broadband Mapping Project's October 1, 2011 data submission. To support varying levels of technical and program knowledge, both a **high-level summary** and a **detailed process review** are supplied.

SUBMISSION SUMMARY

PROVIDER DETAILS

PROVIDER PARTICIPATION

- Providers Included

  Alliance Communications Cooperative
  AT&T MOBILITY
  Beresford Municipal Telephone
  CenturyLink
  Cheyenne River Sioux Tribe
  Consolidated Telecom
  DigitalBridge Communications (BridgeMaxx)
  Faith
  Fort Randall
  Frontier Communications
  Golden West Communications
  Interstate Telecommunications Cooperative
  Kennebec Telephone Company
  KeyOn Communications Inc.
  Knology, Inc.
  Long Lines
  Mediacom Communications Corporation
  Midcontinent Communications
  Midstate Communications
  Mitchell Telecom
  MNW Wireless
  Northern Valley Communications
  Northern Wireless
  Qwest Communications
  RC Communications
  RC Technologies, Inc.
  Roberts County Telephone Cooperative
  Santel Communications
  SDN Communications
  Sioux Valley Wireless
  Sprint
  StarBand Communications Inc.
  Swiftel Communications
  T-Mobile
  Triotel / McCook Cooperative
  Valley Telecommunications Cooperative
  Valley Telephone
  Venture Communications
  Verizon Wireless
  West River Cooperative
  West River Telecommunications Cooperative
  Western Telephone Company

- New Providers Since Last Data Submission
  - MNW Wireless
  - Northern Wireless
  - StarBand Communications

- Non-Responsive/Non-Cooperative Providers
  - None

- Other Provider Comments
  - CenturyLink and Qwest have merged and submitted separate data for this round with the same FRN. Data was aggregated into one footprint and the Qwest provider name was removed.
  - Expanded provider outreach to include the Form 477 filers and discovered that the majority of them that aren't already included in the map are not broadband providers. Attached is a spreadsheet reflecting the results of this review:

    477ProviderReview.xlsx

COVERAGE AREA CHANGES

- Coverage Footprint Reductions/Map Refinement –
  - Alliance Communications (TT-10 and TT-50)
  - Fort Randall Telephone Company (TT-10)
  - Golden West Cablevision Inc (TT-10, TT-41, TT-50)
  - Splitrock (TT-50)

- Coverage Footprint Expansion –
  - Beresford Municipal Telephone (TT-20)
  - CenturyLink (TT-10)
    - Due to Qwest acquisition
  - Interstate Telecommunications Cooperative, Inc. (TT-10, TT-20 and TT-50)
  - Kennebec Telephone Company Inc
    - Inclusion of TT-50
  - Midcontinent Communications (TT-40 and TT-50)
  - Midstate Communications (TT-10, TT-40, TT-50, TT-70)
  - Mitchell Telecom (TT-50)
  - NVC (TT-10)
  - RC Communications (TT-10)
  - Roberts County Telephone Coop. Assn (TT-10)
  - Santel Communications Cooperative (TT-10)
  - SDN Communications (TT-50)
  - Splitrock (TT-10)
  - Swiftel Communications (TT-10 and TT-50)
  - TrioTel Communications, Inc. (TT-10 and TT-50)
  - Valley Telecommunications (TT-10 and TT-50)
  - Venture Communications Coop. (TT-10 and TT-50)
  - Verizon Wireless (TT-80)
  - West River Cooperative Telephone Company (TT-10 and TT-50)
  - West River Telecommunications (TT-10)

DATA CORRECTIONS

- Business only provider coverage areas were added back into the data now that the NTIA data model supports it with the inclusion of the EndUserCat field.
  - Midcontinent Communications

DATA VALIDATION & VERIFICATION

- Provider coverage areas were individually compared against third-party data to identify if the footprint is in alignment. In cases where anomalies were identified, we contacted the provider for further validation and refined the map, where needed. The third-party data sources used for this review are as follows:
  - Comsearch
  - Pitney Bowes
  - American Roamer

- For wireline and fixed wireless technologies, a set of reviews were conducted. Coverage areas were first reviewed for accuracy by the providers directly via our online provider portal.

  Coverage areas were compared against known telecommunications exchange and territory boundaries.

  Coverage areas were compared by state telecommunications personnel against previously stated service boundaries, known areas of operation, and areas/locations where state-funded agencies have broadband services or have attempted to obtain broadband services.

  Crowd sourcing efforts were also undertaken to verify and validate broadband coverage areas. A survey of community anchor institutions was sent by postal mail and electronic mail where possible, collecting information on broadband service availability, technology in use, advertised speeds, and results of a speed test. This effort engaged government technology personnel along with the technology leadership of the healthcare systems of South Dakota, the K-12 education technology coordinators, and technology personnel of higher education. Other industry sectors were also included in the survey by direct mailing and articles in trade publications. This information was overlaid onto provider coverage areas and analyzed for alignment with stated capabilities.

  A public crowd sourcing campaign, including television spots, press releases, and online marketing/social media efforts was started requesting citizens to take speed tests from home, work, and elsewhere via our broadband website. Combining address collection and verification with the speed test, over 5,000 consumer and business locations across the state have been collected. These results have been combined with the data collected by the FCC Consumer Broadband Test and FCC Mobile Application to generate a master list of known broadband addresses and speeds. This master list was analyzed for alignment with provider stated coverage areas and attribution.

- For verification of TransTech 80, Mobile Wireless, a series of drive tests were conducted across the state. Using specialized software on mobile handsets, information on signal strength and broadband speed was GPS-tagged and collected. To date, nearly 17,000 miles of local roads, state and federal highways have been driven, collecting over 5,000 GPS-tagged speed tests and over 600,000 signal strength values. This data was overlaid onto coverage polygons received from each mobile wireless provider and analyzed for accuracy.

  Locations discovered to not have mobile wireless coverage but stated by the provider are being scheduled for additional focus testing and reporting to the provider for review.

  Locations found with broadband data coverage but not included with the provider's original data will also be sent to the provider for review upon discovery. To date, none have been fully confirmed.

  Speed test results were compared against providers advertised speeds for anomalies.

COMMUNITY ANCHOR INSTITUTION (CAI) DETIALS

OVERALL STATISTICS

Community Anchor Institution - Categories	Overall Count	Broadband Subscriber (1 or 2)	Trans Tech	Advertised Speed Down	Advertised Speed Up
Category 1 - School K through 12	453	451	69	64	64
Category 2 - Library	120	120	24	17	16
Category 3 - Medical/Healthcare	204	172	36	27	26
Category 4 - Public Safety	480	468	58	32	32
Category 5 - Universities/Colleges	40	40	22	26	26
Category 6 - Other: Government	333	333	104	56	54
Category 7 - Other: Non-Government	19	18	4	3	3
Total	**1649**	**1602**	**317**	**225**	**221**

CAI CHANGES

- A revised approach to the development of the South Dakota CAI list began for the Oct 2011 submission. Prior efforts involved the use of a combination of data sources, including locations gathered from the South Dakota Department of Education, the South Dakota Board of Regents, the South Dakota Bureau of Administration, trade organizations, healthcare systems, data purchased from the InfoUSA group, and resources internal to the South Dakota Bureau of Information and Telecommunications. This approach was found to include institutions that would not fit the true spirit and definition of a CAI. As such, SDBIT removed those CAI's from the list, while updating the list to include newly opened facilities.

- The list of changes include, but are not limited to:
  - Inclusion of the most recent K-12 education facility list, removing recently consolidated K-12 school district locations and included newly opened facilities
  - Updating the library list to the most recent obtained from the South Dakota State Library
  - Reduction of healthcare facilities to hospitals, major clinics, and facilities for an entire community/locality; thereby removing specialized and limited practice facilities such as dentists, dialysis centers, and chiropractors
  - Reduction of public safety locations to facilities staffed at least part-time
  - Inclusion of the most public higher-education facilities list obtained from the South Dakota Board of Regents
  - Inclusion of additional higher-education facilities, including newly-opened facilities, expanding campus locations, seminaries, and additional private schools located since previous submissions
  - Reduction of government community support locations to those that provide services to a community, such as social services offices, city halls, courthouses, public health nurse offices, and job service locations; Locations removed include maintenance and fueling facilities, government storage facilities, and state park ticketing offices

- Reduction of non-government community support locations, including removal of smaller airport facilities, churches and other houses of worship, and retail offices

- There were 489 CAIIDs added to the CAI Inventory for Category 1: K-12 Schools, Category 2: Libraries and Category 5: Colleges, which were extracted from the three databases communicated by NTIA. These databases are as follows:

  - For K-12 institutions (CAI type 1) please add the NCES ID CCD ID value found here: **http://nces.ed.gov/ccd/bat/**

  - For Higher Education (CAI type 5) please add the NCES IPEDS ID value found here: **http://nces.ed.gov/ipeds/datacenter/**

  - For Libraries (CAI type 2) please. Combine (do not add) "FSCSKey" and "FSCs_SEQ" from the "puout08av2000" file and place them here: **http://harvester.census.gov/imls/data/pls/index.asp** (FYI the LIBID is your state's unique ID for libraries)

SUBMISSION RECEIPT

SUBMISSION RECEIPT RESULTS

- Attached are the results from the NTIA data submission receipt quality script.

SD_2011_10_01.txt

  - The only item flagged in the submission receipt output is the following error, which has been verified as correct entries within the data submission.

  - Field Check: FAILED CAInstitutions_TRANSTECH has 2679 UNEXPECTED VALUES for query: TRANSTECH <> 0 AND TRANSTECH <> 10 AND TRANSTECH <> 20 AND TRANSTECH <> 30 AND TRANSTECH <> 40 AND TRANSTECH <> 41 AND TRANSTECH <> 50 AND TRANSTECH <> 60 AND TRANSTECH <> 70 AND TRANSTECH <> 71 AND TRANSTECH <> 80 AND TRANSTECH <> 90 AND TRANSTECH <> 0

  - This was flagged due to an inconsistency between the data model and the submission receipt script, which has also been communicated by other Grantees on PBWorks.

  Hyperlink to Grantee Workspace in which the same issues were identified by other Grantees: **https://sbdd-granteeworkspace.pbworks.com/w/page/42442088/Data%20Model%20Issues-June2011**

HIGH-LEVEL SUMMARY

DATA GATHERING

BROADBAND SERVICE AREAS, MIDDLE MILE AGGREGATION POINTS AND BROADBAND SERVICE OVERVIEW

The collection of Broadband Service Areas, Middle Mile Aggregation Points and Broadband Service Overview information is handled through the following Provider Outreach Process:

- Build and maintain an inventory of Broadband providers through research and State inputs.
- Update provider material that describes the data requirements and logistics for data transfer.
- Update Non-Disclosure Agreement (NDA) for use in project, where applicable.
- Maintain multiple protocols for the provider to submit data, including Secure File Transfer Protocol (SFTP) technology when desired.
- Conduct one-on-one informational discussions with each provider to communicate the following:
  - Requirements of this project;
  - Broadband data required to support the product data model;
  - Submission protocols available;
  - Capability to validate how the supplied data is aggregated.
- Download/receive provider data.
- Establish a repeatable process with provider. Maintain provider communication, transaction and data handling records throughout the project (dates contacted, data received, etc.).

COMMUNITY ANCHOR INSTITUTION (CAI)

The collection of CAI information is handled through the following CAI Collection Process:

- Collect and maintain inventory of CAIs through data mining, research and State inputs.
- Maintain web-based CAI portal for institutions to add or confirm attribution, location and enter broadband-specific information.
- Upload web-based data to Core Database for standardization.
- Perform internal cleansing, such as removing duplicate records, identifying gaps in broadband attribution and verifying category.
- Geocode CAI locations.
- Translate Core Database data to deliverable-ready format.
- Continue engagement with non-responsive institutions.

DATA INTEGRATION PROCESS

The data integration and processing mechanisms currently used allow for multiple types of inputs and result in a standardized output that meets the NTIA deliverable requirements. This flexible process supports data model changes and project-requested enhancements.

- Receive inputs from providers via submission protocols; upload into Sourcing Database and catalog with provider information.
- Review provider-supplied data for completeness and for potential discrepancies that require resolution prior to processing and flag as necessary.
- Categorize input into data-type category (addresses, block lists, paper maps, etc.).
- Standardize input based on data type within Staging Database.
- Create Compact Polygons (CP)—(internal methodology for generating area-based feature for coverage in Staging Database).
- Apply broadband attribution to CP; apply metadata to CP.
- Perform quality analysis of the CP against the source supplied to identify any completeness or accuracy issues.
- Request additional information from the provider if elements of coverage are missing or contain discrepancies. This is a second manual quality check to ensure data is complete.
    - Process coverage area to build the required NTIA data model layers.
- Process CAI data input into internal standardized format, as discussed above in the **Community Anchor Institution (CAI) subsection**, based on NTIA and State-level requirements.

DATA VALIDATION AND VERIFICATION

Following the creation of the product, process steps within Data Validation and Verification occur. To ensure the data collected and processed is as accurate and comprehensive as possible, provider validation and internal verification activities are employed. After the initial mapping of providers' coverage areas and serviceability claims, additional reviews are performed using the methods described in the subsections below (**Third-Party Data Verification**, **Broadband Provider Validation**, **Confidence Values**).

THIRD-PARTY DATA VERIFICATION

The coverage is visually and programmatically compared against third-party data. Pitney Bowes and American Roamer data are used in cases where a coverage area is questionable. All anomalies identified during this analysis are reviewed with the providers.

BROADBAND PROVIDER VALIDATION—PROVIDER PORTAL APPLICATION

Providers are trained on and requested to use a secure interactive web application to review their current coverage area(s) and supporting broadband attribution and validate their data or submit change requests to update their data. All provider change requests go through the **Data Integration Process** and are reviewed with the provider to complete validation.

CONFIDENCE VALUES

All verification, validation and manual quality review results are tracked by provider/technology type and stored and maintained within a **Validation table**. A confidence value is assigned, based on internal assessments of the collected information, to highlight the provider coverage areas and/or attributions that would benefit from further investigation and/or enhancements.

QUALITY CONTROL

Following collection, processing and analysis of the provider and CAI data, the product is checked manually and algorithmically against the NTIA data model. Some of the items included within these checks are:

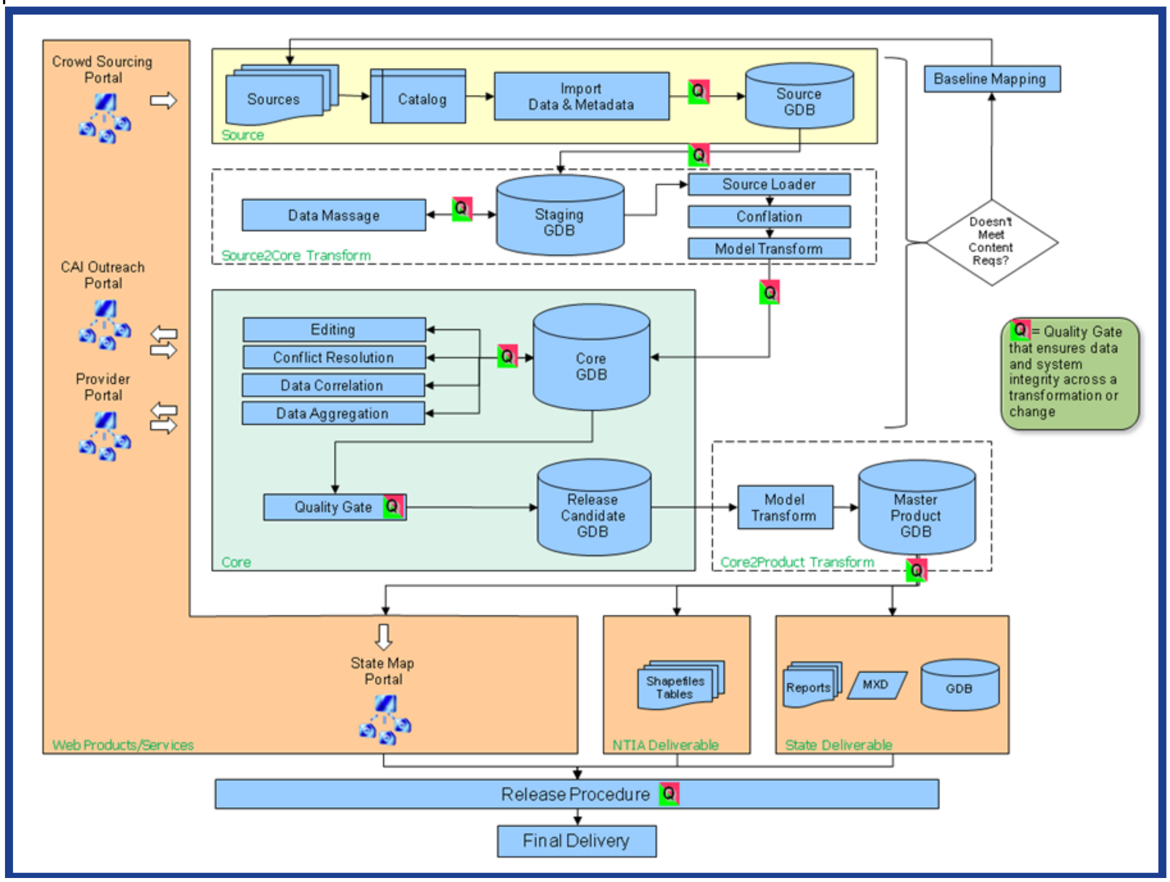
- Format correctness;
- Table and field structure;
- Valid values, including default values, where applicable;
- Geographic extent and topology errors.

Prior to data submission, another quality control script supplied by NTIA is run. This script, SBDD_CheckSubmission.py, creates an output in text form that is required to be submitted along with the final deliverable. All errors must come up clean, unless otherwise specified by NTIA. Exceptions to the script as noted by NTIA on the SBDD Workspace on 03/25/11 can be found at the following link: **https://sbdd-granteeworkspace.pbworks.com/w/page/38218329/CheckSubmissionExceptions**

- Longitude values for States outside the lower 48 (any table);
- CAI results for Transtech, MaxAdUp, MaxAdDown if BBService is “No” or “Unknown”;
- Overview MaxAdDown, MaxAdUp if 100% of record-level data has MaxAdDown or MaxAdUp populated.

DETAILED PROCESS REVIEW

A detailed review of the data collection, integration and quality control points within the broadband data gathering and mapping process are discussed in the subsections that follow. In addition, a diagram showing the overall process can be seen below.



PROVIDER OUTREACH

For the October 2011 data submission, an e-mail notification was sent to all providers with supporting deliverable dates. The providers mainly used the Provider Portal web application to submit changes to and/or validate their current coverage area(s).

In support of the data collection effort, providers that did not timely respond to the outreach were contacted by phone.

OUTREACH MATERIALS

The original provider packet sent via e-mail to the providers included the following documents and files:

- Letter from the State inviting them to participate in the program;
- Copy of the Non-Disclosure Agreement (NDA);
- Copy of the Mapping NOFA from the NTIA;
- Copy of the NOFA Clarification from the NTIA;
- Broadband service address example file in CSV format;
- Word document describing service address example file;
- Broadband service block example file in CSV format;
- Word document describing service block example file;
- Broadband service street example file in CSV format;
- Word document describing service street example file;
- Broadband subscriber example file in CSV format;
- Word document describing subscriber example file;
- Broadband wireless coverage area sample shapefile;
- Word document describing wireless coverage area sample shapefile;
- Instructions for downloading, installing and using the WinSCP SFTP application.

OUTREACH PROCESS

The provider outreach process is comprised of the following general steps:

- Send the provider package and introduction letter to the main point of contact for the provider.
- Follow up with e-mail and telephone to verify that the main point of contact is correct.
- If necessary, discuss the NDA further and resolve any redlines.
- Once the correct primary contact is established, set up a telephone call, if necessary, to learn more about the provider's offerings and direct them to the appropriate outreach materials.
- If providers are unable to be contacted (non-responsive) or indicate that they are not interested in participating (non-cooperative), mark them as such on the provider tracking sheet. These providers will be escalated to the State for further action.
- As the providers are collecting the required data, provide instructions on downloading, installing and using the WinSCP SFTP application, if required.
- Arrange with the providers to transfer the data in whatever way they are comfortable: some providers will find regular email acceptable; others will want to use the SFTP application.
- After data is received and reviewed, it may be necessary to contact a provider for clarification or to address incomplete datasets. In the interest of building and maintaining relationships, care is given not to push the provider but to work with it to obtain accurate data in the best possible format.

DATA COLLECTION

DATA TRANSFER PROCEDURES

There are three primary ways data is collected from providers. These are:

- Secure FTP (SFTP) using the WinSCP application;
- Regular e-mail;
- Mail.

INITIAL DATA REVIEW AND QUALITY ASSURANCE

The initial data review and quality assurance process consists of the following general steps:

1) Access the data from the SFTP site or e-mail.
   a. If e-mailed, place copy of original dataset in the appropriate provider folder on the SFTP site.
2) Place copy of raw data on local computer in a working directory.
3) Review data and determine course of action based on type of data received.
4) Ensure data is complete and contact provider to address any gaps.

NOTE:
The goal is to get as many providers as possible to provide subscriber address data in the correct format. Obviously, this will not be possible with all providers so we will continue to have to process various types of provider-supplied data.

DATA INGESTION

DATA INGESTION OVERVIEW

The following subsections outline the process steps taken based on the type of input supplied by the data provider:

- **Point Data**:
  - Subscriber location;
  - DSLAM location;
  - Central Office location;
  - Broadcast Tower location.
- **Linear Data**:
  - TIGER® street segments.
- **Polygonal Data**:
  - Census Blocks;
  - Coverage Area.

Overall, the process is geared toward taking the provider data supplied and creating polygon shapes to append to the bb_cov feature class. The bb_cov feature class is the interim dataset that is then processed using the makeDeliverable.py Python script to create the MapConnect™ data layers that will be delivered to the State and, ultimately, to the NTIA. Detailed instructions used in this process can be found in the subsections below.

POINT DATA

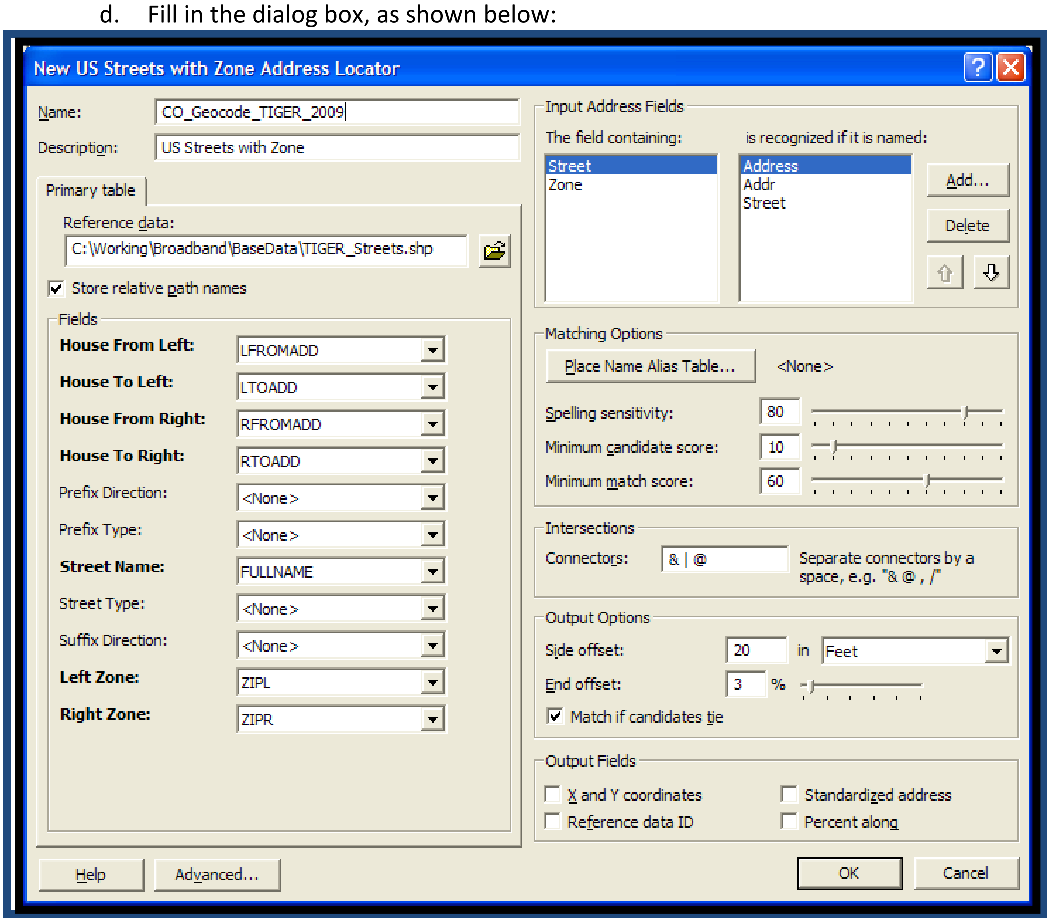
SUBSCRIBER LOCATION—ADDRESS DATA

In the event that the data provider supplies subscriber address data, the steps are as follows:

1) First, convert the address data to a clean Excel spreadsheet in an appropriate address data format.
    a. Usually, this has the following columns: street address (number, pre-directional, pre-modifier, street name, street type, post-directional and post-modifier concatenated), city, state, ZIP.
2) Configure the ArcGIS® geocoding tool to use the TIGER® 2009 streets dataset.
    a. In ArcCatalog®, create a new Address Locater by right-clicking in the white space of the appropriate directory and selecting **New>Address Locater** from the dropdown menu.
    b. Select **US Streets with Zone** and click **OK**.

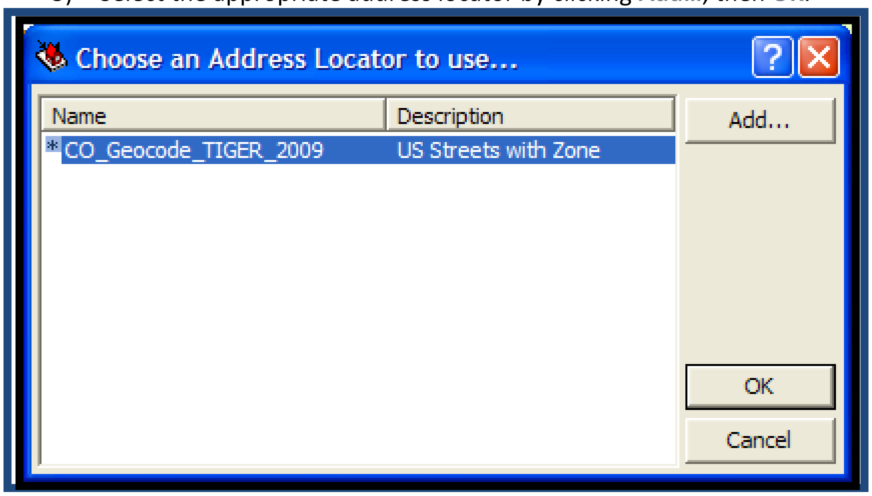
> **NOTE:**
> It is likely that multiple Address Locators will have to be set up to handle the variety of provider address data received.

    c. Navigate to the **TIGER Streets 2009 file** and click **OK**.
    d. Fill in the dialog box, as shown below:

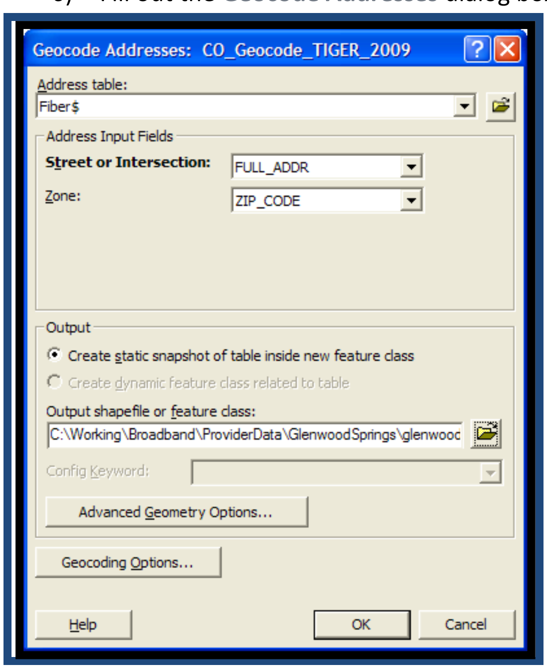


e. Click OK.

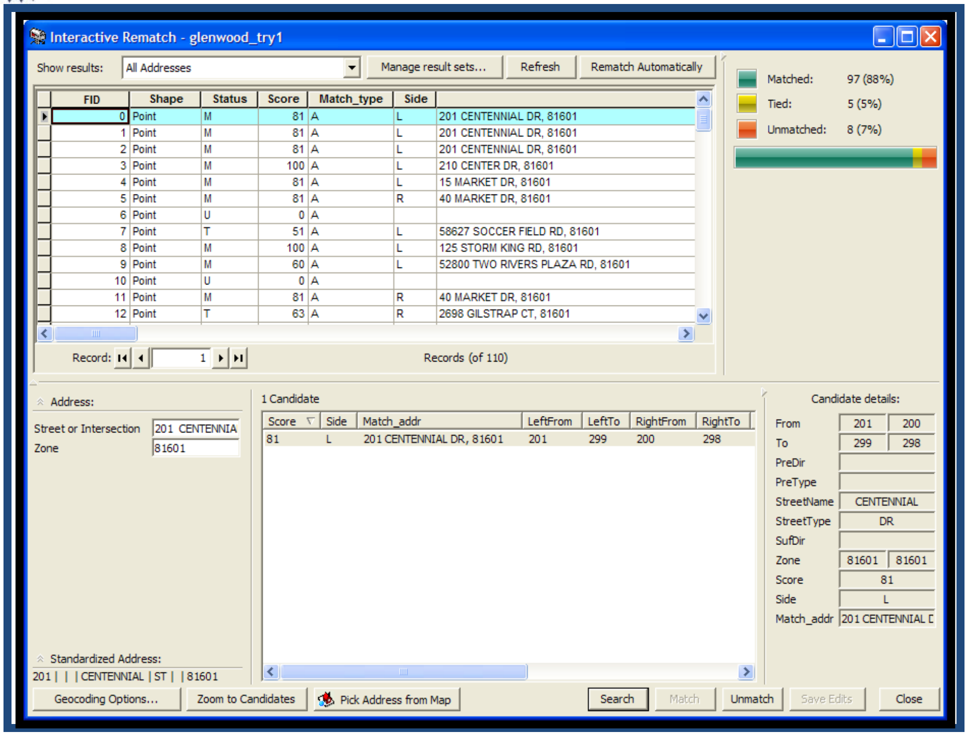
3) Open ArcMap® and add the Excel spreadsheet with the address information.
4) Right-click on the Excel spreadsheet and select **Geocode Addresses** from the dropdown menu.
5) Select the appropriate address locator by clicking **Add…**, then **OK**.



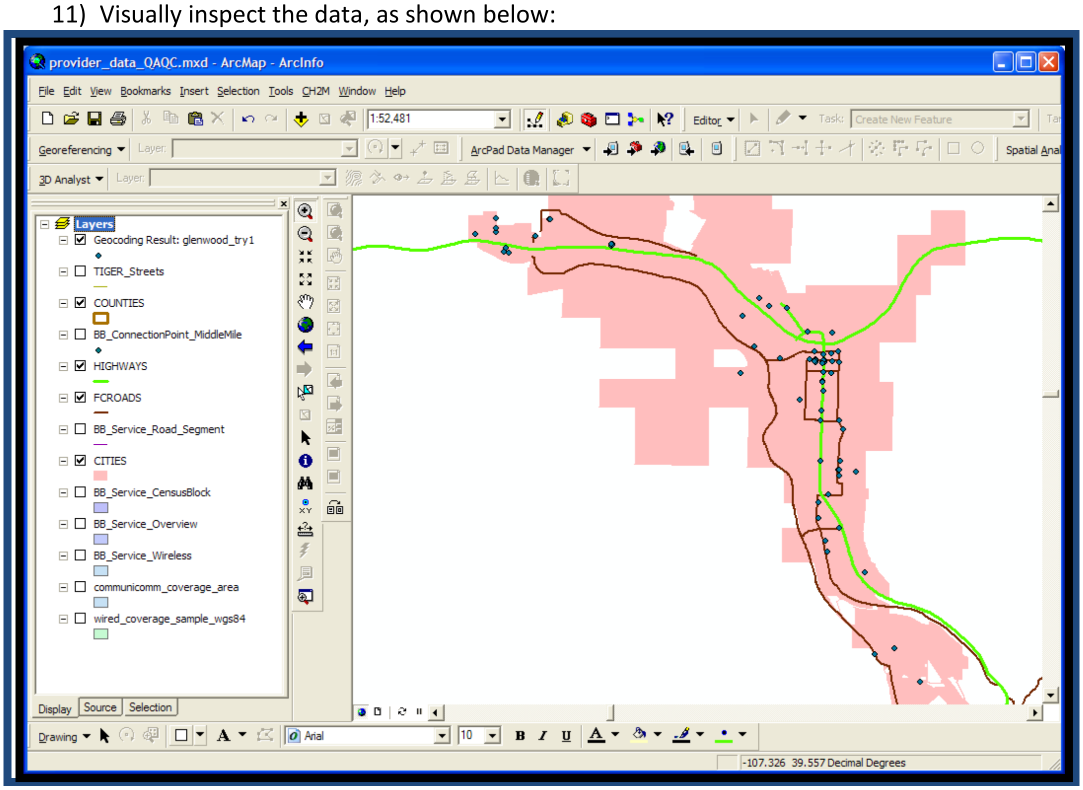
6) Fill out the **Geocode Addresses** dialog box, as shown below:



7) Geocode the list in batch mode using the geocode service set up in **Step 2** above, accepting all the default parameters.
8) Review results. See example below.



9) Adjust geocoding parameters accordingly and repeat batch to resolve issues.
10) Manually geocode unmatched addresses until target hit rate achieved, generally 90%.
11) Visually inspect the data, as shown below:



12) Follow the steps detailed in **Subscriber Location—GIS Data** below.

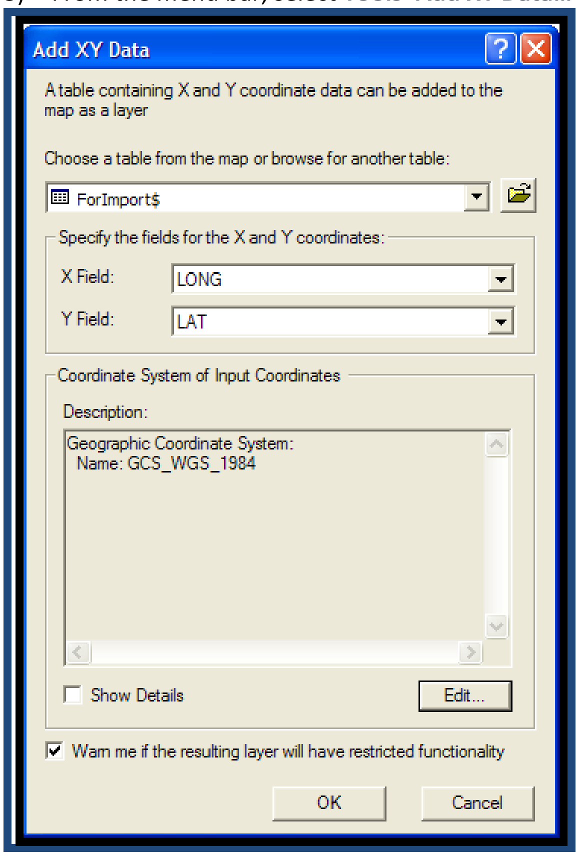
SUBSCRIBER LOCATION—XY DATA

If the provider supplies a list of subscriber data with accompanying XY data such as latitude and longitude, the steps are as follows:

1) Refine the format in Excel so that the data can be opened easily using ArcMap®.
   a. Remove all font color, highlighting, cell colors and borders, clean up column headers and make certain there are no merged cells.
   b. Make certain that XY locations are in decimal degrees.
      (i.) To convert from degrees, minutes, seconds (39º 26' 45.67") to decimal degrees, use the following formula: DD + (MM/60) + (SS.SSS/3600).

NOTE:
If XY locations from some other coordinate system are provided, you can use those in the process below but you must know what the coordinate system is.

2) Open the Excel worksheet in ArcMap®.
3) From the menu bar, select **Tools>Add XY Data…**

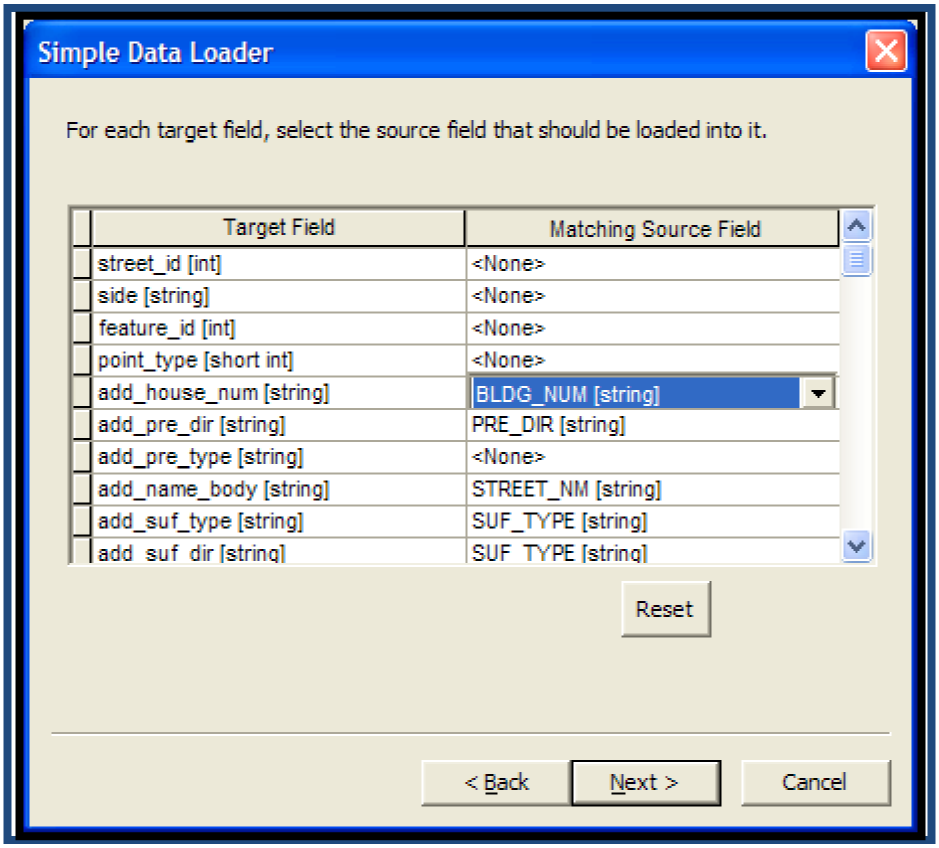


4) Supply the appropriate fields for the X and Y coordinates, choose the appropriate coordinate system and click **OK**.
5) Results are an event layer, not a true spatial layer. Export the data by right-clicking the event layer and selecting **Data>Export Data…** from the dropdown menu.
6) Follow the steps detailed in **Subscriber Location—GIS Data below**.

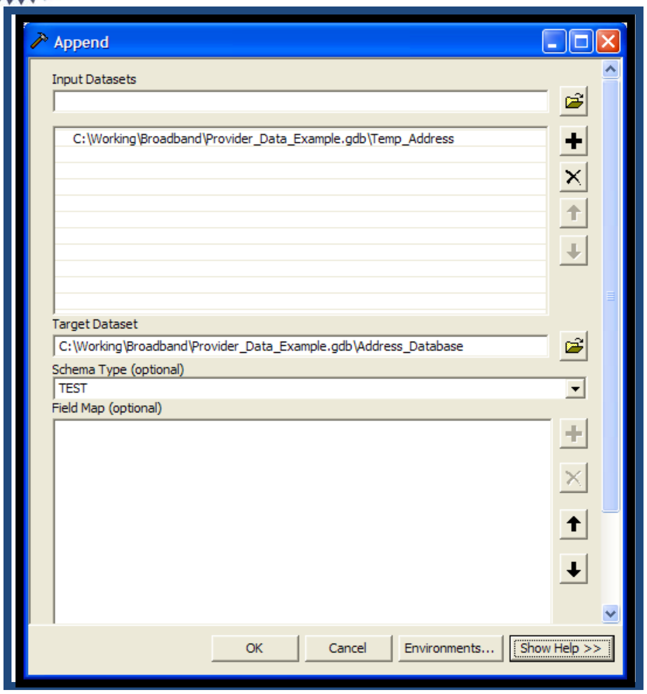
SUBSCRIBER LOCATION—GIS DATA

If the provider supplies subscriber location in GIS format, the only process step is to load that data into the appropriate data schema and it will be ready for processing.

1) First, load the data into the Point Address database schema (please see Appendix D for an example of the Point Address database schema.) using an empty feature class in that schema.
2) In ArcCatalog®, right-click on the empty feature class and select **Load** from the dropdown menu.
3) Navigate to the provider address GIS dataset and then map the attribute fields accordingly, as shown below:



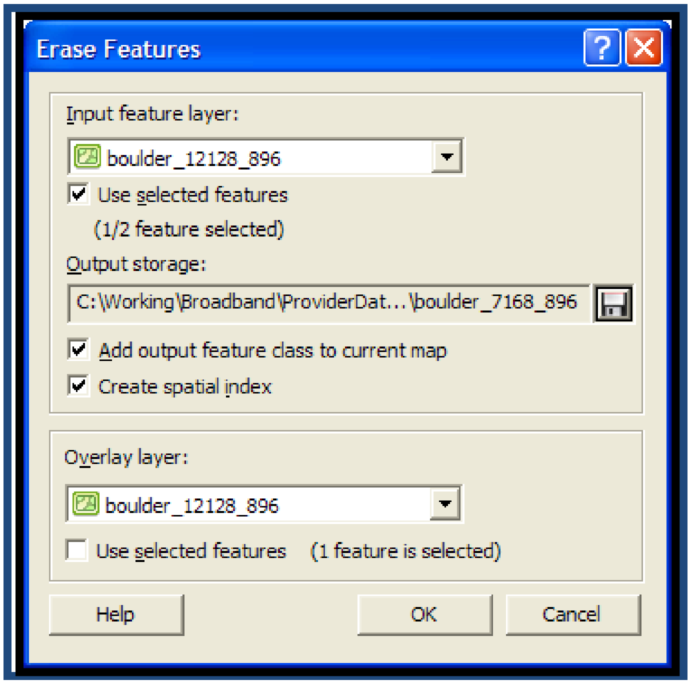
4) Once you have successfully loaded the provider address data into the temporary database with the correct schema, you now will append that data to the overall Point Address database.
5) In ArcToolbox®, use the **Append** command (**Data Management Tools>General> Append***)* to add the features into the overall Point Address database, as shown below:



6) Since the data is already in the Point Address database schema, there is no need to alter the Field Map in the Append tool.
7) After appending, calculate metadata reflecting geometry source and representation values.
8) Break provider-specific points into separate county feature classes and perform the following steps per county feature class:
   a. Within ArcGIS®:
      (i.) Summarize download and upload speeds [first,last] to determine all speeds available for county.
         (1) This will save as a DBF table. Keep track of location for future reference.
      (ii.) Buffer county address point featureclass to 150'.
         (1) During buffer command, dissolve on ad_down; ad_up; provider; dba; frn; tt; all metadata fields; stctyfips. Save as…. county_fastestdown_fastestup.
         (2) Example using Qwest data: boulder_40128_20128, where boulder=county; 40128=ad_down; 20128=ad_up.

NOTE:
These attribute fields are specific to the Point Address database.

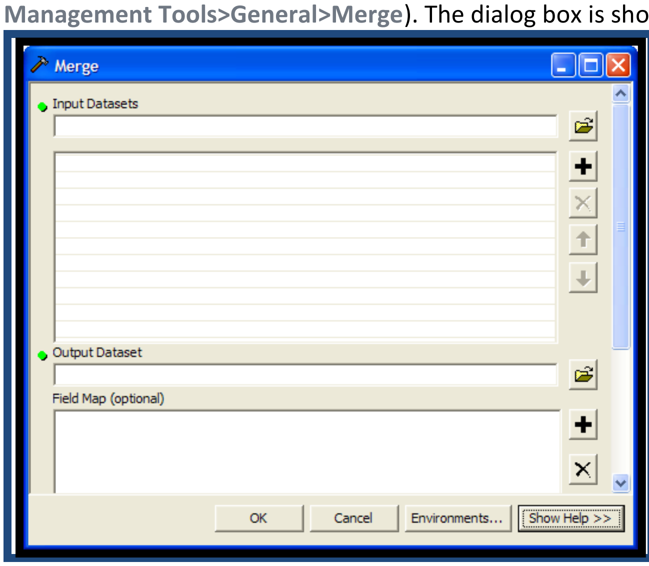
      (iii.) Select the features that represent the lowest speeds.
   b. Using XtoolsPro (***http://www.xtoolspro.com/***):
      (i.) In the XTools Pro toolbar, select **XTools Pro>Layer Operations>Erase Features.**
      (ii.) Use the same feature class for Input and Overlay.
      (iii.) Check **Use selected features** on the **Input** feature, as shown below.
      (iv.) Repeat and erase slowest speeds one speed at a time. Save each new feature class as the next slowest speed, using the same naming convention as shown in **a.(ii.)(1)** above. A general example is shown below:



c. <u>Return to ArcGIS®</u>:

(i.) Edit/delete speeds from the attribution table of each feature class, so each remaining feature class has only one speed value.

(ii.) Merge individual speed feature classes using the **Merge** command in ArcToolbox® (**Data Management Tools>General>Merge**). The dialog box is shown below:



(iii.) Merge individual county feature classes using the **Merge** command in ArcToolbox (**Data Management Tools>General>Merge**).

(iv.) Since the county files are all in the same schema, DO NOT alter the Field Map portion of the command interface.

(v.) When all the county files are merged into one dataset, use the **Append** command in ArcToolbox® *(***Data Management Tools>General>Append**) to add the features to the bb_cov interim dataset. Use the **Field Map** portion of the **Append** tool to map the appropriate field values to their corresponding fields in the bb_cov feature class.

DSLAM OR CENTRAL OFFICE LOCATION—ADDRESS DATA

In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office address data, the steps are as follows:

1) Follow the process for geocoding points in **Subscriber Location—Address Data** above.
2) Follow the steps detailed in **DSLAM or Central Office Location—GIS Data** below.

DSLAM OR CENTRAL OFFICE LOCATION—XY DATA

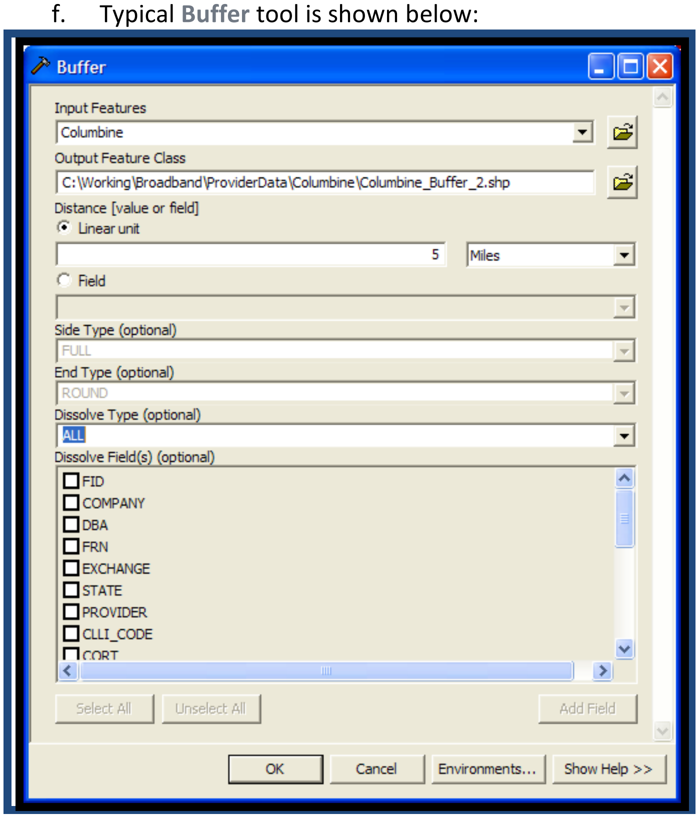
In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office XY data, the steps are as follows:

1) Follow the process for creating points from XY data in **Subscriber Location—XY Data** above.
2) Follow the steps detailed in **DSLAM or Central Office Location—GIS Data** below.

DSLAM OR CENTRAL OFFICE LOCATION—GIS DATA

In the event that the provider supplies DSLAM (digital subscriber line access multiplexer) or Central Office GIS data, the steps are as follows:

1) Buffer the DSLAM/Central Office points feature class.
   a. Add the point feature class to ArcMap®.
   b. Open the ArcToolbox® and go to **Analysis Tools>Proximity>Buffer**.
   c. Set the buffer distance to 5 miles.
   d. Set the dissolve type to **ALL**.
   e. Name the output feature class.
   f. Typical **Buffer** tool is shown below:



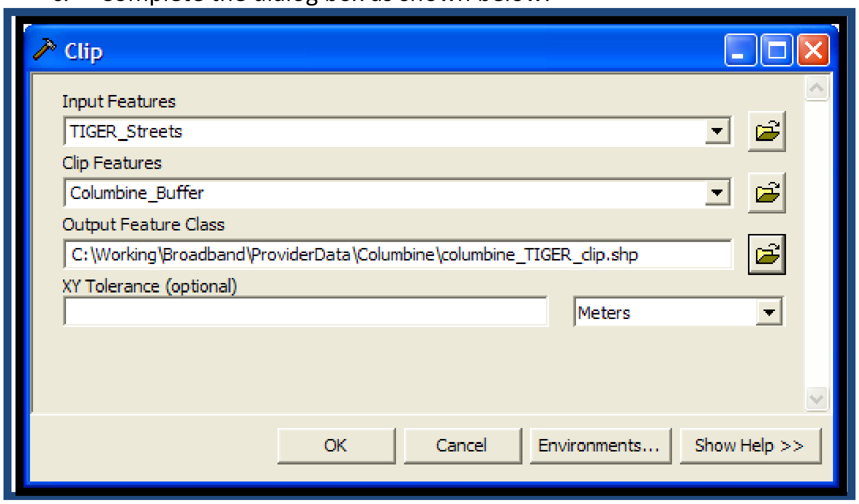
g. Click **OK**.

2) Use the resulting buffer feature class to clip the TIGER® street layer:

   a. Add TIGER® street layer to ArcMap®.

   b. Open the ArcToolbox® and go to **Analysis Tools>Extract>Clip**.

   c. Complete the dialog box as shown below:



   d. Click **OK**.

3) Using ArcCatalog® and within the file geodatabase:

   a. Right-click and create a new Feature Dataset.

      (i.) For the Feature Dataset settings:

         (1) Name the feature dataset accordingly.

         (2) Select horizontal coordinate system by importing the coordinate system associated with the clipped TIGER® street layer by selecting **Import** and navigating to the location of that feature class.

         (3) No vertical coordinate system needed.

         (4) Leave all x,y,z,m values at default.

         (5) Click **Finish**.

4) Import previously created street feature class into new **Feature Dataset**.

5) Right-click **Feature Dataset** and create new Network Dataset—accept all default setting for the Network Dataset.

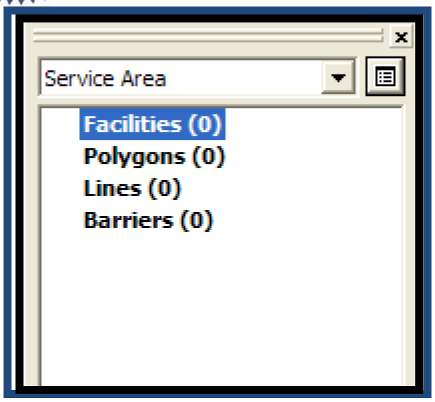
NOTE:
The Network Analyst extension must be turned on.

6) In ArcMap® turn on the **Network Analyst Toolbar** by going to **View>Toolbars>Network Analyst**.

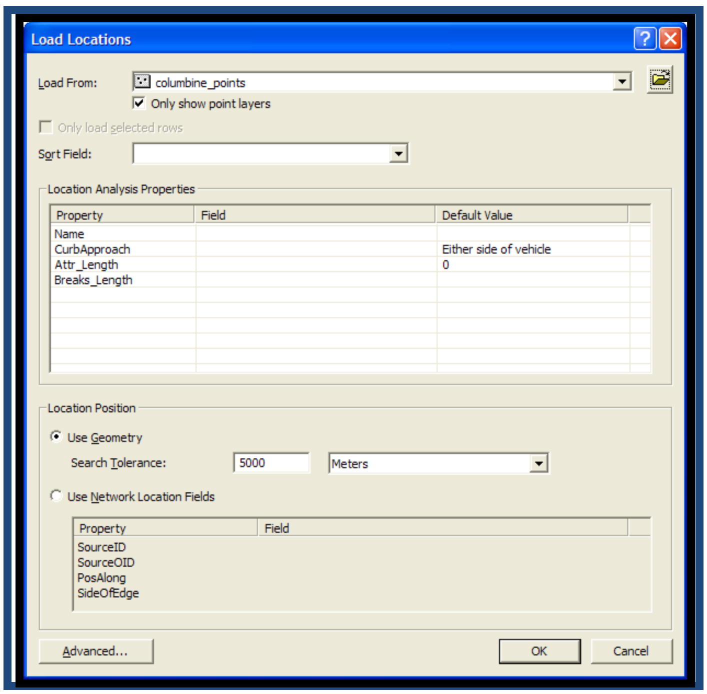
7) Add the Network Dataset created in **Step 5** to ArcMap.

8) Using the **Network Analyst Toolbar** dropdown, create **New Service Area**.

9) Open the **Network Analyst Window** by selecting the  button. See below.



10) Right-click **Facilities** layer, select **Load Locations** and navigate to the DSLAM/Central Office facilities feature class.



11) Click **OK**.

12) Click the **Service Area Properties** button .

13) For the following tabs, change the following properties:

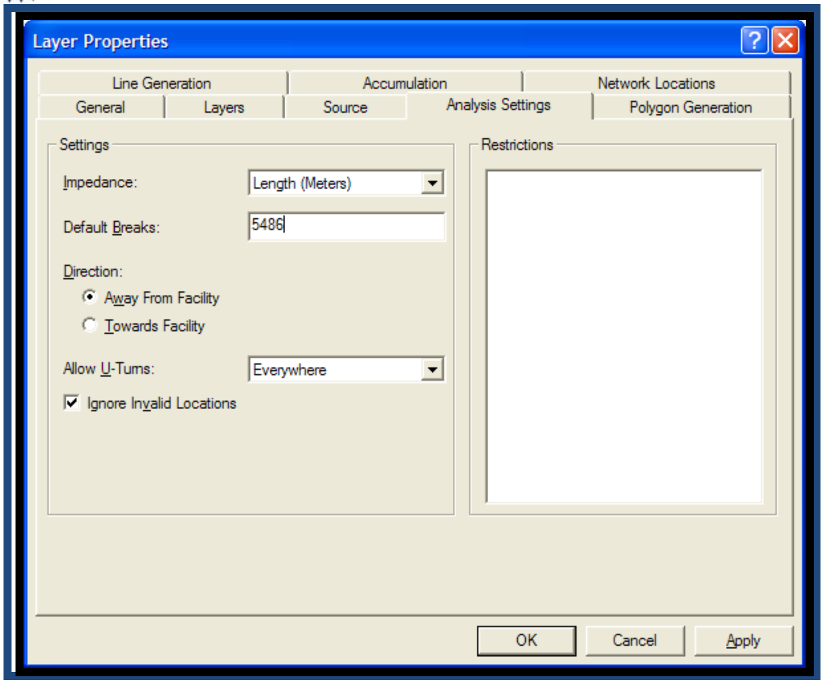
   a. **Polygon Generation** tab:

      (i.) Select **Merge by break value**.

      (ii.) Also disable the **Trim Polygons** option.

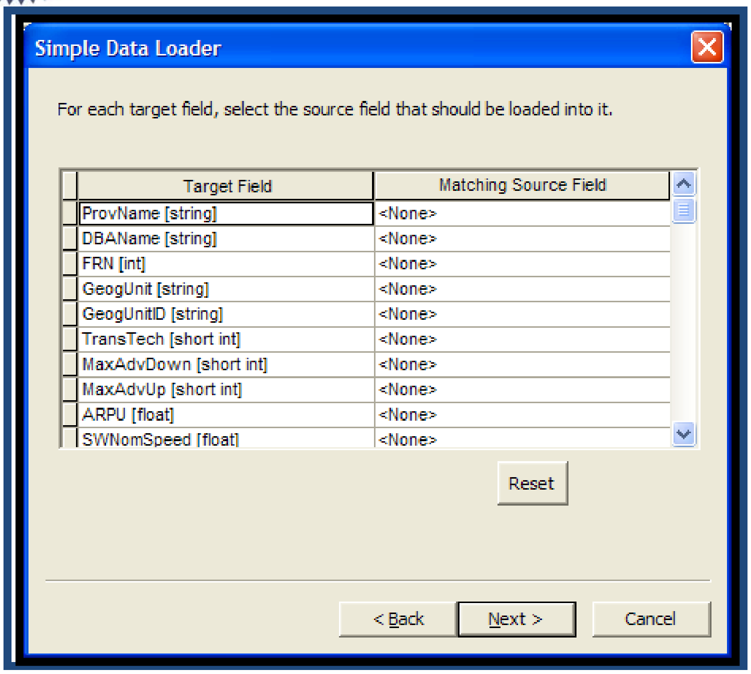
   b. **Analysis Settings** tab—using and converting the specified DSLAM buffer distance from feet to meters—input buffer distance value in meters into the **Default Breaks** location.

      (i.) Generally, 18,000 feet (5486 meters) from DSLAM or Central Office location is used as the buffer distance. See below.



c. Click **OK**.

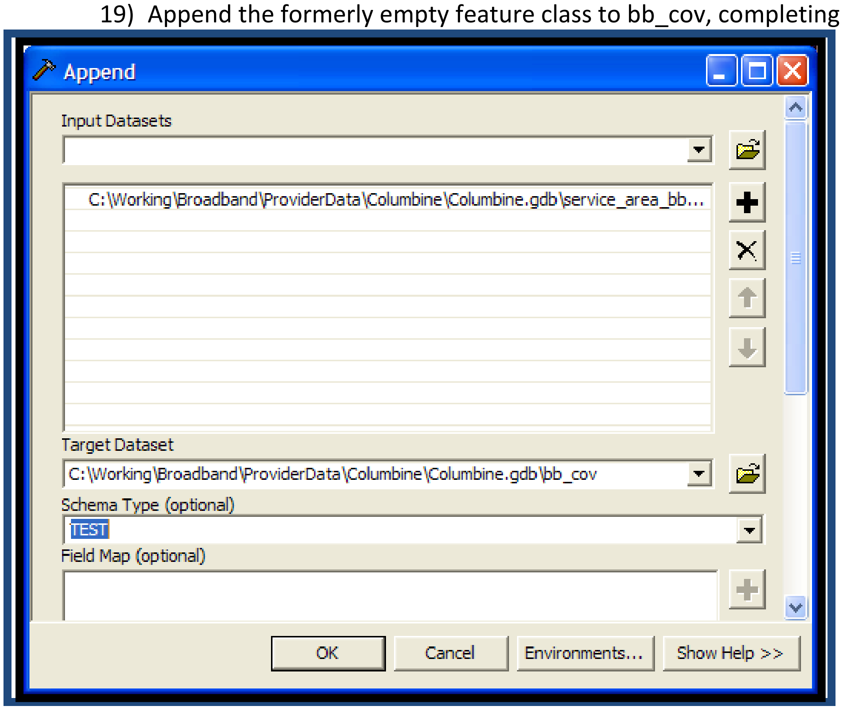
14) On the **Network Analyst Toolbar**, click the **Solve** button to create service area polygons.
15) Right-click on the created service area polygon in the layer list, and select **Data>Export Data** from the dropdown list.
16) Export to a feature class in the file geodatabase you created earlier.
17) In ArcCatalog®, create an empty feature class with the schema of the bb_cov feature class and load the feature class created in **Step 16** into it.
    a. Right-click on the empty feature class, select **Load>Load Data** from the dropdown menu and navigate to the location of the service area feature class.
    b. Click the **Add** button, then click **Next**.
    c. Accept the defaults and click **Next**.
    d. DO NOT attempt to map any fields, as shown below:



e. Click **Next**, then **Next** again, then **Finish**.

18) In ArcToolbox®, go to **Data Management Tools>General>Append**.

19) Append the formerly empty feature class to bb_cov, completing the dialog box, as shown below:



20) Leave the **Schema Type** as TEST.

21) Click **OK**.

22) In ArcMap®, open bb_cov for editing and manually input associated attribution.

BROADCAST TOWER LOCATION—ADDRESS DATA

In the event that the provider supplies wireless broadcast tower location address data, the steps are as follows:

1) Follow the process for geocoding points in **Subscriber Location—Address Data** above.
2) Follow the steps detailed in **Broadcast Tower Location—GIS Data** below.

BROADCAST TOWER LOCATION—XY DATA

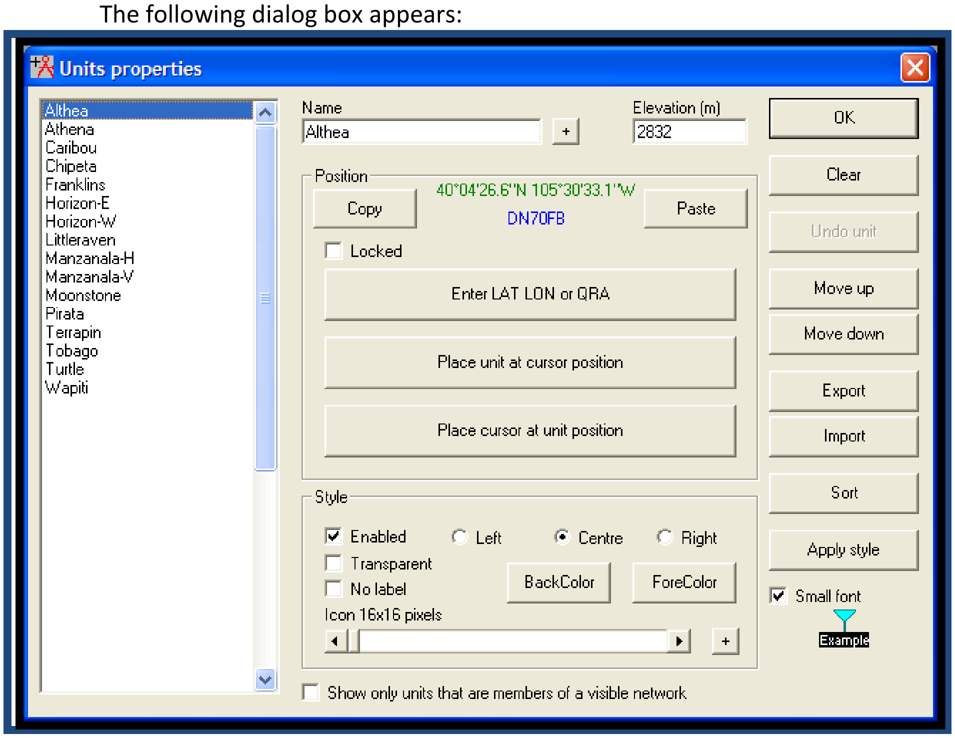
In the event that the provider supplies wireless broadcast tower location XY data, the steps are as follows:

1) Follow the process for creating points from XY data in **Subscriber Location—XY Data** above.
2) Follow the steps detailed in **Broadcast Tower Location—GIS Data** below.

BROADCAST TOWER LOCATION—GIS DATA

In the event that the provider supplies wireless broadcast tower location GIS data, the steps are as follows:

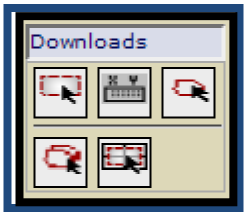
1) Download the required software (Radio Mobile) from the website: **http://www.cplus.org/rmw/english1.html**
2) Install the software according to the standard directions, found here: **http://www.cplus.org/rmw/download/download.php?S=1**
3) Open the application.
4) Load the broadcast tower location and elevation information by selecting **File>Unit properties**. The following dialog box appears:



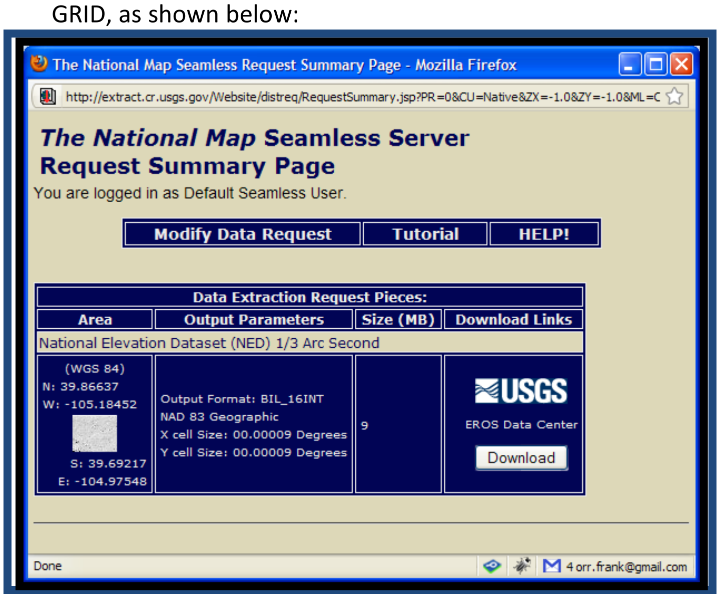
5) Add the information for all the towers supplied by the WISP data provider, including the elevation. If provider does not supply elevation, this information can be obtained from Google Earth.
   a. If available, use the **Import** button to import a Google Earth KML of the tower locations.
6) Go to the National Map Seamless Server (**http://seamless.usgs.gov/**) and download elevation data sufficient to contain the tower locations.

a. At least the 1/3" NED data is needed. Select this by clicking the **Download** button in the upper right of the website and checking the box next to **1/3" NED**.

b. Zoom to the area of interest and use the **Download** tools to define the area to download:

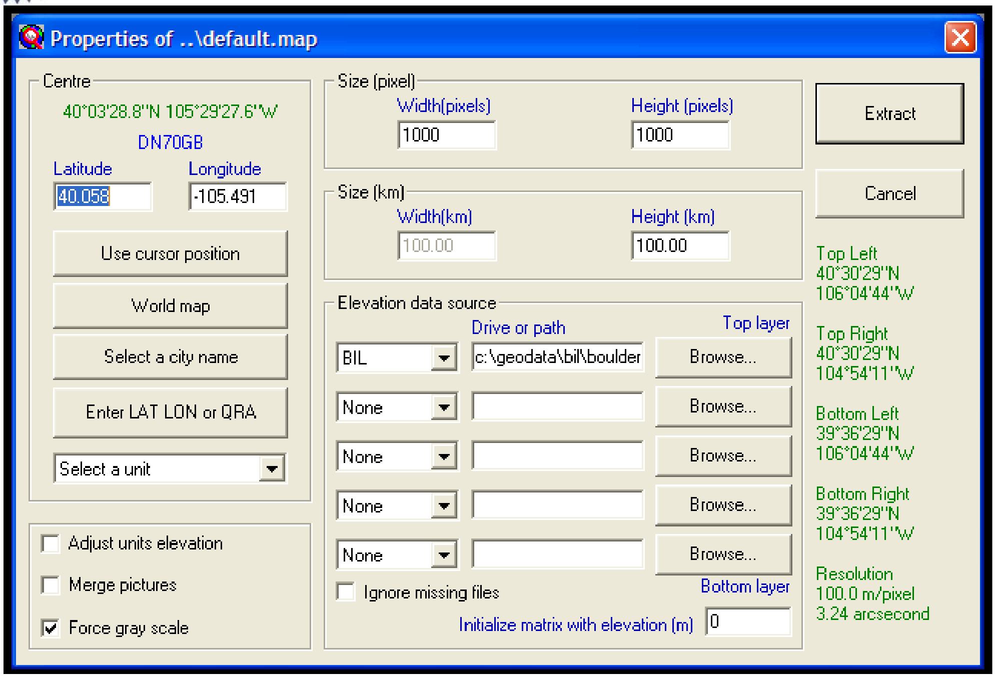


c. Click the **Modify Data Request** button to request the data in BIL_16INT format, not ESRI GRID, as shown below:

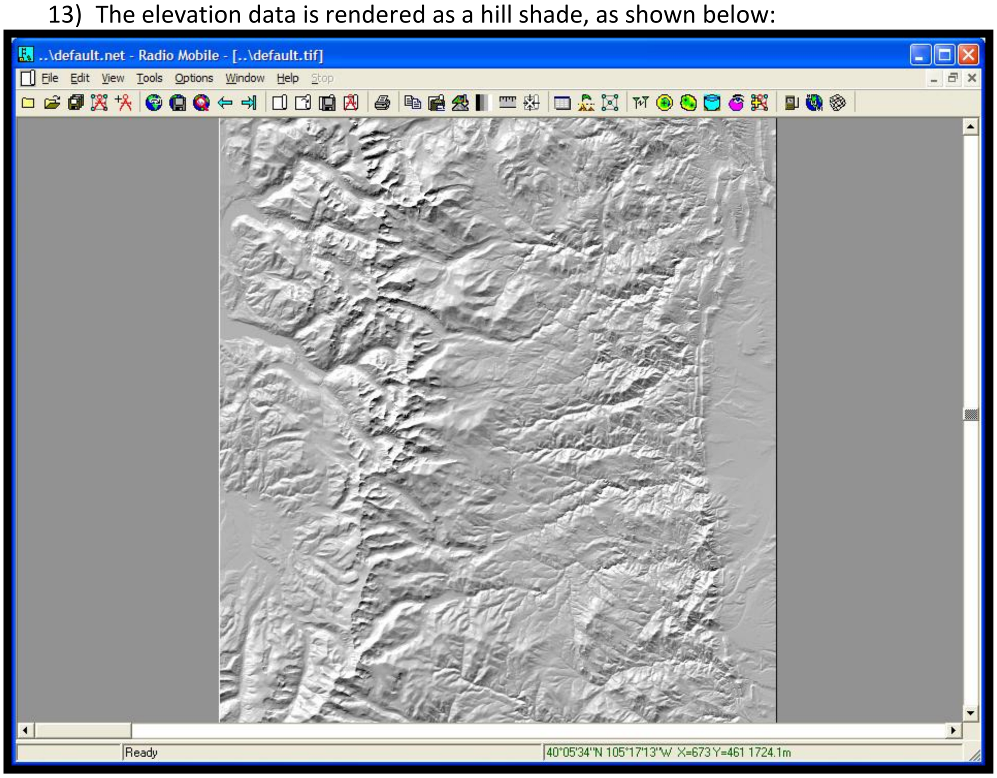


d. Download the data and unzip it.

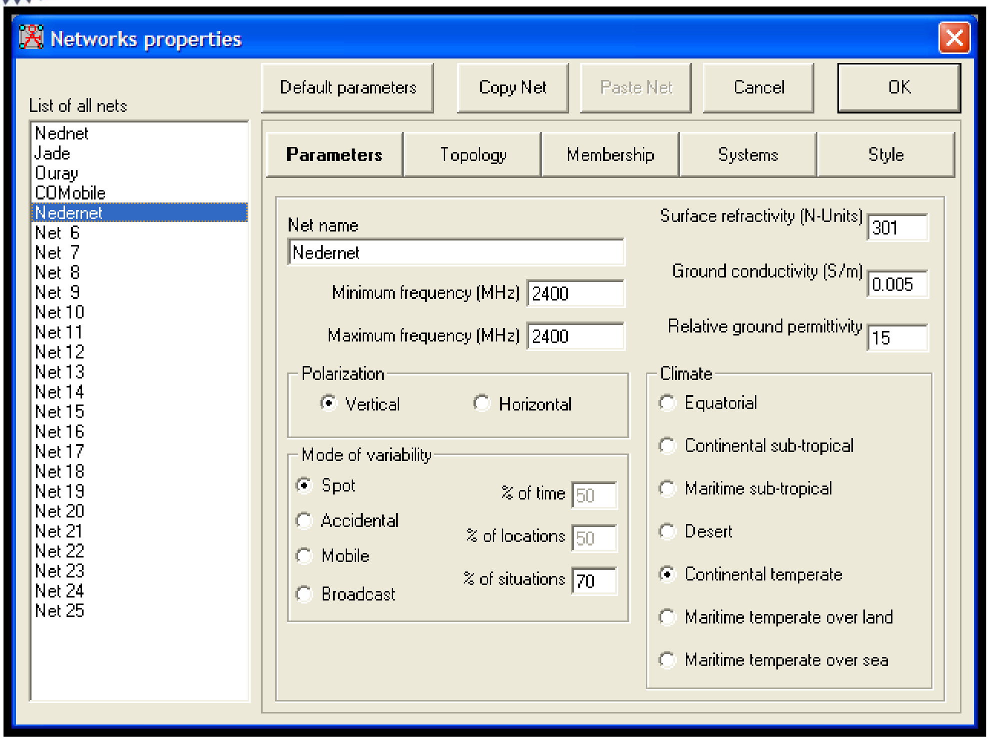
7) Select **File>Map Properties** to define the map.
8) Enter a latitude and longitude in the center of the tower locations.
9) Set the size (in pixels) and the size (in kilometers) of the map.
10) Set the directory path leading to the BIL elevation data just downloaded.
11) The dialog box is shown below:



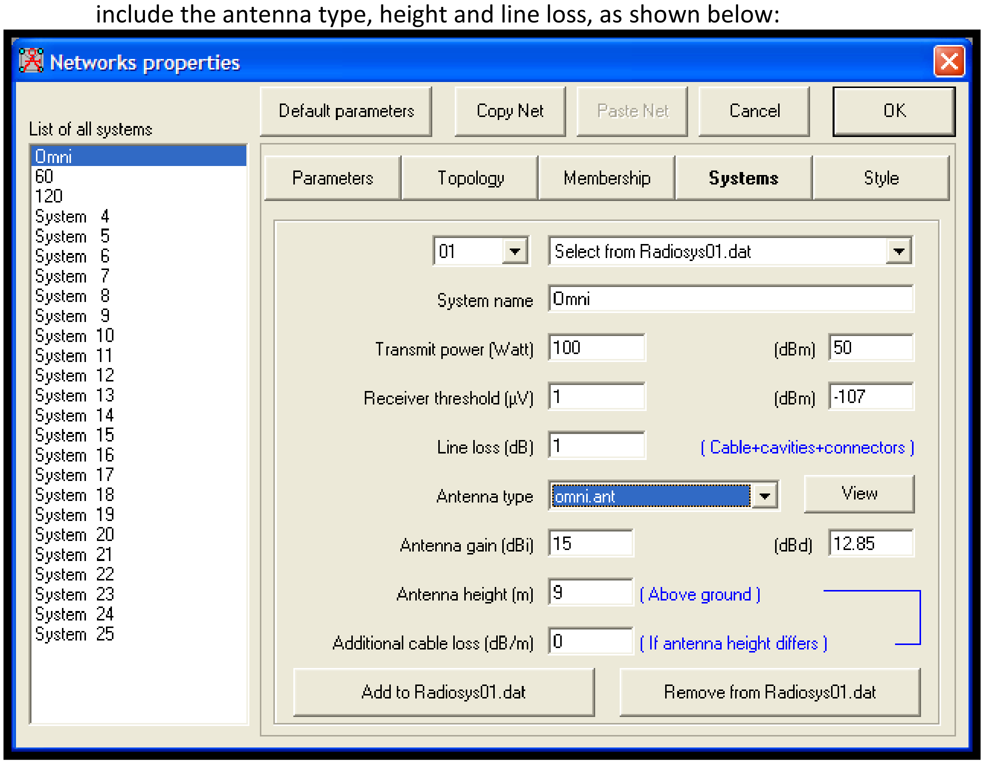
12) Click **Extract**.
13) The elevation data is rendered as a hill shade, as shown below:



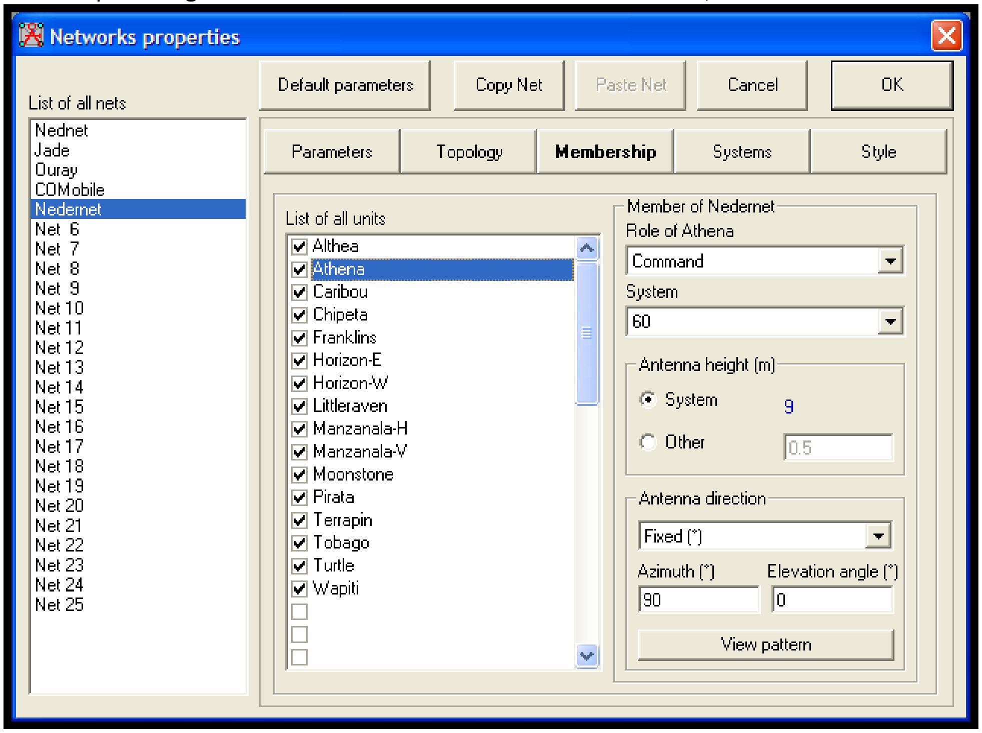
14) Select **File>Network properties** from the main menu.
15) Create a new network and enter in the frequency range under the **Parameters** tab, as shown below:



16) Leave all the other values as they appear, and select the **Systems** tab.
17) Create enough systems to cover all the varieties of equipment in the provider network. This will include the antenna type, height and line loss, as shown below:



18) Now click on the **Membership** tab, and assign the individual towers to their respective systems, providing the azimuth for non-omnidirectional antennas, as shown below:

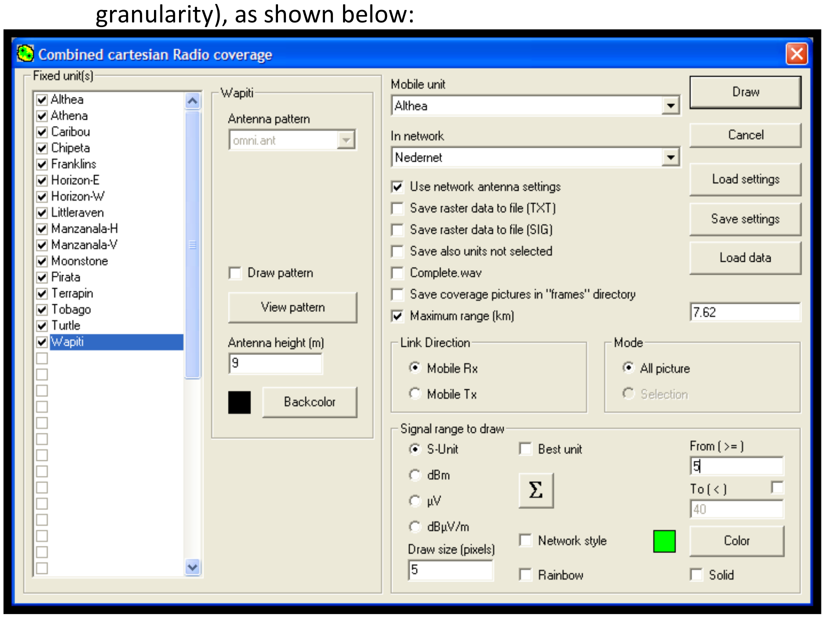


19) Click **OK**.

20) Select **Tools>Radio Coverage>Combined Cartesian** from the main menu.

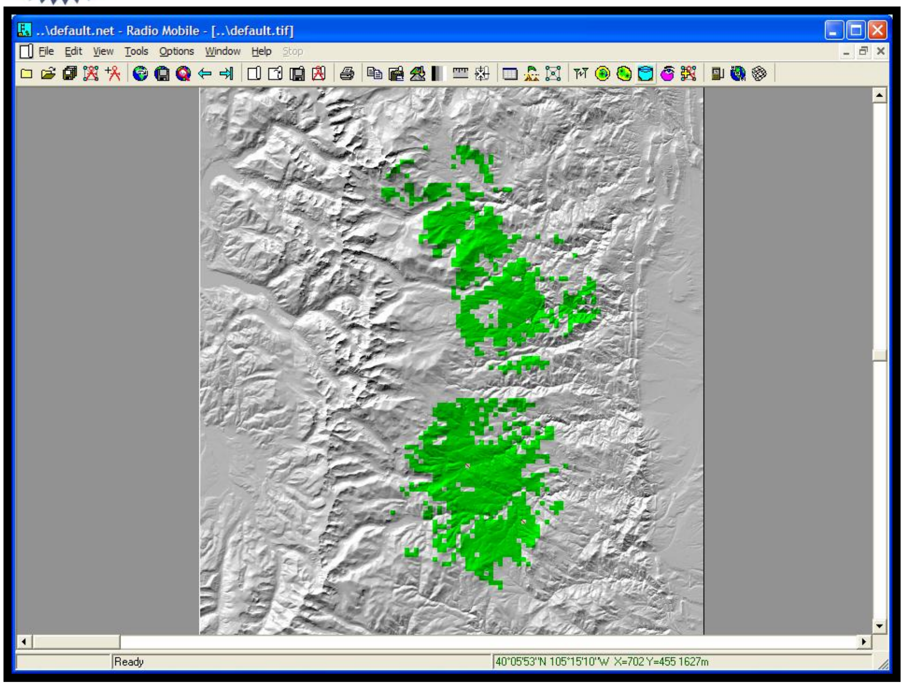
21) Complete the dialog box as shown below, providing the **Maximum Range** from the highest tower beam radius supplied by the provider.

22) Set the **Pixel Size** at 5 (experiment depending on the area covered to get the right level of granularity), as shown below:

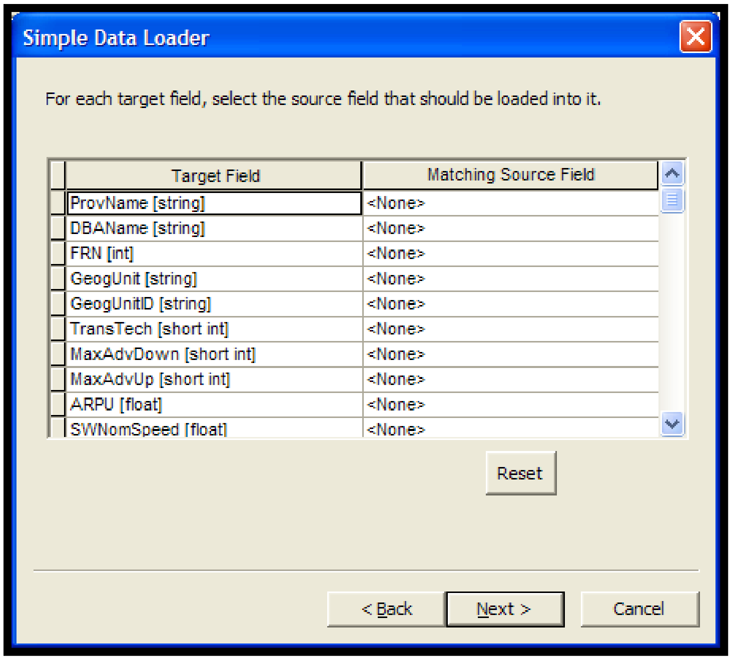


23) Set the **Signal range to draw** to S-Unit and type 5 in the **From (>=)** box.

24) Click on **Draw**. See below.



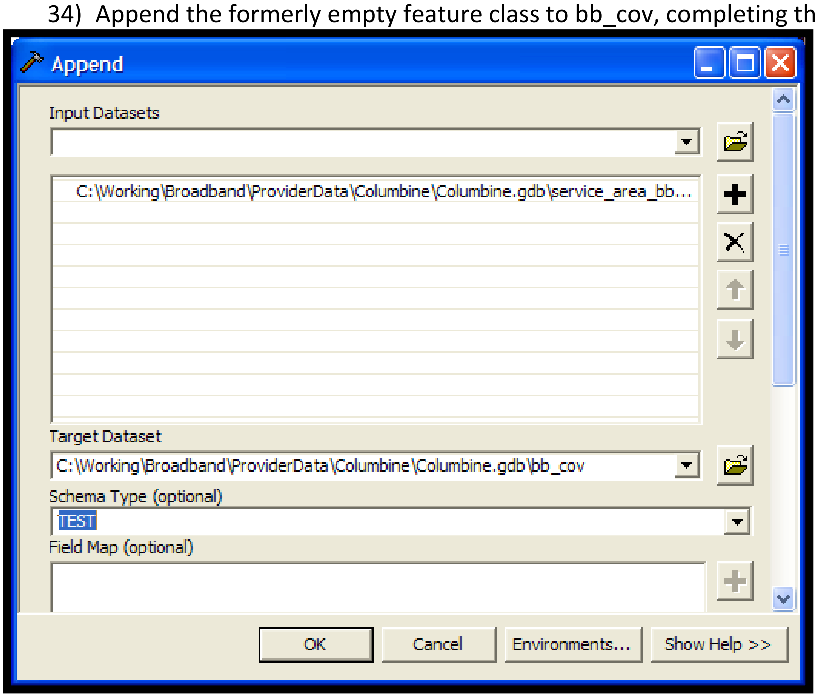
25) Save the resulting image as a TIF by selecting **File>Save Picture as**.
26) Open ArcMap® and load the BIL elevation data you used in Radio Mobile.
27) Load the TIF image you created and georeference it using the corners of the BIL data.
    a. The corners of the data can be seen in the TIF image.
28) Follow the georeferencing directions from the **Coverage Area—PDF/JPG/Other Image Format** section below.
29) Use the **Georeferencing Toolbar** to **Update the Georeferencing** for the TIF dataset.
30) In ArcToolbox®, select **Data Transformations>From Raster>Raster to Polygon** and input the georeferenced TIF you just created, as shown below:
31) Open the resulting polygon feature class for editing using the **Editing** toolbar in ArcMap® and clean up as necessary.
32) In ArcCatalog®, create an empty feature class with the schema of the bb_cov feature class and load the feature class created above into it.
    a. Right-click on the empty feature class, select **Load>Load Data** from the dropdown menu and navigate to the location of the service area feature class.
    b. Click the **Add** button, then click **Next**.
    c. Accept the defaults and click **Next**.
    d. DO NOT attempt to map any fields, as shown below:



e. Click **Next**, then **Next** again, then **Finish**.

33) In ArcToolbox®, go to **Data Management Tools>General>Append**.

34) Append the formerly empty feature class to bb_cov, completing the dialog box, as shown below:



35) Leave the **Schema Type** as TEST.

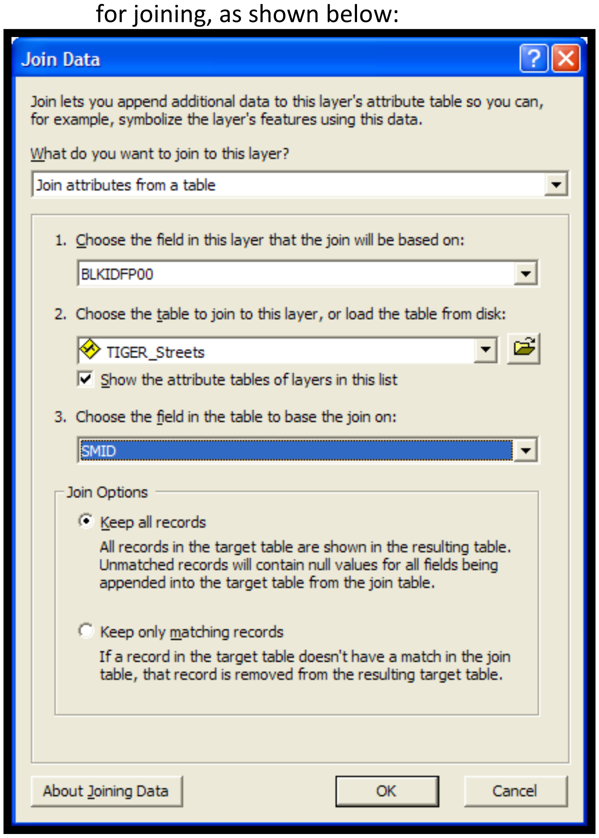
36) Click **OK**.

37) In ArcMap®, open bb_cov for editing and manually input associated attribution.

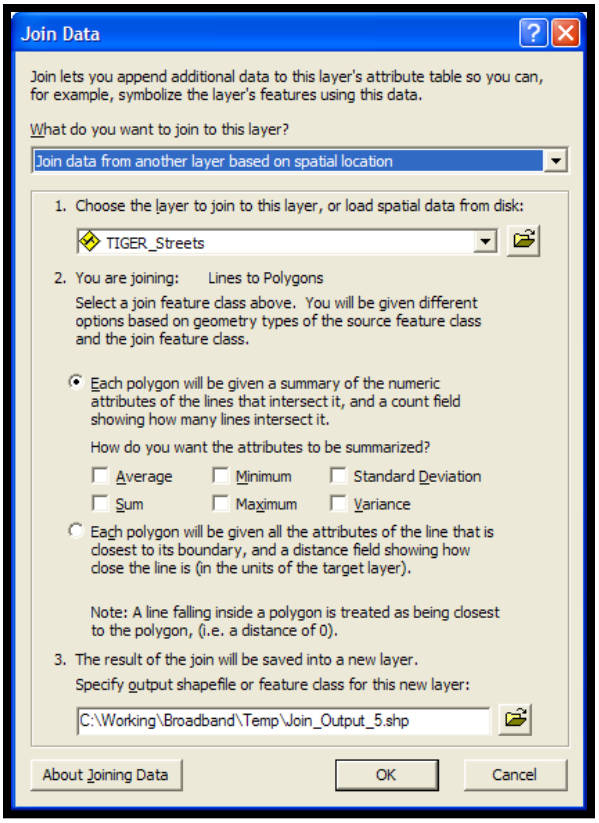
TIGER® STREET SEGMENTS—LIST, SPREADSHEET OR GIS DATA

In the event that the provider supplies TIGER® street segments in list or spreadsheet format, the steps are as follows:

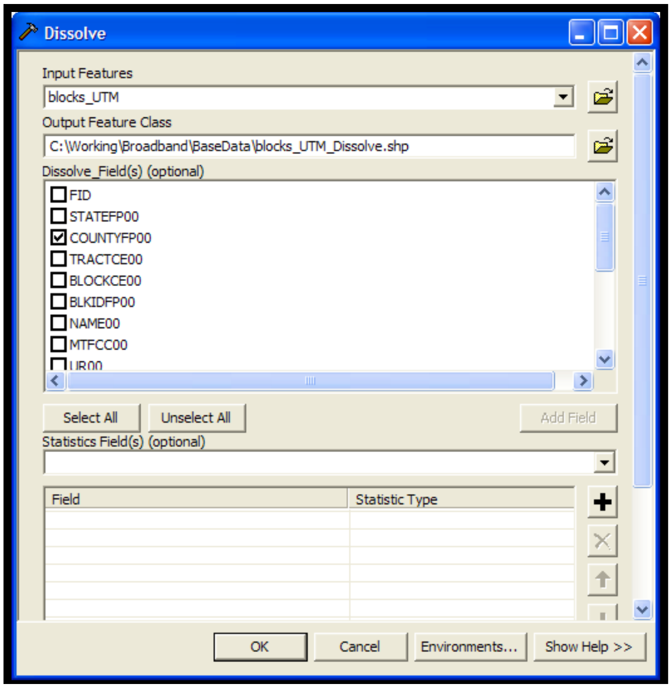
1) Join TIGER® road segments to 2000 census blocks feature class using one of two methods based on how the data is provided:
    a. If the TIGER® data is provided with a Census Block ID, then join the segments to the Census Block geometry based on that ID:
        (i.) Load both datasets into ArcMap®;
        (ii.) In the layer list, right-click on the 2000 census block feature class and select **Joins and Relates>Join**;
        (iii.) In the dialog box, select the TIGER® road segments data and the proper attribute fields for joining, as shown below:



        (iv.) Click **OK**.
    b. If the data provided is a list containing TLIDs, then join to the TIGER®/Line data using the TLID, and use a spatial join to associate the TIGER® segment with the coterminous block based on the block ID:
        (i.) Load both datasets into ArcMap®;
        (ii.) In the layer list, right-click on the 2000 census block feature class and select **Joins and Relates>Join**;
        (iii.) Select **Join data from another layer based on spatial location** from the dropdown menu;
        (iv.) Complete the dialog box, as shown below and click **OK**.



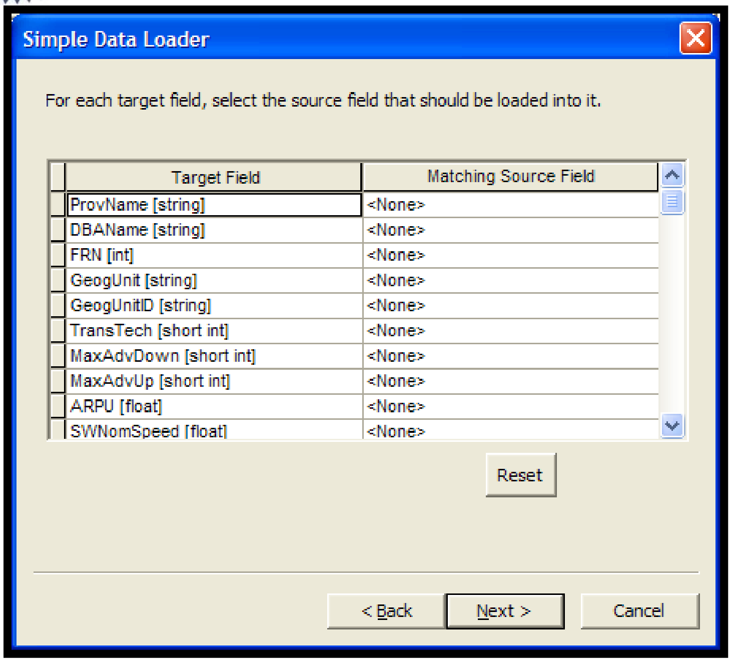
2) Export joined records into a temporary feature class.
3) If joined Census Block geometry is confined to one specific area, then dissolve blocks into one record. If joined Census Block geometry is distributed throughout a particular State, then dissolve sub-selections of census blocks for each county.
   a. Use the County FIPS code to dissolve by county.
   b. In ArcToolbox®, select **Data Management Tools>Generalization>Dissolve**.
   c. Complete the **Dissolve** dialog box, as shown below:



d. Click **OK**.

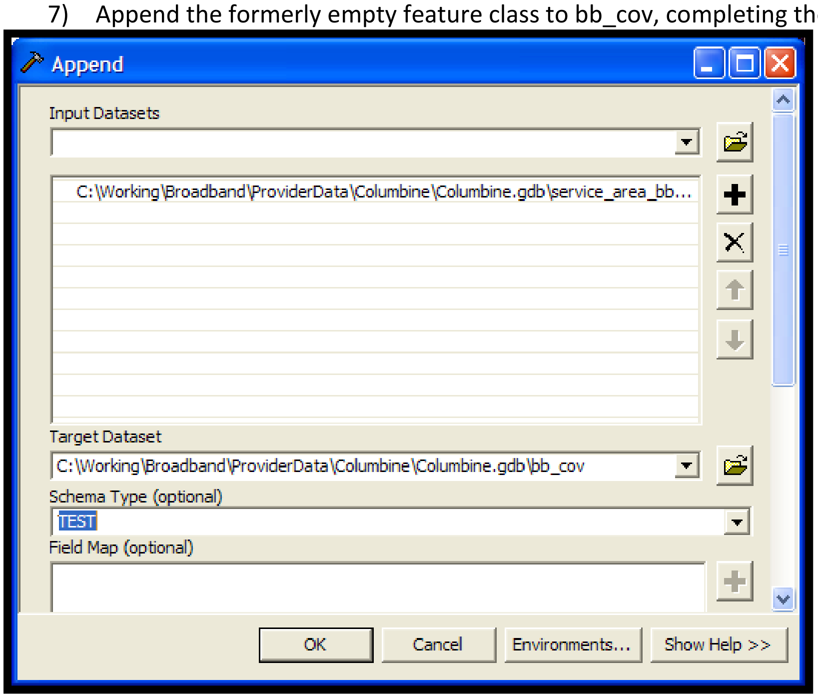
4) For each dissolved region, open the feature class for editing using the **Editing** tool in ArcMap® and remove unnecessary slivers and other small holes. For general guidance on editing features in ArcMap®, see **http://webhelp.esri.com/arcgisdesktop/9.3/pdf/Editing_Tutorial.pdf**

5) In ArcCatalog®, create an empty feature class with the schema of the bb_cov feature class and load the feature class created above into it.
   a. Right-click on the empty feature class, select **Load>Load Data** from the dropdown menu and navigate to the location of the service area feature class.
   b. Click on the **Add** button, then click **Next**.
   c. Accept the defaults and click **Next**.
   d. DO NOT attempt to map any fields, as shown below:



e. Click **Next**, then **Next** again, then **Finish**.

6) In ArcToolbox®, go to **Data Management Tools>General>Append**.
7) Append the formerly empty feature class to bb_cov, completing the dialog box, as shown below:



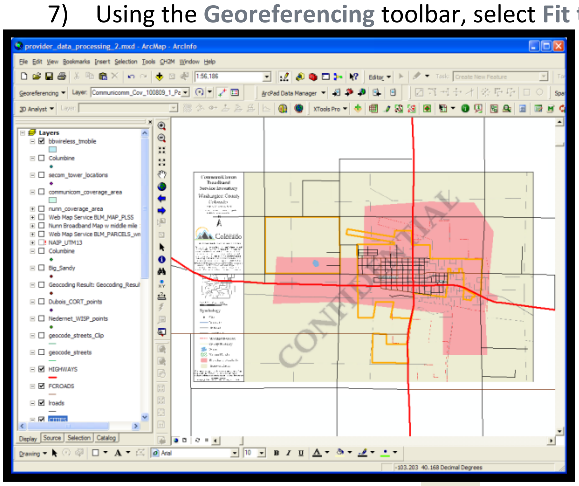
8) Leave the **Schema Type** as TEST.
9) Click **OK**.
10) In ArcMap®, open bb_cov for editing and manually input associated attribution if necessary.

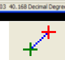
POLYGONAL DATA

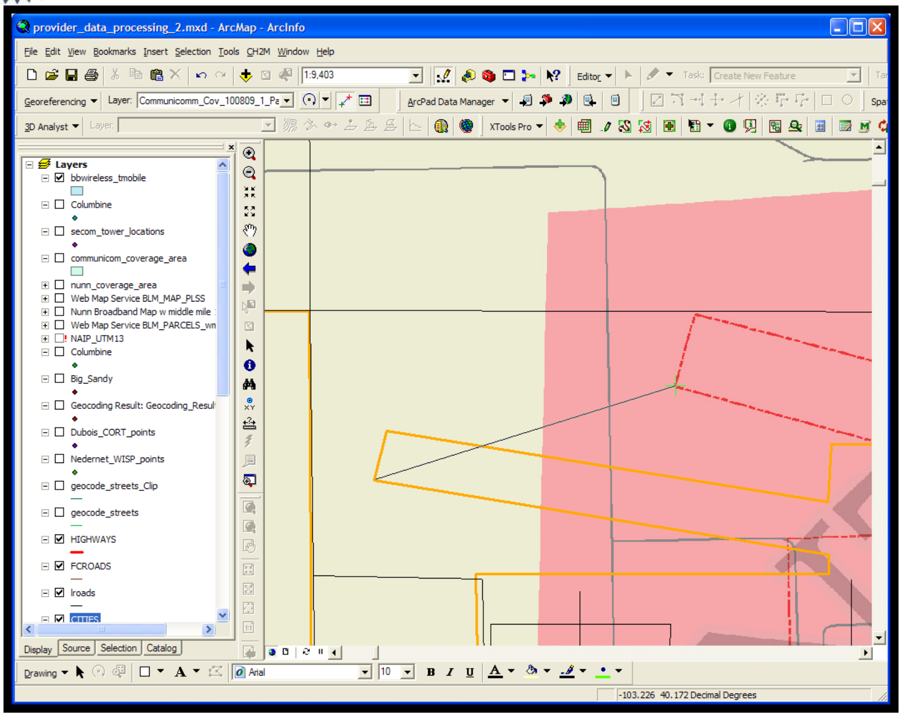
COVERAGE AREA—PDF/JPG/OTHER IMAGE FORMAT

In the event that the provider supplies coverage area data in some image format such as PDF or JPG format, the steps are as follows:

1) If in PDF format, open in Adobe Acrobat and **Save As…** JPG format.
2) Open the JPG image in ArcMap®.
3) Add the required base map vector data for georeferencing.
    a. This generally will be either the CDOT data or TIGER® data.
4) Change the coordinate system of the data frame to the desired end coordinate system.
5) Zoom to the general location of the JPG map image.
    a. This is the location based on the vector data, not the JPG image itself. For example, if you know that the JPG image represents an area around the town of Limon, zoom to the town of Limon in your vector data.
6) Open the **Georeferencing** toolbar by selecting **View>Toolbars>Georeferencing** from the main menu bar.
7) Using the **Georeferencing** toolbar, select **Fit to Display**; results are shown below:



8) Use the **Control Point** button  to add control points to the map.
9) Use common points in the base dataset and the JPG image.
    a. For example, find major street intersections, county/city boundaries, etc.
    b. Try to distribute the points more or less in the four corners on the image for the best transformation.
10) Click on the location on the image first, then click on the corresponding location on the vector database map, as shown in the image below:



11) After placing each control point, the image transformation will update automatically.
12) Repeat until satisfied with the transformation.

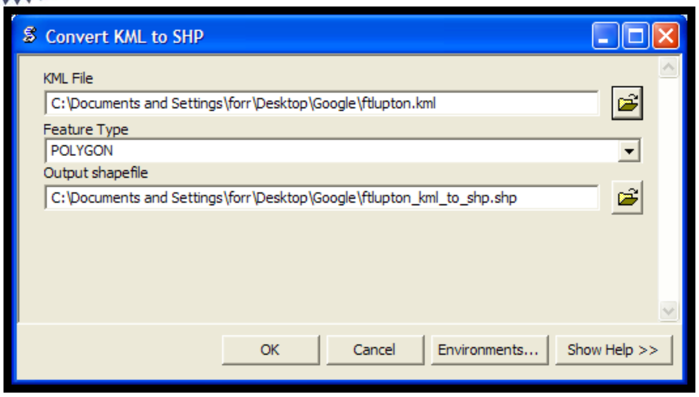
NOTE:
The transformation may take up to four points, although sometimes only two are necessary.

13) When satisfied with the transformation, select **Update Georeferencing** from the **Georeferencing** toolbar dropdown.
    a. This will create a "world" file (.jgw in the case of JPGs) in the same directory as the image file.
14) In ArcCatalog®, create a new polygon shapefile with the appropriate data schema for a provider coverage area, which can be found in Appendix D.
15) Add the shapefile to ArcMap®.
16) Using the **Editor** toolbar, select **Start Editing**. Set the **Task** to **Create New Feature**.
17) Use the **Sketch Tool** to digitize a new coverage polygon using the coverage area outline from the georeferenced JPG and add the required attributes manually.
18) Repeat the above steps for all subscriber speed coverage areas provided.
19) Follow the steps detailed in **Coverage Area—GIS Data** below.

COVERAGE AREA—KML/KMZ

In the event that the provider supplies coverage area data in Google Earth KML or KMZ format, the steps are as follows:

1) Use a KML to SHP converter to translate file into an Esri® format.
2) **http://arcscripts.esri.com/details.asp?dbid=15603**
3) Download the script and follow the provided instructions for installing it in ArcToolbox®.
4) Double-click on the script in ArcToolbox® and navigate to the location of the KML file, as shown below:



5) Add the new shapefile to ArcMap®. Repeat for all KML files provided.
6) Follow the steps detailed in **Coverage Area—GIS Data** below.

COVERAGE AREA—CAD DATA

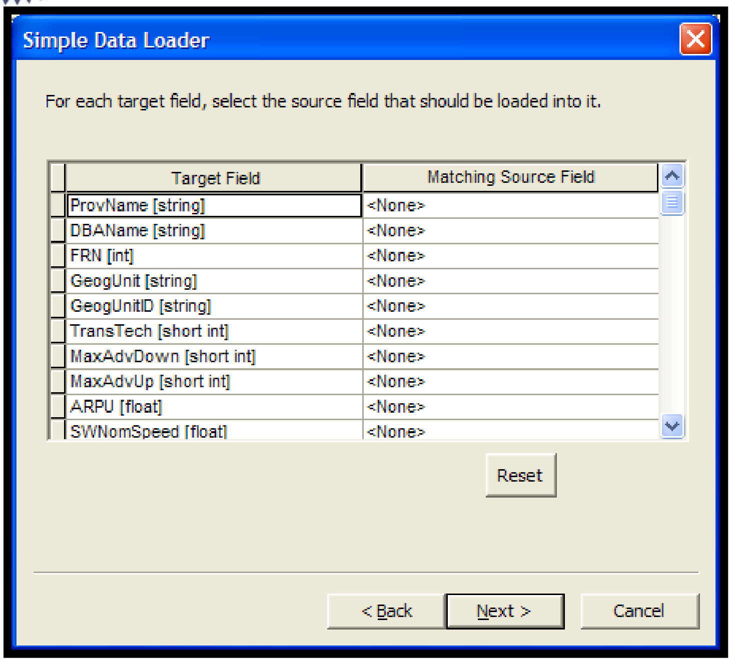
In the event that the provider supplies coverage area data in GIS format, the steps are as follows:

1) Transform the CAD dataset into an Esri® format.
2) **http://webhelp.esri.com/arcgisdesktop/9.2/index.cfm?TopicName=Transforming_CAD_datasets**
3) It may be necessary to contact the provider first to determine the coordinate system of the CAD data.
4) If the CAD data is not in a standard coordinate system, it may be necessary first to use ArcMap® to georeference the CAD data to a known coordinate system.
a) To do so, follow the instructions provided above in **Coverage Area—PDF/JPG/Other Image Format**.
5) In ArcCatalog®, create a new polygon shapefile with the appropriate data schema for a provider coverage area, which can be found in Appendix D.
6) Add the shapefile to ArcMap®.
7) Using the **Editor Toolbar**, select **Start Editing**. Set the **Task** to **Create New Feature**.
8) Use the **Sketch Tool** to digitize a new coverage polygon using the coverage area outline from the georeferenced CAD file and add the required attributes manually.
9) Follow the steps detailed in **Coverage Area—GIS Data** below.

COVERAGE AREA—GIS DATA

In the event that the provider supplies coverage area data in GIS format, the steps are as follows:

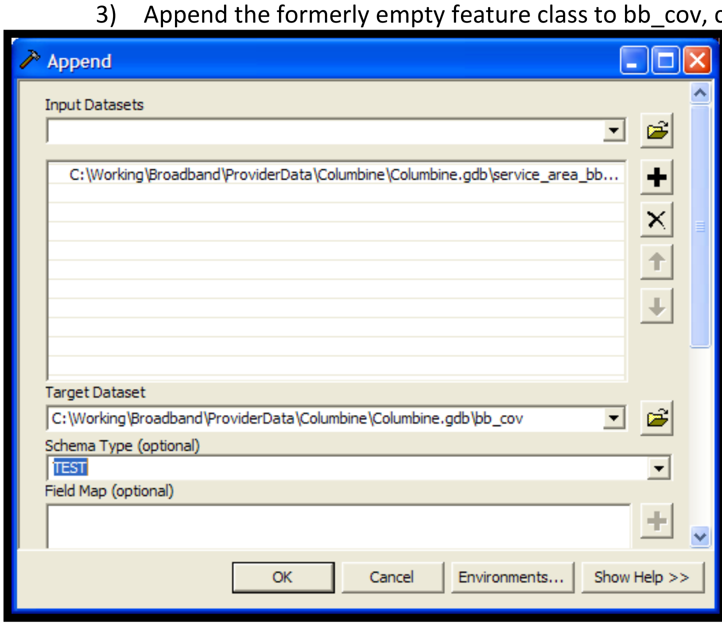
1) In ArcCatalog®, create an empty feature class with the schema of the bb_cov feature class and load the GIS feature class either created above or supplied by the provider into it.
   a. Right-click on the empty feature class, select **Load>Load Data** from the dropdown menu and navigate to the location of the service area feature class.
   b. Click on the **Add** button, then click **Next**.
   c. Accept the defaults and click **Next**.
   d. DO NOT attempt to map any fields, as shown below:



e. Click **Next**, then **Next** again, then **Finish**.

2) In ArcToolbox®, go to **Data Management Tools>General>Append**.

3) Append the formerly empty feature class to bb_cov, completing the dialog box, as shown below:



4) Leave the **Schema Type** as TEST.

5) Click **OK**.

6) In ArcMap®, open bb_cov for editing and manually input associated attribution, if necessary.

COMPACT POLYGON FROM SUBSCRIBER POINTS

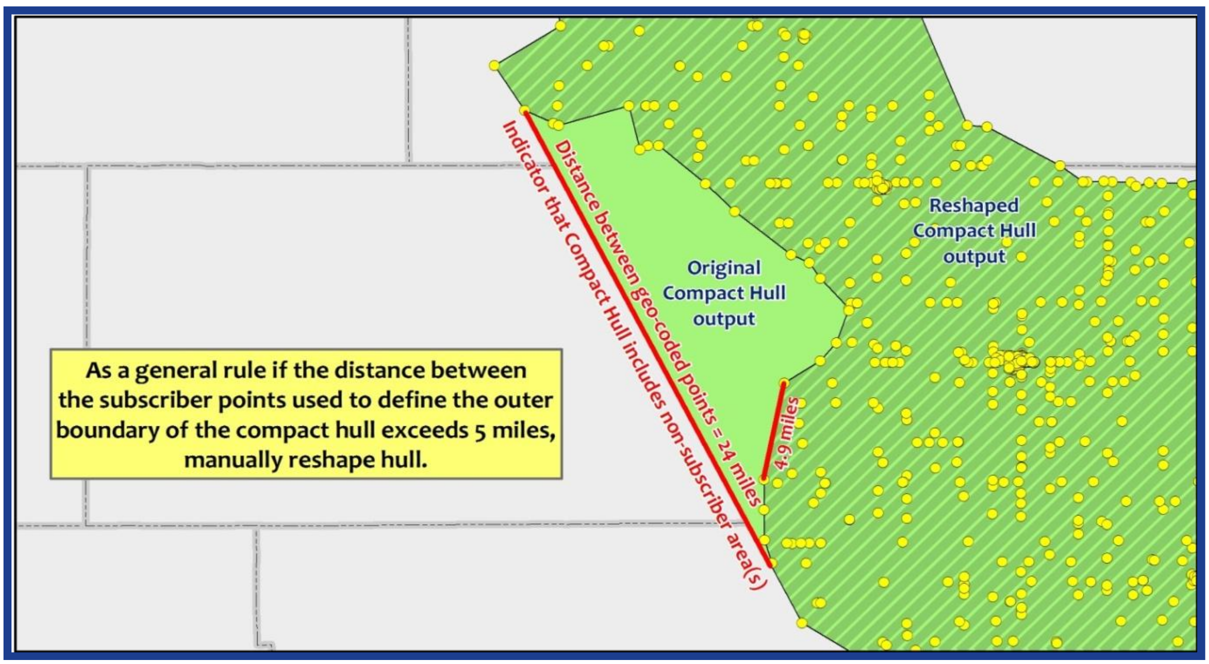
1) Geocode address list using latest **State Composite Locator**.

2) Verify that your geocoded file has only one TT (Technology Type). If not, export individual geocoded layers for each Technology Type.

3) For each TT, check for differences in speed values or speed tiers and create separate layers for each speed value/tier.

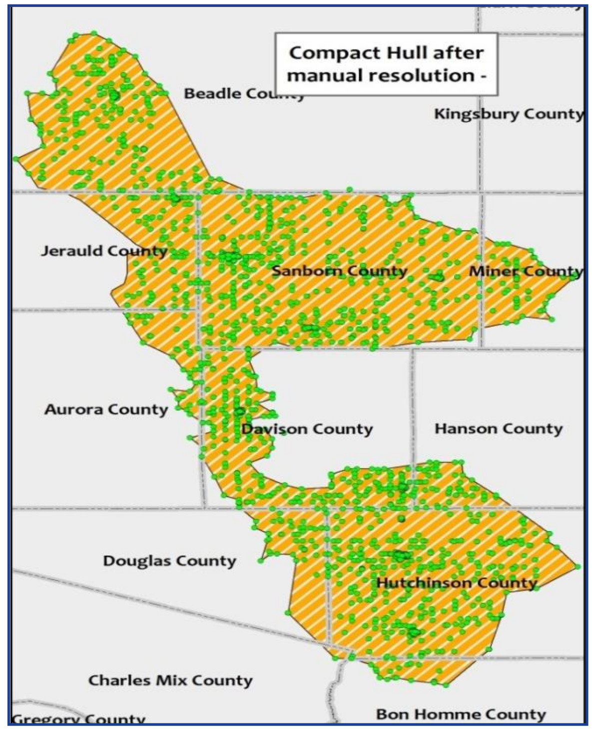
4) Clean your geocoding results: remove any points that geocode to accuracy levels below ZIP+4 (ZIP centroids, carrier route centroids, etc). Also, verify that outliers with acceptable accuracy levels are legitimate, i.e., fall in correct city and Zip.
5) Perform spatial join between county polygons (using stcnyfips field) and the cleaned geocoded subscriber points in order to carry the county name and stcnty fips.
6) Summarize the number of subscribers by county and use the subscriber counts by county to populate the Rate Tier table.
7) Un-join the county data from the geocode subscribers list.
8) Create Compact Polygon using cleaned geocoded layer or sub-selection of XtoolsPro—ConvexHull-DetailedHull option. A sub-selection of geocoded points will be used in areas where more than one polygon will need to be created for one provider's service area.
9) Evaluate output Hull carefully, looking for areas that should not be covered by hull polygon.
    a. If it is determined that an area or areas should not be represented in coverage area, manually reshape hull polygon until coverage area is adequate.
    b. When not obvious and as a general rule, manually resolve compact polygon when the distance between the subscriber points used to define the outer boundary of the compact polygon exceeds 5 miles . When reshaping the hull polygon, snap to the outermost geocoded points. See the three figures below for examples.

Compact Hull: Manual Resolution Required



Compact Hull: Manual Resolution Required

Compact Hull: After Manual Resolution



10) To attribute the compact polygon, perform a spatial join where your Target Feature Class is the compact polygon and the Join Feature Class is your geocoded point layer. Export compact hull with joined attributes and name file appropriately.
11) Append attributed compact polygon to Broadband TT template Feature Class and, if required, manually input any provider attribution that may not have carried over in the append process.
12) Intersect compact polygon with county boundaries to create unique records by county and use the state-county-fips field to populate stcty_fips field. Also use the county name field to populate the BBCov_Name field.
    a. Exception: where a provider's coverage is distributed throughout more than one area of any given county where the BBcov_Name should be populated using an appropriate city or other logical name based on geographical location.
13) Export/load into appropriate BB TT model dataset.

CENSUS BLOCKS—LIST OR SPREADSHEET

In the event that the provider supplies census block data in a list or spreadsheet, the steps are as follows:

1) Ensure block polygons supplied by the provider are 2000 currency.
2) If other currency, convert to 2000 currency before proceeding.
    a. To do this, remove the trailing letter (a, b, etc.) from the block ID.
    b. You will now have two blocks that equate to one block in the 2000 block geometry.
    c. Delete duplicate block IDs, retaining the higher service tier in each case.
3) Prepare the block list in clean Excel format, removing all Excel-only formatting, merged cells, colors, borders, etc.
4) Import the spreadsheet into ArcMap®.
5) Right-click on the 2000 census block feature class in the layer list in ArcMap® and select **Joins and Relates>Join** from the dropdown menu. Join the census block list to the 2000 census blocks feature class using the block ID and export joined records in a new feature class. The **Join** dialog

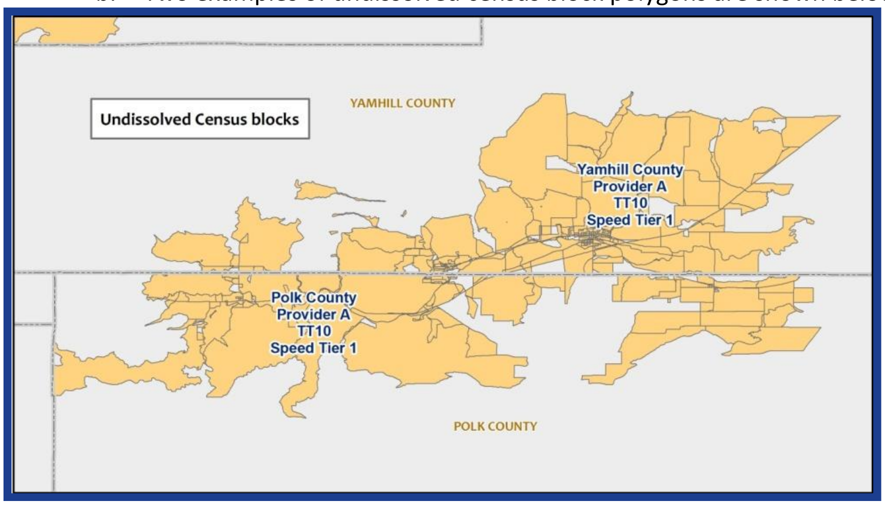
box and process can be seen above in the **TIGER® Street Segments—List, Spreadsheet or GIS Data** subsection.

6) Follow the steps in **Census Blocks—GIS Data** below.

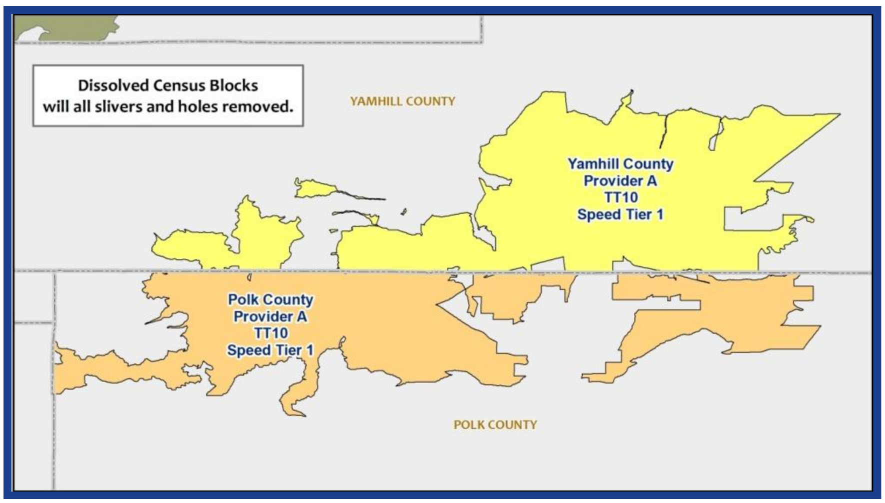
CENSUS BLOCKS—GIS DATA

In the event that the provider supplies census block GIS data, the steps are as follows:

1) Ensure that the blocks supplied by the provider are in the required data schema and are complete as far as required attribution.
    a. If not, manually enter the required attribution or contact the provider to fill gaps.
2) If census block geometry is distributed throughout more than one county, then select **Data Management Tools>Generalization>Dissolve** in ArcToolbox® and dissolve based on County/Provider/TT/Speed Tier so that unique records are created for each unique combination.
    a. The **Dissolve** dialog box is shown above in the **TIGER® Street Segments—List, Spreadsheet or GIS Data** section.
    b. Two examples of undissolved census block polygons are shown below:



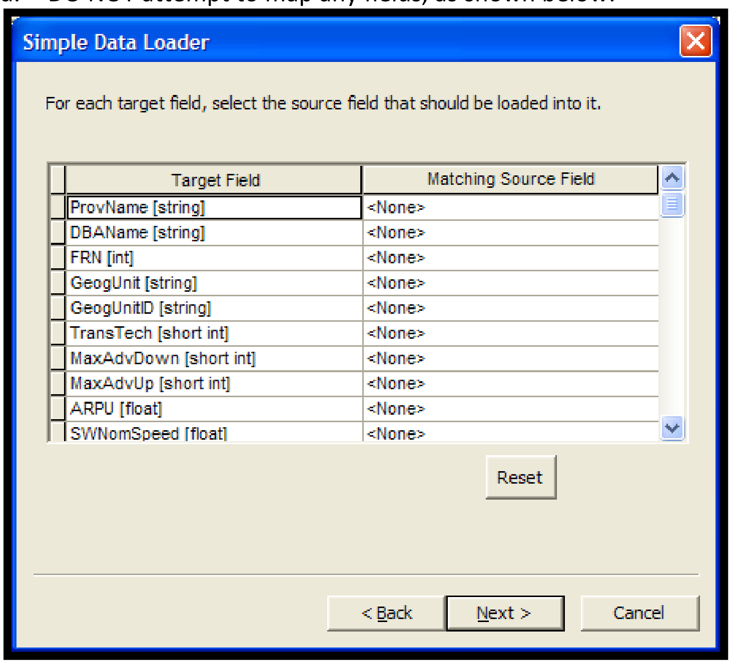
Undissolved census block polygons



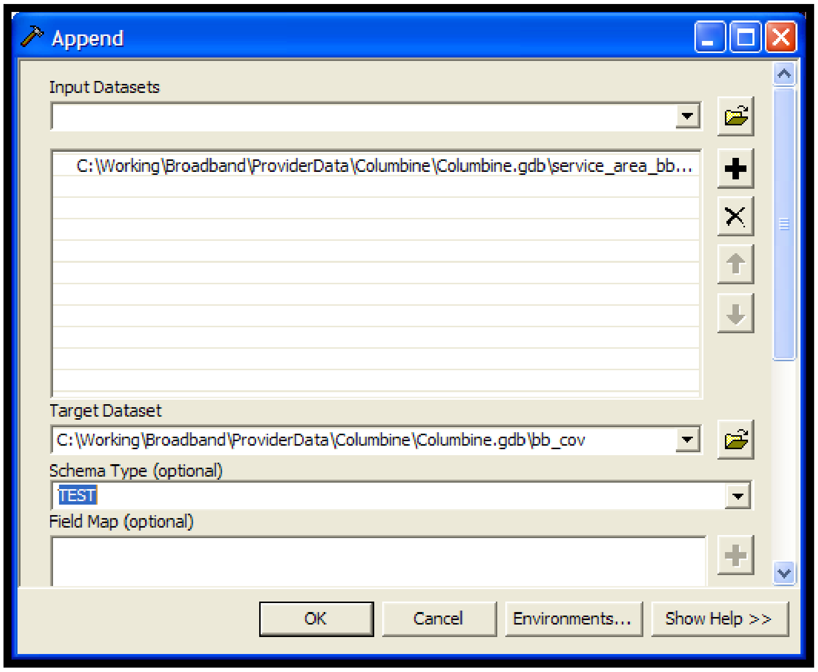
Census block polygons dissolved by county

3) For each dissolved region use the **Editing** toolbar in ArcMap® to remove unnecessary slivers and other small holes.

4) In ArcToolbox®, select **Data Management Tools>General>Merge** and merge the processed polygons into a single layer.
5) The merged census blocks will need to have the subscriber's frn field added and populated.
6) In ArcCatalog®, create an empty feature class with the schema of the bb_cov feature class and load the GIS feature class either created above or supplied by the provider into it.
   a. Right-click on the empty feature class, select **Load>Load Data** from the dropdown menu and navigate to the location of the service area feature class.
   b. Click the **Add** button, the click **Next.**
   c. Accept the defaults and click **Next.**
   d. DO NOT attempt to map any fields, as shown below:



   e. Click **Next**, then **Next** again, then **Finish**.
7) In ArcToolbox®, go to **Data Management Tools>General>Append**.
8) Append the formerly empty feature class to bb_cov, completing the dialog box, as shown below:



9) Leave the **Schema Type** as TEST.
10) Click **OK**.
11) In ArcMap®, open bb_cov for editing and manually input associated attribution, if necessary.

METADATA TRANSACTIONS

Following any updates or changes completed within the file geodatabase (fGDB) stored on the GIS-Analysts staging environment, the GIS-Analyst runs transactions to compare that fGDB with the one stored on the Core server to ensure metadata on all changes is recorded.

The steps taken to run transactions on the updated Core database are outlined below:

1) Open a command line window and run generateTransactions.py:
    a. Usage: **generateTransactions.py [Core fGDB] [Staging Environment fGDB]**
    b. Example of command line:

<path>**generateTransactions.py** <path>**ST_BB_POLY_SRV_AREAS.gdb** <path>**ST_BB_POLY_SRV_AREAS.gdb**

2) Shown below is an example of the output screen that will be displayed:

```
-----------  Collecting Transactions  ----------------


Calculating rec_id field for BBCov_0_BB_POLY_TEMPLATE
value can not be 0 or less
Trouble creating the progress meter


Calculating rec_id field for BBCov_10_CenturyLink

%   10   20   30   40   50   60   70   80   90   100

----|----|----|----|----|----|----|----|----|----|      Goal = 8
```

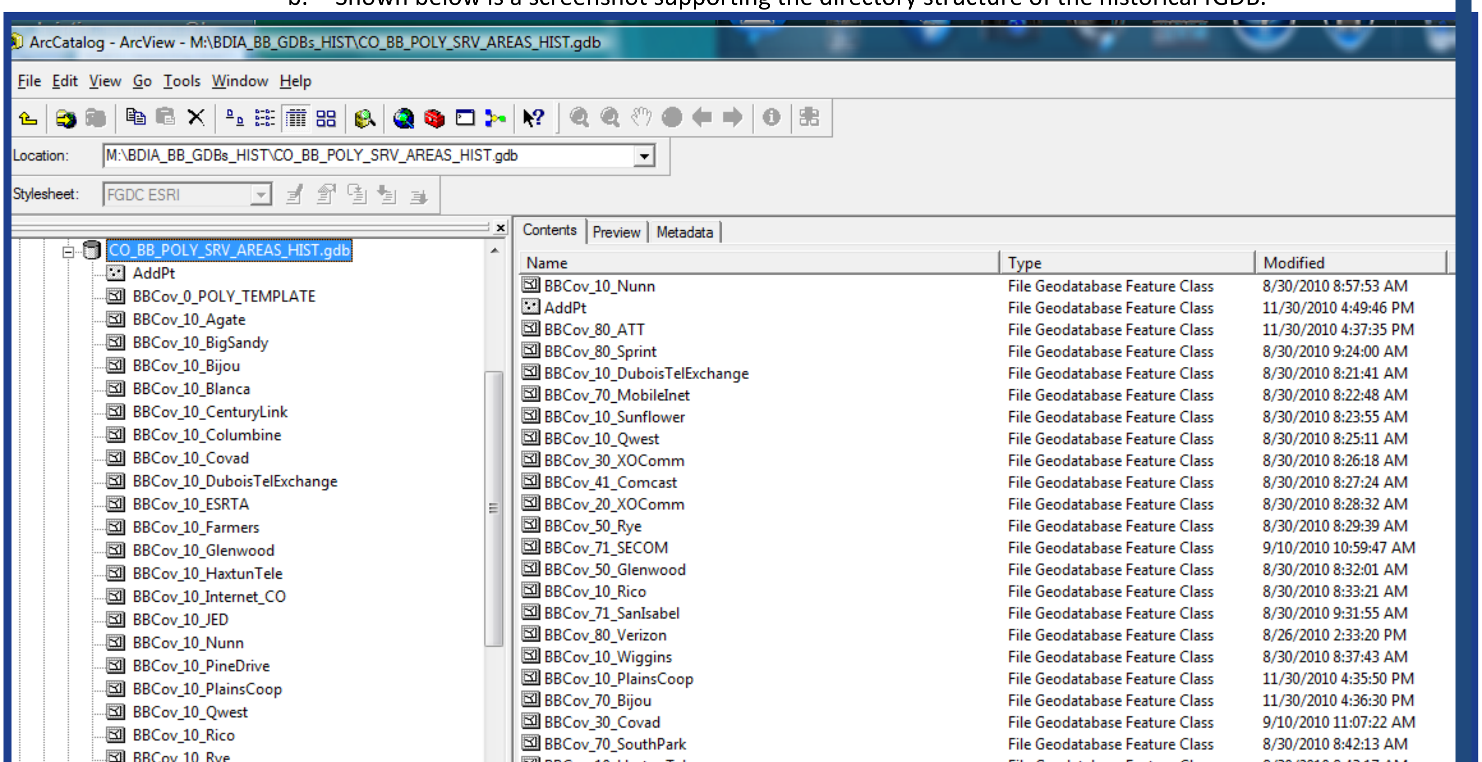
```
Merging change: X:\BDIA_BB_GDBs\MS_BB_POLY_SRV_AREAS.gdb\AddPt
Calculating Transaction fields for AddPt

%   10   20   30   40   50   60   70   80   90   100

----|----|----|----|----|----|----|----|----|----|      Goal = 1
**************************************************
X:\BDIA_BB_GDBs\MS_BB_POLY_SRV_AREAS.gdb\AddPt...changes is complete.


Your transaction FeatureClasses are in:
\\michigan\AllAccess\BDIA_BB_GDBs_HIST\MS_BB_POLY_SRV_AREAS_HIST.gdb
--------------------------------------------------------------------------------
------------
elapsed time = 2994.4 seconds
```

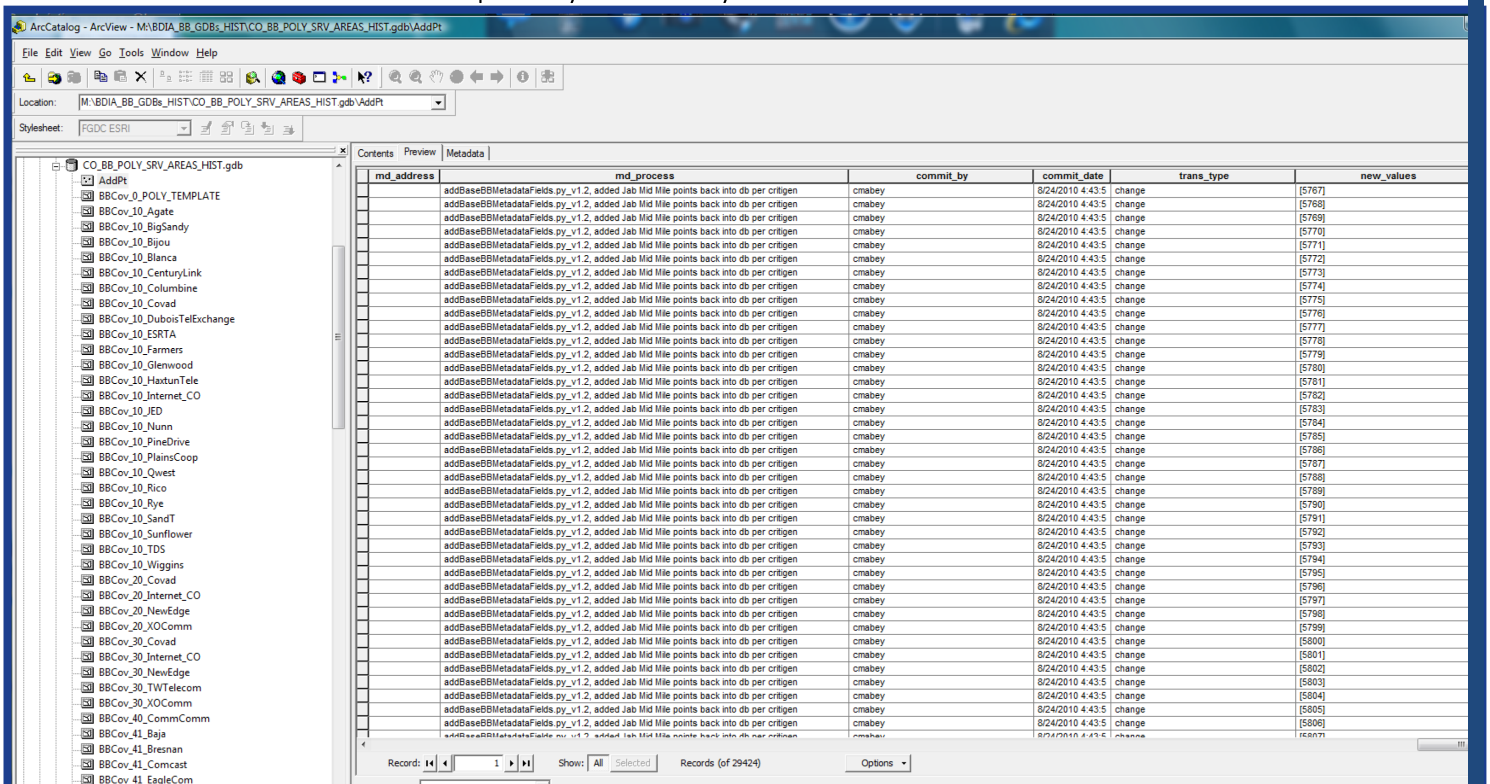
3) After the process has completed, results can be found in the ST_BB_POLY_SRV_AREAS_HIST.gdb:
   a. The transactions scripts records changes at a feature level.
   b. Shown below is a screenshot supporting the directory structure of the historical fGDB.



   c. Attribution associated with each added/removed/changed feature is tracked, including the following additional columns appended to the end of each:

(i.) Commit_by
   (1) Records the GIS-Analyst who committed the changes to the historical fGDB.
(ii.) Commit_date
   (1) Records the date and time stamp on which the changes were committed.
(iii.) Trans_type
   (1) This field reflects the type of change recorded;
   (2) Categorized by: Adds/Change/Deletes.
(iv.) New_values
   (1) Records the new values when a change was completed on a feature. Example: Name or speed change.

d. MD_Process also is transferred from the edited fGDB to the historical fGDB, which states the actions completed by the GIS-Analyst.



DATA PROCESSING

DATA PROCESSING OVERVIEW

The following subsections detail the steps and layout required to process the service provider data further to meet NTIA requirements:

- **Weighted Nominal Speed**;
- **Middle Mile**;
- **Broadband Coverage Template**.

WEIGHTED NOMINAL SPEED

The weighted nominal speed is populated in one of the following two ways: **subscriber data supplied by provider** or **value supplied by provider**.

SUBSCRIBER DATA SUPPLIED BY PROVIDER

Where the data provider supplies subscriber speed information, the following formula from the NOFA is used:

$$\frac{(\text{speed tier-1 in kbps} \times \text{no. of tier-1 subscribers}) + (\text{speed tier-2 in kbps} \times \text{no. of tier-2 subscribers}) + (\text{etc.})}{\text{Total average monthly subscribers}}$$

Data is initially broken up in the following order:

1) Stcty_fips;
2) Transmission technology type;
3) Subscriber tiers.

VALUE SUPPLIED BY PROVIDER

Some providers will supply their weighted nominal speed. In these cases, the data supplied will be populated instead of using the NOFA formula. These obtained or calculated values are used to update the service overview layer.

This can be done manually or by creating a table with the provider's FRN and average weighted speed and joining it to the service overview table in ArcMap®.

1) To join, right-click on the layer to join to and select **Joins and Relates>Join** from the dropdown menu.
2) Then navigate to the table to join to and select the join fields from the dropdown list.
3) Then open the source table (the table in ArcMap®) and right-click on the header of the **Average Weighted Speed** field and select **Calculate Field** from the dropdown menu.
4) Use the value of the average weighted speed from the joined table.

MIDDLE MILE

Middle mile information generally is provided in spreadsheet or text file format. The process is to take what is supplied by the provider and translate it into the required data schema.

1) If the data is supplied with address information, follow the process outlined above in **Subscriber Location—Address Data**.
2) If the data is supplied with associated XY coordinates, follow the process outlined above in **Subscriber Location—XY Data**.
3) Once the data is in GIS format, use the **Append** (**Data Management Tools>General>Append**) command in ArcToolbox® to append the data to the overall middle mile dataset.
4) Set the schema type to NO_TEST and use the Field Map to map the attribute fields from the source to the target dataset.

BROADBAND COVERAGE TEMPLATE

The table below lists descriptions of the fields within the bb_cov layer, which is the interim dataset used to create the final product deliverable.

NAME	ALIAS	DESCRIPTION
objectid	OBJECTID	Internal Object ID
shape	SHAPE	Internal Shape storage
prov_id	PROVIDER_ID	Unique numeric identifier for each provider
prov_name	PROVIDER_NAME	Unique name for each provider
dba_name	DOING_BUSINESS_AS	An alternative "Doing-Business-As" name for the provider
frn	FCC_REGISTRATION_NUMBER	Provider FCC Registration Number
bbcov_name	BBCOV_NAME	BroadMap Broadband Coverage name
trans_code	TRANSMISSION_CODE	Unique code for the transmission technology type described by this layer
trans_name	TRANSMISSION_NAME	Name for the transmissions technology type
trans_desc	TRANSMISSION_DESC	Description for the transmissions technology type
spect_code	SPECTRUM_CODE	Unique code for the spectrum [WIRELESS ONLY]
spect_name	SPECTRUM_NAME	Name for the spectrum [WIRELESS ONLY]
spect_desc	SPECTRUM_DESC	Description for the spectrum [WIRELESS ONLY]
mad_dwn_t	MAX_AD_DOWN_TIER	Maximum advertised downstream speed available within given area (speed tier)
mad_up_t	MAX_AD_UP_TIER	Maximum advertised upstream speed available within given area (speed tier)
typ_dwn_t	TYPICAL_DOWN_TIER	Typical downstream speed available within given area (speed tier)
typ_up_t	TYPICAL_UP_TIER	Typical upstream speed available within given area (speed tier)
mad_dwn_k	MAX_AD_DOWN_KBPS	Maximum advertised downstream speed available within given area (kbps)
mad_up_k	MAX_AD_UP_KBPS	Maximum advertised upstream speed available within given area (kbps)
typ_dwn_k	TYPICAL_DOWN_KBPS	Typical downstream speed available within given area (kbps)
typ_up_k	TYPICAL_UP_KBPS	Typical upstream speed available within given area (kbps)
subs	SUBSCRIBERS	Total average monthly subscribers for this provider for this technology for this coverage polygon
md_geom	MD_GEOMETRY	Metadata: Comma separated list of source ids from which the polygon extent was produced
md_exists	MD_EXISTS	Metadata: Comma-separated list of source ids used in understanding and editing the provider data for this polygon

NAME	ALIAS	DESCRIPTION
md_who	MD_WHO	Metadata: Name of the editor who last edited this feature at the time in md_when
md_when	MD_WHEN	Metadata: Date/time that this feature was last edited
md_process	MD_PROCESS	Metadata: Comma-separated list of processes used to create and/or modify this layer
stcty_fips	STATE_COUNTY_FIPS	State/County FIPS code
rec_id	RECORD_ID	Compound Key formed from STCTY_FIPS+"|"+Provider_ID+"|"+Trans_Code+"|"+BBCov_Name
st_area	ST_AREA(SHAPE)	Area in square decimal degrees
st_length	ST_LENGTH(SHAPE)	Length in decimal degrees
Provider_Type	Type of Provider	Has Subtype (1:Broadband provider as described in the NOFA,2:Reseller,3:Unknown), default value=1 (New 04/11 Model)

VERIFICATION AND VALIDATION

PROVIDER VALIDATION—PROVIDER PORTAL/PDF MAP REVIEW

Following the collection and aggregation of provider data, the aggregated data is validated by the provider to ensure it is an accurate representation of their coverage area and supporting broadband information.

- This validation is completed through the Provider Portal web application, which is a secure interactive map that displays the provider's coverage areas and allows the provider to validate, submit feedback or request changes.
  - If changes are requested, then the features on the portal are updated and an automatic request is sent to the provider to complete the validation process.
- Providers that did not use the Provider Portal are asked to validate a PDF map displaying their coverage area(s). This is accomplished via e-mail notification.

PROVIDER VERIFICATION—THIRD PARTY SOURCE REVIEW

After the provider has validated its coverage areas, a third-party source comparison and analysis is performed.

- Where anomalies or discrepancies are identified, a "SCAN" point is dropped and descriptive comments are applied to be reviewed later with the provider.
- During the provider review, the map is displayed along with the "SCAN" points and potential refinement is completed based on input from the provider.

The table below shows third-party sources used:

THIRD-PARTY SOURCE NAME	SOURCE TYPE	VERIFICATION TYPE
InfoUSA	Consumer and Business Listings	Community Anchor Institutions; Can also be used for demographic information supporting the State websites.
Pitney Bowes (PBBI)	Exchange Info Plus (Central Office Locations)	Exchange datasets are used to verify the following Transmission Technologies (TT): Asymmetric xDSL (10), Symmetric xDSL (20), Other Copper Wireline (30), and Optical Carrier/Fiber to the End User (50).

THIRD-PARTY SOURCE NAME	SOURCE TYPE	VERIFICATION TYPE
Media Prints	Cable Boundaries	Used to verify the following TT: Cable Modem—DOCSIS 3.0 (40) and Cable Modem—Other (41).
American Roamer	Wireless Coverage Patterns (EVDO, GPRS, WISP, HSPA)	Used to verify the following TT: Terrestrial Fixed Wireless—Unlicensed (70), Terrestrial Fixed Wireless—Licensed (71) and Terrestrial Mobile Wireless (80).
ComSearch	Wireless Spectrum Holdings and Tower Data	Used to verify the following TT: Terrestrial Fixed Wireless—Unlicensed (70), Terrestrial Fixed Wireless—Licensed (71) and Terrestrial Mobile Wireless (80).

ASSIGNING CONFIDENCE VALUES

All findings and results from the abovementioned **validation and verification activities**, plus internal peer quality reviews, are captured and tracked in a **Validation table** (see example on the following page) and form the basis of the confidence value assigned for each provider and then each technology.

CONFIDENCE VALUE	DESCRIPTION
0	Coverage area has not been reviewed.
10	Extremely Low: Single Source QC.
20	Very Low: Needs additional validation\verification.
30	Low: Even with validation\verification, coverage still is suspect.
40	Acceptable: Confirm with State prior to shipment.
50	Meets requirements to be included in shipment.
60	Moderate: Meets NTIA/State's standards, representative of Technology Type (TT).
70	High: Accurate representation of coverage based upon TT.
80	Very High: Multiple validation\verification with most third-party sources.
90	Extremely High: Multiple validation\verification sources.
100	Perfect: Multiple validation\verification sources, with complete alignment with sources and ground truth verification activities.

The **Validation table** is maintained as updates or changes occur for each provider, down to technology type, with the overall goal to improve the confidence values and overall map representation. An example of the Validation table is shown below:

Contents | Preview | Metadata

OBJECTID*	BBCOV	CONFIDENCE_CODE	PROVIDER_ID	PEER_QC	PROVIDER_QC	THIRD_PARTY_VERIFICATION	THIRD_PARTY_ID	S	C
1	BBCov_10_Axxis	40	771	11/4/2010	9/27/2010	11/4/2010	3070		Axxis doesn't exist in PitneyBowes exchange data. Geometry and attribution are ok.
2	BBCov_10_BeaverTelCo	80	850	10/18/2010	3/9/2011	6/7/2010	2010		BeaverTelCo tt10 boundary has general shape of overlaying pitneybowes exchange boundary but not a perfect 1:1,030911 confidence raise
3	BBCov_10_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010		Canby Telcom boundary is roughly the shape of two exchanges but not 1:1
4	BBCov_10_CascadeUtil	70	3005	11/4/2010		11/4/2010	3070		CascadeUtil still needs provider validation. This bbcov exists in PitneyBowes exchange boundaries. Areas where they do not correspond s
5	BBCov_10_CenturyLink	70	710	11/4/2010	9/23/2010	11/4/2010	3070		CenturyLink BBCov overlays PitneyBowes exchange boundaries in some places, and not in others. Geometry and attribution representative o
6	BBCov_10_ColtonTel	80	713	11/4/2010	9/16/2010	11/4/2010	3070		CoItonTel overlays with PitneyBowes Exchange boundary. Where it doesn't a scan pt was dropped. Geometry and attribution are ok.
7	BBCov_10_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070		Covad does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
8	BBCov_10_DataVision	30	767	11/4/2010		11/4/2010	3070		Still needs Provider QC. DataVision does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
9	BBCov_10_EasternOregonTelcom	60	899	11/4/2010	9/20/2010	11/4/2010	3070		Eastern Oregon Telcom does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
10	BBCov_10_Frontier	70	784	11/4/2010	9/16/2010	11/4/2010	3070		Frontier is partially overlaid by PitneyBowes exchange boundaries. Areas of difference have scan pts dropped. geometry and attribution are
11	BBCov_10_Gervais	90	767	10/18/2010	9/22/2010	6/7/2010	2010		Main portion of boundary is general shape of corresponding exchange boundary
12	BBCov_10_Helix	70	726	11/4/2010	9/22/2010	11/4/2010	3070		Helix BBCov resides mostly within PitneyBowes exchange boundary of the same name. Scan Pts dropped where different. Geometry and a
13	BBCov_10_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010		Many BBCov polys roughly align to 3rd party exchange boundaries in areas
14	BBCov_10_McMinnville	60	732	11/5/2010	9/27/2010	11/5/2010	3070		BBCov McMinnville resides wholely within the McMinnville Exchange boundary (in pitneybowes dataset which is attributed as Verizon NW).
15	BBCov_10_Molalla	50	734	10/18/2010	9/8/2010	6/7/2010	2010		Northern part of BBCov roughly aligns to northern part of 3rd party exchange boundary
16	BBCov_10_MonitorCOOP	70	1100	10/18/2010	9/17/2010	6/7/2010	2010		Coverage area larger than overlying exchange boundary but overall shape roughly resembles the exchange boundary
17	BBCov_10_Monroe_Telephone	80	736	10/18/2010	9/20/2010	6/7/2010	2010		3rd party exchange boundary very similar to BBCov
18	BBCov_10_MtAngel	90	707	10/18/2010	3/9/2011	6/7/2010	2010		3rd party exchange boundary very similar to BBCov,030911 provider feedback via portal confirmed geometry and max speed and added typ
19	BBCov_10_Nehalem	80	795	10/18/2010	9/28/2010	6/7/2010	2010		Large portion of BBCov roughly aligns to underlying 3rd party exchange but not all
20	BBCov_10_NorthStateTel	40	738	3/15/2011	3/15/2011	11/5/2010	3070		BBcov resides mostly within the Pitneybowes exchange boundary. Geometry is suspect. Attribution is ok. Provider validated via portal.
21	BBCov_10_OregonTeleCo	20	739	11/5/2010	9/14/2010	11/5/2010	3070		Very generalized bbcov partially overlaying PitneyBowes exchange boundaries. Geometry suspect. Attribution is ok.
22	BBCov_10_People	80	1012	11/5/2010	9/17/2010	11/5/2010	3070		People's BBCov mostly resides within PitneyBowes Exchange boundary of same name. Scan Pts dropped where differ. Geometry and Attrib
23	BBCov_10_PineTelephone	70	757	10/15/2010	3/17/2011	6/9/2010	2010		BBCov area has general shape as underlying exchange boundary here. Coverage areas based off of Census Tracts.,031711 Provider valid
24	BBCov_10_Pioneer	70	740	11/5/2010	9/20/2010	11/5/2010	3070		BBCov Pioneer resides mostly within PitneyBowes exchange boundaries of same name. Scan Pts dropped where differ. Geometry and attri
25	BBCov_10_Qwest	80	1102	11/8/2010	5/7/2010	11/8/2010	3070		BBCov_10_Qwest falls within the extents of PitneyBowes Exchange boundaries, but do not cover 1 for 1. Geometry and attribution are ok.
26	BBCov_10_Rionet	50	807	11/8/2010	9/27/2010	11/8/2010	3070		Rionet (UIDC telecom) doesn't exist in PitneyBowes exchange dataset. Geometry and attribution are ok.
27	BBCov_10_Roome	90	746	10/18/2010	9/10/2010	6/7/2010	2010		3rd party exchange boundary very similar to BBCov
28	BBCov_10_Sandy	60	873	11/8/2010	9/17/2010	11/8/2010	3070		BBCov for city of Sandy does not exist in PitneyBowes exchange dataset. Geometry and attribution are good for TT.
29	BBCov_10_Scio	90	800	10/15/2010	3/17/2011	6/9/2010	2010		3rd party exchange boundary roughly aligns to BBCov in this area,031711 Provider validated coverage confidence high
30	BBCov_10_SCS	60	1030	11/8/2010	9/17/2010	11/8/2010	3070		BBCov for SCS does not exist in PitneyBowes exchange dataset. Geometry and attribution are good for TT.
31	BBCov_10_SCTC	70	803	10/18/2010	9/17/2010	11/10/2010	3070		SCTC TT50 resides within pitneybowes exchange area. Geometry and attribution ok.
32	BBCov_10_StPaulTel	80	750	3/15/2011	3/15/2011	6/7/2010	2010		BBCov roughly aligns to two 3rd party exchange boundaries not perfect 1:1. Provider validated via portal.
33	BBCov_10_TDS	40	752	10/18/2010		6/7/2010	2010		BBCov partially aligns with overlying 3rd party exchange boundary
34	BBCov_10_TransCascade	40	709	11/8/2010	9/21/2010	11/8/2010	3070		BBCov resides in part of PitneyBowes Exchange boundary of the same provider name. BBCov also spills into two other PB exchange areas
35	BBCov_20_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010		Canby Telcom boundary is roughly the shape of two exchanges but not 1:1
36	BBCov_20_ClearCreek	80	712	10/18/2010	9/17/2010	6/7/2010	2010		BBCov area very similar to 3rd party exchange here
37	BBCov_20_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070		Covad does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
38	BBCov_20_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010		Many BBCov polys roughly align to 3rd party exchange boundaries in areas
39	BBCov_20_NewEdge	20	796	11/8/2010		11/8/2010	3070		Still needs Provider Validation. Business Only provider's coverage areas do not exist in PitneyBowes exchange datasets. Geometry and attri
40	BBCov_20_QuantumComm	60	1021	11/8/2010	9/23/2010	11/8/2010	3070		QuantumCom coverage areas do not exist in PitneyBowes Exchange datasets. Geometry and attribution are ok for TT.
41	BBCov_20_Rionet	50	807	11/8/2010	9/27/2010	11/8/2010	3070		Rionet (UIDC telecom) doesn't exist in PitneyBowes exchange dataset. Geometry and attribution are ok.
42	BBCov_30_CanbyTelcom	80	706	10/18/2010	9/21/2010	6/7/2010	2010		Canby Telcom boundary is roughly the shape of two exchanges but not 1:1
43	BBCov_30_Covad	60	717	11/4/2010	9/23/2010	11/4/2010	3070		Covad does not exist in PitneyBowes exchange boundaries dataset. Geometry and attribution are ok.
44	BBCov_30_Integra	30	790	10/18/2010	9/27/2010	6/7/2010	2010		Many BBCov polys roughly align to 3rd party exchange boundaries in areas
45	BBCov_30_Lightspeed	20	793	11/8/2010		11/8/2010	3070		Still needs Provider Validation. Business Only provider's coverage areas do not exist in PitneyBowes exchange datasets. Geometry and attri
46	BBCov_30_McMinnville	40	732	11/5/2010	9/27/2010	11/5/2010	3070		BBCov is a single record buffered point residing in a Pitneybowes exchange boundary attributed for another municipality and provider. Geom

Record: 1 Show: All Selected Records (of 122) Options

Preview: Table

COMMUNITY ANCHOR INSTITUTION (CAI) DATA

DATA COLLECTION

The CAI data was initially collected from the State to create the baseline inventory. All location information and broadband coverage data supplied also was ingested into the data deliverable. Additional collection of CAI information was done via data mining and/or webscraping to build out the inventory further. For example: Collection of additional CAIs and location information.

The State-agency-provided CAI inventory was comprehensive but the challenge is collecting broadband related data: service provider(s), technology and speed data for each CAI. Availability of the CAI portal has not significantly increased submission of this data. Additional promotion to CAIs to use the CAI portal will be needed to increase this data for subsequent deliverables.

INSTITUTION DATA

Institution data is obtained from a variety of sources and almost always provided in Excel spreadsheet format. The general process for incorporating this data is as follows:

1) If the data is provided in Excel or some similar format:
    a. Clean and standardize the Excel spreadsheet, removing any cell formats, merged cells, etc.
    b. Standardize the address format as defined in the staging CAI database.
    c. If the spreadsheet includes X and Y values, such as latitude and longitude, use the **Add XY Data** tool in ArcMap® to create a spatial data layer.
    d. If there are only addresses, then follow the geocoding steps outlined above to create spatial data points for each of the institutions.
        (i.) Institutions that do not geocode based on the TIGER® 2009 dataset will have to be located manually using Google Maps, Google Earth or some other information source.
2) If the CAI source data is in GIS format, add the Latitude and Longitude fields and use the **Calculate Geometry** tool to populate them, using the WGS 84 coordinate system.
3) Using ArcCatalog®, load the new data into the staging CAI database.
4) This database is ready for the makeDeliverable.py script to process the information into the final State and NTIA deliverables.

COMMUNITY ANCHOR INSTITUTION (CAI) PORTAL UPDATES

A web application has been released to allow for further data collection and validation of anchor institution location information, broadband coverage and speed test data. Information collected from the CAI Portal is then ingested into the overall inventory and will be compared later against the provider coverage areas mapped to locate any potential discrepancies.

PRODUCT EXTRACT

PYTHON SCRIPTS

The following subsections make use of Python scripts. In general, to use a Python script you must have Python installed on your computer. To download the latest version of Python, go to **http://www.python.org/download/** and download the latest stable version. As of August 2010, this was version 2.7. Once this is installed, the general way to run a script is to type the following at a command prompt: C:\Python27\python.exe C:\<location of script>. Many of the scripts provided have environment variables that must be set before they can be run.

The Python code for BroadMap's product extract has been incorporated into a Hudson CI System, which is detailed in the **Process Operation and Monitoring** section of this document. This was a process improvement activity so that all processes can be monitored, controlled and will contain historical tracking on each process.

PRODUCT EXTRACT PROCESS

NOTE:
Specific Python scripts are called out in **red** font in the subsections below.

The MapConnect™ product extract process, makeDeliverable.py, uses the BB_Cov and BROADMAP_POINTS interim datasets to create the following layers according to the current specifications:

- BB_Service_Road_Segment
  - This layer contains all broadband services associated with specific street segments for census 2000 blocks larger in area than two square miles.
- BB_ServiceCensusBlock
  - Contains all broadband services associated with census blocks of no greater than two square miles.
- BB_Service_Wireless
  - This layer contains all wireless services not associated with specific addresses.
- BB_ServiceOverview
  - This layer contains subscriber-weighted nominal speed for each provider's service area at a county level and is meant to act as a summarized view.
- BB_ConnectionPoint_MiddleMile
  - This layer contains middle-mile and backbone interconnection points.
- BB_Service_CAInstitutions
  - Broadband Service at Community Anchor Institutions (CAI).
  - Community Anchor Institutions consist of schools, libraries, medical and healthcare providers, public safety entities, community colleges and other institutions of higher education as well as other community support organizations and entities.

Because of a NTIA model change for the October 2010 data deliverable, an addition to this code was created to support both models in case a comparison is later desired or a request is made to revert to the original model. This script name is bdia2ntia.py and creates the following layers in addition to the layers mentioned above, rolled up to NATL_Broadband_Map.

- BB_ConnectionPoint_LastMile
  - This layer contains last mile infrastructure points, which is populated only if data cannot be provided at a more granular level.
- BB_Service_Address
  - Represents broadband availability for service address points. Address Point availability refers to those individual addresses at which each facilities-based provider of broadband service can provide broadband services of minimal characteristics within 7-10 business days.
- State_Boundary
  - State boundary supporting topological validation of point feature classes.
- NATL_Broadband_Topology
  - Supports basic topology quality checking. Example: No CAIs or Middle Mile points outside of the State boundary.

The following process flow provides a view of how the Core fGDB is extrapolated to the NTIA final deliverable via the makeDeliverable.py script. Following that, the bdia2ntia.py script is run, which limits what is placed in the final layers based on the NTIA modeling standards.

The product scripts and supporting extract were originally created separately per request, in case data model comparisons were to be completed.

PRODUCT STATISTICS

Following the completion of a product extract, the product statistics script (BDIA_ReleaseNotesStats.py) extracts the following information supporting that product deliverable.

- Provider Statistics:
  - Collects all provider information, listing by Provider Name.
  - Provides output of FRN.
  - Counts the number of features supported within the following layers:
    - Census Block;
    - Street Segment;
    - Max Upstream;
    - Wireless Services;
    - Infrastructure Points.
  - These updates were made to support the Data Package required to accompany every NTIA product deliverable.
- Community Anchor Institution (CAI) Statistics:
  - Breaks down CAI to the eight categories:
    - 1: School: K through 12;
    - 2: Library;
    - 3: Medical/Healthcare;
    - 4: Public Safety;
    - 5: University/College;
    - 6: Other Government;
    - 7: Other Community non-government;
    - None: Unknown Category. In cases where this occurs, further investigation is completed prior to product shipment to ensure all CAIs are categorized accurately.

- Reports out the following counts:
  - Total CAIs within that category;
  - Total CAIs that contain partial BB coverage. Contains any of the following information for a given CAI: BB Subscriber, Transmission Technology, Speed Down Speed Up;
  - Total CAIs that contain full BB coverage. Contains all of the abovementioned BB information for a given CAI.

The output of this script is two CSV files: AnchorInstitutions.csv and Providers.csv. These files then can be inspected to ensure that there are the expected number of CAIs and providers for every release.

QUALITY ASSURANCE

Quality assurance is supported manually and algorithmically on the interim data, BB_Cov file geodatabase and on the final product. For scheduled product releases, a test product extract and subsequent manual and algorithmic QC run is completed along with a release review. The product specifications, project status reports and previous product release notes are used as references throughout this review.

The following parameters are tested using the methodology listed below each:

- Product Deliverable Format:
  - Correct names and format of data deliverables.
    - BDIA_QC_SUITES (please see below for details).
  - Correct Projections/Datum.
    - Manual interaction with product.
  - Metadata Present and Correct.
    - Manual interaction with product.
- Table Structure:
  - All required tables included.
    - BDIA_QC_SUITES.
  - Extraneous tables identified.
    - BDIA_QC_SUITES.
- Field Structure:
  - All fields included.
    - BDIA_QC_SUITES.
  - Extraneous fields identified.
    - BDIA_QC_SUITES.
  - Correct field names, types and widths.
    - BDIA_QC_SUITES.
- Field Domains:
  - Values in all tables are constrained to the specified values specified:
    - This action is accomplished via BDIA_QC_SUITES and manual review of the product;
    - This tends to identify project completeness issues as fields with a null value are identified.
- Geometric Representation:
  - Identify if all layers have the correct geometric representation:
    - Manual review of the BB_ServiceOverview layer;
    - Dependent on NTIA and client requirements.
- Geographic Extent:
  - Product includes the necessary Geography associated with Product?
    - Manual Review—ArcGIS®.
  - Is there extraneous geography included in Product?
    - Manual Review—ArcGIS®.
- Completeness:

- Products contain the expected amount of data?
  - Manual review of product statistics relative to weekly State reports and defined expectations.
- Accuracy:
  - Product meets the stated accuracy requirements for the deliverable?
    - Sampling procedure to manually review source material to resulting product;
    - Provider Validation;
    - Verification using Third-Party Data;
    - Verification against reality, where applicable.
- Data Regression:
  - Any unexplainable data loss or change?
    - This action is accomplished by comparing results within product statistics script (BDIA_ReleaseNotesStats.py) from previous releases, as well as manual review of the product.
- Confidentiality:
  - Any unauthorized confidential information included in the delivery?
    - Review of NDAs and delivery expectations.
- Prior Issues Resolved:
  - Have expected internal issues been resolved?
    - Manual review of data against previous product release notes.
  - Have agreed-upon customer issues been resolved?
    - Manual review of data against previous product release notes, status report and client feedback.
- Delivery Medium:
  - Has the product medium been verified?
    - Manual review.
  - All files present.
    - Manual review of SFTP site to ensure all files are copied correctly, including file/directory size.
  - Correct location.
    - Manual review—confirmation of SFTP link, username and password.

QC SUITE

The BDIA_QC_SUITES consists of four main types of scripts supporting the overall QC process. These scripts are all run in concert and are called from the test_runner script and the test_BDIAProductGDB script.

CONFIGURATION

These scripts establish the configuration for the test_BDIAProductGDB script, which is the core of the QC Suite.

update_test_config
active_config
config_PROCESS01_automated
config_PROCESS01_manual
set_active_config

LIBRARIES

These scripts provide additional functionality that is called from with the test_BDIAProductGDB script.

bb_unittest_fixture
bbcov_structure
BC_XmlWriter
file_folder
search_and_replace

unittst_fixture
validate_BB_DB
validate_BB_GDB
xmlrunner_gui

<u>QC SUITE</u>

This is the core script for performing automated QA/QC on the interim and final data deliverables.
test_BDIAProductGDB

<u>OTHER</u>

These scripts perform other functions detailed below:
test_runner—this is the main script that runs all the other QC scripts and imports all the necessary scripts and libraries.
which_build—this determines the current build and passes information to the configuration scripts.

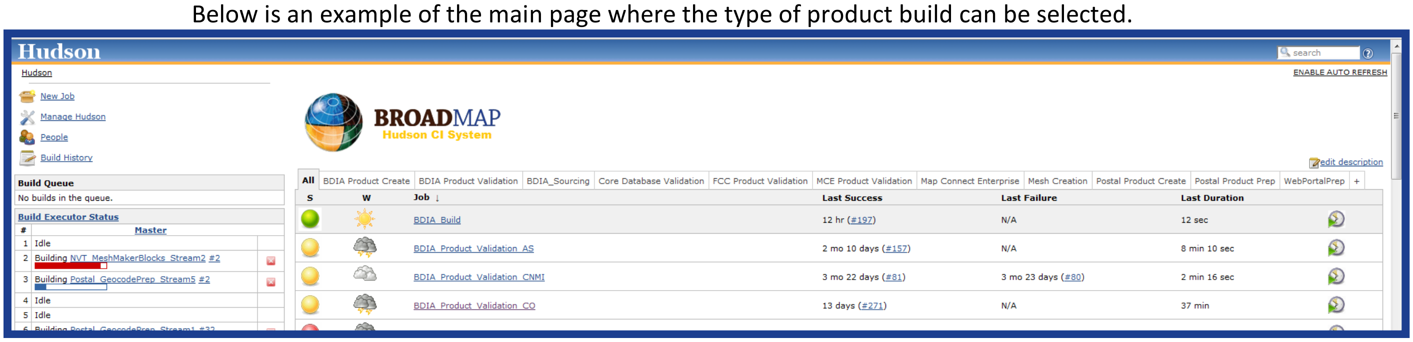
PROCESS OPERATION AND MONITORING

Product Extract, makeDeliverable.py and bdia2ntia.py, is run within BroadMap using a platform called Hudson that has been enhanced to support BDIA product extraction, process monitoring, as well as product validation. The same platform can be planned for implementation for the State, if desired.

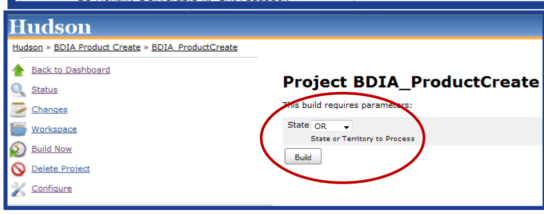
Below are examples of the product create, product validation, product statistics and monitoring processes that are managed within the BroadMap Hudson CI-System. All of the **abovementioned Python scripts**, with the exception of metadata transactions script, are run via this system.

BDIA PRODUCT CREATE

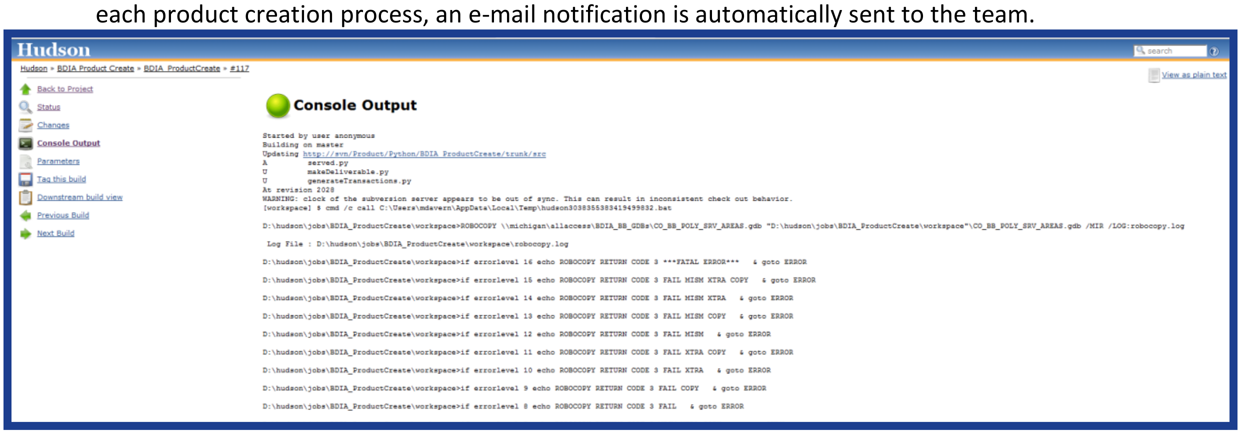
Below is an example of the main page where the type of product build can be selected.



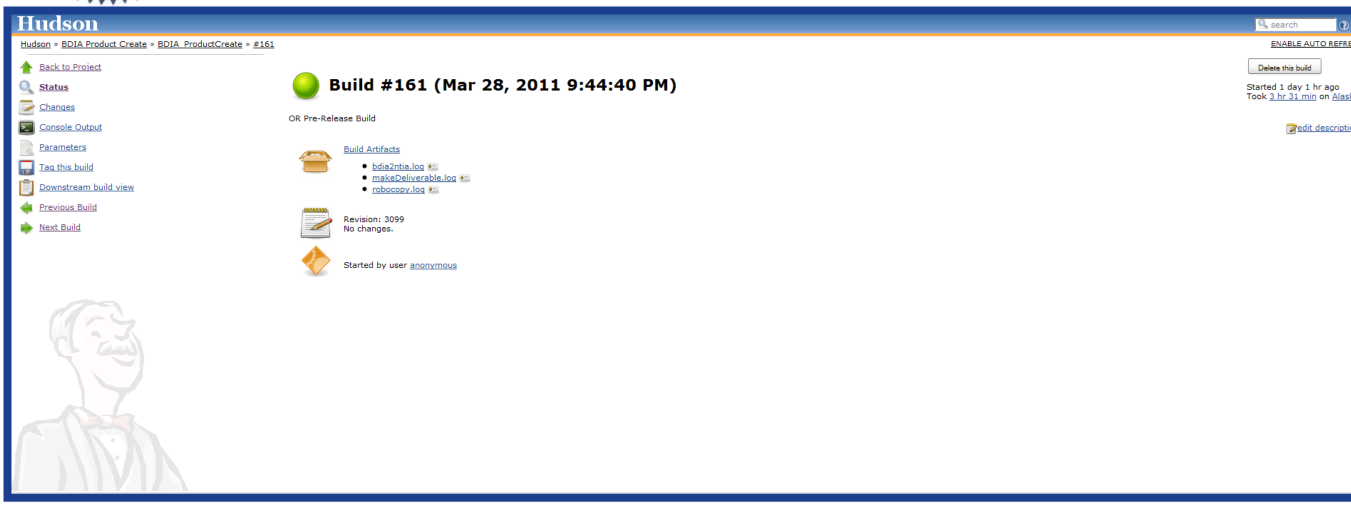
Selecting based on the type of process that will be initiated is shown below:



The Console Output can be reviewed to see the progress of product create. Following the completion of each product creation process, an e-mail notification is automatically sent to the team.



All processes run via the BroadMap Hudson CI-System are stored for historical reporting. Each process can be reviewed, including the Console Output and Build Artifacts from that run.



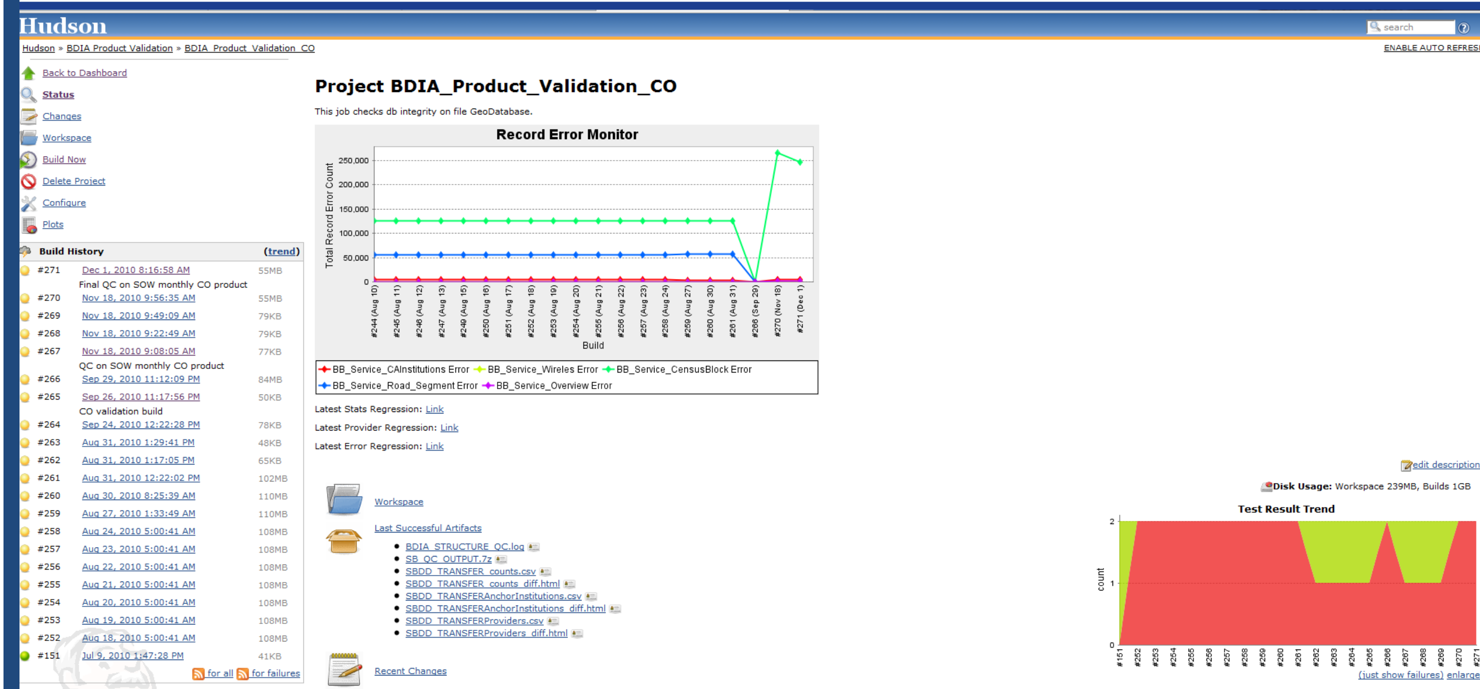
Hudson
search
ENABLE AUTO REFRESH
Hudson » BDIA Product Create » BDIA_ProductCreate » #161
Back to Project
Status
Changes
Console Output
Parameters
Tag this build
Downstream build view
Previous Build
Next Build
Build #161 (Mar 28, 2011 9:44:40 PM)
OR Pre-Release Build
Build Artifacts
bdia2ntia.log
makeDeliverable.log
robocopy.log
Revision: 3099
No changes.
Started by user anonymous
Delete this build
Started 1 day 1 hr ago
Took 3 hr 31 min on Alaska
edit description

PRODUCT VALIDATION AND STATISTICS

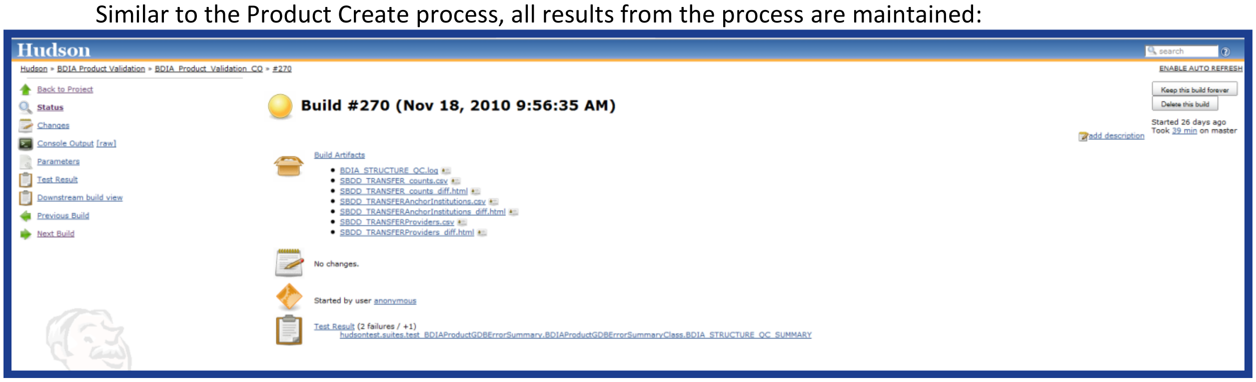
Once the product creation process is complete, Product Validation and Statistics are then initiated. These support the BDIA_ReleaseNotesStats.py script and the BDIA_QC_SUITES scripts detailed above.

All statistics and reports are stored for historical review with the capability to place violation criticality on each quality control check, allowing the identification of errors because of project status/completeness verses project correctness. Example: Typical Speeds populated.

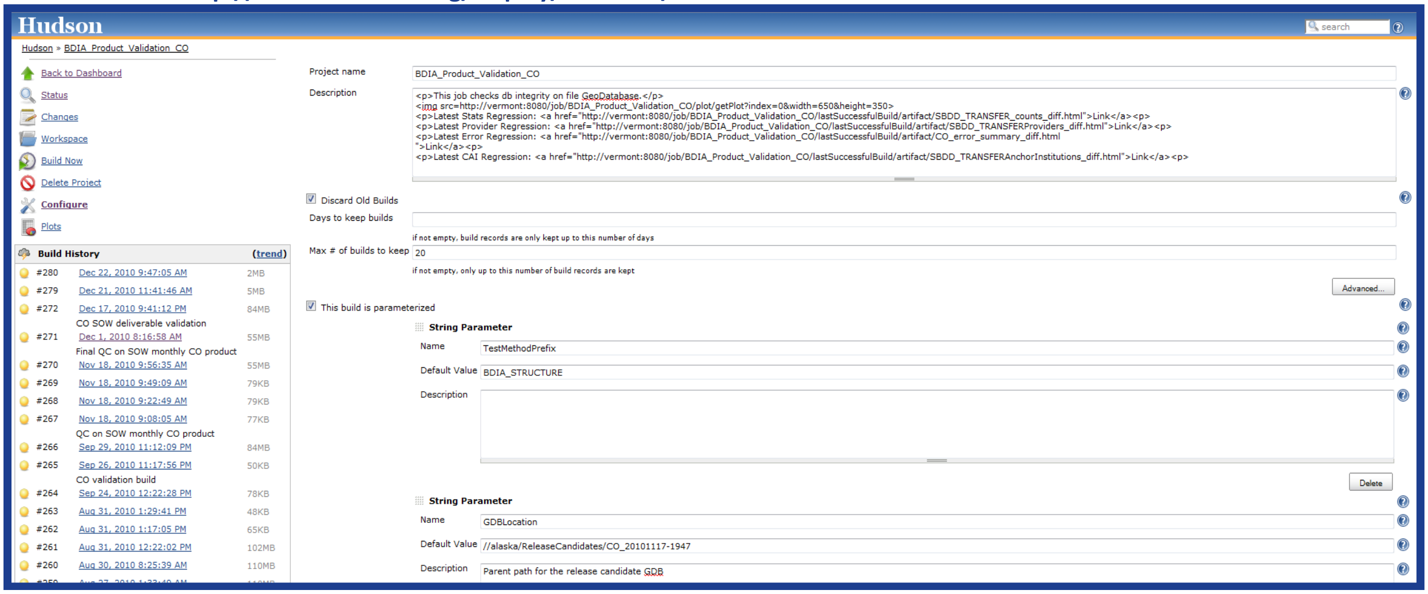
Below is an example of the report provided based on various control points running over a specified period:



Similar to the Product Create process, all results from the process are maintained:



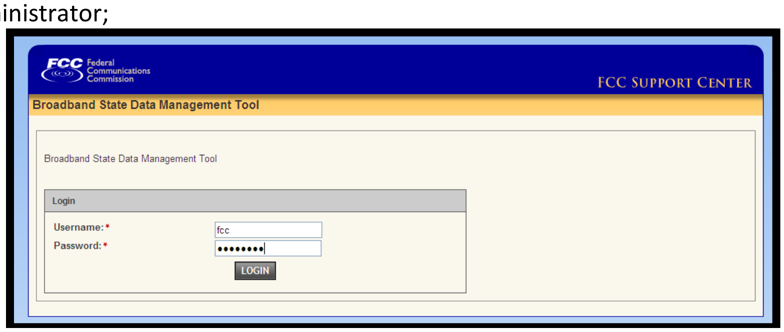
Results are then reviewed manually to ensure no errors reported are critical or in violation of the NTIA data model or project completion statements. Any errors of concern are communicated ahead of product delivery and included within the product release notes. Further detail on the Hudson-CI System environment can be found by navigating to the following link:
http://wiki.hudson-ci.org/display/HUDSON/Meet+Hudson



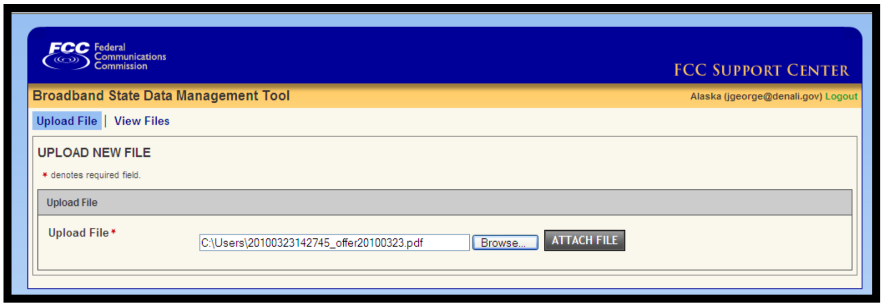
PRODUCT EXTRACT DATA DELIVERY

Product delivery for MapConnect™ Broadband is handled two ways, depending on client requirements:

1) State Submittal:
   a. Data is submitted via SFTP site;
   b. Product Release Notes and QC Test Report accompany the delivery.
2) NTIA Submittal:
   a. Directions for using the NTIA State Broadband Data file submission tool:
      (i.) Go to the following website: **https://esupport.fcc.gov/statedata**;
      (ii.) Enter your **username and password** as provided to you from the NTIA program administrator;



      (iii.) Click in **Upload a file** field;
      (iv.) Browse to local file for submission using the **Browse** button. Select file, then select **ATTACH FILE**. See example below.



(v.) **Logout/Receipt** using the **Logout** button in the top right of the screen;
(vi.) A receipt of submission is e-mailed to username e-mail address.

OFFICIAL OCTOBER 2011 UPDATE SUBMISSION TO THE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION UNDER THE STATE BROADBAND INITIATIVE GRANT PROGRAM FOR THE STATE OF TENNESSEE

CONNECTED Tennessee

THE TRAIL TO INNOVATION®

October 1, 2011

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TENNESSEE COVER LETTER

October 1, 2011

Ms. Anne W. Neville
SBI Grant Program Director
National Telecommunications and Information Administration
U.S. Department of Commerce
1401 Constitution Avenue, NW Room 4716
Washington, DC 20230

Dear Ms. Neville:

As the State Broadband Designated Entity, Connected Tennessee, in partnership with the Department of Finance and Administration's Office of Information Resources and the Department of Economic and Community Development among other agencies, please accept this submission from Connected Tennessee on behalf of the State of Tennessee's State Broadband Initiative (SBI) Grant Program, known as Connected Tennessee.

These artifacts should be found to be compliant with the October 1, 2011, deadline for the semi-annual data update and in accordance with the terms of the July 1, 2009, Notice of Funds Availability (NOFA) and all subsequent clarifications pertaining to delivery of state-level mapping of broadband service availability. This packet includes:

Inventory of Deliverables, Connected Tennessee: October 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points

Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing
Appendix A: 4	n/a	Community Anchor Institutions-Narratives
VII.A.1(a)	n/a	Accuracy and Verification Report
n/a	DataPackage.xlsx	Worksheets of Contact Information, Record Count, and Provider Summary Table
n/a	n/a	List of Changes and Corrections to the Dataset
n/a	n/a	Non-Participating Provider Narratives
n/a	n/a	Broadband Provider Roster and Participation Status

In addition, this data update submission should be found to be compliant with the additional program requirements instituted by the National Telecommunications and Information Administration since the time of the April 2011 SBI data submission for the Connected Tennessee program. Specifically, these new requirements are:

SBI Data Transfer Model
The submission of the broadband dataset for October 1, 2011, is contained within the SBI Data Transfer Model as released on the Grantee Workspace on June 30, 2011. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information on each provider as possible.

Additional Submission Guidance
This submission also includes a list of changes and corrections made to the dataset between the April 2011 submission and the October 2011 submission. This represents a summary of why data displays and/or supplied speeds, etc. are different from the previous submission. Changes can include upgrades to infrastructure to allow for higher throughput speeds for customers, an expansion of the service area (e.g. additional fixed wireless towers, recently activated DSLAMs, etc.), or a new provider in the marketplace. Corrections can include revisions to speed tier information that was previously reported incorrectly or the addition of a previously existing provider that has not yet been submitted in a semi-annual dataset.

This October 2011 semi-annual data update under the State Broadband Initiative Grant Program continues to demonstrate our dedication to implementing the joint purposes of the Recovery Act and the Broadband Data Improvement Act (BDIA) by gathering comprehensive and accurate state-level broadband mapping data, developing state-level broadband maps, aiding in the development and maintenance of the National Broadband Map, and undertaking statewide initiatives for broadband planning.

Broadband Service Availability — Provider Outreach and Verification

This data update submission under the SBI program includes datasets for 90 percent of the Tennessee provider community, or 81 of 90 total providers. Of the 81 participating providers, 30 supplied an update to their network or coverage area(s), while 47 have reported no change. The remaining 4 represent providers who previously supplied data but were non-responsive in the October 2011 update effort; therefore, their previous dataset is being put forward as part of this compilation. A complete roster by provider depicting participation status and contact record is contained herein. Of the 9 providers that are not represented in the attached datasets, 5 have refused to participate in the voluntary program or were non-responsive to multiple contact attempts, and 4 providers are currently in some form of progress toward data submission but were not able to submit coverage areas at the time of this submission.

As the aforementioned roster and attached methodology documentation will attest, it is the collective opinion of the Connected Tennessee principals that all commercially reasonable efforts were made to account for 100 percent of the known Tennessee broadband provider community, pursuant to this semi-annual data update submission.

Connected Tennessee has also continued to perform broadband verification activities through several means. In addition to confirmation of service area(s) by each provider, Connected Tennessee conducts field validation efforts. To date, 42 (46.67 percent) providers have been validated through field verification activities. Additional details on verification activities are contained within the Field Validation Methodology.

The Connected Tennessee website, www.connectedtennessee.org, continues to serve a prominent role in the outreach and data collection effort. This program asset provides a way for the general public to participate in the process by offering interactive tools for users to test their connection speed, submit broadband inquiries, or contact a program representative.

As an indicator of stakeholder penetration, the Connected Tennessee website encountered 6,774 unique visits during this reporting period (33,845 total to date for the life of the grant awarded on December 20, 2009). Additionally, this pronounced Web activity netted 74 broadband inquiries over this same reporting period (1,331 grant inception to date). The website also provides the BroadbandStat application, which allows the consumer to confirm or dispute the coverage represented on the broadband inventory map. These consumer-initiated actions are facilitated through the Connected Tennessee website and the Connected Tennessee interactive mapping tool (BroadbandStat) that offer the citizens the vehicles to provide information regarding availability in their respective service area, either in affirmation or contest of the reported data represented in the Connected Tennessee mapping artifacts. Since the initial data collection and release of corresponding maps, feedback in the form of broadband inquiries has allowed Connected Nation to identify additional areas that are in need of field validation, which is scheduled as soon as possible.

Community Anchor Institutions

Connected Tennessee has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBI NOFA Technical Appendix.

Outreach was conducted during this data update reporting period by Connected Tennessee to continue identification of existing, centralized sources for CAI connectivity data. Additionally, a CAI survey continues to be made available for all institutions on the Connected Tennessee website. During this reporting period Connected Tennessee has continued developing relationships with statewide associations to promote the importance of broadband connectivity at anchor institutions and participation in this data collection process. Connected Tennessee will continue to build upon these new relationships over the coming months and utilize its contacts throughout the state to collect data and raise awareness of this project.

During this reporting period a Connected Tennessee CAI newsletter has been drafted to assist with outreach and highlight the Stewart County Library which serves as a broadband cornerstone for its community. From our work in Tennessee, as well as other states, we recognize the great value of this data to future collaboration efforts within the state as well as its value to the National Broadband Map. We plan to continue to bring best practices to the Connected Tennessee efforts, along with an investment of both human and technical resources required to reach our goal of increasing the data that is secured and reported as part of this process.

The Connected Tennessee program exists to improve data on the deployment and adoption of broadband services and to assist in the extension of broadband technology across all regions of the great State of Tennessee, as well as the United States through contribution to the National Broadband Map. We look forward to the continuing work ahead.

Respectfully submitted,

Michael L. Ramage
Executive Director
Connected Tennessee

Thomas W. Ferree
Chief Operating Officer
Connected Nation, Inc.

DATA ACQUISITION: TENNESSEE COMMUNITY ANCHOR INSTITUTIONS METHODOLOGY

In this fourth reporting period of the SBI, Connected Tennessee has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBI NOFA Technical Appendix. During this reporting period Connected Tennessee has continued to focus efforts on conducting outreach and raising awareness of this important project.

Connected Tennessee has continued to identify and process CAI data obtained through an ongoing statewide outreach campaign. Physical address information continues to be augmented through manual sourcing and geocoded by Connected Tennessee through ESRI ArcGIS software.

Connected Tennessee continues to utilize a customized online survey with a landing page on the Connected Tennessee website that was developed during the first reporting period. This survey, in combination with a customized data-gathering spreadsheet, was distributed to a targeted list of CAI throughout the state. Connected Tennessee will continue to use these data-gathering tools for future targeted outreach efforts throughout the coming months leading up to the next reporting period. These materials are customized to fit the CAI categories as defined in the SBI NOFA.

The survey can be accessed at this link:
http://www.connectedtennessee.org/broadband_landscape/community_anchor_institution_survey.php

During this reporting period Connected Tennessee conducted research to identify existing, centralized sources for CAI connectivity data. In tandem with these efforts to identify existing data, Connected Tennessee continues to identify key CAI contacts in an effort to distribute and promote the online survey and raise awareness of the importance of CAI broadband connectivity.

Connected Tennessee has an ongoing mission to educate CAI throughout the state on the importance of participating in the project. Participation by these institutions will raise awareness about the importance of broadband connectivity and the need to report the requested data for inclusion on the National Broadband Map. During this reporting period Connected Tennessee developed and distributed a CAI newsletter to CAI contacts throughout the state. This newsletter highlights the Stewart County Tennessee Library and encourages institutions to share their data by participating in the CAI online survey. This newsletter will continue to be utilized for outreach, will be made available on the CAI page of the Connected Tennessee website, and it will be updated over the next reporting period.

The greatest challenge with collecting this data continues to be the difficulty in securing CAI broadband connectivity data. Connected Tennessee is overcoming this challenge through new relationships that are being formed, coordination with existing broadband projects within the state, and the release of a CAI newsletter. A specific focus during this reporting period was identifying broadband speeds for K-12 schools across Tennessee. Speeds at more than 700 schools were identified, which are reflected in the summary table below.

A CAI summary of all processed and submitted data is provided below:

CAI Type	Total	Physical Address	Lat/Long	Technology of Transmission	Download Speed	Upload Speed
K-12	2,442	2,442	2,442	1,168	1,168	1,165
Libraries	258	258	258	230	230	230
Healthcare	825	825	825	115	114	114
Public Safety	742	742	742	260	105	105
Higher Ed Institutions	316	316	316	158	161	105
Other Government	1,262	1,262	1,262	1,180	1,141	1,140
Other Non-Government	163	163	163	72	68	68
Total	**6,008**	**6,008**	**6,008**	**3,183**	**2,987**	**2,927**

SBI Data Submission Methodology

The submission of the broadband dataset for October 1, 2011, is contained within the SBI Data Transfer Model and additional components as released on the Grantee Workspace on June 30, 2011. Connected Nation has reviewed all literature that relates to the release and use of this data transfer model and recognizes that it does not replace or dictate how data is stored, processed, or displayed for the state, as it is meant primarily as a means to transfer the broadband data from all states and territories and populate the National Broadband Map in a seamless fashion. Guidance from the Technical Mapping Guide, as released on the Grantee Workspace on March 24, 2011, was also followed to ensure the completeness and validity of the submission through completion steps and checklists, completing the DataPackage spreadsheet, uploading broadband datasets into the Data Transfer Model, and checking the dataset using the SBDD_CheckSubmission receipt process.

As part of the ongoing review and analysis process, NTIA has requested further information in the submission of the DataPackage spreadsheet. In addition to the information on providers whose coverage and accompanying attributes is submitted in the SBI Data Transfer Model, information on other providers that are considered to be non-viable is also included in the DataPackage. Providers deemed non-viable that have been excluded from continued outreach may have been eliminated for reasons such as (i) the company offers Internet service but at speeds below the current definition of broadband; (ii) the company was listed in advertisements as a broadband provider, but is actually a network solution or consulting firm, etc.; (iii) the company may build or install network infrastructure, but does not actually provide the broadband service to consumers; and (iv) the company has gone out of business. The submitted DataPackage includes any relevant information that has been obtained through the course of due diligence and/or direct provider outreach, such as a Federal Registration Number (if applicable), the company's URL, the existence of an executed Nondisclosure Agreement, and brief notations regarding the status of the company.

In addition to the methodologies contained herein, as well as the DataPackage.xls containing contact information, the data dictionary, and a provider summary table, the following feature classes are submitted within the SBI Data Transfer Model for the State of Tennessee.

Inventory of Deliverables, Connected Tennessee: October 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area.
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles.
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address.
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points.
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing.

The provider data collected by Connected Nation on behalf of the State of Tennessee have been formatted per the given specifications and uploaded into the appropriate feature classes of the SBI Data Transfer Model. Wireline availability is contained within census blocks and road segments, wireless availability is contained as polygons of coverage areas, and middle-mile connections and community anchor institutions are contained as point data. All speed data is contained at the census block, road segment, or wireless polygon level of availability. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information as possible.

Connected Nation has continued outreach to satellite providers on their availability, technology, and speed information, but granular coverage is not yet available. Submitted within the wireless feature class are the satellite companies providing service to Tennessee as a polygon of the state boundary. Efforts will continue to collect, process, or otherwise create more granular satellite data based on availability analyses and guidance received from NTIA.

PROVIDER CHANGES AND CORRECTIONS FOR OCTOBER 2011

As requested by the SBI Program Office, a listing of the changes and/or corrections to the datasets between the April 2011 and October 2011 submissions is included in this narrative. This information is presented in this section as well as in the Broadband Provider Log. Changes to the data include expansion of service area(s), activation of new wireless towers, and upgrades to the network to provide higher download speeds to consumers. Corrections to the dataset include the addition of previously existing providers whose coverage has never been submitted, revision of coverage or speed information that was incorrect, and any other items that were misrepresented in the April 2011 dataset.

Changes

- Comcast Cable Communications, LLC (cable): Speed and technology of transmission information was updated using the previous spatial coverage converted to 2010 Census data. Additional, more current spatial information could not be provided, verified, and approved in the necessary time frame.
- ECSIS.NET (fixed wireless): Provider added three new fixed wireless towers into service.
- ETC Communications, LLC (cable): Speed tier upgrades from download 7 to 9 and upload 3 to 5; technology also upgraded to DOCSIS 3.0.
- Frontier Communications Corporation (DSL): Three DSLAMs added to previous coverage areas.
- Jackson Energy Authority (fiber): Provider upgraded from download speed tier 9 to tier 10.
- Ken-Tenn Wireless, L.L.C. (fixed wireless): Provider added four new fixed wireless towers into service.
- Millington CATV, Inc. (DSL): Provider expanded service into additional areas.
- Monster Broadband (fixed wireless): Provider added four new fixed wireless towers into service.
- Morristown Utilities Commission (fiber): Provider expanded service into additional area.

Corrections

- DISH Network Corporation (satellite): Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
- Electric Power Board for the City of Chattanooga (fiber): Speed fields revised from tier 10 to tier 11 to reflect 1 Gbps symmetrical service available.
- Hughes Network Systems (satellite): Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.

- Knology of Tennessee, Inc. (cable): First time coverage has been submitted for this provider, which previously offered broadband service in the state.
- OnWav, Inc. (fixed wireless): Previously submitted coverage was a generalized polygon of service; it has been replaced with modeled propagation.
- TDS Telecommunications Corporation (fiber): Provider expanded service into additional areas.
- TEC of Jackson, Inc. (d.b.a. People's Telephone and West Tennessee Telephone) (DSL): Provider corrected coverage based on where its franchise boundaries are located.
- United Telephone Company, Inc. (fiber): First time coverage has been submitted for this provider, which previously offered fiber broadband service in the state.
- TELE-PAGE Inc. (fixed wireless): Previously submitted coverage was a generalized polygon of service; it has been replaced with modeled propagation.
- WildBlue Communications, Inc. (satellite): Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.

Changes and/or Corrections – Entirely New Dataset Submitted

- AT&T Inc. (DSL and mobile wireless)
- Cable ONE Inc. (cable): Also, download speeds upgraded to speed tier 9.
- CenturyLink (DSL)
- Charter Communications Inc. (cable)
- Clearwire Corporation (mobile wireless)
- Leap Wireless International, Inc. (mobile wireless)
- Millington CATV, Inc. (cable)
- Sprint Nextel Corporation (mobile wireless)
- T-Mobile USA, Inc. (mobile wireless)
- TDS Telecommunications Corporation (DSL)
- TEC of Jackson, Inc. (d.b.a. Crockett Telephone) (DSL)
- United States Cellular Corporation (mobile wireless)
- Verizon Communications, Inc. (mobile wireless)

TENNESSEE FIELD VALIDATION METHODOLOGY

Connected Nation focused a portion of its time on specific validation processes such as:

- conducting random spectrum analysis studies throughout the state using an Avcom PSA-37-XP spectrum analyzer;

- conducting mobile speed tests throughout the state using an iPhone, Android (or other smart phone) as well as provider-specific aircards (Sprint 3G/4G, Clearwire et al);
- identifying pre-selected, provider-submitted wireless transmit tower sites and cross-referencing data about that tower against the Federal Communications Commission (FCC) databases such as Antenna Structure Registration and/or the Universal Licensing System;
- cross-referencing Federal Registration Number data against available FCC Form 477 data as well as the FCC **CO**mmission **RE**gistration **S**ystem (CORES);
- validating provider submitted data (for example: latitude/longitude) using a handheld Garmin eTrex Summit GPS unit or GPS enabled software such as Microsoft Streets and Trips;
- locating physical wire-line attributes (such as Remote Terminals, CATV plant, etc.) and comparing them against provider submitted data; and
- conducting on-net and off-net speed tests using the FCC portal at http://www.broadband.gov/qualitytest/about/ or using the Ookla Net Metrics enabled speed test utility located on each of Connected Nation's state specific websites.

Additionally, Connected Nation cross-referenced numerous public documents in order to ensure that all known broadband providers were located and contacted. This included searching membership logs from the trade associations (WISPA, WCAI, PCIA, etc.), the Cable Television Fact Book, Public Utility Commission records, Public Service Commission records, Chamber of Commerce, etc.

To date, Connected Nation's staff conducted on-site validation tests in Tennessee on the following providers: Ardmore Telephone Company, Inc.; AT&T, Inc.; Aurora Cable TV; Beasley Wireless; Ben Lombard Rural Telephone Cooperative, Inc.; Big River; Cable ONE, Inc.; Cellular South, Inc.; Charter Communications; Clarksville Department of Electricity (d.b.a. CDE Lightband); Clearwire Corporation; Columbia Power & Water Systems; Comcast; CRU Enterprises; DotSpot Wireless; ECSIS.NET; Frontier Communications Corporation; High Country Online; Infostructure Cable; Jackson Energy Authority; Ken-Tenn Wireless LLC; Leap Wireless International (d.b.a. Cricket Communications, Inc.); Mediacom Southwest LLC (d.b.a. Mediacom Communications Corporation; Rapid Communications LLC and Mediacom); Millington Telephone Company; NetEase; NewWave Communications; OrbWireless.net; Planet Connect Internet; QuickRelay Wireless Communications; Rural Tennessee Wireless Broadband; Sprint Nextel Corporation; SurfMore; TDS Telecom; TEC of Jackson, Inc.; T-Mobile USA, Inc.; Trenton TV Cable Company; U.S. Cellular; UltraNet; United Telephone Company; Verizon Communications, Inc.; West Kentucky Rural Telephone; and Xpansion Networks.

From program initiation through this reporting period, Connected Nation has completed in-the-field validation testing against 42 companies (out of a universe of 90 viable providers) totaling 46.67 percent within the State of Tennessee.

Connected Nation has also continued to review provider datasets for accurate speed information, platform listings, and other intricacies that may fall outside of the standard SBI Data Transfer Model parameters. Any providers whose submitted coverage and attributes are anticipated to come into question have been further reviewed and confirmed; details on a case-by-case basis are presented below.

CenturyLink
Issue: DSL platform with a maximum advertised download speed in tier 9.
Resolution: Provider representative indicated that tier 9 DSL service is indeed available, but to less than 10% of its customers, which is why it is not widely advertised.

ECSIS.NET
Issue: Fixed wireless platform with maximum advertised download speed in tier 7.
Resolution: Provider website advertises service at 10 Mbps; screenshot available below.

Wireless access speeds start at 512x256k through 10MB

OnWav, Inc.
Issue: Fixed wireless platform with maximum advertised download speed in tier 7.
Resolution: Provider representative confirmed that 10 Mbps download and upload speeds are available to residential customers, but it is not readily advertised.

Accuracy and Verification: Provider Validation Methodology

Broadband providers maintain their service area data in many different formats, all in varying levels of complexity and granularity. In order to ensure that the data required by the NTIA is standardized across all providers and that it is as accurate as possible, Connected Nation translates and formats the data that providers are able to supply into a GIS shapefile and produces maps for the provider to review. The resulting map(s) and review process allow for providers to see their service area in a geographic format – for some providers, this is the first time they have seen maps of their broadband service area. Having the mapped service area allows providers to quickly identify any issues that appear in the data representation, whether the issue is in the data translation into a GIS format or from the original data collection and submission. Often data is provided from various sources and through the review and revision process, local engineers who operate the networks and work in the field are able to ensure that the tabular data that has been submitted is accurate and represents the real-world network extent. Any issues in how the service area is represented on the map(s) are remedied by Connected Nation, whether they are additions, removal of service, or any other revisions. Revised maps of service area representations are sent to the provider for review and approval; Connected Nation will revise data and return maps as many times as necessary until the provider is in agreement that the map represents their service area as accurately as possible. Once the review process has been completed and final approval of the data is provided, the data is deemed ready for NTIA submission.

Once the data collection has been aggregated at a statewide level, static maps of statewide and county-level availability are produced and made publicly available. In addition, consumers can visit the interactive online tool, BroadbandStat, to create customized views of broadband service areas and analyze corresponding demographic information. Leveraging broadband service data on various platforms allows for public users, providers, and other stakeholders to review, scrutinize, and provide feedback on the represented data. This feedback becomes a validation method in itself as consumers submit inquiries to Connected Nation either affirming where service is not available or identifying areas where broadband service is shown on the map, but in actuality is not available. This allows for a follow-up to providers regarding revisions to the data as it is represented; it also allows for Connected Nation to identify locations where on-site visits may be necessary to complete field validation of available services. Public feedback on all forms of mapping products serves as a localized validation method for provider-supplied information and allows Connected Nation to resolve inaccuracies as they are identified to ensure that only the highest quality information is provided to stakeholders.

Estimates derived from provider-validated data indicate that approximately 5.05 percent of Tennessee households do not have terrestrial fixed broadband service available, and approximately 0.38 percent[1] of Tennessee households have neither mobile nor fixed broadband service available.[2]

Within rural areas of the state, results derived from provider-validated data indicate that approximately 9.49 percent of rural Tennessee households do not have terrestrial fixed broadband service available, and approximately 0.75 percent[3] of rural Tennessee households have neither mobile nor fixed broadband service available.[4] Please note that the availability estimates presented are based on Census 2000 household information; these figures will be updated in the near future with Census 2010 household information.

[1] In accordance with NTIA's definition of available broadband service as specified in the SBI NOFA, this estimate includes both terrestrial fixed *and* mobile broadband service, if the service offers download speeds of at least 768 Kbps and upload speeds greater than 200 Kbps.

[2] Due to the nature of the SBI data collection methodology as defined by the NTIA and based on both census block geographic units and street segment data, the estimates of broadband availability derived from provider-validated data may include an overstatement of the actual number of households with broadband availability. Under the census block-based data collection method, a provider will typically report broadband availability for an entire census block whether its network is present across the whole or only a subset of that census block. This potential overestimation at the census block level can be amplified as the data is aggregated across the entire state.

[3] See footnote 1.

[4] See footnote 2.

WIRELESS METHODOLOGY

Broadband Service Availability in Provider's Service Area
Wireless Services Not Provided to a Specific Address

Data solicited from a fixed wireless provider to create propagation models include, but are not limited to:

1. The name of the structure
2. Whether the transmitting device is operational or proposed
3. The maximum advertised downstream speed, the maximum advertised upstream speed
4. The typical downstream speed, the typical upstream speed (peak periods for both)
5. The frequency range of spectrum being used (as prescribed by NTIA)
6. The primary population center(s) being served (for geopolitical boundary reference)
7. The physical address of the transmit site (in the event latitude/longitude is unavailable from the provider this allows a quick reference point for geocoding)
8. Latitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
9. Longitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
10. Antenna pattern (e.g. omni-directional, 180°, 120°, 90°, etc.)
11. Azimuth of antenna (e.g. 360° with magnetic declination if known)
12. Approximate transmit radius (in feet, miles, or kilometers)
13. Polarity of transmit antenna (Vertical or Horizontal)
14. Transmit antenna gain (in dBi)
15. Line loss (applicable only to providers using coax, heliax, waveguide or other forms of cabling – excludes power-over-Ethernet devices)
16. Mechanical and/or Electrical beam tilt (if applicable)
17. Equipment Manufacturer (allows easy cross-reference against manufacturer's specification sheet)
18. Power output of the transmitting device (if unknown, FCC standards or manufacturer specifications are applied)
19. AMSL at base of tower site
20. Antenna centerline AGL (height of antenna above ground level measured at the centerline of the actual antenna)
21. Foliage factors (Evergreens/Deciduous and percent of ground cover)
22. Ground Clutter (primarily used in rural areas to account for foliage and in metropolitan areas to account for types and heights of buildings if known)
23. Average gain of receive antenna

24. Receive antenna is estimated at height above average terrain (HAAT) of 6.2 meters/20 feet
25. Federal Registration Numbers (if applicable) which may allow opportunities to cross-reference and/or obtain additional data from the Federal Communications Commission Universal Licensing System and the **CO**mmission **RE**gistration **S**ystem

Propagation modeling is an empirical mathematical formulation for the characterization of radio wave propagation as a function of frequency, distance, and other conditions. Propagation software(s) typically use the Irregular Terrain Model (also known as Longley-Rice) of radio propagation for frequencies between 20 MHz and 20 GHz. This model is based on electromagnetic theory and statistical analyses of the combination of terrain features and radio measurements, then predicting the median attenuation of a radio signal as a function of distance and the variability of the signal in time and in space. For metropolitan areas, the software can typically be adjusted to use the Okumura-Hata model which accounts for predicting the behavior of cellular transmissions in areas where buildings are the primary obstructions. The resulting product from either model depicts a graphical illustration of the theoretical propagation characteristics of a selected frequency range based on defined variables (receiver sensitivity of the home/mobile device, foliage factor, and digital elevation terrain input).

After converting propagation models into a geospatial format, additional processing is completed to remove the small pixels representing service present in the resulting dataset. These areas are initially created based on the parameters entered in the software from the provider equipment information, the underlying data parameters of elevation, hillshade, etc., and the limitations of the software itself to display a broadband service area as accurately as possible. Generally, these random pixel striations appear as a result of signal levels reaching the highest elevated points within the prescribed radius. Typically, while this pixilation anomaly shows legitimate areas where signals can be received, these highly elevated points may have exceedingly sparse populations or are entirely void of population. As a result, and congruent to the *Wireless Technology Methodologies and Business Logic* white paper submitted to NTIA on January 20, 2011, all independent pixels representing service that are less than 0.125 square miles in area have been removed from the geospatial representation of each wireless provider.

Broadband Inquiries Methodology

Connected Nation collects consumer feedback in the form of broadband inquiries (BBIs). These inquiries represent any type of communication received from the public regarding broadband service. Once BBIs are received across the state, this information is overlaid with the broadband availability information which was collected through the SBI program. This allows for a real-world comparison of the broadband landscape to the information received from broadband inquiries. Consumers submitting these inbound comments and/or inquiries are able to provide information regarding three categories: 1) residents who do not have broadband but want it; 2) residents who have broadband but want a different provider; and 3) residents who do not have broadband, but the broadband inventory maps indicate that they do.

BBIs are submitted frequently by consumers via the Connected Tennessee website. Inquiries often seek help to identify local broadband provider options, or to learn when a specific provider may be able to provide service to that consumer. Consumer comments also provide information which may help modify maps with actual service area information. The primary objectives of Connected Nation regarding these inquiries are 1) to improve the accuracy of the state maps with submitted consumer information and follow-up field research; 2) to provide broadband options to consumers through cooperation with mapped providers and by facilitating new broadband service options; and 3) to map and analyze information from consumers about areas of unmet broadband demand and alternatives to currently mapped services.

New BBIs are assigned to either the GIS department or the Engineering & Technical Services (ETS) team depending on the category entered by the consumer on the website submission form. The GIS or ETS team members respond to each inquiry according to the information requested by the consumer. Many BBIs can be resolved through desktop research; however, if a BBI requires research in the field, the assigned ETS team member conducts such research when performing field validations in the area of the inquiry, or at other such time as is practical and appropriate. GIS and ETS team members respond to and conclude BBIs via telephone contact and/or e-mail communication.

The broadband inquiry process has been implemented in each of the Connected Nation state programs with successful results. Altogether Connected Nation has received over 17,000 broadband inquiries since 2007, allowing the state programs to evaluate each inquiry for broadband demand and data verification. These inquiries are continuously examined against current broadband availability, updated every six months, to determine if previously unserved households have been expanded to and can now receive broadband at their residence. This database of broadband inquiries has also allowed the Connected Nation state programs to aggregate demand in concentrated areas to show providers the exact locations where the population has made it clear that they would purchase broadband if it was made available to them. Providers in the states have responded to this process and have expanded to areas knowing that their investment will be worthwhile. Data verification methods have also proven successful, as the state programs have been able to show those inquiries that indicate the broadband service areas are misrepresented on the map to providers, who then verify where service cannot reach in regard to that residence(s). The broadband coverage in these states has been altered to create a more accurate map based on the inquiries submitted by the public.

During this reporting period, the Connected Tennessee project has received a total of 74 inquiries (1,331 grant inception to date). As more inquiries are submitted to Connected Tennessee, a more thorough validation of the broadband landscape can be performed, while also allowing providers to see which areas have a high demand for broadband adoption.

BROADBANDSTAT METHODOLOGY

BroadbandStat is an online, interactive mapping tool for viewing, analyzing, and validating broadband data. Developed through a partnership with ESRI, the market leader in geographic information system (GIS) software, BroadbandStat is a multi-functional, user-friendly way for local leaders, policymakers, consumers, and technology providers to devise a plan for the expansion and adoption of broadband.

First and foremost, BroadbandStat allows consumers to locate their residence and identify providers that offer broadband Internet service to that location. The interactive platform allows for users to build and evaluate broadband expansion scenarios using a wealth of data, including education and population demographics, broadband availability, and research about the barriers to adoption.

New functionality in BroadbandStat allows the consumer to provide feedback on the broadband data displayed on the interactive map. Through the collection of this feedback, a visual demand for broadband is presented. This visualization allows the Connected Nation state programs the ability to validate the broadband availability for accuracy. If residents within a region state they are without broadband, but the interactive map shows otherwise, this allows Connected Nation to approach the providers within that area in an effort to trim down their coverage to more accurately represent real-world availability on the ground.

The Connected Tennessee project launched BroadbandStat on February 10, 2010, and has received a total of 6,623 visits to date, of which 894 occurred this reporting period.

SPEED TEST METHODOLOGY

The 2,514 speed tests that are represented in the Connected Tennessee Speed Test Report during this reporting period (9,620 grant inception to date) are the result of a partnership between Connected Nation and Ookla Net Metrics. Utilizing this relationship increases the level of confidence in the data being collected and provides for a far greater sample size than could be collected by a single testing site.

Ookla owns and operates Speedtest.net, as well as develops and deploys speed tests, such as the Connected Tennessee speed test website, for partners around the world. This network of sites that is developed and run on its testing technology provides Ookla with a vast dataset that, due to the variability of geographic information collected across the varying speed test sites, is geocoded utilizing Geo-IP technology. This technology allows for tests to be geocoded to points of aggregation, typically larger nodes across provider networks. While there are hundreds of thousands of tests that have been conducted, the level of aggregation is only sufficient for county-level detail due to the test results being located at these larger nodes and not at an absolute location for each speed test.

In an effort to validate broadband data from the Connected Tennessee project, speed test information is collected throughout the state. Speed tests provide speed information on the path taken through all networks (a provider's network as well as additional networks) a local machine must connect to in order to reach the host test. The benefit of this collection of speed information is two-tiered. First, it allows for a comprehensive dataset of speeds, while also providing Connected Tennessee with the information on where broadband services are available. Second, unlike theoretical speed information which was received through the data collection process, the use of speed tests provide real-world information on the speeds that currently exist within the State of Tennessee.

Broadband Provider Log

Complete	96
Non-Responsive/Refused	6
In Progress	10
Count of Datasets by Status	**112**
Total Unique Providers Represented	**90**

Provider Name	Platform	Status	NDA Execution Date	Notes
AT&T Inc.	DSL	Data Added to Statewide Inventory	12/16/2009	[SEP-08-11 Ashley Littell] Changes and/or Corrections: possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
AT&T Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/16/2009	[SEP-08-11 Ashley Littell] Changes and/or Corrections: possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Cable ONE Inc.	Cable	Data Added to Statewide Inventory	12/7/2009	[AUG-25-11 Ashley Littell] Changes and/or Corrections: possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission. Download speeds upgraded to speed tier 9.
CenturyLink	DSL	Data Added to Statewide Inventory	12/4/2009	[AUG-25-11 Ashley Littell] Changes and/or Corrections: possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Charter Communications, Inc.	Cable	Data Added to Statewide Inventory	12/15/2009	[SEP-08-11 Ashley Littell] Changes and/or Corrections: possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Clearwire Corporation	Mobile Wireless	Data Added to Statewide Inventory	3/3/2010	[SEP-08-11 Ashley Littell] Changes and/or Corrections: possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Comcast Cable Communications, LLC	Cable	Data Added to Statewide Inventory	12/7/2009	[SEP-14-11 Ashley Littell] Changes and/or Corrections: speed and technology of transmission information was updated using the previous spatial coverage converted to 2010 Census data. Additional, more current spatial information could not be provided, verified, and approved in the necessary time frame.
ECSIS.NET	Fixed Wireless	Data Added to Statewide Inventory	10/29/2009	[SEP-08-11 Ashley Littell] Change: provider added three new fixed wireless towers into service.
Electric Power Board for the City of Chattanooga	Fiber	Data Added to Statewide Inventory		[AUG-25-11 Ashley Littell] Correction: Speed fields revised from tier 10 to tier 11 to reflect 1 Gbps symmetrical service is available.
ETC Communications, LLC	Cable	Data Added to Statewide Inventory	10/14/2009	[AUG-25-11 Ashley Littell] Change: Speed tier upgrades from download 7 to 9 and upload 3 to 5; technology also upgraded to DOCSIS 3.0.
Frontier Communications Corporation	DSL	Data Added to Statewide Inventory	1/22/2010	[SEP-08-11 Ashley Littell] Change: Three DSLAMs added to previous coverage areas.
Jackson Energy Authority	Fiber	Data Added to Statewide Inventory	3/17/2010	[SEP-08-11 Ashley Littell] Change: Provider upgraded from download speed tier 9 to tier 10.
Ken-Tenn Wireless, L.L.C.	Fixed Wireless	Data Added to Statewide Inventory	1/25/2010	[SEP-08-11 Ashley Littell] Change: provider added four new fixed wireless towers into service.
Knology of Tennessee, Inc.	Cable	Data Added to Statewide Inventory	7/13/2011	[SEP-08-11 Ashley Littell] Correction: First time coverage has been submitted for this provider, which previously offered broadband service in the state.
Leap Wireless International, Inc.	Mobile Wireless	Data Added to Statewide Inventory	4/6/2010	[SEP-08-11 Ashley Littell] Changes and/or Corrections: possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Millington CATV, Inc.	Cable	Data Added to Statewide Inventory	10/19/2009	[SEP-08-11 Ashley Littell] Changes and/or Corrections: possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Millington CATV, Inc.	DSL	Data Added to Statewide Inventory	10/19/2009	[SEP-08-11 Ashley Littell] Change: provider expanded service into additional areas.
Monster Broadband, Inc.	Fixed Wireless	Data Added to Statewide Inventory	11/6/2009	[SEP-08-11 Ashley Littell] Change: provider added four new fixed wireless towers into service.
Morristown Utilities Commission	Fiber	Data Added to Statewide Inventory	3/25/2010	[SEP-08-11 Ashley Littell] Change: provider expanded service into additional area.

OnWav, Inc.	Fixed Wireless	Data Added to Statewide Inventory	3/15/2010	[SEP-08-11 Ashley Littell] Correction: previously submitted coverage was a generalized polygon of service; it has been replaced with modeled propagation.
Sprint Nextel Corporation	Mobile Wireless	Data Added to Statewide Inventory	1/14/2010	[SEP-08-11 Ashley Littell] Changes and/or Corrections: possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
T-Mobile USA, Inc.	Mobile Wireless	Data Added to Statewide Inventory	1/8/2010	[SEP-08-11 Ashley Littell] Changes and/or Corrections: possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
TDS Telecommunications Corporation	DSL	Data Added to Statewide Inventory	1/27/2010	[SEP-08-11 Ashley Littell] Changes and/or Corrections: possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
TDS Telecommunications Corporation	Fiber	Data Added to Statewide Inventory	1/27/2010	[SEP-08-11 Ashley Littell] Change: provider expanded service into additional areas.
TEC of Jackson, Inc.	DSL	Data Added to Statewide Inventory	7/29/2010	[SEP-08-11 Ashley Littell] Correction: provider corrected coverage based on where their franchise boundaries are located.
TEC of Jackson, Inc.	DSL	Data Added to Statewide Inventory	7/29/2010	[SEP-08-11 Ashley Littell] Correction: provider corrected service area based on where franchise boundaries are located.
TEC of Jackson, Inc.	DSL	Data Added to Statewide Inventory	7/29/2010	[SEP-08-11 Ashley Littell] Changes and/or Corrections: possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
United States Cellular Corporation	Mobile Wireless	Data Added to Statewide Inventory	2/15/2011	[SEP-08-11 Ashley Littell] Changes and/or Corrections: possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
United Telephone Company, Inc.	Fiber	Data Added to Statewide Inventory	2/25/2010	[SEP-08-11 Ashley Littell] Correction: First time coverage has been submitted for this provider, which previously offered fiber broadband service in the state.
Verizon Communications, Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/14/2009	[SEP-08-11 Ashley Littell] Changes and/or Corrections: possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
DeltaCom, Inc.	Backhaul	Backhaul Provider Only Processing Complete	2/16/2010	
Level 3 Communications, LLC	Backhaul	Backhaul Provider Only Processing Complete	12/14/2009	
Sprint Nextel Corporation	Backhaul	Backhaul Provider Only Processing Complete	1/14/2010	
T-Mobile USA, Inc.	Backhaul	Backhaul Provider Only Processing Complete	1/8/2010	
Windstream Communications	Backhaul	Backhaul Provider Only Processing Complete		
Zayo Group, LLC	Backhaul	Backhaul Provider Only Processing Complete		
TELE-PAGE Inc.	Fixed Wireless	Approval for Update Not Received – Data Still Submitted	1/26/2010	[SEP-12-11 Ashley Littell] Correction: previously submitted coverage was a generalized polygon of service; it has been replaced with modeled propagation.
Access Cable Television, Inc.	Cable	No Update to Provide		
Ardmore Telephone Company Inc.	DSL	No Update to Provide	2/16/2010	
AT&T Inc.	Backhaul	No Update to Provide	12/16/2009	
Beasley Wireless	Fixed Wireless	No Update to Provide	1/19/2010	
Ben Lomand Rural Telephone Coop., Inc.	DSL	No Update to Provide	10/21/2009	
Ben Lomand Rural Telephone Coop., Inc.	Fiber	No Update to Provide	10/21/2009	
Bledsoe Telephone Cooperative Inc.	DSL	No Update to Provide	1/20/2010	
BreezeAir.net	Fixed Wireless	No Update to Provide	8/17/2010	
Bristol Tennessee Essential Services	Fiber	No Update to Provide	9/1/2010	
Celina Cable Communications, Inc.	Cable	No Update to Provide	1/15/2010	
Cellular South, Inc.	Mobile Wireless	No Update to Provide	4/12/2010	
CenturyLink	Backhaul	No Update to Provide	12/4/2009	
Clarksville Department of Electricity	Fiber	No Update to Provide		
Columbia Power & Water Systems	Cable	No Update to Provide		
CRU Enterprises, Inc.	Fixed Wireless	No Update to Provide	2/4/2010	
DeKalb Telephone Cooperative, Inc.	DSL	No Update to Provide	2/24/2010	
DISH Network Corporation	Satellite	No Update to Provide	1/27/2010	[SEP-16-11 Ashley Littell] Correction: Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
Fayetteville Public Utilities	Cable	No Update to Provide		
High Country Online LLC	Fixed Wireless	No Update to Provide	3/4/2010	
Highland Telephone Cooperative, Inc.	DSL	No Update to Provide	3/14/2010	
Hughes Network Systems, LLC	Satellite	No Update to Provide	2/5/2010	[SEP-16-11 Ashley Littell] Correction: Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
iGiles.net	Fixed Wireless	No Update to Provide	2/25/2010	
Info-Ed Inc	Fixed Wireless	No Update to Provide	2/9/2010	
InfoStructure Inc.	Cable	No Update to Provide	10/2/2009	
James Cable LLC	Cable	No Update to Provide	1/11/2010	
Loretto Telephone Company, Inc.	DSL	No Update to Provide	3/16/2010	
Mediacom Southeast LLC	Cable	No Update to Provide	1/12/2010	
MegaPath Inc.	Backhaul	No Update to Provide	2/15/2010	

MidSouth Satellite, LLC	Fixed Wireless	No Update to Provide	7/7/2010	
MidSouth Satellite, LLC	Backhaul	No Update to Provide	7/7/2010	
NetEase	Fixed Wireless	No Update to Provide	2/3/2010	
NewWave Communications	Cable	No Update to Provide	10/13/2009	
North Central Communications	DSL	No Update to Provide	2/5/2010	
OrbWireless.net	Fixed Wireless	No Update to Provide		
Pickwick Cablevision, Inc.	Cable	No Update to Provide		
Planet Connect Internet	Fixed Wireless	No Update to Provide		
Pulaski Electric System	Fiber	No Update to Provide	12/30/2009	
Rural Tennessee Wireless Broadband (RTWB)	Fixed Wireless	No Update to Provide	2/15/2011	
Skyline Telephone Membership Corporation	DSL	No Update to Provide	2/2/2010	
Skyline Telephone Membership Corporation	Backhaul	No Update to Provide	2/2/2010	
Softek, Inc.	Fixed Wireless	No Update to Provide	1/14/2010	
Spirit Broadband	Cable	No Update to Provide	3/29/2010	
Surfmore.Net, Inc.	Fixed Wireless	No Update to Provide	1/25/2010	
TDS Telecommunications Corporation	Backhaul	No Update to Provide	1/27/2010	
TEC of Jackson, Inc.	Backhaul	No Update to Provide	7/29/2010	
Tullahoma Utilities Board	Fiber	No Update to Provide		
tw telecom of tennessee, llc	Backhaul	No Update to Provide	3/31/2010	
Twin Lakes Telephone Cooperative Corporation	DSL	No Update to Provide	1/14/2010	
Ultranet High-Speed Internet	Fixed Wireless	No Update to Provide	2/23/2010	
United Telephone Company, Inc.	DSL	No Update to Provide	2/25/2010	
Verizon Communications, Inc.	Backhaul	No Update to Provide	12/14/2009	
Wave2Wave Communications Inc.	Backhaul	No Update to Provide	4/28/2010	
West Kentucky Rural Telephone Coop Corp Inc.	DSL	No Update to Provide	1/7/2010	
WildBlue Communications, Inc.	Satellite	No Update to Provide	1/8/2010	[SEP-16-11 Ashley Littell] Correction: Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
XO Communications, LLC	Backhaul	No Update to Provide	2/12/2010	
Zito Midwest, LLC	Cable	No Update to Provide	2/17/2011	
Aurora Cable TV	Cable	No Update Provided - Use Last Submission Data	3/12/2010	
Iris Networks	Backhaul	No Update Provided - Use Last Submission Data	1/5/2010	
QuickRelay Wireless Communications	Fixed Wireless	No Update Provided - Use Last Submission Data		
Trenton TV Cable Company	Cable	No Update Provided - Use Last Submission Data		
ABG Wireless, LLC	Fixed Wireless	Provider Gathering Data		
TNets Internet	Fixed Wireless	Solicited Initial Data		
Wisper, LLC	Fixed Wireless	Solicited Initial Data	2/22/2011	
DeKalb Telephone Cooperative, Inc.	Fiber	Other	2/24/2010	[AUG-16-11 Ashley Littell] While provider is in the process of building out fiber, they do not have any in service as of June 30, 2011.
Highland Telephone Cooperative, Inc.	Fiber	Other	3/14/2010	[AUG-16-11 Ashley Littell] While provider is in the process of building out fiber, they do not have any in service as of June 30, 2011.
North Central Communications	Fiber	Other	2/5/2010	[AUG-16-11 Ashley Littell] While provider is in the process of building out fiber, they do not have any in service as of June 30, 2011.
PAETEC Communications, Inc.	Backhaul	Other		[SEP-08-11 Wes Kerr] Multiple outreach attempts were conducted but no response was received. PAETEC was bought out during the collection phase of this round by Windstream and we intend to be able to include the PAETEC coverage as a part of the Windstream footprint during the next round.
Skyline Telephone Membership Corporation	Fiber	Other	2/2/2010	[SEP-13-11 Ashley Littell] Provider is in the process of constructing fiber network and anticipates that the project will be completed in early 2012.
Twin Lakes Telephone Cooperative Corporation	Fiber	Other	1/14/2010	[SEP-01-11 Ashley Littell] Coverage maps were sent for review, but approval and additional information on the network was not received. Since data was created from scanned document, the accuracy is in question. Build-out of fiber continues and may not be completely active yet. Data will be submitted in April 2012.
West Kentucky Rural Telephone Coop Corp Inc.	Fiber	Other	1/7/2010	[AUG-16-11 Ashley Littell] While provider is in the process of building out fiber, they do not have any in service as of June 30, 2011.
Birch Communications, Inc.	DSL	Refused to Participate		[JUN-22-11 Daryl Coffey] a company representative sent an e-mail stating they are still not interested in participating.
Birch Communications, Inc.	Backhaul	Refused to Participate		[JUN-22-11 Daryl Coffey] a company representative sent an e-mail stating they are still not interested in participating.
Global Crossing Telecommunications, Inc.	Backhaul	Non-Responsive to Multiple Attempts		In addition to contact attempts made between July 1, 2010 and February 17, 2011, 3 additional attempts were made this period.

Trinity Communications LLC	Cable	Non-Responsive to Multiple Attempts		In addition to contact attempts made between July 1, 2010 and February 16, 2011, 5 additional attempts were made this period.
Utopian Wireless Corporation	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to contact attempts made between August 9, 2010 and January 4, 2011, 4 additional attempts were made this period.
TNWEB, LLC	Fixed Wireless	Slated Field Audit for Estimated Coverage Analysis		[AUG-17-11 Ashley Littell] While provider has refused to participate, we discovered that the fixed wireless service is limited to Lewisburg. Chip Spann will schedule a trip to estimate service area for the next submission.

OFFICIAL OCTOBER 2011 UPDATE SUBMISSION TO THE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION UNDER THE STATE BROADBAND INITIATIVE GRANT PROGRAM FOR THE STATE OF TEXAS

CONNECTED TEXAS®

October 1, 2011

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TEXAS COVER LETTER

October 1, 2011

Ms. Anne W. Neville
SBI Grant Program Director
National Telecommunications and Information Administration
U.S. Department of Commerce
1401 Constitution Avenue, NW Room 4716
Washington, DC 20230

Dear Ms. Neville:

As the State Broadband Designated Entity, in partnership with the state of Texas, please accept this submission from Connected Nation on behalf of the state of Texas' State Broadband Initiative (SBI) Grant Program, known as Connected Texas.

These artifacts should be found to be compliant with the October 1, 2011, deadline for the semi-annual data update and in accordance with the terms of the July 1, 2009, Notice of Funds Availability (NOFA) and all subsequent clarifications pertaining to delivery of state-level mapping of broadband service availability. This packet includes:

Inventory of Deliverables, Connected Texas: October 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing

Appendix A: 4	n/a	Community Anchor Institutions-Narratives
VII.A.1(a)	n/a	Accuracy and Verification Report
n/a	DataPackage.xlsx	Worksheets of Contact Information, Record Count, and Provider Summary Table
n/a	n/a	List of Changes and Corrections to the Dataset
n/a	n/a	Non-Participating Provider Narratives
n/a	n/a	Broadband Provider Roster and Participation Status

In addition, this data update submission should be found to be compliant with the additional program requirements instituted by the National Telecommunications and Information Administration since the time of the April 2011 SBI data submission for the Connected Texas program. Specifically, these new requirements are:

SBI Data Transfer Model
The submission of the broadband dataset for October 1, 2011, is contained within the SBI Data Transfer Model as released on the Grantee Workspace on June 30, 2011. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information on each provider as possible.

Additional Submission Guidance
This submission also includes a list of changes and corrections made to the dataset between the April 2011 submission and the October 2011 submission. This represents a summary of why data displays and/or supplied speeds, etc. are different from the previous submission. Changes can include upgrades to infrastructure to allow for higher throughput speeds for customers, an expansion of the service area (e.g. additional fixed wireless towers, recently activated DSLAMs, etc.), or a new provider in the marketplace. Corrections can include revisions to speed tier information that was previously reported incorrectly or the addition of a previously existing provider that has not yet been submitted in a semi-annual dataset.

Another addition in this submission is narratives describing the data and coverage estimations of non-participating providers. While Connected Texas continues outreach to all providers prior to each submission period, the need to submit broadband service data for all providers regardless of their participation is evident as the SBI program continues into this fourth round of data submissions. The submission of these estimated broadband service areas for providers that have not supplied data to Connected Texas is essential in being able to portray a more accurate depiction of the current broadband landscape.

This October 2011 semi-annual data update under the State Broadband Initiative Grant Program continues to demonstrate our dedication to implementing the joint purposes of the Recovery Act and the Broadband Data Improvement Act (BDIA) by gathering comprehensive and accurate state-level broadband mapping data, developing state-level broadband maps, aiding in the development and maintenance of the National Broadband Map, and undertaking statewide initiatives for broadband planning.

Broadband Service Availability — Provider Outreach and Verification

This data update submission under the SBI program includes datasets for approximately 80.54 percent of the Texas provider community, or 149 of 185 total providers. There are 146 participating providers and 3 additional non-participating providers whose estimated coverage areas have been submitted. Of the 146 participating providers, 54 supplied an update to their network or coverage area(s), while 75 have reported no change. The remaining 17 represent providers who previously supplied data but were non-responsive in the October 2011 update effort; therefore their previous dataset is being put forward as part of this compilation. A complete roster by provider depicting participation status and contact record is contained herein. The 36 providers that are not represented in the attached datasets have refused to participate in the voluntary program or were non-responsive to multiple contact attempts.

As the aforementioned roster and attached methodology documentation will attest, it is the collective opinion of the Connected Texas principals that all commercially reasonable efforts were made to account for 100 percent of the known Texas broadband provider community, pursuant to this semi-annual data update submission.

Connected Texas has also continued to perform broadband verification activities through several means. In addition to confirmation of service area(s) by each provider, Connected Texas conducts field validation efforts. To date, 114 (61.62 percent) providers have been validated through field verification activities. Additional details on verification activities are contained within the Field Validation Methodology.

The Connected Texas website, www.connectedtx.org, continues to serve a prominent role in the outreach and data collection effort. This program asset provides a way for the general public to participate in the process by offering interactive tools for users to test their connection speed, submit broadband inquiries, or contact a program representative.

As an indicator of stakeholder penetration, the Connected Texas website encountered 5,289 unique visits during this reporting period, which includes 5,143 visits to the English website and 146 visits to the Spanish website (34,898 total to date for the life of the grant awarded on January 1, 2010, which includes 34,505 to the English website and 393 to the Spanish website). Additionally, this pronounced Web activity netted 50 broadband inquiries over this same reporting period (474 grant inception to date). The website also provides the BroadbandStat application, which allows the consumer to confirm or dispute the coverage represented on the broadband inventory map. These consumer-initiated actions are facilitated through the Connected Texas website and the Connected Texas interactive mapping tool (BroadbandStat) that offer the citizens the vehicles to provide information regarding availability in their respective service area, either in affirmation or contest of the reported data represented in the Connected Texas mapping artifacts. Since the initial data collection and release of corresponding maps, feedback in the form of broadband inquiries has allowed Connected Nation to identify additional areas that are in need of field validation, which is scheduled as soon as possible.

Community Anchor Institutions

Connected Texas has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBI NOFA Technical Appendix.

In conjunction with the Texas Department of Agriculture, outreach was conducted during this data update reporting period by Connected Texas to continue identification of existing, centralized sources for CAI connectivity data. Additionally, outreach was coordinated to distribute a CAI survey to institutions throughout the state through multiple methods including a customized online survey available on the Connected Texas website. During this reporting period Connected Texas has developed a number of new relationships with statewide associations to promote the importance of broadband connectivity at anchor institutions and participation in this data collection process. Connected Texas will continue to build upon these new relationships over the coming months and utilize its contacts throughout the state to collect data and raise awareness of this project.

Connected Texas continues to work with the Texas Broadband Task Force and utilize the inaugural issue of the Connected Texas CAI newsletter to further outreach opportunities within the state. From our work in Texas, as well as other states, we recognize the great value of this data to future collaboration efforts within the state as well as its value to the National Broadband Map. We plan to continue to bring best practices to the Connected Texas efforts, along with an investment of both human and technical resources required to reach our goal of increasing the data that is secured and reported as part of this process.

The Connected Texas program exists to improve data on the deployment and adoption of broadband services and to assist in the extension of broadband technology across all regions of the great state of Texas, as well as the United States through contribution to the National Broadband Map. We look forward to the continuing work ahead.

Respectfully submitted,

Thomas W. Ferree
Chief Operating Officer
Connected Nation, Inc.

Data Acquisition: Texas Community Anchor Institutions Methodology

In this fourth reporting period of the SBI, Connected Texas, working in coordination with the Texas Department of Agriculture, has established an ongoing mechanism for gathering data on the location and broadband connectivity of Community Anchor Institutions (CAI), in accordance with the data requirements of the SBI NOFA Technical Appendix. During this reporting period Connected Texas has continued to focus efforts on conducting outreach and raising awareness of this important project.

Connected Texas has continued to identify and process CAI data obtained through an ongoing statewide outreach campaign. Physical address information continues to be augmented through manual sourcing and geocoded by Connected Texas through ESRI ArcGIS software.

Connected Texas continues to utilize a customized online survey hosted through SurveyMonkey, with a landing page on the Connected Texas website that was developed during the first reporting period. This survey, in combination with a customized data-gathering spreadsheet, was distributed to a targeted list of CAI throughout the state. Connected Texas will continue to use these data-gathering tools for future targeted outreach efforts throughout the coming months leading up to the next reporting period. These materials are customized to fit the CAI categories as defined in the SBI NOFA.

The survey can be accessed at this link using the following password:
http://connectedtx.org/mapping/Community_Anchor_Institution_Data_Collection.php
Password: CAI_TX_7933

During this reporting period Connected Texas conducted research, specifically within the education sector, to identify existing, centralized sources for CAI connectivity data. Connected Texas has located existing datasets within the state for K-12 schools, libraries, and higher education facilities but is still in coordination with these groups to receive this data for processing as part of this project. Any data received as part of this effort will be reported during the April 2012 submission. In tandem with these efforts to identify existing data, Connected Texas continues to identify key CAI contacts in an effort to distribute and promote the online survey and raise awareness of the importance of CAI broadband connectivity.

Connected Texas has an ongoing mission to educate CAI throughout the state on the importance of participating in the project. Participation by these institutions will raise awareness about the importance of broadband connectivity and the need to report the requested data for inclusion on the National Broadband Map. Connected Texas continues to utilize a CAI newsletter which was distributed in March 2011 and is available on the CAI page of the Connected Texas website. The newsletter is currently being updated with plans to distribute an updated version in Q42011.

The greatest challenge with collecting this data continues to be the difficulty in securing CAI broadband connectivity data. Connected Texas is overcoming this challenge through new relationships that are being formed, our work with the Texas Department of Agriculture, and the upcoming release of an updated CAI newsletter. Connected Texas expects noted progress to occur over the coming months leading up to the April 2012 submission.

A CAI summary of all processed and submitted data is provided below:

CAI Type	Total	Physical Address	Lat/Long	Technology of Transmission	Download Speed	Upload Speed
K-12	10,604	10,604	10,601	78	71	71
Libraries	1,136	1,136	1,136	103	261	100
Healthcare	865	865	865	78	163	80
Public Safety	2,904	2,904	2,870	256	543	254
Higher Ed Institutions	420	420	420	36	106	35
Other Government	705	705	705	464	92	43
Other Non-Government	10,604	10,604	10,601	78	71	71
Total	**16,634**	**16,634**	**16,597**	**1,015**	**1,236**	**583**

SBI Data Submission Methodology

The submission of the broadband dataset for October 1, 2011, is contained within the SBI Data Transfer Model and additional components as released on the Grantee Workspace on June 30, 2011. Connected Nation has reviewed all literature that relates to the release and use of this data transfer model and recognizes that it does not replace or dictate how data is stored, processed, or displayed for the state, as it is meant primarily as a means to transfer the broadband data from all states and territories and populate the National Broadband Map in a seamless fashion. Guidance from the Technical Mapping Guide, as released on the Grantee Workspace on March 24, 2011, was also followed to ensure the completeness and validity of the submission through completion steps and checklists, completing the DataPackage spreadsheet, uploading broadband datasets into the Data Transfer Model, and checking the dataset using the SBDD_CheckSubmission receipt process.

As part of the ongoing review and analysis process, NTIA has requested further information in the submission of the DataPackage spreadsheet. In addition to the information on providers whose coverage and accompanying attributes are submitted in the SBI Data Transfer Model, information on other providers that are considered to be non-viable is also included in the DataPackage. Providers deemed non-viable that have been excluded from continued outreach may have been eliminated for reasons such as (i) the company offers Internet service but at speeds below the current definition of broadband; (ii) the company was listed in advertisements as a broadband provider, but is actually a network solution or consulting firm, etc.; (iii) the company may build or install network infrastructure, but does not actually provide the broadband service to consumers; and (iv) the company has gone out of business. The submitted DataPackage includes any relevant information that has been obtained through the course of due diligence and/or direct provider outreach, such as a Federal Registration Number (if applicable), the company's URL, the existence of an executed Nondisclosure Agreement, and brief notations regarding the status of the company.

In addition to the methodologies contained herein, as well as the DataPackage.xls containing contact information, the data dictionary, and a provider summary table, the following feature classes are submitted within the SBI Data Transfer Model for the state of Texas.

Inventory of Deliverables, Connected Texas: October 1, 2011

NOFA Requirement	Data Transfer Model	Data Description
Appendix A: 1(a)(i)	BB_Service_CensusBlock	Broadband Service Availability of Facilities-Based Providers in Census Blocks of No Greater Than Two Square Miles in Area.
Appendix A: 1(a)(ii)	BB_Service_RoadSegment	Broadband Service Availability of Facilities-Based Providers by Road Segment in Census Blocks Larger in Area Than Two Square Miles.
Appendix A: 1(b)	BB_Service_Wireless	Broadband Service Availability of Wireless Services Not Provided to a Specific Address.
Appendix A: 3(b)	BB_ConnectionPoint_MiddleMile	Broadband Service Infrastructure Middle-Mile and Backbone Interconnection Points.
Appendix A: 4	BB_Service_CAInstitutions	Community Anchor Institutions-Listing.

The provider data collected by Connected Nation on behalf of the state of Texas have been formatted per the given specifications and uploaded into the appropriate feature classes of the SBI Data Transfer Model. Wireline availability is contained within census blocks and road segments, wireless availability is contained as polygons of coverage areas, and middle-mile connections and Community Anchor Institutions are contained as point data. All speed data is contained at the census block, road segment, or wireless polygon level of availability. All efforts have been made to comply with formatting, domain, and metadata requirements to include as much information as possible.

Connected Nation has continued outreach to satellite providers on their availability, technology, and speed information, but granular coverage is not yet available. Submitted within the wireless feature class are the satellite companies providing service to Texas as a polygon of the state boundary. Efforts will continue to collect, process, or otherwise create more granular satellite data based on availability analyses and guidance received from NTIA.

PROVIDER CHANGES AND CORRECTIONS FOR OCTOBER 2011

As requested by the SBI Program Office, a listing of the changes and/or corrections to the datasets between the April 2011 and October 2011 submissions is included in this narrative. This information is presented in this section as well as in the Broadband Provider Log. Changes to the data include expansion of service area(s), activation of new wireless towers, and upgrades to the network to provide higher download speeds to consumers. Corrections to the dataset include the addition of previously existing providers whose coverage has never been submitted, revision of coverage or speed information that was incorrect, and any other items that were misrepresented in the April 2011 dataset.

Changes

- Alenco Communications, Inc. (DSL): Provider upgraded infrastructure and can now offer speed tier 7 download speeds in select area.
- AT&T Communications of Texas, Inc. (mobile wireless): Network expansion to include more coverage around Midland, Odessa, Fairfield, Palestine, Buffalo, etc.
- Big Bend Telephone Company, Inc. (fiber): Provider upgraded infrastructure to expand FTTH service territory.
- Cap Rock Telephone Cooperative, Inc. (DSL): Network update to include additional Remote Terminals and provider upgraded infrastructure and can now offer speed tier 5 download speeds in select area.
- Cap Rock Telephone Cooperative, Inc. (fiber): Provider upgraded infrastructure and can now offer speed tier 5 download speeds.
- Celltex Networks, LLC (fixed wireless): New fixed wireless tower in operation.
- Central Texas Telephone Investments, LP (fixed wireless): New fixed wireless towers in operation.
- Coleman County Telephone Cooperative, Inc. (DSL): Network expansion to include new DSLAMs.
- Consolidated Communications (fiber): Provider upgraded infrastructure and now offers FTTH in select areas.
- CTX Unwired (fixed wireless): New fixed wireless towers in operation.
- Cumby Telephone Cooperative, Inc. (fiber): Provider upgraded infrastructure to expand FTTH service territory.
- DigiComm Enterprises, LLC (fixed wireless): New fixed wireless towers in operation.
- Dot 10 Wireless, LLC (fixed wireless): New fixed wireless tower in operation.
- East Texas DSL (fixed wireless): New fixed wireless towers in operation.
- Eastex Telephone Cooperative, Inc. (DSL): Network expansion (new Remote Terminals).
- ENMR Telephone Cooperative, Inc. (fiber): Network expansion (new fiber lines) and provider upgraded infrastructure and can now offer tier 7 download and upload speeds.
- Gower Computer Support, Inc. (fixed wireless): Provider upgraded infrastructure and can now offer speed tier 4 download speeds.

- Grande Communications Networks LLC (cable): Provider upgraded infrastructure to service additional homes and provide maximum download speeds of tier 10 to most market areas.
- Grayson CableRocket, LLC (cable): Provider upgraded infrastructure and can now offer speed tier 7 download speeds.
- Gtek Communications (fixed wireless): New fixed wireless towers in operation.
- GVEC.net (fixed wireless): New fixed wireless towers in operation.
- IGN-LPG Enterprises LLC (fixed wireless): New fixed wireless tower in operation.
- Industry Telephone Company (DSL): Provider upgraded infrastructure and can now offer speed tier 6 download speeds.
- JAB Wireless, Inc. (fixed wireless): JAB Wireless acquired the following fixed wireless operators: Rhino Communications, PVCo, Twilight Communications, Cobalt Broadband, and Wickson.
- KeyOn Communications, Inc. (fixed wireless): Provider acquired some of ERF Wireless's tower sites in Central Texas and North Texas; new composite propagations submitted.
- Millennium Telcom, LLC (fixed wireless): New fixed wireless towers in operation.
- Poka Lambro Telephone Cooperative, Inc. (DSL): Network expansion and provider upgraded infrastructure and can now offer speed tier 8 download speeds.
- Poka Lambro Telephone Cooperative, Inc. (fiber): Provider upgraded infrastructure to expand FTTH service territory and can now offer speed tier 8 download speeds.
- Rodzoo Wireless (fixed wireless): Provider's speed tiers previously didn't meet the minimum requirements/definition of broadband. Provider upgraded infrastructure and can now offer speed tier 3 download speeds.
- South Plains Telephone Cooperative, Inc. (fiber): Provider upgraded infrastructure to expand FTTH service territory.
- Texas Wireless Internet (fixed wireless): New fixed wireless towers in operation.
- TISD, Inc. (fixed wireless): New fixed wireless towers in operation.
- US Cable Corporation (cable): Network expansion to include new plant in Fort Stockton.
- Valley Telephone Cooperative, Inc. (fixed wireless): New fixed wireless towers in operation.
- Versalink Enterprises, LLC (cable): Provider expanded service area.
- XIT Telecommunications & Technology, Ltd. (fiber): Provider upgraded infrastructure to expand FTTH service territory.

Corrections

- Big Bend Telephone Company, Inc. (satellite): Provider submitted new platform type, satellite, for this submission.
- Broadwaves (fixed wireless): Estimated coverage submitted (propagation) for non-participating provider.

- Charter Communications, Inc. (cable): Provider submitted a new dataset showing a slight decrease in coverage.
- CKS Wireless, Inc. (fixed wireless): Estimated coverage submitted (propagation) for non-participating provider.
- DISH Network Corporation (satellite): Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
- East Texas Broadband (fixed wireless): Estimated coverage submitted (propagation) for non-participating provider.
- East Texas WiFi (fixed wireless): East Texas WiFi was previously non-responsive, but it provided data this round.
- ERF Wireless (fixed wireless): "Circle" polygons of service have been replaced with propagations. Also, speeds corrected to what is actually advertised on its website for residential services (1M down).
- Hi Speed Wireless (fixed wireless): Provider clarified it only offers speed tier 5 download speeds as its highest package.
- Hughes Network Systems, LLC (satellite): Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
- Millennium Telcom, LLC (cable): Updated download speeds to tier 8, per its website information and DOCSIS 3.0 technology type.
- NetWest Online, Inc. (fixed wireless): Provider only offers 3-5M download speeds to residential subscribers; corrected to tier 5.
- Stelera Wireless, LLC (mobile wireless): "Circle" polygons of service have been replaced with propagations.
- Tier One Converged Networks, Inc. (fixed wireless): "Circle" polygons of service have been replaced with propagations.
- WildBlue Communications, Inc. (satellite): Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
- Windjammer Communications LLC (cable): Windjammer Communications LLC was previously non-responsive, but it provided data this round.

Changes and/or Corrections – Entirely New Dataset Submitted

- AT&T Communications of Texas, Inc. (DSL)
- Cable ONE, Inc. (cable)
- CenturyLink (DSL)
- Cequel Communications (cable)
- Clearwire Corporation (fixed wireless, mobile wireless)
- Comcast Cable Communications, LLC (cable)
- Consolidated Communications (DSL)
- Leap Wireless International, Inc. (mobile wireless)

- Sprint Nextel Corporation (mobile wireless)
- T-Mobile USA, Inc. (mobile wireless)
- Time Warner Cable LLC (cable)
- United States Cellular Corporation (mobile wireless)
- Verizon Southwest, Inc. (DSL, fiber, mobile wireless)
- Windstream Communications (DSL)

TEXAS FIELD VALIDATION METHODOLOGY

Connected Nation focused a portion of its time on specific validation processes such as:

- conducting random spectrum analysis studies throughout the state using an Avcom PSA-37-XP spectrum analyzer;
- conducting mobile speed tests throughout the state using an iPhone, Android (or other smart phone) as well as provider-specific aircards (Sprint 3G/4G, Clearwire et al);
- identifying pre-selected, provider-submitted wireless transmit tower sites and cross-referencing data about that tower against the Federal Communications Commission (FCC) databases such as Antenna Structure Registration and/or the Universal Licensing System;
- cross-referencing Federal Registration Number data against available FCC Form 477 data as well as the FCC **CO**mmission **RE**gistration **S**ystem (CORES);
- validating provider submitted data (for example: latitude/longitude) using a handheld Garmin eTrex Summit GPS unit or GPS enabled software such as Microsoft Streets and Trips;
- locating physical wire-line attributes (such as Remote Terminals, CATV plant, etc.) and comparing them against provider submitted data; and
- conducting on-net and off-net speed tests using the FCC portal at http://www.broadband.gov/qualitytest/about/ or using the Ookla Net Metrics enabled speed test utility located on each of Connected Nation's state specific websites.

Additionally, Connected Nation cross-referenced numerous public documents in order to ensure that all known broadband providers were located and contacted. This included searching membership logs from the trade associations (WISPA, WCAI, PCIA, etc.), the Cable Television Fact Book, Public Utility Commission records, Public Service Commission records, Chamber of Commerce, etc.

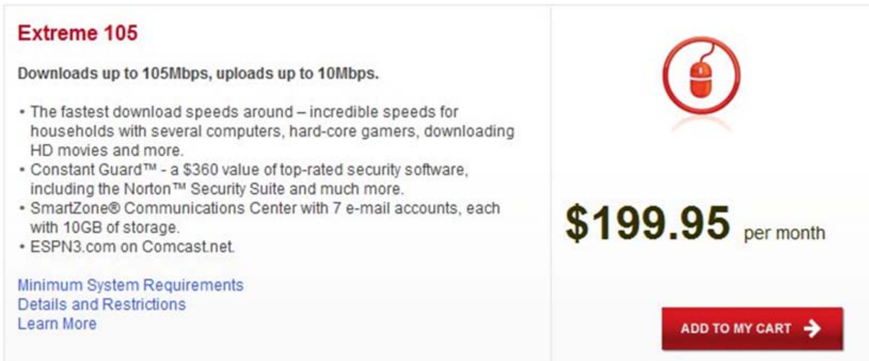
To date, Connected Nation's staff conducted on-site validation tests in Texas on the following providers: Alenco Communications, Inc.; Allegiance Communications; Alpheus (d.b.a. Aspen Communications); AT&T, Inc.; AwesomeNet, Inc.; Basin 2 Way Radio, Inc.; Basin Broadband, Inc.; Big Bend Telephone Company, Inc.; Blossom Telephone; Border to Border Communications, Inc.; Broadband Data Services of Texas LLC; Broadcomm.US; Cable One, Inc.; Cameron Telephone Company LLC; Cap Rock Telephone Cooperative, Inc.; Cebridge (d.b.a. Suddenlink); Central Texas

Cable Partners, Inc.; Central Texas Telephone Cooperative, Inc.; CenturyLink; Cequel Communications; Charter Communications; Clearwire Corporation; Coleman County Telephone Cooperative LLC; Colorado Valley Telephone Cooperative LLC; Comcast Cable Communications LLC; Community Telephone Company, Inc.; Consolidated Communications; Cumby Telephone Company, Inc.; DCT Texas.Net; Dell Telephone Cooperative, Inc.; Digitex.com; East Texas DSL; Eastex Telephone Cooperative, Inc.; Eccentric Technologies; ECTISP; ELC Internet Services, Inc.; Electra Telephone Company; Element Networks LLC; eNet; ENMR Telephone Cooperative, Inc. (d.b.a. ENMR Plateau Communications, Inc.); ERF Wireless; ETAN Industries; Etex Communications LP; ETS Cablevision Company, Inc.; Farm to Market Broadband LP; Five Area Telephone Company, Inc.; Ganado Telephone Company, Inc.; GEUS; Gilmer Cable; Gower Computer Support, Inc.; Grande Communications Network LLC; Grayson CableRocket LLC; Greasy Bend Ventures, Inc. (d.b.a. Live Air Networks); GTEK Communications; Guadalupe Valley Communications Systems; GVEC.net; Hill Country Telephone Cooperative; Iguana Net; Industry Telephone Company; JAB Wireless (d.b.a. Dot11 Networks, Partnership Broadband); KeyOn Communications, Inc.; La Ward Telephone Exchange, Inc.; Lake Livingston Telephone Company; Leap Wireless International, Inc.; Livingston Telephone Company, Incorporated; Maverick Internet; McDonald Group; Mid-Plains Rural Co-op, Inc.; NetWest Online, Inc.; Neu Ventures, Inc.; Nortex Communications; North Texas Broadband LLC; Northland Communications; NTS Communications; Panhandle Telephone Cooperative, Inc.; Phantom Wave (d.b.a. Argon Technologies); Poka Lambro Telephone Cooperative, Inc.; Promptwireless LLP; RB3 LLC; Ridgewood Cable; Rioplex Wireless Ltd.; Riviera Telephone Company, Inc.; Rock Solid Internet & Telephone; Santa Rosa Telephone Cooperative, Inc.; Smithville System; South Plains Telephone Cooperative, Inc.; Southwest Arkansas Telephone Cooperative, Inc.; Southwest Texas Telephone Company; Speed of Light Broadband, Inc.; Sprint Nextel Corporation; Stelera Wireless LLC; Tatum Telephone; Taylor Telephone Cooperative, Inc.; Texas Broadband, Inc.; Texas CellNet; Texas Wireless Internet; Texhoma Wireless; TierOne Converged Networks, Inc.; Time Warner Cable, Inc.; TISD; T-Mobile USA, Inc.; Totalcom Communications, Inc.; U.S. Cable; Valley Telephone Cooperative, Inc.; Verizon Southwest, Inc.; WEHCo Video (d.b.a. Kilgore Video, Kilgore Cable); West Texas Rural Telephone Cooperative; Wes-Tex Telecommunications Ltd.; Wharton County Electric Cooperative, Inc.; Windstream Communications; XIT Telecommunications & Technology Ltd.; and Zito Midwest LLC (d.b.a. Galaxy Cable).

From program initiation through this reporting period, Connected Nation has completed in-the-field validation testing against 114 companies (out of a universe of 185 viable providers) totaling 61.62 percent within the state of Texas.

Connected Nation has also continued to review provider datasets for accurate speed information, platform listings, and other intricacies that may fall outside of the standard SBI Data Transfer Model parameters. Any providers whose submitted coverage and attributes are anticipated to come into question have been further reviewed and confirmed; details on a case-by-case basis are presented below.

Comcast
Issue: Cable platform with maximum advertised download speed in tier 10, higher than expected value range for the technology.
Resolution: Provider's website advertises 105 Mbps; screenshot available below.



Grande Communications
Issue: Cable platform with maximum advertised download speed at tier 10, higher than expected value range for the technology.
Resolution: Provider's website advertises 110 Mbps; screenshot available below.

	Starter	Express	Power	Ultra	Unleashed	Peak
MONTHLY PRICE	$27.99	$35.99	$19.99 for 6 months Reg $45.99	$55.99	$89.99	$110.00
TOP DOWNLOAD SPEED	3 Mbps	8 Mbps	24 Mbps	40 Mbps	65 Mbps	110 Mbps
TOP UPLOAD SPEED	512 Kbps	1 Mbps	3 Mbps	4 Mbps	5 Mbps	5 Mbps

Millennium Telcom
Issue: Technology of transmission 40 with maximum advertised download speed at tier 6, lower than expected value range for the technology.
Resolution: Use of DOCSIS 3.0 throughout service area was confirmed, even at lower speeds.

Nortex Communications
Issue: Technology of transmission 40 with maximum advertised download speed at tier 7, lower than expected value range for the technology.
Resolution: Confirmed use of DOCSIS 3.0 throughout service area; however, speeds are kept lower currently to be backwards compatible.

North Texas Broadband
Issue: Technology of transmission 40 with maximum advertised download speed at tier 6, lower than expected value range for the technology.
Resolution: Use of DOCSIS 3.0 throughout service area was confirmed, even at lower speeds.

Suddenlink
Issue: Technology of transmission 40 with maximum advertised download speeds in tiers 3, 4, 5, 6, and 7, lower than expected value range for the technology.
Resolution: Additional information on the technology in use was not received and the dataset is submitted as-is; work will continue on the technology clarification.

US Cable
Issue: Technology of transmission 40 with maximum advertised download speed in tier 7, lower than expected value range for the technology.
Resolution: Provider representative confirmed that DOCSIS 3.0 is indeed in use across its entire service area.

Data Submission and Coverage Estimation of Non-Participating Providers

Broadwaves

As part of its ongoing broadband mapping efforts, Connected Nation (CN) has developed a series of processes with the goal of submitting mapping data to NTIA for every known and qualifying broadband provider, regardless of whether the provider has chosen to support and participate in the SBDD mapping initiative.

The following narrative provides detail regarding the recent data collection activities related to Broadwaves, a wireless Internet service provider (WISP), located in Brenham, Texas, with a service area in and around Washington County. The narrative will include information regarding how and where CN obtained publicly available data, and the "on-the-ground" validation techniques that support the underlying data.

Background
CN staff members have attempted to obtain the participation of the provider with at least 18 recorded instances of communication via telephone and e-mail from September 17, 2009, through August 5, 2011. Over that period, the provider representative stated on three occasions that the company would not participate in the state mapping program.

A CN staff member visited the provider's home city of Brenham in May 2011 seeking a storefront or office, but was unable to locate the provider. The staff member, however, was able to identify the provider's tower site in Brenham (a commercial bank building) and spoke with the site landlord to confirm the provider's equipment presence on the building. Unfortunately, the landlord representative did not know the business location of the provider. In a visit to a local computer repair shop adjacent to the bank site, the CN staff member spoke with a computer technician who knew about the local Internet providers, but did not know of Broadwaves.

During the site visit to Brenham in May, the CN staff member attempted to contact the provider for an in-person meeting; however, the provider did not respond. On June 7, 2011, the CN staff member sent via e-mail a representative propagation map of one of the provider's seven advertised tower sites with the objective of securing a meeting with the provider, however, the provider did not respond. On June 28, the same CN staff member again sent an e-mail request for a personal meeting with the provider for the following week; however, the provider continued to be unresponsive.

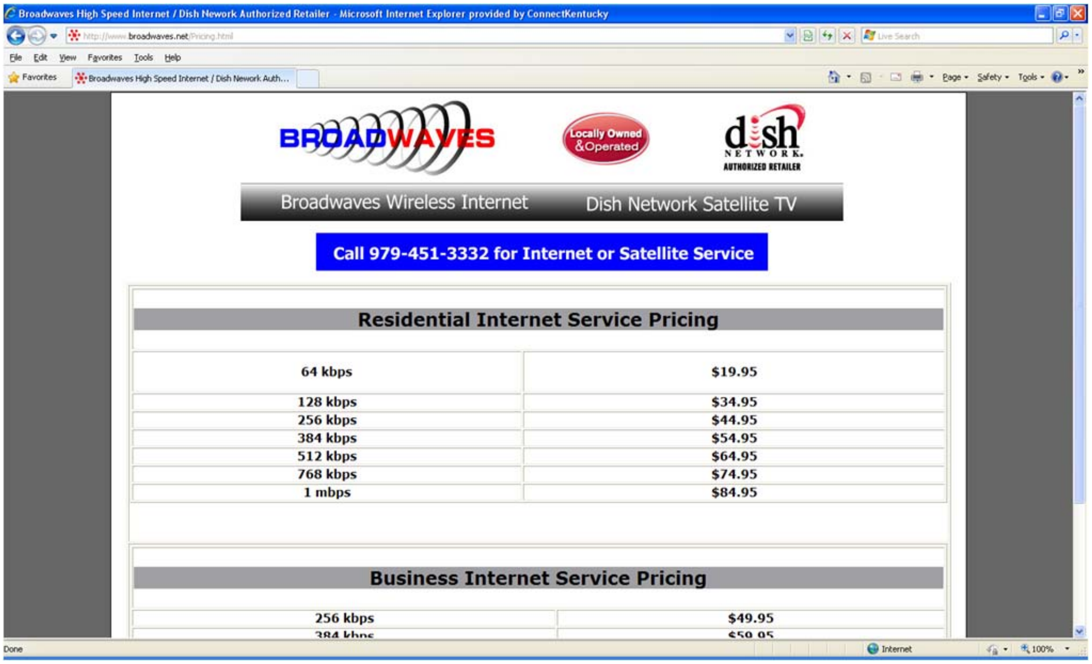
The Issue

Connected Nation has been unable to obtain this provider's broadband coverage information through typical outreach efforts. Broadwaves has, since April 2010, repeatedly stated its refusal to participate in the Connected Texas broadband mapping initiative, and has been unresponsive to multiple attempts to meet in person to discuss the program and the provider's coverage area.

Identification of Provider's Service Plans, Service Area, Legal Name, d.b.a., FRN, and Licensing

CN began building a file based on research information and, as time progressed, enriched the file with information obtained through the public domain. As a first step, CN reviewed the provider's website (www.broadwaves.net) to determine the residential service plans **(Exhibit A)** and the service area **(Exhibit B)** advertised for the provider's wireless network. A search for a Federal Registration Number ("FRN") on the FCC **CO**mmission **RE**gistration **S**ystem ("CORES") system using both the business name as well as the company owner's name did not reveal a verifiable FRN. A similar search in the Texas business licensing system also did not identify Broadwaves as an entity licensed to do business in the state. Finally, a search of the FCC's Universal Licensing System (ULS) for Washington County, Texas, did not identify any wireless licenses held by the provider.

Exhibit A: Advertised Service Plans


Broadwaves High Speed Internet / Dish Nework Authorized Retailer - Microsoft Internet Explorer provided by ConnectKentucky

BROADWAVES | Locally Owned &Operated | dish NETWORK. AUTHORIZED RETAILER

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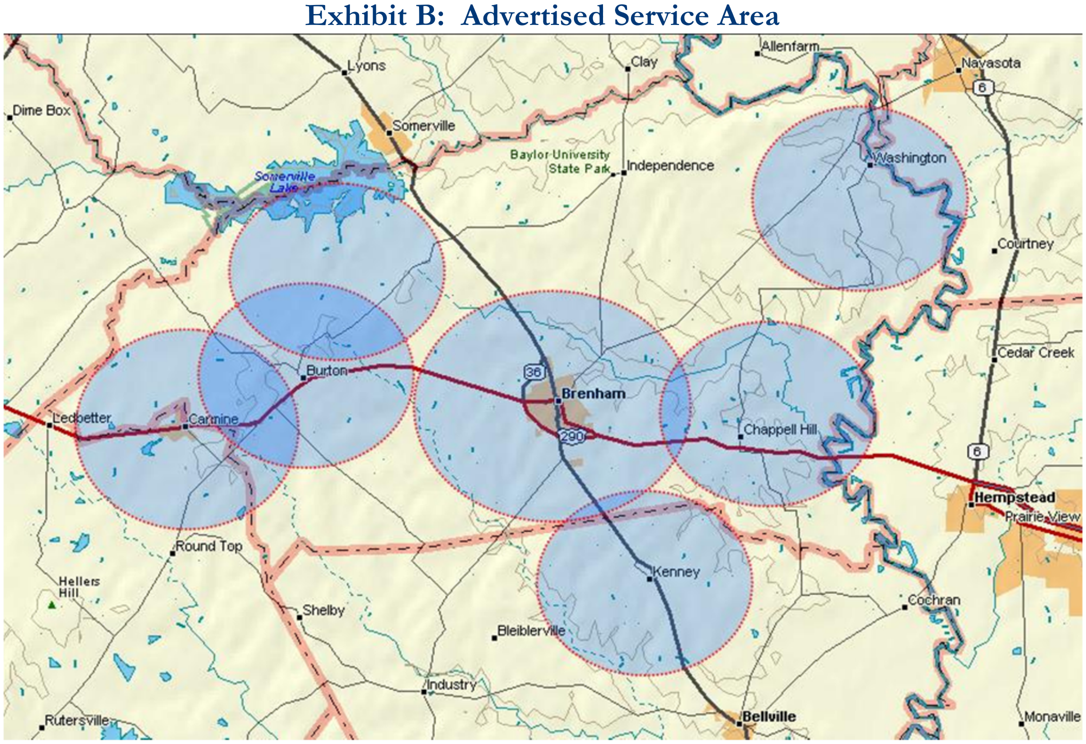
256 kbps	$44.95
384 kbps	$54.95
512 kbps	$64.95
768 kbps	$74.95
1 mbps	$84.95

Business Internet Service Pricing

256 kbps	$49.95

Exhibit B: Advertised Service Area



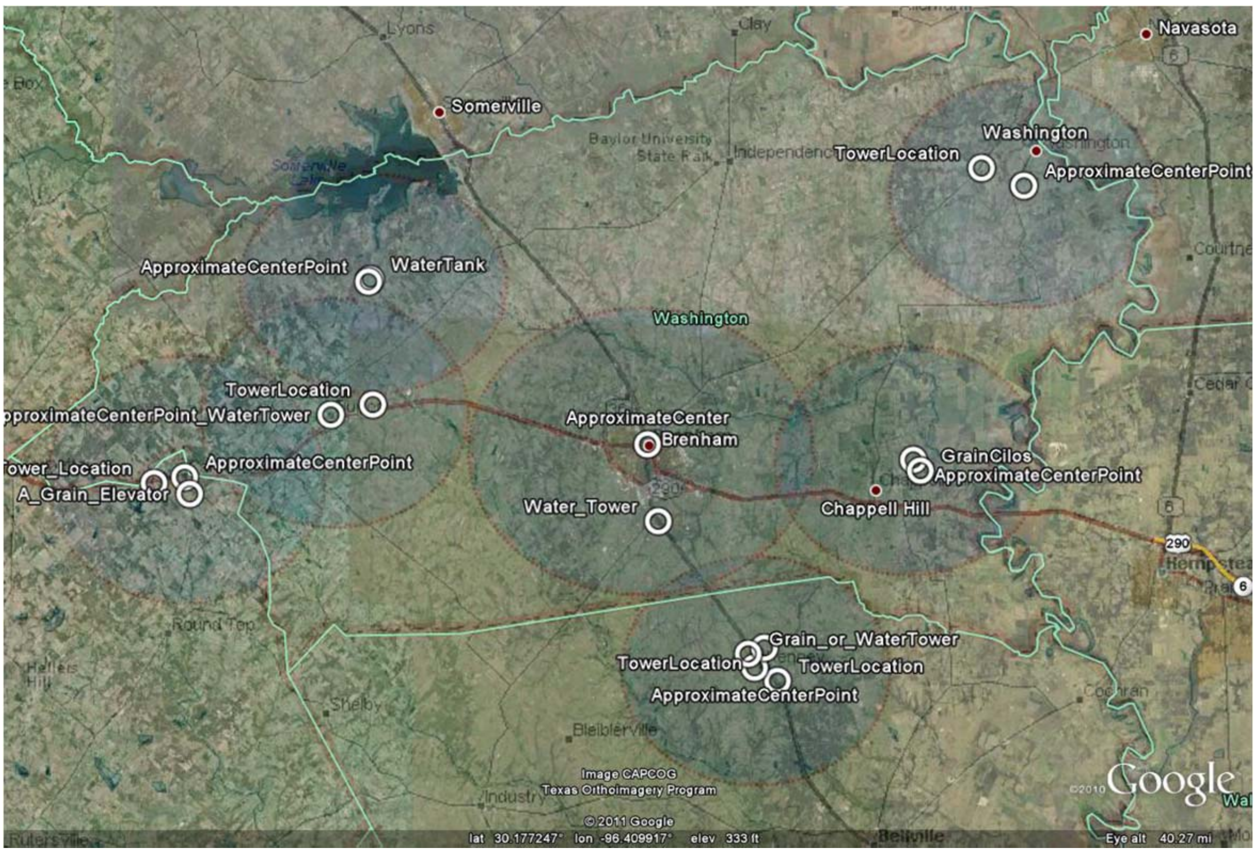
Broadwaves.net website as of June 30, 2011

Preliminary Identification of Provider's Coverage Area

The website service area extracted from the Broadwaves website was utilized to create a Google Earth (GE) image overlay **(Exhibit C)** for the purpose of determining approximate center points and possible tower sites. The image overlay was positioned to match the GE base map's roadways, county boundaries, and water bodies.

The approximate center points of each of the seven advertised coverage circles were examined utilizing the zoom option of GE's aerial imagery as well as GE street-level views. Target locations and structures were identified for on-the-ground research.

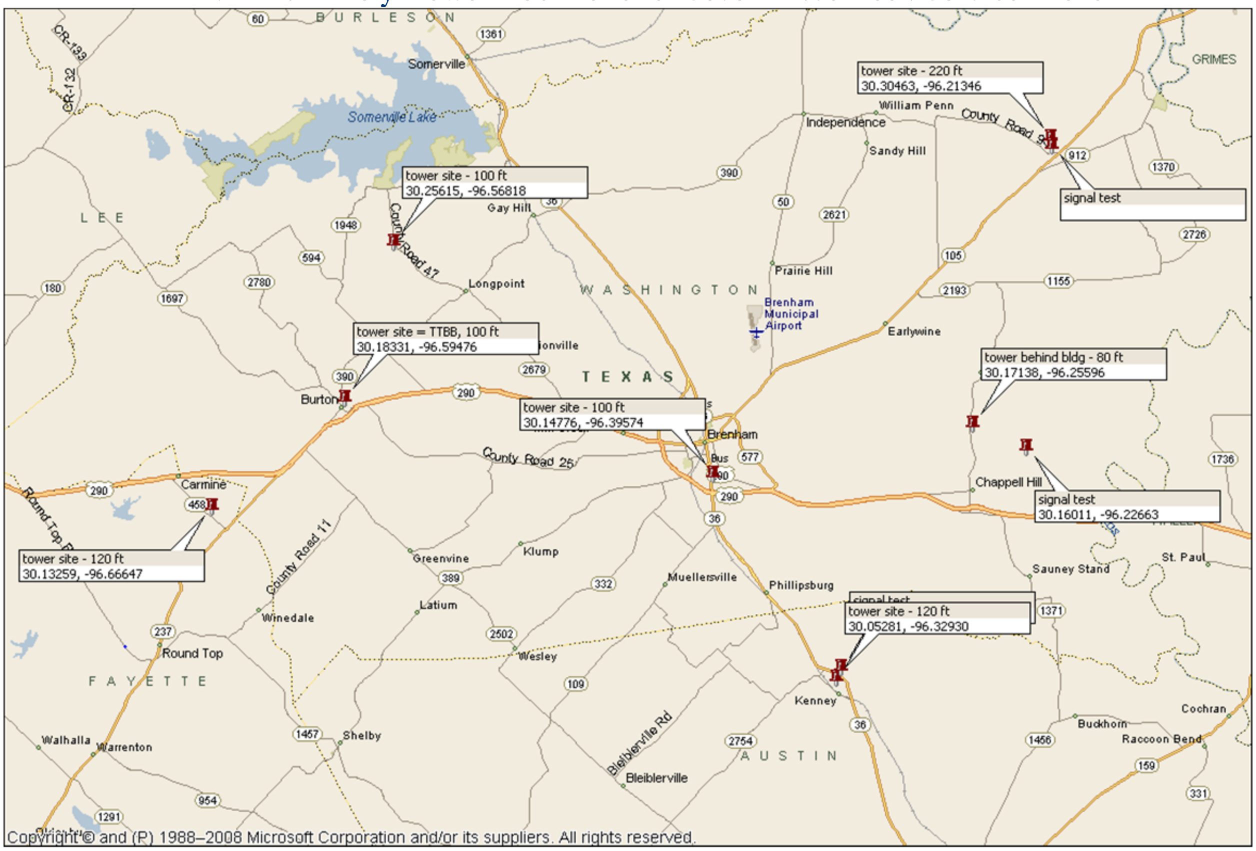
Exhibit C: Google Earth Image Overlay of Provider's Advertised Service Area



Field Testing Techniques

Connected Nation staff developed a tower site research and validation plan based on information identified with the Google Earth image overlay. A CN wireless technician sought out viable tower locations beginning with the approximate center points, and extending in road-based search patterns radiating from those logical center points. Utilizing Microsoft's *Streets and Trips* software, the search results are depicted in **Exhibit D**.

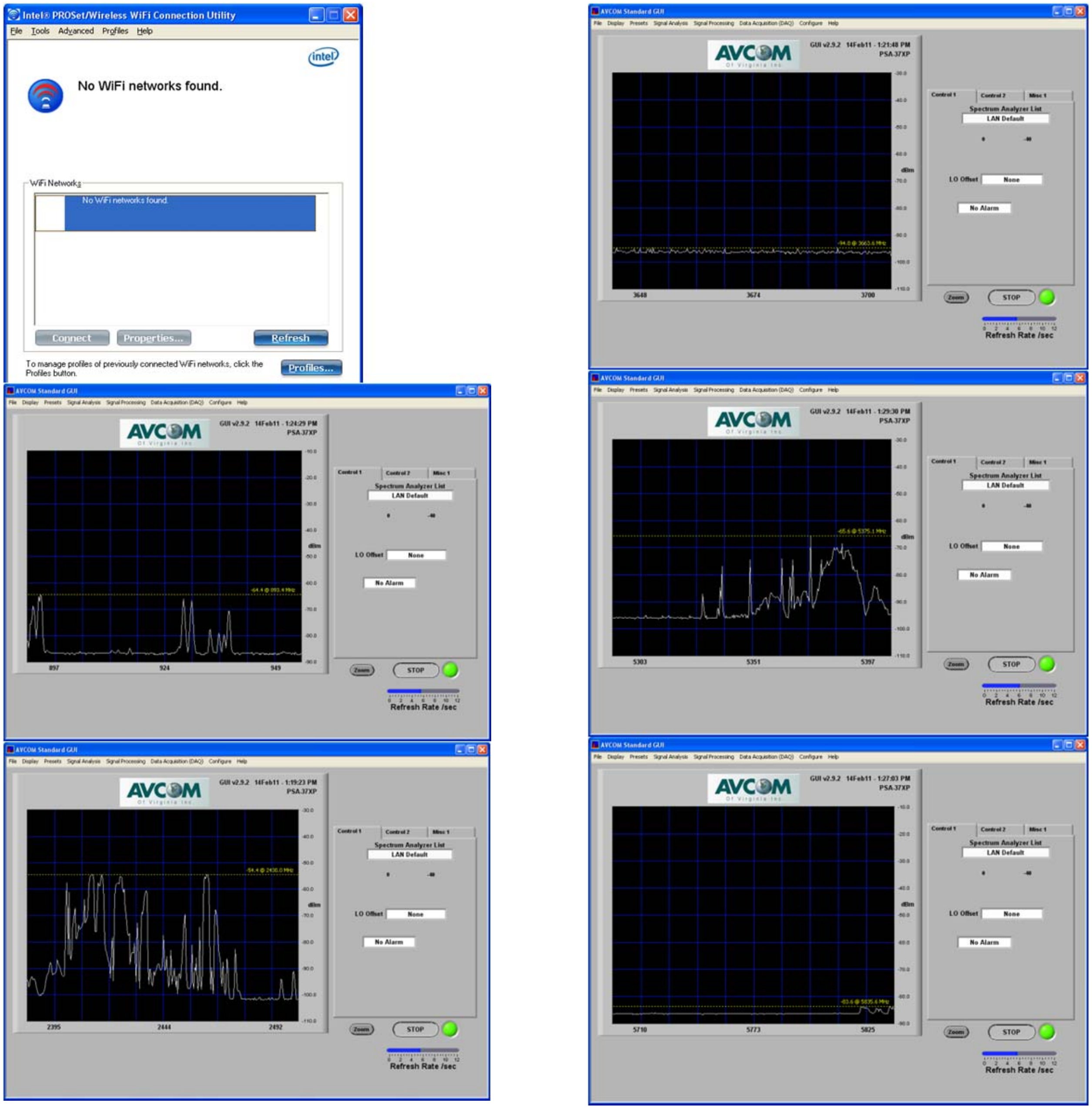
Exhibit D: Likely Tower Locations for Seven Advertised Service Areas



Where possible, the CN technician confirmed through a third party that the tower location was being utilized by Broadwaves. Examples include the confirmation of Broadwaves gear on the Brenham bank building as described above, and a telephone conversation with a water utility representative confirming the presence of Broadwaves gear (as well as another provider's gear) on the water tower in Burton. In other instances, the presence of the same transmission gear on multiple tower locations added confidence to the identification of the likely Broadwaves tower sites. Photographs were also taken at each tower site of the equipment, the support structure, and the general location of the site (e.g., populated vs. rural).

Having established the most likely tower location for each circular coverage area represented on the Broadwaves website, the CN technician then performed signal tests for the detection of active wireless frequencies typically utilized to provide WISP service. The CN technician was equipped with an AVCOM PSA-37XP analyzer with RF detection from 1 MHz to 6 GHz and an array of antennas tuned specifically for the 900 MHz, 2.4 GHz, 3.65 GHz, and 5 GHz frequency bands. At each signal test location, the CN technician attempted to be isolated from Wi-Fi networks in the test area, facilitated spectrum readings from the AVCOM analyzer, and captured the results of the frequency tests as validation data for wireless tower transmissions (**Exhibit E**), which can be viewed on the following page.

Exhibit E: Signal Test Results for the Kenney Service Area



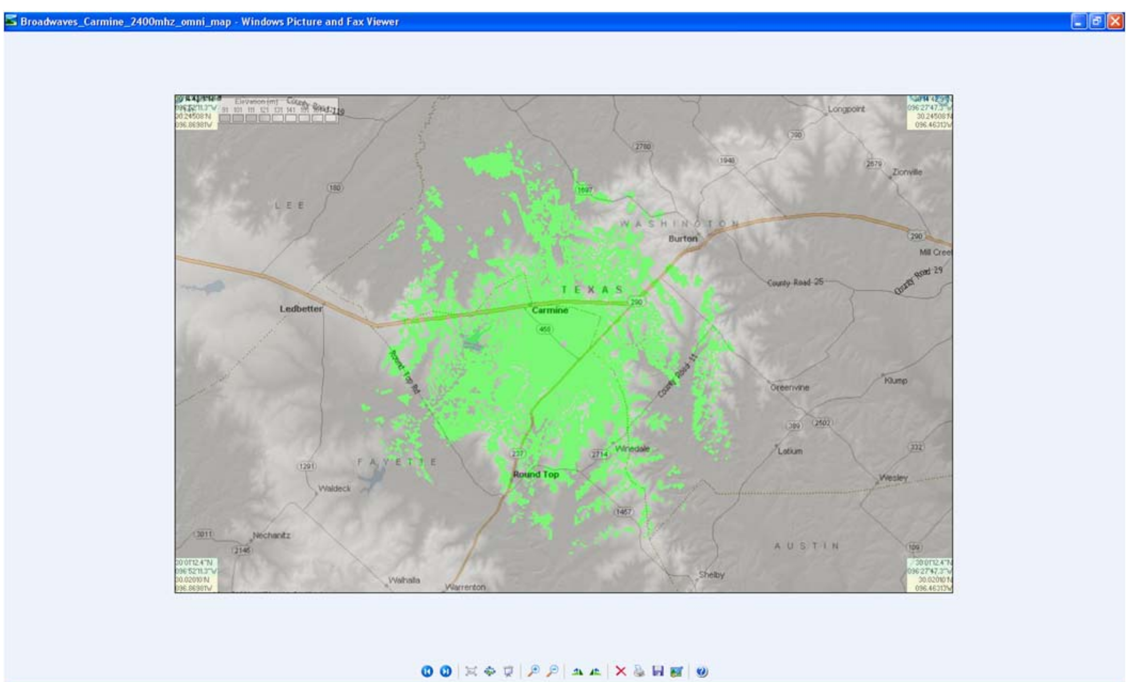
Signal Propagation Maps

Upon making a reasonable confirmation that the tested tower site was, or was likely to be, a Broadwaves tower site, the CN technician estimated the antenna height, determined the GPS coordinates for the tower, and recorded this and other information into the standard Excel provider data collection format. With the objective of reasonably representing the provider's practical service area, the CN technician obtained information for each tower site (**Exhibit F**), and prepared propagation maps (**Exhibit G**) based on that information as well as the provider's own advertised service area representations.

Exhibit F: Tower Research and Propagation Data

Wireless Provider Information											
Provider Name (Legal entity)			**Broadwaves**								
DBA ("Doing Business As") Name			N/A								
FRN # (10-digit FCC Registration Number)			not found								
Name of Location	**Status**	**Pop Center**	**Structure**	**Latitude**	**Longitude**	**Omni?**	**Radius**	**Frequency**	**Gain**	**Power**	**Elevation**
Carmine	Active	Carmine	silo	30.13259	-96.66647	Yes	10	2400	10	24	120
Burton	Active	Burton	water twr	30.18331	-96.59476	Yes	10	2400	12	24	100
Lake Somerville	Proposed	Lake Somerville	water tank	30.25615	-96.56818	Yes	10	2400	12	24	100
Brenham	Active	Brenham	bank bldg	30.14776	-96.39574	Yes	10	2400	14	26	100
Kenney	Active	Kenney	tower	30.05281	-96.3293	Yes	10	2400	10	23	120
Chappell Hill	Proposed	Chappell Hill	tower	30.17138	-96.25596	Yes	10	2400	10	24	80
Washington	Active	Washington	tower	30.30463	-96.21346	Yes	10	2400	10	24	220

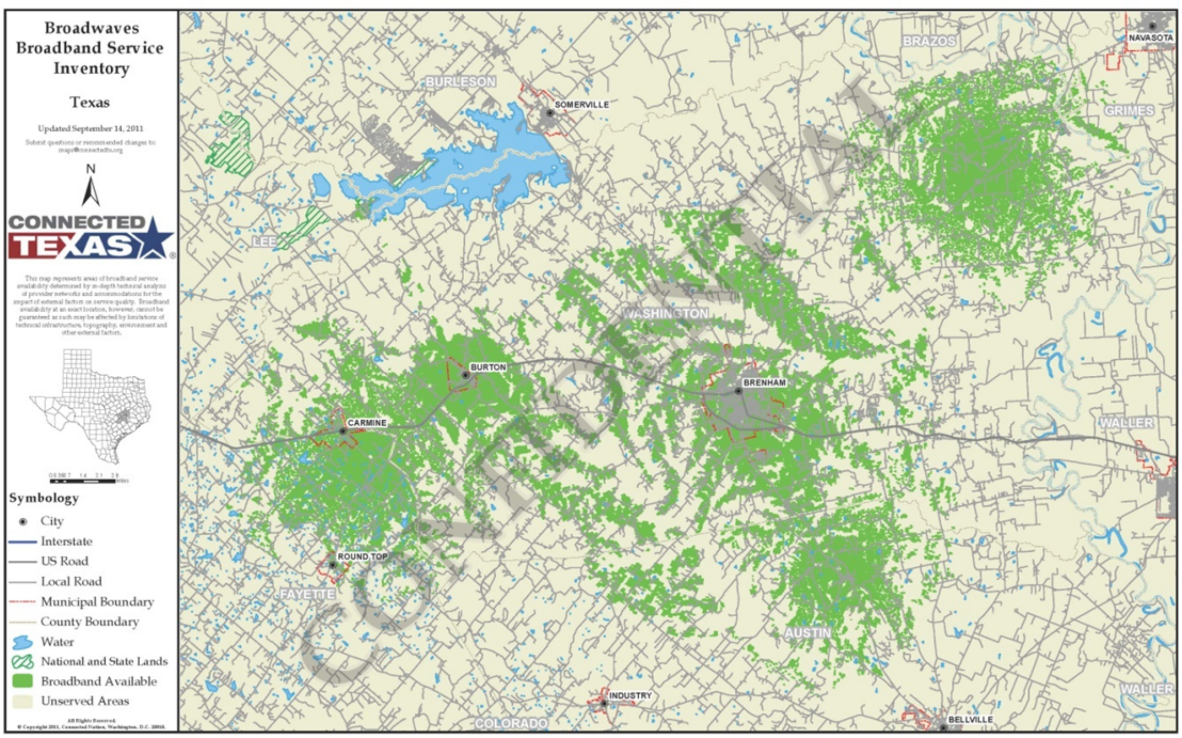
Exhibit G: Propagation Map for the Carmine Tower Location



<u>Results and Submission for October 2011</u>

After driving several hundred miles combing the highways, streets, and county roads of the provider's overall service area, seven likely access points were identified. Two sites – Lake Somerville and Chappell Hill – could not be verified as operational sites; the advertised service areas near those towns are likely to be proposed areas rather than currently operational. A composite propagation study **(Exhibit H),** excluding these two "proposed" locations, reasonably represents the researched service area based on all information identified as of June 30, 2011 (see Follow-Up Notes below). As indicated above, a propagation map was forwarded to the provider several weeks ago, with no response received. Nonetheless, this document was also forwarded to Broadwaves with the acknowledgement that this information would be submitted to the Texas Department of Agriculture and NTIA broadband mapping projects for immediate inclusion unless a provider representative responded to CN within 48 hours with corrections or additional notes.

Exhibit H: Broadwaves Composite Coverage



Follow-Up Notes
Subsequent to the accumulation of research results related to the service area for Broadwaves as of June 30, 2011, for the October 2011 data update submission, the CN technician most familiar with this provider noted changes to the coverage information on the provider's website. The new advertised coverage area includes nine tower access points instead of the previous seven, some of the original coverage circles were moved to suggest a changed center point/tower location, and all of the circles are differently-sized, presumably based on preferred operating parameters specific to each site (**Exhibit I**). In early September, the CN technician plotted the likely center points for each circle, and visited the Carmine area to perform new research (**Exhibit J**), which is visible on the following page.

Exhibit I: Broadwaves Coverage Subsequent to June 30, 2011

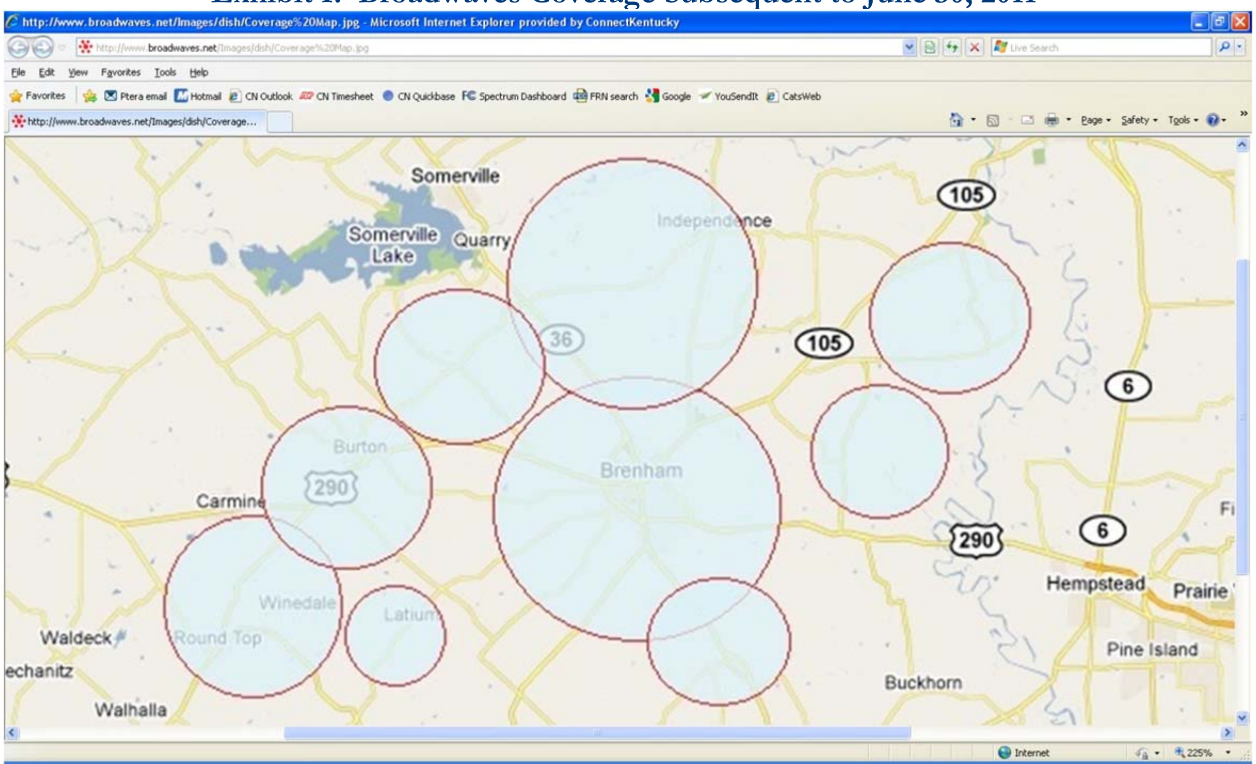
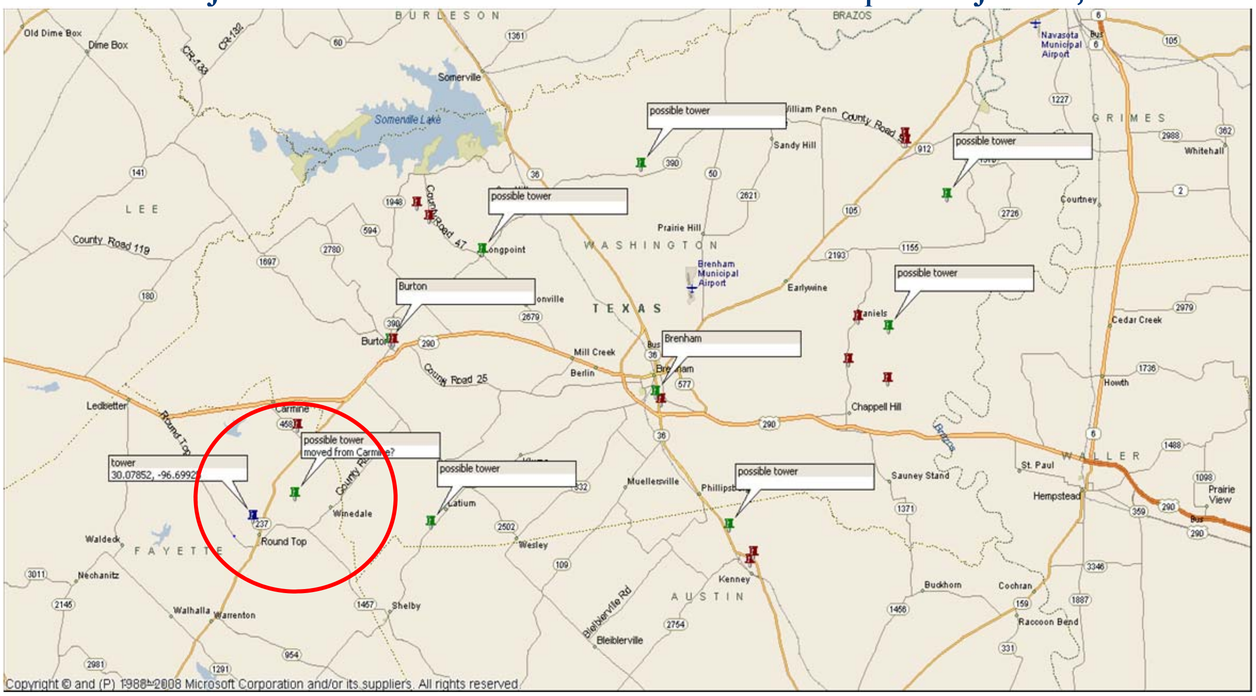


Exhibit J: Broadwaves Possible Tower Locations Subsequent to June 30, 2011



In this Exhibit J, the red circle depicts the proscribed service area based on the new website information. The red pushpin is proximate to the center point for the previous service area, and is the actual tower location identified for the June 30 submission. The green pushpin is the approximate center point of the new service area. The recent site visit determined that the tower identified as closest to the green pushpin was at the edge of the community of Round Top and is represented by a blue pushpin.

The CN technician visited the Round Top Chamber of Commerce (RTCOC), whose representative was unaware of any company called Broadwaves operating in the area. The RTCOC representative, however, did point the technician towards the construction location of a new community Wi-Fi network being built by the local incumbent telephone provider. The CN technician visited the Wi-Fi site less than one mile from the identified tower (blue pushpin) and spoke with a construction representative who said that he was unaware of any conflicting wireless signals in the area, particularly in the 2.4 GHz band, and also unaware of a competing Internet provider called Broadwaves. A signal test performed by the CN technician from an isolated area in close proximity to the tower (blue pushpin) resulted in the detection of a weak signal, and only in the 2.4 GHz band.

Finally, the technician drove by the original tower location in Carmine, and found the wireless transmission equipment still in place on top of the grain silo. Although additional work will need to be performed to update the coverage area for the April 2012 submission, the composite map contained herein as Exhibit H represents the best information for the October 2011 submission of the broadband coverage area for Broadwaves.

CKS Wireless, Inc.

As part of its ongoing broadband mapping efforts, Connected Nation (CN) has developed a series of processes with the goal of submitting mapping data to NTIA for every known and qualifying broadband provider, regardless of whether the provider has chosen to support and participate in the SBI mapping initiative.

The following narrative provides detail regarding the recent data collection activities related to CKS Wireless, Inc., a wireless Internet service provider (WISP), located in Jacksonville, Texas, with a service area around Mount Selman, Ponta, Jacksonville, and Rusk, Texas. The narrative will include information regarding how and where CN obtained publicly available data and the "on-the-ground" validation techniques that support the underlying data.

Background

CN staff members have continued trying to obtain the participation of the provider with 23 instances of communication via telephone and e-mail sessions since February 10, 2010, through July 19, 2011. Only one communication reply was received from a company representative on May 13, 2010, with a response of electing not to participate. Additionally, a CN staff member visited the CKS Wireless, Inc. office on February 10, 2011, to discuss the broadband mapping project in person with CKS Wireless, Inc. owner, but he was unavailable for discussions.

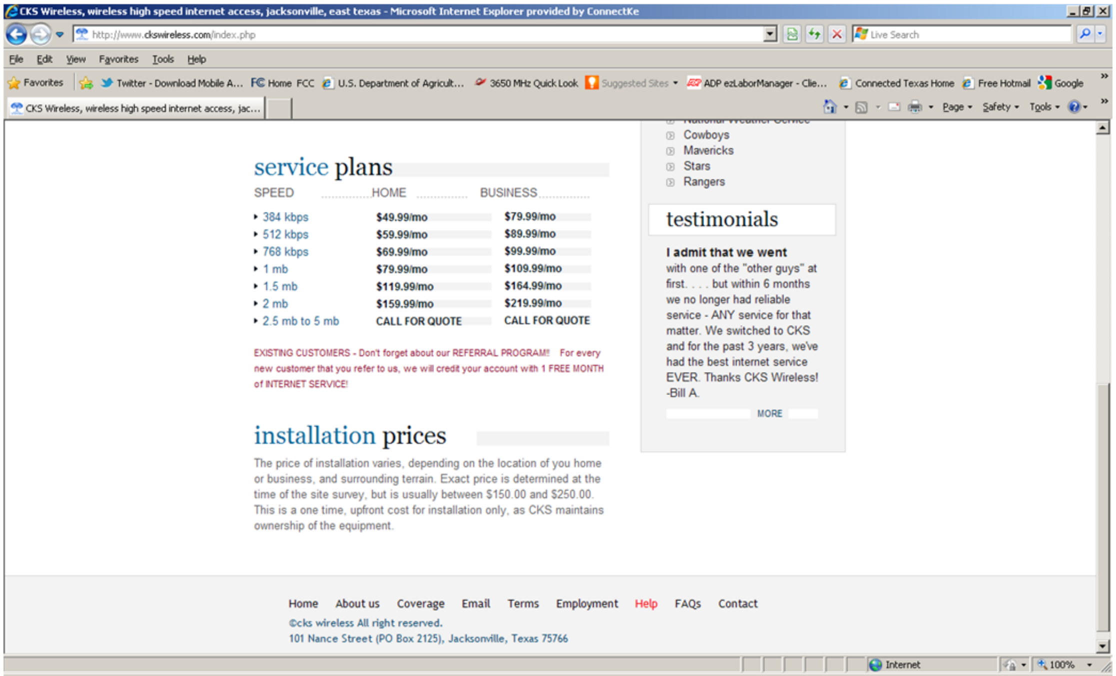
The Issue

CKS Wireless, Inc. by its lack of responsiveness since May 13, 2010, has predicated its unwillingness to participate in the Connected Texas broadband mapping initiative.

Identification of Provider's Service Plans, Service Area, Legal Name, d.b.a., FRN, and Licensing

CN began building a file based on research information and, as time progressed, enriched the file with information obtained through the public domain. For example, CN reviewed the provider's website (www.ckswireless.com) to determine the residential service plans **(Exhibit A)** and the service area **(Exhibit B)** of the provider's wireless network. A search for a Federal Registration Number ("FRN") on the FCC **CO**mmission **RE**gistration **S**ystem ("CORES") the system yielded an FRN of 0006165625 **(Exhibit C)** with contact information relative to the owner of the company. Also, to support field validation of access points, the FRN was referenced to the FCC Universal Licensing System (ULS) to identify any licenses the provider may hold which could possibly enhance locating active access points for the service area. This process yielded license WQJW906 **(Exhibit D)**, Radio Service: NN-3650-3700MHz with 5 unique locations.

Exhibit A: Service Plans



CKS Wireless, wireless high speed internet access, jacksonville, east texas - Microsoft Internet Explorer provided by ConnectKe

http://www.ckswireless.com/index.php

Cowboys
Mavericks
Stars
Rangers

service plans

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1.5 mb	$119.99/mo	$164.99/mo
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I admit that we went with one of the "other guys" at first. . . . but within 6 months we no longer had reliable service - ANY service for that matter. We switched to CKS and for the past 3 years, we've had the best internet service EVER. Thanks CKS Wireless! -Bill A.

MORE

installation prices

The price of installation varies, depending on the location of you home or business, and surrounding terrain. Exact price is determined at the time of the site survey, but is usually between $150.00 and $250.00. This is a one time, upfront cost for installation only, as CKS maintains ownership of the equipment.

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101 Nance Street (PO Box 2125), Jacksonville, Texas 75766

Exhibit B: Service Area

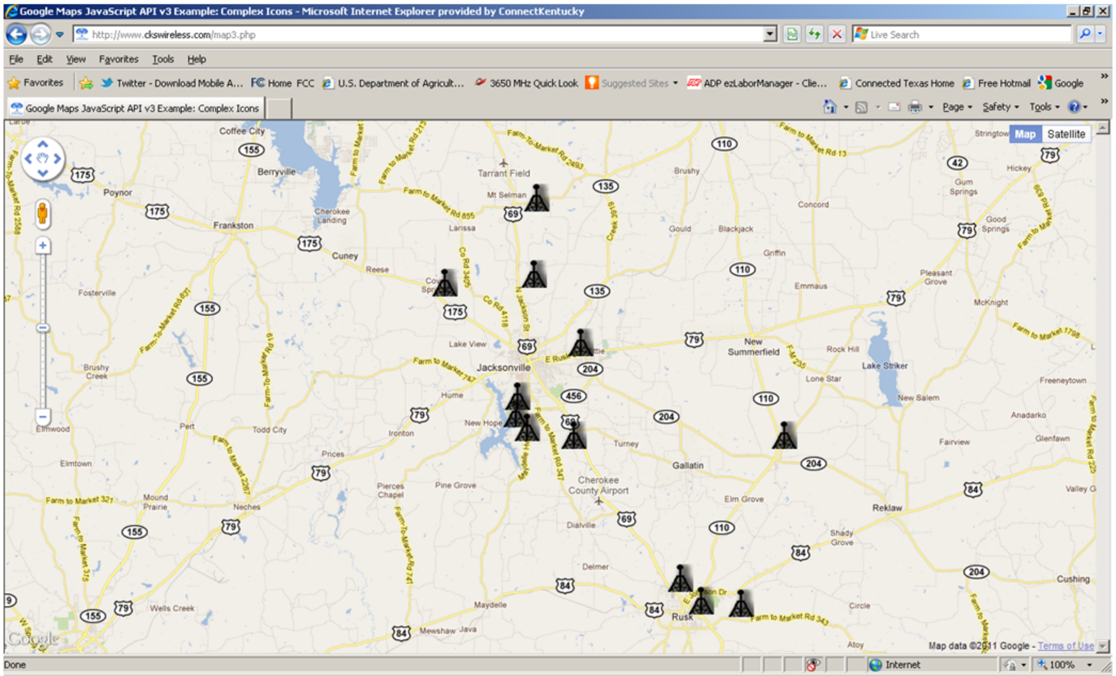
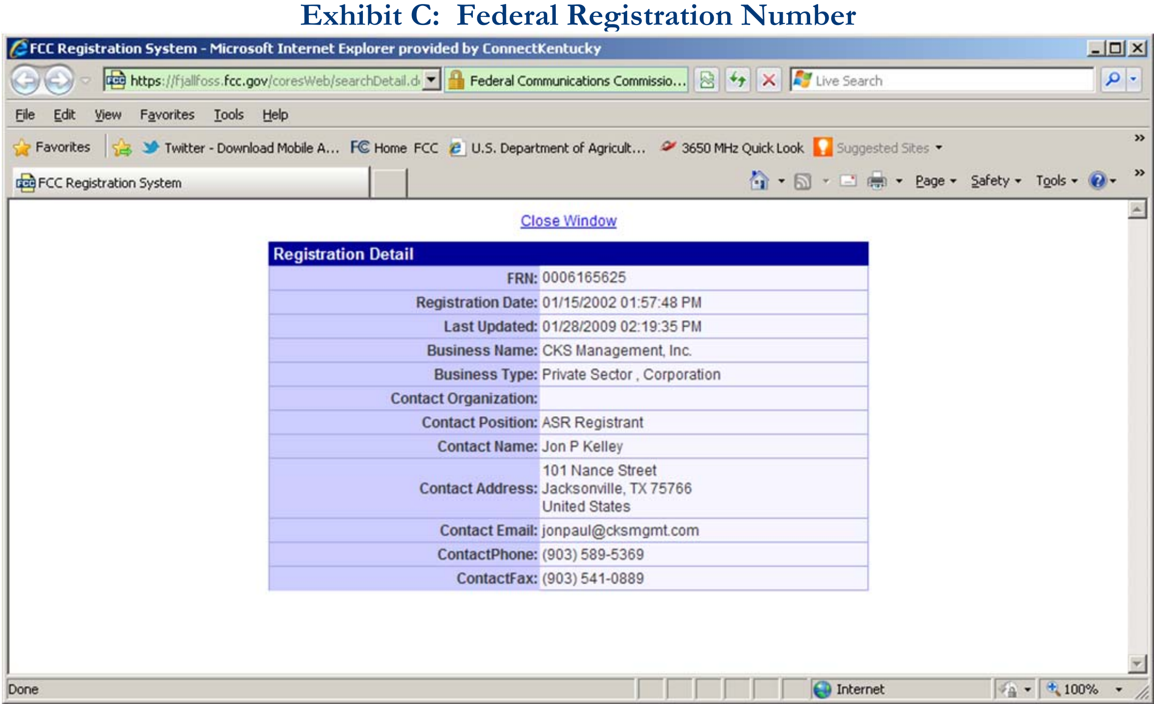


Exhibit C: Federal Registration Number



Registration Detail	
FRN:	0006165625
Registration Date:	01/15/2002 01:57:48 PM
Last Updated:	01/28/2009 02:19:35 PM
Business Name:	CKS Management, Inc.
Business Type:	Private Sector , Corporation
Contact Organization:	
Contact Position:	ASR Registrant
Contact Name:	Jon P Kelley
Contact Address:	101 Nance Street Jacksonville, TX 75766 United States
Contact Email:	jonpaul@cksmgmt.com
ContactPhone:	(903) 589-5369
ContactFax:	(903) 541-0889

Exhibit D: WQJW906 License Reference


FCC Federal Communications Commission

FCC Home | Search | Updates | E-Filing | Initiatives | For Consumers | Find People

Universal Licensing System

FCC > WTB > ULS > Online Systems > License Search

License Search

Search Results

New Search Refine Search Printable Page Query Download Map License

Specified Search

Call Sign like **wqjw906**

Matches **1- 1** (of **1**)

PA = Pending Application(s)
TP = Termination Pending
L = Lease

Page 1

	Call Sign/Lease ID	Name	FRN	Radio Service	Status	Expiration Date
1	WQJW906	CKS Wireless, Inc.	0006165625	NN	Active	01/29/2019

Page 1

ULS Help	ULS Glossary - FAQ - Online Help - Technical Support - Licensing Support
ULS Online Systems	CORES - ULS Online Filing - License Search - Application Search - Archive License Search
About ULS	Privacy Statement - About ULS - ULS Home
Basic Search	By Call Sign = SEARCH


3650-3700 MHz License - WQJW906 - CKS Wireless, Inc.

Locations Summary

New Search Refine Search Return to Results Printable Page Reference Copy Map License

MAIN | ADMIN | LOCATIONS

Call Sign	WQJW906	Radio Service	NN - 3650-3700 MHz

7 Total Locations
10 Locations per Summary Page

	Location	Latitude,Longitude	Transmitter Azimuth
1	CKS TOWER	31-58-03.7 N, 095-14-44.0 W	184.3 degrees
2	ARRINGTON LUMBER	31-52-46.8 N, 095-12-45.8 W	342.3 degrees
3	CKS TOWER	31-58-03.7 N, 095-14-44.7 W	325.2 degrees
4	North Jacksonville	32-00-49.0 N, 095-16-59.0 W	145.2 degrees
5	CT Water Tank	31-54-19.0 N, 095-15-04.0 W	4.3 degrees
6	Not Assigned	31-47-33.5 N, 095-07-07.5 W	271.5 degrees
7	KOA	31-47-33.5 N, 095-07-07.5 W	271.5 degrees

7 Total Locations
10 Locations per Summary Page

Preliminary Identification of Provider's Coverage Area

Connected Nation extracted the CKS Wireless, Inc. service area map from its website and the information through the FCC ULS database in reference to license WQJW906. The website service area was utilized to create a Google Earth image overlay **(Exhibit E).** The image overlay was positioned to match the Google Earth base map's roadways, county boundaries, and water bodies. The degree of accuracy of the image overlay was maintained at less than .1 mile (528 ft.) to establish a minimum search criteria of a given access point. The provider's service area depiction is represented by tower symbols as shown in Exhibit B. Using the coordinates (5 unique locations) available through the FCC ULS license search an accuracy validation of the image overlay was conducted to determine the feasibility of utilizing the tower symbols for identifying coordinates of the remaining 7 locations. The five licensed locations' coordinates were inputted into Google Earth and examined utilizing the zoom option of the aerial imagery. All five locations structures were identified. This provided a means of establishing coordinates for the remaining access point locations. All 12 locations were entered into the *Streets and Trips* software program **(Exhibit F)** to develop a route for the validation process, which is presented on the following page.

Exhibit E: Google Earth – CKS Wireless Inc.'s Service Area Image Overlay

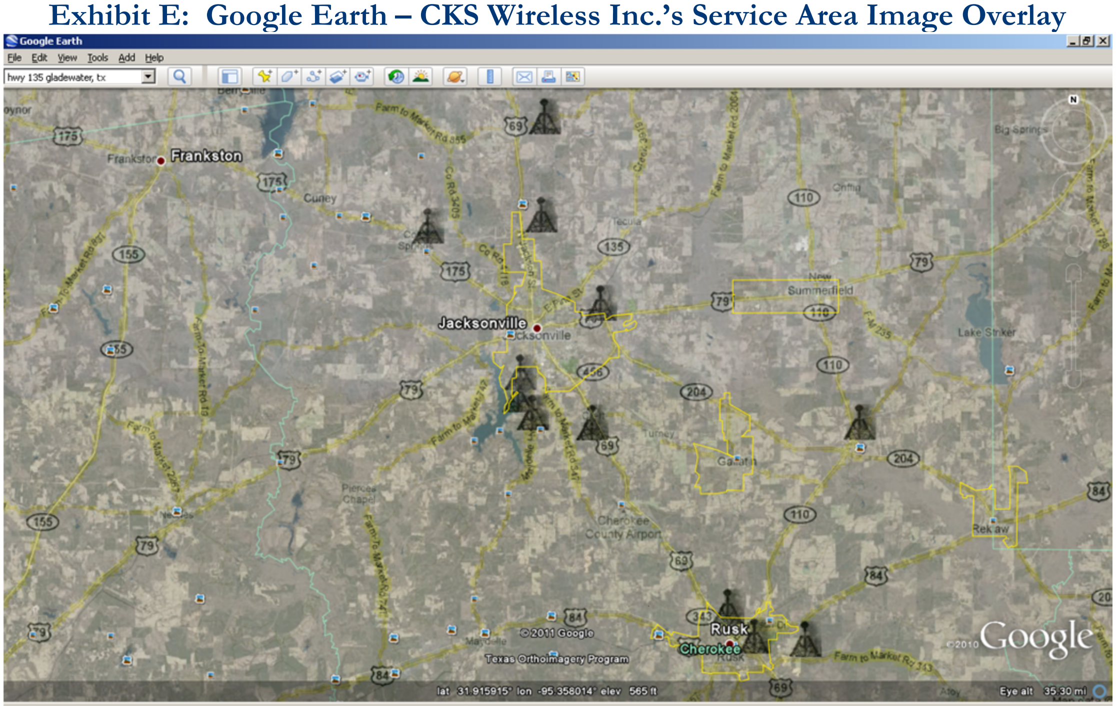
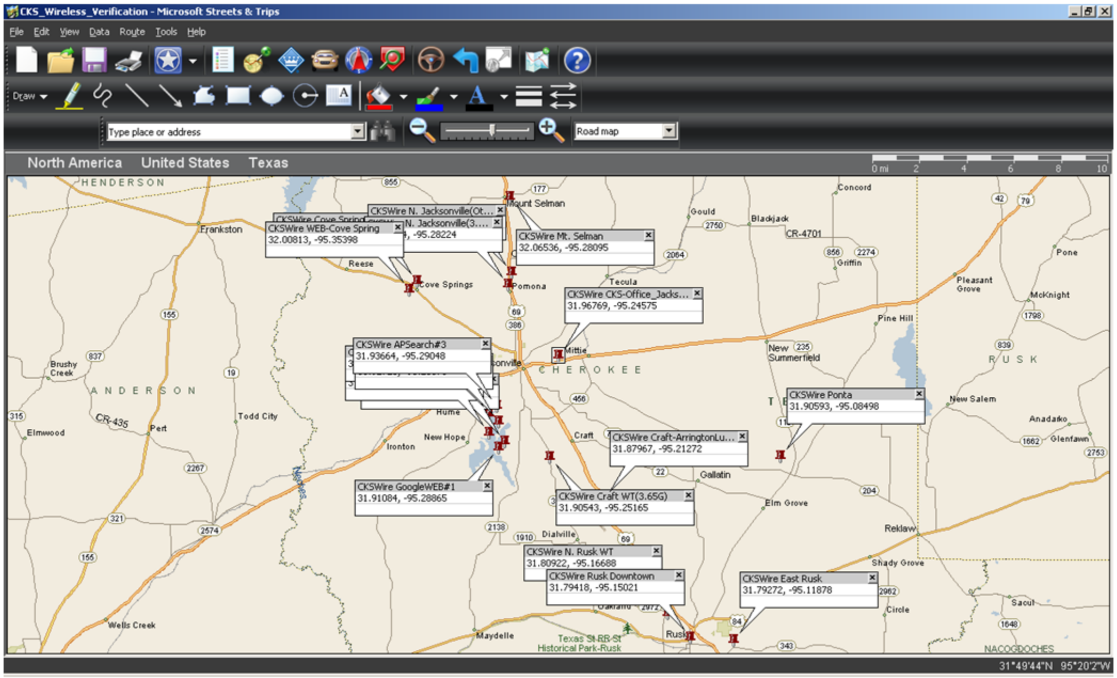


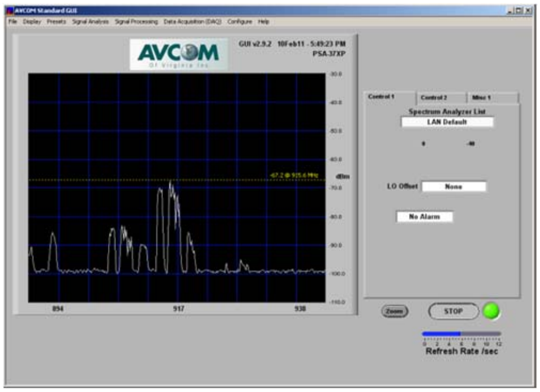
Exhibit F: Validation Points for AP Structures

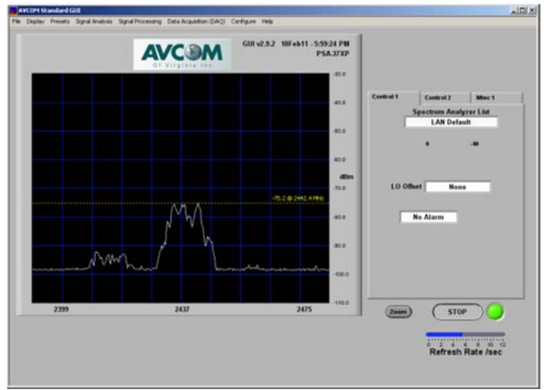


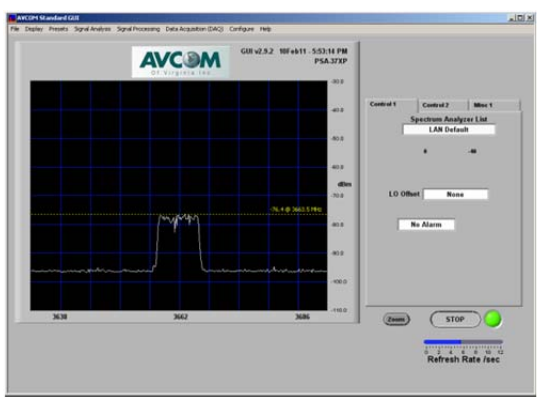
Testing Techniques

Connected Nation staff developed a site validation route based on data established with the Google Earth image overlay and publicly available data through the FCC ULS database for CKS Wireless, Inc. 3650-3700 MHz radio service. The CN wireless engineer was equipped with an AVCOM PSA-37XP analyzer with RF detection from 1 MHz to 6 GHz and an array of antennas tuned specifically for the 900 MHz, 2.4 GHz, 3.65 GHz, and 5 GHz frequency bands **(Exhibit G)**. Each validation point was scrutinized for frequency of operation. A screen image of the operating frequency (or frequencies) was captured; general notes were recorded for each location - approximate antenna height, frequency of operation, antenna type (omni or sectored), and photographs were taken of the access points.

Exhibit G: Field Data for CKS Wireless, Inc. Office/Hub Location







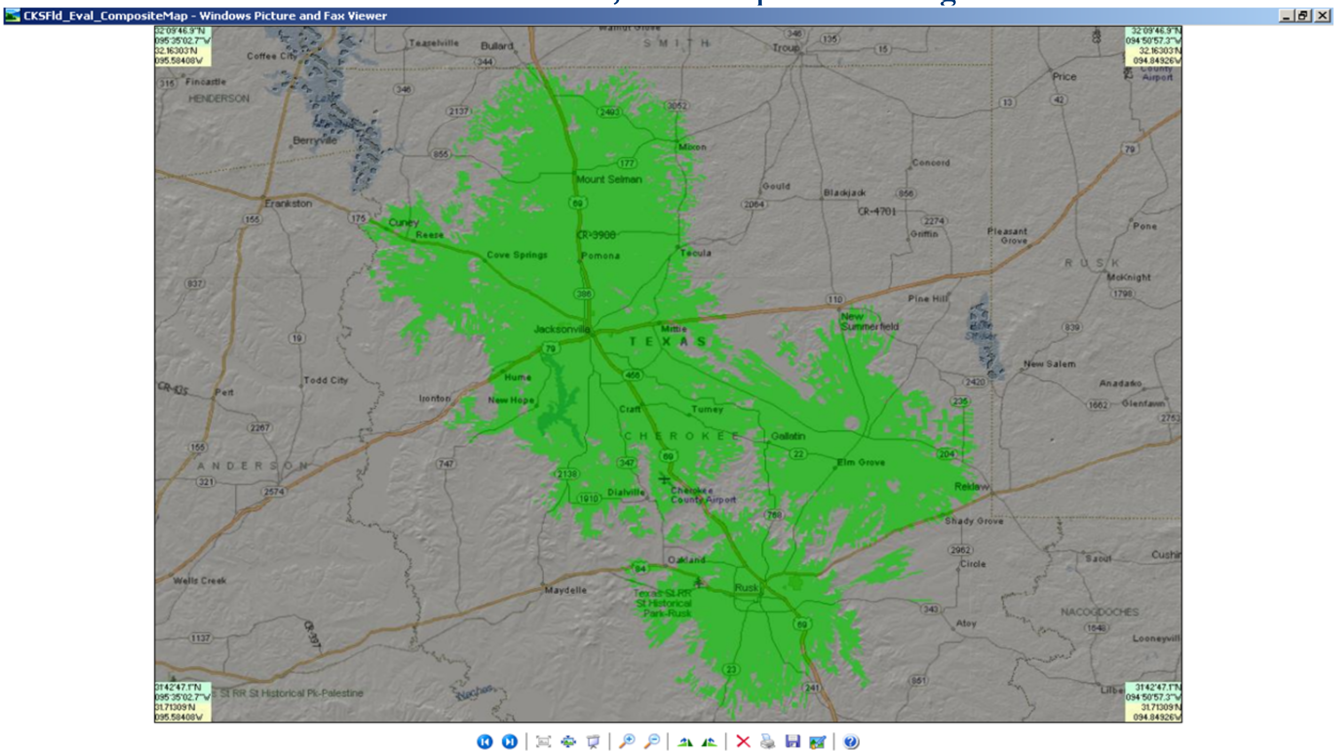
Results and Submission for October 2011

Of the 18 locations visited during the validation point route, 12 access points were identified and relative information was logged into the CKS Wireless, Inc. field validation notes file **(Exhibit H)**. The field and the publicly available data were transferred to the Connected Nation Provider Information file. A composite propagation study was completed based on the field data **(Exhibit I)**. Both documents were forwarded to CKS Wireless, Inc. and advised the information will be submitted to Connected Texas and the NTIA broadband mapping project for processing if there are no discrepancies of the estimated coverage received from the provider within a 48-hour period.

Exhibit H: Field Validation Notes

Location	Latitude	Longitude	Frequency Band Availability	Structure	Approximate Antenna Height
Mt. Selman	32.065356	-95.280947	900MHz	Tower	180 ft.
N. Jacksonville(3.65G)	32.011444	-95.282236	900MHz 3.65GHz	Tower	300 ft.
WEB-Cove Spring	32.008128	-95.353983	900MHz	Rohn-Residential	90 ft.
CKS-Office_Jacksonville(3.65G)	31.967694	-95.245750	900MHz 2.4GHz 3.65GHz	Tower	120 ft.
Craft WT(3.65G)	31.905431	-95.251653	900MHz 3.65GHz	Water Tank	140 ft.
SE LakeJack	31.910836	-95.288650	900MHz	Rohn-Residential	90 ft.
SW LakeJack	31.92005278	-95.295992	900MHz	Rohn-Residential	90 ft.
NW LakeJack	31.93175	-95.295992	900MHz	Rohn-Residential	90 ft.
N. Rusk WT	31.80921667	-95.166878	900MHz	Water Tower	150 ft.
Rusk Downtown	31.79418333	-95.150214	2.4GHz	Rohn	80 ft.
East Rusk-KOA(3.65GHz)	31.79272222	-95.118783	2.4GHz 3.65GHz	Tower	120 ft.
Ponta	31.90592778	-95.084975	900MHz 2.4GHz	Tower	130 ft.

Exhibit I: CKS Wireless, Inc. Composite Coverage



East Texas Broadband

As part of its ongoing broadband mapping efforts, Connected Nation (CN) has developed a series of processes with the goal of submitting mapping data to NTIA for every known and qualifying broadband provider, regardless of whether the provider has chosen to support and participate in the SBI mapping initiative.

The following narrative provides detail regarding the recent data collection activities related to East Texas Broadband, a wireless Internet service provider (WISP), located in Palestine, Texas, with a service area around Palestine, Elkhart, and Elmwood, Texas. The narrative will include information regarding how and where CN obtained publicly available data and the "on-the-ground" validation techniques that support the underlying data.

Background

CN staff members have continued trying to obtain the participation of the provider with 17 instances of communication via telephone and e-mail sessions since July 7, 2010, through August 24, 2011. Only one communication was established with a company representative on February 4, 2011. An introduction of the state mapping initiative was provided to the representative with a request to review and provide the requested data as submitted with previous correspondence. Since this date the representative has been non-responsive to telephone messages and e-mails.

The Issue

East Texas Broadband, by its lack of responsiveness since February 4, 2011, has predicated its unwillingness to participate in the Connected Texas broadband mapping initiative.

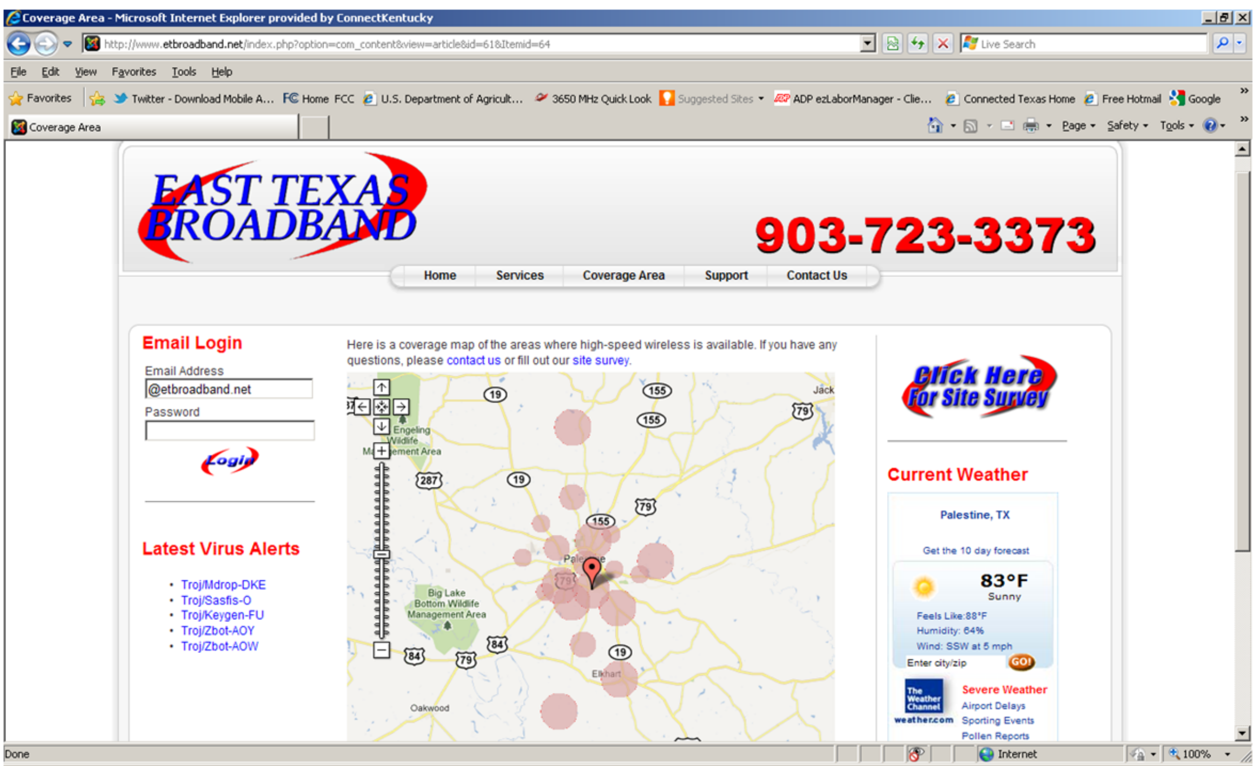
Identification of Provider's Service Plans, Service Area, Legal Name, d.b.a., FRN, and Licensing

CN began building a file based on research information and as time progressed, enriched the file with information obtained through the public domain or by phone inquiry through the provider's customer support line. For example, CN reviewed the provider's website (www.etbroadband.net) to determine the residential service plans. However, the website did not identify the residential service plans. A telephone call was placed through customer support and the residential plans were quoted over the phone **(Exhibit A)** and the service area **(Exhibit B)** of the provider's wireless network was identified. A search for a Federal Registration Number ("FRN") on the FCC **CO**mmission **RE**gistration **S**ystem ("CORES") system yielded no FRN for East Texas Broadband. Also, to support field validation of access points, the FCC Universal Licensing System (ULS) was utilized to identify any licenses the provider may hold which could possibly enhance locating active access points for the service area. This process yielded no licensed frequencies associated to East Texas Broadband, indicating the provider's broadband delivery is by way of the unlicensed Wi-Fi frequencies band (900 MHz, 2.4 GHz, and 5 GHz).

Exhibit A: Service Plans

Speed Tier Offerings		Residential Service Price
Download	Upload	
512 Kbps	256 Kbps	$24.95
1 Mbps	512 Kbps	$39.95
2 Mbps	1 Mbps	$54.95
3 Mbps	1 Mbps	$69.95

Exhibit B: Service Area



Preliminary Identification of Provider's Coverage Area

Connected Nation extracted the East Texas Broadband service area map from its website. The website service area was utilized to create a Google Earth image overlay **(Exhibit C).** The image overlay was positioned to match the Google Earth base map's roadways, county boundaries, and water bodies. The degree of accuracy of the image overlay was maintained at less than .1 mile (528 ft.) to establish a minimum search criteria of a given access point. The provider's service area depiction is represented by circular type polygons as shown in Exhibit B. Based on the provider's website coverage depiction there are nineteen (19) locations identified as possible locations for access point structures. Utilizing Google Earth with the provider's coverage overlay (Exhibit C), coordinates were established of the circular polygons center points for route development. Further enhancement for possible structure identification was completed by a satellite aerial imagery and street level session with the Google Earth application. Possible structure locations were identified around the center points. This provided a means of establishing coordinates for the access point locations. Twenty-one (21) locations were entered into the *Streets and Trips* software program **(Exhibit D)** to develop a route for the validation process.

Exhibit C: Google Earth - Provider's Service Area Image Overlay

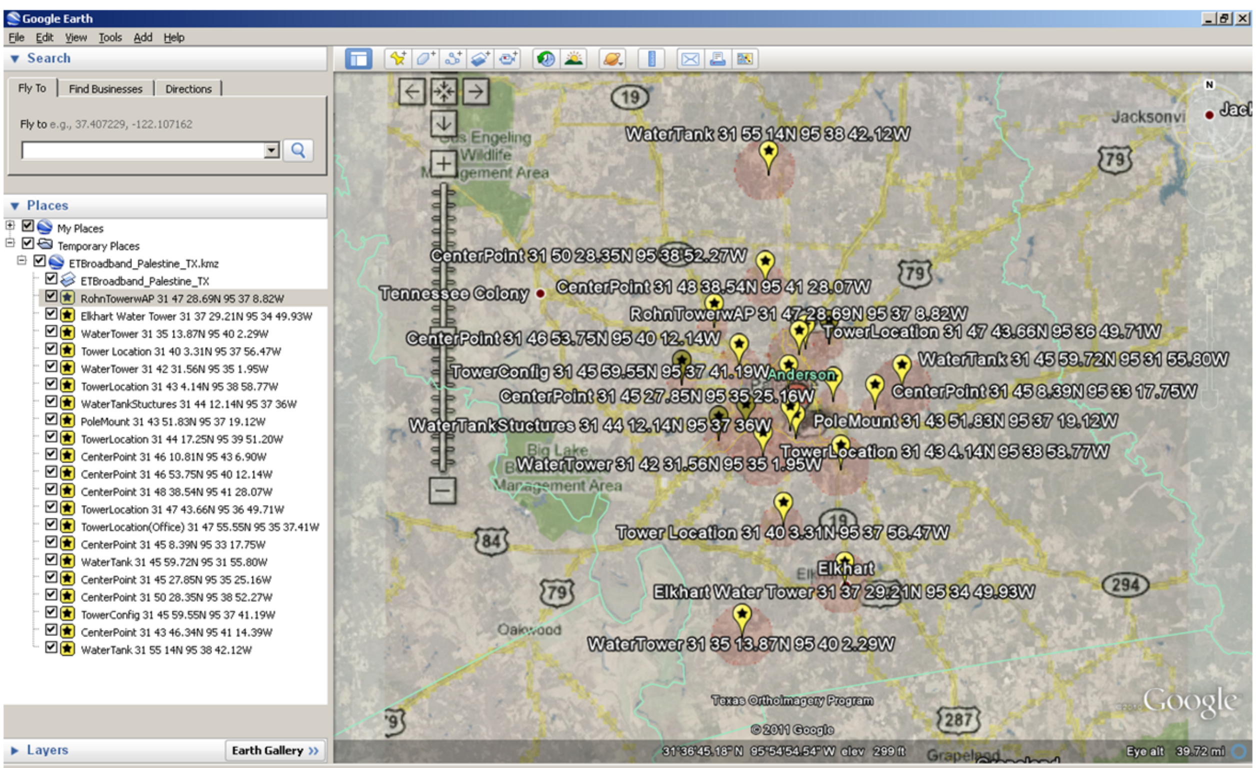
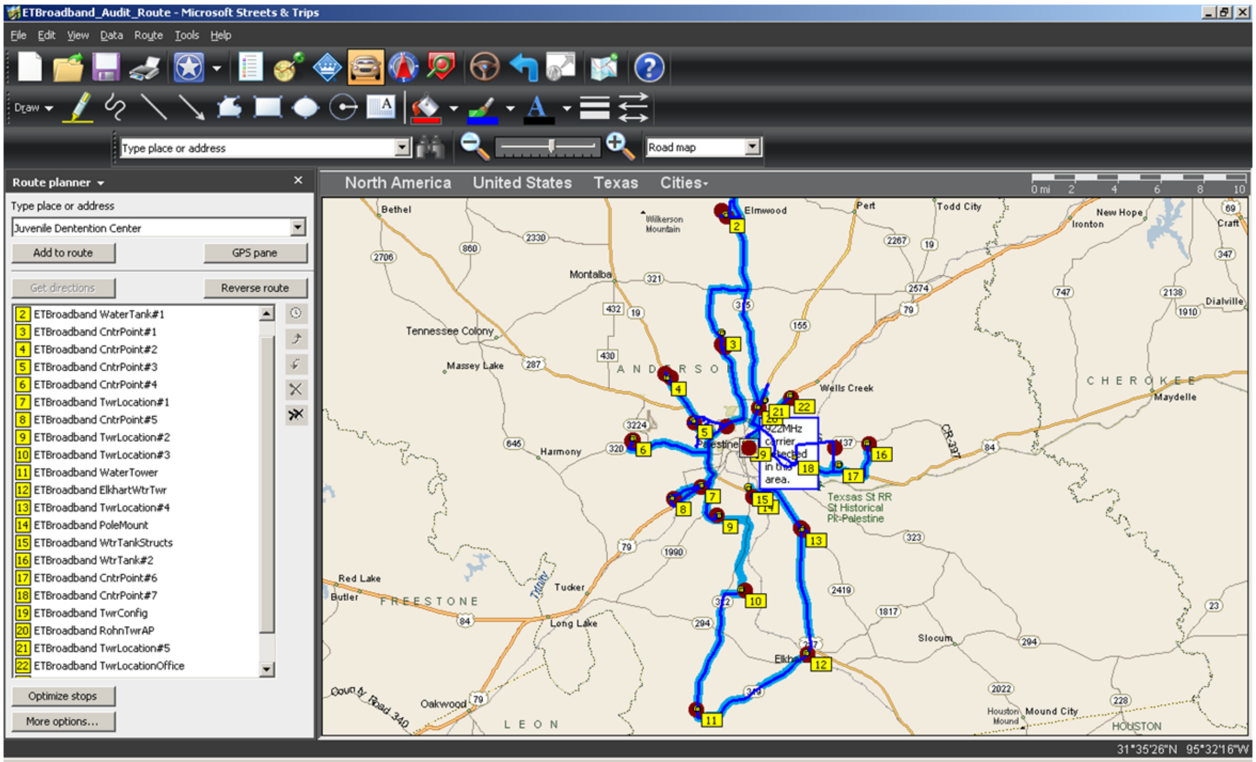


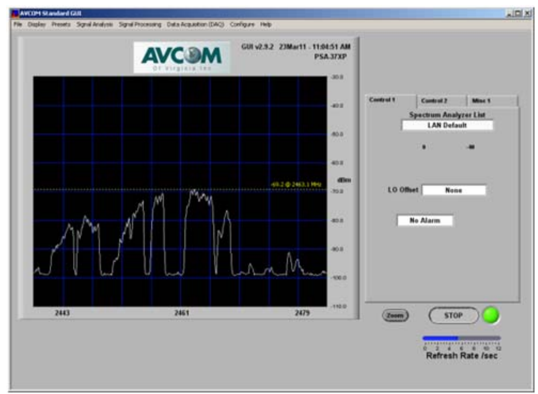
Exhibit D: Validation Points for AP Structures



Testing Techniques

Connected Nation staff developed a site validation route based on data established with the Google Earth image overlay and publicly available data through East Texas Broadband's website. The CN wireless engineer was equipped with an AVCOM PSA-37XP analyzer with RF detection from 1 MHz to 6 GHz and an array of antennas tuned specifically for the 900 MHz, 2.4 GHz, 3.65 GHz, and 5 GHz frequency bands **(Exhibit E)**. Each validation point was scrutinized for frequency of operation. A screen image of the operating frequency (or frequencies) was captured; general notes were recorded for each location - approximate antenna height, frequency of operation, and antenna type (omni or sectored), and photographs were taken of the access points.

Exhibit E: Sample Field Data for East Texas Broadband
CR433-ROHN (CntrPoint#2) Location



Provider	Location	Latitude	Longitude	Frequency Availability				Structure	Approximate Antenna Height	Notes
				900MHz	2.4GHz	3.65GHz	5.0GHz			
East Texas BB	CR433-ROHN (CntrPoint#2)	31.813611	-95.693056		X			Residential Rohn	80	

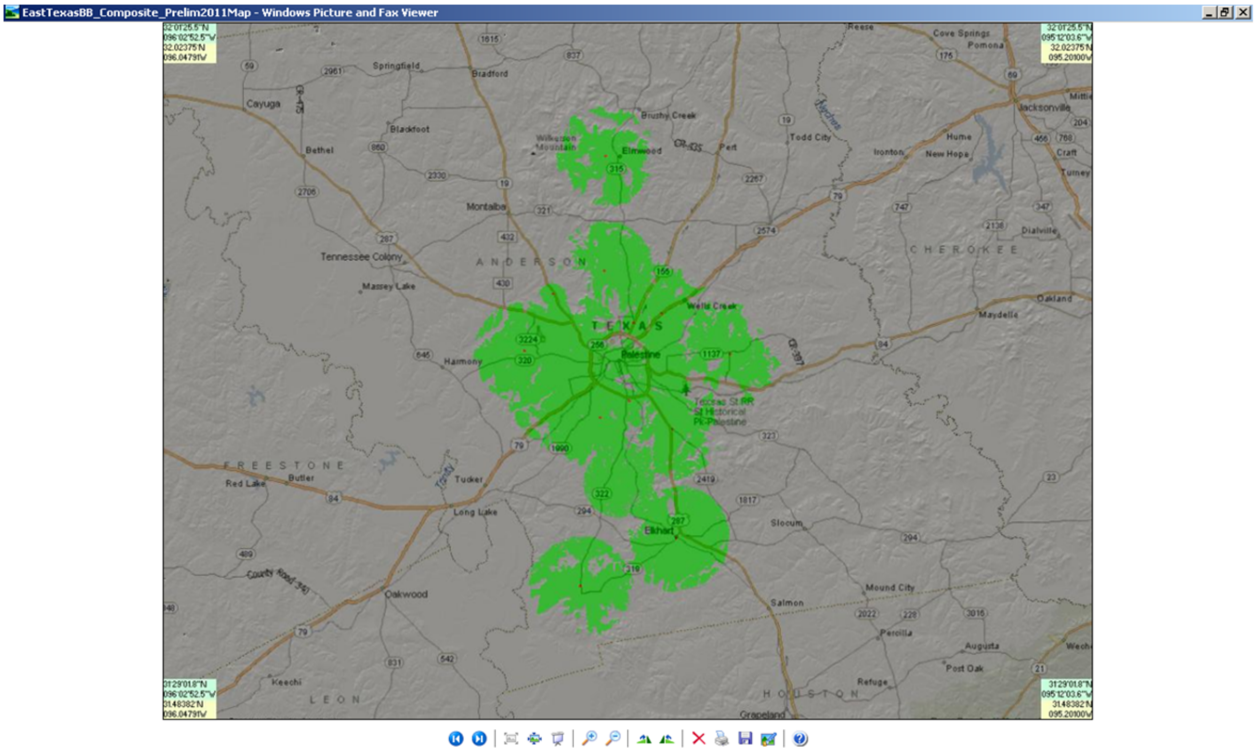
Results and Submission for October 2011

Of the 21 locations visited during the validation point route, 17 access points were identified and relative information was logged into the East Texas Broadband field validation notes file **(Exhibit F)**. The field and the publicly available data were transferred to the Connected Nation Provider Information file. A composite propagation study was completed based on the field data **(Exhibit G)**. Both documents were forwarded to East Texas Broadband and advised the information will be submitted to Connected Texas and the NTIA broadband mapping project for processing if there are no discrepancies of the estimated coverage received from the provider within a 48-hour period.

Exhibit F: Field Validation Notes

Location	Latitude	Longitude	Frequency Band Availability	Structure	Approximate Antenna Height
Elmwood-WaterTank#1	31.920556	-95.645033	900MHz	Water Tank	100 ft.
CR404 WT (CntrPoint#1)	31.831667	-95.645833	900MHz	Water Tank	100 ft.
CR433-ROHN (CntrPoint#2)	31.813611	-95.693056	2.4GHz	Residential Rohn	80 ft.
CR419-ROHN (CntrPoint#3)	31.780833	-95.670000	900MHz	Residential Rohn	70 ft.
BroylesChapel-ROHN (CntrPoint#4)	31.769444	-95.718611	900MHz	Residential Rohn	80 ft.
Hwy79SW-Lattice (TwrLocation#1)	31.738125	-95.664222	900MHz	Lattice	120 ft.
Larkspur Ln-ROHN (CntrPoint#5)	31.729167	-95.685833	900MHz	Residential Rohn	60 ft.
CR2012B-GuyedTwr (TwrLocation#2)	31.717817	-95.649658	900MHz	Commercial Guyed	100 ft.
Hwy322-WaterTower	31.587222	-95.667778	900MHz	Water Tank	120 ft.
Elkhart-WaterTower	31.624781	-95.580536	900MHz	Water Tower	150 ft.
FM3266 WtrTwr (WtrTank#2)	31.766944	-95.531389	900MHz	Water Tank	80 ft.
N. Church-BldgROHN (TwrConfig)	31.763889	-95.626667	2.4GHz	3 story w 40Ft. Rohn	80 ft.
Hwy155 (RohnTowerAP)	31.791303	-95.619117	2.4GHz	Residential Rohn	100 ft.
Hwy79N_ROHN (TwrLocationOffice)	31.798764	-95.593725	900MHz	Residential Rohn-G	120 ft.
WalstonSpringsWT (TwrLocation#4)	31.708767	-95.583875	900MHz	Water Tower	80 ft.
ETBB Office	31.730833	-95.623333	2.4GHz 5.1GHz	Commercial Guyed	150 ft.

Exhibit G: East Texas Broadband Composite Coverage



Accuracy and Verification: Provider Validation Methodology

Broadband providers maintain their service area data in many different formats, all in varying levels of complexity and granularity. In order to ensure that the data required by the NTIA is standardized across all providers and that it is as accurate as possible, Connected Nation translates and formats the data that providers are able to supply into a GIS shapefile and produces maps for the provider to review. The resulting map(s) and review process allow for providers to see their service area in a geographic format – for some providers, this is the first time they have seen maps of their broadband service area. Having the mapped service area allows providers to quickly identify any issues that appear in the data representation, whether the issue is in the data translation into a GIS format or from the original data collection and submission. Often data is provided from various sources and through the review and revision process, local engineers who operate the networks and work in the field are able to ensure that the tabular data that has been submitted is accurate and represents the real-world network extent. Any issues in how the service area is represented on the map(s) are remedied by Connected Nation, whether they are additions, removal of service, or any other revisions. Revised maps of service area representations are sent to the provider for review and approval; Connected Nation will revise data and return maps as many times as necessary until the provider is in agreement that the map represents their service area as accurately as possible. Once the review process has been completed and final approval of the data is provided, the data is deemed ready for NTIA submission.

Once the data collection has been aggregated at a statewide level, static maps of statewide and county-level availability are produced and made publicly available. In addition, consumers can visit the interactive online tool, BroadbandStat, to create customized views of broadband service areas and analyze corresponding demographic information. Leveraging broadband service data on various platforms allows for public users, providers, and other stakeholders to review, scrutinize, and provide feedback on the represented data. This feedback becomes a validation method in itself as consumers submit inquiries to Connected Nation either affirming where service is not available or identifying areas where broadband service is shown on the map, but in actuality is not available. This allows for a follow-up to providers regarding revisions to the data as it is represented; it also allows for Connected Nation to identify locations where on-site visits may be necessary to complete field validation of available services. Public feedback on all forms of mapping products serves as a localized validation method for provider-supplied information and allows Connected Nation to resolve inaccuracies as they are identified to ensure that only the highest quality information is provided to stakeholders.

Estimates derived from provider-validated data indicate that approximately 3.53 percent of Texas households do not have terrestrial fixed broadband service available, and approximately 0.22 percent[1] of Texas households have neither mobile nor fixed broadband service available.[2] Within rural areas of the state, results derived from provider-validated data indicate that approximately 8.13 percent of rural Texas households do not have terrestrial fixed broadband service available, and approximately 0.70 percent[3] of rural Texas households have neither mobile nor fixed broadband service available.[4] Please note that the availability estimates presented are based on Census 2000 household information; these figures will be updated in the near future with Census 2010 household information.

[1] In accordance with NTIA's definition of available broadband service as specified in the SBI NOFA, this estimate includes both terrestrial fixed *and* mobile broadband service, if the service offers download speeds of at least 768 Kbps and upload speeds greater than 200 Kbps.

[2] Due to the nature of the SBI data collection methodology as defined by the NTIA and based on both census block geographic units and street segment data, the estimates of broadband availability derived from provider-validated data may include an overstatement of the actual number of households with broadband availability. Under the census block-based data collection method, a provider will typically report broadband availability for an entire census block whether its network is present across the whole or only a subset of that census block. This potential overestimation at the census block level can be amplified as the data is aggregated across the entire state.

[3] See footnote 1.

[4] See footnote 2.

Wireless Methodology

Broadband Service Availability in Provider's Service Area
Wireless Services Not Provided to a Specific Address

Data solicited from a fixed wireless provider to create propagation models include, but are not limited to:

1. The name of the structure
2. Whether the transmitting device is operational or proposed
3. The maximum advertised downstream speed, the maximum advertised upstream speed
4. The typical downstream speed, the typical upstream speed (peak periods for both)
5. The frequency range of spectrum being used (as prescribed by NTIA)
6. The primary population center(s) being served (for geopolitical boundary reference)
7. The physical address of the transmit site (in the event latitude/longitude is unavailable from the provider this allows a quick reference point for geocoding)
8. Latitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
9. Longitude in either Degrees, Minutes and Seconds and/or in Decimal Degrees (typically received as NAD 27 or NAD 83)
10. Antenna pattern (e.g. omni-directional, 180°, 120°, 90°, etc.)
11. Azimuth of antenna (e.g. 360° with magnetic declination if known)
12. Approximate transmit radius (in feet, miles, or kilometers)
13. Polarity of transmit antenna (Vertical or Horizontal)
14. Transmit antenna gain (in dBi)
15. Line loss (applicable only to providers using coax, heliax, waveguide or other forms of cabling – excludes power-over-Ethernet devices)
16. Mechanical and/or Electrical beam tilt (if applicable)
17. Equipment Manufacturer (allows easy cross-reference against manufacturer's specification sheet)
18. Power output of the transmitting device (if unknown, FCC standards or manufacturer specifications are applied)
19. AMSL at base of tower site
20. Antenna centerline AGL (height of antenna above ground level measured at the centerline of the actual antenna)
21. Foliage factors (Evergreens/Deciduous and percent of ground cover)
22. Ground Clutter (primarily used in rural areas to account for foliage and in metropolitan areas to account for types and heights of buildings if known)
23. Average gain of receive antenna
24. Receive antenna is estimated at height above average terrain (HAAT) of 6.2 meters/20 feet

25. Federal Registration Numbers (if applicable) which may allow opportunities to cross-reference and/or obtain additional data from the Federal Communications Commission Universal Licensing System and the **CO**mmission **RE**gistration **S**ystem.

Propagation modeling is an empirical mathematical formulation for the characterization of radio wave propagation as a function of frequency, distance, and other conditions. Propagation software(s) typically use the Irregular Terrain Model (also known as Longley-Rice) of radio propagation for frequencies between 20 MHz and 20 GHz. This model is based on electromagnetic theory and statistical analyses of the combination of terrain features and radio measurements, then predicting the median attenuation of a radio signal as a function of distance and the variability of the signal in time and in space. For metropolitan areas, the software can typically be adjusted to use the Okumura-Hata model which accounts for predicting the behavior of cellular transmissions in areas where buildings are the primary obstructions. The resulting product from either model depicts a graphical illustration of the theoretical propagation characteristics of a selected frequency range based on defined variables (receiver sensitivity of the home/mobile device, foliage factor, and digital elevation terrain input).

After converting propagation models into a geospatial format, additional processing is completed to remove the small pixels representing service present in the resulting dataset. These areas are initially created based on the parameters entered in the software from the provider equipment information, the underlying data parameters of elevation, hillshade, etc., and the limitations of the software itself to display a broadband service area as accurately as possible. Generally, these random pixel striations appear as a result of signal levels reaching the highest elevated points within the prescribed radius. Typically, while this pixilation anomaly shows legitimate areas where signals can be received, these highly elevated points may have exceedingly sparse populations or are entirely void of population. As a result, and congruent to the *Wireless Technology Methodologies and Business Logic* white paper submitted to NTIA on January 20, 2011, all independent pixels representing service that are less than 0.125 square miles in area have been removed from the geospatial representation of each wireless provider.

Broadband Inquiries Methodology

Connected Nation collects consumer feedback in the form of broadband inquiries (BBIs). These inquiries represent any type of communication received from the public regarding broadband service. Once BBIs are received across the state, this information is overlaid with the broadband availability information which was collected through the SBI program. This allows for a real-world comparison of the broadband landscape to the information received from broadband inquiries. Consumers submitting these inbound comments and/or inquiries are able to provide information regarding three categories: 1) residents who do not have broadband but want it; 2) residents who have broadband but want a different provider; and 3) residents who do not have broadband, but the broadband inventory maps indicate that they do.

BBIs are submitted frequently by consumers via the Connected Texas website. Inquiries often seek help to identify local broadband provider options, or to learn when a specific provider may be able to provide service to that consumer. Consumer comments also provide information which may help modify maps with actual service area information. The primary objectives of Connected Nation regarding these inquiries are 1) to improve the accuracy of the state maps with submitted consumer information and follow-up field research; 2) to provide broadband options to consumers through cooperation with mapped providers and by facilitating new broadband service options; and 3) to map and analyze information from consumers about areas of unmet broadband demand and alternatives to currently mapped services.

New BBIs are assigned to either the GIS department or the Engineering & Technical Services (ETS) team depending on the category entered by the consumer on the website submission form. The GIS or ETS team members respond to each inquiry according to the information requested by the consumer. Many BBIs can be resolved through desktop research; however, if a BBI requires research in the field, the assigned ETS team member conducts such research when performing field validations in the area of the inquiry, or at other such time as is practical and appropriate. GIS and ETS team members respond to and conclude BBIs via telephone contact and/or e-mail communication.

The broadband inquiry process has been implemented in each of the Connected Nation state programs with successful results. Altogether Connected Nation has received over 17,000 broadband inquiries since 2007, allowing the state programs to evaluate each inquiry for broadband demand and data verification. These inquiries are continuously examined against current broadband availability, updated every six months, to determine if previously unserved households have been expanded to and can now receive broadband at their residence. This database of broadband inquiries has also allowed the Connected Nation state programs to aggregate demand in concentrated areas to show providers the exact locations where the population has made it clear that they would purchase broadband if it was made available to them. Providers in the states have responded to this process and have expanded to areas knowing that their investment will be worthwhile. Data verification methods have also proven successful, as the state programs have been able to show those inquiries that indicate the broadband service areas are misrepresented on the map to providers, who then verify where service cannot reach in regard to that residence(s). The broadband coverage in these states has been altered to create a more accurate map based on the inquiries submitted by the public. During this reporting period, the Connected Texas project has received a total of 50 inquiries (474 grant inception to date). As more inquiries are submitted to Connected Texas, a more thorough validation of the broadband landscape can be performed, while also allowing providers to see which areas have a high demand for broadband adoption.

BroadbandStat Methodology

BroadbandStat is an online, interactive mapping tool for viewing, analyzing, and validating broadband data. Developed through a partnership with ESRI, the market leader in geographic information system (GIS) software, BroadbandStat is a multi-functional, user-friendly way for local leaders, policymakers, consumers, and technology providers to devise a plan for the expansion and adoption of broadband.

First and foremost, BroadbandStat allows consumers to locate their residence and identify providers that offer broadband Internet service to that location. The interactive platform allows for users to build and evaluate broadband expansion scenarios using a wealth of data, including education and population demographics, broadband availability, and research about the barriers to adoption.

New functionality in BroadbandStat allows the consumer to provide feedback on the broadband data displayed on the interactive map. Through the collection of this feedback, a visual demand for broadband is presented. This visualization allows the Connected Nation state programs the ability to validate the broadband availability for accuracy. If residents within a region state they are without broadband, but the interactive map shows otherwise, this allows Connected Nation to approach the providers within that area in an effort to trim down their coverage to more accurately represent real-world availability on the ground.

The Connected Texas project launched BroadbandStat on June 16, 2010, and has received a total of 14,948 visits to date (14,937 to the English website and 11 to the Spanish website), of which 1,407 occurred this reporting period (1,401 to the English website and 6 to the Spanish website).

SPEED TEST METHODOLOGY

The 1,018 speed tests that are represented in the Connected Texas Speed Test Report during this reporting period (6,312 grant inception to date) are the result of a partnership between Connected Nation and Ookla Net Metrics. Utilizing this relationship increases the level of confidence in the data being collected and provides for a far greater sample size than could be collected by a single testing site.

Ookla owns and operates Speedtest.net, as well as develops and deploys speed tests, such as the Connected Texas speed test website, for partners around the world. This network of sites that is developed and run on its testing technology provides Ookla with a vast dataset that, due to the variability of geographic information collected across the varying speed test sites, is geocoded utilizing Geo-IP technology. This technology allows for tests to be geocoded to points of aggregation, typically larger nodes across provider networks. While there are hundreds of thousands of tests that have been conducted, the level of aggregation is only sufficient for county-level detail due to the test results being located at these larger nodes and not at an absolute location for each speed test.

In an effort to validate broadband data from the Connected Texas project, speed test information is collected throughout the state. Speed tests provide speed information on the path taken through all networks (a provider's network as well as additional networks) a local machine must connect to in order to reach the host test. The benefit of this collection of speed information is two-tiered. First, it allows for a comprehensive dataset of speeds, while also providing Connected Texas with the information on where broadband services are available. Second, unlike theoretical speed information which was received through the data collection process, the use of speed tests provide real-world information on the speeds that currently exist within the state of Texas.

Broadband Provider Log

Complete	243
Non-Responsive/Refused	40
In Progress	1
Count of Datasets by Status	**284**
Total Unique Providers Represented	**185**

Provider Name	Platform	Status	NDA Execution Date	Notes
Alenco Communications, Inc.	DSL	Data Added to Statewide Inventory	11/17/2009	[SEP-16-11 Sarah Finne] Change: Provider upgraded infrastructure and can now offer speed tier 7 download speeds in select area.
AT&T Communications of Texas, Inc.	DSL	Data Added to Statewide Inventory	12/16/2009	[AUG-24-11 Sarah Finne] Change and/or Correction: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
AT&T Communications of Texas, Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/16/2009	[AUG-15-11 Sarah Finne] Change: Network expansion to include more coverage around Midland, Odessa, Fairfield, Palestine, Buffalo, etc.
Big Bend Telephone Company, Inc.	Fiber	Data Added to Statewide Inventory	3/10/2010	[SEP-16-11 Sarah Finne] Change: Provider upgraded infrastructure to expand FTTH service territory.
Big Bend Telephone Company, Inc.	Satellite	Data Added to Statewide Inventory	3/10/2010	[SEP-16-11 Sarah Finne] Correction: Provider submitted new platform type, satellite, for this submission.
Cable ONE, Inc.	Cable	Data Added to Statewide Inventory	12/7/2009	[AUG-18-11 Sarah Finne] Change and/or Correction: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Cap Rock Telephone Cooperative, Inc.	DSL	Data Added to Statewide Inventory	3/4/2010	[SEP-16-11 Sarah Finne] Change: Network update to include additional Remote Terminals and provider upgraded infrastructure and can now offer speed tier 5 download speeds in select area.
Cap Rock Telephone Cooperative, Inc.	Fiber	Data Added to Statewide Inventory	3/4/2010	[SEP-16-11 Sarah Finne] Change: Provider upgraded infrastructure and can now offer speed tier 5 download speeds.
Celltex Networks, LLC	Fixed Wireless	Data Added to Statewide Inventory		[SEP-16-11 Sarah Finne] Change: New fixed wireless tower in operation.
Central Texas Telephone Investments, LP	Fixed Wireless	Data Added to Statewide Inventory	4/22/2010	[AUG-19-11 Sarah Finne] Change: New fixed wireless towers in operation.
CenturyLink	DSL	Data Added to Statewide Inventory	12/4/2009	[AUG-17-11 Sarah Finne] Change and/or Correction: possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Cequel Communications	Cable	Data Added to Statewide Inventory	12/15/2009	[AUG-29-11 Sarah Finne] Change and/or Correction: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Charter Communications, Inc.	Cable	Data Added to Statewide Inventory	12/15/2009	[AUG-15-11 Sarah Finne] Change: Provider submitted a new dataset showing a slight decrease in coverage.
Clearwire Corporation	Mobile Wireless	Data Added to Statewide Inventory	3/3/2010	[AUG-24-11 Sarah Finne] Change and/or Correction: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Clearwire Corporation	Fixed Wireless	Data Added to Statewide Inventory	3/3/2010	[AUG-24-11 Sarah Finne] Change and/or Correction: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Coleman County Telephone Cooperative, Inc.	DSL	Data Added to Statewide Inventory	3/10/2010	[SEP-16-11 Sarah Finne] Change: Network expansion to include new DSLAMs.
Comcast Cable Communications, LLC	Cable	Data Added to Statewide Inventory	12/7/2009	[AUG-29-11 Sarah Finne] Change and/or Correction: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Consolidated Communications	DSL	Data Added to Statewide Inventory	11/30/2009	[AUG-24-11 Sarah Finne] Change and/or Correction: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Consolidated Communications	Fiber	Data Added to Statewide Inventory	11/30/2009	[AUG-24-11 Sarah Finne] Change: Provider upgraded infrastructure and now offers FTTH in select areas.
CTX Unwired	Fixed Wireless	Data Added to Statewide Inventory	2/14/2011	[AUG-22-11 Sarah Finne] Change: New fixed wireless towers in operation.
Cumby Telephone Cooperative, Inc.	Fiber	Data Added to Statewide Inventory	3/5/2010	[SEP-16-11 Sarah Finne] Change: Provider upgraded infrastructure to expand FTTH service territory.
DigiComm Enterprises, LLC	Fixed Wireless	Data Added to Statewide Inventory	6/15/2010	[SEP-16-11 Sarah Finne] Change: New fixed wireless towers in operation.
Dot 10 Wireless, LLC	Fixed Wireless	Data Added to Statewide Inventory		[SEP-16-11 Sarah Finne] Change: New fixed wireless tower in operation.

East Texas DSL	Fixed Wireless	Data Added to Statewide Inventory	5/25/2010	[AUG-24-11 Sarah Finne] Change: New fixed wireless towers in operation.
East Texas WiFi	Fixed Wireless	Data Added to Statewide Inventory		[AUG-22-11 Sarah Finne] Correction: East Texas WiFi was previously non-responsive, but they provided data this round.
Eastex Telephone Cooperative, Inc.	DSL	Data Added to Statewide Inventory	6/20/2011	[AUG-08-11 Sarah Finne] Change: Network expansion (new Remote Terminals).
ENMR Telephone Cooperative, Inc.	Fiber	Data Added to Statewide Inventory	4/22/2010	[AUG-08-11 Sarah Finne] Change: Network expansion (new fiber lines) and provider upgraded infrastructure and can now offer tier 7 download and upload speeds.
Gower Computer Support, Inc.	Fixed Wireless	Data Added to Statewide Inventory	2/14/2011	[AUG-08-11 Sarah Finne] Change: Provider upgraded infrastructure and can now offer speed tier 4 download speeds.
Grande Communications Networks LLC	Cable	Data Added to Statewide Inventory	3/31/2010	[AUG-23-11 Sarah Finne] Change: Provider upgraded infrastructure to service additional homes and provide maximum download speeds of tier 10 to most market areas.
Grayson CableRocket, LLC	Cable	Data Added to Statewide Inventory	6/15/2010	[AUG-08-11 Sarah Finne] Change: Provider upgraded infrastructure and can now offer speed tier 7 download speeds.
Gtek Communications	Fixed Wireless	Data Added to Statewide Inventory	5/24/2010	[AUG-22-11 Sarah Finne] Change: New fixed wireless towers in operation.
GVEC.net	Fixed Wireless	Data Added to Statewide Inventory	2/25/2010	[AUG-22-11 Sarah Finne] Change: New fixed wireless towers in operation.
IGN-LPG Enterprises LLC	Fixed Wireless	Data Added to Statewide Inventory	2/17/2011	[AUG-22-11 Sarah Finne] Change: New fixed wireless tower in operation.
Industry Telephone Company	DSL	Data Added to Statewide Inventory	11/6/2009	[SEP-16-11 Sarah Finne] Change: Provider upgraded infrastructure and can now offer speed tier 6 download speeds.
JAB Wireless, Inc.	Fixed Wireless	Data Added to Statewide Inventory	6/14/2010	[AUG-22-11 Sarah Finne] Change: JAB Wireless acquired the following fixed wireless operators: Rhino Communications, PVCo, Twilight Communications, Cobalt Broadband, and Wickson.
KeyOn Communications, Inc.	Fixed Wireless	Data Added to Statewide Inventory	10/15/2009	[SEP-16-11 Sarah Finne] Change: Provider acquired some of ERF Wireless' tower sites in Central Texas and North Texas.; new composite propagations submitted.
Leap Wireless International, Inc.	Mobile Wireless	Data Added to Statewide Inventory	4/6/2010	[AUG-22-11 Sarah Finne] Change and/or Correction: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Millennium Telcom, LLC	Fixed Wireless	Data Added to Statewide Inventory	8/26/2010	[SEP-16-11 Sarah Finne] Change: New fixed wireless towers in operation.
Poka Lambro Telephone Cooperative, Inc.	DSL	Data Added to Statewide Inventory	2/15/2010	[SEP-01-11 Sarah Finne] Change: Network expansion and provider upgraded infrastructure and can now offer speed tier 8 download speeds.
Poka Lambro Telephone Cooperative, Inc.	Fiber	Data Added to Statewide Inventory	2/15/2010	[AUG-30-11 Sarah Finne] Change: Provider upgraded infrastructure to expand FTTH service territory and can now offer speed tier 8 download speeds.
RodZoo Wireless	Fixed Wireless	Data Added to Statewide Inventory		[SEP-16-11 Sarah Finne] Change: Provider's speed tiers previously didn't meet the minimum requirements/definition of broadband. Provider upgraded infrastructure and can now offer speed tier 3 download speeds.
South Plains Telephone Cooperative, Inc.	Fiber	Data Added to Statewide Inventory	3/15/2010	[SEP-16-11 Sarah Finne] Change: Provider upgraded infrastructure to expand FTTH service territory.
Sprint Nextel Corporation	Mobile Wireless	Data Added to Statewide Inventory	1/14/2010	[AUG-24-11 Sarah Finne] Change and/or Correction: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
T-Mobile USA, Inc.	Mobile Wireless	Data Added to Statewide Inventory	1/8/2010	[AUG-24-11 Sarah Finne] Change and/or Correction: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Texas Wireless Internet	Fixed Wireless	Data Added to Statewide Inventory	5/14/2010	[AUG-23-11 Sarah Finne] Change: New fixed wireless towers in operation.
Time Warner Cable LLC	Cable	Data Added to Statewide Inventory	12/21/2009	[AUG-17-11 Sarah Finne] Change and/or Correction: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
TISD, Inc.	Fixed Wireless	Data Added to Statewide Inventory	4/19/2010	[AUG-22-11 Sarah Finne] Change: New fixed wireless towers in operation.
United States Cellular Corporation	Mobile Wireless	Data Added to Statewide Inventory	2/15/2011	[AUG-24-11 Sarah Finne] Change and/or Correction: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
US Cable Corporation	Cable	Data Added to Statewide Inventory	5/20/2010	[AUG-18-11 Sarah Finne] Change: Network expansion to include new plant in Fort Stockton.
Valley Telephone Cooperative, Inc.	Fixed Wireless	Data Added to Statewide Inventory	11/24/2009	[AUG-22-11 Sarah Finne] Change: New fixed wireless towers in operation.
Verizon Southwest, Inc.	DSL	Data Added to Statewide Inventory	12/14/2009	[AUG-18-11 Sarah Finne] Change and/or Correction: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.

Verizon Southwest, Inc.	Fiber	Data Added to Statewide Inventory	12/14/2009	[AUG-18-11 Sarah Finne] Change and/or Correction: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Verizon Southwest, Inc.	Mobile Wireless	Data Added to Statewide Inventory	12/14/2009	[AUG-18-11 Sarah Finne] Change and/or Correction: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
Versalink Enterprises, LLC	Cable	Data Added to Statewide Inventory	5/11/2010	[SEP-16-11 Sarah Finne] Change: Provider expanded service area.
Windjammer Communications LLC	Cable	Data Added to Statewide Inventory	11/16/2009	[AUG-18-11 Sarah Finne] Correction: Windjammer Communications LLC was previously non-responsive, but they provided data this round.
Windstream Communications	DSL	Data Added to Statewide Inventory	1/19/2010	[AUG-22-11 Sarah Finne] Change and/or Correction: Possible service expansion or corrections to previous dataset; entirely new dataset provided for October 2011 submission.
XIT Telecommunications & Technology, Ltd.	Fiber	Data Added to Statewide Inventory	3/2/2010	[SEP-16-11 Sarah Finne] Change: Provider upgraded infrastructure to expand FTTH service territory.
360networks	Backhaul	Backhaul Provider Only Processing Complete	1/19/2010	
Alenco Communications, Inc.	Backhaul	Backhaul Provider Only Processing Complete	11/17/2009	
Alpheus Communications, L.P.	Backhaul	Backhaul Provider Only Processing Complete		
AT&T Communications of Texas, Inc.	Backhaul	Backhaul Provider Only Processing Complete	12/16/2009	
CenturyLink	Backhaul	Backhaul Provider Only Processing Complete	12/4/2009	
Charter Communications, Inc.	Backhaul	Backhaul Provider Only Processing Complete	12/15/2009	
Level 3 Communications, LLC	Backhaul	Backhaul Provider Only Processing Complete	12/14/2009	
MegaPath Inc.	Backhaul	Backhaul Provider Only Processing Complete	2/15/2010	
Poka Lambro Telephone Cooperative, Inc.	Backhaul	Backhaul Provider Only Processing Complete	2/15/2010	
Sprint Nextel Corporation	Backhaul	Backhaul Provider Only Processing Complete	1/14/2010	
T-Mobile USA, Inc.	Backhaul	Backhaul Provider Only Processing Complete	1/8/2010	
Valley Telephone Cooperative, Inc.	Backhaul	Backhaul Provider Only Processing Complete	11/24/2009	
Verizon Southwest, Inc.	Backhaul	Backhaul Provider Only Processing Complete	12/14/2009	
Windstream Communications	Backhaul	Backhaul Provider Only Processing Complete	1/19/2010	
Zayo Bandwidth, LLC	Backhaul	Backhaul Provider Only Processing Complete		
Broadwaves	Fixed Wireless	Estimated Coverage Submitted for Non-Participating Provider		[SEP-13-11 Sarah Finne] Correction: Estimated coverage submitted (propagation) for non-participating provider.
CKS Wireless, Inc.	Fixed Wireless	Estimated Coverage Submitted for Non-Participating Provider		[SEP-09-11 Sarah Finne] Correction: Estimated coverage submitted (propagation) for non-participating provider.
East Texas Broadband	Fixed Wireless	Estimated Coverage Submitted for Non-Participating Provider		[SEP-01-11 Sarah Finne] Correction: Estimated coverage submitted (propagation) for non-participating provider.
AirBand Communications, Inc.	Backhaul	No Update to Provide	3/29/2010	
Aledo Broadband	Backhaul	No Update to Provide	3/26/2010	
Aledo Broadband	Fixed Wireless	No Update to Provide	3/26/2010	
Alenco Communications, Inc.	Fixed Wireless	No Update to Provide	11/17/2009	
Alenco Communications, Inc.	Fiber	No Update to Provide	11/17/2009	
Allegiance Communications	Cable	No Update to Provide	2/4/2010	
Argon Technologies	Fixed Wireless	No Update to Provide		
AwesomeNet, Inc.	Fixed Wireless	No Update to Provide		
Basin 2 Way Radio, Inc.	Fixed Wireless	No Update to Provide	4/14/2010	
Big Bend Telephone Company, Inc.	DSL	No Update to Provide	3/10/2010	
Big Bend Telephone Company, Inc.	Backhaul	No Update to Provide	3/10/2010	
Blossom Telephone Company, Inc.	DSL	No Update to Provide	3/26/2010	
Border to Border Communications, Inc.	DSL	No Update to Provide		
Brazoria Telephone Company	Cable	No Update to Provide	6/17/2010	
Brazoria Telephone Company	DSL	No Update to Provide	6/17/2010	
Broadcomm.US	Fixed Wireless	No Update to Provide	3/9/2011	
Cameron Telephone Company, LLC	Backhaul	No Update to Provide	3/18/2010	
Cameron Telephone Company, LLC	DSL	No Update to Provide	3/18/2010	
Cap Rock Telephone Cooperative, Inc.	Backhaul	No Update to Provide	3/4/2010	
Cap Rock Telephone Cooperative, Inc.	Fixed Wireless	No Update to Provide	3/4/2010	
Central Texas Cable Partners, Inc.	Cable	No Update to Provide	2/22/2010	
Central Texas Telephone Cooperative, Inc.	DSL	No Update to Provide	3/2/2010	
Central Texas Telephone Cooperative, Inc.	Fixed Wireless	No Update to Provide	3/2/2010	
CenturyLink	Backhaul	No Update to Provide	12/4/2009	
Coleman County Telephone Cooperative, Inc.	Fixed Wireless	No Update to Provide	3/10/2010	
Colorado Valley Telephone Cooperative, Inc.	DSL	No Update to Provide	3/9/2010	
Colorado Valley Telephone Cooperative, Inc.	Fixed Wireless	No Update to Provide	3/9/2010	
Community Telephone Company, Inc.	Backhaul	No Update to Provide	3/10/2010	
Community Telephone Company, Inc.	DSL	No Update to Provide	3/10/2010	
Connextions Telcom	DSL	No Update to Provide	3/2/2011	
Connextions Telcom	Fiber	No Update to Provide	3/2/2011	
Cumby Telephone Cooperative, Inc.	DSL	No Update to Provide	3/5/2010	
Dell Telephone Cooperative, Inc.	Backhaul	No Update to Provide	4/6/2010	
Dell Telephone Cooperative, Inc.	DSL	No Update to Provide	4/6/2010	
Dell Telephone Cooperative, Inc.	Fiber	No Update to Provide	4/6/2010	
Dell Telephone Cooperative, Inc.	Fixed Wireless	No Update to Provide	4/6/2010	
Digitex.com	Fixed Wireless	No Update to Provide	5/25/2010	
Digitex.com	Backhaul	No Update to Provide	5/25/2010	
DISH Network Corporation	Satellite	No Update to Provide	1/27/2010	[SEP-16-11 Sarah Finne] Correction: Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
Eccentrix Technologies, LLC	Fixed Wireless	No Update to Provide	3/30/2010	
ELC Internet Services, Inc.	Fixed Wireless	No Update to Provide	3/4/2011	
Electra Telephone Company	DSL	No Update to Provide	11/24/2009	
Element Networks, LLC	Fixed Wireless	No Update to Provide	5/14/2010	

ENMR Telephone Cooperative, Inc.	Backhaul	No Update to Provide	4/22/2010	
ENMR Telephone Cooperative, Inc.	DSL	No Update to Provide	4/22/2010	
ETAN Industries	Cable	No Update to Provide		
ETEX Communications, LP	Backhaul	No Update to Provide	2/25/2010	
ETEX Communications, LP	DSL	No Update to Provide	2/25/2010	
ETEX Communications, LP	Fiber	No Update to Provide	2/25/2010	
ETS Cablevision Co., Inc.	Cable	No Update to Provide	10/30/2009	
ETS Cablevision Co., Inc.	Fiber	No Update to Provide	10/30/2009	
Farm to Market Broadband LP	Fixed Wireless	No Update to Provide	4/16/2010	
Ganado Telephone Company, Inc.	DSL	No Update to Provide	11/16/2009	
GEUS	Cable	No Update to Provide		
Gilmer Cable Television Company, Inc.	Cable	No Update to Provide	6/18/2010	
Gtek Communications	Backhaul	No Update to Provide	5/24/2010	
Guadalupe Valley Communications Systems	Cable	No Update to Provide	11/23/2009	
Guadalupe Valley Communications Systems	DSL	No Update to Provide	11/23/2009	
Guadalupe Valley Communications Systems	Fiber	No Update to Provide	11/23/2009	
GVEC.net	Backhaul	No Update to Provide	2/25/2010	
Helmsco, Inc.	Fixed Wireless	No Update to Provide	2/15/2010	
Hi Speed Wireless	Fixed Wireless	No Update to Provide	2/22/2011	[SEP-16-11 Sarah Finne] Correction: Provider clarified they only offer speed tier 5 download speeds as their highest package.
Hill Country Telephone Cooperative, Inc.	Backhaul	No Update to Provide	3/9/2011	
Hill Country Telephone Cooperative, Inc.	DSL	No Update to Provide	3/9/2011	
Hill Country Telephone Cooperative, Inc.	Fixed Wireless	No Update to Provide	3/9/2011	
Hughes Network Systems, LLC	Satellite	No Update to Provide	2/5/2010	[SEP-16-11 Sarah Finne] Correction: Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
James Cable LLC	Cable	No Update to Provide	1/11/2010	
James Cable LLC	Fixed Wireless	No Update to Provide	1/11/2010	
La Ward Telephone Exchange, Inc.	DSL	No Update to Provide	11/16/2009	
Lake Livingston Telephone Company, Inc.	DSL	No Update to Provide	11/20/2009	
Livingston Telephone Company, Inc.	Backhaul	No Update to Provide	2/25/2010	
Livingston Telephone Company, Inc.	DSL	No Update to Provide	2/25/2010	
Maverick Internet	Fixed Wireless	No Update to Provide	6/4/2010	
Maverick Internet	Backhaul	No Update to Provide	6/4/2010	
McDonald Group	Cable	No Update to Provide	3/5/2010	
Mid-Plains Rural Tel. Co-op. Inc.	Backhaul	No Update to Provide	3/5/2010	
Mid-Plains Rural Tel. Co-op. Inc.	DSL	No Update to Provide	3/5/2010	
Mid-Plains Rural Tel. Co-op. Inc.	Fiber	No Update to Provide	3/5/2010	
Millennium Telcom, LLC	DSL	No Update to Provide	8/26/2010	
Millennium Telcom, LLC	Fiber	No Update to Provide	8/26/2010	
Millennium Telcom, LLC	Cable	No Update to Provide	8/26/2010	[SEP-12-11 Sarah Finne] Correction: Updated download speeds to tier 8, per their website information and DOCSIS 3.0 technology type.
NetWest Online, Inc.	Fixed Wireless	No Update to Provide	2/23/2010	[SEP-12-11 Sarah Finne] Correction: Provider only offers 3-5M download speeds to residential subscribers; corrected to tier 5.
Neu Ventures, Inc.	Backhaul	No Update to Provide	6/17/2010	
Neu Ventures, Inc.	Cable	No Update to Provide	6/17/2010	
Neu Ventures, Inc.	Fixed Wireless	No Update to Provide	6/17/2010	
Nextlink Wireless, Inc.	Backhaul	No Update to Provide	2/12/2010	
Nortex Communications	Backhaul	No Update to Provide	2/12/2010	
Nortex Communications	Cable	No Update to Provide	2/12/2010	
Nortex Communications	DSL	No Update to Provide	2/12/2010	
Nortex Communications	Fiber	No Update to Provide	2/12/2010	
Nortex Communications	Fixed Wireless	No Update to Provide	2/12/2010	
North Texas Cellular, Inc.	DSL	No Update to Provide	3/22/2010	
North Texas Telephone Company	DSL	No Update to Provide	11/30/2009	
Northland Communications	Cable	No Update to Provide	8/19/2010	
Panhandle Telephone Cooperative, Inc.	Cable	No Update to Provide	12/7/2009	
Panhandle Telephone Cooperative, Inc.	DSL	No Update to Provide	12/7/2009	
Panhandle Telephone Cooperative, Inc.	Fixed Wireless	No Update to Provide	12/7/2009	
Peoples Communication, Inc.	Backhaul	No Update to Provide	3/4/2010	
Peoples Communication, Inc.	DSL	No Update to Provide	3/4/2010	
Poka Lambro Telephone Cooperative, Inc.	Fixed Wireless	No Update to Provide	2/15/2010	
Promptwireless, LLP	Fixed Wireless	No Update to Provide	4/27/2010	
RB3, LLC	Cable	No Update to Provide	10/23/2009	
RB3, LLC	Fixed Wireless	No Update to Provide	10/23/2009	
Ridgewood Cable	Fixed Wireless	No Update to Provide		
Rioplex Wireless LTD	Fixed Wireless	No Update to Provide	3/3/2010	
Santa Rosa Telephone Cooperative, Inc.	Backhaul	No Update to Provide	3/9/2010	
Santa Rosa Telephone Cooperative, Inc.	DSL	No Update to Provide	3/9/2010	
Santa Rosa Telephone Cooperative, Inc.	Fiber	No Update to Provide	3/9/2010	
Santa Rosa Telephone Cooperative, Inc.	Fixed Wireless	No Update to Provide	3/9/2010	
Smithville System	Fixed Wireless	No Update to Provide	6/17/2010	
South Plains Telephone Cooperative, Inc.	Backhaul	No Update to Provide	3/15/2010	
South Plains Telephone Cooperative, Inc.	DSL	No Update to Provide	3/15/2010	
Southwest Arkansas Telephone Cooperative, Inc.	Backhaul	No Update to Provide	1/19/2010	
Southwest Arkansas Telephone Cooperative, Inc.	DSL	No Update to Provide	1/19/2010	
Southwest Texas Telephone Company	Backhaul	No Update to Provide	3/3/2010	
Southwest Texas Telephone Company	DSL	No Update to Provide	3/3/2010	
Southwest Texas Telephone Company	Fixed Wireless	No Update to Provide	3/3/2010	
Speed of Light Broadband, Inc.	Fixed Wireless	No Update to Provide	11/3/2009	
Stelera Wireless, LLC	Mobile Wireless	No Update to Provide		[SEP-12-11 Sarah Finne] Correction: "Circle" polygons of service have been replaced with propagations.
Tatum Telephone Company	DSL	No Update to Provide	11/24/2009	
Taylor Telephone Cooperative, Inc.	Backhaul	No Update to Provide	3/11/2010	
Taylor Telephone Cooperative, Inc.	DSL	No Update to Provide	3/11/2010	
Taylor Telephone Cooperative, Inc.	Fiber	No Update to Provide	3/11/2010	

Texas Broadband, Inc.	Fixed Wireless	No Update to Provide	5/12/2010	
Texas CellNet	Fixed Wireless	No Update to Provide	2/17/2011	
Texhoma Wireless, L.L.C.	Fixed Wireless	No Update to Provide	3/8/2011	
TGN Cable	Cable	No Update to Provide	5/20/2010	
Tier One Converged Networks, Inc.	Fixed Wireless	No Update to Provide	3/24/2010	[SEP-09-11 Sarah Finne] Correction: "Circle" polygons of service have been replaced with propagations.
Time Warner Cable LLC	Backhaul	No Update to Provide	12/21/2009	
Totelcom Communications, LLC	Fixed Wireless	No Update to Provide	11/30/2009	
Totelcom Communications, LLC	DSL	No Update to Provide	11/30/2009	
tw telecom of texas, llc	Backhaul	No Update to Provide	3/10/2010	
Valley Telephone Cooperative, Inc.	DSL	No Update to Provide	11/24/2009	
Valley Telephone Cooperative, Inc.	Fiber	No Update to Provide	11/24/2009	
Wes-Tex Telecommunications, Ltd.	Backhaul	No Update to Provide	3/1/2010	
Wes-Tex Telecommunications, Ltd.	Cable	No Update to Provide	3/1/2010	
Wes-Tex Telecommunications, Ltd.	DSL	No Update to Provide	3/1/2010	
Wes-Tex Telecommunications, Ltd.	Fixed Wireless	No Update to Provide	3/1/2010	
Wharton County Electric Cooperative, Inc.	Backhaul	No Update to Provide	4/15/2010	
Wharton County Electric Cooperative, Inc.	Fixed Wireless	No Update to Provide	4/15/2010	
WildBlue Communications, Inc.	Satellite	No Update to Provide	1/8/2010	[SEP-16-11 Sarah Finne] Correction: Satellite data is being submitted and was not included in the April 2011 submission. While coverage is currently the entire state boundary, work continues on having more granular data available.
XIT Telecommunications & Technology, Ltd.	DSL	No Update to Provide	3/2/2010	
XO Communications, LLC	Backhaul	No Update to Provide	2/12/2010	
Zito Midwest, LLC	Cable	No Update to Provide	2/17/2011	
Basin Broadband, Inc.	Fixed Wireless	No Update Provided - Use Last Submission Data	3/23/2010	
Broadband Data Services of Texas, LLC	Fixed Wireless	No Update Provided - Use Last Submission Data	4/29/2010	
Cequel Communications	Backhaul	No Update Provided - Use Last Submission Data	12/15/2009	
Cogent Communications, Inc.	Backhaul	No Update Provided - Use Last Submission Data		
ECTISP, Inc.	Fixed Wireless	No Update Provided - Use Last Submission Data		
Enet Internet Services, LLC	Fixed Wireless	No Update Provided - Use Last Submission Data		
ERF Wireless	Fixed Wireless	No Update Provided - Use Last Submission Data		[SEP-09-11 Sarah Finne] Correction: "Circle" polygons of service have been replaced with propagations. Also, speeds corrected to what is actually advertised on their website for residential services (1M down).
Five Area Telephone Cooperative, Inc.	DSL	No Update Provided - Use Last Submission Data	3/8/2010	
Five Area Telephone Cooperative, Inc.	Fiber	No Update Provided - Use Last Submission Data	3/8/2010	
Greasy Bend Ventures, Inc.	Fixed Wireless	No Update Provided - Use Last Submission Data	8/16/2010	
North Texas Broadband, LLC	Cable	No Update Provided - Use Last Submission Data	3/1/2010	
NTS Communications	DSL	No Update Provided - Use Last Submission Data		
NTS Communications	Fiber	No Update Provided - Use Last Submission Data		
Our-Town Internet Service	Fixed Wireless	No Update Provided - Use Last Submission Data	3/31/2010	
Pulsestream Internet Services, LLC	Backhaul	No Update Provided - Use Last Submission Data	6/2/2011	
Riviera Telephone Company, Inc.	Backhaul	No Update Provided - Use Last Submission Data	3/11/2010	
Riviera Telephone Company, Inc.	DSL	No Update Provided - Use Last Submission Data	3/11/2010	
Rock Solid Internet & Telephone	Fixed Wireless	No Update Provided - Use Last Submission Data	2/14/2011	
SmartBurst, LLC	Fixed Wireless	No Update Provided - Use Last Submission Data	8/4/2010	
WEHCo Video, Inc.	Cable	No Update Provided - Use Last Submission Data		
West Texas Rural Telephone Cooperative, Inc.	Backhaul	No Update Provided - Use Last Submission Data	3/31/2010	
West Texas Rural Telephone Cooperative, Inc.	Cable	No Update Provided - Use Last Submission Data	3/31/2010	
West Texas Rural Telephone Cooperative, Inc.	DSL	No Update Provided - Use Last Submission Data	3/31/2010	
West Texas Rural Telephone Cooperative, Inc.	Fiber	No Update Provided - Use Last Submission Data	3/31/2010	
Central Texas Telephone Investments, LP	DSL	Other	4/22/2010	[SEP-12-11 Sarah Finne] Provider does not offer any DSL services. Record added by mistake.
Anvil Communications	Fixed Wireless	Refused to Participate		[JUN-21-11 Dwayne Goodman] Spoke directly to a company representative indicating there is no merit to the participation and feels the information will be used by competitors; expressed unwillingness to participate.
CIT - Campbell Information Technology	Fixed Wireless	Refused to Participate		[JUL-27-11 Dwayne Goodman] A company representative responded to the October 2011 data submission cycle and requested removal of current coverage. As stated by the representative, the organization feels there is too much information available for competitors and sees no benefit for their organization or potential new customers.
Fiberlight, LLC	Backhaul	Refused to Participate	4/20/2010	[JUN-21-11 Dwayne Goodman] A company representative forwarded the following message, "We appreciate your effort but at this time we have decided not to participate."
SOS Communications LLC	Fixed Wireless	Refused to Participate		[MAY-04-11 Dwayne Goodman] Received the following e-mail from a company representative: "We decline to participate in NTIA survey. No value or benefit."
Starnet Online Systems	Fixed Wireless	Refused to Participate		[JUN-13-11 Daryl Coffey] A company officer stated that he doesn't "see the benefit at this time" in participating.
Telecom Cable, LLC	Cable	Refused to Participate		[AUG-08-11 Dwayne Goodman] Received an e-mail reply from a representative of the company indicating there will not be any additional contribution from the organization other than the standard FCC Form 477 reporting to the appropriate authorities.
Terral Telephone Company	Fixed Wireless	Refused to Participate		[MAY-04-11 Dwayne Goodman] A company representative declined to participate per the data submission outreach.

Western Broadband	Fixed Wireless	Refused to Participate		[JUN-13-11 Dwayne Goodman] Received an e-mail reply from the provider representative stating "we will not be participating."
281 Communications, Inc.	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between August 2, 2010 and February 21, 2011, 3 additional attempts were made this period.
AMA TechTel	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between August 11, 2010 and February 1, 2011, 6 additional attempts were made this period.
Bee Creek Communications	Fixed Wireless	Non-Responsive to Multiple Attempts	5/21/2010	In addition to multiple contact attempts made between July 26, 2010 and January 24, 2011, 10 additional attempts were made this period.
Buffalo Cable TV	Cable	Non-Responsive to Multiple Attempts		4 contact attempts were made between March 1, 2011 and August 5, 2011.
Buford Media Group	Cable	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between August 2, 2010 and February 16, 2011, 5 additional attempts were made this period.
Centrovision	Cable	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between August 2, 2010 and February 16, 2011, 5 additional attempts were made this period.
Centrovision	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between August 2, 2010 and February 16, 2011, 5 additional attempts were made this period.
Cybercom Corporation	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between August 2, 2010 and January 5, 2011, 6 additional attempts were made this period.
Digital Passage	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between January 10, 2011 and February 22, 2011, 5 additional attempts were made this period.
East Texas Cable Co.	Cable	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between August 4, 2010 and February 16, 2011, 6 additional attempts were made this period.
Gecko Inter.net	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between August 9, 2010 and January 14, 2011, 3 additional attempts were made this period.
Hometown Computing	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between August 4, 2010 and January 14, 2011, 3 additional attempts were made this period.
Indian Creek Internet Services	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between August 4, 2010 and February 18, 2011, 3 additional attempts were made this period.
Internet America Wireless Internet Access	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between August 9, 2010 and January 14, 2011, 3 additional attempts were made this period.
Liquid Stone Wireless	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between August 12, 2010 and February 18, 2011, 3 additional attempts were made this period.
LSCWeb.Com	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between August 5, 2010 and February 18, 2011, 3 additional attempts were made this period.
Medicine Park Telephone Company	Backhaul	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between January 31, 2011 and February 11, 2011, 3 additional attempts were made this period.
Pathwayz Communications, Inc.	DSL	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between August 3, 2010 and January 13, 2011, 2 additional attempts were made this period.
Pathwayz Communications, Inc.	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between August 3, 2010 and January 13, 2011, 2 additional attempts were made this period.
Phonoscope Enterprises Group, LLC	Backhaul	Non-Responsive to Multiple Attempts	5/20/2010	In addition to multiple contact attempts made between August 11, 2010 and February 18, 2011, 5 additional attempts were made this period.
Presidio Community Wireless Network	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between February 1, 2011 and February 18, 2011, 1 additional attempt was made this period.
Reliance Globalcom Services, Inc.	Backhaul	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between August 5, 2010 and February 3, 2011, 3 additional attempts were made this period.
Sterling Cable	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between August 4, 2010 and February 16, 2011, 6 additional attempts were made this period.

Sterling Cable	Cable	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between August 4, 2010 and February 16, 2011, 6 additional attempts were made this period.
Texas Communications	DSL	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between August 4, 2010 and February 18, 2011, 6 additional attempts were made this period.
Texas Communications	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between August 4, 2010 and February 18, 2011, 6 additional attempts were made this period.
Twin Wireless, Inc.	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between August 4, 2010 and February 17, 2011, 4 additional attempts were made this period.
Utopian Wireless Corporation	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between August 9, 2010 and January 6, 2011, 4 additional attempts were made this period.
VRFuturenet	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between August 4, 2010 and February 18, 2011, 4 additional attempts were made this period.
WesTex Connect Internet	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between August 3, 2010 and February 18, 2011, 5 additional attempts were made this period.
Zeecon Wireless Internet, LLC	Fixed Wireless	Non-Responsive to Multiple Attempts		In addition to multiple contact attempts made between August 4, 2010 and February 18, 2011, 4 additional attempts were made this period.
Zulu Internet, Inc.	Fixed Wireless	Non-Responsive to Multiple Attempts		6 contact attempts were made between May 26, 2011 and August 12, 2011

About the Utah Broadband Project's Map & Data

The Utah Broadband Project Interactive Map website is a joint project of the Utah Public Service Commission, Governor's Office of Economic Development, and Department of Technology Services.

The Utah Broadband Interactive Map was developed and is hosted by the Utah Automated Geographic Reference Center (AGRC) utilizing data complied by the Project from broadband providers and public sources, including Utah's State Geographic Information Database (SGID) which is utilized extensively for locating addresses, locating geographic places, and displaying background maps.

Please report any problems with this web page, the Utah Broadband Interactive Map, or relating to broadband availability in Utah to broadband@utah.gov.
This page contains the following sections:

Additional Utah Broadband Maps and Resources

In addition to the Utah Broadband Map interactive map website, additional broadband map products are available that depict availability, speed, and technology in Utah. At present these include maps of highest available speed, available technology, and community anchor institution maps that depict school, health center, government office, and emergency response station facilities and the internet access at these locations.

Map Goals

The map attempts to provide consumers, community leaders, and broadband providers with a comprehensive map-based view of non-confidential data complied by the Utah Broadband Project. This information can be used to support:

- ***Consumer and Business Decision Support:***
  - What provider options and performance are available at a specified locations?
  - What locations is broadband service available from a provider of interest (a current provider, for example)?
  - Does the broadband map accurately reflect available services?
- ***Community Leader Decision Support:***
  - How does broadband service compare in an area of interest with other parts of the state?
  - Where are un- or under-served areas for which the expansion of broadband service or performance should be targeted?
  - Does the broadband map accurately reflect available services?
- ***Broadband Providers Decision Support:***
  - Where are opportunities to expand service and performance?
  - Does the broadband map accurately reflect available services?

Map Data Description

The Utah Broadband Project's Fall 2010 submission to the NTIA/FCC State Broadband Data and Development (SBDD) program includes both confidential and non-confidential data relating to service availability and infrastructure for over 40 broadband providers. Non-confidential data depicts broadband availability, speed, and technology for wireless service provision as service area polygons and, for wireline provision, as service areas and address points aggregated to a census block level in urban and rural settled areas and along road segments in rural and exurban areas where census blocks are greater than 2 square miles in size. Additionally, provider-submitted middle and last mile infrastructure data and pre-aggregation address-level wireline service information were submitted to the SBDD program as confidential data.

The locations of community anchor institutions, such as schools, libraries, government offices, health and human service provision locations, and public safety facilities were also collected and submitted. Where possible, speed and service technology are indicated, especially for those institutions that receive broadband service from the Utah Education Network, the State of Utah Department of Technology Services, or the Utah Telehealth Network and those organizations that report this information to the State Library.

The State of Utah and its provider engagement contractor, International Research Council (of Mesa, Arizona) developed program communication packets, worked to develop NDAs where necessary, and provided engagement and technical assistance to providers regarding the submission guidelines and process.

- Participating providers list

Map Data Validation

The Utah Broadband Project submission was in the data structure outlined in the National Broadband Map Data Transfer Model (NBMDTM) v1.0.1. In order to submit data in this format, all provider data submissions were transformed to this data structure and loaded into an ESRI File Geodatabase. The project worked with provider data in many formats including customer and 'buildings-passed' addresses and address ranges in spreadsheet, text file, and geographic information system formats. Census blocks, pdf maps, computer assisted design (CAD) data files, and public-facing websites showing provider service areas were also translated into NBMDTM compliant formats.
Aerial photography, address location services, census block geometry, and road segment geometry used for broadband service mapping and quality control of the data are from public domain resources in Utah's State Geographic Information Database (SGID) maintained by the Utah Automated Geographic Reference Center and funded and supported by the State of Utah general fund, the Utah 911 Committee, and partnering local, state and federal agencies.

Additionally, in cases where providers were only able to provide last-mile infrastructure locations, terrain modeling was used to generate wireless coverage data and network distance modeling was used to form DSL provision areas using the street network as a surrogate for the broadband delivery system's wire network.

Due to time constraints, validation work was somewhat limited to the work to translate provider data submissions into the NBMDTM and its list of coded values and other attribute specifications. In subsequent submissions, the Project will incorporate automated procedures developed by the FCC to ensure that project data conforms to the evolving NBMDTM.

Map Data Verification

Utah feels strongly the best verification resource is a continued relationship with participating providers and the display of availability and speed data through the state broadband interactive map. Along these lines, Utah prepared provider feedback packages including a CD containing the providers NBMDTM transformed data, pdf overview maps of the providers service area by download speed, submission record counts, transformation process notes (including problem areas), and suggestions on how to improve the data quality and/or how to make subsequent submissions easier.

Utah also compared data submitted to the American Roamer and Media Print Cable Boundaries data and to the Public Service Commission's telecommunications territory boundaries. In preparation for the release of the Utah Broadband Map, project staff is holding interactive review sessions with providers to review service area data together via online meetings and a preview version of the map. These sessions are targeted to providers where further clarification is deemed necessary.

Utah has also experimented with mapping and analysis of FCC speed test data and terrain analysis of statewide satellite coverage claims.

Map Disclaimer

Broadband service availability and characteristics are depicted as derived from data assembled by the Utah Broadband Project. Data sources include biannual broadband service provider submissions and publicly available sources. Data has been modified, where necessary, to meet broadband mapping standards set by the National Telecommunications and Information Administration (NTIA). Broadband service availability is displayed per NTIA specifications which include technology and speed categories and the aggregation of non-wireless service availability information to either U.S. Census blocks (where smaller than 2 sq. miles) or road segments.

Speeds shown are the 'maximum advertised' for the geographic features depicted, and must exceed 0.768 Mbps download and 0.2 Mbps upload (NTIA broadband definition) to be included. Actual speeds may vary within and along census blocks and roads, due to the granularity and currency of the data, technological limitations, and service plan limitations. Users of the site are encouraged to inquire directly to providers for current service availability and speed.

All information presented on the Utah's interactive broadband map is for general reference purposes only and may contain errors and omissions. The State of Utah makes no warranty with respect to information available, express or implied, including but not limited to the fitness for use for a particular purpose.

The Utah Broadband Project welcomes your comments (broadband@utah.gov).

Commonwealth of Virginia

Virginia Center for Innovative Technology

Virginia Information Technologies Agency
Virginia Geographic Information Network

Virginia Tech
Center for Geospatial Information Technology

NTIA STATE BROADBAND DATA DEVELOPMENT
ROUND 4 - FALL 2011 SUBMISSION

Summary of Virginia Submission

The Virginia Center for Innovative Technology (CIT) was designated by the Governor of Virginia as the primary point of contact for all Commonwealth of Virginia participation in the National Broadband Mapping Project. The CIT worked in conjunction with the Virginia Information Technologies Agency's (VITA) Virginia Geographic Information Network (VGIN) to review, process, normalize and submit the information outlined in the National Telecommunications and Information Administration's (NTIA) Notice of Funding Availability (NOFA) establishing a Virginia iteration of the National Broadband Map.

The fall 2011 submission is the fourth submission of data to the NTIA and the update includes data from 47 broadband service providers with unique federal identifications delivered in various formats ranging from GIS shape files to text files detailing broadband availability. Of the 47 broadband providers included, 28 submitted updated service information. To provide a complete snapshot of broadband availability in Virginia, the spring 2011 submission data was carried forward for several remaining broadband providers while some carry over providers were reworked for the 2010 census block request.

A summary of the fall 2011 submission data includes:

Census Block polygons provided with coverage information	359947
Address points provided with availability information	63497
Street Segments provided with availability information	54707
Wireless polygons with coverage	19
Middle Mile points with availability information	557
Community Anchor Institution points with availability information	3591

All broadband providers participating provided advertised speed information for wireless polygons, census block, road centerline segment, or addresses.

Base Map Data

VGIN maintains a series of statewide feature classes or partnerships with commercial entities which allow the granularity of data necessary to support the National Broadband Mapping Project. The following Virginia and Federal data sets were used in SBDD data processing.

Address Points - VGIN maintains a statewide address point feature class that is updated quarterly using locality address submissions. This statewide address point database is used to generate a Point Address Geocoding Service which is fed into the Virginia statewide composite geocoding web service.

Road Centerlines (RCL) – VGIN maintains a statewide road centerline feature class that is updated quarterly using locality centerline submissions. This road centerline database contains address range information when it is provided by the locality. The RCL database is used to generate a geocoding service which is an interpolated point along a centerline and this is fed into the Virginia statewide composite geocoding web service.

TIGER 2010 Census Blocks – 2010 Census geometry that is available to the broadband mapping project for location and presentation of broadband data.

Getting Started: Selection Set Feature Classes

Before any provider information was processed, a geodatabase of selection set feature classes was created and individual feature classes were created for use in the 2011 fall data submission. In order to support the processing of broadband data based on select by location, feature classes were set up into a selection feature database which allowed subsets of provider information to be joined spatially or by attributes and schema to be used seamlessly from the processing environment to the transfer data model. Each feature class of interest was an import of the most recent iteration the NTIA SBDD data model schema (June 2011). Features from Virginia base map data was ETL'd using appropriate field mapping. The following are layers used in the Selection Set geodatabase:

NTIA Roads Feature Class - Virginia RCL data has address ranges in the form of four fields; from left, to left, from right, & to right. Two fields were added in the VA State RCL output for address high and low and calculated based on several selection queries. A blank schema feature class of the roads was added and the field V_LEID (VA RCL unique ID) was added to the feature class. This customized statewide data set from the Virginia RCL Quarter 2 of 2011 was then loaded to a selection set feature class which cloned the schema of the NTIA SBDD model feature class called BB_Service_RoadSegment. Unique IDs from the VA centerline were loaded to the selection set road centerline feature class. All Broadband related fields (DBA, FRN, TransTech, etc.) assumed default values of the NITA data model and were <Null> or blank.

NTIA Addresses Feature Class - Statewide data from the Virginia AP Q2 of 2011 was loaded to a selection set feature class which cloned the schema of the NTIA SBDD model feature class called BB_Service_Address. A spatial join was performed to this data set to the 2010 census blocks in order to apply block information to the point and the 2010 bock information available on the fly. The FULLFIPSID field inside the address points was then overwritten with the new spatially joined data based on the GEOID value from 2010. Latitude and Longitude values were also calculated in the selection set feature class. All Broadband related fields assumed default values of the NTIA data model and were <Null> or blank. These values were calculated individually for providers who submitted data relevant to address points.

NTIA Blocks2000 Feature Class - 2000 Tiger blocks were loaded into the NTIA model directly using the schema of the NTIA SBDD data model for the feature class named BB_Service_CensusBlock. FIPS values were matched up in the ETL and several other related block fields were loaded as well. Broadband related fields assumed default values of the NTIA data model. Values were calculated individually based on joins. This data was used solely to create a quick reference to confirm suspicions of whether a provider submitted data in 2000 census block geography or 2010.

NTIA Blocks2010 Feature Class - 2010 Tiger blocks were loaded into the NTIA model directly using the schema of the NTIA SBDD data model for the feature class name BB_Service_CensusBlock. GEOID values in the 2010 data were mapped to the FIPS values in the NTIA schema and other related block data was matched with its appropriate field name. Broadband related fields assumed default values of the NTIA data model. A separate field called SQ_MI_VA_LAMBERT was added to the selection set feature class and was created in the NAD_1983_Virginia_Lambert (Meters) projection and calculated to the WGS_84 data set. This was used in Square Mile QC.

Broadband Provider Processing Environment

To support the processing of broadband provider information separately, a broadband provider specific staging geodatabase was created. Each broadband provider participating in the fall 2011 had its own geodatabase and data was processed completely independent of all other broadband providers, allowing providers to move through the process at different rates. This also allowed the correction of any data problems specific to broadband providers without affecting the entire submission database.

A naming convention for each selection set feature class was used and called “NTIA_” and the feature class type. “NTIA_Roads” were loaded to the transfer data model feature class BB_Service_RoadSegment, “NTIA_Census_Blocks” were loaded to the transfer data model BB_Service_CensusBlock feature class, “NTIA_Addresses” were loaded to the transfer data model BB_Service_Address feature class, and depending on provider category “NTIA_Wireless” was loaded to the transfer data model BB_Service_Wireless. Once the broadband provider data was processed to a point in its native feature class in the staging geodatabase which fully conformed to the NTIA specifications, it was included in the Virginia submission for quality control and subsequent delivery.

Virginia Provider Data Submission Categorization

Between submissions from the spring 2011 and fall 2011, Virginia designed a nomenclature to use in referring to a provider based on the category of data which they provide to the CIT and VGIN. While it is apparent that the receipt of GIS data is the most desirable format when processing data sets, some providers may not be able to send this type of information based on the resources they have at hand. Provider data category generally dictates provider processing methodology.

Between submissions it was noted that some providers may actually change the type of data they submit to CIT and VGIN. Some providers may have the capability of storing or already storing their information in the most desirable format although not submitting data in this format.

Tracking what is sent and placing a category for the type of data received can be a good factor in analyzing deltas for feedback looping and can ultimately build provider communication and allow new standardization of data submitted. Virginia would like for providers to be consistent in the data they send to the CIT and VGIN and provider data category becomes a quick reference for this consistency.

The naming convention is only for providers who submit census blocks, addresses, address ranges, or wireless information. In the next submission, middle mile, pricing, and additional data sets may be used in the update to wireline provider type. The following are categories which refer to the data received by a provider for base data:

Wireline Providers:

Category 1
- Provider sent GIS census blocks (census)
- Provider sent GIS road centerlines (census)

Category 2
- Provider sent census block IDs in tabular form for blocks less than 2 square miles
- Provider sent address ranges in tabular form with TLID (Tiger GIS line ID)

Category 3
- Provider sent census block IDs in tabular form for blocks less than 2 square miles
- Provider sent customer address numbers in tabular form

Category 4
- Provider sent census block IDs in tabular form for blocks less than 2 square miles

- Provider sent address ranges in tabular form with no TLID

Category 5
- Provider sent census block IDs in tabular form
- Provider did not submit address level data

Category 6
- Provider did not send census block IDs
- Provider sent customer address numbers in tabular form OR provider sent address ranges

Wireless Providers:

Category 7
- Provider sent GIS shapefiles of coverage areas

Category 8
- Provider sent customer address numbers in tabular form which represented coverage (propagation model developed)

Generalized Broadband provider Data Processing

Broadband provider processing was accomplished in using selection set feature classes and the appropriate geometry supplied. Data was reported in many different categories and each of these reporting formats was handled differently. While there were other NTIA SBDD data sets that were provided differently from providers (pricing, speed by region), they were considered separate use cases than base layer data since the output of these secondary data sets was not primarily geospatial. The following are GIS data layers reported in the SBDD data model.

Wireless Service Area Polygon Reporting – Service Area Polygons were reported by Wireless Broadband providers and required little processing to be included in the NTIA SBDD data model. Typical inclusion processes included attribute validation and use of the ESRI Simple Data Loader or Copy and Paste.

Census Block Reporting – Broadband providers reporting broadband availability on a census block basis submitted it in list form a majority of the time. These lists came in the form of spreadsheets and text files. These lists were normalized into spreadsheets and then imported into a provider staging geodatabase table. Providers who submitted data for the fall 2011 release were then asked as a follow up by the CIT what census geography they reported their data in and a spreadsheet kept record of all new submissions and the geography used.

If data was submitted in 2010 census block geography, it was joined directly to the 2010 selection set block GIS data and checked to make sure reported provider values matched 100%. If the data did not match all records in the submitted table, data was inspected to see whether there was duplicate transmission technology or if the provider may have actually submitted in a different geography than requested. Attributes were joined to the 2010-2000 cross walk table by FIPS with only matching records being kept in the join. The data was then exported to a separate feature table and the new feature table was joined to 2010 selection set block data using the GEOID value.

Some anomalies were encountered about geometry and are documented in the individual provider processing section. Generally, these anomalies occurred in the conversion from 2000 where blocks were less than two square miles in census 2000 geography but the 2010 blocks were greater than two square miles. The resulting broadband provider specific staging database was validated and attribute anomalies were filtered into an error database.

Address Reporting - Providers reporting broadband availability on a service address basis submitted it in list form. These lists were either submitted in the form of spreadsheets or text files; no geospatial address data was received. Once the address number data was converted to spreadsheets from text files, the address lists were geocoded using VGINs three tiered geocoding process. Addresses were first geocoded against the statewide address point database. Any service addresses that were tied with the match threshold or unmatched on the first pass were rerun using the statewide road centerline geocoding web service. At this point, a majority of the addresses were located and unmatched addresses were then exported as a spreadsheet.

Road Segment Address Reporting – Broadband providers reporting broadband availability using road address ranges submitted the data in a non-spatial list in a majority of cases, although several providers did send in TIGER lines. These lists were normalized into a series of spreadsheets when processing the individual provider. The data was either used in joining to census features by Tiger Line ID (TLID) and then selecting by location from the selection set RCL data or used raw in geospatial format and selected. No providers from the fall 2011 processing were geocoded by address range. If data was not usable by this format, address data was requested from the provider and geocoded as a reported address.

Community Anchor Institutions – Virginia's CAI data has additional attribution to the NTIA data model due the source of the VA data set. In conjunction with Virginia Tech holding speed tests in 2009 to receive download and upload speeds for locations across Virginia, working with many statewide non spatial data sets, VGIN was able to geocode several sources into a singe CAI feature class. This aggregate feature class was loaded into the round 1 NTIA transfer data model. NTIA requested that the data model not be changed so unfortunately speed data was not reported since VT actual values for upload and download speeds populated as opposed to the requested advertised speeds.

In several joint efforts, CAI ID was added to the Virginia CAI data set by Virginia Tech and VGIN. For the spring 2011 SBDD submission, VT aided in the incorporation of additional unreported federal ID values in the data. VGIN received a CAI update from Virginia Tech in early September of 2011 which contained federal ID additions to the data for approximately 75 features which were not previously identified. Theses values were conflated to the VGIN SDE CAI feature class by the spatial adjustment toolbar in ArcMap. Attributes were mapped in for CAI ID, and edit dates as well as edit comments were updated in the VA CAI data. There were several hundred features in the VA Broadband SDE database which did not have appropriate latitude/longitude values so the data set was batch calculated with coordinate values for all features.

In order to represent the data with 2010 census geography as requested by the NTIA for the fall 2011 SBDD submission, data was spatially joined to the 2010 census block data and updated in the SDE layer. This was loaded to the transfer data model in the NTIA SBDD format.

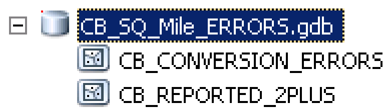
Middle Mile – The majority of providers do not send middle mile data. When it is received it is converted into a geodatabase table in the broadband provider's staging geodatabase. An add XY function was performed in ArcMap and XY events were exported as a new feature class. Inside the provider's staging geodatabase, the NTIA SBDD data model feature class named BB_ConnectionPoint_MiddleMile was imported and renamed NTIA_middle_mile. Data was either loaded to this feature class and all appropriate fields were calculated based on the XY event in order to load data spatially or if only a handful of points were provided the data was manually edited in an edit session. Census blocks for 2010 GEOID value were spatially joined to the middle mile points after all provider who submitted middle mile data and carry over middle mile points were loaded.

Pricing - If nominal weighted subscriber speed was available from a broadband provider, the data was placed into an excel spreadsheet for the fall 2011 submission which followed the format of requested text output information from NTIA. It was then output to a requested tab delimited text file for the release. All providers who had previously sent in pricing data but had not submitted an update for the fall 2011 release were carried over into the fall 2011 pricing spreadsheet.

Speed based on CMA/MSA/RSA - If speed was available by cellular market area or MSA/RSA and provided to CIT and VGIN, this information was placed into a newly created SDE feature class which tracked the most current speed from a provider. If the provider was a new or updated submission, the feature class was updated with the most recent speed data. All archive speed data was located and custom areas of interest were added as polygons in this feature class.

Processing QC, Batch Calculation, & Loading

While some provider data imported directly, where information for 2010 census geography was needed (Census Blocks, Middle Mile, Address Points) the feature of interest was imported and processed differently depending on the type of geography stored. A new geodatabase was created called CB_SQ_Mile_Errors and was necessary for the storage of census blocks which reported errors in the conversion from 2000 to 2010 census geography. Not all providers submitted census blocks to the NTIA but those who did were validated with a field in the selection set census block layer which contained square mileage calculated on the VA Custom Lambert projection. Another geodatabase was created called REPORTED_ERRORS_2010 and it tracked blocks sent by providers which were in fact greater than two square miles.



For data reported as service addresses, several fields were required that could be calculated in batch. The FULLFIPSID was calculated to the address points by spatially joining points to the census blocks. Latitude and Longitude were calculated in ArcCatalog using the calculate geometry function.

Only a few broadband providers who participated in the spring 2011 NTIA submittal provided Middle mile data. Resultantly, the processing and aggregation of a middle mile data set was done outside of standard broadband provider data processing.

Address Points, Road Centerlines, Census blocks, and Wireless Service polygons were processed as broadband provider data was received although middle mile information was a post processing step. To create middle mile event data, the broadband providers that provided the information to CIT and VGIN generally included latitude and longitude of the facility and these values were used in ArcGIS with the add XY function. After points were brought into ArcGIS, data was exported into a separate feature class and values were calculated based on information the broadband provider provided.

Specific Broadband Provider Processing Methodology

The following Broadband Providers submitted CIT data for the spring 2011 NTIA submission. It is assumed that the participating Broadband providers provided entire coverage as opposed to update only data sets unless otherwise noted. Included are the methods used in updating the Virginia Broadband map data:

Broadband Provider	FCC Registration Number
AT&T Wireless	0004979233
CenturyLink	0018626853
Charter Communications, Inc.	0017179383
Comcast	0004441663
Covad Communications Company	0003753753
Cox Communications	0001524461
Cricket Communications, Inc.	0002963528
Level 3 Communications, LLC	0003723822
Northern Neck Wireless Internet Services, LLC	0017338054
NTELOS Inc.	0005849518
NTELOS (Richmond 20 MHz LLC)	0001656180
NTELOS (Virginia PCS Alliance, L.C.)	0002051720
NTELOS (West Virginia PCS Alliance, L.C.)	0002049328
NTELOS Telephone Inc.	0002073138
NTELOS Network Inc.	0003742442
Roanoke and Botetourt Telephone Company	0003775244
R&B Network Inc.	0003775301
RCN	0003735016
Shentel Cable Company	0018024075
Shentel Service Company	0013393988
Sprint Nextel Corporation	0003774593
Sunset Digital Communications Inc.	0000826322
T-Mobile	0006945950
TDS Telecom (Amelia Telephone Corporation)	0002073526
TDS Telecom (New Castle Telephone Company)	0003767399
TDS Telecom (Virginia Telephone Company)	0002058261
Time Warner Cable	0013430244
Verizon Wireline	0002073203

AT&T Wireless

AT&T wireless provided geospatial data in the form of a coverage area shape file. Middle mile was included but the values reported were the same as reported in the spring 2011 submission. Weighted speed was included but the document provided was for the state of Mississippi so it could not be used.

Inside the shapefile provided by AT&T were over 1700 polygon records and every single record contained identical attribution. The data appeared to be gridded for internal use. The data was imported into the provider's staging geodatabase using the NTIA wireless schema. Polygons were merged into a single coverage polygon, and attributes were populated to match supporting documentation reported by AT&T. Upon reviewing the documentation, the polygon did have two spectrums so a second polygon was created based on copy and paste and coded to match the appropriate transmission technology spectrum. After completion, the data was loaded into NTIA SBDD transfer data model reporting database.

Provider Name:	AT&T Mobility, LLC
DBA Name:	AT&T Mobility, LLC
FRN:	0004979233
Transmission Technology	80
VA Data Category:	7
Wireless Polygons:	2
2010 Census Blocks <2 Square miles:	0
Address Point features:	0
Road Centerline features:	0
Middle Mile features:	1
Community Anchor Institutions reported:	0

Century Link

CenturyLink provided geospatial data in the form of road centerlines and census blocks and reported to CIT that the census Geography was in 2010. Middle mile and subscriber weighted speed were not included this round and were carried over from the most recent data submission into the speed SDE layer and pricing spreadsheet. A staging geodatabase was created using selection Set Feature Classes for Street Centerlines and Census blocks.

Census blocks less than two square miles were joined to the Selection Set Census block data using the FULLFIPSID text. Inspecting the join, all features seemed to successfully pass through, signifying that the provider did in fact submit data in 2010 geometry. The joined block data was output to new features. Since the data associated to the blocks were named similarly to the NITA model data, they were calculated in the selection set export and then loaded into the NTIA transfer data model.

In order to provide the Road Centerline data in Virginia's geometry (VBMP RCL Quarter 2, 2011), the road lines provided by Century Link were used in a select by location analysis. The Virginia Road Centerline Selection set was selected if the lines provided by CenturyLink were within 5 meters and then exported to a new feature class. All values inside the Century Link roads were then used in select by location queries to conflate attributes. This iteration of the roads was loaded into the NTIA transfer data model.

Provider Name:	CenturyTel, Inc.
DBA Name:	CenturyLink
FRN:	0018626853
Transmission Technology	10
VA Data Category:	1
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	28909
Address Point features:	0

Road Centerline features:	14807
Middle Mile features:	1
Community Anchor Institutions reported:	0

Charter

Charter provided Geospatial data in the form of road centerlines and census blocks and reported to CIT that the census Geography was in 2010. Subscriber weighted speed was not included this round and was carried over from the most recent data submission. To date, middle mile data has not been received from this provider. A new Personal geodatabase was created to represent the staging of this provider for the fall 2011 release. Selection Set Feature Classes for Street Centerlines and Census blocks were used.

In order to provide the Road Centerline data in Virginia's geometry (VBMP RCL Quarter 2, 2011), the road lines provided by Charter were used in a select by location analysis. The Virginia Road Centerline Selection Set was selected if the lines provided by Charter were within 5 meters and then exported to a new feature class. All values inside the Charter roads were then used in select by location queries to conflate attributes. This iteration of the roads was loaded into the reporting database.

Charter also provided geospatial data in the form of census blocks less than two square miles. These values were joined to the Selection Set Census block data by FULLFIPSID and after inspected, all features successfully joined signifying that Charter did report data in 2010 geography. The data was then output to a new feature class. Since the data associated to the blocks were named similarly to the NITA model data, they were calculated in the selection set export and then into the NTIA transfer data model.

Provider Name:	Charter Communications, Inc.
DBA Name:	Charter Communications, Inc.
FRN:	0017179383
Transmission Technology	41
VA Data Category:	1
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	4670
Address Point features:	0
Road Centerline features:	804
Middle Mile features:	0
Community Anchor Institutions reported:	0

Comcast

Comcast provided census block and address number spreadsheets and reported to CIT that the geography used was in Census 2010. Speed data was provided by region in a spreadsheet and the values inside were added to the Speed SDE feature class as regional polygons. A staging file geodatabase was created for this provider and the census block spreadsheet information was imported as a table.

Comparing this submission to the last, there were several thousand blocks less in the data but over 35K records which was presumably the entire coverage data set and not an update of deltas only. This FGDB table was joined to the 2010 selection set census blocks directly and all blocks did successfully join from the table to the feature, signifying that Comcast did report features in 2010 geography. None of the census blocks reported were over two square miles. The joined data was then exported to a new feature class. The features in this new layer were selected by location to the SDE speed feature class in order to apply maximum down and upload speeds which were reported in the speed spreadsheet.

The address availability import table was geocoded using the VGIN address point geo-locator. Matched and Tied results were exported to a separate table and re-geocoded to the road centerline locator. All RCL locator points were spatially joined to the Virginia RCL selection set and output to a separate feature class. The address point and road centerline feature classes were then imported into the NTIA transfer data model.

Provider Name:	Comcast Cable Communications, LLC
DBA Name:	Comcast
FRN:	0004441663
Transmission Technology	40, 41
VA Data Category:	3
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	35719
Address Point features:	12860
Road Centerline features:	491
Middle Mile features:	0
Community Anchor Institutions reported:	0

Covad Communications Company

Covad provided Census Blocks, Address ranges, Middle Mile, subscriber pricing, and speed by region as text files. This data was normalized to spreadsheets. CIT confirmed with the provider that the census geography used was in 2010. A staging geodatabase was created and the spreadsheets were imported as feature class tables. The pricing information was added directly from the imported spreadsheet to the provider aggregate pricing spreadsheet while the Middle mile and speed data were checked and no updates were necessary to make in the Middle mile point and Speed polygon feature classes so values were carried over from the spring 2011 submission.

Covad provided different transmission technology speeds within the same geometric features so the output product need was stacked geometry. In order to geographically represent the data this way, for Census Block and Address Segment data, transmission type was selected and a separate geodatabase table was exported for each. There were

3 tables for Census Blocks created; 10, 20, & 30. There were 3 tables for address ranges created; 10, 20, & 30. Each of these were joined to the appropriate feature class individually, exported as a separate feature class, and then loaded to a single feature class per geometry.

The census block text file contained varying transmission technologies. There were more records than Microsoft excel 2003 could handle so the import procedure to normalize the data was directly into an Access database. To graphically represent the COVAD data, the imported Access table was added as a table in ArcMap and individual table selections were output for Transmission Technology type. There were three output tables created and each table was individually joined to the selection set census block layer to verify record number counts. The joins all were successful, signifying that the data was indeed in 2010 geography so they were exported to a separate feature class per table. Typical Download and Upload speeds were on the feature through the join but Advertised was located in the speed information which was applied to the SDE Speed polygon layer so layers were selected individually to conflate the advertised speeds based on select by location. The three populated feature classes were loaded into a single feature class to represent block geography and this was loaded to the NITA transfer data model.

Address Ranges did have TLID values inside of them so for each Address Table created, they were joined to the 2010 TIGER lines and then exported individually to a TIGER Feature class. Each Tiger feature class was used in select by location to be within 5 meters of the selection set Virginia Road Centerline data. Three selection set feature classes were then output and attributes were populated individually. The three line features were merged into a single feature of stacked geometries and this was loaded to the NTIA Transfer data model.

Provider Name:	DIECA Communications, Inc.
DBA Name:	Covad Communications Company
FRN:	0003753753
Transmission Technology	10, 20 , 30
VA Data Category:	2
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	123550
Address Point features:	0
Road Centerline features:	1769
Middle Mile features:	6
Community Anchor Institutions reported:	0

Cox

Cox provided text files of Address Availability, Census Blocks, Middle mile, weighted speeds, and speed by region. These files were normalized into spreadsheets and imported as tables into the provider staging geodatabase. Weighted speed information was placed into the pricing spreadsheet directly. Speed by region was used in creating new polygons in the SDE speed layer. Middle mile had no changes so values were carried over from the spring 2011 submission.

Cox reported to CIT that their blocks were in 2010 census geography but when working with the census blocks first, the spreadsheet FIPS value was joined to the 2010 block feature class and only 13000 blocks achieved a result. In total, there were over 25K blocks which were preliminarily joined to feature layers of XREF to 2010 block features. After this viewing of the data, they were assumed 2000 and the geodatabase table was joined to the 2000-2010 XREF table in ArcMap and only matched values were kept. These values were exported into a new table and then joined to the 2010 block selection set by GEOID. The new feature class join was then exported to a new feature class and values were calculated based on joined features. Where information was not present, the Speed SDE feature class was used by select by location and calculations were performed based on block centroid location in provider speed area. Blocks were then exported to two feature classes based on the SQ_MI_VALAMBERT inside the selection set feature class; one which represented blocks less than two square miles and one which was blocks greater than two square miles. The feature class of blocks less than two square miles was loaded to the NTIA transfer data model and the feature class of blocks greater than two square miles was loaded to the reported_error block feature class.

The Cox address availability import table was geocoded to the VGIN address point geo-locator and the output data provided was the same XY as the address point. Matched points were spatially joined to the selection set address point data. Unmatched and Tied results were exported to a separate table and re-geocoded to the road centerline locator. All RCL locator points were spatially joined to the Virginia RCL selection set and output to a separate feature class. Using the speed SDE layer, missing values were calculated for both address points and road centerlines. The address point and road centerline feature classes were then imported into the NTIA transfer data model.

Provider Name:	CoxCom Inc.
DBA Name:	Cox Communications
FRN:	0001524461
Transmission Technology	40
VA Data Category:	1, 3
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	25140
Address Point features:	2558
Road Centerline features:	195
Middle Mile features:	4
Community Anchor Institutions reported:	0

Cricket

Cricket provided Geospatial data in the form of a coverage area shape file. Middle mile data was not included. The shape file had all of the fields needed to load into the NTIA model therefore no additional information was needed. The GIS shape file was copied and pasted into the provider staging geodatabase feature class and attributes were populated and checked against the source data. After completion, the data was loaded into NTIA SBDD transfer data model reporting database.

Provider Name:	Leap Wireless International, Inc.
DBA Name:	Cricket Communications, Inc.
FRN:	0002963528
Transmission Technology	80
VA Data Category:	7
Wireless Polygons:	1
2010 Census Blocks <2 Square miles:	0
Address Point features:	0
Road Centerline features:	0
Middle Mile features:	0
Community Anchor Institutions reported:	0

Level 3

Level 3 provided text files of address availability and middle mile points for the fall 2011 submission. A staging geodatabase was created for the provider and both text files were imported for normalization. Address availability import table was geocoded to the VGIN address point geo-locator. Matched and Tied results were exported to a separate table and re-geocoded to the road centerline locator. All RCL locator points were spatially joined to the Virginia RCL selection set and output to a separate feature class. The address point and road centerline feature classes were then imported into the NTIA transfer data model.

Middle mile data was added as XY events and exported using the same coordinate system as the NTIA SBDD layers. It was then imported into a feature class which replicated the middle mile schema of the NTIA transfer data model and cleaned. This was then loaded into the NTIA Transfer data model.

Provider Name:	Level 3 Communications, LLC
DBA Name:	Level 3 Communications, LLC
FRN:	0003723822
Transmission Technology	50
VA Data Category:	6
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	0
Address Point features:	581
Road Centerline features:	106

Middle Mile features:	436
Community Anchor Institutions reported:	0

Northern Neck Wi-Fi

Northern Neck Wireless provided its submission for the fall 2011 release in the form of address level data even though they are a wireline provider. Based on NTIA feedback and the transmission technology type of the provider, Virginia Tech developed a radio tower propagation model for the spring 2011 SBDD data release to be used in reporting instead of address level point or road centerline data. For detailed processing information, please review the spring 2011 SBDD reporting documentation. The address level data for the fall 2011 release was geocoded and points were used in verification of accuracy of the polygon data based on the centroid of the point.

Many addresses that were geocoded fell outside of the model generated for the previous release. All address and RCL point matches through the history of submission of Northern Neck Wi-Fi were merged together in a single point layer. Points were selected if their centroid fell within the propagation model polygon, and then results were switched to find all features outside of the polygon. Many customer addresses points were found outside of the tower extents (polygons). Buffers of 500 meters were created around the points since the original VA broadband map from 2008 was generated for statewide visualization of 500 meter buffers. The polygon buffers were all merged together in a single polygon and loaded to the SBDD wireless polygon feature class in the transfer data model. The carryover polygon information from spring 2011 was loaded into the transfer data model as well.

Provider Name:	Northern Neck Wireless Internet Services, LLC
DBA Name:	Northern Neck Wireless Internet Services, LLC
FRN:	0017338054
Transmission Technology	70
VA Data Category:	8
Wireless Polygons:	2
2010 Census Blocks <2 Square miles:	0
Address Point features:	0
Road Centerline features:	0
Middle Mile features:	0
Community Anchor Institutions reported:	0

NTELOS Wireless

NTELOS and its numerous provider names submitted to Geospatial data in the form of a coverage area shape file. Middle mile data was not included. Inside the shapefile provided by NTELOS were four polygon records; one polygon for each different FRN. The structure had all of the fields needed to load into the NTIA model therefore no additional information was needed. The NTELOS GIS shape file was copied and pasted into the provider staging geodatabase feature class and attributes were populated and checked against the source data. After completion, the data was loaded into NTIA SBDD transfer data model.

Provider Name:	NTELOS Inc.
DBA Name:	NTELOS
FRN:	0005849518
Transmission Technology	80
VA Data Category:	7
Wireless Polygons:	1
2010 Census Blocks <2 Square miles:	0
Address Point features:	0
Road Centerline features:	0
Middle Mile features:	0
Community Anchor Institutions reported:	0

Provider Name:	Richmond 20 MHz LLC
DBA Name:	NTELOS
FRN:	0001656180
Transmission Technology	80
VA Data Category:	7
Wireless Polygons:	1
2010 Census Blocks <2 Square miles:	0
Address Point features:	0
Road Centerline features:	0
Middle Mile features:	0
Community Anchor Institutions reported:	0

Provider Name:	Virginia PCS Alliance, L.C.
DBA Name:	NTELOS
FRN:	0002051720
Transmission Technology	80
VA Data Category:	7
Wireless Polygons:	1
2010 Census Blocks <2 Square miles:	0
Address Point features:	0
Road Centerline features:	0
Middle Mile features:	0
Community Anchor Institutions reported:	0

Provider Name:	West Virginia PCS Alliance, L.C.
DBA Name:	NTELOS
FRN:	0002049328
Transmission Technology	80
VA Data Category:	7
Wireless Polygons:	1
2010 Census Blocks <2 Square miles:	0
Address Point features:	0

Road Centerline features: 0
Middle Mile features: 0
Community Anchor Institutions reported: 1

NTELOS Wireline

NTELOS provided text files of Address Availability, Census Blocks, and subscriber weighted speed for the Fall 2011 data inclusion. These files were normalized into spreadsheets for usage. The pricing information was directly placed into the pricing spreadsheet. The master address and census blocks spreadsheets were imported into the provider staging database as tables. While there were no updates for speed information by region, the speed SDE layer was updated with data from the spring 2011 submission to use in selections. Addresses that were reported appeared to be updates only so a master spreadsheet of this provider was carried over from the last submission to this new submission server directory and the updates were added to the master address spreadsheet. Middle mile information was carried over from the spring 2011 submission.

NTELOS reported to CIT that their blocks were in 2010 census geography but when working with the census blocks first, the spreadsheet FIPS value was joined to the 2010 block feature class and approximately 1000 blocks were unmatched. This signified that the blocks reported may have been sent in 2000 geography or a geography different than 2010. Due to the unmatched joins, NTELOS blocks were assumed 2000 geography and the geodatabase table was joined to the 2000-2010 XREF table in ArcMap and only matched values were kept. These values were exported into a new table and then joined to the 2010 block selection set by GEOID. The new feature class join was then exported to a new feature class and values were calculated based on joined features. Where information was not present, the Speed SDE feature class was used by select by location and calculations were performed based on block centroid location in provider speed area. Blocks were then exported to two feature classes based on the SQ_MI_VALAMBERT inside the selection set feature class; one which represented blocks less than two square miles and one which contained a small subset of blocks greater than two square miles. The feature class of blocks less than two square miles was loaded to the NTIA transfer data model and the feature class of blocks greater than two square miles was loaded to the reported_error block feature class.

The address availability import table was updates only so a master spreadsheet carried over from the last submission of NTELOS addresses was updated with the changes which were provided. This was geocoded to the VGIN address point geo-locator and the output data provided was the same XY as the address point. Matched and Tied results were exported to a separate table and re-geocoded to the road centerline locator. All RCL locator points were spatially joined to the Virginia RCL selection set and output to a separate feature class. Using the speed SDE layer, missing values were calculated for both address points and road centerlines. The address point and road centerline feature classes were then imported into the NTIA transfer data model.

Provider Name:	NTELOS Inc.
DBA Name:	NTELOS Telephone Inc.
FRN:	0002073138
Transmission Technology	10, 50
VA Data Category:	3
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	3260
Address Point features:	6462
Road Centerline features:	1263
Middle Mile features:	2
Community Anchor Institutions reported:	0

Provider Name:	NTELOS Inc.
DBA Name:	NTELOS Network Inc.
FRN:	0003742442
Transmission Technology	10, 50
VA Data Category:	3
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	1946
Address Point features:	1768
Road Centerline features:	295
Middle Mile features:	50
Community Anchor Institutions reported:	0

Provider Name:	NTELOS Inc.
DBA Name:	Roanoke and Botetourt Telephone Company
FRN:	0003775244
Transmission Technology	10, 50
VA Data Category:	3
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	1297
Address Point features:	3508
Road Centerline features:	121
Middle Mile features:	1
Community Anchor Institutions reported:	0

Provider Name:	NTELOS Inc.
DBA Name:	R&B Network Inc.
FRN:	0003775301
Transmission Technology	10
VA Data Category:	3
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	1019
Address Point features:	469
Road Centerline features:	171
Middle Mile features:	13
Community Anchor Institutions reported:	0

RCN

RCN provided a spreadsheet of address availability and middle mile points for the fall 2011 submission. A provider staging geodatabase was created and both files were imported as tables for normalization. The Address availability import table was geocoded to the VGIN address point geo-locator. Matched and Tied results were kept, while unmatched results were exported to a separate table in the geodatabase. All RCL locator points were spatially joined to the Virginia RCL selection set and output to a separate feature class. The address point and road centerline feature classes were then imported into the NTIA transfer data model.

Middle mile data was added as XY events and exported using the same coordinate system as the NTIA SBDD layers. After viewing the data, it appeared the points were not valid coordinates so addresses were geocoded and XY points were created and checked to the source. The middle mile data extracted from addresses was then imported into a feature class which replicated the middle mile schema of the NTIA transfer data model while data was cleaned and calculated. This was then loaded into the NTIA Transfer data model.

Provider Name:	Starpower Communications, LLC
DBA Name:	RCN
FRN:	0003735016
Transmission Technology	40
VA Data Category:	6
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	0
Address Point features:	2038
Road Centerline features:	0
Middle Mile features:	2
Community Anchor Institutions reported:	0

Shentel

Shentel provided a spreadsheet for Shentel Cable Company and Shentel Service Company and within each spreadsheet was a tab for address availability, a tab for census block availability, and a tab for Speed information. Middle mile and pricing was not submitted at this point in time. The speed information provided was used in updating the SDE speed layer. Two new staging geodatabases were created for both Shentel FRNs and tables were imported into the geodatabase of interest from the original excel tab.

Census block information was reported in 2000 geography to CIT so the imported block data was joined the 2000-2010 XREF table in ArcMap and only matched values were kept. These values were exported into a new table and then joined to the 2010 block selection set by GEOID. The new feature class join was then exported to a new feature class and values were calculated based on joined features. Blocks were then verified for appropriate square mileage in the geography conversion and exported to two feature classes based on the SQ_MI_VALAMBERT inside the selection set feature class; one which represented blocks less than two square miles and one which was blocks greater than two square miles. The feature class of blocks less than two square miles was loaded to the NTIA transfer data model and the feature class of blocks greater than two square miles was loaded to the Conversion_Error block feature class.

The address import data did have TLID available as a column Shentel's data. In order to provide the Road Centerline data in Virginia's geometry (VBMP RCL Quarter 2, 2011), the imported tables for address ranges based on Shentel FRN numbers were joined to the 2009 tiger lines since it was presumed they were not using 2010 geography for lines. The joins were output to new feature classes and they were used in a select by location analysis. The Virginia Road Centerline Selection set was selected if the lines provided by Shentel TLID lines were within 5 meters and then exported to a new feature class. All values inside the Shentel roads were then used in select by location queries to conflate attributes. This iteration of the roads was loaded into the reporting database.

Provider Name:	Shentel Cable Company
DBA Name:	Shentel
FRN:	0018024075
Transmission Technology	40
VA Data Category:	2
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	11209
Address Point features:	0
Road Centerline features:	3587
Middle Mile features:	0
Community Anchor Institutions reported:	0

Provider Name:	Shentel Service Company
DBA Name:	Shentel
FRN:	0013393988
Transmission Technology	10
VA Data Category:	2
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	2153
Address Point features:	0
Road Centerline features:	1188
Middle Mile features:	0
Community Anchor Institutions reported:	0

Sprint

Sprint provided Geospatial data in the form of a coverage area shape file. Middle mile was included. The shapefile contained two records and the structure had all of the fields needed to load into the NTIA model therefore no additional information was needed.

The GIS shape file was loaded into the provider staging geodatabase feature class and FRN information was scrubbed to match the NTIA number reporting format. The data was then loaded into the Transfer Data Model. Middle mile information did not appear to change any attribution so it was loaded from the spring 2011 transfer data model.

Provider Name:	Sprint Nextel Corporation
DBA Name:	Sprint
FRN:	0003774593
Transmission Technology	80
VA Data Category:	7
Wireless Polygons:	2
2010 Census Blocks <2 Square miles:	0
Address Point features:	0
Road Centerline features:	0
Middle Mile features:	2
Community Anchor Institutions reported:	0

Sunset Digital

Sunset Digital was a first time provider for the fall 2011 SBDD submission and provided Geospatial data in the form of road centerlines and census blocks. The provider reported to CIT that the census Geography was in 2010 and VGIN provided them a road centerline data set for usage in reporting. Middle mile was included this round as text files although there may be potential to receive future middle mile submissions in a geospatial format. A new personal geodatabase was created to represent the staging of this provider for the fall 2011 release. Selection Set Feature Classes for Street Centerlines and Census blocks were used.

Census blocks less than two square miles were joined to the Selection Set Census block data using the FULLFIPSID text. Inspecting the join, all features seemed to successfully pass through, signifying that the provider did in fact submit data in 2010 geometry. The joined block data was output to new features. Since the data associated to the blocks were named similarly to the NITA model data, they were calculated in the selection set export and then into the NTIA transfer data model directly.

Sunset Digital provided road centerline segments to CIT and VGIN in the Virginia Road Centerline geometry. The submission data included the VA unique ID for road segments. The V_LEID was joined to the selection set road centerline data V_LEID and only matching records were used. After records were verified, a 100% match rate between the two data sets was achieved. Road centerlines were then output to a staging feature class and then calculated. The staging feature class was then loaded to the transfer data model.

Provider Name:	Sunset Digital Communications Inc.
DBA Name:	Sunset Digital Communications Inc.
FRN:	0000826322
Transmission Technology	50
VA Data Category:	1
Wireless Polygons:	0

2010 Census Blocks <2 Square miles:	1522
Address Point features:	0
Road Centerline features:	778
Middle Mile features:	20
Community Anchor Institutions reported:	0

T-Mobile

T-mobile provided geospatial data in the form of three coverage area shapefiles. In the supporting documentation, T-mobile explained attribute values for each polygon feature class. Middle mile and pricing information was included but the values reported were the same as reported in the spring 2011 submission and were carried over into the new transfer model.

The shapefiles provided by T-mobile were named UMTS, HSPA 21, & HSP 42 and inside each shapefile were several thousand records with every single record in each feature class containing identical attribution. The data appeared to be gridded for internal use. The three shapefiles were imported into the provider's staging geodatabase. The polygons were merged into a single coverage polygon in the individual staging feature class, and attributes were populated to match supporting documentation provided by T-mobile. After completion, each feature class was loaded into the NTIA transfer data model.

Provider Name:	T-Mobile USA, Inc.
DBA Name:	T-Mobile
FRN:	0006945950
Transmission Technology	80
VA Data Category:	7
Wireless Polygons:	3
2010 Census Blocks <2 Square miles:	0
Address Point features:	0
Road Centerline features:	0
Middle Mile features:	1
Community Anchor Institutions reported:	0

TDS Telecom

TDS Telecom provided text files of Address Availability, Middle mile, and weighted speeds. These files were normalized into spreadsheets. The master address and middle mile spreadsheets were imported into the provider staging geodatabase as tables. The weighted speed information was placed into the pricing spreadsheet directly. Comparison of the middle mile data to the spring 2011 release, revealed no changes so values were carried over from the spring data set. Review of the address level data revealed there were transmission technologies reported for 10 and 50. Each of these technologies was exported into a separate table to geocode.

The address availability import tables for each technology were geocoded to the VGIN address point geo-locator and the output data provided is the same XY as the address point. Matched and Tied results were exported to a separate table and re-geocoded to the road centerline locator. All RCL locator points were spatially joined to the Virginia RCL selection set and output to a separate feature class. When previewing the source TDS Telecom data, there were many values where max advertised and typical down and up were significantly lower than max and typical up so values were standardized based on average values. In the TDS Telecom data, Max advertized seemed to be equal to typical up and down so both typical values were calculated based on max advertised. Data for points and address ranges were loaded to the transfer data model.

Provider Name:	Amelia Telephone Corporation
DBA Name:	TDS Telecom
FRN:	0002073526
Transmission Technology	10, 50
VA Data Category:	6
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	0
Address Point features:	0
Road Centerline features:	568
Middle Mile features:	1
Community Anchor Institutions reported:	0

Provider Name:	New Castle Telephone Company
DBA Name:	TDS Telecom
FRN:	0003767399
Transmission Technology	10
VA Data Category:	6
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	0
Address Point features:	1349
Road Centerline features:	97
Middle Mile features:	1
Community Anchor Institutions reported:	0

Provider Name:	Virginia Telephone Company
DBA Name:	TDS Telecom
FRN:	0002058261
Transmission Technology	10, 50
VA Data Category:	6
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	0
Address Point features:	997
Road Centerline features:	72
Middle Mile features:	1
Community Anchor Institutions reported:	0

Time Warner Cable

Time Warner provided Geospatial data in the form of road centerlines and census blocks and reported to CIT that the census Geography was in 2010. Middle mile and subscriber weighted speed were not included this round.

Working in the provider staging database, census blocks less than two square miles were joined to the Selection Set Census block data using the FIPS number text fields. Inspecting the join, all features seemed to successfully pass through, signifying that the provider did in fact submit data in 2010 geometry. None of the blocks provided were over two square miles. The joined block data was output to a new feature class. Fields were calculated in the selection set export to match Time Warner fields and then the feature class was loaded into the NTIA transfer data model.

In order to provide the Road Centerline data in Virginia's geometry (VBMP RCL Quarter 2, 2011), the road lines provided by Time Warner were used in a select by location analysis. The Virginia Road Centerline Selection set was selected if the lines provided by Time Warner were within 5 meters and then exported to a new feature class. The values for all road segments were the same so values from the selection road centerline set were manually calculated to match the provided roads. This iteration of the roads was loaded into the reporting database.

Provider Name:	Time Warner Cable
DBA Name:	Time Warner Cable
FRN:	0013430244
Transmission Technology	41
VA Data Category:	1
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	3282
Address Point features:	0
Road Centerline features:	2126
Middle Mile features:	0
Community Anchor Institutions reported:	0

Verizon Wireline

Verizon Wireline provided text files for census block availability, address range availability with TLID, and a spreadsheet of Middle Mile information by addresses. The text files were exported to excel files and loaded into the provider staging geodatabase as tables. The middle mile information was geocoded to the state address point locator and output to a feature class, and then loaded into the transfer data model middle mile feature class. Speed data was not reported this round but the SDE speed feature class was updated with Verizon's speed data from the spring 2011 submission.

Census block information was reported in 2010 geography to CIT and a Verizon reported dual transmission technology types. An initial join of the Verizon census block table to the 2010 blocks showed that several thousand records were filtered out by the join. A frequency was performed on the provided census block FIPS id to see if any duplicate records were present signifying potential transmission technology overlap and there were several thousand. Block information was then exported to two Transmission technology type tables; one for DLS and one for FIOS. These tables were individually joined to the 2010 census blocks in order to achieve exact record matches. The joins were exported to new feature classes and values were calculated based on joined features. Blocks were then verified for appropriate square mileage in the geography conversion and exported to two feature classes per transmission technology type based on the SQ_MI_VALAMBERT inside the selection set feature class. Blocks greater than two square miles that were erroneously reported were exported and loaded to the reported error feature class. The remaining blocks less than two square miles was loaded to the NTIA transfer data model.

The address import data did have TLID available as a column Verizon's data. Since census block transmission technology represented multiple areas, the Transmission Technology type for addresses reported was separated into two geodatabase tables for DSL and for FIOS. In order to provide the Road Centerline data in Virginia's geometry (VBMP RCL Quarter 2, 2011), individual transmission technology tables were joined to the 2010 tiger lines since Verizon reported 2010 data. The joins were output to new feature classes and they were used in a select by location analysis. The Virginia Road Centerline Selection set was selected if the lines provided by Verizon TLID joined lines were within 5 meters and then exported to a new feature class. All values inside the Verizon roads were then used in select by location queries to conflate attributes. This iteration of the roads was loaded into the reporting database.

Provider Name:	Verizon Virginia Inc.
DBA Name:	Verizon Virginia Inc.
FRN:	0002073203
Transmission Technology	10, 50
VA Data Category:	2
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	110765
Address Point features:	0
Road Centerline features:	15635
Middle Mile features:	12
Community Anchor Institutions reported:	0

Many providers did not submit updates for the fall 2011 so their data from the spring 2011 SBDD transfer model was carried over. A new staging geodatabase was created which represented providers who did not send updates and the schema matched the transfer data model. Providers who did not submit an update were selected by FRN from the spring 2011 NTIA SBDD submittal. The following broadband providers are participants in the VA SBDD project but did not indicate having updates and were loaded into the address point, road centerline, and middle mile carryover feature classes directly without the need of a data rework:

Broadband Provider	FCC Registration Number
BVU OptiNet	0006823991
Burkes Garden Telephone Company	0004942819
Citizens Cablevision Inc.	0009485343
Citizens Telephone Cooperative	0004381422
Highland Telephone Cooperative	0004318846
FairPoint Communications	0002071116
MGWnet	0019225366
Midatlantic Broadband Cooperative	0019765304
New Hope Telephone Cooperative	0002071579
Roadstar Internet, Inc.	0013445358
Scott County Telephone Cooperative	0002069862
Verizon Wireless	0003290673
Virginia Mountain Micro	0018713800

BVU OptiNet

Provider Name:	BVU
DBA Name:	OptiNet
FRN:	0006823991
Transmission Technology	50
VA Data Category:	6
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	0
Address Point features:	2313
Road Centerline features:	1813
Middle Mile features:	0
Community Anchor Institutions reported:	0

Burkes Garden Telephone Company

Provider Name:	Burke’s Garden Telephone Company, Inc.
DBA Name:	Burke’s Garden Telephone Company, Inc.
FRN:	0004942819
Transmission Technology	10
VA Data Category:	6
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	0
Address Point features:	107
Road Centerline features:	68
Middle Mile features:	1
Community Anchor Institutions reported:	0

Citizens

Provider Name:	Citizens Cablevision, Inc.
DBA Name:	Citizens
FRN:	0009485343

Transmission Technology	41
VA Data Category:	6
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	0
Address Point features:	525
Road Centerline features:	245
Middle Mile features:	0
Community Anchor Institutions reported:	0

Provider Name:	Citizens Telephone Cooperative
DBA Name:	Citizens
FRN:	0004381422
Transmission Technology	10, 41
VA Data Category:	6
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	0
Address Point features:	6081
Road Centerline features:	2408
Middle Mile features:	0
Community Anchor Institutions reported:	0

Highland Telephone Cooperative

Provider Name:	Highland Telephone Cooperative
DBA Name:	Highland Telephone Cooperative
FRN:	0004318846
Transmission Technology	10
VA Data Category:	6
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	0
Address Point features:	1049
Road Centerline features:	306
Middle Mile features:	0
Community Anchor Institutions reported:	0

FairPoint Communications

Provider Name:	Peoples Mutual Telephone Company
DBA Name:	FairPoint Communications
FRN:	0002071116
Transmission Technology	10
VA Data Category:	6
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	0
Address Point features:	6360
Road Centerline features:	969
Middle Mile features:	0
Community Anchor Institutions reported:	0

MGW Networks

Provider Name:	MGW Networks, LLC
DBA Name:	MGW Networks, LLC
FRN:	0019225366

Transmission Technology	10
VA Data Category:	6
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	0
Address Point features:	375
Road Centerline features:	21
Middle Mile features:	0
Community Anchor Institutions reported:	0

MidAtlantic Broadband Cooperative

Provider Name:	Mid-Atlantic Broadband Cooperative
DBA Name:	MBC
FRN:	0019765304
Transmission Technology	50
VA Data Category:	6
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	0
Address Point features:	77
Road Centerline features:	75
Middle Mile features:	0
Community Anchor Institutions reported:	0

New Hope Telephone Cooperative

Provider Name:	New Hope Telephone Cooperative
DBA Name:	New Hope Telephone Cooperative
FRN:	0002071579
Transmission Technology	10
VA Data Category:	6
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	0
Address Point features:	0
Road Centerline features:	1210
Middle Mile features:	0
Community Anchor Institutions reported:	0

Roadstar Internet, Inc.

Provider Name:	Roadstar Internet Inc.
DBA Name:	Roadstar Internet Inc.
FRN:	0013445358
Transmission Technology	71
VA Data Category:	8
Wireless Polygons:	1
2010 Census Blocks <2 Square miles:	0
Address Point features:	0
Road Centerline features:	0
Middle Mile features:	0
Community Anchor Institutions reported:	0

Scott County Telephone Cooperative

Provider Name:	Scott County Telephone Cooperative
DBA Name:	SCTC

FRN:	0002069862
Transmission Technology	10, 50
VA Data Category:	6
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	0
Address Point features:	8583
Road Centerline features:	1847
Middle Mile features:	0
Community Anchor Institutions reported:	0

Verizon Wireless

Provider Name:	Cellco Partnership and its Affiliated Entities
DBA Name:	Verizon Wireless
FRN:	0003290673
Transmission Technology	80
VA Data Category:	7
Wireless Polygons:	2
2010 Census Blocks <2 Square miles:	0
Address Point features:	0
Road Centerline features:	0
Middle Mile features:	0
Community Anchor Institutions reported:	0

Virginia Mountain Micro

Provider Name:	Virginia Mountain Micro
DBA Name:	VMMicro
FRN:	0018713800
Transmission Technology	71
VA Data Category:	7
Wireless Polygons:	1
2010 Census Blocks <2 Square miles:	0
Address Point features:	0
Road Centerline features:	0
Middle Mile features:	0
Community Anchor Institutions reported:	0

The provider information was seamlessly added although with the 2010 census block request from the NTIA, several steps were needed to update point data with the GEOID values of 2010 blocks.

To populate the appropriate data with 2010 census block information, carryover address point and middle mile point data for theses providers was spatially joined to the 2010 census block polygons and the FIPS code of the block added to each point was calculated with the 2010 GEOID value for the block.

In general, census blocks from carry over providers were assumed to be delivered in 2000 geography since the 2010 TIGER data was unavailable before these providers would have sent data to CIT so they were joined to the 2000 XREF table and output non-spatially.

This non-spatial table was joined to the 2010 Selection Set and fields were populated for the model.

The following providers were reprocessed using the source data and 2010 block conversion methodology or a separate effort to rework their information. Specific processing details are included by provider:

Broadband Provider	FCC Registration Number
Buggs Island	0002031698
Metrocast Communications	0018547471
Nelson Cable	0000900287
Nextlink Wireless, Inc.	0014286934
The Wired Road	0020153854
XO Communications, LLC	0006275945

BIT Communications

BIT Communications' had only submitted one piece of data and the receipt was for the round 1, spring 2010, submission to the NTIA. The provider sent an excel spreadsheet with census blocks. Although blocks were included in the original submission to CIT and VGIN, they had not been included in previous submissions to the NTIA. The original methodology for providing BIT Communications data was selecting all address points and road centerlines that fell within the blocks and then send to NTIA. With some additional validation, this provider's data was worked and submitted in a presumably more accurate format. A new BIT Communications geodatabase was created in a carryover directory for providers who needed census block conversion.

The spreadsheet BIT communications submitted was in 2000 geography. This data was joined to the 2010 XREF table by FIPS and then exported to a new table. The new table was joined to the 2010 census blocks by GEOID and the resulting join was exported to a new feature class. There were many blocks included that were greater than two square miles so everything greater than two was removed from the feature class based on the SQ_MI_VALAMBERT field and loaded to the CB_SQ_MI_Error geodatabase for conversions. Roads that and address points that were carried over from the spring submission were selected by location to the new census blocks less than two square miles. If the address point or road centerline's centroid fell within the feature, it was removed completely. Three feature types were loaded to the carryover geodatabase.

Provider Name:	Buggs Island Telephone Cooperative
DBA Name:	BIT Communications
FRN:	0002031698
Transmission Technology	10
VA Data Category:	5
Wireless Polygons:	0

2010 Census Blocks <2 Square miles:	2290
Address Point features:	807
Road Centerline features:	191
Middle Mile features:	0
Community Anchor Institutions reported:	0

MetroCast

MetroCast had only submitted one piece of data and the receipt was for the round 1, spring 2010, submission to the NTIA. In the preliminary mapping from 2008-2009, the provider sent a hard copy map which showed road centerline coverage. The block spreadsheet showed no information so address point and road centerline data was initially converted to match coverage area. This resulted in census blocks less than two square miles reporting additional features erroneously

In order to present this provider in census blocks with 2010 geography, the selection set census blocks were selected within 1 meter of address points. These blocks were exported to a feature class and all blocks greater than two square miles were filtered out based on attribute selection. Address points and road centerlines were used with the blocks less than two square miles. If a point centroid fell within a block less than two square miles, it was removed. Centerline centroids that fell within a block less than two square miles were removed as well. All new points, roads, and census block features were loaded to the carryover geodatabase.

Provider Name:	Gans Communications, LP
DBA Name:	MetroCast Communications
FRN:	0018547471
Transmission Technology	41
VA Data Category:	4
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	368
Address Point features:	1782
Road Centerline features:	546
Middle Mile features:	0
Community Anchor Institutions reported:	0

Nelson Cable

Nelson Cable originally submitted census block data via e-mail for the spring 2010 release and also provided actual addresses for where service was provided, duplicating coverage efforts. The original processed submission from Virginia to the NTIA was in address points and road centerlines only since these were the most granular data sets although the features covered areas where census blocks were less than two square miles. In order to provide data to the NTIA more along the lines of geometric format, the data was reworked with 2010 blocks to match coverage area. A new Nelson Cable geodatabase was created in a carryover directory for providers who needed census block conversion.

Blocks provided by Nelson Cable from the spring 2010 submission were selected and joined to the 2000 census blocks. These blocks were joined to the 2000-2010 XREF table and only matching records were kept. These matches were exported to a new table and the joined directly to the 2010 census blocks. All blocks greater than two square miles were filtered and exported to the conversion error feature class. Address points and road centerlines were used with the blocks less than two square miles. If a point centroid fell within a block less than two square miles, it was removed. Centerline centroids that fell within a block less than two square miles were removed as well. All new points, roads, and census block features were loaded to the carryover geodatabase.

Provider Name:	Wintergreen Community CableVision
DBA Name:	Nelson Cable Inc.
FRN:	0000900287
Transmission Technology	41
VA Data Category:	3
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	66
Address Point features:	1318
Road Centerline features:	64
Middle Mile features:	0
Community Anchor Institutions reported:	0

Nextlink Wireless, Inc.

NextLink's original data submission was for the spring 2010 release. The provider originally sent CIT and VGIN a spreadsheet of census block numbers only. A staging geodatabase for this provider was created in the carryover provider directory and the original spreadsheet was imported as a table. The table was joined to the 2000-2010 cross reference table in ArcMap and results were exported a new table. The new table was joined to the 2010 census block data and exported to a new feature class. Fields in the data were calculated based on previous NTIA submissions. No reported blocks were greater than two square miles so the data was loaded to the provider carryover geodatabase.

Provider Name:	Nextlink Wireless, Inc.
DBA Name:	Nextlink Wireless, Inc.
FRN:	0014286934
Transmission Technology	30
VA Data Category:	5
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	29
Address Point features:	0
Road Centerline features:	0
Middle Mile features:	0
Community Anchor Institutions reported:	0

The Wired Road

The Wired Road's provided updates for the fall 2010 release to replace their original data submission in the NTIA SBDD transfer data model. The provider sent a spreadsheet of census block numbers as well as addresses outside blocks greater than two square miles although the addresses did not need any work for the geometry conversion. A staging geodatabase for this provider was created in the carryover provider directory for the fall 2011 release and the original spreadsheet was imported as a table.

The table was joined to the 2000-2010 cross reference table in ArcMap and results were exported a new table. The new table was joined to the 2010 census block data and exported to a new feature class. Fields in the data were calculated based on previous NTIA submissions. Several blocks were filtered when selecting on square mileage and were exported to the census block conversion error feature class. The original address point and road centerlines were loaded to the carryover database as well ad the newly converted blocks less than two square miles.

Provider Name:	The Wired Road
DBA Name:	The Wired Road
FRN:	0020153854
Transmission Technology	50, 70
VA Data Category:	3,7
Wireless Polygons:	1
2010 Census Blocks <2 Square miles:	1199
Address Point features:	1530
Road Centerline features:	871
Middle Mile features:	1
Community Anchor Institutions reported:	0

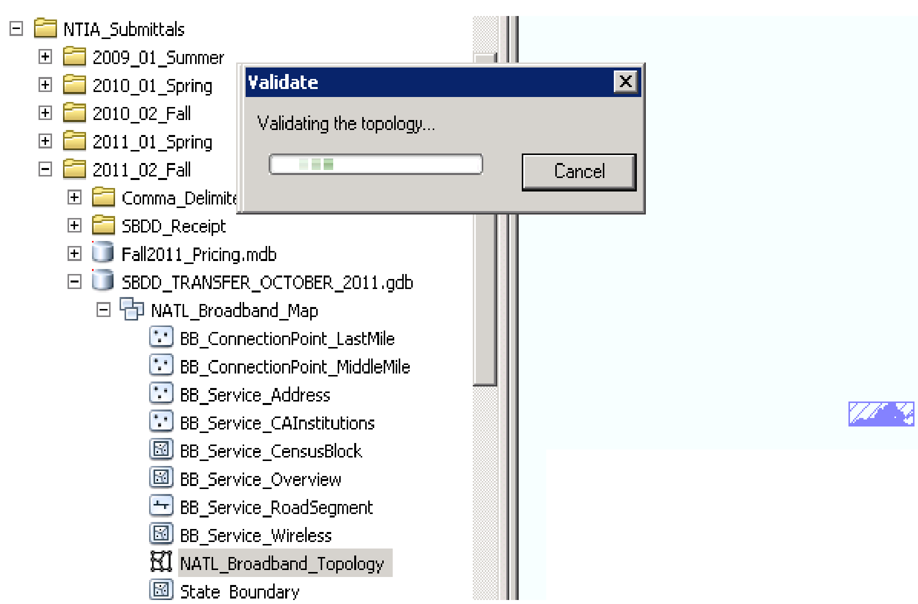
XO Communications

XO Communications' original data submission was for the spring 2011 release. The provider originally sent a spreadsheet of census block numbers only. This original spreadsheet was imported into the provider staging database as a table. The table was joined to the 2000-2010 cross reference table in ArcMap and results were exported a new table. The new table was joined to the 2010 census block data and exported to a new feature class. Fields in the data were calculated based on previous NTIA submissions. No reported blocks were greater than two square miles so the data was loaded to the provider carryover geodatabase.

Provider Name:	XO Communications, LLC
DBA Name:	*DBA Name:* XO Communications Services, Inc. (Affiliated Entity)
FRN:	0006275945
Transmission Technology	10, 20, 30
VA Data Category:	5
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	1206
Address Point features:	0
Road Centerline features:	0
Middle Mile features:	0
Community Anchor Institutions reported:	0

Post Processing Validation and Quality Control

The data included in the NTIA SBDD data model was quality controlled using the topology included in the model as well as the python script provided by NTIA. The topology was validated using ESRI ArcGIS Topology validation tools within ArcCatalog.

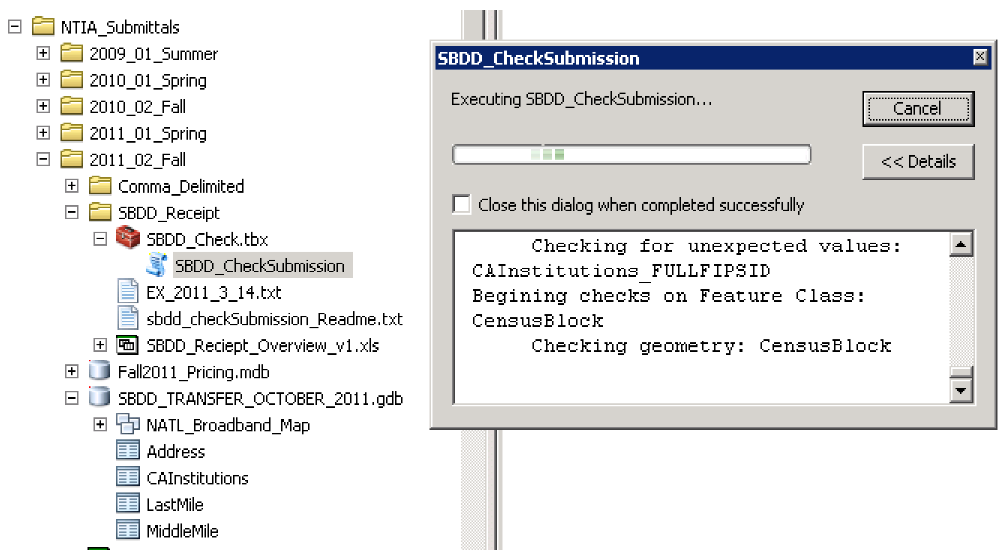


The following is the exported topology summary log:

Class1	Rule	Class2	Errors	Exceptions
	Must Be Larger Than Cluster Tolerance		0	0
BB_Service_CAInstitutions	Must Be Properly Inside	State_Boundary	0	0
BB_ConnectionPoint_MiddleMile	Must Be Properly Inside	State_Boundary	0	0
BB_ConnectionPoint_LastMile	Must Be Properly Inside	State_Boundary	0	0
BB_Service_Address	Must Be Properly Inside	State_Boundary	0	0
BB_Service_RoadSegment	Must Not Self-Overlap		0	0
BB_Service_RoadSegment	Must Not Self-Intersect		0	0

The spring 2011 SBDD data submission was quality controlled using the available python script since VGIN's ArcGIS environment was not at v10. In the time gap between the spring and fall of 2011, VGIN upgraded its ArcGIS software and service packs and was able to use the included ArcGIS geoprocessing model. The attribution included in the Virginia submission was validated using the NTIA provided model and the model interface was run repeatedly against the data sets until all attribute errors were identified and corrected.

The python script imbedded in the model was altered by VGIN to limit each run to only one feature class to speed processing. Once each feature class was run successfully, the entire script was enabled and run in its entirety against the Virginia submission.



The output of the preliminary run is shown below:

```
* ---------------------------------------------------------------------------
* Data Submission Receipt
* CheckSBDDSubmission.py
* Created on: 9/21/2011
* Created by: VA
* State Broadband Data Development Program
* NTIA / FCC
* ---------------------------------------------------------------------------

*******************************************************************************
*****                                            *****
*****                                            *****
*****          Submission Receipt File - version 1.2          *****
*****          Check below for any FAILED Statements          *****
*****                                            *****
*****                                            *****
*******************************************************************************

*Check Layer: LastMile
    Geometry PASSED:  Layer has 0 records.
    Field Check:    passed    LastMile_PROVNAME values are good
    Field Check:    passed    LastMile_DBANAME values are good
    Field Check:    passed    LastMile_FRN values are good
    Field Check:    passed    LastMile_OWNERSHIP values are good
    Field Check:    passed    LastMile_BHCAPACITY values are good
    Field Check:    passed    LastMile_BHTYPE values are good
    Field Check:    passed    LastMile_LATITUDE values are good
    Field Check:    passed    LastMile_LONGITUDE values are good
    Field Check:    passed    LastMile_STATEABBR values are good
    Field Check:    passed    LastMile_FULLFIPSID values are good

*Check Layer: MiddleMile
    Geometry PASSED:  Layer has 557 records.
    Field Check:    passed    MiddleMile_PROVNAME values are good
    Field Check:    passed    MiddleMile_DBANAME values are good
    Field Check:    passed    MiddleMile_FRN values are good
    Field Check:    FAILED    MiddleMile_OWNERSHIP has UNEXPECTED VALUES
    Field Check:    passed    MiddleMile_BHCAPACITY values are good
    Field Check:    passed    MiddleMile_BHTYPE values are good
    Field Check:    passed    MiddleMile_LATITUDE values are good
    Field Check:    passed    MiddleMile_LONGITUDE values are good
    Field Check:    passed    MiddleMile_STATEABBR values are good
    Field Check:    passed    MiddleMile_FULLFIPSID values are good

*Check Layer: Address
    Geometry PASSED:  Layer has 63497 records.
    Field Check:    passed    Address_PROVNAME values are good
    Field Check:    passed    Address_DBANAME values are good
    Field Check:    FAILED    Address_PROVIDER_TYPE has UNEXPECTED VALUES
    Field Check:    passed    Address_FRN values are good
    Field Check:    passed    Address_ADDRESS values are good
    Field Check:    passed    Address_BLDGNBR values are good
    Field Check:    passed    Address_STREETNAME values are good
    Field Check:    passed    Address_CITY values are good
    Field Check:    passed    Address_STATECODE values are good
    Field Check:    passed    Address_ZIP5 values are good
    Field Check:    passed    Address_LATITUDE values are good
    Field Check:    passed    Address_LONGITUDE values are good
    Field Check:    FAILED    Address_ENDUSERCAT has UNEXPECTED VALUES
    Field Check:    passed    Address_TRANSTECH values are good
    Field Check:    passed    Address_MAXADDOWN values are good
    Field Check:    passed    Address_MAXADUP values are good
    Field Check:    passed    Address_SpeedNotBB values are good
    Field Check:    passed    Address_OneSpeedAndNotTheOther values are good
```

Field Check: passed Address_FULLFIPSID values are good

**Check Layer: CAInstitutions*
Geometry PASSED: Layer has 3591 records.
Field Check: passed CAInstitutions_ANCHORNAME values are good
Field Check: FAILED CAInstitutions_ADDRESS has UNEXPECTED VALUES
Field Check: FAILED CAInstitutions_BLDGNBR has UNEXPECTED VALUES
Field Check: FAILED CAInstitutions_STREETNAME has UNEXPECTED VALUES
Field Check: passed CAInstitutions_CITY values are good
Field Check: FAILED CAInstitutions_STATECODE has UNEXPECTED VALUES
Field Check: FAILED CAInstitutions_ZIP5 has UNEXPECTED VALUES
Field Check: passed CAInstitutions_CAICAT values are good
Field Check: passed CAInstitutions_BBSERVICE values are good
Field Check: FAILED CAInstitutions_TRANSTECH has UNEXPECTED VALUES
Field Check: passed CAInstitutions_MAXADDOWN values are good
Field Check: passed CAInstitutions_MAXADUP values are good
Field Check: passed CAInstitutions_SpeedNotBB values are good
Field Check: passed CAInstitutions_OneSpeedAndNotTheOther values are good
Field Check: passed CAInstitutions_FULLFIPSID values are good

**Check Layer: CensusBlock*
Geometry PASSED: Layer has 359947 records.
Field Check: passed CensusBlock_PROVNAME values are good
Field Check: passed CensusBlock_DBANAME values are good
Field Check: passed CensusBlock_PROVIDER_TYPE values are good
Field Check: passed CensusBlock_FRN values are good
Field Check: passed CensusBlock_STATEFIPS values are good
Field Check: passed CensusBlock_COUNTYFIPS values are good
Field Check: passed CensusBlock_TRACT values are good
Field Check: passed CensusBlock_BLOCKID values are good
Field Check: passed CensusBlock_FULLFIPSID values are good
Field Check: passed CensusBlock_TRANSTECH values are good
Field Check: passed CensusBlock_MAXADDOWN values are good
Field Check: passed CensusBlock_MAXADUP values are good
Field Check: FAILED CensusBlock_SpeedNotBB has UNEXPECTED VALUES
Field Check: passed CensusBlock_OneSpeedAndNotTheOther values are good
Speed Tier Record Check PASSED

**Check Layer: Overview*
Geometry PASSED: Layer has 0 records.
Field Check: passed Overview_PROVNAME values are good
Field Check: passed Overview_DBANAME values are good
Field Check: passed Overview_FRN values are good
Field Check: passed Overview_GEOUNITTYPE values are good
Field Check: passed Overview_STATECOUNTYFIPS values are good
Field Check: passed Overview_TRANSTECH values are good
Field Check: passed Overview_STATEABBR values are good

**Check Layer: RoadSegment*
Geometry PASSED: Layer has 54707 records.
Field Check: passed RoadSegment_PROVNAME values are good
Field Check: passed RoadSegment_DBANAME values are good
Field Check: FAILED RoadSegment_PROVIDER_TYPE has UNEXPECTED VALUES
Field Check: passed RoadSegment_FRN values are good
Field Check: passed RoadSegment_STATE values are good
Field Check: passed RoadSegment_TRANSTECH values are good
Field Check: passed RoadSegment_MAXADDOWN values are good
Field Check: passed RoadSegment_MAXADUP values are good
Field Check: passed RoadSegment_SpeedNotBB values are good
Field Check: passed RoadSegment_OneSpeedAndNotTheOther values are good

**Check Layer: Wireless*
Geometry FAILED and fixed: Layer now has 19 records.
Field Check: passed Wireless_PROVNAME values are good
Field Check: passed Wireless_DBANAME values are good
Field Check: passed Wireless_FRN values are good

Field Check: passed Wireless_TRANSTECH values are good
Field Check: passed Wireless_MAXADDOWN values are good
Field Check: passed Wireless_MAXADUP values are good
Field Check: passed Wireless_SpeedNotBB values are good
Field Check: passed Wireless_OneSpeedAndNotTheOther values are good
Field Check: passed Wireless_STATEABBR values are good

There were several areas which yielded errors. These check failures may have resulted due to source data issues, processing issues, or loading to the transfer model from disparate locations based on individual providers. In an ArcMap session, the feature classes in the transfer data model were edited in conjunction with the NTIA provided SBDD_Receipt_Overview.xls check matrix. Values were calculated to match default values in the model. The following were errors that were located and fixed based on the geoprocessing model:

BB_Service_MiddleMile:
Field Check: FAILED MiddleMile_OWNERSHIP has UNEXPECTED VALUES
Error source: NTIA QC GP model not recognizing -9999 as valid value
Resolution: None. NTIA needs to alter model in order for this to be unflagged.

BB_Service_Address:
Field Check: FAILED Address_PROVIDER_TYPE has UNEXPECTED VALUES
Error source: 0 values present
Resolution: All '0' values were calculated '1' since there is not currently an 'unavailable' domain value

Field Check: FAILED Address_ENDUSERCAT has UNEXPECTED VALUES
Error source: "", " ", and <NULL> values present
Resolution: 58876 of 63472 values calculated to NTIA default of "ZZ"

BB_Service_CAInstitutions:
Field Check: FAILED CAInstitutions_ADDRESS has UNEXPECTED VALUES
Error source: 4 records contained "", " ", and <NULL> values
Resolution: values calculated as "N/A". This issue will be followed up between NTIA releases.

Field Check: FAILED CAInstitutions_BLDGNBR has UNEXPECTED VALUES
Error source: 11 records contained 0, "", " ", and <NULL> values
Resolution: 4 values calculated as "N/A". This issue will be followed up between NTIA releases.

Field Check: FAILED CAInstitutions_STREETNAME has UNEXPECTED VALUES
Error source: 142 records contained " " values
Resolution: values calculated as "N/A". This issue will be followed up between NTIA releases.

Field Check: FAILED CAInstitutions_STATECODE has UNEXPECTED VALUES
Error source: 1 record contained "" value
Resolution: value calculated as "VA"

Field Check: FAILED CAInstitutions_ZIP5 has UNEXPECTED VALUES
Error source: 7 records contained " " values
Resolution: values calculated as "N/A". This issue will be followed up between NTIA releases.

Field Check: FAILED CAInstitutions_TRANSTECH has UNEXPECTED VALUES
Error source: NTIA QC GP model not recognizing -9999 as valid value
Resolution: None. NTIA needs to alter model in order for this to be unflagged.

BB_Service_CensusBlock:

Field Check: FAILED CensusBlock_SpeedNotBB has UNEXPECTED VALUES
Error source: "MAXADDOWN" = '2' OR "MAXADDOWN" IS NULL, "MAXADUP" = "1"
Covad = 14 <Null> Values, calculated = Typical up/down values
XO = 72 (all values of download/2 = 2), calculated minimum download (3) and minimum upload (2)
Resolution: Recalculated erroneously entered or missed values
Covad = Calculated Max Advertised Down/Up as Typical Down/Up values for the 14 records
XO = Calculated as minimum download (3) and minimum upload (2) for the 72 records

BB_Service_RoadSegment:

Field Check: FAILED RoadSegment_PROVIDER_TYPE has UNEXPECTED VALUES
Error source: 10851 records = 0
Resolution: values calculated as "1". This issue will be followed up between NTIA releases based on feedback looping with provdiers.

All failed checks were corrected to valid values and the geoprocessing model was rerun with success. The following results output to text file:

```
 ***********************************************
 *******************CONGRATULATIONS***************
       It appears you have NO data inegrity issues
         this file is ready to submit to the FCC
 *******************CONGRATULATIONS***************
 ***********************************************
 Completed script SBDDCheckSubmission...
Succeeded at Thu Sep 22 13:11:36 2011 (Elapsed Time: 40 minutes 17
seconds)
```

Upon examining the .txt output file there were several items that should have not resorted in errors but failed due to the NTIA model yielding errors with default values. To examine these issues directly, please review the text file entitled VA_2011_9_22.txt which is included with Virginia's submission package. Several items were noted and skipped due to inconsistencies in the NTIA GP check model. There have been several posts on the PB works site and it is assumed that for future releases, particularly round 5, this issue will be corrected.

Data Issues/Considerations

Broadband providers who only reported address level data did not have any additions or subtractions done to their reported data unless they needed to be converted to 2010 census blocks. The data from previous submission for these carry over providers was generally geocoded directly from one of the 3 previous submissions and results were loaded into the master data set wholesale. One thing that may be done or at least need to be looked at for the next submission is where these 13 broadband providers report addresses that fall in blocks less than two square miles. There may be many cases where these broadband providers actually need a block placed in the report instead of centerlines and points. This may reduce the amount of total address points and road segments submitted as well as increase the individual coverage area for a broadband provider if we do leave out features that sit on top of these polygons. There were 6 providers that were reworked for 2010 blocks and the reduction of address points from the spring 2011 NTIA SBDD submission can be directly attributed to this type of processing.

Another major issue with Virginia Broadband data is notable in the QC output script and that is the Community Anchor Institution data. VGIN plans to do a full analysis of this data set between NTIA submissions which will correct many attribute issues. The addition of this feature class to the VA SDE database

Feedback looping will hopefully allow providers to conform more to the most desirable provider data category as outlined in a previous section. The most desirable format to receive data in from a provider is GIS format and working with the CIT and providers in general, there may be many ways to receive the data from all or most providers who are a category 2 or category 3 solely in GIS format since these category providers appear to have data initially stored geospatially.

Project History: Vermont's Broadband Mapping Initiative (BMI) is a collaborative broadband data collection and verification effort involving partners from the public, private and academic sectors participating as the Vermont Broadband Mapping Team. The BMI is supported by grant funds provided under the National Telecommunications and Information Administration's (NTIA) State Broadband Data and Development Program (SBDD).

In November 2009 the Vermont Broadband Mapping Team (BMT) initiated the creation and development of a comprehensive and verified geographic inventory of broadband service availability in the State of Vermont. Landline and wireless services (fixed and mobile) were mapped using information from the providers and other sources. The broadband mapping information collected and verified through this effort is supporting the broadband development objectives identified in the RUS Broadband Initiatives Program (BIP) and NTIA's Broadband Technology Opportunities Program (BTOP) in Vermont. Most importantly, the geographic inventory will further refine our understanding of the location of "unserved" and "underserved" areas in the state, thereby supporting targeted future investments in these areas.

The BMT includes the following organizations: Vermont Department of Public Service, the Vermont Telecommunications Authority, the Center for Rural Studies at the University of Vermont, Vermont's Enhanced 9-1-1 Board and the Vermont Center for Geographic Information. The BMT is also supported by private sector contractors.

Summary of Deliverables: The BMT's second broadband data submission (October 1st, 2011) includes broadband information as of June 30, 2011 (VT_Package_Oct1_2011_v1.zip). The data complies with the NTIA NOFA requirements and SBDD data model (FGDB) specifications as of 6/30/2011. A detailed description of each dataset is available in the ./metadata folder included with the deliverable package.

Data Development Methodology: A variety of data source and data collection methods were used to identify the characteristics and geographic extent of broadband service in Vermont. Here is a quick breakdown

- **Cable:** Mapped to street/street-segment level
- **DSL:** Mapped as polygons (usually Exchange areas) or address points (list of addresses submitted by provider).
- **Fiber Optic:** Mapped as address points (list of address submitted by provider)
- **Fixed Wireless (WISP):** Mapped as polygons (propagation maps prepared by independent contractor using data provided by WISPs)
- **Mobile Wireless:** Mapped as polygons (data submitted by provider)
- **Satellite:** Mapped as polygons (data submitted by provider). Providers of satellite-based broadband services claimed that they covered the entire state.

The cable, DSL, fiber optic, and fixed wireless (WISP) layers were "intersected" with Vermont's E911 address point layer to determine broadband availability at the address-level. This information was then intersected with Vermont's 2010 Census Block layer to calculate availability at the block level. The October 1st, 2011 deliverable includes Census block-level data for Census Blocks less than or equal to 2 sq miles, and address level data for Census blocks greater than 2 sq miles.

Mobile wireless and satellite-based broadband polygons were submitted by providers to VCGI. They were formatted to match NTIA specification, but otherwise forwarded as-is.

Vermont's broadband providers submitted data which was used to populate a table listing maximum advertised and typical speeds by Metropolitan Statistical & Rural Service Areas (Cellular Market Areas). This information was used to populate the speed information contained in the submitted broadband, including speed information at the census block level. In numerous cases providers did not submit typical speed information.

The initial list of Community Anchor Institutions (CAIs) was derived from existing data sources including the VT Critical Facilities Database and Public Libraries Survey from the Institute of Museum and Library Services. Community Anchor Institutions include schools, libraries, medical facilities, public safety facilities, universities and colleges, and other community facilities such as town halls/offices. An email and hard-copy mailing was sent to every institution in the list. They were asked to fill out an online survey. Follow-up emails and phone calls were made to increase the response rate. The data delivered to the NTIA includes all CAIs, but only includes broadband information for a subset. Additional broadband institutions will be added as their information becomes available.

Data Review: No formal confidence interval for provider data submissions has been established. Vermont is waiting for clarification from the NTIA on this. However, each provider submitted dataset is evaluated against a minimum standard or expectation of quality. If the data submission is identified by the VT Dept of Public Service as not credible based upon their experience, it is not included in the inventory. If a provider creates a data submission that cannot be parsed or, resolved, we contact the provider to try and work out a method of submission that can be used. Vermont had 100% participation from all 38 broadband providers for the 6/30/2011 data submission. However, many of these did not have any updates to report.

Feedback Loops: Each broadband provider that supplies broadband service data in some manner to the VT broadband data inventory is given the option to view a final version of their data submission as it will be represented in the NTIA delivery. However, very few providers have asked for a copy of the final version of their data submission for review. Some smaller providers have asked for, and received, a hardcopy map or digital map graphic (PDF) of their coverage area. All of the providers that requested to see what was being submitted to NTIA representing their coverage area received either a copy of the data, a hardcopy map or digital map graphic in accordance with their preference.

Data Verification Methodology: The BMT used two primary data verification methods: 1) a phone survey conducted by the UVM Center for Rural Studies (CRS) to verify the broadband maps, and 2) InfoGroup's ISP Connectivity dataset. Addresses from both datasets were geocoded (mapped to a lat/long coordinate), then used to evaluate the "accuracy" of the broadband coverage data.

Conclusion: Vermont's Broadband Mapping Team is pleased to deliver a robust broadband availability inventory to the NTIA. We are confident that it meets the specifications outlined in the NTIA SBDD NOFA. The broadband data and maps will help Vermonters refine their understanding of "un-served" and "underserved" areas of the state, thereby supporting targeted future investments in these areas.

Washington Broadband Mapping

Data Submission Report

October 1, 2011

October 1, 2011

Sanborn
320 Miller Avenue
Suite 80
Ann Arbor MI 48103

Washington Broadband Mapping

Data Submission Report (October 1, 2011)

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1 Introduction

This report is submitted along with the fourth data submission for the Washington Broadband Mapping Project. This submission includes all data collected so far per the requirements of the National Telecommunications and Information Administration (NTIA) State Broadband Data and Development Grant Program (Docket No. 0660-ZA29) Notice of Funds Availability (NOFA) and formal and informal clarifications to it. Specifically, it includes broadband data collected from broadband providers and community anchor institutions data compiled from various sources for the State of WA. The State of WA has retained a mapping contractor, The Sanborn Map Company to perform the work related to the Mapping Grant for this project. Data from the previous submission is now publicly accessible via the WA Broadband Program (http://wabroadbandmapping.org/).

This document is a supplement to the three previous reports submitted with previous data submissions on May 1, 2010, October 1, 2010, and April 1, 2011 respectively. Therefore, it builds on the document provided with those submissions. Rather than repeat the contents of the previous report, this document makes incremental updates on various topics where changes have been made in the methodology or reiterates the methodology used. Please refer to the previous documents for further details.

1 Overall Project Status

1.1 DATA COLLECTION

This section details data collection related to NTIA deliverables which include broadband data and community anchor institution data.

1.1.1 Broadband Data

For this submission, Sanborn started data collection efforts on July 13th 2011 by sending out data update requests and technical data specifications after NTIA announced all final changes. These were sent to a large list of companies which were compiled from multiple lists (FCC 477 list (dated June 30th, 2010), a list provided by the Washington UTC, NTIA's Wireless Internet Service Providers Association (WISPA))and from any providers that were identified through other sources such as web research, planning meetings, etc. In our technical document, we highlighted the transformation of data from Census 2000 to Census 2010 and given that change, we requested all providers to submit data in the Census 2010 format. Sanborn also uploaded the final data for each provider in NTIA format from the previous submission to the Sanborn Provider Portal. The providers were encouraged to use the provider portal and update their information on it.

We followed the same contact and follow-up protocols as the previous submissions. The following are some of the important changes or no changes:

1. All census blocks and road segments are mapped based on 2010 census data set. Any data submitted in 2000 or 2009 format was converted to 2010 for this submission.

2. We continued to not collect data from resellers.

3. We are submitting data for satellites in this submission based on NTIA clarifications. All satellite providers who have provided speed, FRN number and other technology information have been mapped to serve the full state. At present WA data includes only two satellite providers – Hughes and Wildblue. The other satellite providers which operate in WA to the best of our knowledge are Starband and Stratos Offshore Services Co. both of which did not provide adequate attribute information in order to be included on the mapping data.
    1) Additionally, given the topography in WA, we have done some Viewshed Analysis to identify areas with no line of sight to satellites. This analysis has been done separately for each provider and for now, the analysis has been done for Wildblue and Hughes satellites. We have provided the resulting data to Wildblue and are working with them to

validate the data at present. Based on what we find, we will decide how to represent such areas of unlikely line of sight on the State Broadband Map.

4. We worked hard to get even more Public Utility Districts (PUDs) in Washington to participate in the program. As previously noted, PUDs are public entities at the County level that lay broadband infrastructure connecting to the end users (i.e. such as fiber to the homes) but WA regulations do not allow them to sell directly to the customers. In these PUD deployments, broadband service is provided by resellers using the infrastructure owned by the PUDs at speeds and costs that the market is capable of bearing. While most PUDs are able to provide their area of availability, it is harder for them to provide the speed bundles that their resellers are using. We held a meeting with NTIA (Andrew McRae) and the State of Washington Program Manager (Will Saunders) to discuss some options for putting PUDs on the map. We held additional meetings with the representatives of several PUDs and made the decision that the map and data should represent the highest speeds that the PUDs are capable of providing should there be a customer willing and able to pay for such a speed. Therefore, the PUD data represents high speeds in rural areas since most of the PUDs are in rural areas and have put in fiber connections to homes. It does not take into account the backbone capacity.

5. Due to NDA restrictions and our inability to accurately flag service by “category of end user”, address points are not included in this submission to NTIA for any commercial provider.

6. Some providers did not submit middle mile elevation or backhaul capacity, particularly when they asked us to reuse previous submission data. Wherever possible, we went back to providers to obtain that information, but it is not available for every record.

7. Terrestrial Mobile Wireless and Terrestrial Fixed Wireless (licensed and unlicensed) were treated as wireless coverage and were delivered as a shapefile. In cases where a provider served using the same technology and spectrum but with different speeds, overlapping areas were removed and the higher speed was assigned.

8. If a cable based wireline provider provides both DOCIS 2.0 and DOCIS 3.0 service to the same area, the block or road was listed only once with a technology code of 40.

9. Providers were only willing to indicate on a general level if they served business, residential or both, so we did not get any providers that broke down the type of service by block. Only if the provider stated they only serve business to business customers did we fill in the “category of end user” with a code of 2, otherwise this field was left blank.

10. The submission 4 provider data model is currently based on the NTIA data model as of 6/30/11.

We added 5 new providers in this submission – Pogo Zone (terrestrial fixed wireless unlicensed), PUD Skagit (fiber), Northland Cable (cable), Rock Island (wireless) and Tanager (wireline and wireless). In this submission, 59% of the providers submitted new or updated data whereas for 41% of the providers we reused data from their previous submissions. One of the larger wireline providers in WA, Qwest was bought out by Century Link. Also another provider, Megapath merged with Covad. The Qwest and Megapath data are now represented under Century Link and Covad data even though the datasets provided were different. In places where Qwest and Century Link's service overlapped, we used spatial tools to select the highest speeds for a given technology of transmission.

1.1.2 Community Anchor Institutions Data

The community anchor institutions data continues to be crowd-sourced through the online data gathering application created by the Sanborn Team. The State of Washington is doing the PR around this data collection and contacting the relevant agencies to request them to fill in data. This has been a slow process and we are getting to a point of diminishing returns with this effort. The numbers of community anchor institutions that have responded so far is provided below:

Category	Name	Total	Total with Broadband Information in Submission 4
1	School - K through 12	2299	1773
2	Library	356	356
3	Medical/healthcare	135	54
4	Public Safety	1706	105
5	University, college, other post-secondary	220	180
6	Other community support - government	343	32
7	Other community support - nongovernmental	344	11

1.2 DATA PROCESSING

All data received went through the following processing steps:

1. **Triage:** All new data was quickly reviewed to understand what was received, and in what format. We also made sure we had all the required components for NTIA's data model, such as their FRN and advertised speed information. We also screened for any known issues that we might have seen before (such as Excel 2003 spreadsheets that cut off at 32k row).
2. **Ingest:** At this time the data is actually brought into our systems. Each provider is set up with a unique file geodatabase to store their information. Record counts of what was received is logged so that we can validate we did not drop anything in processing.
3. **Data Processing:** This is where the data goes through a number of ETL routines to convert the raw proprietary information into a format similar to the NTIA format. The exact routine utilized depends on how the data is received
    1) When a provider submits a service boundary, we select all the blocks and roads inside that shape.
    2) If a provider submits a customer address list, the points are geocoded, and then the appropriate block or road segment is selected.
    3) If a provider submits block and road information using Census data, we just make sure everything is formatted to the appropriate specifications.
    4) If the provider submits any type of road or line data that does not direct correlate to the TIGER data set, we convert the lines to TIGER by selecting the road centroid and spatially selecting the closed segment in our data set. If the road is in a block less than 2sqmi, than the block is selected. Some manual cleanup is also applied to make sure we do not accidentally drop any road segments that should have been processed.
    5) After each round of processing, we make sure that we only keep unique records. A unique record is defined as having a unique combination of FRN, Block/Road ID, and technology type. If there are multiple records with different speeds, but all else is equal, than we select the maximum of the advertised speeds.
4. **QC Review:** All data is then sent to a different analyst to perform a through quality control review on the processed data set. Record counts are compared to what was submitted. The QC staff also make sure the ETL scripts and routines populated all of the right fields.
5. **QA Review:** Data is then sent to another team for Quality Assurance Review. In this step the data is not only double checked against what was originally submitted, but it is also brought up inside standardized MXD templates that allow us to make sure our results make sense. This often involves comparing

the new data set with prior submissions, as well as looking for any possible technology or speed anomalies.

6. **Provider Review:** Processed data is all posted to a customized web-mapping tool we commonly refer to as the Provider Portal. All providers were notified once their data was available on the site, and they were always given 3-5 business days to review the data and respond. In this site, providers can log on and visually see their processed data in a map format. It also allows them to overlay their raw data to help them validate that we did indeed process things correctly. The provider portal also has a suite of markup tools that will allow the providers to edit their data, including adding or removing service areas, and making changes to the data attributes.
7. **Comment Processing:** All comments and feedback received from the provider portal, is then reviewed and applied to the processed data set. This updated data set goes back through our QA and QC processes, and if time allows, back out to the Provider Portal, for the provider to review and sign off on.
8. **Data Append:** After all of the individual data sets are processed and approved, we run an append process which merges all of the individual provider data sets into one geodatabase. This is also the point where our team will do any final transformations to get our working data model into the latest NTIA publishing format.
9. **Final QA/QC:** A series of quality checks are run on the final appended data sets to ensure it is ready for submission to NTIA. We also run the NTIA receipt tool at this time. Any last issues are corrected, and the data is sent to the state for their review
10. **Submission to NTIA.**

1.2.1 Conversion Process of Data from Census 2000 to 2010

Due to the changes in census geography, all providers were asked to submit new data. In those instances when a provider A) submitted new data in Census 2000 format, or B) instructed us to reuse their last data submission, we had to convert the blocks and roads into 2010 format.

Basic 2000 to 2010 Conversion Process:

1. For the blocks, take the 2000 block ID, and select all the corresponding 2010 block id's
    1) using census crosswalk table – not an actual spatial process, since this was faster
2. Look at the new 2010 block ids, and filter on greater than or less than 2 sq miles.
    1) If less than or equal to 2 --> bring in the 2010 geometry and add that record to the blocks table
    2) If greater than 2 --> select any roads in that area – spatial select (using roads gt2 table)

3. For the roads, take the 2000 or 2009 TLID and try to match it to the 2010 TLID's
    1) If there is a match, add that record to the roads table
    2) If there is not a match, select centroid of existing 2000/2009 segment, and select closest 2010 road
    3) If the road is now in a block LT2, select the block(s) instead and drop the road
4. Remove any duplicate records in both tables
5. Run some automated checks to catch missed features (i.e. add le2smi blocks surrounded by roads that have not already been added)
6. Manual review (QC) and corrections.
    1) There will be some blocks that are selected inappropriately (especially at town edges for CT providers, where we know their franchise ends at a town line.)
    2) There are some holes in the census crosswalk table
    3) The road conversion process may only select one portion of the road if it has now been broken into multiple segments

Assumptions

1. If a road was in an area greater than 2smi in s3, and due to census re-drawing, is now in an area less than 2smi, we will grab blocks (le2smi) on both sides of that road and add them to the provider data:
2. If a new 2010 block, that is less than 2smi, is completely surrounded by roads and/or blocks served by that provider, than we will add the block to the provider service area.

1.2.2 Submission 4: Reference Data Creation

This section describes the reference data used in submission 4.

BLOCK REFERENCE
For s4, Census 2010 data was utilized. The data was set up as follows:

1. Block size (AREA) is calculated combining the 2000 land area (ALAND) and water area (AWATER)
2. AREA is converted from square meters to square miles to calculate square mileage (SMI).
3. If the SMI of a block is less than or equal to 2, then the less than or equal to 2 square mile indicator (LE2SMI) is set to true.

ROAD REFERENCE
2010 Tiger Line IDs (TLID) were used for data processing in s4.   The data was set up as follows:

1. The GT2SMI (Greater Than 2 Square Mile) indicator is set to True when:

    1) The 2010 road segment is completely within a block that is NOT less than 2 square miles
2. Only minimum and maximum address ranges and a single zip code for each road segment is maintained.

1.2.3 Submission 4: NTIA Submission Data Model Schema Changes

The data model released on June 30, 2011 contained the following changes to the s4 data model:

- The Category of End user field was added back in to the block and road tables. In addition the domain values were changed. 1 still represents residential, but a 2 now represents all non-residential uses.
    - This field is not required, and for many providers, was left blank since the data was not provided.

1.3 DATA VALIDATION

Sanborn has continued to perform the same validation on the data as the previous three submissions (details in previous reports). Some minor updates to the validation process are discussed below.

1) QC of the data at various steps
2) Spatial checks against public and commercial datasets
    a. For WA, we continued to use the following datasets for validation:
        i. Exchange Boundaries: for DSL boundaries
        ii. MediaPrints: for Cable boundaries
        iii. Speedtest.net data
3) Verification by providers
4) In this Submission, along with the standard verification by providers using the Provider Portal, we also identified for providers issues that they needed to focus on regarding the findings of our validation team. This also included validation and feedback we received through our website – this submission we have incorporated and integrated several feedback tools in the Interactive Map and information sourced from users is evaluated with respect to provider data and any noted discrepancies are passed back to the provider for correction. In addition, in this round, we incorporated any feedback provided by NTIA for Submission 3. All of these were done by sending providers a letter that identified issues using screenshots and explaining to them

what the error was and then asking them to go fix those errors using the secure provider portal. If providers disagreed with the feedback, we have documented their response.

5) Speedtest data collection and other data collection for verification
    a. We continue to use speedtest data and community anchor data crowdsourced for validation purposes.
6) Planning workshops and local validation

State Broadband Initiative
Mapping Methodology

For the States of Alabama, Idaho, Wisconsin and Wyoming
Revised September 30, 2011

CostQuest Associates

LinkAMERICA Alliance

Contents

Overview

The following documentation provides an overview of how the fourth required data set was collected and processed for the State Broadband Initiative (SBI) in the states of Alabama, Idaho, Wisconsin, and Wyoming.

Although we could separate this draft into state-specific deliverables, the majority of methodology remains intentionally consistent among the states. As one important validation test is comparability across states, we find value in this cross-state approach. This cross-state approach also helps the LinkAMERICA team focus on comparable outcomes across the four states, where appropriate. Our intent is not to make the states look and be the same, rather it is to leverage economies of scope and scale among the business processes.

As expected, this document rests heavily on the prior drafts, but has also been updated and expanded.

Significant changes include additions covering:

1. Trends in provider inputs
2. Expansion in retrieval of WISP coverage
3. Requested changes based upon NTIA guidance
    a. Modification of Satellite providers as a Type 1 Broadband provider;
    b. Discontinuation of estimating Community Anchor Institution coverage and speed;
    c. Review of submitted speed with respect to NTIA supplied frequency table
4. Transition planning with respect to capacity building within the State for Broadband map development
5. Development and posting of a provider Type classification rubric

Treatment of the following subjects has been expanded:

1. Community anchor institutions and survey methodology
2. Verification and validation
3. Data production methods
4. Conversion to Census 2010

As anticipated, the SBI program continues to mature and evolve. Technical leadership and strong program office guidance has been appreciated. We continue to focus resources on establishing stable business processes to track submissions, verify received and processed data, test for temporal stability and provide reporting deliverables consistent with NTIA expectations.

In our view, the mapping deliverable reflects (1) a good faith effort, which results in a reasoned response to the NOFA, Technical Appendix A, as well as supplementary program office guidance and modifications offered in phone calls, emails, and webinars, (2) a stable foundation for improvement and prioritization of both NTIA and state needs and interests , (3) a valid data processing model to support

online mapping, consumer feedback, provider verification and reporting, and finally, (4) a valid use of the evolving data transfer model and its intrinsic validation methods. More importantly, the resulting data and online coverage maps that follow from this work are providing good input and context for the Broadband planning teams working across the states we have the pleasure to serve.

We close this methodology document with two Appendices. Appendix One describes Data Collection Challenges. This section describes some of the open issues, challenges and questions we are exploring. Our hope is to receive clarification and counsel from NTIA in how best to confront some of these issues, which are likely common across states. Appendix Two describes the confidentiality framework explained by NTIA.

Purpose of This Manual

This technical document was developed to provide transparency in our data production process.

Our goal is to illustrate a thoughtful process designed to meet the intent of the submission. Our hope is that we have developed a process that is reasonable, with respect to the data it deals with, as well as flexible enough to change with evolving NTIA requirements and lessons learned from the Broadband mapping community.

Data Sources

Developing the Provider List

Provider lists for all states were developed at project inception from the following sources:

- State lists of regulated telecommunications, cable and wireless service providers
- State and national industry organizations (i.e. cable associations, wireless service provider organizations, telecommunications associations)
- FCC Form 477 respondents
- Independent web searches
- Prior comparable mapping/research efforts
- Interviews with key state staff members and important community influencers

After the April 1, 2011 “Round 3” submission, we continued our research and added new providers to the program as discovered. As one would expect in a dynamic marketplace, provider identification is an ongoing and important component of our work. Mergers and acquisitions, the use of multiple regional DBAs, the lack of any universal identity management attribute, and the generally complex parent-subsidiary structure of many telecommunications companies, make provider identification and tracking very challenging.

In early July 2011, we once again initiated an email and telephone outreach campaign to contact all known providers. This is an extremely time consuming process, but it is necessary to ensure that the list of contact persons remains current, and that providers are aware of data request changes and deadlines

associated with each round. Where necessary, we execute new NDAs with providers. In “Round 4”, this effort continued on a daily basis until we reached our final data submission deadline on August 19, 2011. After August 19, we continued to work with providers who were not able to meet the deadline. In most cases were able to “crash” our process to accommodate this extra data, but late submissions continue to create inefficiencies and add costs to the overall program. In Round 4 providers that responded too late to be included in the final dataset will be included in our Round 5 submission. Once again, as contact is made in each round, we verbally qualify each provider by asking a series of questions regarding the type of service and speeds offered. If the provider does not meet the minimum specifications for a Broadband provider (as defined in the NOFA) we make a note of their status and remove them from the data submitted to NTIA.[1] We continue to reach out to them in future rounds in the event that their service is upgraded or expanded.

Provider Outreach

To meet the program’s aggressive deadlines and participation goals, LinkAMERICA believes it is critical to maintain rapport with providers. To do this, we continued to reach out to providers with regular project communications, including a program newsletter and links to the various state mapping websites. As described above, individual e-mails and/or telephone calls were made to all providers explaining the status of the program and requesting their continued support in Round Four. We’ve also had the opportunity to support providers in their BTOP / BIP applications in certain cases. Through these collective outreach initiatives, and our engagement with various industry associations, we continue to enjoy a healthy and appropriate relationship with Broadband service providers.

NDA

To provide protection for all parties involved, LinkAMERICA continues to honor the terms of our NDA. If providers did not execute the NDA in previous rounds they were offered the opportunity to do so in this collection round. New providers were of course also supplied with a copy of the NDA.

To facilitate the execution of NDA’s, LinkAMERICA continues to use the DocuSign online document management solution. This system allows providers to review and digitally sign the NDA in a legally binding manner, and has been instrumental in achieving rapid approval and execution of NDAs with the majority of providers. In some cases, NDA’s were individually negotiated to address specific provider concerns. In all cases, minimum standards established by the NOFA are honored. In other cases, providers chose to submit data without executing an NDA.

Provider Survey

Since three prior rounds of data collection had been completed, the LinkAMERICA team had a solid base of coverage and speed information with which to begin Round 4. This allowed us to provide two response options to providers. The first was for them to review check maps of their coverage and speed data – submitting only corrections and additions to the existing dataset. (For provider convenience the

[1] As with other Grantees, we struggle with appropriate and consistent classification for service providers who opportunistically provision Broadband services. In this submission we continue to bring them into the analysis as a provider type “other”. As the inclusion of this category isn’t our primary goal, we are working to process data as we can. We are similarly categorizing and retaining reseller information. Our datapackage.xls illustrates the categorization of non Broadband providers within our provider tracking and verification systems.

check maps were created in both PDF and Google Earth (.KMZ) formats.) The second was to allow submittal of completely new datasets, either in tabular form or in multiple other digital formats. For those without sophisticated CAD or GIS systems, we continued to allow the submittal of printed/scanned maps and other written materials.

Survey Methods

Once again, we used a secure digital survey process (via our provider portal websites) to collect and display information for providers. The Round 4 survey process was designed to accommodate both new and returning providers, and the different types of information they would be submitting. The following is a summary of the process encountered by each group:

New providers: New providers were routed directly to our standard survey where they were provided with templates for uploading data in tabular NTIA-compliant formats. As in previous rounds, if providers could not supply information in the requested format, alternatives were offered. These alternatives included uploading service-area boundary maps, exchange area maps, CAD drawings or customer address lists. From that information, the LinkAMERICA team developed a geographic representation of coverage and was able to build coverage features for each provider.

Returning providers: For Round 4 we continued to work with participating providers to improve their datasets. The change in Census Data vintage was explained to providers and links to appropriate files were provided to assist with the transition to the new vintage data.

Check maps continue to be a useful tool to show providers how their area would be displayed on the resulting interactive state map and to get constructive feedback regarding corrections and changes that need to be made to their coverage and speed data. Generating these customized documents in each round is an extremely time consuming verification process, but it allows us to close many of the gaps that might have otherwise persisted.

Follow Up

After the release of the Round 4 survey in early July 2011, LinkAMERICA launched an extensive effort to encourage responses. Every known provider was contacted at least twice during the months of July and August. The initial data submission deadline was set for August 19, but, as previously noted, we continued to accept "straggler" submissions into September.

No Response Policy

As mentioned above, every effort was made to contact each provider who appeared on our initial list. However, if no current information could be found on the company (i.e. no website, no valid phone number, no contact person identified) they were removed from the list of "known providers". We believe the vast majority of those we were unable to reach were providers who have simply ceased to exist[2].

[2] The list of known providers and important submission statistics are contained in the datapackage.xls file.

Summary

In summary, an intensive 45-60 day provider outreach and data collection process is initiated at the beginning of each round. In Round 4, given the data vintage of June 30, 2011, we began this process in July and the last submissions were accepted in September, 2011.

While we continue to successfully engage the majority of providers in each round, the amount of manpower required to solicit complete and timely responses should not be underestimated. This process is one of the most costly and complex within the entire SBI program.

Third Party Data Used

Beyond the data obtained from providers, we acquired the following commercial data products:

- American Roamer, Coverage Right Advanced Services. This data served two purposes. The first was to verify the provider list and help find Broadband service providers not on other lists. The second was to verify the reasonableness of the Broadband service provider's submission.
- MapInfo ExchangeInfo, Professional. This data was used in the verification of telephone Broadband provider data. Where a public domain exchange boundary wasn't available, the MapInfo boundary was used for coverage containment tests.
- Media Prints Cable boundaries. This data was used in the verification of Cable/HFC Broadband provider data. It was used to research valid providers and discover if that provider was offering Internet service. In very rough terms the contained boundaries were used to test the location of some provider data.
- FCC 477 restricted use data were analyzed to find valid providers within a given area.

We have included third party data sources, which touch on each of the three major technologies analyzed within the SBI program. Each of these data sources tie back to a public domain data source, which provides a cross-verification mechanism for the commercial data product.

Although there are a large number of third party licensed data sources available, we remain conservative in our acquisition plans. From our limited analysis we are concerned about the ability to cross-verify additional third party licensed sources against public domain data. Further, we are unsure of how we may be able to integrate another data provider's view of valid Broadband providers within the definitions used by the NOFA (eg. Are they using an FRN/DBA identity view or a marketing view? Can the provider supply in a 7-10 day window? Are they facilities based or not?). This leads us back to a statement we made in a 'lessons learned' Webinar (April 2010) about exploring a consortia to lower the cost of data acquisition and allow multiple entities to peer review the quality and methodologies behind licensed data products.[3]

Beyond these commercial data sources, we used a number of public domain sources. These included:

a. Geographic Data Files

[3] We also suggested forming a technical standards committee and a consistent system for confidence reporting.

        i. US Census TIGER data[4]

b. Sources that helped isolate providers, identity management or provider service areas
    i. NECA Tariff 4
    ii. State produced exchange boundaries
    iii. Carrier produced wirecenter boundaries
    iv. FCC Coals reports (321/325)
    v. FCC FRN API lookup tool
    vi. FCC/FAA Antenna Registration System
    vii. FCC FRN Lookup Tool (plain text search)
    viii. USAC High Cost FCC Filing Appendices
c. Sources that helped isolate anchor institutions
    i. USAC Grant lookup tool
    ii. USAC High-Cost FCC Filing Appendices
    iii. HRSA data warehouse
    iv. NCES data lookup
    v. State managed lists of schools (K-12), post-secondary institutions and libraries
    vi. List of museums, conventions, and visitors bureaus from www.onlineatlas.us

Finally, challenges exist when dealing with the inevitable conflicts between provider-submitted data and third party sources (public or commercial). There is no guarantee third party sources are more accurate or timely than the providers' own reports. Indeed, some third party sources are based upon different standards than those specified in the NOFA, perhaps making them less reliable than information collected directly from providers. At the very minimum, provider data has a lineage and temporal status that we can identify. A concern we have with increasing use of third party data is that we have no way to verify its quality or development methodology. In other words, we may hit a wall in which we can't determine how the commercial source derived its coverage conclusion. To us this means that third party data sources are beneficial, but represent a supplementary view, not an authoritative one, of the NOFA defined Broadband market.

In short, we have chosen to use provider data as the baseline. We will challenge provider reports when third party data shows major anomalies, when submitted data conflict with prior submissions or when a consistent volume of consumer feedback points to a potential error.

As the program evolves it is also our intention to provide tools that allow end users to evaluate the accuracy of the data in their own way. A confidence score or the presentation of multiple (and potentially competing) reports for the same location may be made available. This notion is discussed further in the "Validation" section.

[4] Census data were derived from < http://www.census.gov/cgi-bin/geo/shapefiles2010/main>, Census 2010 files. Roads were derived from the county faces and edges file downloaded at the same location and tiled for a full state.

Confidentiality and the Use of Licensed Materials

As a mapping vendor, we are reliant upon the cooperation of Broadband service providers. In large part, what underlies this cooperation is trust that we will not violate the proprietary and confidential nature of the data provided to us.

We are thankful for the confidentiality clarification that NTIA shared with us (included as Appendix Two). We intend to use this as a guiding document to help us communicate with providers about what information NTIA considers to be confidential. Our suggestion is that NTIA publish this, or something comparable, to ensure a consistent interpretation of the NOFA and how it guides NDAs.

As some providers are non-responsive to requests for information, or lack resources necessary to put data into NTIA compliant formats, we have fallen back to the use of commercial data sources in several places.

For instance, some mobile wireless providers were unable to submit coverage information to us. In these circumstances we have generalized the American Roamer coverage. For incumbent telephone providers we have used commercial wirecenter boundary products to filter Census Blocks that are clearly out of their exchange areas.

Public Engagement: Crowd Sourcing, Surveys and Social Media

Crowd sourcing (i.e., an intentional and carefully designed effort to tap into the collective intelligence of the public at large to expand our knowledge base) continues to be an important element of our data collection and validation process. In addition to the various opportunities the public has to provide input via the online service coverage maps and the related 'Broadband story' process, our crowd sourcing efforts are grounded in a time tested telephone survey approach focused on the consumer market. In addition, we continue to advance our process to include certain initiatives centered in two social media outlets – Facebook and Twitter. These initiatives are discussed below.

Consumer Surveys

Working under contract for the state of Alabama in 2009, our initial consumer survey was performed before the NTIA SBI grant was in place. Subsequent consumer surveys funded by the SBI grant were hosted in 2010 for the states of Idaho, Wisconsin and Wyoming and then again in 2011 for Alabama (as noted below). These surveys will be repeated after two years to establish and evaluate trends. To this end, in August/September 2011 we are wrapping up a second-round survey in Alabama designed to expand our understanding of important adoption issues and to establish important local trends from the initial 2009 survey. Survey results from this effort are currently under evaluation. These primarily telephone based surveys include two distinct and carefully scripted tracks: one for Internet users and one for non-users. The telephone survey approach allows us to reach the non-Internet user group as well as the current Internet user. A secondary online approach is also used to augment input from current Internet users. In the most recent Alabama survey we added a third tier to our approach as we equipped local field survey teams with an iPad-based survey tool and targeted their time to reaching the younger market. For non-users, the surveys help determine why they don't have or don't use

Broadband. For current Broadband users, the survey helps determine the nature of their Broadband access and how they use that connectivity in their daily lives. In addition to our state-specific surveys a nation-wide survey was also hosted to provide a broader view of consumer views for comparison purposes. State-specific surveys are, where possible, framed to match the state's regional Broadband planning structure (e.g., the updated consumer survey in Alabama was designed to produce results relevant to the state's twelve Broadband planning regions).

The resulting data is helpful on a number of fronts in the SBI's mission to advance the access and adoption to Broadband. Survey data provides an important, albeit broad, gauge for assessing coverage information obtained by providers. For example, areas with widely available coverage (according to provider information), but lower consumer subscription levels (according to survey results), or perhaps where survey results suggest Broadband is not available, can be examined in more detail. Survey results are also very important to the Broadband planning (and capacity building) components of the SBI program in that they help inform and formulate Broadband advancement priorities. Survey results also help inform Broadband policy discussions on both the local and state levels. Finally, survey results provide important information to the service provider community regarding market demand and specific Internet use in specific communities (i.e., regions).

Our ongoing consumer survey process adheres to a consistent process. For example, consistent with prior practice the 2011 Alabama survey was launched in June 2011 with a test number of survey calls to confirm (and adjust as needed) the structure of the survey and the underlying survey process. Our surveys typically run for three to four months. All telephone surveys are completely random beginning with the acquisition of a list of state-specific, randomly selected landline telephone numbers. Mobile phones are not typically included in the surveys. Upon evaluation of the survey statistics, auxiliary surveys are executed to ensure appropriate representation is achieved on both demographic and geographic fronts. For example and as noted above, the recent Alabama survey was augmented with a field effort to ensure the younger demographic (i.e., age 18 – 25) was adequately represented. This secondary step is required because of the continued migration (by younger markets) to non-landline based communications. This younger market is also surveyed by reaching out through social media outlets to encourage their participation in an online survey process.

Survey statistics from the Alabama update survey are currently being developed and evaluated. Survey statistics from our initial surveys in Idaho, Wisconsin and Wyoming were summarized in our last filing. Survey volumes are designed to achieve statistical validity.

As noted above, our telephone survey process is augmented by providing online access to the survey. Participation in the online survey is promoted on all of our state-specific public web sites and selected social media.

As a final relevant point with respect to the consumer survey process the length of the survey is noteworthy. By survey standards, these tend to be long surveys. The surveys typically average just over fifteen minutes. While this clearly contributes to the number of survey call attempts that were required to reach the level of statistical validity, it is not insurmountable.

Social Media

The phenomenon of social media is widely documented and yet still emerging as an effective access point for public engagement. We continue to explore appropriate ways to use a variety of social media venues in our SBI efforts. All of our efforts are informed by and consistent with relevant state statues and guidelines. Different states have different perspectives on if and how the state will participate in the use of social media. Some state requirements are well defined and some are still being formed. Where appropriate, we use LinkedIn, Facebook and Twitter to support our work. A central focus is on promoting awareness. As noted above, we are able to promote additional input on the consumer surveys through a social media outreach program aimed at our younger market segments.

In addition, we continue to evaluate how Facebook and Twitter can be used to drive public input on two important crowd sourced issues: online speed tests and input on map accuracy. Based on data obtained through our web site traffic monitoring process and readily available social media tracking processes, our most recent results are promising.

Capacity Building and Transitioning to State Partners

A foundational goal of LinkAMERICA has always been to transfer knowledge and capacity to our State partners. As we move into program year 3, distinct tasks are migrating to the responsibility of our State partners.

Within each State, transition planning and responsibility for specific activities is on a slightly different timeline. Much of this is driven by resource availability and partner identification within the State. For example in round 3, the State of Alabama used interns to validate Community Anchor Institution (CAI) data. In this submission Alabama took on greater responsibility for the CAI submission. To support this LinkAMERICA developed a detailed transition document describing the current CAI efforts.

Other States are looking more towards program year 3 and the in-State hire of a Broadband Coordinator as the initiation point to support their transition efforts.

Data Production Process

To support our objective of transitioning the data development process to our State partners, we continue to model and document our data production process. We find this to be a very beneficial step for two purposes.

First, it helps us understand why (and if) a task is being done, and if it is being done efficiently. Much of this program started so quickly that it was difficult to plan logical integration and hand off points among the various workgroups. Further, we are currently in the process of consolidating much of the process data (check-ins, check-outs, metadata) and we can use this process model to efficiently plan a cohesive information architecture.

Second, our process documentation and modeling helps explain why resources are being consumed in a particular way. This helps our State partners plan for in-sourcing specific tasks as their time and

budgetary constraints allow. It also helps our LinkAMERICA team better plan and cross-train members to deal with the work surge that occurs 30-45 days prior to submission.

Finally, documenting and modeling our process helps us to take advantage of increasing specialization and proficiency with certain types of data and management responsibilities. In submission 3, we had identified data “czars” responsible for check-in and check-out of data. That data czar helped to bridge the gap among receipt functions, provider feedback, production and DBA.

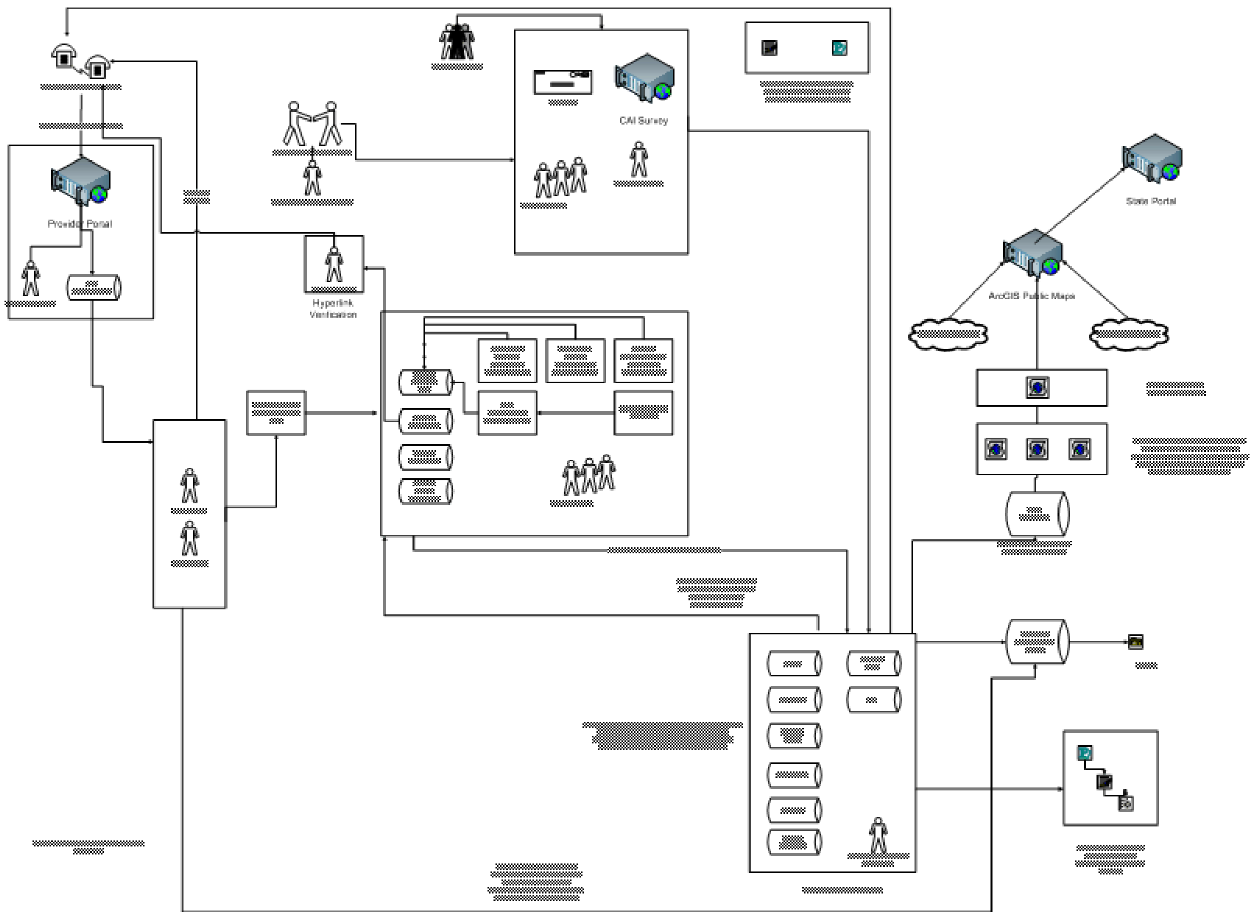

Figure 1—SBI Data Development Business Process Diagram

Data Production Methods

As raw data were received from the provider community, attention turned to normalizing the disparate submission formats[5]. The team considered each submission with respect to the following criteria. These criteria are important because they perform the basis for our verification and quality assurance

[5] In line with NTIA Best Practices we continue to request and receive a large number of data input formats. This ranges from tabular Block lists to hand drawn maps.

process. In other words, we have to appropriately scale our data verification efforts to match the scale or ambiguity of the following:

- Locational certainty
- Speed certainty
- Temporal certainty
- provider and network ownership certainty

The team's goal was NOT to quantify a particular degree of precision with respect to any of these criteria. Rather, we are working to attribute the above "certainty attributes" to each submission, and will continue to implement quality assurance and verification mechanisms that are resource-appropriate for each.

Deriving Broadband Coverage Information

Broadband Coverage[6] was normalized into four formats:

1. Coverage in Census Blocks (2010) of 2.00 or less square miles
2. Covered Street Segments (2010) in Census Blocks greater than 2 square miles[7]
3. Address Level Coverage (point data)
4. Wireless Service Areas (SHP file format)

With each submission, the team went through a series of steps to normalize and categorize the data. Since data arrived in many different formats, and at many levels of granularity, the following normalization procedures were used:

1. Determining the nature of service being provisioned (who is providing service and what technologies are in use)
2. Planning an attack strategy for the submission –understanding the data and assigning team members to various tasks
3. Geo-referencing the data; QA the geo-referenced data
4. Geoprocessing the geo-referenced response
5. Segregating the submission into the correct NOFA-compliant submission formats.
6. Apply appropriate source metadata[8]

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[6] Speed, Anchor institutions and Middle Mile facilities are discussed in later sections.

[7] To help clarify issues relating to Census block area and vintages in use, our team published a technical paper to the Grantee workspace. Because we were unsure if this standard should be implemented uniformly, this document was never distributed to the provider community.

[8] When our team logs a submission into the staging database we record at least two attributes. One records the method used to derive the coverage, the other records the method by which speed was attributed to that object. Other attributes carried to NTIA carry source meta values as well.

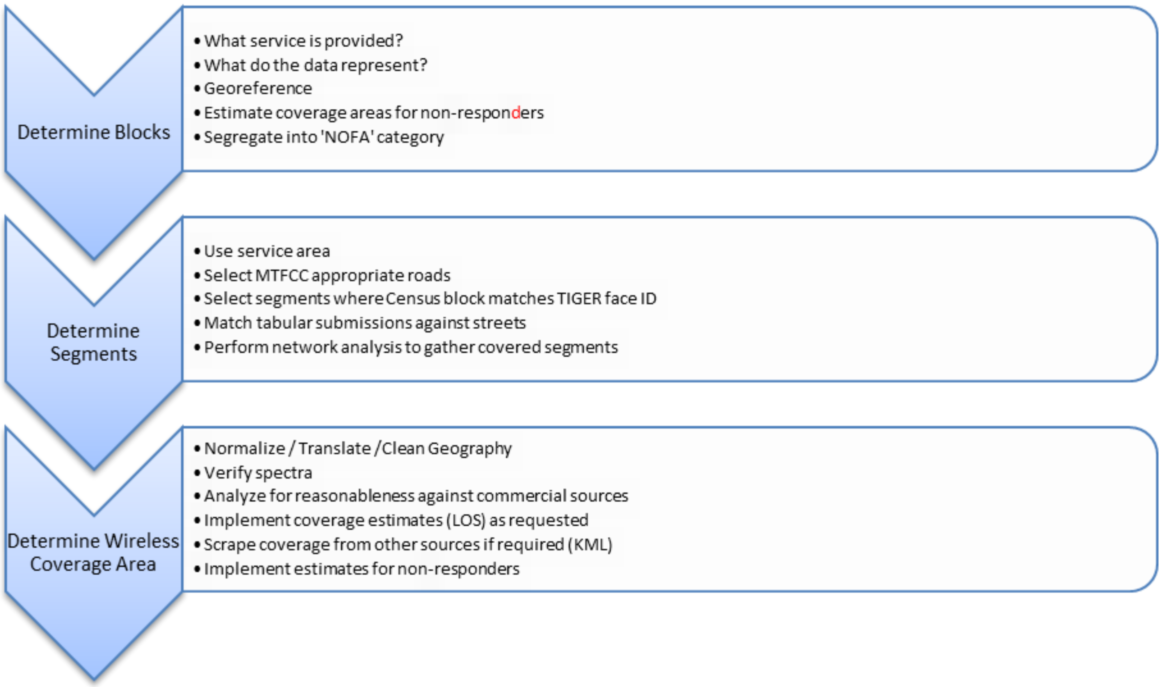


Figure 2-Broadband Coverage Process

Impact of Program Change

There were several important program changes that impacted how Broadband coverage was developed and submitted to NTIA in Round 4.

Census Conversion

The first and most obvious change in submission 4 was the conversion to a Census 2010 coverage baseline. This impacted all wireline providers, the data submitted, the appearance of the mapped information and the baseline coverage metric comparisons against prior submissions.

Release of the June 30 Grantee guidance document, allowed LinkAMERICA to communicate this change with providers. LinkAMERICA provided by FTP access appropriately formatted and sized[9] TIGER 2010 Census blocks and Tiger Road Segments. Given the relatively late release date, we received a mix of responses from Broadband providers. Some easily produced Census 2010 information. Others requested that we do the translation from their supplied blocks and segments. Others requested that we translate their engineering data into appropriate formats. A small number of providers committed to producing Census 2010 data but struggled internally with the conversion in this rapid time frame.

Census 2010 has significantly more Blocks than Census 2000. For the most part there are far more small Census 2010 blocks (less than 2.0 sq mi) than Census 2000. As our team worked through the QA process, this presented a significant challenge in comparing our converted results to prior submissions. We use a block count metric as our first test of consistency across submissions. Since the block count

[9] In Submission 3 we released a technical note describing how we measure Census block area. Although there remains no consensus on this, we used the same process as outlined in the paper.

increased it was hard to distinguish coverage area changes from coverage chances resulting only from a change in Census shapes.

The converse side of this challenge was even more precarious to work through. Because many road segments dropped out due to the covered area now being in a small block area it was difficult to determine how effective our covered segment process was given the fact that many segments naturally dropped out due to changes in Census shapes.

The tendency for large blocks becoming small was not universal. We note in some of our very rural areas of Wyoming and Idaho, small block covered areas become large. This created a contrary situation where small blocks become road segment areas. The image below shows a coverage area change between submission 3 and 4. The covered number of blocks is comparable but the appearance of the coverage is different as a manifestation of the Census change.

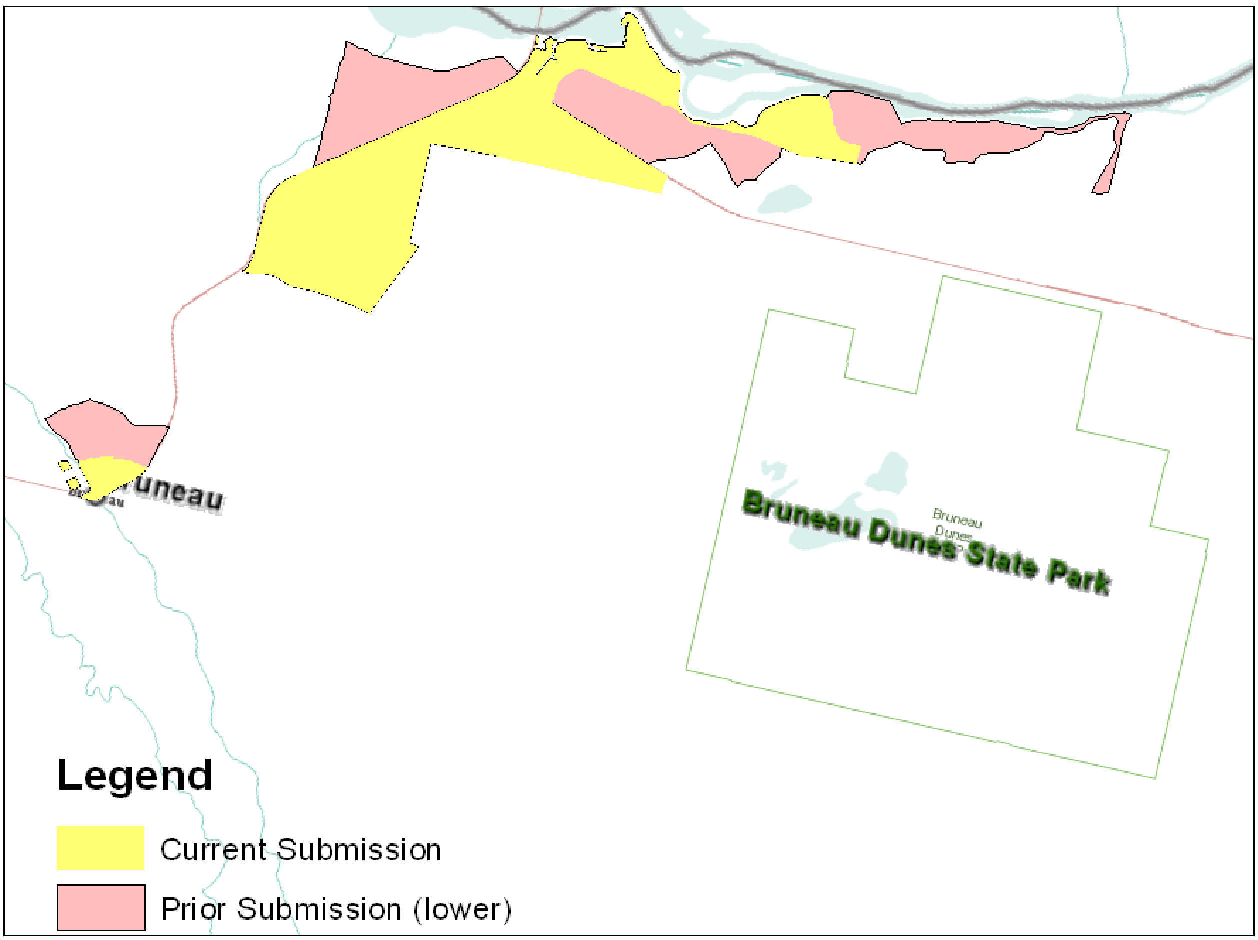


Figure 3--Coverage Change across submissions

This somewhat indeterminate process required our QA analysts to examine a number of submissions in detail. The conclusion was that although the appearance of coverage was significantly different, the underlying engineering data was the same (or very similar) but how the coverage was manifested was a product of the Census conversion.

Census Conversion Practices

Although we had hoped there would be a single process we could follow for all Census conversions our experience has been that it is necessary to be flexible and base the Census conversion process upon the data received.

On a subjective level, we felt the most comfortable converting into Census 2010 where we had facility or demand data to guide the block and segment selection process. In these circumstances we used geoprocessing methods like intersections or network analysis Analyst to make an objective determination. The geoprocessing methods mirrored those discussed in the next section. This was probably the majority of our submitted data.

In circumstances where we were provided Tiger 2010 blocks or segments, we used those as given and performed our standard validation process. Some providers used the TIGER blocks and segments which we supplied them and made their own selections.

Finally, in circumstances where we had either a Census 2000 block list or a geographic file containing Census 2000 geographies and were told there was no coverage change for this submission, we used the Census crosswalk tables[10] to derive a list of candidate blocks. The output of a conversion process is shown below.

[10] See http://www.census.gov/geo/www/2010census/rel_blk.html

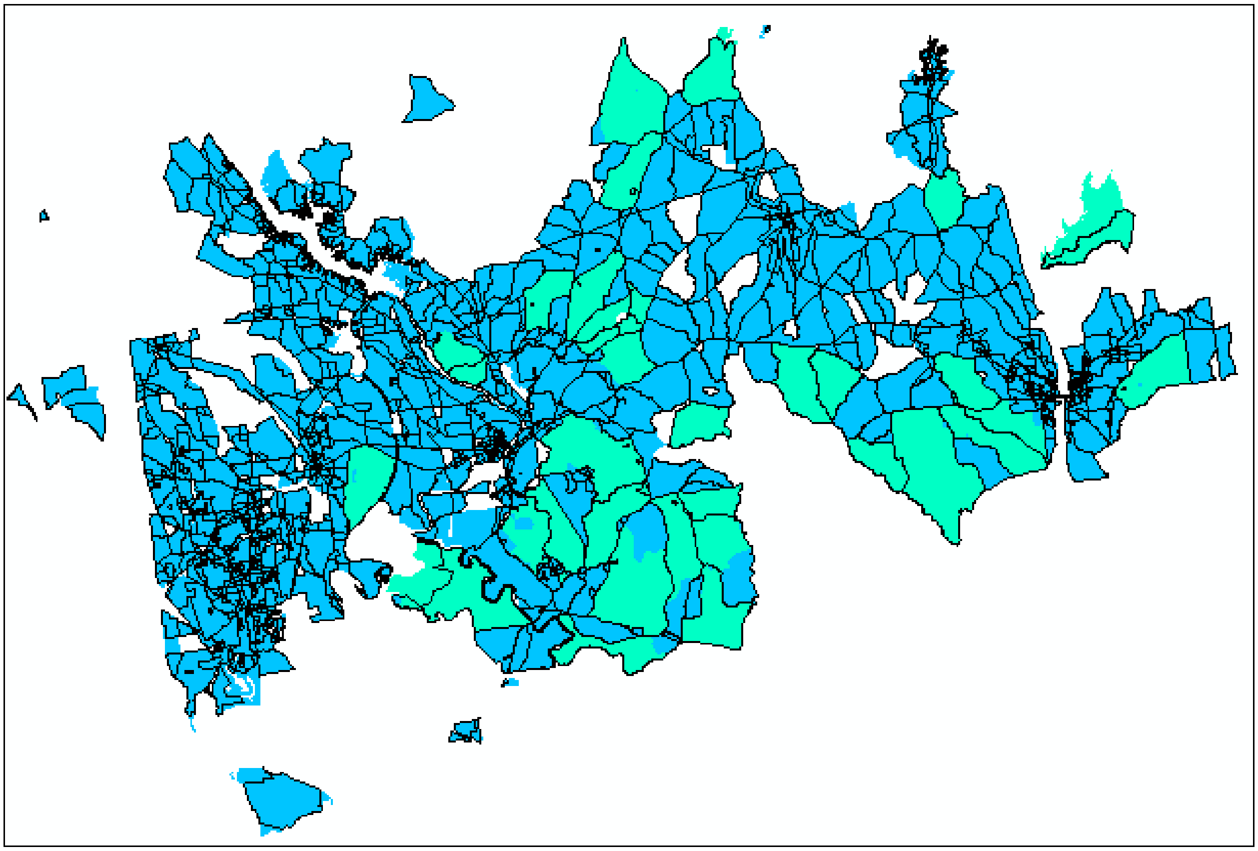


Figure 4—Block Conversion Process, Census 2000 black outline, no fill. Green is 2010 large blocks, so any shading without an outline is 2010 block area not covered in 2000

For the most part it is difficult to discern the impact of a conversion into Census 2010. We don't see vast changes in areas covered. Nonetheless because the block shapes do change the overall coverage area will look different.

As the 2010 data gets pushed into public deliverables, our sense is we will receive questions about the appearance of the new data.

Speed Examination

Given recent concerns about the depiction of speed and what that mapped speed represents, LinkAMERICA invested considerable time requesting detailed information on speed which appeared to be beyond normal speeds for a given Technology of Transmission given the NTIA supplied frequency tables.

Based upon these conversations we learned

A) For a large incumbent telephone provider; the speeds beyond the normal DSL range represent significantly shortened copper loops.

B) For a large national cable provider the intermixing of Docsis 3.0 and non 3.0 systems in a market area is typical and sometimes reflects a circumstance where segments of plant cannot

be upgraded to Docsis 3.0. This variance can be at a level below the Census block. In these cases the maximum advertised speeds remain to represent the market area but the plant variance is typical. This same provider expressed concern with moving reported advertised speeds below the market level.

C) We have a minority of providers who submit a theoretical speed that is unmatched by their web advertising. In these cases we request clarification from the provider on the inconsistency. Our experience has been that providers will modify the speed to be consistent with their web coverage.

Provider Definitions

Within our provider verification process we work to derive a state level provider match against third party data sources. As discussed in the early pages of this manual, there is no guarantee that a third party data source is any more accurate than submitted data, nor does it necessarily reflect the provider ecosystem specified in the NOFA, Technical Appendix A. We devote significant resources to matching our submitted data against three, third party data sources. In many cases this becomes a judgment call trying to match provider names across systems. It is a difficult and somewhat arbitrary process. Nonetheless we do believe it has value because it forces a re-examination of who we believe is an appropriate provider within a non-NOFA context[11].

The use of a provider match system, as well as the webinar comments (3/17/11) directing grantees to estimate, wherever possible, non-participating providers have made us back away from one of our fundamental assumptions in data collection. As discussed in the prior draft of this manual, we had developed a certain "hold-out" class of data when a provider's data wasn't of sufficient quality to verify, or we were unable to put it into the data model (eg. address points submitted for a wireless). In this submission, much of this hold-out data has been included[12]. In some cases this means we are using simple polygons to capture a wireless ISPs serving area. Other times, if we are confident in the coverage, but can get little clarification on the submitted speeds or frequencies, we release the coverage and note in our internal metadata the source issues with the other attributes.

Finally, we have used the new provider type classification of 'other' to bring some aspect of the provider's data into our submission. There still seems to be confusion on how to handle provider types where a provider offers multiple paths to provision Broadband for typically business customers. Rather than waiting for certainty on the answer, we bring the provider in and list them as provider Type "other". Our sense is provider Type "other" will continue to expand in subsequent submissions.

[11] We have requested from NTIA information on how provider matching is done within their QA process; beyond the relatively short whitepaper posted with the national map <http://www.broadbandmap.gov/blog/wp-content/uploads/2011/02/DataComparison_Methodology2.pdf>, we have not received any more detailed information on how providers are cross verified between submitted and third party sources at the national level. Our understanding is licensing concerns are holding the release of this information.

[12] We continue to process older submission data looking for information and methods by which we can estimate coverage information. This will be an ongoing process.

Clearly one challenge is the data, but an equally significant challenge is appropriate messaging around this "other" provider type category. We do not want to leave consumers with the impression that they can get a high capacity fiber or microwave link despite the fact that the hospital next to them in the same Census block can get this service.

After the Grantee conference, LinkAMERICA submitted a paper describing our provider classification system[13]. It is our feeling that understanding the type of provider is essential to appropriate verification methods.

Coverage Geoprocessing Methods

The next section discusses how data were georeferenced and geoprocessed given a particular submission format. We have yet to find a particular method that works across all submissions. Rather we tend to tailor our geoprocessing to meet the specifics of the service provider and data submitted.

In most cases, in Round 4 we were still not provided with street segment level information for Blocks greater than two square miles (large Blocks). This necessitated subsidiary geoprocessing. As stated before, our first goal was to derive block level coverage. Then, for Blocks greater than 2.00 square miles, we moved to a segment gathering processing. The segment process will be described in the last section.[14]

Block Level Coverage Derivation Using Service Point Data

A number of providers submitted point level customer data.

In some cases the submissions themselves were not internally consistent. For example, in the image below, unprojected points are shown, while the Census block polygon to which the points are supposed to "belong" is highlighted. In this case, one of the following scenarios has occurred: block attribution is wrong, the points are not in the location to which they are attributed, or different block shapes were used than what is assumed.

[13] https://sbdd-granteeworkspace.pbworks.com/w/file/42309493/provider%20ClassificationFINAL.docx

[14] As has been discussed previously, we note inconsistency in how providers are supplying information at the block and segment level. Beyond the temporal differences, we see that providers are computing area differently, as well as including or excluding water areas. This provides an inconsistent measure across providers for the 2.00 sq mile cut off. Our preference would be to provide guidance to service providers within our states, but our concern is that we will inconsistently message this with grantees in other states. We would appreciate consistent guidance from FCC/NTIA on this topic.

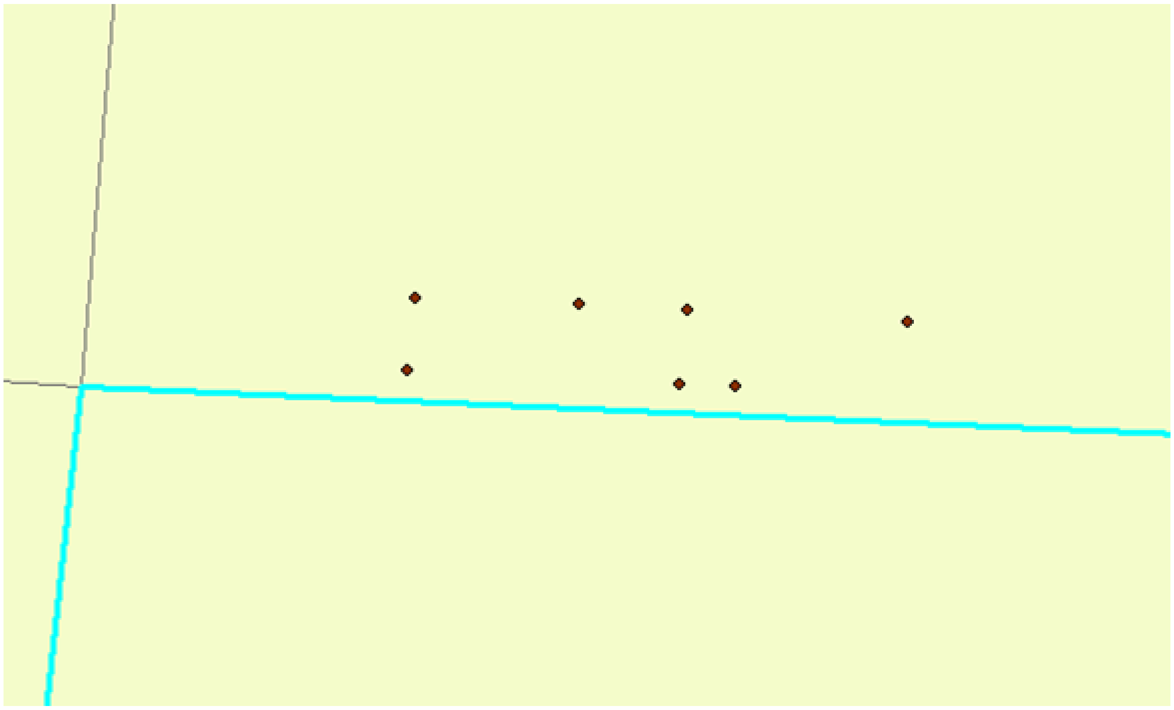


Figure 5-Internal inconsistency in submitted data

In other circumstances, we found that inconsistent geocoding standards may produce misleading results. The next image shows point level data, and the Blocks are colored based upon the counts of points intersecting Blocks. The challenge this presents is that if geocoding was performed on a different dataset than the block boundaries (the road traces are not coincident with block boundaries) and/or geocoding was done without an offset, it becomes problematic to assign coverage to a Census block based upon only the point locations.

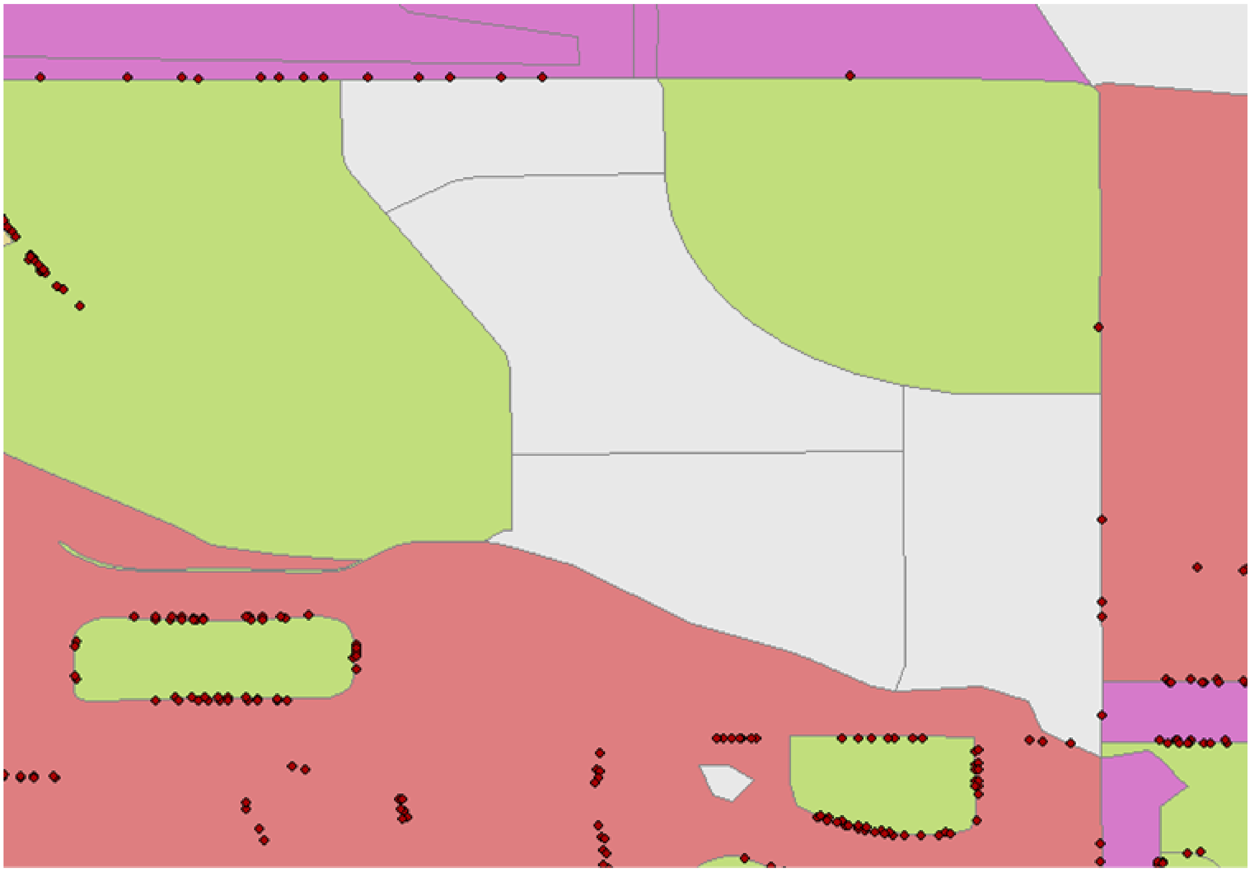


Figure 6-Block Coverage

For this reason, where we were provided address point data and asked to generate covered Census blocks, we elected to use a 200-foot buffer to select Census Blocks that intersect our points.

We are also starting to see a number of providers submit customer data and facility data. Their intent is to allow us to have two primary sources from which to derive the most accurate coverage. In these cases we tend to look for clusters of customers in areas where we see no facility based coverage.

With respect to deriving Block level speed from sub-Block data, we have instituted a business rule where the predominant speed in a Block is the speed we attribute to the Block.

Block Level Coverage Derivation Using Customer Facing Plant Level Point Data

In other circumstances, providers submitted point level plant data. From what we could gather, these points tended to be customer-dedicated terminals. Typically, these providers were high speed Broadband producers—which may somewhat strain the definition of Broadband as other providers supplying comparable services specifically disclaimed the ability to provide high-capacity Broadband services in the required 7-10 day interval. In these plant point data submissions, we had similar concerns to the point level customer data, but two factors tended to make us use a more conservative intersection buffer. First, we tended to have far fewer points to work from, so our concern was grabbing too many covered Blocks as the Blocks tended to be much smaller in these urban areas.

Second, these plant points tended to be dedicated to distinct customers, but it was difficult to know which element of the customer's campus to attach coverage to.

In the case of the image below, given a small shift to the left, it would be easily possible to gather 1 to 3 Census Blocks from this point. Although orthoimagery is helpful in a circumstance such as this, it is still indeterminate.

Thus, in the circumstance of plant level point data, we used a 100-foot intersection buffer.

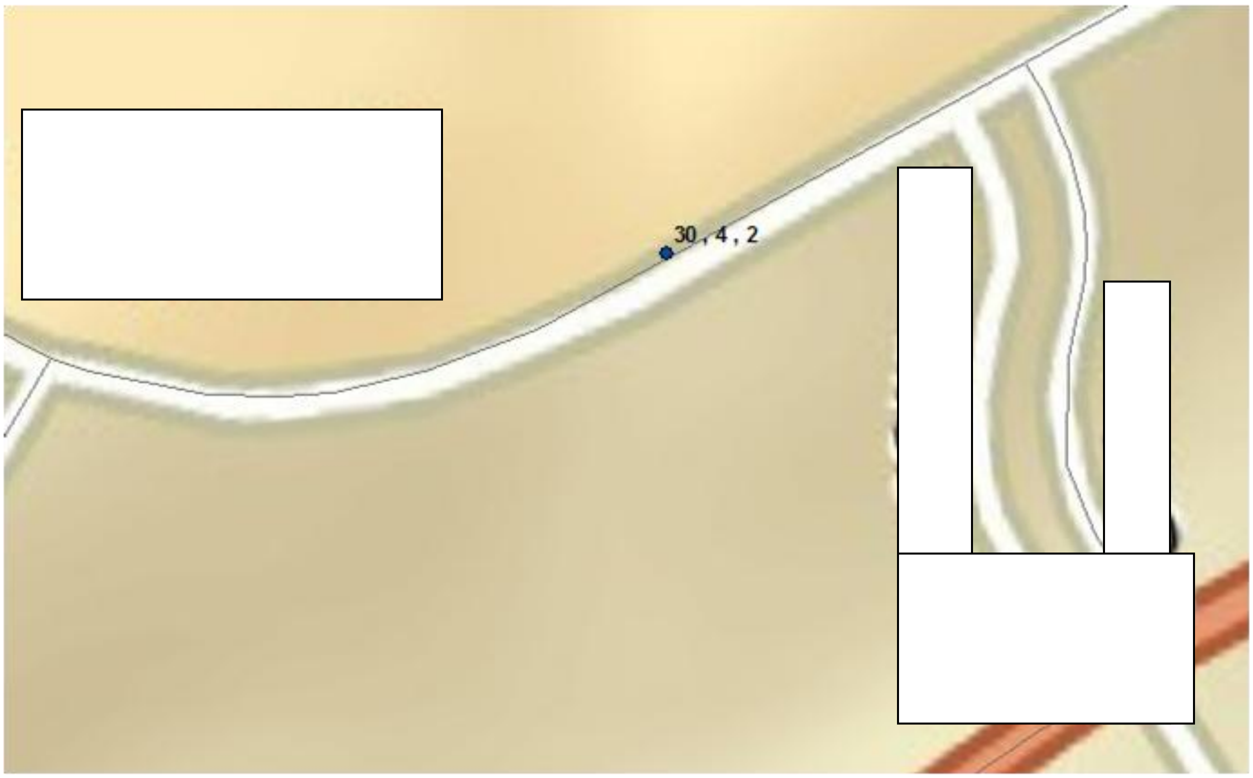


Figure 7-Plant Point level data

Coverage Derivation Using Linear Facilities Data

A number of providers submitted facilities data. We handled this data in different ways depending upon what we believed the facility data represented.

Most telecommunications networks are divided into two components. Feeder supplies higher capacity nodes (eg. DSLAMs, Fiber Nodes). Distribution usually supplies customer premises (NIDs, Pedestals, Taps, ONTs). Where we could discern what strand we were provided, we used different methods.

The next image demonstrates a geo-referenced CAD image as given to us by a Broadband service provider. Note the light and dark green shading. We would infer that the lighter segments represent distribution and the dark green represents the feeder network.

In the case of a combined strand map, we used a relatively tight buffer of 200 feet to gather covered Census Blocks. Our intersection tolerance is based upon an assumption that our data likely represent a

situation comparable to customer point level submission in that we have most of the network footprint captured.

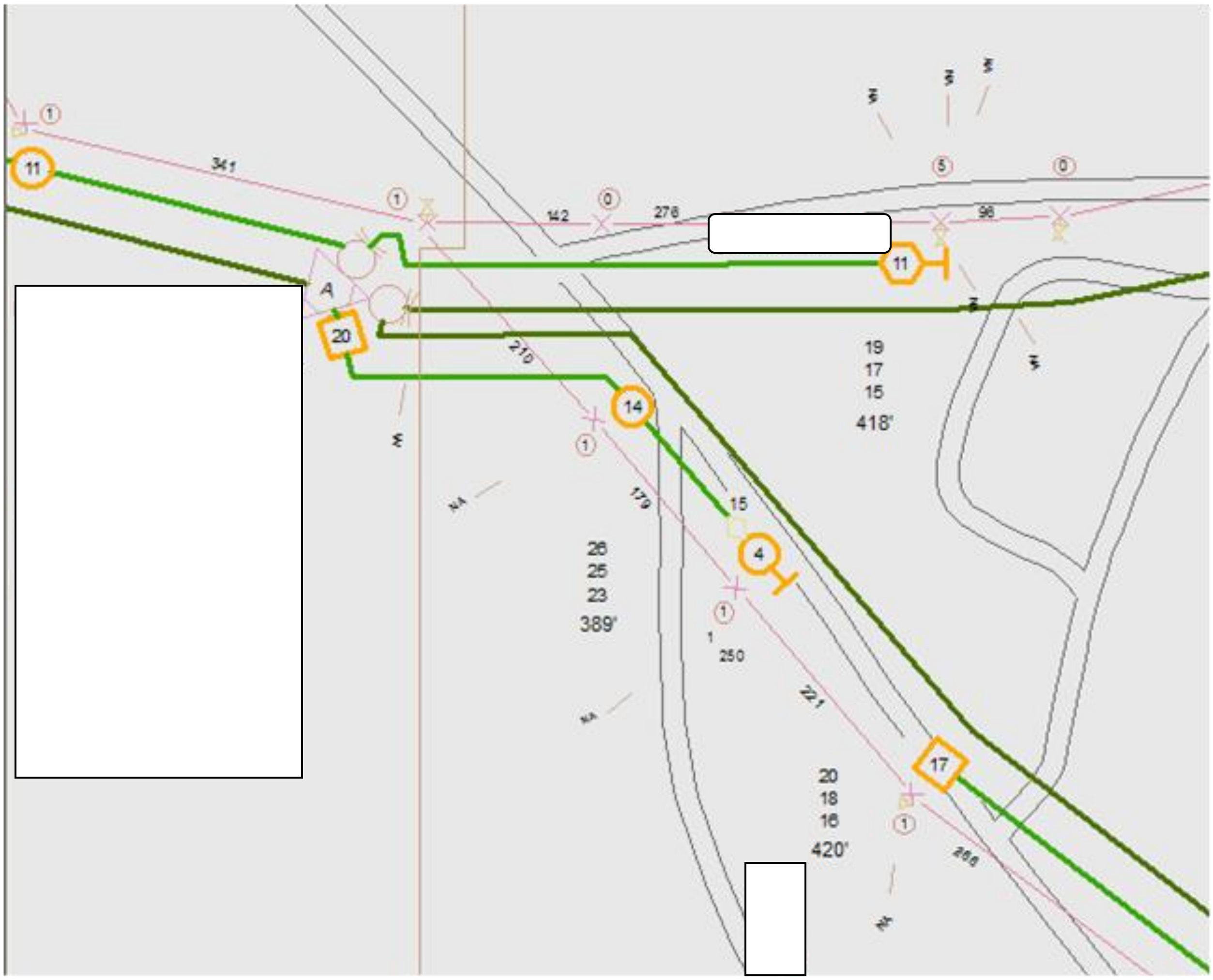


Figure 8-Georeferenced CAD information supplied by Broadband provider

In other circumstances, we were provided engineering information that we inferred to be feeder only. This inference was typically based upon the presence of fiber optic equipment only. In these cases, we used a more generous 2,000 meter Census block intersection. The 2,000 meter criteria was based upon an informal survey of population in proximity to the geo-referenced strand data, but it could be varied based upon a more complete survey.

Coverage Derivation Using Covered Street Segment Data

In some cases we were provided with covered street segment data. Covered segments tended to come from two sources.

In some circumstances, providers gave us CAD data, which was not drawn in a projected manner. This is relatively common for older engineering data derived from hand drawn records. This meant that our

team geo-registered the image into an approximate position. In this case, the boundary streets were selected, and an enclosing polygon was derived. The intersection of this polygon and the Blocks within became the geoprocessing method to derive Blocks.

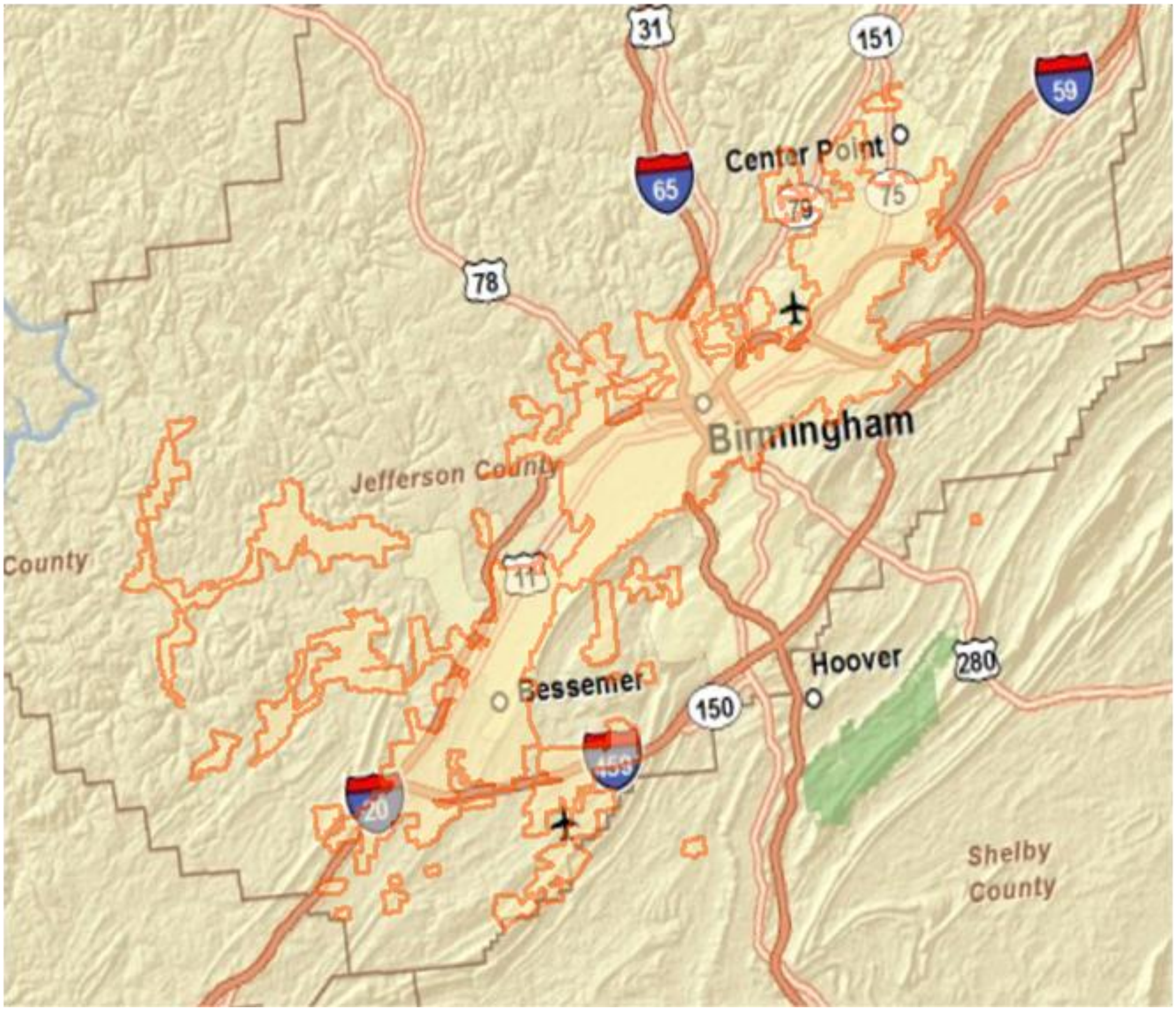


Figure 9-Coverage derived from street segments

In a second circumstance, street segment data was developed during coverage estimation. Handling the estimated data is discussed below.

Coverage Derivation Using Serving Area Point Submission Data

In other cases we worked with providers to derive service areas based upon point plant data. In these cases we were given a serving node and an appropriate road length service boundary. There is an important distinction from the plant data discussed above. In this specific case, the data submitted was a node that served many locations--such as a Central Office or DSLAM. This is contrasted with the earlier example in which the point represents a node serving only a few customers.

When trying to derive coverage from Central Office or DSLAM nodes, the team used ESRI Network Analyst to derive covered road segments honoring these road engineering parameters.

The figure below shows street level coverage derived from Central Office and remote DSLAM point data.

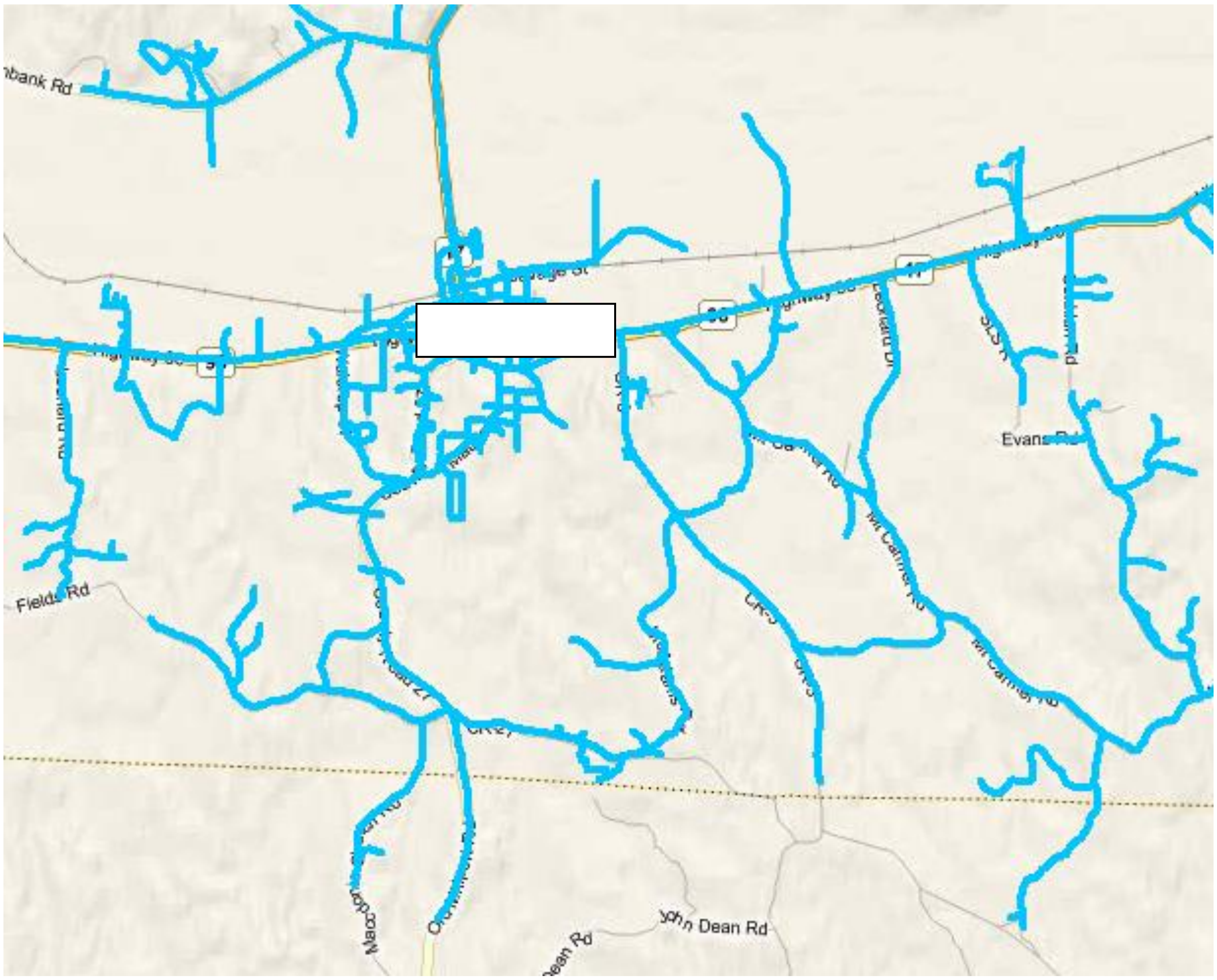


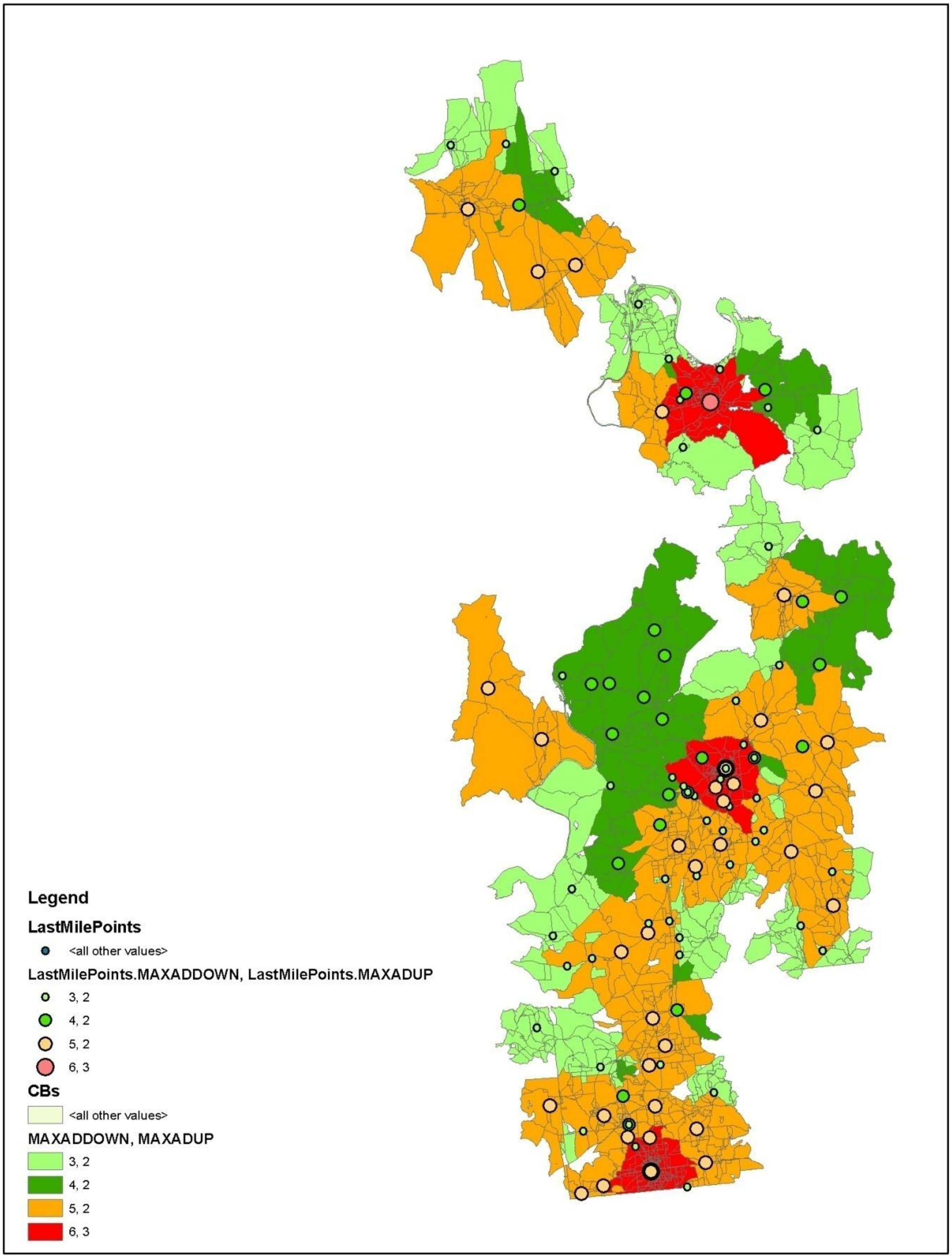
Figure 10-Coverage derived through road paths

In response to Provider feedback we revised this process to include a larger variety of TIGER road types. In Round 1, unimproved roads were not used. In the current submission -- particularly to improve estimates in areas bordering parks and public lands -- a wider class of TIGER roads was used.[15]

The segment level coverage is easily extendable to derivations of Census block level speed. The figure below shows the attributions of block level speed based upon the Maximum Advertised Speed available from a DSLAM. Although the methodology isn't perfect, it does provide insight into the value of granular infrastructure data.

[15] Only TIGER features of MTFCC type S1100 and S1200 were excluded from use.

Over time we have seen an increase in the number of providers submitting this type of data for our use. Our sense is some providers find plant level data easier to generate and are satisfied with the results of derived coverage.



Legend
LastMilePoints
<all other values>
LastMilePoints.MAXADDOWN, LastMilePoints.MAXADUP
3, 2
4, 2
5, 2
6, 3
CBs
<all other values>
MAXADDOWN, MAXADUP
3, 2
4, 2
5, 2
6, 3

Coverage Derivation Using Polygon/Polyline Serving Areas

Broadband service providers sometimes submitted coverage in terms of served areas. This was either in direct geospatial formats, CAD files, or paper maps. The image below reflects a carrier's service area. Within that service area, there are variations in technology of transmission and served speeds. When polygons with speed data and technology of transmission were available, we used a spatial intersection to gather covered Census Blocks. In many cases, using covered Census Blocks resulted in a loss of the speed variation (sometimes the speed variation was at a level smaller than a Block and did not get picked up within a spatial query).

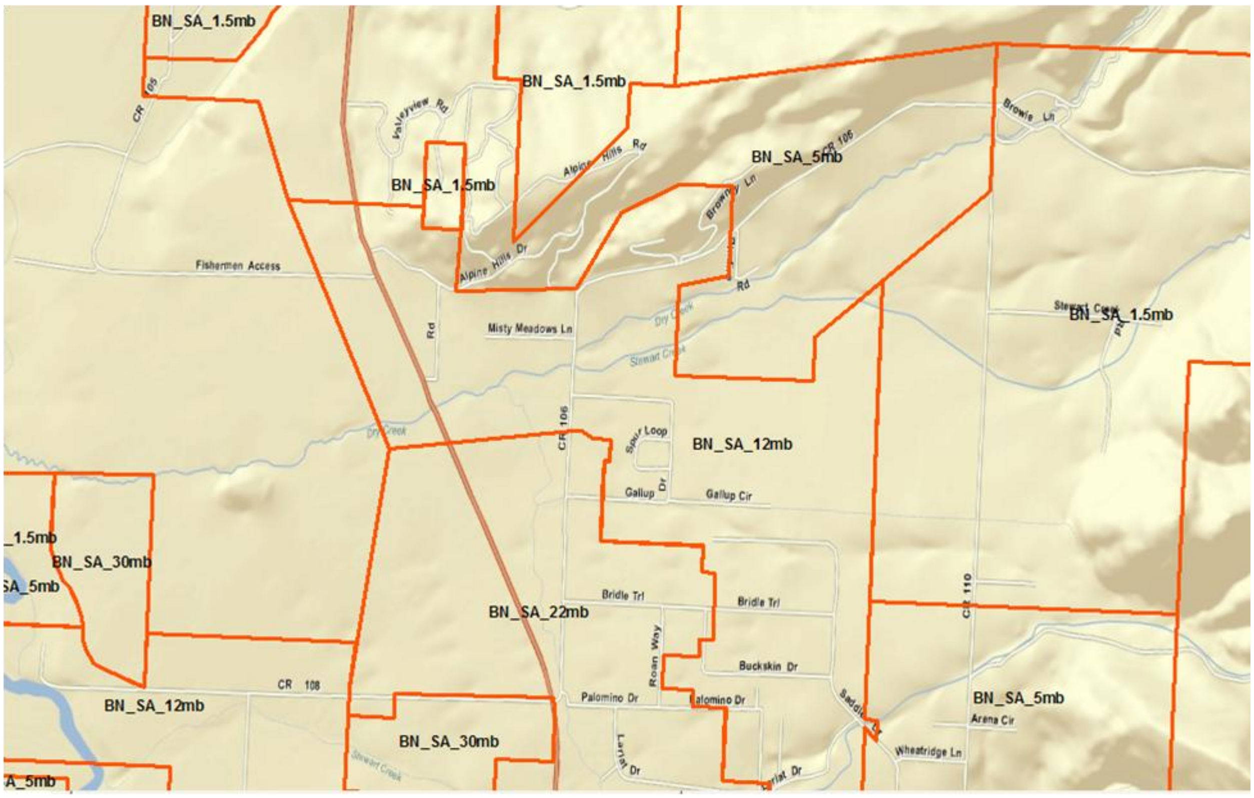


Figure 11-Coverage derived through serving area polygons

Although we cannot directly solve the loss of speed granularity due to Block shapes, we honor a business rule wherein we always select Blocks from the highest speed areas first, and then allow the lower speeds to select from the remaining Blocks. This is an arbitrary rule, but our feeling was that it should be a consistent selection, rather than an unordered selection.

Street Segment Derivation, Large Blocks

For those calculated Blocks greater than 2.00 square miles (large Blocks), we provided coverage in terms of covered street segments and corresponding geography.

With respect to segments we had four sources of data:

1. Covered large Blocks
2. Tabular street segments and address ranges for large Blocks

3. Geographic segments either with street attributes or without
4. Service area boundaries

A number of providers only provided a list of covered large Blocks without corresponding segment information beneath the block. This provided the dichotomy of either selecting all segments in the block, or none. Because we had little information from which to make the selection, we elected to be conservative and did NOT pass any covered segments to NTIA from this submission format. Some Broadband providers submitted covered street names and street ranges. In these cases we performed a manual analysis trying to link to specific segment names and address ranges within covered Blocks. Sometimes this was a simple process because a provider used a TIGER derived street database. In other cases we could not determine the source of the provider's street data. Street and Address matching tended to yield a relatively good result (typically between 30% and 100% of possible segments in the Block), but was very time consuming. Where yield rates were low, our result was a shredded segment coverage pattern, like the image shown

below.[16]

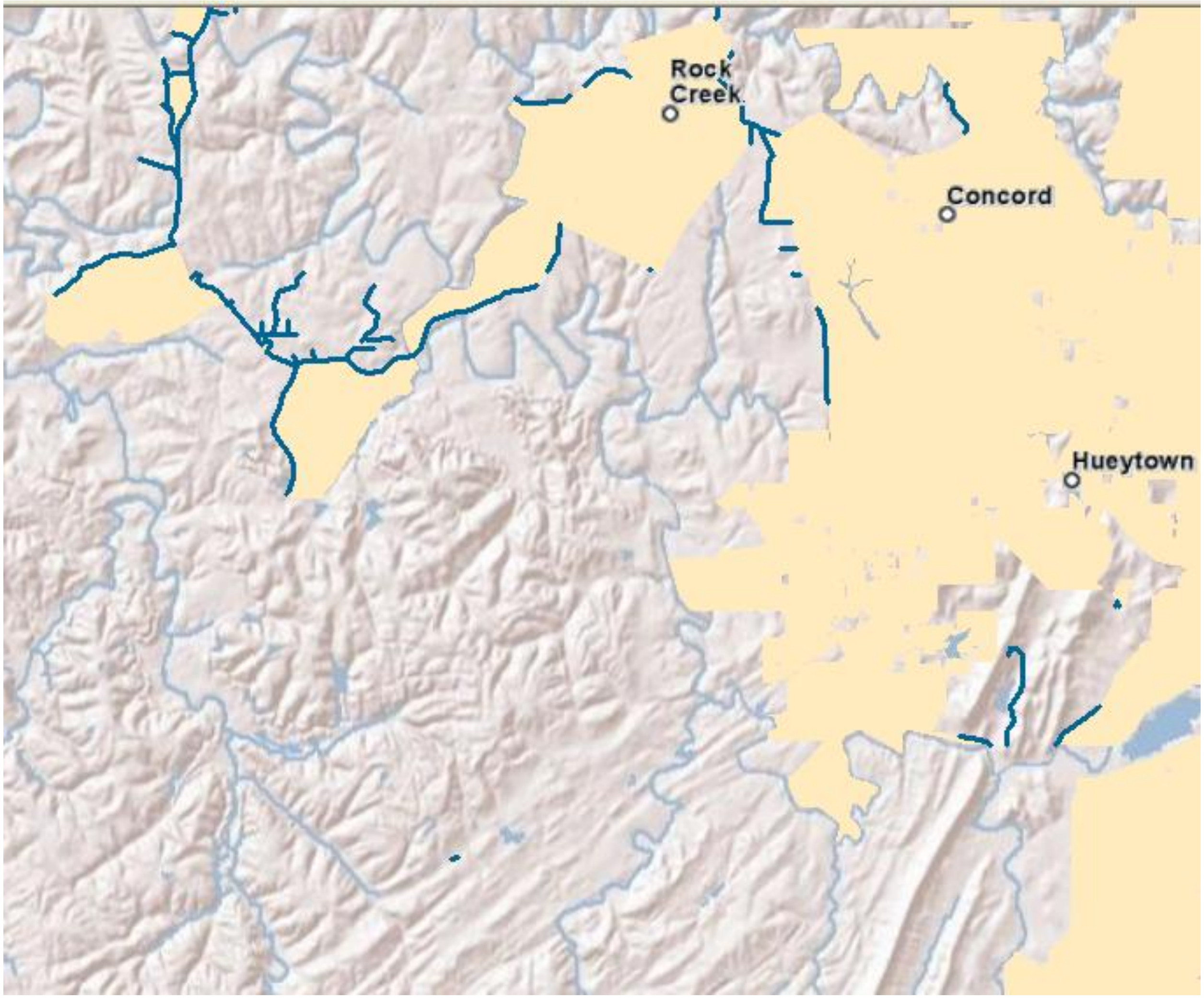


Figure 12-Blue road segments adjacent to peach covered small Blocks

A number of providers submitted geographic objects. In this case, our manual process was directed toward a conflation of data sources. The goal was to take provider submitted segments and put these segments in terms of our TIGER 2010 basemap. Although there is a trade-off in the accuracy using non-provider submitted segments, we felt it was more important to have a road set that would edgematch our Block features and remain consistent with the Block size standards we used for other providers. This is important for the appearance of the online maps, as well as potential verification work where we are attempting to judge a feature based upon its attachment to a covered small Census block. The figure below shows street segment input data.

[16] We continue to hear providers expressing concern that our request for either a geographic object or TIGER Line ID is beyond the scope of the NOFA clarification. Therefore, they cannot supply additional information to us.

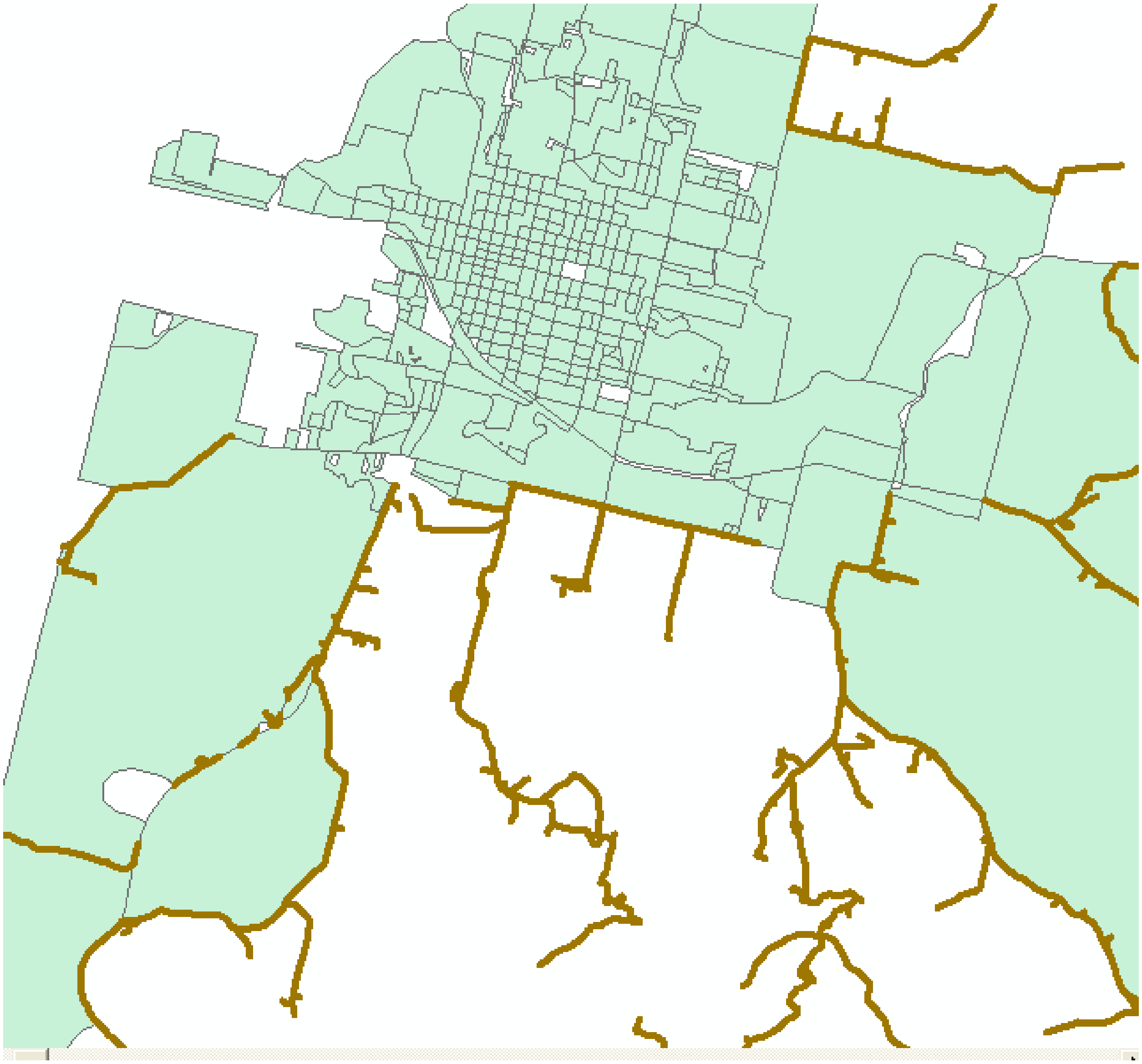


Figure 13-provider Submitted Street Segment Objects. The segments don't edge match the Blocks nor are they continuous.

The figure following demonstrates the same area after the conflation process. Blue segments are the conflated TIGER roads which will be passed to NTIA.

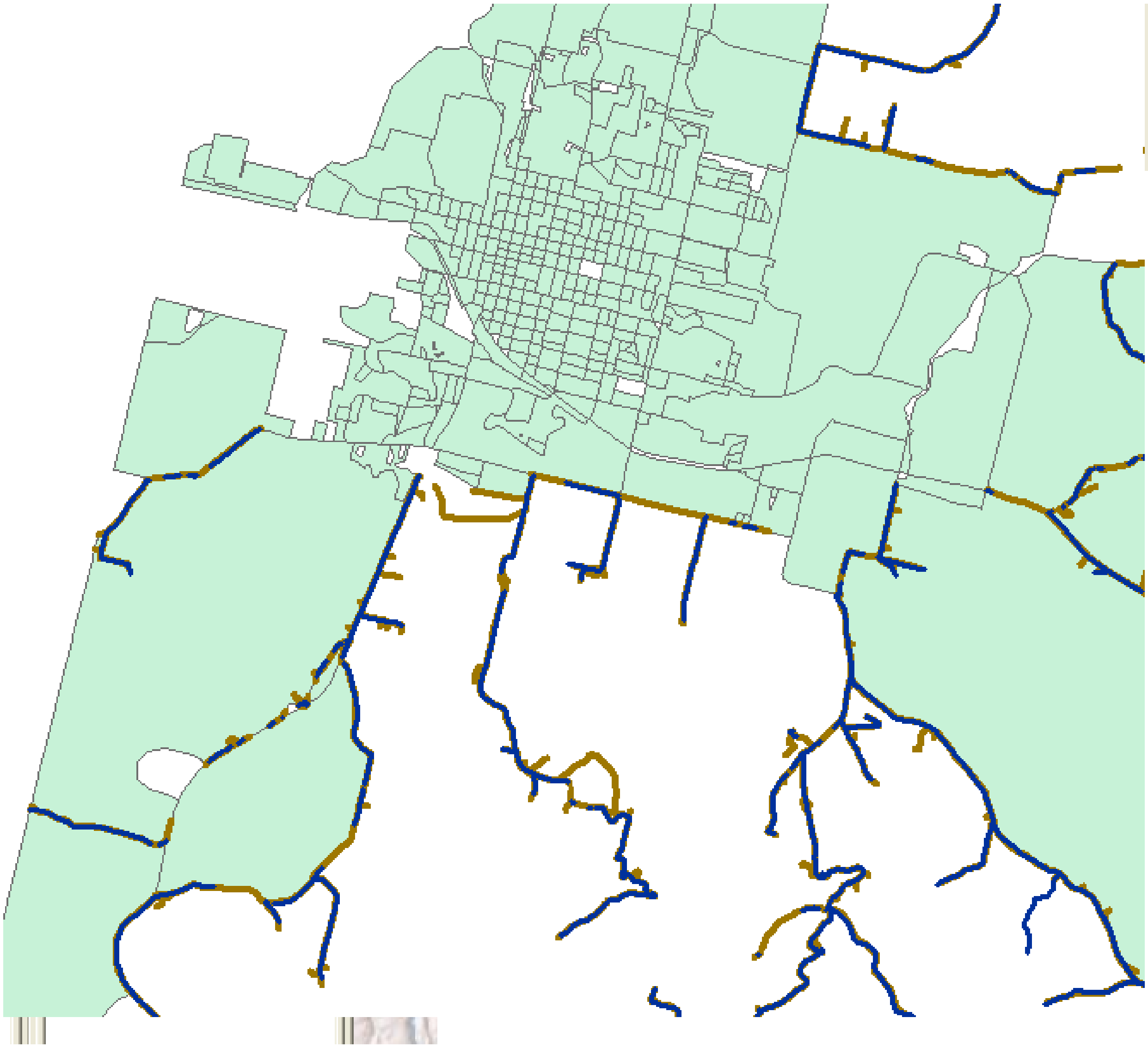


Figure 14-provider submitted segments in gold, selected TIGER in blue—Conflation result; in many cases what was a continuous segment is made discontinuous because even with a distance buffer the TIGER segment doesn't always intersect the provider segment

The final segment process was used when we were supplied with a Broadband covered area polygon. In this case, we found the segments within covered areas and eliminated those segments inside of Blocks less than or equal to 2.00 square miles.

Because there was more control over the format of the inputs (we knew we had a boundary and were working with TIGER segments), this was an automated process that followed this general format:

1. Select large covered Blocks by provider ID (from updated Large Block table)
2. Select TIGER 2010 road segments (MTFCC like 'S%') that face (CB = CBLeft2010 or CB = CBRight2010) covered large Blocks for provider

4. Select segments as distinct records, max speed with corresponding technology, join in feature names, export selected records to temporary DBMS table
5. Join TIGER roads feature class to temporary table on TLID
6. Select covered segments (Python script)
7. Select service area polygons for provider
8. Clip selected facing segments with selected service area
9. Export clipped segments to staging feature class, keyed by providerID

In this figure, orange represents covered small Blocks; black lines are covered segments in large Census Blocks (light blue). The service area boundary is shown in grey. Based upon feedback from providers, we have elected to clip segments at the end of a coverage boundary.[17]

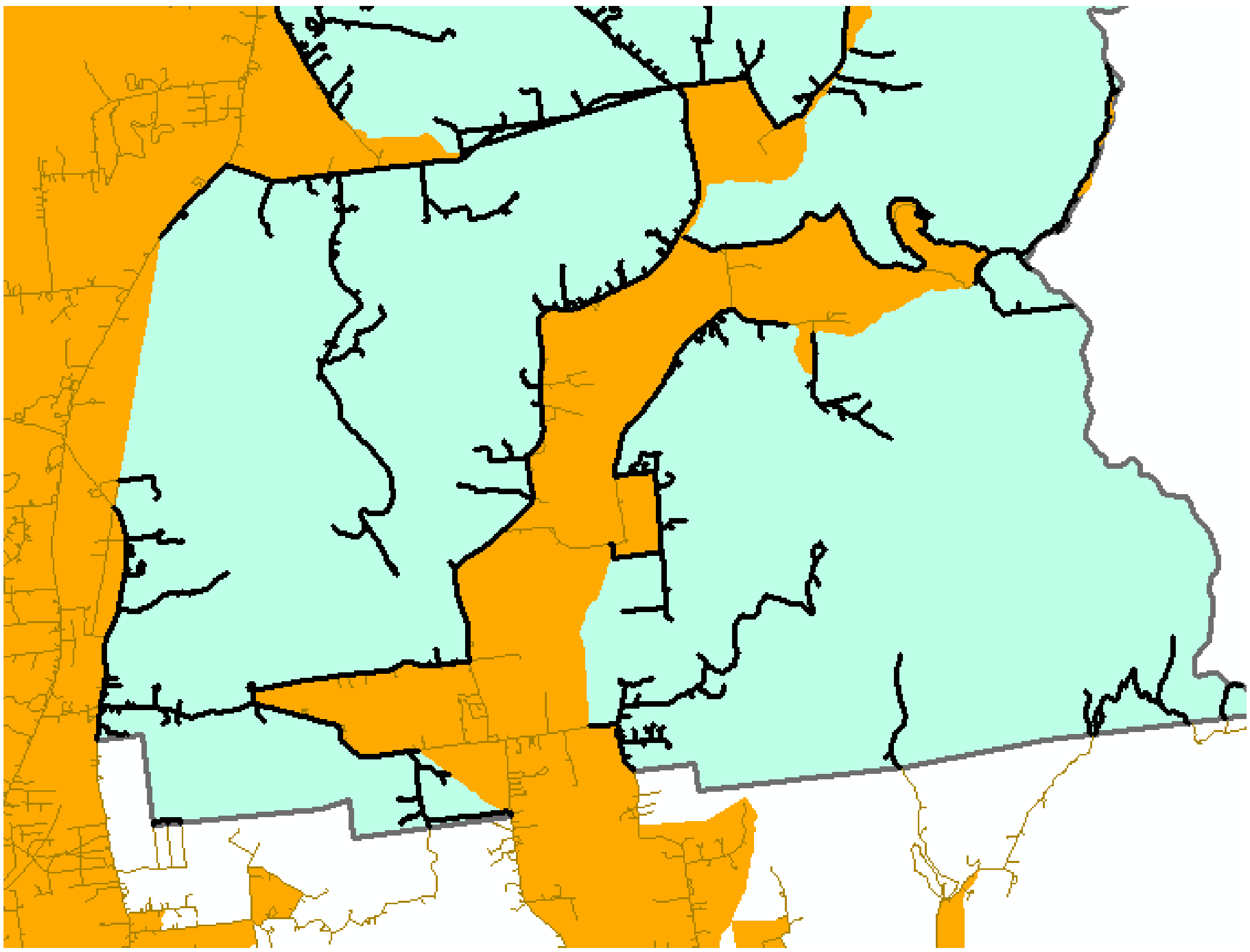


Figure 15-Output of the Segment Process

Wireless Coverage Process

In general, most providers of mobile Broadband submitted coverage information in a NOFA-compliant format. Other than attributions for spectrum and speed, little was done to this coverage.[18]

[17] An outcome not discussed here is how to handle address ranges on segments. As NTIA is asking for a Min and Max on the segment, deriving theses values for clipped segments is very problematic. Also the prevalence of alphabetic characters in addresses makes the min/max selections very arbitrary. We are grateful that addresses are nullable data elements.

LinkAMERICA continues to make aggressive efforts to bring additional WISP coverage into the NTIA dataset. For the most part, our outreach was with providers who were unable to supply sufficiently granular data in the past or those that could only submit wireless address points which is no longer a valid submission format.

In Round 4 fixed wireless providers generally either supplied coverage information or infrastructure from which coverage estimates could be derived. Many allowed us to use their tower locations, antenna heights and direction/spread of coverage to derive a line of sight coverage estimate. In our experience, this is a conservative and reasonable derivation of coverage.

Some wireless providers submitted RF studies. When this was done, there was a request that the signal strength be removed from coverage data. The request was honored.

Other fixed providers were able to supply us with hand drawn maps or polygons/polylines drawn in Google Earth format. In these cases we did our best to georeference and verify the coverage areas with the WISP.

When we received coverage information in KML format, like the image below, we accepted the data as it was presented to us.

[18] Some polygon data did exceed the node count threshold. In these cases, data was rasterized to 100m cells and then converted back to polygons. The polygons were dissolved to multi-part geometry. This addressed the node count concern.

As the image above shows, in some cases we were provided hand-drawn coverage, as well as infrastructure. Instead of estimating their coverage using a line of sight or RF study, we elected to stick with the provider's supplied information. Our decision was guided by two primary factors:

- If the provider is advertising using this coverage they must have specific confidence in its accuracy.
- If the provider can supply coverage, as well as infrastructure that reasonably supports the coverage, there is a very high likelihood in the accuracy of the information.

The downside, of course, is the polygon shown on the map may not represent our notion of how wireless coverage should appear.

In general we note several interesting trends in the wireless data. First, we can be successful in increasing the amount of WISP coverage when we aggressively pursue WISPs. This means we have to be willing to accept data on their terms and convey it into SBI formats. Some of our WISP submissions have taken over 12 hours to normalize into SBI formats. Second, we have to accept that some WISPs will not be able to supply FRNs. There remains a minority of WISP providers who are not aware of the FCC FRN. Third, there appears to be some variation on how the NOFA coverage definition is met. In other words, there seems to be a disparity on the necessary strength (e.g. -80 dB, -98 db, -120 dB, etc) to provide the appropriate quality of service for data services. Fourth, it was very difficult getting providers to identify spectra used for Broadband data services[19]. We are unsure if this is a competitive concern, or if the same coverage pattern is yielded for multiple frequencies. Typically, the spectra returned were those that a provider was licensed for. At this point, we have no reliable way to locally determine what set of frequencies are used to provide Broadband data services in a local area.

Service Address Point Process

A handful of providers have requested that customer level, service address point data be submitted to NTIA. In these circumstances we have done minimal processing to preserve the provider's intent with this deliverable and not bias downstream NTIA use.

Our verification included checks against commercial or Public Utility/Public Service Commission exchange boundary maps. Points not contained within one mile of a boundary are not submitted to NTIA. The percentage of excluded data variesacross providers.

We retain from the provider the provided latitude and longitude, as well as Census block. For some coverage data, if a provider is unable to supply a longitude, latitude or Census block, we fill in these attributes. In those circumstances where we do not have a Census block, but we do have a longitude

[19] One provider responded by email, "This mapping program is to provide the coverage area for Broadband provided by a company. Not to keep a detailed account of every aspect of a companies (sic) network."

and latitude, we accept the given longitude and latitude and use that as the basis for our Census block assignment.

With point data we have tested for comparable geocoding success rates but do not overwrite provider information.[20] From this type of analysis we note the amount (usually little more than 10%) of addresses that seem to locate with less than street segment certainty. Deriving a thematic representation of the points on speed also illustrates some of the locational certainty issues in this point level data.

Coverage Estimation Process

Although the derivation of Broadband coverage into Census Blocks, street segments, or wireless coverage files is, in itself, a bit of an estimation process, there was an explicit estimation process required in cases where a Broadband provider either refused to participate in our survey, or provided such a threadbare submission that no carrier-based coverage information could be gleaned[21].

We typically resorted to three possible estimation paths.

For Cable (HFC) providers who did not provide any coverage information, we fell back to Media Prints data. Rather than using the entire Census Block Group gathered by Media Prints, we used only those Census Designated Places carrying the same or similar names to the Media Prints p_com field. Our reasoning was that Cable systems tend to be franchised on a municipal or at least administrative basis so the coverage will likely follow a governmental boundary. As a general rule, cable infrastructure is not available in the public domain[22] and what could be found was poor in quality and difficult to ascertain for validity.

For DSL providers who did not provide any coverage information, we estimated road-based coverage from their Central Offices[23]. We only used Central Offices that showed evidence of DSL or fiber-based services in the NECA 4 tariff. Road-based engineering areas were derived via ESRI Network Analyst to 18kft. These segments/boundaries were clipped to commercial wirecenter boundary edges.

For mobile Broadband providers who were non-responsive to our requests, we fell back to American Roamer coverage patterns. We generalized the American Roamer coverage to ½ km in order to protect the licensed information.

For fixed wireless providers who provided no coverage information, we relied on their public websites to derive coverage maps. When these maps were available, we georeferenced them and tried to use the

[20] We will make a second geocoding pass on locations with no longitude or latitude from provider. We typically pick up ~5% from our second geocoding pass. Typically the issue is address quality but also difficulties in geocoding in very rural areas.

[21] We report estimated submissions to NTIA as a non-responsive provider but we have data in the submission for them. This is the reason for datapackage.xls entries which are non responsive but contain submitted data.

[22] The team tried to use data from the FCC Coals system and 321/325 fillings but this seemed to be a bit non-uniform in quality.

[23] Central Office location was derived from MapInfo ExchangeInfo Professional. Wirecenter boundaries also came from this commercial product.

outer polygon boundary to represent their serving area. In other cases, when only a tower could be provided, we used a view shed analysis and estimated coverage at 10mi per tower[24]. Because much wireless propagation is driven far below the Census Block and much engineering information isn't known (frequency in use, polarization of the signal, coverage pattern of antenna(s), local terrain/land cover) this was the most complicated group to estimate.

Speed

Speed attributes are reported both at the block (typical) and higher levels (maximum advertised and subscriber weighted). We note that in many cases, providers did not supply typical or subscriber-weighted speeds. In some cases, it appears--although we cannot verify--that their maximum advertised speeds were used to populate typical speed columns.

We do have limited testing data on reported speeds, but we have been careful to not use our typical reported values with carrier-provided information. If we do not have a speed value from a provider, we report an empty value.

Several service providers claim they do not have data on typical speeds available, but estimate a 20% overhead factor between the advertised speed and what may be experienced by an end user.

We continue to request advertised speed at the block level. Nevertheless we appear to be getting speeds that do not vary over a large geographic area – leading us to believe that providers may still be submitting the maximum speed advertised in local media for the entire market. For the most part, we have been unsuccessful in messaging that advertised speed should not correspond to a market area, but instead, the maximum speed, which can be provided to a household—what some may describe as a 'qualified speed.'[25]

As a general rule, in circumstances where a provider supplies a range of speed attributes, we assign NTIA categories based upon the midpoint of the range. We follow this rule unless we can determine other grantees are handling the same submitted information differently.

To support NTIA program office requests, we have also modified the structure of the Service Overview table. Even if Maximum Advertised Speed is supplied at the market or county level, we push that speed down to the contained Blocks. The only records that remain in this table, will be those wireline records with either a non NULL nominal weighted speed or ARPU value.

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[24] In some cases we had an approximate radius of coverage but no height. In this case we used a 50' height estimate and then clipped the coverage to the provided coverage range. We also clipped wireless coverage to honor state boundaries but did not look for providers serving coverage with out of study state facilities.

[25] As an example of a response to our request for Block level advertised speeds, we received the following comment from one anonymous provider, "This is and of itself does not require anything new of us – just states the NTIA supports efforts focused on getting that information on the CB level." It would be helpful to have broader messaging so that providers understand this new direction.

Community Anchor Institutions

In the first submission, the Community Anchor Institution (CAI) process was referred to in terms of a learning curve. This continues to be an appropriate metaphor. The mapping team continues to focus on data that will support and help inform policy makers and the SBI planning process.

In the first submission, the team gathered information on what data was available and what resources will be required to engage these categories of important institutions. In the second submission we continued to obtain additional connectivity information. For the Spring 2011 collection, the team began a survey process to directly engage these important organizations. As the October 2011 submission represents a transitional phase, much of the CAI effort encompassed getting this dataset stabilized for work outside the LinkAMERICA team.[26]

In the current submission we worked to achieve four goals

1) Modify the source data so as to no longer pass NTIA any connectivity estimates

2) Propagate administrative capabilities in our Community Anchor Verification System (CAVS) systems to the Regional Planning Teams

3) Verify the available connectivity information based upon new survey information

4) Update the Federal record identifiers (NCES codes, etc).

CAI Philosophy

Our work with CAIs is guided by three principles.

First, CAIs are important stakeholders within the planning process. Our goal is to engage participants in regional planning that have strong ties into the CAI categories identified by NTIA. This has a direct benefit of engaging an established stakeholder community. It also allows Broadband planning to tie into existing organizational and planning networks. In each of our states, key relationships with education, public safety, libraries, and economic development sectors are being identified and developed.

Second, we believe that CAIs will likely be one of the primary beneficiaries of targeted Broadband funding. Our belief stems from the sense that many of the benefits of Broadband will extend from these community 'anchor points'. In other words, it isn't solely the existence of Broadband at a library that provides a benefit. It is people using applications that work only on a Broadband network to upgrade their skills (e.g., online training) and gain access to online content (e.g., job postings, goods and services), etc. The targeted use of a specific application--that can only take place with Broadband networks-- is what produces the priority benefit. Put another way, there seems to be a realization that

[26] LinkAMERICA began transitioning the CAI data collection effort in the state of Alabama to ConnectingALABAMA in Round 3. For Round 4 ConnectingALABAMA assumed full responsibility for the CAI data collection effort in Alabama. To facilitate the reporting process, the ConnectingALABAMA team continued to use the Community Anchor Verification System (CAVS) to store CAI data collected or modified. CostQuest maintained responsibility for the CAI data submission for Alabama for round 4.

things are less about pure connectivity (for the sake of connectivity) than about connectivity in terms of an application (for the sake of the benefit obtained through the application).

Third, we continue to use a rational and targeted approach to derive information. This means we will utilize our planning teams for as much ground work as possible. This also means that a goal of our CAI process is not an exhaustive Census of anything that could be a CAI; rather, it is the discovery, inventory and integration of Broadband planning activities into those CAIs that stand to produce the greatest synergies with the SBI planning process.

The above implies two significant points. First, the team's goal is to document community anchor institution connectivity within a broader context of regional and statewide planning objectives. Second, if a particular category of CAI has an independent Broadband planning effort underway, we will encourage that organization to take the lead, and we will provide relevant expertise and support as warranted. For example, in one of our states, the public safety community is already engaged in a mobile Broadband survey effort. We have aligned our CAI data collection process with that effort and are sharing information and expertise (e.g., hosting a survey) to support their mission. In another state we are attempting to glean connectivity information from a municipal government survey. There may be some downside to this collaborative approach in that we may have to work with data spanning different times or we may not have all of the location-specific information we need, but this does prevent the same user from receiving multiple inquiries.

Anchor Institution Survey

During the third submission period we designed and developed a simple on-line survey system called CAVS (Community Anchor Verification Survey). The intent of the survey was to both verify received connectivity information and garner additional connectivity information from CAIs. For round 4 we continued the use of the on-line survey process. Although we have found that reaching out to central contacts, for specific institution groups, is the most fruitful way of collecting connectivity data we find value in inviting individual anchor institutions to participate through means of a survey. From our perspective this approach gives the individual institutions an opportunity to become engaged in the broadband planning process. The link for the survey is housed on the Home Page of the website developed for each state, thus providing the added opportunity for responding institutions to learn more about activities in their state.

The survey remains open between collection periods to provide opportunity for the Regional Planning Teams to update information as they engage with the community and to allow responding institutions to update their data as necessary.

Anchor Institution Trends

At this point we have focused our CAI attention on schools and libraries, with respect to connectivity. We benefit from strong relationships throughout the education sector (K-12 and Post-Secondary). We have also found excellent resources within State librarians in all States.

To supplement the education and library information we have formed organizational relationships with the major hospital associations within each state. Our goal with this relationship is to cull information from their planning process. We continue to formalize/advance this relationship.

As in the prior submissions, we rely on public domain sources of information for the public safety-category . Collecting connectivity data for this group continues to be one of our most significant challenges. Our hope is that in subsequent submissions, we will reduce the size of this category and connectivity information specific to root nodes of the public safety network--such as County Emergency Operation Centers.[27] At this point we have had minimal success gaining this information.

Because we have a wide ranging population of CAIs in our data set we have a variety of Broadband services that don't always fit NOFA parameters. Services like PRI or T1 are classified into "other copper," We also had difficulty obtaining both the upstream and downstream channel capacities. In most instances, when it was logical to do so, we made the speeds symmetrical, but this is an assumption on our part. If a site records bandwidth across several services (eg. video and data), we record the total bandwidth to give a picture of available site bandwidth. We are also working to standardize our response to NTIA in circumstances where an entity shares a Broadband connection among a campus which is fiber fed. In this case we use the total campus bandwidth and use the primary campus Internet connection.

As a final verification step, we attempt to screen the CAI data for duplicate values. Because many CAI are closely clustered together we perform the de-duplication based upon the ANCHORNAME within the ZIP5.

Middle Mile

Middle Mile information was collected directly from providers via survey or interview. Middle Mile is a "chicken or egg" type of challenge in that it is possible to verify that the infrastructure exists, but extremely difficult to know what is the site is doing without engineering level assistance. Although most providers submitted "something," there was a significant variance in what that "something" represented.

The purpose of this section is to record some of the comments and questions we have received about Middle Mile. We hope this provides better context for our data submission.

[27] Within the public safety category, it is also very difficult to derive precise locations as many CAI are addressed to PO boxes.

Within the NOFA, Middle Mile was defined as (a) a service provider's network elements (or segments) or (b) between a service provider's network and another provider's network, including the Internet backbone. (Collectively, (a) and (b) are "middle-mile and backbone interconnection points.")[28]

Given the existence of the "or" in this definition, providers submitted a variety of information. Based upon the NOFA example, several fixed wireless providers interpreted Middle Mile in terms of the connection points from their towers to their own serving backhaul location. The topology was commonly Microwave from their distribution towers to their NOC. The NOC and towers were listed as the Middle Mile points. This seems to be consistent with the first definition clause (a).

Telephone, Mobile Wireless, and Cable providers tended to remain either silent on the question, or would provide a single location in which Internet peering occurred (clause b). A number of participants explained that the NOFA was quite ambiguous with data traffic moving back and forth over both TDM and IP networks--it was unclear where the distinction should be drawn. As a general rule it seemed like many providers listed a single location where Internet Peering occurred.

A number of providers refused to answer the question on grounds of confidentiality[29]. Others would not disclose as their Middle Mile points are not owned--another company provides the physical and electronic connection to their network. In other words, the entity providing Broadband is not the entity providing Middle Mile.

Additionally, based upon the new Provider Type classification of "other," we have started to integrate points provided by Broadband service providers not meeting the NOFA definition. This includes POP locations and aggregation points for public / private networks.[30] Within a given submission there were two final attributes that tended to concern respondents. First, speed should be measured in terms of only data capacity and what exactly is "data" (e.g., can/should you segregate out voice or video), and is the relevant capacity of the physical connection, channelized to a specific virtual circuit on their network.

Finally, a number of other providers were unsure of the height above grade measure (is this their floor, the street outside, etc). We seem to have a combination of height above or below grade, as well as heights above mean sea level (AMSL).

To the extent possible in our timeframe, we verified the location of a sample of Middle Mile points. Where we could see infrastructure that appeared to be consistent in location with other provider

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[28] From http://broadbandusa.gov/files/BroadbandMappingNOFA(FederalRegisterVersion).pdf at 54, visited March 28, 2010

[29] As received in email 9/30/10, "Due to security concerns and the risk of public disclosure of highly sensitive data, whether inadvertent or otherwise, ***REDACT***response to the Middle Mile and backbone interconnection request is limited to publicly available information available on {remainder not included}"

[30] As discussed in our readme.txt file, a number of middle mile points were lost in validation due to their location in adjacent state. This will cause a decrease in some providers relative to prior submission.

infrastructure, we felt that the location was accurate. In some cases, the point provided seems sensible (is on a road, near other equipment), but using imagery, we couldn't find a place where this type of connection could occur. This wouldn't be unforeseen, in that Middle Mile connectivity likely takes place in a protected environment much smaller than a standard Central Office installation.

Mobile Wireless Coverage

We have received mobile wireless coverage from most mobile Broadband providers in each state. At this point we have cleaned the geometry of the data and attributed it with spectra and FRN as required.

Provider derived coverage has been reviewed against the commercial licensed product for consistency. To a limited extent we also use licensing locations and tower infrastructure to spot-check supplied coverage. This mode of verification remains complex, given the lack of facility-based information with mobile wireless.

Finally with respect to mobile Broadband services, we note several trends.

First LinkAMERICA used the NTIA supplied frequency tables to report speeds consistent with other grantees. In circumstances where a provider supplied a range of experienced speeds, we used the portion of the range consistent with the most frequently reported Grantee value.

Second where a provider reports multiple frequency bands in use but doesn't distinguish these bands by submitted SHP file, we submit identical geometries but attribute one geometry to each submitted spectrum value.

Third we are seeing a trend toward increasing Broadband speed. As of this writing, there is not consistency across providers in how they attribute the advertised 4G speed values. In other words, for some providers 4G means advertised speed categories increase. For other providers, the speed value did not change.

Verification

Almost by definition, data verification is an ongoing and evolving process. Clearly, with each new data submission there will be a validation process at hand and at the same time, our team continues to expand and improve the efficiency and effectiveness our data verification routines. Consistent with the movement toward an fGDB export database and use of a data receipt script, much of our validation effort was spent in supporting the ETL processes into the required formats. In future data submissions we will continue our work to stabilize and improve the business process that normalizes provider submissions into NOFA formats and expands in more depth on the confidence analysis within the data.

Verification Standard

Our overall verification standard is focused on the level at which we supply processed data to NTIA. This means that the vast majority of our verification process will be focused on ascertaining coverage for Census block's less than 2 square miles and covered road segments.

We are learning that Verification has multiple dimensions.

Provider verification is finding providers who supply Broadband and discriminate out providers not meeting Technical Appendix A's definition of Broadband.

Identity verification is taking the provider's categorized in the first step and ensuring that the provider either has a valid FRN or is assigned a default FRN. Identity verification is very complicated because of the Technical Appendix A's mandate to record data at the FRN, provider Name and DBA level. Each of these attributes could be unique for a single provider going to market under different or the same names. As a result, rolling up each provider into an identity collection that matches either the FCC data integration team or a third party Broadband provider's data view, is very, very time intensive. Identity verification is discussed in the earlier section-- Developing the provider List.

Coverage verification is a broad term, but in our definition it boils down to determining if Broadband coverage is in the right place. For a given provider, the question is whether the coverage is assigned to appropriate Census Blocks, road segments or area features. Coverage verification can be further broken out into two distinct classes:

- Technology verification, which is determining if the provider is listed with a technology consistent with their marketing information.
- Speed verification, which is determining if the speed supplied for that block, road segment, point area file or market area is consistent with the technology and the marketing information received.

The final verification dimension is consumer feedback and crowd-source verification. This is a dynamic set of steps we are beginning to implement. One side of this is responding to consumer concerns. The second is using the crowd sourced data to validate provider claims and, if appropriate, update the map and the underlying data.

At this stage, our working hypothesis (confirmed by our experience) is that there will not be a single dispositive measure to indicate Broadband coverage availability in a Census block or along a segment. From prior work, and examining our current provider submissions, we believe that there is too much variation below the submitted record to make a single binary yes/no indication. Rather, there will be a series of measures that combine to provide qualitative confidence (a classification scheme) in our indication of Broadband availability at the block, segment, or wireless polygon level. We believe such a qualitative confidence scheme is both relevant to and supportive of NTIA interests, as well as the interests of our end-user community – that is, the states and citizens we serve through this program.

The intent of this section is to illustrate why we are moving toward a particular verification methodology. Our team is learning as we go along, and will adjust and improve this thinking. But given our experience to date, this is where we are heading. As stated above:

- First, coverage verification is at the level of data submitted to NTIA.
- Second, coverage verification is enhanced when there is a secondary measure of availability (such as infrastructure presence or serving area boundaries)
- Third, given the limited resources of this effort, the most important coverage verification process to implement is the erroneous dispersion of coverage. These are the “islands” of coverage isolated by significant distance from other covered areas. . In other words, Broadband Internet likely doesn’t exist far away from other areas with Broadband Internet access.

Before explaining our overall verification thought process, we have several examples, which illustrate the complexity of coverage verification.

The first example is taken from a gentleman who requested a map change in Alabama. His home is near the yellow dot. The darker grey Blocks are covered Census Blocks. The black lines are covered road segments. He cannot receive DSL from his incumbent provider, although his neighbors can. The incumbent carrier does have at least one structure in that block from which Broadband services can be provided; unfortunately his home is not served.

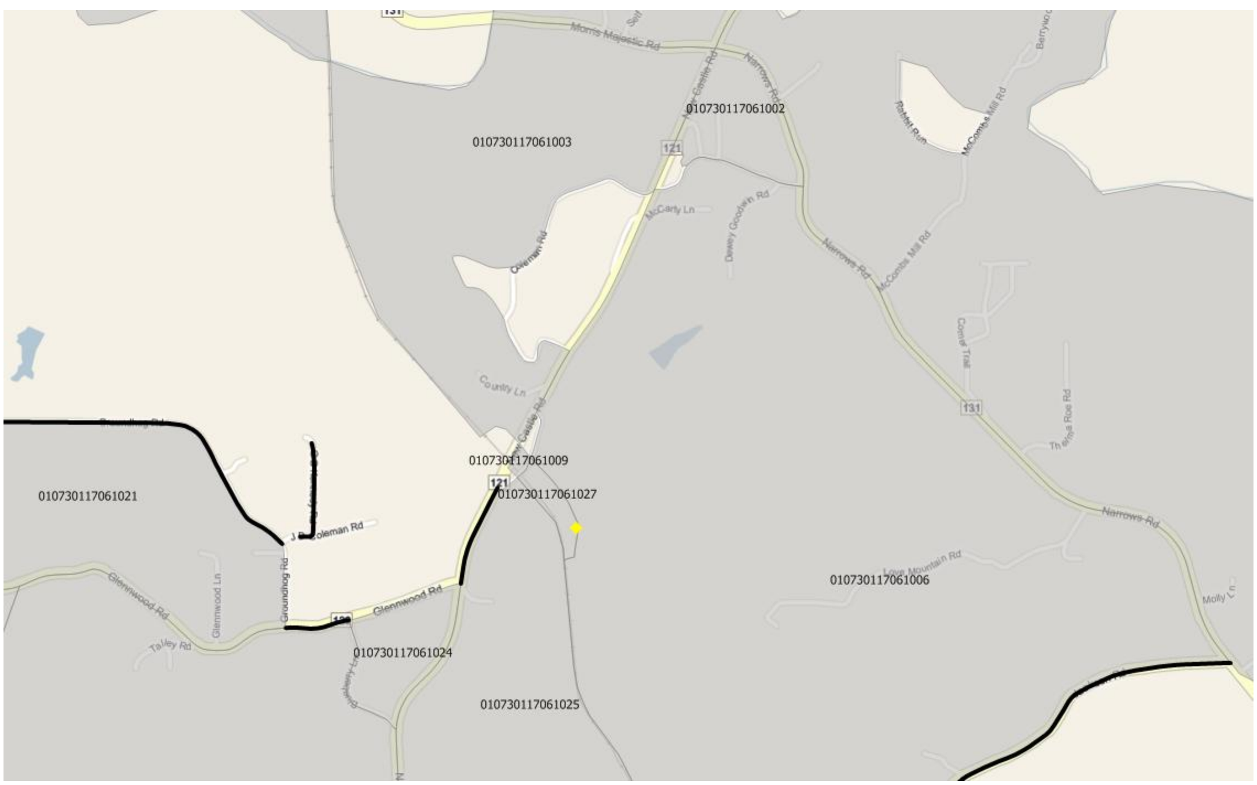


Figure 16--Sub block variation

Because the SBI program requires the depiction of coverage at the block level, the above map has been correctly generated. However, from the customer's point of view, the map is inaccurate. This requires us to explain that the maps are not intended to be a structure-level qualification, at which point some consumers question the value of the maps when seeking service information. Of course, we also share this information with the incumbent carrier in the area so they are aware of a potential customer market.

Beyond this type of one-off structure-level qualification, sometimes, as shown below, we have even larger gaps in provided coverage. The image here shows an "outlier" block that could be an error, or it could indicate missing Blocks along a major road that should have been filled in. In this figure, the outlier block is highlighted in turquoise.

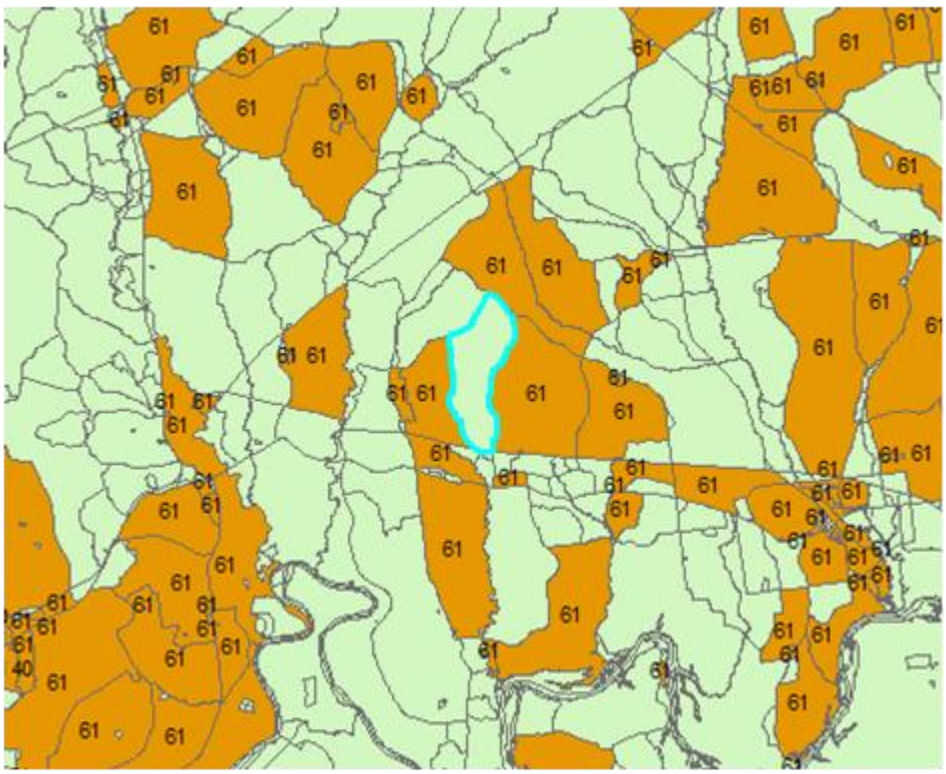


Figure 17--Dispersion in Submitted Data

In this particular case, we are faced with a different verification question. Based upon the properties of the neighbors, we believe this block should likely be covered (coverage interpolation,) but supplied data from the incumbent says otherwise.

The next example shows where an interpolation process could require some adjustment. The figure below shows a town level. There are some smaller Blocks that are likely covered by interpolation logic, but we also do not want to extend coverage beyond a franchise boundary as in the areas shown in a box on the bottom of the map.

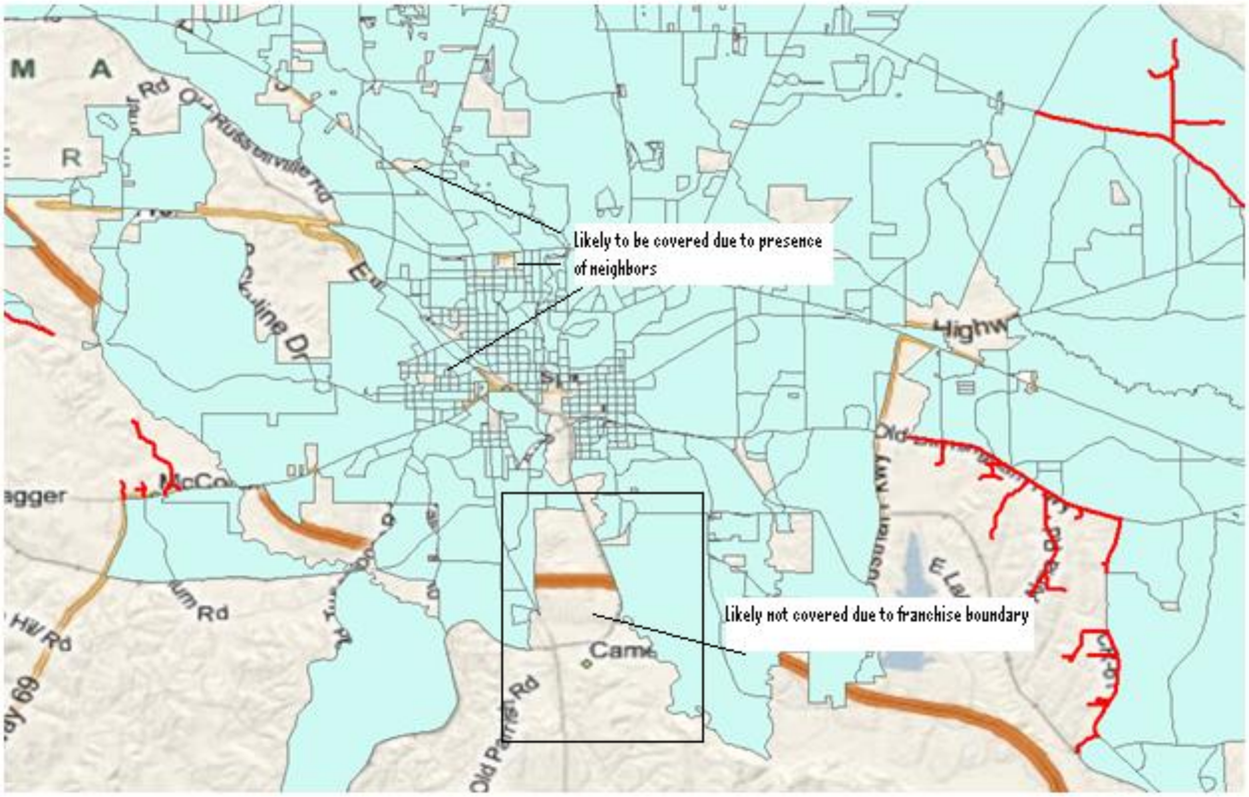


Figure 18-Where do you stop interpolating?

From what we can gather from some providers, the submitted data—data with consistently high degrees of dispersion or coverage holes—tends to come from geocoded billing records. In this paradigm, this means where there are no customers; service is not identified on a map. The interpolation verification question then takes on two dimensions.

> First, if a provider has no customers in an area, how can we know if they would be able to provide service in a 7-10 day interval?
>
> Second, if we use the properties of neighboring Blocks to interpolate coverage, when should we stop (e.g., at a franchise boundary, at a certain distance, etc.)?

We continue to work with providers to get additional information to help us better understand and contend with this type of circumstance. However, we have not been entirely successful at getting franchise boundaries that would address much of the issue.

The final map shows this dispersion problem, but to an even larger degree. This solitary large block is likely the result of a bad geocode, but we don't know, given the data that has been submitted by the provider and the "single customer in a block standard" set by the NOFA clarification.

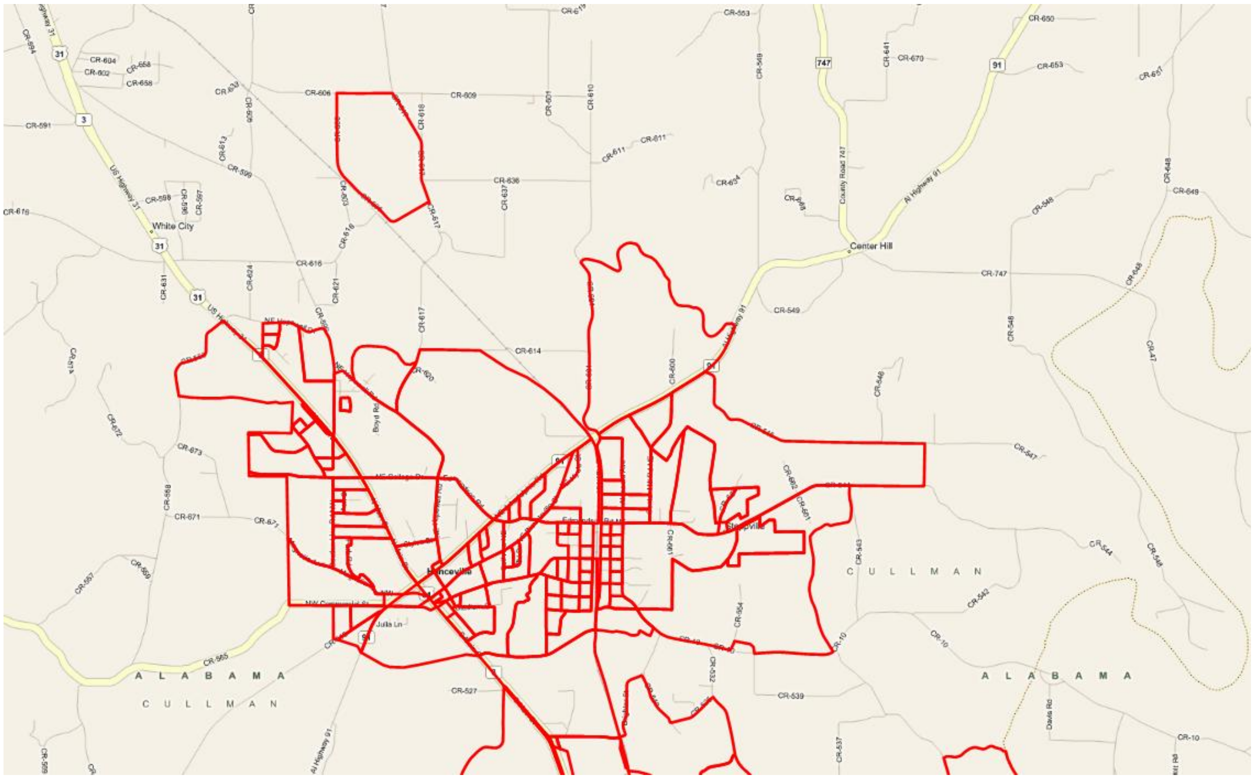


Figure 19-Dispersion in covered Blocks

Due to the fact that this situation is quite obvious in display, this type of problem is one that we are more aggressively trying to resolve. Where a single block has no neighbor offering comparable coverage and is a specified distance beyond an exchange boundary, our approach has been to filter these Blocks out. As of now, this filter is limited to incumbent DSL providers because we have a good source of exchange boundaries.

The exchange boundary dispersion verification method breaks down when examining smaller providers who are more likely to CLEC into neighboring territory. In the figure below, the black line represents the exchange boundary, while the continuity in the DSLAMs likely points to coverage extending along a road into another provider's territory.

Figure 20--DSL Coverage outside of exchange boundary

In sum, the variability in our source data continues to suggest that our dynamic verification process is relevant, appropriate and evolving in a manner consistent with the overall program. And, as noted above, we believe the more meaningful outcome of our verification processes will likely be a series of qualitative indicators or expressed confidence levels. Our concern, as with the development of any sort of classification process, is how rigid we should make this classification given the variation in our input data and the varied perceptions of service providers, map viewers and down-stream data consumers.

Verification Work Process

To support our dynamic multi-factor verification process, we have implemented the following steps.

First, when data is received, an analyst reviews the submission and any immediate questions or concerns are sent back to the provider as quickly as possible. We have found this gatekeeping step very helpful in making sure we understand the intent of the submission.

Second, for all providers who submitted data to us in the third round, they received both a tabular data summary and mapped output[31]. Prior to releasing the "check maps" to providers, we had a team of analysts visually inspect each provider's coverage area. The focus on this QC effort has been to identify and flag suspect Blocks. After this in-house review, we solicited a second level of feedback from providers and received a number of requested changes and corrections used in the development of the October, 2011 round 4 dataset.

For those providers who submit only block or segment level coverage (i.e., in those cases where we have no infrastructure to test with) we test for coverage containment within known service boundaries. The intent of this validation step is to remove Blocks that are obviously erroneous. We also verify the submitted speeds against the typical speed ranges in the NTIA frequency tables. If we note a value outside of typical range, we ask the provider for clarification.

As mentioned in the sections above, we have implemented a check on dispersed Blocks, but we have implemented less with respect to coverage interpolation (holes in coverage). We continue to work on a series of mechanical tools to assist with the inspection process but have run into challenges related to geographic basemap and timing.

As our submissions have moved online, we have also begun to benefit from crowd source feedback. In some cases this has helped us identify and fix errors in our underlying data. In other cases, as we have shared with NTIA, we have encountered some perceptual issues rooted in how the data are developed and modeled to comply with the NOFA. Depiction of uniform coverage in small Census Blocks continues to be a challenge. Despite our best efforts to explain the full block coverage requirement, we continue to receive complaints that the coverage shown on the map is not accurate for a particular location within that block.

[31] For the verification of round 3 data, we submitted both PDF and KMZ (Google Earth) format check maps. Some providers prefer to work with the Google format as it supports easier modification. Others continue to submit marked up PDFs.

Consumer and Provider Responses to Deliverables

Here, we segue from internal verification to external verification. We view responses to our work product as a form of validation and verification. On the one hand, this gives us the opportunity to fix mistakes and then generate QA steps to make sure that the problem does not reoccur. We also learn how to improve what we are doing or better explain what we are doing to a community not always familiar with the NOFA and program office framework. On the other hand, listening and learning from this feedback helps us better target our mapping deliverable to meet the needs of our external customers. In this second case, external feedback not only provides feedback on perceived qualities (or lack of quality) in the data, it helps us to learn if we are developing data that is truly helpful to downstream users.

At this point, our external deliverables take three forms: State Broadband Maps, data transfer to NTIA used for the National Broadband Map, and text format data requested by outside parties.

Online Map Experiences

With our State maps are online, we continue to harvest viewer feedback and comments. Because an online map allows someone to zoom in far below the scale of the data, a large number of comments reflect sub-Census block concerns. While important to the citizens reporting these issues and to our Broadband planning teams, this level of data is outside the scope of our core validation process, which as noted above, is focused on the level of data submitted to NTIA.

There are several other themes that our team believes are important to share. These comments are actually quite helpful because they also improve our data processes to better meet the needs of map viewers. For example, we have invested significant time in harvesting more segments from provider data. Because the appearance of segments is so important, we are putting time into ensuring a visually appropriate edge match between the roads we harvest and the Blocks/roads we will show online. On a technical level, we also believe that a good segment process will help us understand more about dispersion in the data, and what is valid versus what is not valid.

Online Display of Consumer Feedback

We have completed development of a consumer feedback layer for our online maps.

The intent of the new layer is to show viewers the feedback of other map viewers. We anticipate the feedback layer will go live when the Round 4 data is posted on our state maps. We expect this to be prior to the end of October, 2011.

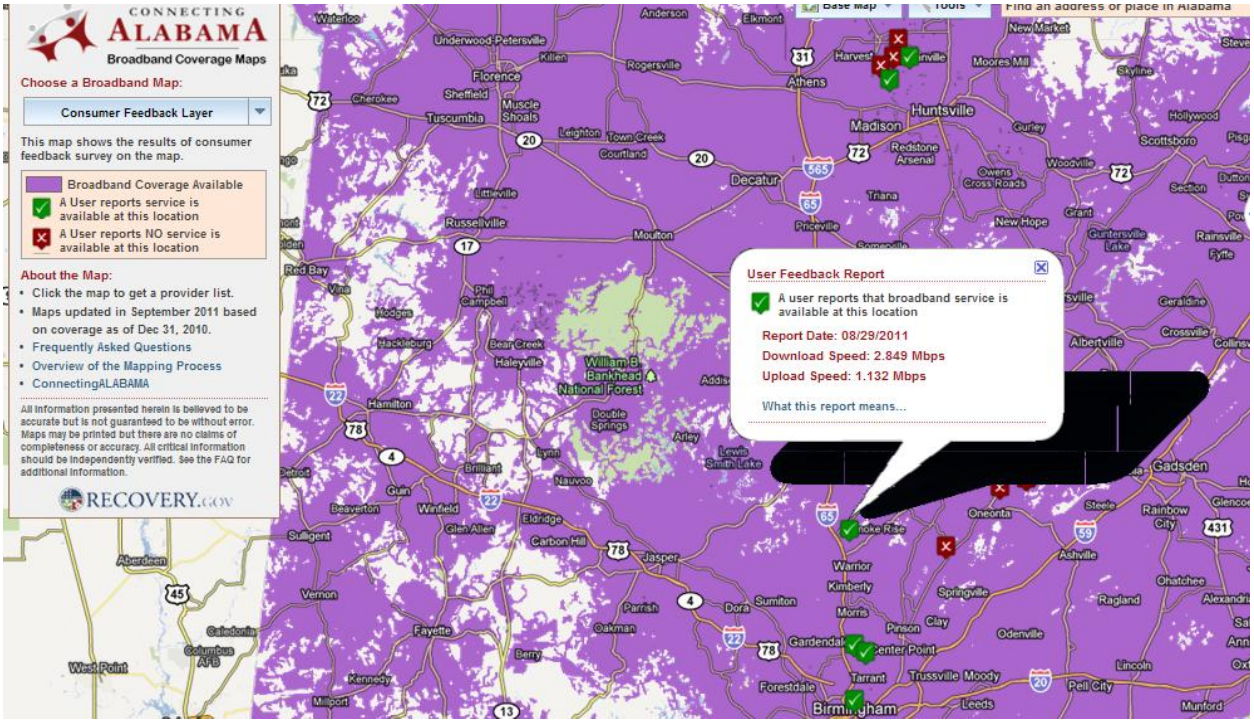
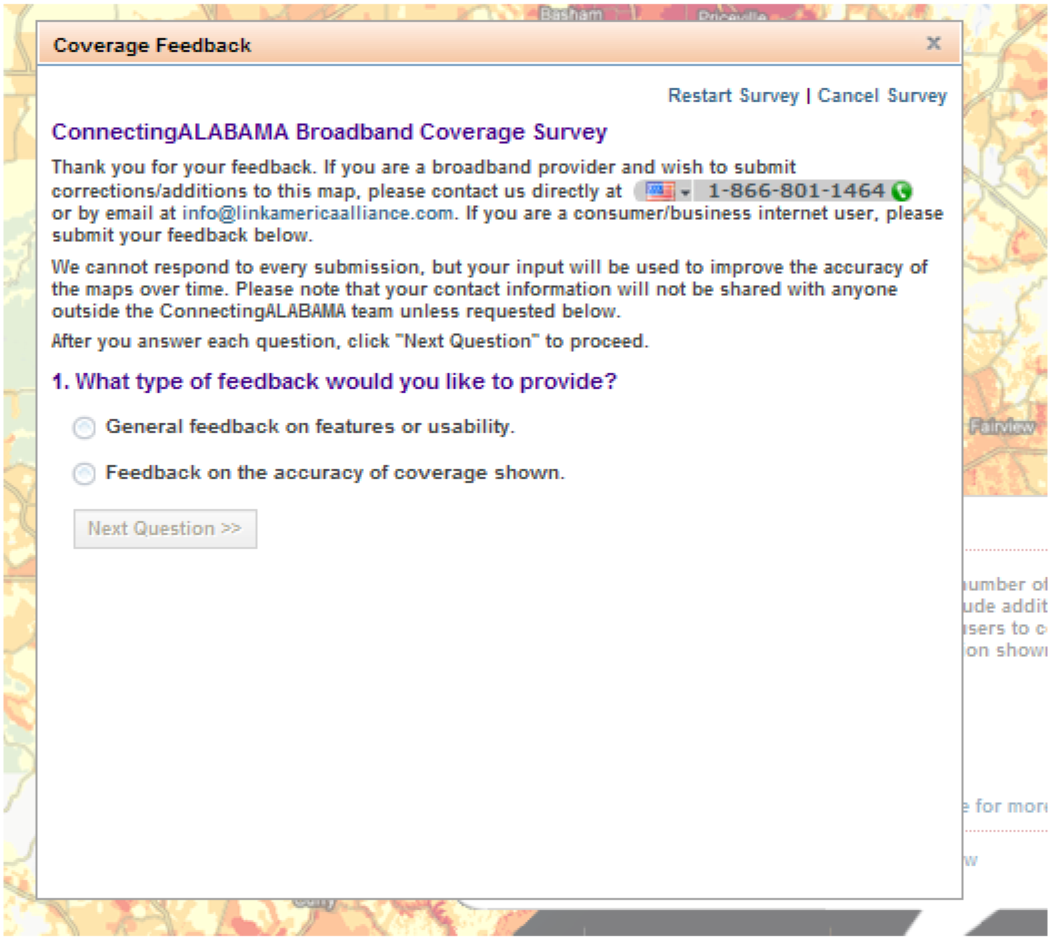


Figure 21--Consumer Feedback Layer

To gather feedback, we use a survey wizard which asks the end users to categorize their concerns. The survey went through several iterations of design and usability testing. Our experience has been unless we get a way to constrain the user feedback into manageable categories, it becomes very difficult to act upon.



As mentioned by other Grantees we struggle with how to use all of the feedback we receive. The qualified data points seem to fall below a volume in which we can infer significant modifications to the map data. Nevertheless, we believe it is important to gather structure and display the feedback to support project transparency.

Perception of Unfair Treatment Across Technologies

Several Broadband service providers have expressed strong concerns regarding how wireline services are displayed, as contrasted to how wireless coverage is displayed. This is an artifact of the SBI data model. As an example, consider the figure below.

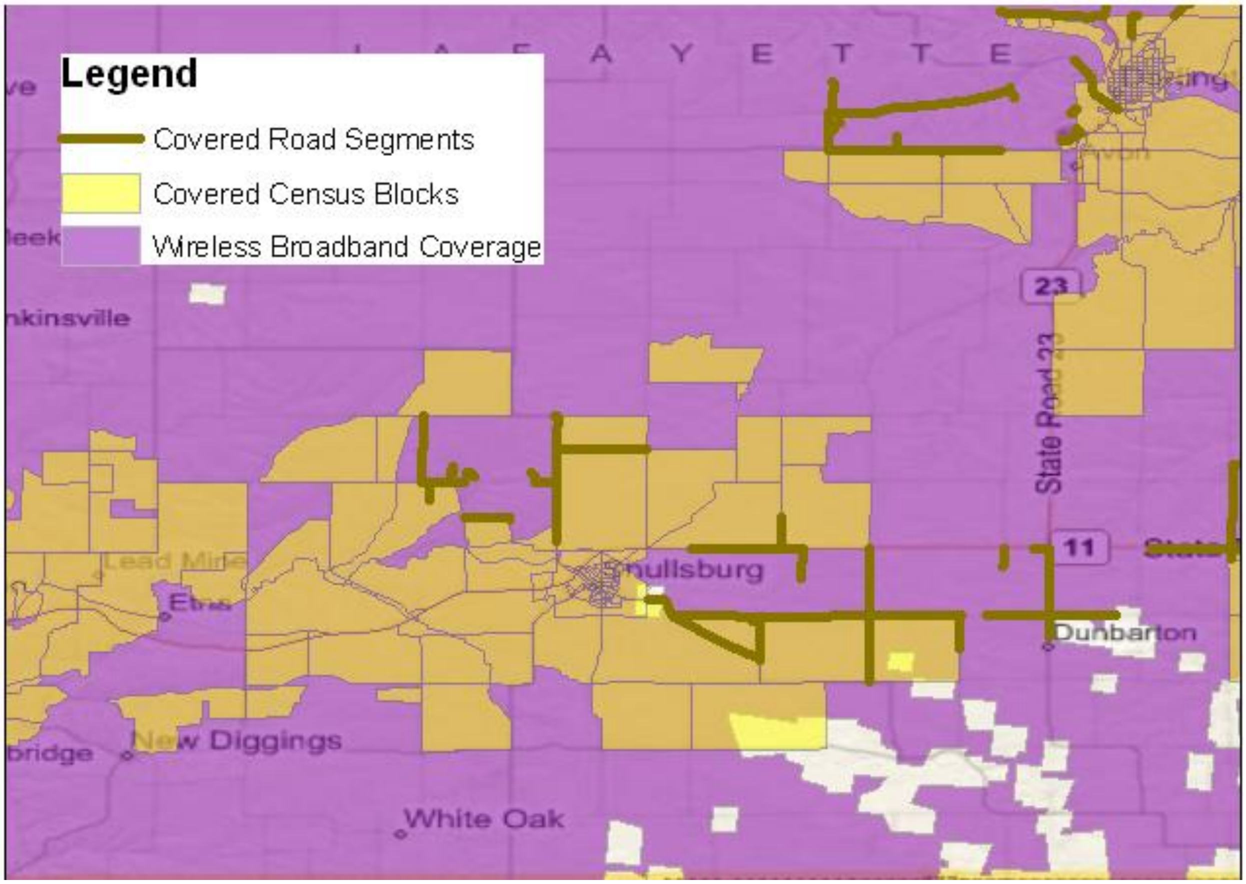


Figure 22--Multi Network Coverage portrayal

In this image, covered Census Blocks are light gold. Covered road segments are a darker gold and wireless coverage is purple. The concern seems to come down to how a wireline provider's coverage is shown in the large Census Blocks (greater than 2.0 sq mi). Some wireline providers have expressed dissatisfaction because their coverage is only tied to road geography, which leads to a visual "hole" in their coverage map. At the same time, they feel that it is unfair that the wireless provider's coverage is shown to be uniform in the same area. Put another way, if our maps show wireline in terms of Blocks and segments, why don't our maps show wireless the same way?

Perceptions of Carrier of Last Resort (COLR) Obligations

Some wireline providers have also expressed dissatisfaction because online maps limit the distance of coverage from a road segment. In our current online maps we buffer a wireline carrier's service 300' from road centerline. A number of providers have expressed that they are mandated to provide voice coverage (which Broadband will accompany) anywhere in the Exchange. There seem to be many dimensions to this argument, but the basic concern comes down to not being able to accurately reflect the scope of their COLR obligation within the mixed block/segment view. Their ability (or lack thereof) to actually provision such services for new users within a 7-10 day period adds yet another level of complexity when attempting to fairly portray their coverage capabilities.

Intentions of Coverage Mapping

When a viewer of an online map clicks on the map (or zooms to an address), they are provided with a pop-up of service provider coverage in the area. The critical question is this: what is the area to which that pop-up window responds to? In the past, we reported back to the specific Census block, or buffered road segment intersected by the user click. As far as the map was concerned, once we move off of that road, or out of that segment, we have a new area to examine.

Our sense, given feedback received, is that our provider view should be a bit more tilted toward finding providers in a general area, rather than finding providers at a single-click location. If the goal of the map is to get someone to call a provider for service, our bias should be to include all of the potential providers in the general area, rather than giving potential customers a method to self-disqualify. That is, we want to cast a wider coverage net, rather than one too narrow. The problem with this approach is that it will create a number of false positive Broadband reports. As of this date we cannot determine if the claims of inaccurate coverage in online maps are due to the looser provider view standard or not. We keep this looser standard in place to minimize the likelihood of self-disqualifications.

CAI Survey Fatigue

We are beginning to note an increase in survey fatigue among CAIs. Sometimes, as part of a direct survey process an end user will tell us how unhappy they are with the repeated Broadband survey efforts. Within several states BTOP grants are in effect that also survey Community Anchor Institutions.. As stated earlier we will defer to other Grantees when there are overlapping survey efforts.

Appendix One

Data Collection Challenges

This section summarizes some of the challenges we have experienced with data collection and processing. The team believes it is important to categorize these challenges as they help inform the geoprocessing and verification methods used. It is also our hope that some of the more global issues can be discussed and decided within the Grantee community.

We begin with several global issues and then continue toward more granular challenges.

Global Data Collection Issues

Census Block and Road Standards are not clear

We receive a variety of Census data. Some were able to supply 2010 Census blocks. Others continued to provide Census 2000. Managing this set of heterogeneous inputs has proved to be a challenge.

There seem to be several methods by which providers are calculating the Census block area. So the distinction between at 2.00 square miles can be uniform, it would be ideal to articulate an operational area calculation definition as early as possible.

Providers Not Wishing for Block Level Aggregation of Their Data

Both ***REDACT*** have supplied address point level data. Both carriers want NTIA to have the point level information, and they have asked CostQuest/LinkAMERICA not to aggregate their coverage to Blocks. Other than a verification to make sure that point data were contained within, or fell within 1 mile of exchange boundaries, the only other processing was normalization into NTIA formats.

Broadband providers not Meeting the NOFA "provider" Definition

PBWorks appears to reflect a concern among a number of grantees about what a Broadband provider is--and how that definition impacts mapping.

If the 7-10 day provisioning rule is to be strictly enforced, it would seem to eliminate a number of prominent Broadband providers[32]. Further, the need for clarification around a facilities-based provider, versus the reseller, has injected even more ambiguity into the mix. Right now we are unclear on how strictly to interpret either of these important distinctions, but we are concerned that we are beginning to create an NTIA exclusion criteria that is going to confuse downstream consumers of the data.

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[32] By email ***REDACT*** informed us they could not provision in 7-10 days, but they also supply information on qualified locations to the address point level. Therefore, we draw a distinction between an incumbent provider owning the facility--which terminates at a customer premise--who cannot turn up service at a qualified location, versus a provider not reporting any specific qualified locations in which they cannot turnup service in the 7-10 day window. In the first case we have a sense of where service can be offered and verified. In the second, we have no evidence that a service could exist there until a specific location becomes a customer.

Again, we do not want to exclude a service provider, but we believe there needs to be further clarification around the 7-10 day ”rule,” the definition of a “reseller,” and better interpretation of facility-based providers, versus equipping UNEs, SpA or leased lines.

We have used the provider Type of ”Other” to classify a number of providers who offer Broadband services, but we do not offer them in a manner consistent with Technical Appendix A definitions.

To What Extent Should We Begin “Classifying” the Data and Maps?

The question immediately preceding gets to the intent of a Broadband provider. This question gets to the intent of the Data and Maps.

Earlier in this document we discussed the question of what type of bias we should introduce to our online map messaging. In an online environment, do we want to more likely create an overstatement of coverage for a provider than an understatement? In other words, is the larger problem allowing a consumer to self-disqualify, versus calling a number of neighboring providers? There is a related issue to this. Clearly in our maps there is a lot of scatter in data that we believe should be more continuous. These are the islands of coverage from an incumbent provider[33]. There are a number of processes that could be put in place to deal with this type of scatter, but without more information from the service provider-- essentially the last mile facilities-- it will be difficult to perform this clean up in an informed manner. On the one hand, we can aesthetically clean the maps up and reduce the scatter, but we have little sub-block engineering information upon which to make this decision. Right now our preference is to put out a somewhat aesthetically messier deliverable and work with providers to get better information to clean their submission. If that isn't forthcoming, we are limited in what can be done given the lack of facility level information. In summary this yields two questions

1. In our online maps should we error on overstating coverage to prevent consumer self-disqualification?
2. In our online maps should we work to clean up a lot of the scatter that we see without having facility-based evidence from which to remove it?

Granular Data Collection Issus

Non-Uniform Submission Standards

It is clear among providers that there isn't a consistent method used to derive Broadband coverage. Some providers appear to be use a geocoding approach and then point in polygon or point on segment process. Others may be using GPS locations. In some cases, it is difficult to infer what reference data was used to georeference plant (is it the carrier's roadbase?). This leads to uncertainty regarding the input data scale or accuracy relative to other base layers. Although we may be trading off absolute

[33] For a provider who sells opportunistically (not within a franchise area) it becomes even more problematic to classify their coverage because the points are more related to the type of consumer purchasing the service than a bounded offering. In a matter of speaking, the ProviderType is more determined by the technology and/or location than a type of business. The core intent of the NOFA and our grant application was centered around the 7-10 day providers but we believe maintaining information on provider Type “Other” and “Reseller” is important to assist in validation and market segment analysis as resources are available.

accuracy, our standard has been to conflate submitted data to TIGER 2010 Blocks and TIGER 2010 roads. We perform our verification against this conflated data product.

Temporal

We are unsure of how well the data are temporally consistent. Some providers gave us their best effort to control to June 30, 2011. We note that some providers were clear that the submission was as of extract date without any way to move back in time. They have no means to control for time and cannot provide any audit support beyond when the data are released to us. Some data-especially loop qualification data-may change from day to day. It will be very difficult to clarify why something was changed from a given point in time.

Perceived Inaccuracy with Respect to Internal Standards

The NOFA is clear on submitting a list of Blocks in which a provider delivers Broadband service. This is a different objective than perfectly reflecting service territories. If a firm's accuracy standard is a reflection of their service area, then the data created under the NOFA will not meet their perception of accuracy. This leads to two other issues: First, using Census Blocks rather than serving area may overstate or understate a particular provider's Broadband serving area. This was a significant concern of ***REDACT*** who specifically required us to submit only address-level qualification data. The second issue this brings up is how or if, there should be some standard on how much of a Census Block needs to be covered to call it covered.

Confidentiality

Several providers have noted concerns with CPNI-related issues and have stated this as a reason for non-participation. We have also heard expressions of comparable concern regarding identifiable responses to Anchor Institution information.

Unclear on Definitions

As discussed earlier, several providers claimed confusion on several key terms involved in Middle Mile. We note a consistent stream of questions around the interpretation of Maximum Advertised Speed. Some providers understand this to be the most common speed package bought within the mass market, while others view this as a speed that can be purchased for an additional cost above a mass market offering (eg. a Turbo option for an additional fee per month). Others interpret this as the fastest speed that is available for that particular location--in terms of xDSL, a structure qualified speed, for example.

Perception of Data Use

There seems to be some hesitancy releasing speed information because no one is sure of how the information will be used, or what the speed is intended to reflect. A number of providers have verbally indicated that typical speed will be about (on average) 80% of purchased speed due to overhead. But there are many other factors (such as a user's home network) that influence speeds measures. Providers are concerned about introducing statistics without a clear understanding of how those statistics are derived and will then be used. Also, as advertised speed is pushed down to a block level, we sense more trepidation to report speed values. This quickly begins to touch on parity across network types (why is wireline down at the block when wireless is half the state, etc.). Finally we note a

significant increase in speed reported to us. This may be due to network upgrades or competitive concerns to match the theoretical network speed.

Location Uncertainty In Source Data

Within this document we have noted concerns about the impact of source data accuracy. Our geoprocessing methodology provided what we believe is a relatively conservative tolerance to account for the scale issue in the source data, but we are unsure of how this may impact downstream users. Clearly, it also impacts the verification process because we can't attempt to verify received data beyond a scale at which it was developed.

Covered Segment Process

Deriving those Broadband covered segments in Census Blocks greater than 2 square miles has proved to be a challenge. Moving from a NOFA specified tabular deliverable to a requested geographic deliverable also increases the complexity of the effort.

Record Level Metadata

It would be helpful to have one or two additional fields in each feature class transmitted to NTIA. One User Defined field could be helpful as an expression of record level confidence. The second field could be used as a Key between the transfer geodatabase and our systems. Ideally, both fields could be large text fields (50 char) so the Grantee can use them to express a variety of attributes.

Miscellaneous Data Collection Notes

We note the following important observations regarding our data submission:

1. There are Middle Mile plant records for providers who are not present in the Census block, segment or wireless area feature classes. This is due to classification as non-NOFA Broadband providers.
2. In some cases, we have trimmed wireless coverage estimates to honor state boundaries.
3. We believe some providers are trimming their coverage to honor license area boundaries.
4. As a departure from past practice, where a provider submitted Middle Mile points out of state, we are no longer passing those points to NTIA as they fail the validation script. We experienced validation errors for BroadbandServed=N records in the CAI table. These records were attributed a Technology of Transfer=0. This cleared validation.
5. In tables with mandatory Street and Zip5 attributes(Service Address), if the value is unavailable it is filled with N/A. was not available, we have inserted 'N/A
6. As with submission three, there remains a tension between the Data Model, Data Model Default Values and the Python Validation Script. As an example the data model allows a NULL for the Maximum Advertised speeds in a Census block record. A default 'zz' is available for this condition as well but zz will fail the validation script. In the case where we have data which is missing Maximum Advertised Speeds, we are holding that data back to prevent downstream validation problems.
7. We have a significant amount of VDSL, ADSL 2 and ADSL 2+ coverage categorized into the xADSL category. This introduces a variance in speed availability as some providers are using VDSL, shortened loops and/or pair bonding to increase speed over 10 Mbps.

8. We have left in the data Middle Mile locations with above grade elevations that appear to be unreasonable, given review of orthoimagery. This seems to be confusion between above grade request and above sea level readings.
9. All fGDB have passed validation except in cases where attributed speeds did not agree with domains associated with technology of transmission (eg Upstream Speed of 2 with ADSL). We have modified the Python script to allow for conditions in the CAI table in which default data model values are disallowed in the Python submission script.
10. We note a few providers who have speeds seemingly inconsistent with their technology of transmission. This is either very low speeds with optical fiber, or very high speeds with non DOCSIS 3.0 systems. We have verified on provider websites that the reported speeds are available in the area but these speeds will fall out of the NTIA frequency table analysis.
11. We have a small number of providers who serve an area with both a residential and business speed tier. In cases where we cannot distinguish which speed tier offering to use, we use the lower of the speed tiers.
12. Per NTIA request we have modified the manner in which we handle Wireless coverage polygons. If a Provider submits a single geometry but specifies multiple spectrum codes in use in that polygon, we duplicate the polygon for each spectrum code. In other words the geographic object is identical but the attribute data for the object is unique.
13. In point level data submissions (Service Address and CAI) we note points that are spatially coincident. With respect to Service Address points our thought is these represent multi-unit dwellings or businesses but we don’t have enough address detail to determine if these are multi-unit structures or duplicated customers. Because we cannot determine the reason for the duplication we leave spatially coincident records in our submission. We also leave in our CAI submission points which may be the same physical structure but have slight variations in addressing.
14. In point level middle mile data, we are finding a variance in the quality of the geocoded longitude and latitude returned. Given the data received we are unsure if this is an issue where the plant address is difficult to geocode or if the longitude and latitude provided to us is different than what would be returned in geocoding.
15. We note two important issues in our datapackage.xls. First the number of records in the provider tab will not sum up to the total record count. This is due to the requested grouping within the Excel table.. Second for estimated broadband coverage, we internally mark that coverage as an estimate but the provider is described as non-responsive within the datapackage.xls.
16. We made one modification to the NTIA supplied verification script. For the CAI layer we The query to check the TRANSTECH field now includes: "AND TRANSTECH <> -9999"

Appendix Two

This appendix contains the confidentiality clarification supplied in a series of emails between CostQuest and NTIA.

Feature Class	*Metadata*	*NOFA Confidential?*	*Online Map*	*Public Disclosure*	*Exemption*
Last Mile	Constraints on accessing and using the data	Yes	No	No	None
	Access constraints: None				
	Use constraints:				
	This data is confidential as defined in the NOFA.				
Middle Mile	Constraints on accessing and using the data	Yes	No	No	None
	Access constraints: None				
	Use constraints:				
	This data is confidential as defined in the NOFA.				
Service Address	Constraints on accessing and using the data	No	No	Yes	
	Access constraints: None				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
CAI	Constraints on accessing and using the data	No	Yes	Yes	NO attributes on any record in this feature class are considered confidential

	Access constraints: None				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
Census Block	Constraints on accessing and using the data	No	Yes	Yes	NO attributes on any record in this feature class are considered confidential
	Access constraints: None				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
Service Overview	Constraints on accessing and using the data	No	Yes	Yes	The only provider who may not show up this table is a provider who has provided only confidential data (last mile, Middle Mile,

					address point with provider name)
	Access constraints: None				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
Road Segment	Constraints on accessing and using the data	No	Yes	Yes	NO attributes on any record in this feature class are considered confidential
	Access constraints: None.				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
Wireless	Constraints on accessing and using the data	No	Yes	Yes	NO attributes on any record in this feature class are considered confidential
	Access constraints: None				
	Use constraints:				

	There are no restrictions on distribution of the data by users

West Virginia Geological and Economic Survey

State Broadband Mapping Methodology

For the State of West Virginia, September 2011

Contents

Overview

This document gives a summary of the data collection, normalization and verification processes used by the State of West Virginia (State) for the September 2011 data submission to the National Telecommunication and Information Agency (NTIA) in accordance with the State Broadband Data Development (SBDD) program. While the processes used in this data submission remained the same as ones for the previous submissions, there were additional challenges overcoming the changes from 2000 to 2010 census blocks. Additionally, the State of West Virginia interactive broadband map is now available to the public and is able to receive comments and feedback from consumers and citizens of the state.

Purpose

This documentation was developed to illustrate the processes used during the data collection, normalization and verification processes. The information within this document will provide a background to the development of the provider list and data request, and specific issues encountered by West Virginia regarding data collection, normalization and validation.

Data Sources

Provider List

The provider list for the fourth round of data collection started during the first round of data collection. For this round, the list was regenerated to include any new providers within the state. The list was created by contacting the West Virginia Cable Telecommunications Association, the West Virginia Public Services Commission (PSC) and the West Virginia Broadband Deployment Council. The state receives an updated provider list from the PSC every six months. This information was compiled and compared against the list from the Federal Communications Commission (FCC). Providers were then contacted using information provided by the FCC's public information search Web tool. Providers who were contacted during the first round of data were contacted again through the same name and address. If a provider contacted during the first round had given more detailed contact information for a specific individual, those individuals were contacted instead of the contact provided by the FCC.

The provider list is updated every six months to reflect any mergers or acquisitions that have occurred. There are some legal issues when a merger occurs, but the data integration does not occur until up to a year later. In those circumstances, the data is kept separate until a full merger occurs.

Data Gathering

Provider Data Request

This component of the project was heavily reliant on working with service providers to obtain data. Each identified provider was mailed a standard data request outlining the elements identified in the Notice of Funds Availability (NOFA) Technical Appendix that were requested from providers. This request included information regarding the availability of broadband services, technology used to provide them, the location of certain broadband infrastructure and the speed of the service. Data was requested to be submitted in the form of census block lists and service area boundaries, including address level and street segment data. If a provider was unable to fulfill such requirements, the West Virginia Geological and Economic Survey (WVGES) worked with those providers to gather the necessary data in an alternative approach.

After the initial data request was mailed, follow up phone calls and emails were made to remind providers of due dates and to collect any missing or unclear data. As of this submission, the response rate from providers is over 90 percent. After data was received, the data was normalized per NTIA standards and placed into the provided geodatabase. WVGES continued to operate under the same assumption as used in the first round of data gathering. As the focus was on normalizing, not changing the data, WVGES made no core changes without first consulting the provider.

Providers typically submitted only advertised speed data. A very small percentage of providers are willing to submit typical speed data as doing so would be an admission that advertised and typical speeds are not the same. Advertised speed data was given by all providers and then pushed to typical speeds as per NTIA's advice in the Round 3 data review conference call.

In addition to the data request, each provider was required to sign a Nondisclosure Agreement (NDA) between themselves and WVGES. The NDA outlined how provider data would be handled and what portions of that data would be considered confidential, which would be shared with the NTIA and which were to be made publically available.

Coverage Information

Data was derived and normalized into four formats in accordance with the data model:

- Census blocks (2000) of two or less square miles
- Street segments (2000) of census blocks greater than two square miles
- Address level (geocoded point data)
- Wireless area (shapefile)

The normalization procedures were as follows:

- Determine service being provided – what technologies are being used to provide the service
- Understand data/determine how to process – determine which feature class in the geodatabase data belongs
- Georeferencing/geocoding necessary data – georeferencing data for wireless area coverage and other service area maps, as well as geocoding address level data
- Segregating data into NOFA compliant formats – completely filling in geodatabase fields, as well as making sure topology is correct
- Quality assurance/quality control (QA/QC) – verification and validation of data

Typically there were two main types of data supplied for normalization – service area maps and flat Excel tables.

Service areas were georeferenced, digitized and then intersected with the master blocks and roads files. These blocks and road segments were then loaded into the geodatabase and the additional company specific data was appended to those records.

Flat Excel tables were exported to a database and then joined with the FIPS ID for the block files and the TLID for the roads files. The joined fields were exported and then imported into the database. NTIA has not required this information and in cases where a TLID was not given by the provider there was much greater difficulty and inaccuracy as roads had to be geocoded and hand selected.

Geocoding Issues

The West Virginia Statewide Addressing and Mapping Board (SAMB) information is not yet completed across all of the counties in West Virginia, leaving areas within the State without complete or verified address information. This led to low geocoding match rates of provider supplied information, especially in rural areas, throughout the data normalization workflows. For some of these areas, additional broadband coverage processes were used to derive coverage estimates described in the next section.

One part of this issue was due to the acquisition of Verizon by Frontier. When Frontier submitted digital subscriber line access multiplexer (DSLAM) locations for the April 1, 2011 deadline it did not include the entire Verizon infrastructure. Frontier has since re-submitted its DSLAM locations, which now should include those missing Verizon DSLAMs and the coverage map has been extended into certain area that were not previously included

Additional Data Processing Techniques

Because of geocoding inconsistencies in certain areas of the State, some provider address information could not be mapped and other data processing techniques had to be implemented to create broadband coverage estimates. In cases where DSLAM points were able to be provided, broadband coverage was mapped by loading the DSLAM points into Environmental System Research Institute's (ESRI's) Network Analyst. For this processing, the West Virginia State SAMB street centerlines were used as the source roads. DSLAM points were loaded into the facilities point feature class of the service area template using a 1000 foot snapping tolerance to help locate points to nearest roadway. Any points still not connecting to the road network were viewed and manually linked to the road network. Processing was run to create segment lines for each point and to create a detailed polygon area around each street segment area for each point. A 15,000 foot distance parameter was used and no impedances were placed on the streets.

Once the process was run, the created segment lines and polygon areas were linked to the original DSLAM point attribute table and exported from the analyst dataset into standalone polygon and line feature classes. These two feature classes were clipped to the provided wire center boundaries. These coverage areas were used to select covered census blocks and street segments for the data submission. Final broadband coverage estimates were reviewed with the provider prior to final submission.

Another unique processing issue occurred when providers submitted address-level fixed wireless data which would produce error through the new data model. As per discussion with NTIA, the unlicensed fixed wireless points were plotted and then buffered out to 800 feet. A shapefile was created and moved to the wireless feature class within the geodatabase.

One of the foremost issues of this round of data collection has been converting to 2010 Census Blocks. NTIA's decision to switch to 2010 Census Blocks did not leave much time to notify providers of the change. Many providers submitted 2000 Census Blocks, not 2010 Census Blocks. The conversion led to multiple inaccuracies between Round 3 and Round 4 submissions because of the problems intersecting 2000 Census Blocks with 2010 Census Blocks. Many block boundaries had been redrawn and the crosswalk file provided by the Census was in a very unwieldy format and not much help.

FRN Number Discrepancies

Discrepancies between Round 2 and Round 3 data submissions were noticed concerning FCC Registraton Numbers (FRNs). Affected providers were contacted directly to clear up these issues. FRNs that were loaded into the database come from direct contact with providers.

Community Anchor Institutions

The process used to identify the Community Anchor Institutions was based on the information provided by NTIA. This included the categories of schools K-12, libraries, medical/healthcare, Public Safety, higher education and other community support consisting of either government or nongovernmental facilities.

All public schools in West Virginia were used for the K-12 category. Libraries consisted of all public libraries throughout West Virginia. Medical/healthcare included hospitals, nursing homes and primary care centers. The primary care centers are made up of main locations of the primary care centers along with satellite clinics and school-based health centers. Public Safety consisted of West Virginia police departments along with the correctional facilities and juvenile centers, fire departments and

9-1-1 centers. Higher education consisted of public and private universities located across West Virginia. The community support consisted of courthouses, regional development centers and workforce locations.

There was a cutoff created to focus on identifying main facilities as Community Anchor Institutions (CAIs). However, if there is a need to go and include more facilities, the State is open to adding those facilities for future updates.

The following agencies were contacted for information: West Virginia (WV) Department of Education, WV Library Commission, Hospitals located throughout the state, Nursing Homes located throughout the State, WV Division of Primary Care, WV Primary Care Association, WV 9-1-1 Center Directors, WV Emergency Management Directors, WV Regional Jail Authority, WV Higher Education Policy Commission, WV Courthouse Facility Improvement Authority, WV Workforce, WV Regional Development Centers and county addressing coordinators.

Data was collected and verified by the West Virginia Division of Homeland Security. Surveys were sent out to various facilities and included a section where their primary city-style address could be filled in. For those facilities that returned the survey, the statewide addressing and mapping data that the counties provided was used as a way to verify the address. Once the location was verified the latitude and longitude coordinates were added. In cases where surveys were not returned, the statewide addressing and mapping data was used to determine if the information could be matched. If this wasn't possible, then the Internet was used to find a Webpage with additional information. If this method was not successful, attempts were made to contact the facility directly. At this point in time, there is approximately a 90-95 percent match rate for the location of the CAIs.

Validation and Verification

Throughout the data gathering and data preparation processes for each data submission, the data verification has been continuous and has evolved based on the evolution of the data model. The focus has been on getting complete data from all providers and assuring that all data can be processed into the required data model for submission. Where providers did not submit data in acceptable formats for data normalization into NOFA formats or where they did not submit complete data or any data, there has been continued focus on working with the providers by WVGES to continue to improve the source information being provided. Data verification and validation is an on-going, long term process that will continue to evolve throughout the broadband data development program. With this fourth data submission in September 2011 being a much more complete broadband coverage across the State because of additional data supplied by providers, additional data verification methods, beyond what has been implemented to date, will continue to be evaluated to refine the map, where applicable.

Validation Processes

Data validation begins within the data collection process to determine if the data submission by providers is formatted in a way that can be normalized into the required NOFA formats. Where data is deemed incomplete or in non-conforming standards, WVGES staff reached out to providers as necessary to improve the data submissions. After each round of data preparation the format for the updates being collected has improved.

Quality assurance and quality control has been a big focus of the data validation of the submittals assuring that the required data fields are populated properly and that data fields are populated with values that follow the data model rules. As the data model has evolved over each round of data submission these QA/QC checks have been modified to include the changes in fields, values, domains, etc. that are being required for submission.

Validation methods employed include the following:

- Assuring all applicable providers' datasets are propagated forward to each round of data collection
- Verifying that all required fields are populated with valid values and default values are used when appropriate. This includes:
    - Speeds valid for the technologies reported

- Latitude/longitude coordinates fall within an acceptable range, given the state boundaries
- The relationships between maximum and typical, and downstream and upstream speeds are valid
- Service reported at the block level is done using blocks of the appropriate size (less than two square miles)
- Speeds and technologies reported per provider are consistent between blocks and segments
- Administrative information (provider name, doing business as [DBA] Name, FRN) is consistently reported per provider in each populated feature class.

Outreach to Providers

To further assure the providers' broadband footprints would be accurately represented in data submissions, "check maps" depicting each respective provider's served small census blocks and segments located in large blocks were distributed back to providers. Providers were requested to either approve their check maps as-is, or submit additional changes if their coverage was not accurately represented. Any modifications received as a result of this effort were incorporated into the broadband coverage maps. WVGES plans to incorporate future data reviews with providers using web collaboration tools. .

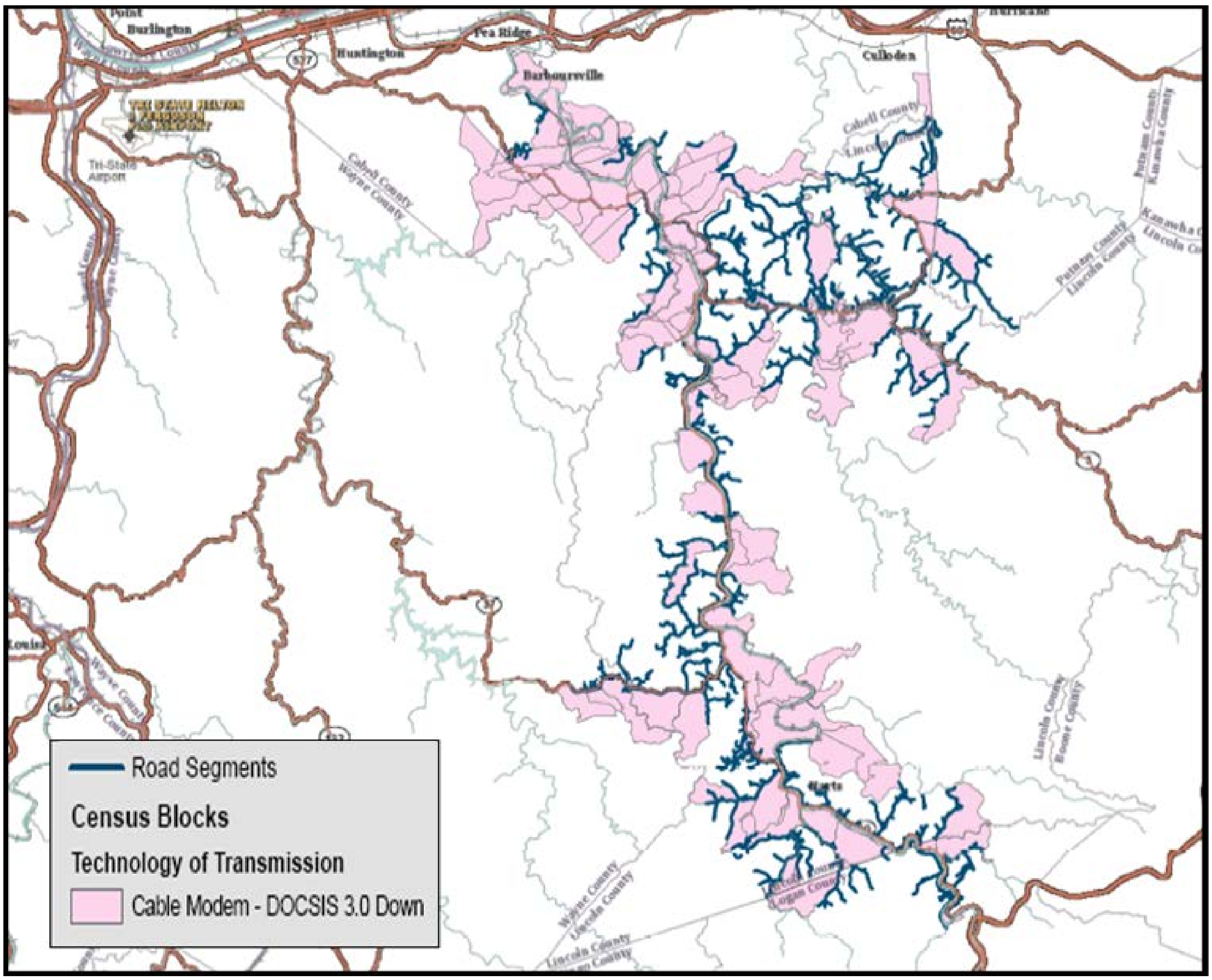

Figure 1—Example of a portion of a provider check map

The validation process for the September 2011 submission includes the use of the Python scripts for validation provided by NTIA.

Third Party Datasets

As data collections and data normalization processes progressed, additional validation was conducted using commercially available datasets. The following commercially available datasets were used as a reference for the specific technologies that their data represented.

- American Roamer datasets
- TeleAtlas Exchange boundaries
- Media Prints Cable boundaries

These datasets were used primarily as a validation source for provider service coverage.

State Broadband Interactive Map

The State of West Virginia released its interactive broadband mapping Website to the public in May 2011. The Website address is www.wvbroadbandmap.org. The Website provides consumers the opportunity to review broadband availability across the State.

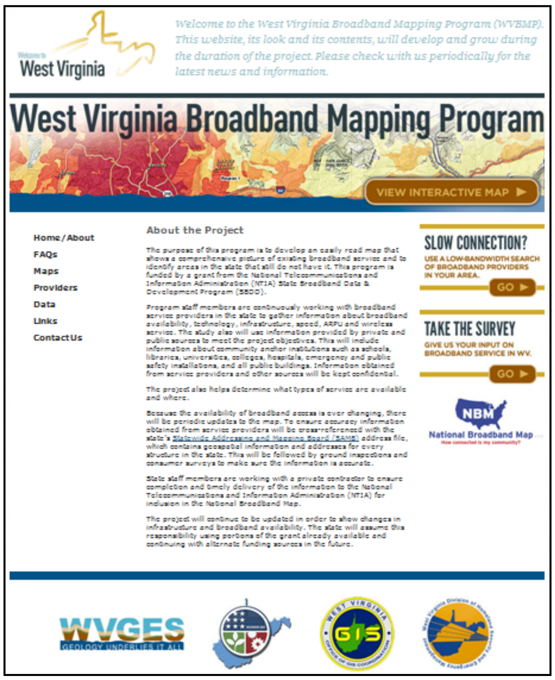

Figure 2—WVBMP main landing page

The main landing page for the West Virginia Broadband Mapping Program (WVBMP) provides background information on the program, contact information and a frequently asked questions section. The landing page has the main link to the broadband coverage map and a link to an address lookup tool for users with slow internet connections. This will allow them to view what coverage is available around their address or zip code without needing to view the entire map, which might not be feasible for users who might still be on dial-up connection speeds. By having this slow internet connection coverage tool, it allows feedback from those consumers even if they do not have the capabilities to bring up the interactive map application.

The Web application has the functionality for consumers and citizens using the State broadband map Web application to submit comments and feedback. The information gathered from that feedback is being reviewed as more potential source information for validating and determining confidence levels of the broadband coverage across the regions of the State. By comparing comments supplied by consumers about broadband availability to the broadband coverage, trends could be recognized where potential inconsistencies in the existing broadband map could exist. This could delineate the need for further focused validation or verification in specific areas that could refine the broadband coverage information for future data submissions.

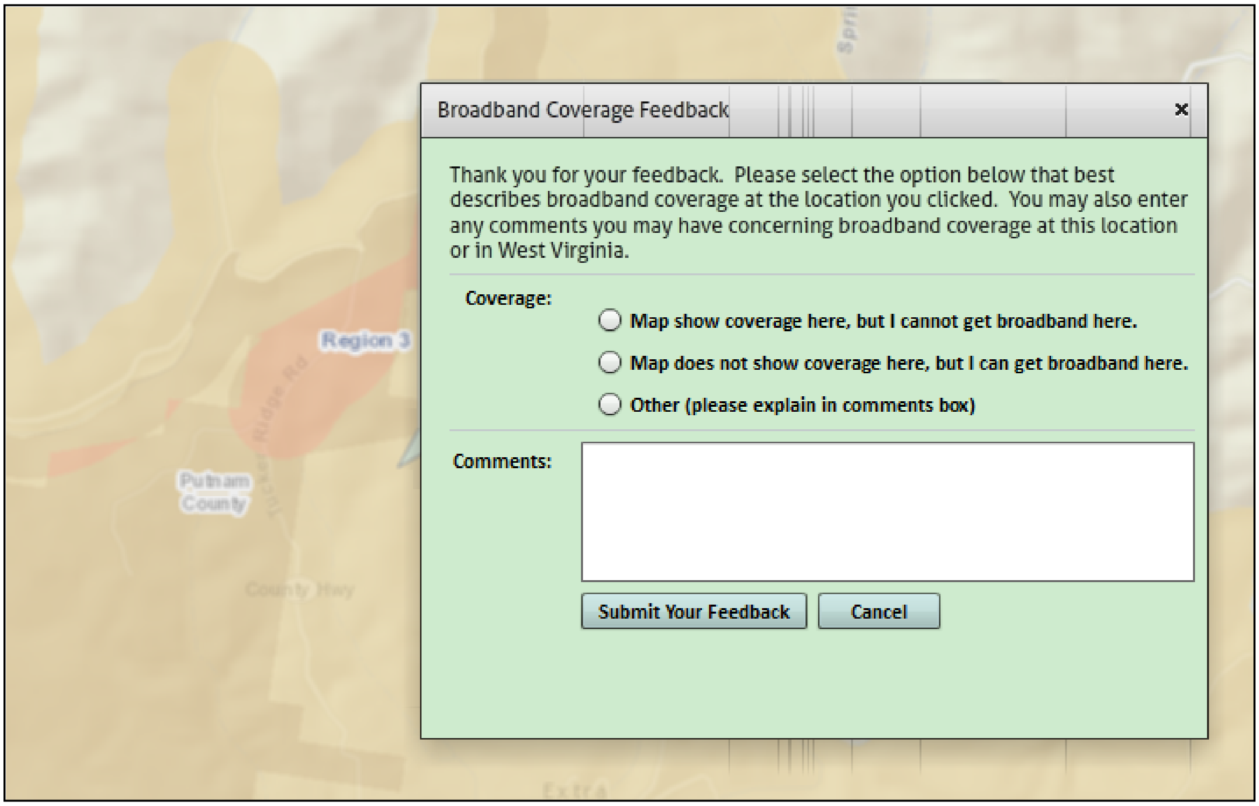

Figure 3—Example of feedback tool interface

Users browsing the interactive map can click on any location and select to provide specific feedback for that location. This will store the coordinate information of the selected location allowing them to select from a couple of coverage categories for their comment or select “other”. Within the feedback tool, they can type in more specific details about their broadband coverage.

After the initial release of the broadband map, there was some initial feedback and comments mainly pertaining to a few areas that were not showing coverage. The feedback indicated that there should be coverage or scenarios where we were showing coverage. One resident made a comment that there was not cable service on a particular road or area. Some of the missing coverage was due to the acquisition of Verizon by Frontier as discussed above.

During the next six month data collection period leading up to the April 2012 data submission, the State plans to incorporate more advertising to the interactive broadband map and feedback tools. Continuing to work more closely with the regional planning councils to review coverage in their communities, a plan to include an advertisement of the interactive broadband map into local phone bills is being developed.

A speed test has been developed within the WVBMP interactive Website.   The design of the Website includes links to the speed test developed using the Ookla broadband speed test tools. The speed test is embedded within a broadband survey wizard that allows consumers to provide specific information that will help the State analyze information about use and demand for broadband within the State. To get more users to take the speed test to obtain more results for analysis over the next six months, the speed test will be advertised along with the interactive Website. Speed test results and statistics will be leveraged to compare against the existing broadband coverage and help validate speed information. As stated previously, this could assist in determining if there are any trends or patterns in the information that could be an additional tool for prioritizing areas where more refined verification and validation might need to occur.

Future Steps for Validation

Future plans for data validation continue to include establishing confidence levels to assign to broadband coverage based on comparisons with other source information collected, such as feedback from crowd sourcing results from the State broadband map and the national broadband map. Confidence rankings will be used to prioritize any areas where additional verification techniques might be used (consumer and business surveys).

As part of continued broadband planning activities and future validation of data, a third party dataset from Infogroup is being purchased. For broadband map validation, the Infogroup datasets provide consumer broadband use information including coordinate based location information along with provider name and technology that is being used by that particular consumer. The Infogroup data will allow the consumer information to be plotted on the map and compared against existing coverage maps to determine if there are any trends within the Infogroup data that help to determine where additional validation needs to occur. For example, there may be clusters of consumer points for a particular provider that exists in an area of the State where there is no coverage for that provider. The goal would be to identify the major patterns or trends that might need to be re-visited with a provider if data appears to be missing.

Another dataset that is being considered for purchase for broadband planning activities and broadband demand analysis is Telogical's broadband statistical datasets that provide pricing information. Included in the datasets is information on broadband maximum advertised speed by providers which could help validate some of the speed data within the broadband mapping datasets.

Throughout the broadband data development program, as addressing information from the State Addressing and Mapping Board's addressing datasets are continually updated, address point information from providers will continually be re-verified prior to each submission to NTIA to improve geocoding results and refine the broadband coverage areas.

Providers

Non-Responsive Providers

Names of providers who were non responsive will be passed along to the WV Geographic Information Systems (GIS) Coordinator's Office to be contacted again.

Atlantic Broadband LLC
DBA: Atlantic Broadband, LLC
FRN: 0009596883
This provider was contacted eight times. Data was not provided by the October submittal date. Further attempts at data gathering will be made in the next round of data collection.

Hughes Communications, Inc.
DBA: HNS Licensuse Sub, LLC
FRN: 0018483073
Detailed data was not provided by the October submittal data. Further attempts at data gathering will be made in the next round of data collection.
StarBand Communications Inc.
DBA: StarBand Communications Inc.

FRN: 0005087457
Detailed data was not provided by the October submittal data. Further attempts at data gathering will be made in the next round of data collection.

WildBlue Communications, Inc.
DBA: WildBlue Communications, Inc.
FRN: 0007843766
Detailed data was not provided by the October submittal data. Further attempts at data gathering will be made in the next round of data collection.

Skyweb, Inc
DBA: SKYWEB Inc.
FRN: 0018516799
This provider was contacted eight times. Tower locations were provided along with additional information for each tower site. Two computerized propagation studies were performed to approximate coverage for a local provider supplying broadband data. The two studies were predicted in the 900 MHz and 2.4 GHz bands that are utilized at these locations. The data was received from the provider that defined the tower sites currently utilized to provide coverage. Parameters provided include site locations, ground elevation, transmit power, antenna height above ground, and antenna gain. All of these components were compiled into EDX Signal software program which calculates the associated link budget and in which the program takes into account terrain and land use land clutter (LULC). Propagation studies show potential coverage throughout the area. Additional assumptions made include a predicted reliability of 90 percent for any signal received by a device and no additional signal loss was taken into account for signals received inside buildings which may further impact the coverage predictions. The coverage area was being reviewed by the provider on the final week prior to submission for October deadline. Data was not finalized in time for the October submission and will be included within the April 2012 submission.

Satellite Providers

Data requests sent to Satellite providers were met with the response of "We provide to the entire state." Attempts made at gathering more detailed data sets were unsuccessful for this round of data collection. Further attempts will be made for the next round of data collection.

Provider that Submitted Data

Provider Name	DBA Name	FRN
Armstrong Holdings, Inc.	Armstrong Telephone Company - Northern Division	0004311528
Armstrong Holdings, Inc.	Armstrong Telephone Company-WV	0004379731
Armstrong Holdings, Inc.	Armstrong Utilities, Inc.	0003765617
AT&T Inc	New Cingular Wireless Services, Inc.	0003766532
Broadview Networks Holdings, Inc.	Broadview Networks Holdings, Inc.	0010296853
Cequel Communications, LLC	Suddenlink Communications	0015784663
Citizens Communications Company	Frontier Communications Corporation	0003576352
City of Philippi	City of Phillipi	0001984244
Comcast Corporation	Comcast Cable Communications Inc.	0003768165
Community Antenna Service, Inc.	Community Antenna Service Inc.	0004966131
Deutsche Telekom AG	T-Mobile USA, Inc.	0006945950
DSL.net, Inc.	DSLnet Communications, LLC	0004324851

Provider Name	DBA Name	FRN
Gateway Telecom, LLC	Gateway Telecom LLC	0018536623
Hardy Telecommunications, Inc.	Hardy Telecommunications Inc	0002008043
Hardy Telecommunications, Inc.	Hardy Telecommunications,Inc CLEC	0013169313
Hickory Tech Corporation	Enventis Telecom Inc.	0008394322
Inter Mountain Cable, Inc.	Inter-Mountain Cable Inc	0001789080
Inter Mountain Cable, Inc.	Mikrotec CATV, LLC	0014471288
JB-Nets	JB-Nets	0016474868
Leap Wireless International, Inc.	Cricket Communications, Inc.	0002963528
Level 3 Communications, LLC	Level 3 Communications, LLC	0003723822
Level 3 Communications, LLC	Broadwing Communications, LLC	0008599706
LightEdge Solutions, Inc	LightEdge Solutions, Inc.	0015546443
Metropolitan Telecommunications Holding Company	Metropolitan Telecommunications Holding Company	0009806019
Micrologic, Inc.	Micrologic, Inc.	0018675256
New Edge Holding Company	New Edge Network, Inc.	0003720471
NTELOS, Inc.	NTELOS Communications Inc.	0004342762
NTELOS, Inc.	West Virginia PCS Alliance, L.C.	0002049328
Otelco Inc.	War Acquisition Corp	0018657858
Qwest Communications International, Inc.	Qwest Communications Company, LLC	0003605953
Shenandoah Telecommunications Company	Shentel Cable Company	0018024075
Sprint Nextel Corporation	Sprint Nextel Corporation	0003774593
Spruce Knob Seneca Rocks Telephone, Inc.	Spruce Knob Seneca Rocks Telephone, Inc.	0004337002
TelAtlantic, Inc.	West Side Telecommunications	0002009405
TelAtlantic, Inc.	Communications Plus, Inc.	0009281262
Time Warner Cable LLC	Time Warner Cable LLC	0013430244
TW Telecom inc.	tw telecom holdings inc.	0014942668
Verizon Communications Inc.	Cellco Partnership	0018506568
Verizon Communications Inc.	Verizon Business Global LLC	0010856284
Verizon Communications Inc.	Verizon West Virginia Inc.	0002011278
Visual Link Internet LLC	Visual Link Internet LLC	0017645813

Table 1—Providers That Have Submitted Data for SBDD Program

State Broadband Initiative Mapping Methodology

For the States of Alabama, Idaho, Wisconsin and Wyoming
Revised September 30, 2011

CostQuest Associates

LinkAMERICA Alliance

Contents

Overview

The following documentation provides an overview of how the fourth required data set was collected and processed for the State Broadband Initiative (SBI) in the states of Alabama, Idaho, Wisconsin, and Wyoming.

Although we could separate this draft into state-specific deliverables, the majority of methodology remains intentionally consistent among the states. As one important validation test is comparability across states, we find value in this cross-state approach. This cross-state approach also helps the LinkAMERICA team focus on comparable outcomes across the four states, where appropriate. Our intent is not to make the states look and be the same, rather it is to leverage economies of scope and scale among the business processes.

As expected, this document rests heavily on the prior drafts, but has also been updated and expanded.

Significant changes include additions covering:

1. Trends in provider inputs
2. Expansion in retrieval of WISP coverage
3. Requested changes based upon NTIA guidance
    a. Modification of Satellite providers as a Type 1 Broadband provider;
    b. Discontinuation of estimating Community Anchor Institution coverage and speed;
    c. Review of submitted speed with respect to NTIA supplied frequency table
4. Transition planning with respect to capacity building within the State for Broadband map development
5. Development and posting of a provider Type classification rubric

Treatment of the following subjects has been expanded:

1. Community anchor institutions and survey methodology
2. Verification and validation
3. Data production methods
4. Conversion to Census 2010

As anticipated, the SBI program continues to mature and evolve. Technical leadership and strong program office guidance has been appreciated. We continue to focus resources on establishing stable business processes to track submissions, verify received and processed data, test for temporal stability and provide reporting deliverables consistent with NTIA expectations.

In our view, the mapping deliverable reflects (1) a good faith effort, which results in a reasoned response to the NOFA, Technical Appendix A, as well as supplementary program office guidance and modifications offered in phone calls, emails, and webinars, (2) a stable foundation for improvement and prioritization of both NTIA and state needs and interests , (3) a valid data processing model to support

online mapping, consumer feedback, provider verification and reporting, and finally, (4) a valid use of the evolving data transfer model and its intrinsic validation methods. More importantly, the resulting data and online coverage maps that follow from this work are providing good input and context for the Broadband planning teams working across the states we have the pleasure to serve.

We close this methodology document with two Appendices. Appendix One describes Data Collection Challenges. This section describes some of the open issues, challenges and questions we are exploring. Our hope is to receive clarification and counsel from NTIA in how best to confront some of these issues, which are likely common across states. Appendix Two describes the confidentiality framework explained by NTIA.

Purpose of This Manual

This technical document was developed to provide transparency in our data production process.

Our goal is to illustrate a thoughtful process designed to meet the intent of the submission. Our hope is that we have developed a process that is reasonable, with respect to the data it deals with, as well as flexible enough to change with evolving NTIA requirements and lessons learned from the Broadband mapping community.

Data Sources

Developing the Provider List

Provider lists for all states were developed at project inception from the following sources:

- State lists of regulated telecommunications, cable and wireless service providers
- State and national industry organizations (i.e. cable associations, wireless service provider organizations, telecommunications associations)
- FCC Form 477 respondents
- Independent web searches
- Prior comparable mapping/research efforts
- Interviews with key state staff members and important community influencers

After the April 1, 2011 “Round 3” submission, we continued our research and added new providers to the program as discovered. As one would expect in a dynamic marketplace, provider identification is an ongoing and important component of our work. Mergers and acquisitions, the use of multiple regional DBAs, the lack of any universal identity management attribute, and the generally complex parent-subsidiary structure of many telecommunications companies, make provider identification and tracking very challenging.

In early July 2011, we once again initiated an email and telephone outreach campaign to contact all known providers. This is an extremely time consuming process, but it is necessary to ensure that the list of contact persons remains current, and that providers are aware of data request changes and deadlines

associated with each round. Where necessary, we execute new NDAs with providers. In "Round 4", this effort continued on a daily basis until we reached our final data submission deadline on August 19, 2011. After August 19, we continued to work with providers who were not able to meet the deadline. In most cases were able to "crash" our process to accommodate this extra data, but late submissions continue to create inefficiencies and add costs to the overall program. In Round 4 providers that responded too late to be included in the final dataset will be included in our Round 5 submission. Once again, as contact is made in each round, we verbally qualify each provider by asking a series of questions regarding the type of service and speeds offered. If the provider does not meet the minimum specifications for a Broadband provider (as defined in the NOFA) we make a note of their status and remove them from the data submitted to NTIA.[1] We continue to reach out to them in future rounds in the event that their service is upgraded or expanded.

Provider Outreach

To meet the program's aggressive deadlines and participation goals, LinkAMERICA believes it is critical to maintain rapport with providers. To do this, we continued to reach out to providers with regular project communications, including a program newsletter and links to the various state mapping websites. As described above, individual e-mails and/or telephone calls were made to all providers explaining the status of the program and requesting their continued support in Round Four. We've also had the opportunity to support providers in their BTOP / BIP applications in certain cases. Through these collective outreach initiatives, and our engagement with various industry associations, we continue to enjoy a healthy and appropriate relationship with Broadband service providers.

NDA

To provide protection for all parties involved, LinkAMERICA continues to honor the terms of our NDA. If providers did not execute the NDA in previous rounds they were offered the opportunity to do so in this collection round. New providers were of course also supplied with a copy of the NDA.

To facilitate the execution of NDA's, LinkAMERICA continues to use the DocuSign online document management solution. This system allows providers to review and digitally sign the NDA in a legally binding manner, and has been instrumental in achieving rapid approval and execution of NDAs with the majority of providers. In some cases, NDA's were individually negotiated to address specific provider concerns. In all cases, minimum standards established by the NOFA are honored. In other cases, providers chose to submit data without executing an NDA.

Provider Survey

Since three prior rounds of data collection had been completed, the LinkAMERICA team had a solid base of coverage and speed information with which to begin Round 4. This allowed us to provide two response options to providers. The first was for them to review check maps of their coverage and speed data – submitting only corrections and additions to the existing dataset. (For provider convenience the

[1] As with other Grantees, we struggle with appropriate and consistent classification for service providers who opportunistically provision Broadband services. In this submission we continue to bring them into the analysis as a provider type "other". As the inclusion of this category isn't our primary goal, we are working to process data as we can. We are similarly categorizing and retaining reseller information. Our datapackage.xls illustrates the categorization of non Broadband providers within our provider tracking and verification systems.

check maps were created in both PDF and Google Earth (.KMZ) formats.) The second was to allow submittal of completely new datasets, either in tabular form or in multiple other digital formats. For those without sophisticated CAD or GIS systems, we continued to allow the submittal of printed/scanned maps and other written materials.

Survey Methods

Once again, we used a secure digital survey process (via our provider portal websites) to collect and display information for providers. The Round 4 survey process was designed to accommodate both new and returning providers, and the different types of information they would be submitting. The following is a summary of the process encountered by each group:

New providers: New providers were routed directly to our standard survey where they were provided with templates for uploading data in tabular NTIA-compliant formats. As in previous rounds, if providers could not supply information in the requested format, alternatives were offered. These alternatives included uploading service-area boundary maps, exchange area maps, CAD drawings or customer address lists. From that information, the LinkAMERICA team developed a geographic representation of coverage and was able to build coverage features for each provider.

Returning providers: For Round 4 we continued to work with participating providers to improve their datasets. The change in Census Data vintage was explained to providers and links to appropriate files were provided to assist with the transition to the new vintage data.

Check maps continue to be a useful tool to show providers how their area would be displayed on the resulting interactive state map and to get constructive feedback regarding corrections and changes that need to be made to their coverage and speed data. Generating these customized documents in each round is an extremely time consuming verification process, but it allows us to close many of the gaps that might have otherwise persisted.

Follow Up

After the release of the Round 4 survey in early July 2011, LinkAMERICA launched an extensive effort to encourage responses. Every known provider was contacted at least twice during the months of July and August. The initial data submission deadline was set for August 19, but, as previously noted, we continued to accept "straggler" submissions into September.

No Response Policy

As mentioned above, every effort was made to contact each provider who appeared on our initial list. However, if no current information could be found on the company (i.e. no website, no valid phone number, no contact person identified) they were removed from the list of "known providers". We believe the vast majority of those we were unable to reach were providers who have simply ceased to exist[2].

[2]The list of known providers and important submission statistics are contained in the datapackage.xls file.

Summary

In summary, an intensive 45-60 day provider outreach and data collection process is initiated at the beginning of each round. In Round 4, given the data vintage of June 30, 2011, we began this process in July and the last submissions were accepted in September, 2011.

While we continue to successfully engage the majority of providers in each round, the amount of manpower required to solicit complete and timely responses should not be underestimated. This process is one of the most costly and complex within the entire SBI program.

Third Party Data Used

Beyond the data obtained from providers, we acquired the following commercial data products:

- American Roamer, Coverage Right Advanced Services. This data served two purposes. The first was to verify the provider list and help find Broadband service providers not on other lists. The second was to verify the reasonableness of the Broadband service provider's submission.
- MapInfo ExchangeInfo, Professional. This data was used in the verification of telephone Broadband provider data. Where a public domain exchange boundary wasn't available, the MapInfo boundary was used for coverage containment tests.
- Media Prints Cable boundaries. This data was used in the verification of Cable/HFC Broadband provider data. It was used to research valid providers and discover if that provider was offering Internet service. In very rough terms the contained boundaries were used to test the location of some provider data.
- FCC 477 restricted use data were analyzed to find valid providers within a given area.

We have included third party data sources, which touch on each of the three major technologies analyzed within the SBI program. Each of these data sources tie back to a public domain data source, which provides a cross-verification mechanism for the commercial data product.

Although there are a large number of third party licensed data sources available, we remain conservative in our acquisition plans. From our limited analysis we are concerned about the ability to cross-verify additional third party licensed sources against public domain data. Further, we are unsure of how we may be able to integrate another data provider's view of valid Broadband providers within the definitions used by the NOFA (eg. Are they using an FRN/DBA identity view or a marketing view? Can the provider supply in a 7-10 day window? Are they facilities based or not?). This leads us back to a statement we made in a 'lessons learned' Webinar (April 2010) about exploring a consortia to lower the cost of data acquisition and allow multiple entities to peer review the quality and methodologies behind licensed data products.[3]

Beyond these commercial data sources, we used a number of public domain sources. These included:

a. Geographic Data Files

[3] We also suggested forming a technical standards committee and a consistent system for confidence reporting.

i. US Census TIGER data[4]

b. Sources that helped isolate providers, identity management or provider service areas
   i. NECA Tariff 4
   ii. State produced exchange boundaries
   iii. Carrier produced wirecenter boundaries
   iv. FCC Coals reports (321/325)
   v. FCC FRN API lookup tool
   vi. FCC/FAA Antenna Registration System
   vii. FCC FRN Lookup Tool (plain text search)
   viii. USAC High Cost FCC Filing Appendices
c. Sources that helped isolate anchor institutions
   i. USAC Grant lookup tool
   ii. USAC High-Cost FCC Filing Appendices
   iii. HRSA data warehouse
   iv. NCES data lookup
   v. State managed lists of schools (K-12), post-secondary institutions and libraries
   vi. List of museums, conventions, and visitors bureaus from www.onlineatlas.us

Finally, challenges exist when dealing with the inevitable conflicts between provider-submitted data and third party sources (public or commercial). There is no guarantee third party sources are more accurate or timely than the providers' own reports. Indeed, some third party sources are based upon different standards than those specified in the NOFA, perhaps making them less reliable than information collected directly from providers. At the very minimum, provider data has a lineage and temporal status that we can identify. A concern we have with increasing use of third party data is that we have no way to verify its quality or development methodology. In other words, we may hit a wall in which we can't determine how the commercial source derived its coverage conclusion. To us this means that third party data sources are beneficial, but represent a supplementary view, not an authoritative one, of the NOFA defined Broadband market.

In short, we have chosen to use provider data as the baseline. We will challenge provider reports when third party data shows major anomalies, when submitted data conflict with prior submissions or when a consistent volume of consumer feedback points to a potential error.

As the program evolves it is also our intention to provide tools that allow end users to evaluate the accuracy of the data in their own way. A confidence score or the presentation of multiple (and potentially competing) reports for the same location may be made available. This notion is discussed further in the "Validation" section.

[4] Census data were derived from < http://www.census.gov/cgi-bin/geo/shapefiles2010/main>, Census 2010 files. Roads were derived from the county faces and edges file downloaded at the same location and tiled for a full state.

Confidentiality and the Use of Licensed Materials

As a mapping vendor, we are reliant upon the cooperation of Broadband service providers. In large part, what underlies this cooperation is trust that we will not violate the proprietary and confidential nature of the data provided to us.

We are thankful for the confidentiality clarification that NTIA shared with us (included as Appendix Two). We intend to use this as a guiding document to help us communicate with providers about what information NTIA considers to be confidential. Our suggestion is that NTIA publish this, or something comparable, to ensure a consistent interpretation of the NOFA and how it guides NDAs.

As some providers are non-responsive to requests for information, or lack resources necessary to put data into NTIA compliant formats, we have fallen back to the use of commercial data sources in several places.

For instance, some mobile wireless providers were unable to submit coverage information to us. In these circumstances we have generalized the American Roamer coverage. For incumbent telephone providers we have used commercial wirecenter boundary products to filter Census Blocks that are clearly out of their exchange areas.

Public Engagement: Crowd Sourcing, Surveys and Social Media

Crowd sourcing (i.e., an intentional and carefully designed effort to tap into the collective intelligence of the public at large to expand our knowledge base) continues to be an important element of our data collection and validation process. In addition to the various opportunities the public has to provide input via the online service coverage maps and the related 'Broadband story' process, our crowd sourcing efforts are grounded in a time tested telephone survey approach focused on the consumer market. In addition, we continue to advance our process to include certain initiatives centered in two social media outlets – Facebook and Twitter. These initiatives are discussed below.

Consumer Surveys

Working under contract for the state of Alabama in 2009, our initial consumer survey was performed before the NTIA SBI grant was in place. Subsequent consumer surveys funded by the SBI grant were hosted in 2010 for the states of Idaho, Wisconsin and Wyoming and then again in 2011 for Alabama (as noted below). These surveys will be repeated after two years to establish and evaluate trends. To this end, in August/September 2011 we are wrapping up a second-round survey in Alabama designed to expand our understanding of important adoption issues and to establish important local trends from the initial 2009 survey. Survey results from this effort are currently under evaluation. These primarily telephone based surveys include two distinct and carefully scripted tracks: one for Internet users and one for non-users. The telephone survey approach allows us to reach the non-Internet user group as well as the current Internet user. A secondary online approach is also used to augment input from current Internet users. In the most recent Alabama survey we added a third tier to our approach as we equipped local field survey teams with an iPad-based survey tool and targeted their time to reaching the younger market. For non-users, the surveys help determine why they don't have or don't use

Broadband. For current Broadband users, the survey helps determine the nature of their Broadband access and how they use that connectivity in their daily lives. In addition to our state-specific surveys a nation-wide survey was also hosted to provide a broader view of consumer views for comparison purposes. State-specific surveys are, where possible, framed to match the state's regional Broadband planning structure (e.g., the updated consumer survey in Alabama was designed to produce results relevant to the state's twelve Broadband planning regions).

The resulting data is helpful on a number of fronts in the SBI's mission to advance the access and adoption to Broadband. Survey data provides an important, albeit broad, gauge for assessing coverage information obtained by providers. For example, areas with widely available coverage (according to provider information), but lower consumer subscription levels (according to survey results), or perhaps where survey results suggest Broadband is not available, can be examined in more detail. Survey results are also very important to the Broadband planning (and capacity building) components of the SBI program in that they help inform and formulate Broadband advancement priorities. Survey results also help inform Broadband policy discussions on both the local and state levels. Finally, survey results provide important information to the service provider community regarding market demand and specific Internet use in specific communities (i.e., regions).

Our ongoing consumer survey process adheres to a consistent process. For example, consistent with prior practice the 2011 Alabama survey was launched in June 2011 with a test number of survey calls to confirm (and adjust as needed) the structure of the survey and the underlying survey process. Our surveys typically run for three to four months. All telephone surveys are completely random beginning with the acquisition of a list of state-specific, randomly selected landline telephone numbers. Mobile phones are not typically included in the surveys. Upon evaluation of the survey statistics, auxiliary surveys are executed to ensure appropriate representation is achieved on both demographic and geographic fronts. For example and as noted above, the recent Alabama survey was augmented with a field effort to ensure the younger demographic (i.e., age 18 – 25) was adequately represented. This secondary step is required because of the continued migration (by younger markets) to non-landline based communications. This younger market is also surveyed by reaching out through social media outlets to encourage their participation in an online survey process.

Survey statistics from the Alabama update survey are currently being developed and evaluated. Survey statistics from our initial surveys in Idaho, Wisconsin and Wyoming were summarized in our last filing. Survey volumes are designed to achieve statistical validity.

As noted above, our telephone survey process is augmented by providing online access to the survey. Participation in the online survey is promoted on all of our state-specific public web sites and selected social media.

As a final relevant point with respect to the consumer survey process the length of the survey is noteworthy. By survey standards, these tend to be long surveys. The surveys typically average just over fifteen minutes. While this clearly contributes to the number of survey call attempts that were required to reach the level of statistical validity, it is not insurmountable.

Social Media

The phenomenon of social media is widely documented and yet still emerging as an effective access point for public engagement. We continue to explore appropriate ways to use a variety of social media venues in our SBI efforts. All of our efforts are informed by and consistent with relevant state statues and guidelines. Different states have different perspectives on if and how the state will participate in the use of social media. Some state requirements are well defined and some are still being formed. Where appropriate, we use LinkedIn, Facebook and Twitter to support our work. A central focus is on promoting awareness. As noted above, we are able to promote additional input on the consumer surveys through a social media outreach program aimed at our younger market segments.

In addition, we continue to evaluate how Facebook and Twitter can be used to drive public input on two important crowd sourced issues: online speed tests and input on map accuracy. Based on data obtained through our web site traffic monitoring process and readily available social media tracking processes, our most recent results are promising.

Capacity Building and Transitioning to State Partners

A foundational goal of LinkAMERICA has always been to transfer knowledge and capacity to our State partners. As we move into program year 3, distinct tasks are migrating to the responsibility of our State partners.

Within each State, transition planning and responsibility for specific activities is on a slightly different timeline. Much of this is driven by resource availability and partner identification within the State. For example in round 3, the State of Alabama used interns to validate Community Anchor Institution (CAI) data. In this submission Alabama took on greater responsibility for the CAI submission. To support this LinkAMERICA developed a detailed transition document describing the current CAI efforts.

Other States are looking more towards program year 3 and the in-State hire of a Broadband Coordinator as the initiation point to support their transition efforts.

Data Production Process

To support our objective of transitioning the data development process to our State partners, we continue to model and document our data production process. We find this to be a very beneficial step for two purposes.

First, it helps us understand why (and if) a task is being done, and if it is being done efficiently. Much of this program started so quickly that it was difficult to plan logical integration and hand off points among the various workgroups. Further, we are currently in the process of consolidating much of the process data (check-ins, check-outs, metadata) and we can use this process model to efficiently plan a cohesive information architecture.

Second, our process documentation and modeling helps explain why resources are being consumed in a particular way. This helps our State partners plan for in-sourcing specific tasks as their time and

budgetary constraints allow.   It also helps our LinkAMERICA team better plan and cross-train members to deal with the work surge that occurs 30-45 days prior to submission.

Finally, documenting and modeling our process helps us to take advantage of increasing specialization and proficiency with certain types of data and management responsibilities.   In submission 3, we had identified data “czars” responsible for check-in and check-out of data. That data czar helped to bridge the gap among receipt functions, provider feedback, production and DBA.

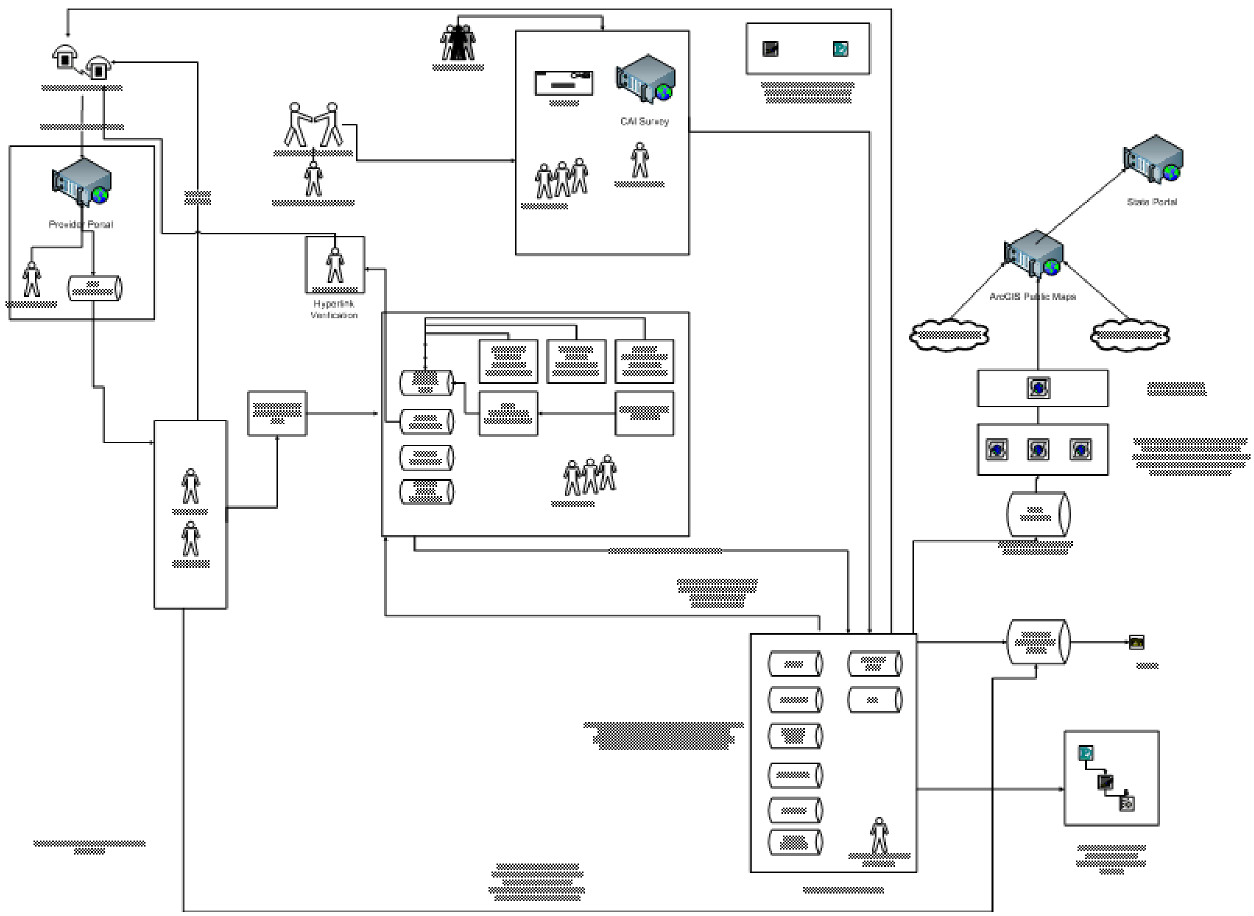

Figure 1—SBI Data Development Business Process Diagram

Data Production Methods

As raw data were received from the provider community, attention turned to normalizing the disparate submission formats[5]. The team considered each submission with respect to the following criteria. These criteria are important because they perform the basis for our verification and quality assurance

[5] In line with NTIA Best Practices we continue to request and receive a large number of data input formats. This ranges from tabular Block lists to hand drawn maps.

process. In other words, we have to appropriately scale our data verification efforts to match the scale or ambiguity of the following:

- Locational certainty
- Speed certainty
- Temporal certainty
- provider and network ownership certainty

The team's goal was NOT to quantify a particular degree of precision with respect to any of these criteria. Rather, we are working to attribute the above "certainty attributes" to each submission, and will continue to implement quality assurance and verification mechanisms that are resource-appropriate for each.

Deriving Broadband Coverage Information

Broadband Coverage[6] was normalized into four formats:

1. Coverage in Census Blocks (2010) of 2.00 or less square miles
2. Covered Street Segments (2010) in Census Blocks greater than 2 square miles[7]
3. Address Level Coverage (point data)
4. Wireless Service Areas (SHP file format)

With each submission, the team went through a series of steps to normalize and categorize the data. Since data arrived in many different formats, and at many levels of granularity, the following normalization procedures were used:

1. Determining the nature of service being provisioned (who is providing service and what technologies are in use)
2. Planning an attack strategy for the submission –understanding the data and assigning team members to various tasks
3. Geo-referencing the data; QA the geo-referenced data
4. Geoprocessing the geo-referenced response
5. Segregating the submission into the correct NOFA-compliant submission formats.
6. Apply appropriate source metadata[8]

[6] Speed, Anchor institutions and Middle Mile facilities are discussed in later sections.

[7] To help clarify issues relating to Census block area and vintages in use, our team published a technical paper to the Grantee workspace. Because we were unsure if this standard should be implemented uniformly, this document was never distributed to the provider community.

[8] When our team logs a submission into the staging database we record at least two attributes. One records the method used to derive the coverage, the other records the method by which speed was attributed to that object. Other attributes carried to NTIA carry source meta values as well.

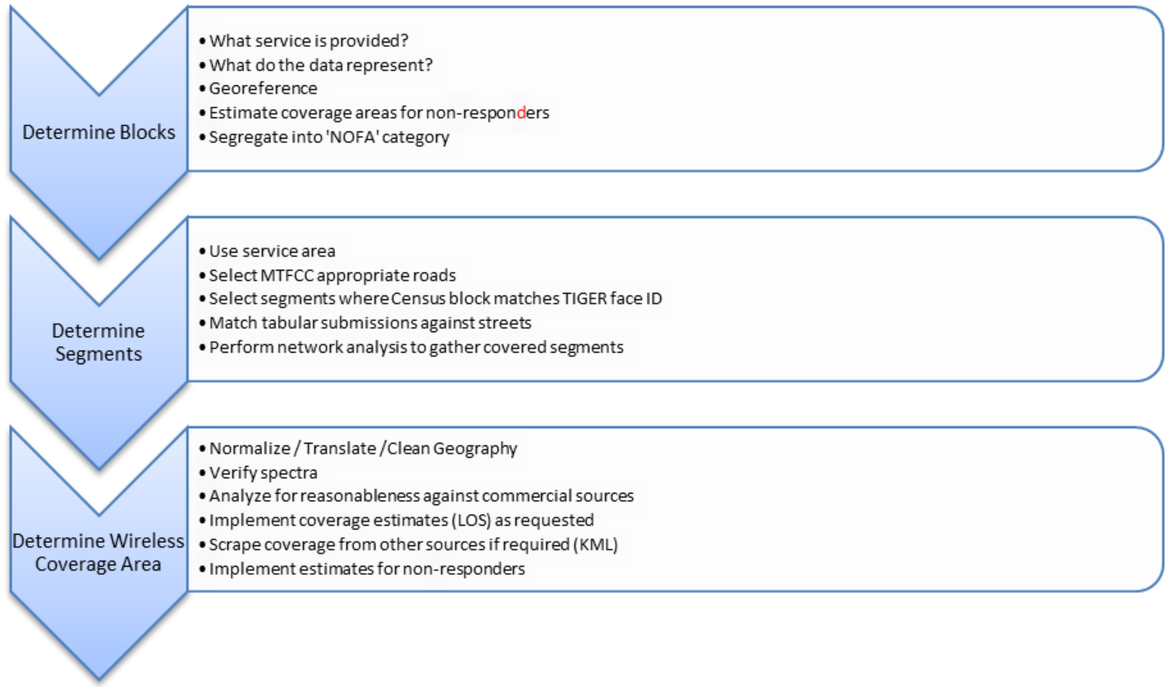

Figure 2-Broadband Coverage Process

Impact of Program Change

There were several important program changes that impacted how Broadband coverage was developed and submitted to NTIA in Round 4.

Census Conversion

The first and most obvious change in submission 4 was the conversion to a Census 2010 coverage baseline. This impacted all wireline providers, the data submitted, the appearance of the mapped information and the baseline coverage metric comparisons against prior submissions.

Release of the June 30 Grantee guidance document, allowed LinkAMERICA to communicate this change with providers. LinkAMERICA provided by FTP access appropriately formatted and sized[9] TIGER 2010 Census blocks and Tiger Road Segments. Given the relatively late release date, we received a mix of responses from Broadband providers. Some easily produced Census 2010 information. Others requested that we do the translation from their supplied blocks and segments. Others requested that we translate their engineering data into appropriate formats. A small number of providers committed to producing Census 2010 data but struggled internally with the conversion in this rapid time frame.

Census 2010 has significantly more Blocks than Census 2000. For the most part there are far more small Census 2010 blocks (less than 2.0 sq mi) than Census 2000. As our team worked through the QA process, this presented a significant challenge in comparing our converted results to prior submissions. We use a block count metric as our first test of consistency across submissions. Since the block count

[9] In Submission 3 we released a technical note describing how we measure Census block area. Although there remains no consensus on this, we used the same process as outlined in the paper.

increased it was hard to distinguish coverage area changes from coverage chances resulting only from a change in Census shapes.

The converse side of this challenge was even more precarious to work through. Because many road segments dropped out due to the covered area now being in a small block area it was difficult to determine how effective our covered segment process was given the fact that many segments naturally dropped out due to changes in Census shapes.

The tendency for large blocks becoming small was not universal. We note in some of our very rural areas of Wyoming and Idaho, small block covered areas become large. This created a contrary situation where small blocks become road segment areas. The image below shows a coverage area change between submission 3 and 4. The covered number of blocks is comparable but the appearance of the coverage is different as a manifestation of the Census change.

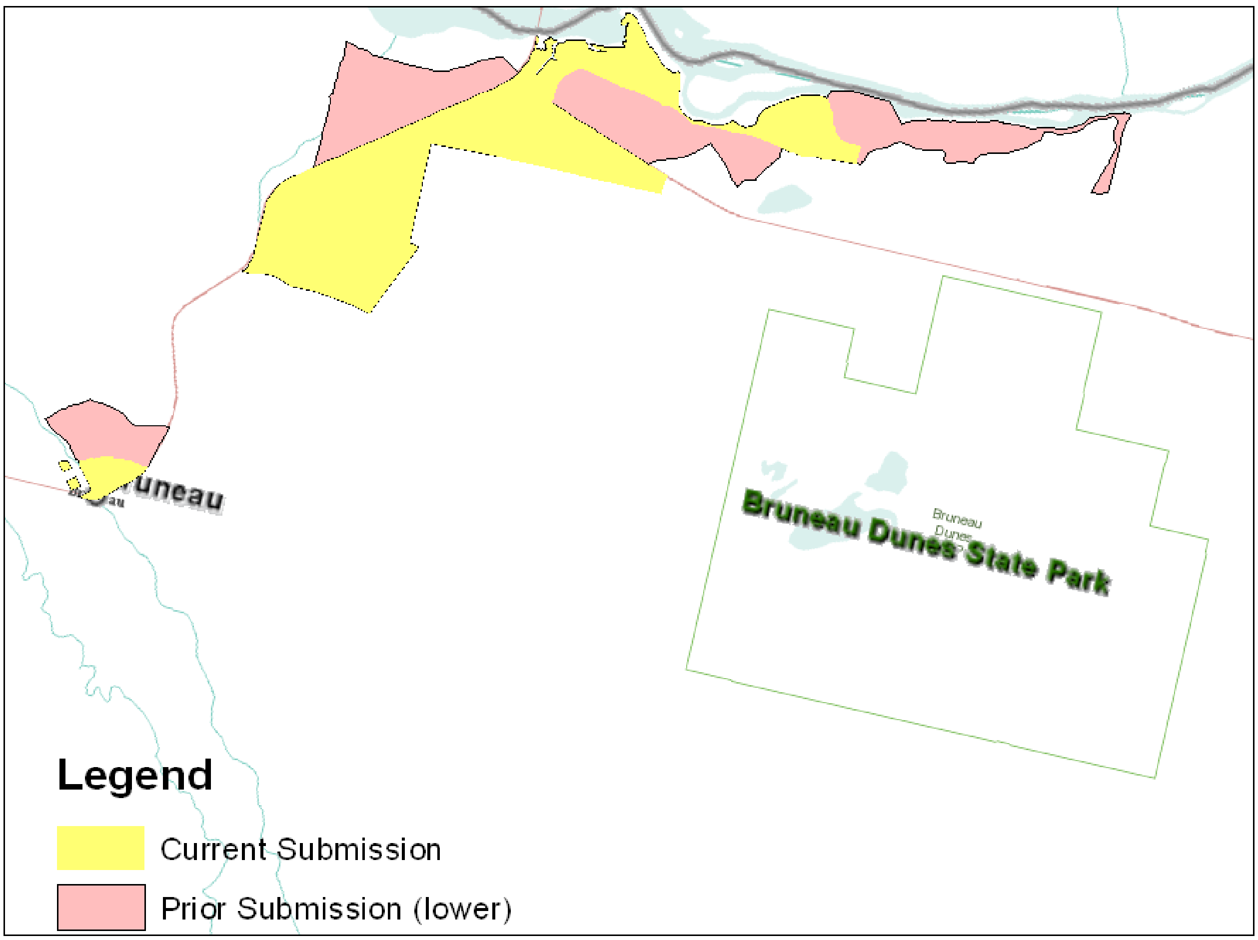

Figure 3--Coverage Change across submissions

This somewhat indeterminate process required our QA analysts to examine a number of submissions in detail. The conclusion was that although the appearance of coverage was significantly different, the underlying engineering data was the same (or very similar) but how the coverage was manifested was a product of the Census conversion.

Census Conversion Practices

Although we had hoped there would be a single process we could follow for all Census conversions our experience has been that it is necessary to be flexible and base the Census conversion process upon the data received.

On a subjective level, we felt the most comfortable converting into Census 2010 where we had facility or demand data to guide the block and segment selection process. In these circumstances we used geoprocessing methods like intersections or network analysis Analyst to make an objective determination. The geoprocessing methods mirrored those discussed in the next section. This was probably the majority of our submitted data.

In circumstances where we were provided Tiger 2010 blocks or segments, we used those as given and performed our standard validation process. Some providers used the TIGER blocks and segments which we supplied them and made their own selections.

Finally, in circumstances where we had either a Census 2000 block list or a geographic file containing Census 2000 geographies and were told there was no coverage change for this submission, we used the Census crosswalk tables[10] to derive a list of candidate blocks. The output of a conversion process is shown below.

[10] See http://www.census.gov/geo/www/2010census/rel_blk.html

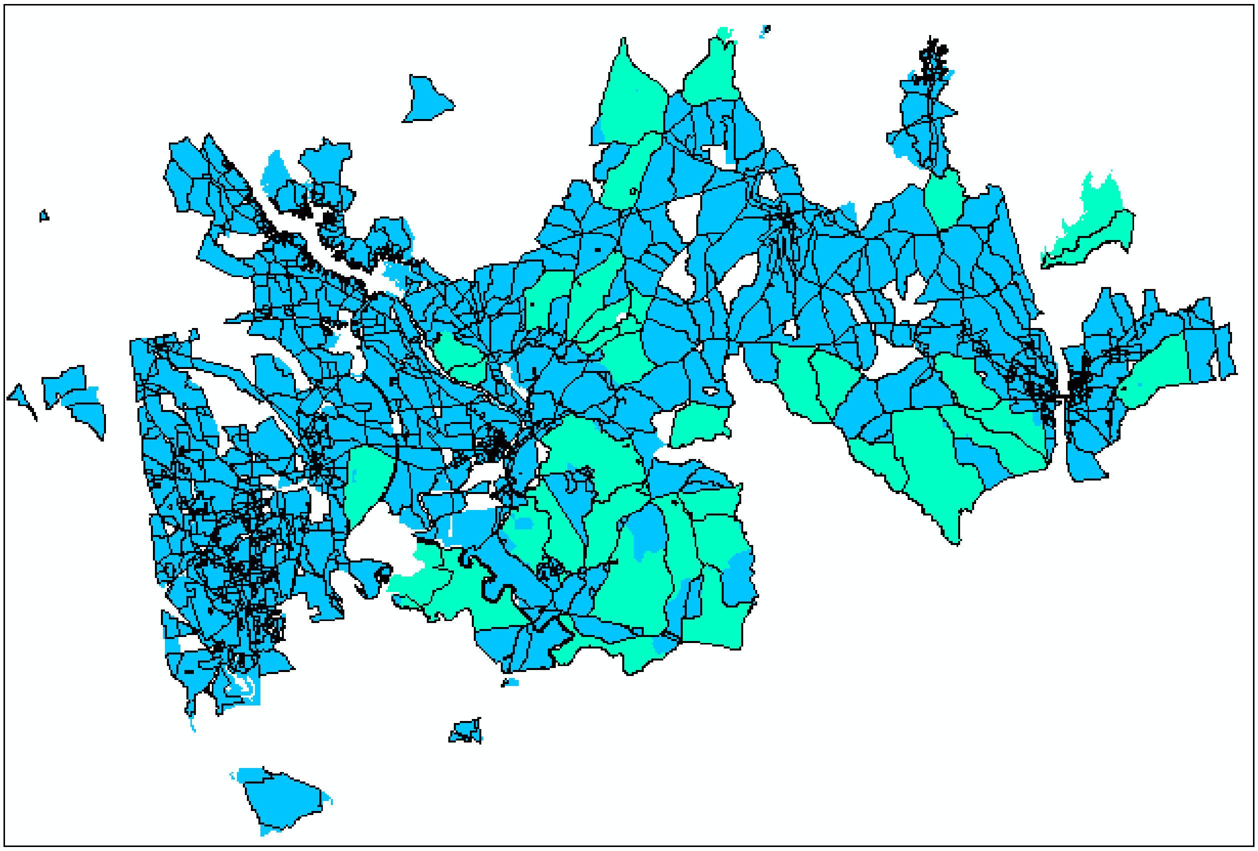

Figure 4—Block Conversion Process, Census 2000 black outline, no fill. Green is 2010 large blocks, so any shading without an outline is 2010 block area not covered in 2000

For the most part it is difficult to discern the impact of a conversion into Census 2010. We don't see vast changes in areas covered. Nonetheless because the block shapes do change the overall coverage area will look different.

As the 2010 data gets pushed into public deliverables, our sense is we will receive questions about the appearance of the new data.

Speed Examination

Given recent concerns about the depiction of speed and what that mapped speed represents, LinkAMERICA invested considerable time requesting detailed information on speed which appeared to be beyond normal speeds for a given Technology of Transmission given the NTIA supplied frequency tables.

Based upon these conversations we learned

> A) For a large incumbent telephone provider; the speeds beyond the normal DSL range represent significantly shortened copper loops.
>
> B) For a large national cable provider the intermixing of Docsis 3.0 and non 3.0 systems in a market area is typical and sometimes reflects a circumstance where segments of plant cannot

be upgraded to Docsis 3.0. This variance can be at a level below the Census block. In these cases the maximum advertised speeds remain to represent the market area but the plant variance is typical. This same provider expressed concern with moving reported advertised speeds below the market level.

C) We have a minority of providers who submit a theoretical speed that is unmatched by their web advertising. In these cases we request clarification from the provider on the inconsistency. Our experience has been that providers will modify the speed to be consistent with their web coverage.

Provider Definitions

Within our provider verification process we work to derive a state level provider match against third party data sources. As discussed in the early pages of this manual, there is no guarantee that a third party data source is any more accurate than submitted data, nor does it necessarily reflect the provider ecosystem specified in the NOFA, Technical Appendix A. We devote significant resources to matching our submitted data against three, third party data sources. In many cases this becomes a judgment call trying to match provider names across systems. It is a difficult and somewhat arbitrary process. Nonetheless we do believe it has value because it forces a re-examination of who we believe is an appropriate provider within a non-NOFA context[11].

The use of a provider match system, as well as the webinar comments (3/17/11) directing grantees to estimate, wherever possible, non-participating providers have made us back away from one of our fundamental assumptions in data collection. As discussed in the prior draft of this manual, we had developed a certain "hold-out" class of data when a provider's data wasn't of sufficient quality to verify, or we were unable to put it into the data model (eg. address points submitted for a wireless). In this submission, much of this hold-out data has been included[12]. In some cases this means we are using simple polygons to capture a wireless ISPs serving area. Other times, if we are confident in the coverage, but can get little clarification on the submitted speeds or frequencies, we release the coverage and note in our internal metadata the source issues with the other attributes.

Finally, we have used the new provider type classification of 'other' to bring some aspect of the provider's data into our submission. There still seems to be confusion on how to handle provider types where a provider offers multiple paths to provision Broadband for typically business customers. Rather than waiting for certainty on the answer, we bring the provider in and list them as provider Type "other". Our sense is provider Type "other" will continue to expand in subsequent submissions.

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[11] We have requested from NTIA information on how provider matching is done within their QA process; beyond the relatively short whitepaper posted with the national map <http://www.broadbandmap.gov/blog/wp-content/uploads/2011/02/DataComparison_Methodology2.pdf>, we have not received any more detailed information on how providers are cross verified between submitted and third party sources at the national level. Our understanding is licensing concerns are holding the release of this information.

[12] We continue to process older submission data looking for information and methods by which we can estimate coverage information. This will be an ongoing process.

Clearly one challenge is the data, but an equally significant challenge is appropriate messaging around this “other” provider type category. We do not want to leave consumers with the impression that they can get a high capacity fiber or microwave link despite the fact that the hospital next to them in the same Census block can get this service.

After the Grantee conference, LinkAMERICA submitted a paper describing our provider classification system[13]. It is our feeling that understanding the type of provider is essential to appropriate verification methods.

Coverage Geoprocessing Methods

The next section discusses how data were georeferenced and geoprocessed given a particular submission format. We have yet to find a particular method that works across all submissions. Rather we tend to tailor our geoprocessing to meet the specifics of the service provider and data submitted.

In most cases, in Round 4 we were still not provided with street segment level information for Blocks greater than two square miles (large Blocks). This necessitated subsidiary geoprocessing. As stated before, our first goal was to derive block level coverage. Then, for Blocks greater than 2.00 square miles, we moved to a segment gathering processing. The segment process will be described in the last section.[14]

Block Level Coverage Derivation Using Service Point Data

A number of providers submitted point level customer data.

In some cases the submissions themselves were not internally consistent. For example, in the image below, unprojected points are shown, while the Census block polygon to which the points are supposed to “belong” is highlighted. In this case, one of the following scenarios has occurred: block attribution is wrong, the points are not in the location to which they are attributed, or different block shapes were used than what is assumed.

[13] https://sbdd-granteeworkspace.pbworks.com/w/file/42309493/provider%20ClassificationFINAL.docx

[14] As has been discussed previously, we note inconsistency in how providers are supplying information at the block and segment level. Beyond the temporal differences, we see that providers are computing area differently, as well as including or excluding water areas. This provides an inconsistent measure across providers for the 2.00 sq mile cut off. Our preference would be to provide guidance to service providers within our states, but our concern is that we will inconsistently message this with grantees in other states. We would appreciate consistent guidance from FCC/NTIA on this topic.

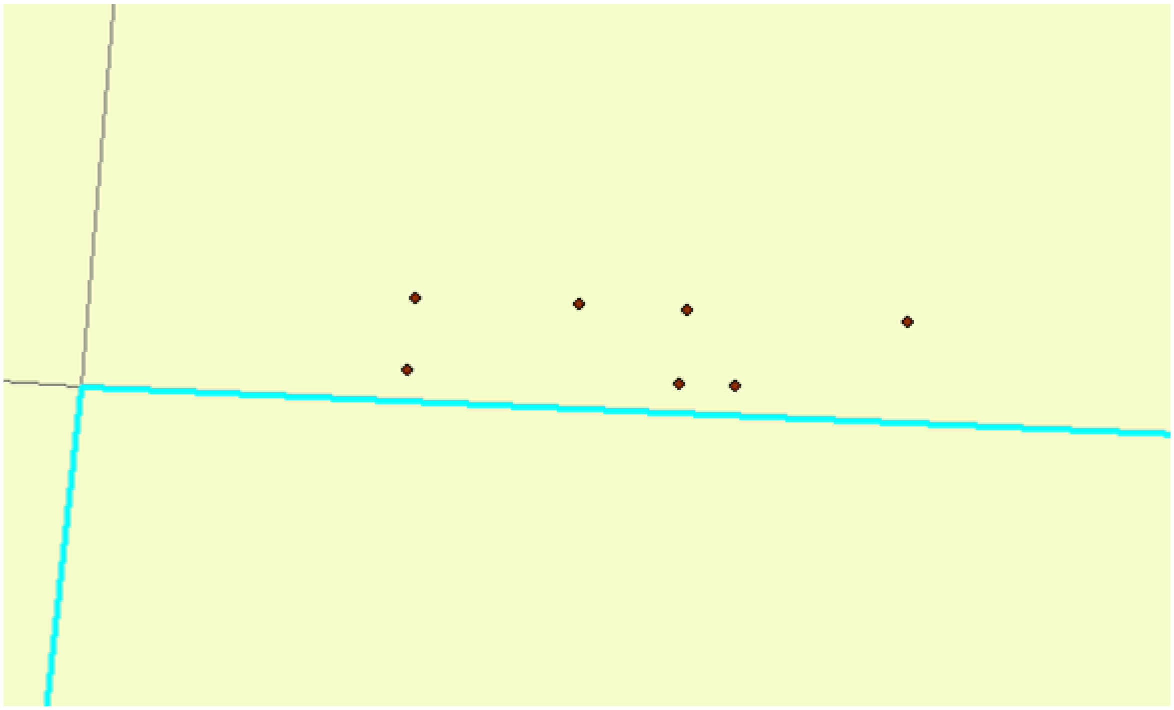


Figure 5-Internal inconsistency in submitted data

In other circumstances, we found that inconsistent geocoding standards may produce misleading results. The next image shows point level data, and the Blocks are colored based upon the counts of points intersecting Blocks. The challenge this presents is that if geocoding was performed on a different dataset than the block boundaries (the road traces are not coincident with block boundaries) and/or geocoding was done without an offset, it becomes problematic to assign coverage to a Census block based upon only the point locations.

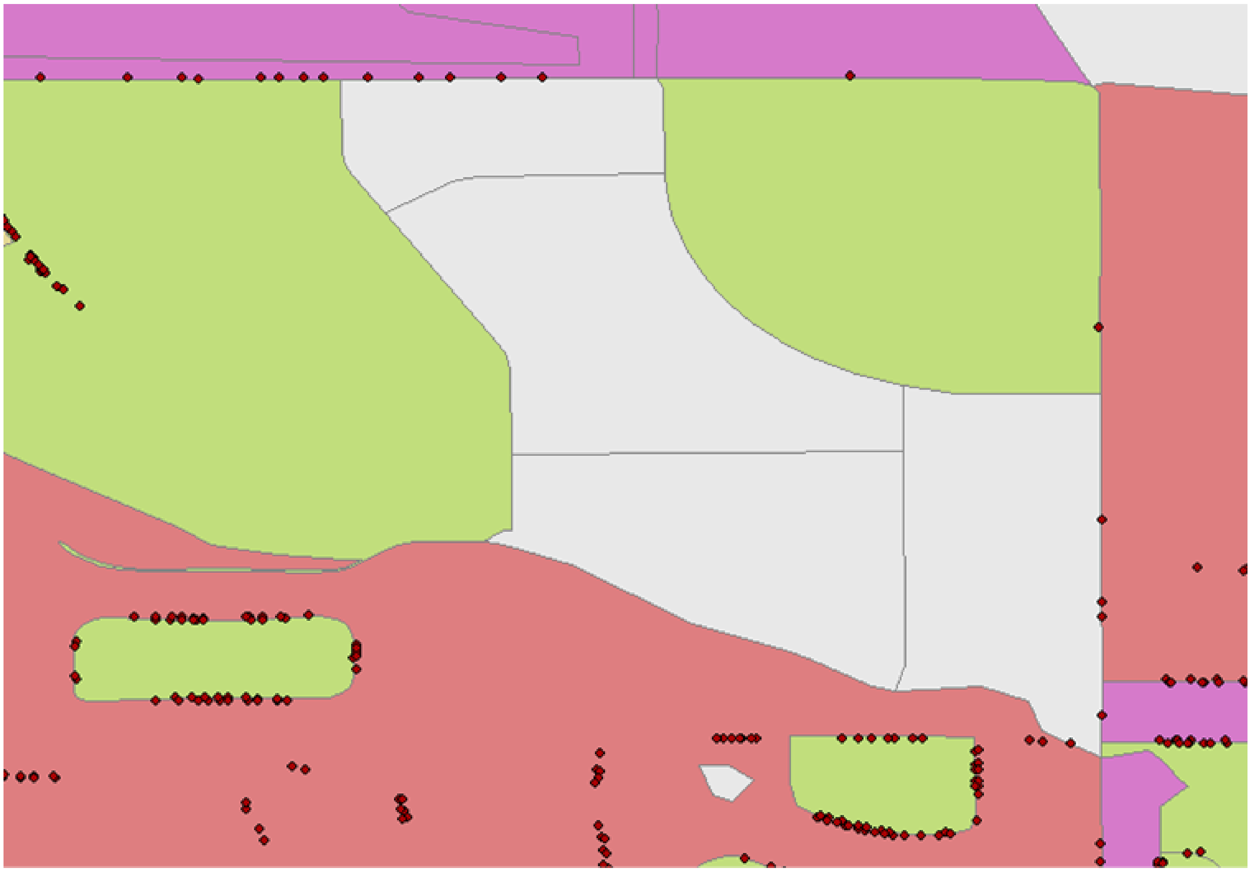


Figure 6-Block Coverage

For this reason, where we were provided address point data and asked to generate covered Census blocks, we elected to use a 200-foot buffer to select Census Blocks that intersect our points.

We are also starting to see a number of providers submit customer data and facility data. Their intent is to allow us to have two primary sources from which to derive the most accurate coverage. In these cases we tend to look for clusters of customers in areas where we see no facility based coverage.

With respect to deriving Block level speed from sub-Block data, we have instituted a business rule where the predominant speed in a Block is the speed we attribute to the Block.

Block Level Coverage Derivation Using Customer Facing Plant Level Point Data

In other circumstances, providers submitted point level plant data. From what we could gather, these points tended to be customer-dedicated terminals. Typically, these providers were high speed Broadband producers—which may somewhat strain the definition of Broadband as other providers supplying comparable services specifically disclaimed the ability to provide high-capacity Broadband services in the required 7-10 day interval. In these plant point data submissions, we had similar concerns to the point level customer data, but two factors tended to make us use a more conservative intersection buffer. First, we tended to have far fewer points to work from, so our concern was grabbing too many covered Blocks as the Blocks tended to be much smaller in these urban areas.

Second, these plant points tended to be dedicated to distinct customers, but it was difficult to know which element of the customer's campus to attach coverage to.

In the case of the image below, given a small shift to the left, it would be easily possible to gather 1 to 3 Census Blocks from this point. Although orthoimagery is helpful in a circumstance such as this, it is still indeterminate.

Thus, in the circumstance of plant level point data, we used a 100-foot intersection buffer.

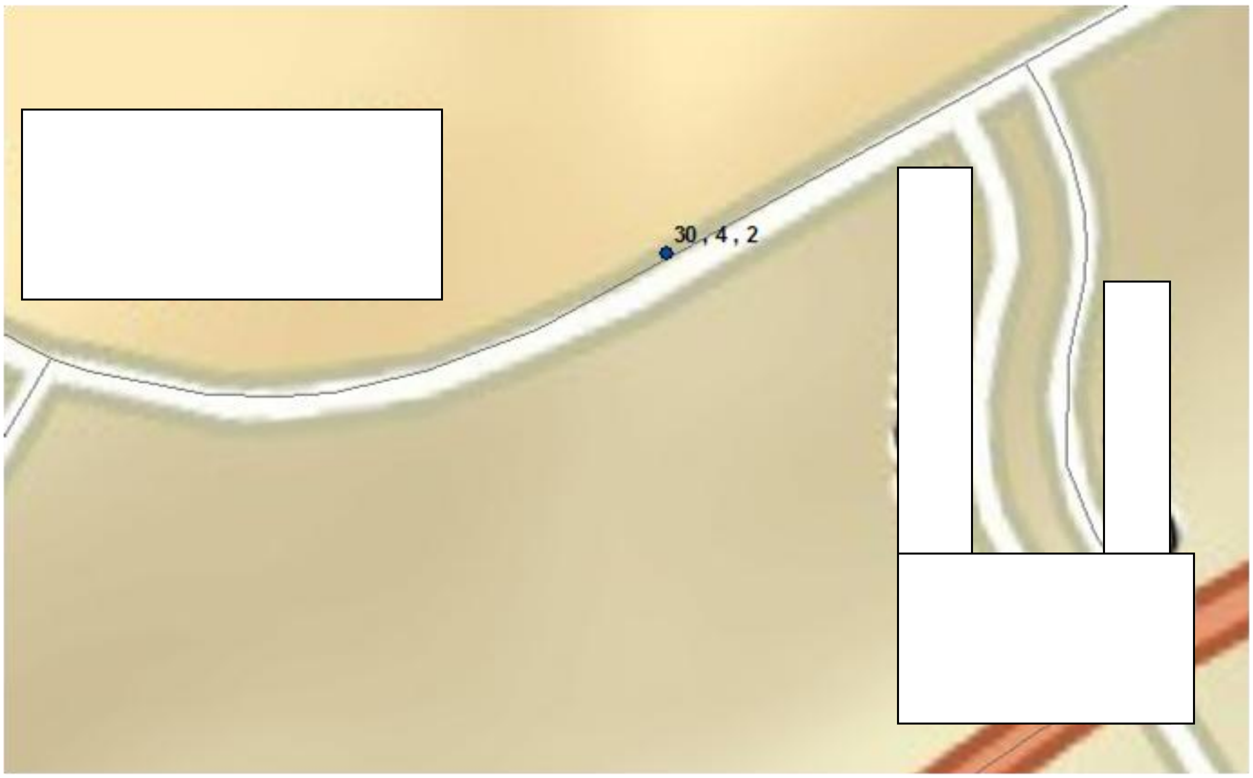


Figure 7-Plant Point level data

Coverage Derivation Using Linear Facilities Data

A number of providers submitted facilities data. We handled this data in different ways depending upon what we believed the facility data represented.

Most telecommunications networks are divided into two components. Feeder supplies higher capacity nodes (eg. DSLAMs, Fiber Nodes). Distribution usually supplies customer premises (NIDs, Pedestals, Taps, ONTs). Where we could discern what strand we were provided, we used different methods.

The next image demonstrates a geo-referenced CAD image as given to us by a Broadband service provider. Note the light and dark green shading. We would infer that the lighter segments represent distribution and the dark green represents the feeder network.

In the case of a combined strand map, we used a relatively tight buffer of 200 feet to gather covered Census Blocks. Our intersection tolerance is based upon an assumption that our data likely represent a

situation comparable to customer point level submission in that we have most of the network footprint captured.

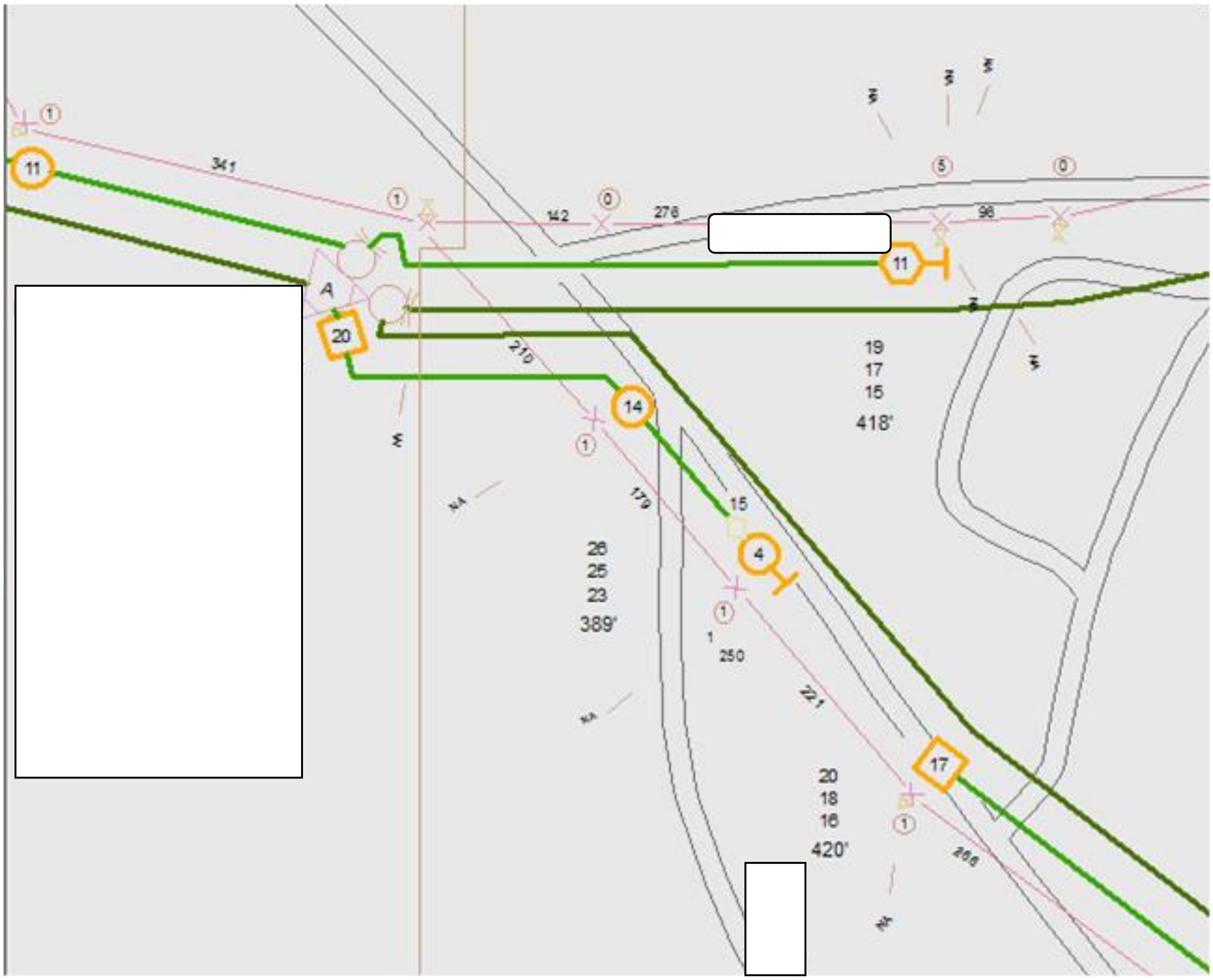


Figure 8-Georeferenced CAD information supplied by Broadband provider

In other circumstances, we were provided engineering information that we inferred to be feeder only. This inference was typically based upon the presence of fiber optic equipment only. In these cases, we used a more generous 2,000 meter Census block intersection. The 2,000 meter criteria was based upon an informal survey of population in proximity to the geo-referenced strand data, but it could be varied based upon a more complete survey.

Coverage Derivation Using Covered Street Segment Data

In some cases we were provided with covered street segment data. Covered segments tended to come from two sources.

In some circumstances, providers gave us CAD data, which was not drawn in a projected manner. This is relatively common for older engineering data derived from hand drawn records. This meant that our

team geo-registered the image into an approximate position. In this case, the boundary streets were selected, and an enclosing polygon was derived. The intersection of this polygon and the Blocks within became the geoprocessing method to derive Blocks.

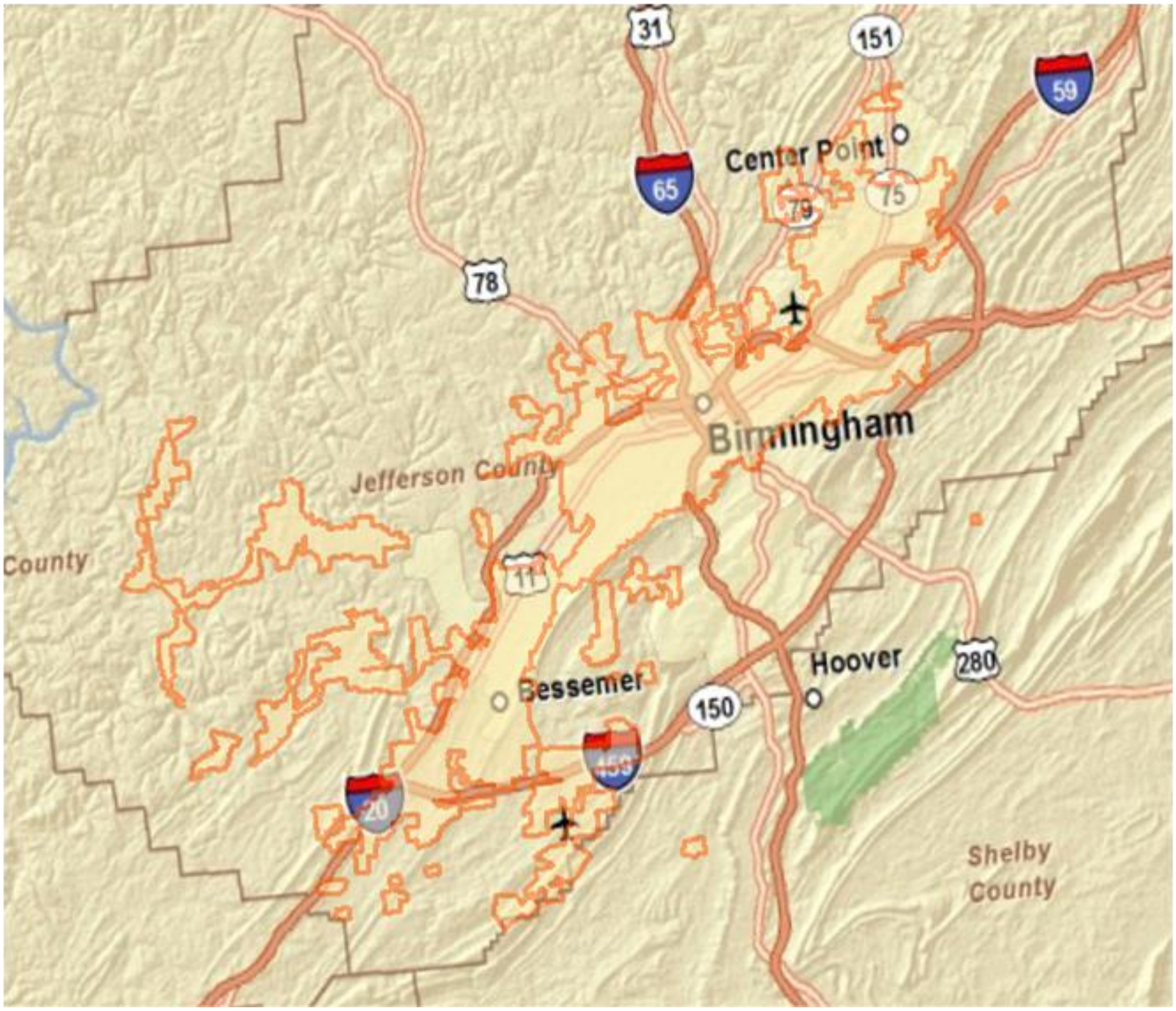


Figure 9-Coverage derived from street segments

In a second circumstance, street segment data was developed during coverage estimation. Handling the estimated data is discussed below.

Coverage Derivation Using Serving Area Point Submission Data

In other cases we worked with providers to derive service areas based upon point plant data. In these cases we were given a serving node and an appropriate road length service boundary. There is an important distinction from the plant data discussed above. In this specific case, the data submitted was a node that served many locations--such as a Central Office or DSLAM. This is contrasted with the earlier example in which the point represents a node serving only a few customers.

When trying to derive coverage from Central Office or DSLAM nodes, the team used ESRI Network Analyst to derive covered road segments honoring these road engineering parameters.

The figure below shows street level coverage derived from Central Office and remote DSLAM point data.

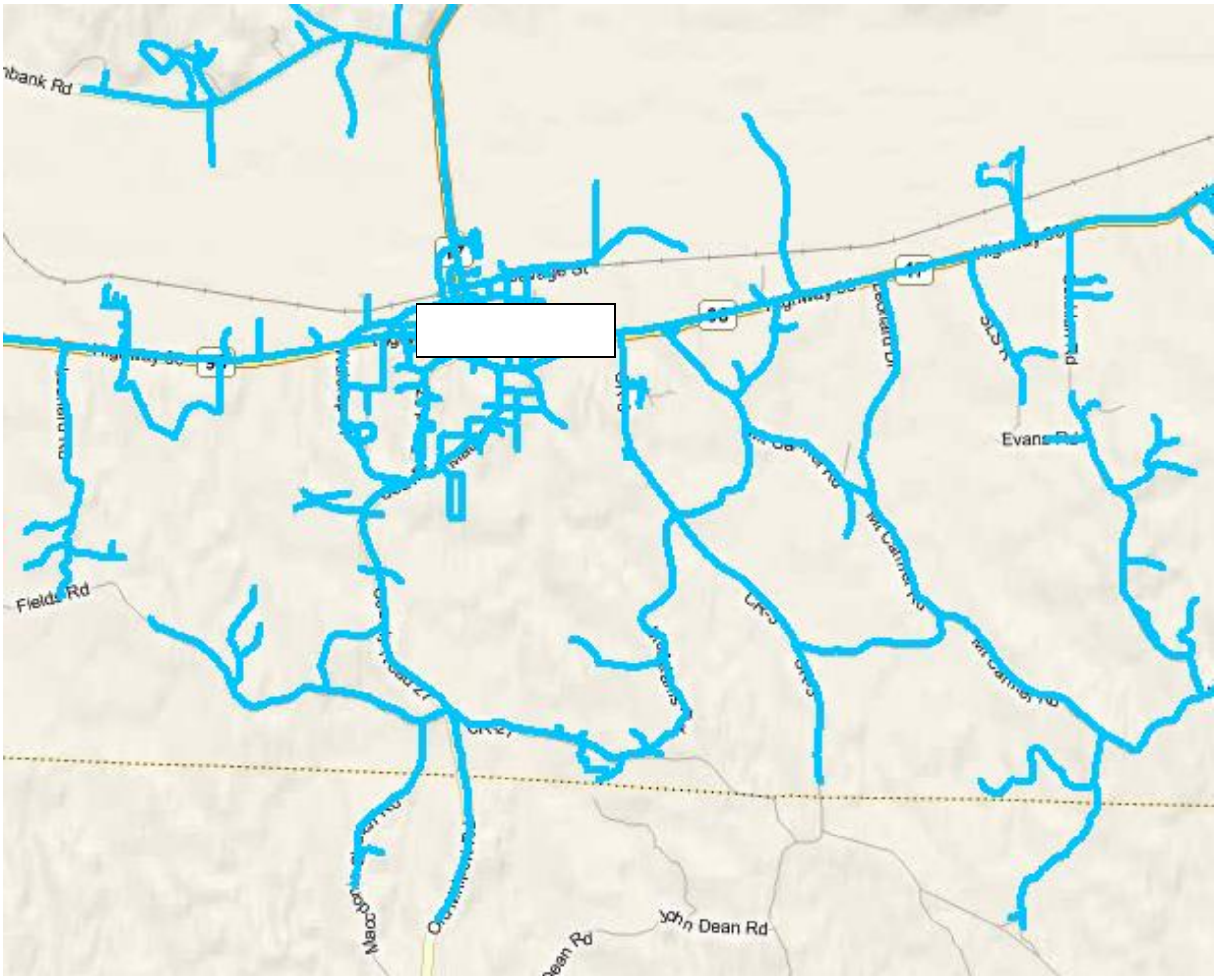


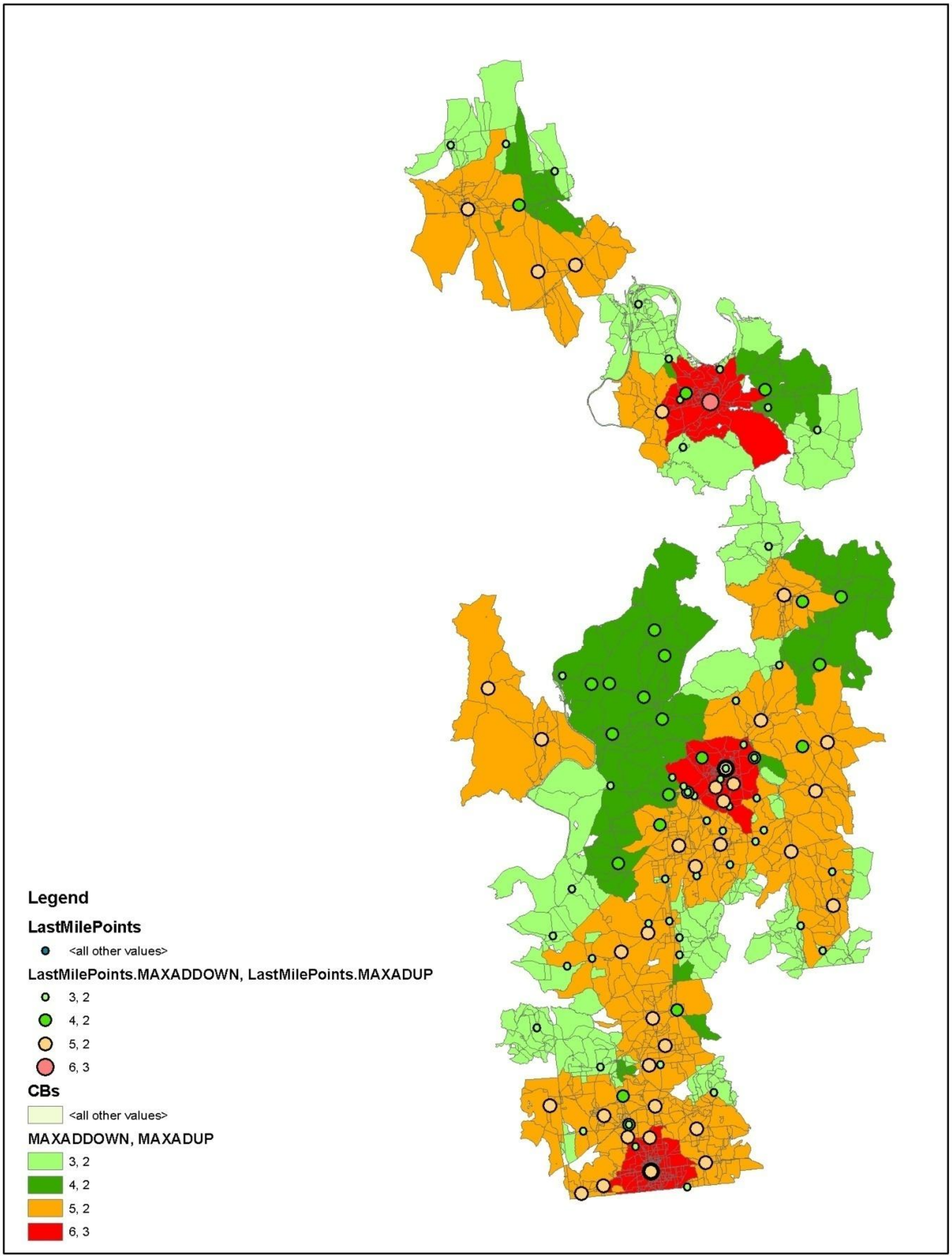
Figure 10-Coverage derived through road paths

In response to Provider feedback we revised this process to include a larger variety of TIGER road types. In Round 1, unimproved roads were not used. In the current submission -- particularly to improve estimates in areas bordering parks and public lands -- a wider class of TIGER roads was used.[15]

The segment level coverage is easily extendable to derivations of Census block level speed. The figure below shows the attributions of block level speed based upon the Maximum Advertised Speed available from a DSLAM. Although the methodology isn't perfect, it does provide insight into the value of granular infrastructure data.

[15]Only TIGER features of MTFCC type S1100 and S1200 were excluded from use.

Over time we have seen an increase in the number of providers submitting this type of data for our use. Our sense is some providers find plant level data easier to generate and are satisfied with the results of derived coverage.


Legend
LastMilePoints
<all other values>
LastMilePoints.MAXADDOWN, LastMilePoints.MAXADUP
3, 2
4, 2
5, 2
6, 3
CBs
<all other values>
MAXADDOWN, MAXADUP
3, 2
4, 2
5, 2
6, 3

Coverage Derivation Using Polygon/Polyline Serving Areas

Broadband service providers sometimes submitted coverage in terms of served areas. This was either in direct geospatial formats, CAD files, or paper maps. The image below reflects a carrier's service area. Within that service area, there are variations in technology of transmission and served speeds. When polygons with speed data and technology of transmission were available, we used a spatial intersection to gather covered Census Blocks. In many cases, using covered Census Blocks resulted in a loss of the speed variation (sometimes the speed variation was at a level smaller than a Block and did not get picked up within a spatial query).

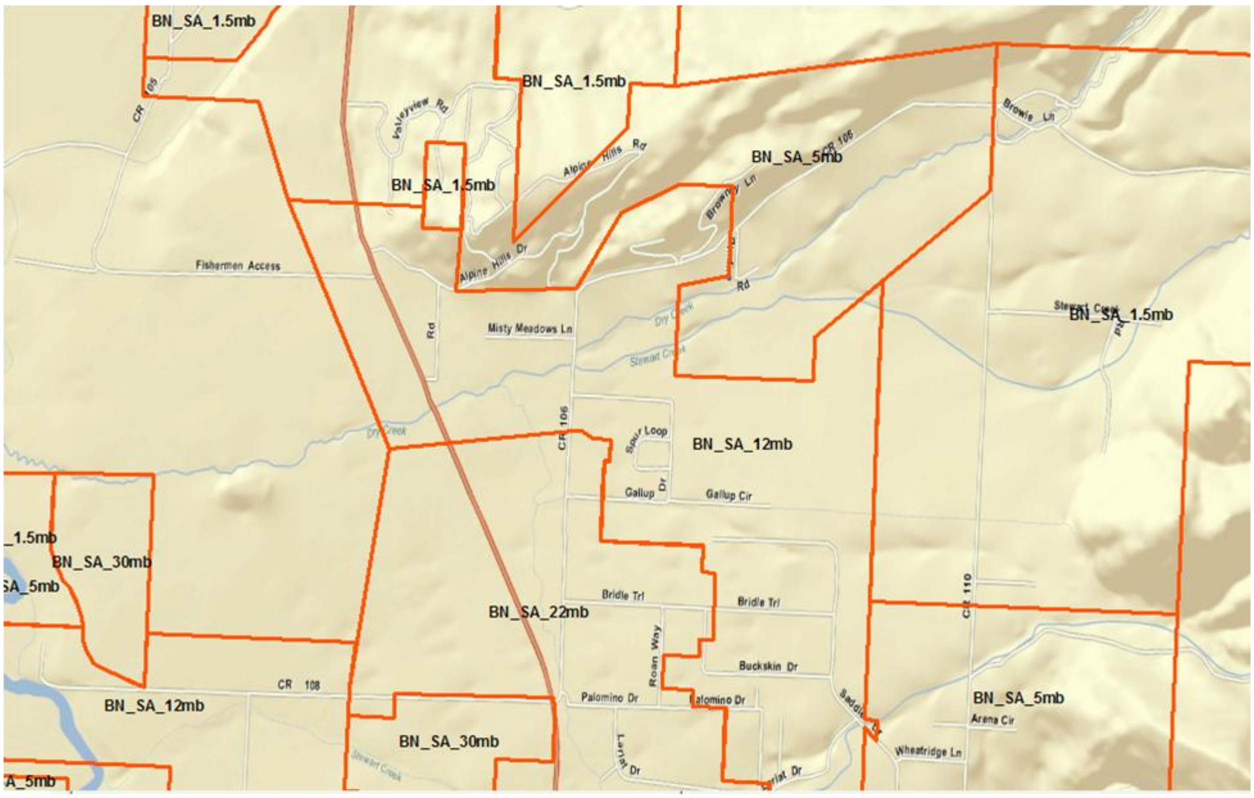


Figure 11-Coverage derived through serving area polygons

Although we cannot directly solve the loss of speed granularity due to Block shapes, we honor a business rule wherein we always select Blocks from the highest speed areas first, and then allow the lower speeds to select from the remaining Blocks. This is an arbitrary rule, but our feeling was that it should be a consistent selection, rather than an unordered selection.

Street Segment Derivation, Large Blocks

For those calculated Blocks greater than 2.00 square miles (large Blocks), we provided coverage in terms of covered street segments and corresponding geography.

With respect to segments we had four sources of data:

1. Covered large Blocks
2. Tabular street segments and address ranges for large Blocks

3. Geographic segments either with street attributes or without
4. Service area boundaries

A number of providers only provided a list of covered large Blocks without corresponding segment information beneath the block. This provided the dichotomy of either selecting all segments in the block, or none. Because we had little information from which to make the selection, we elected to be conservative and did NOT pass any covered segments to NTIA from this submission format. Some Broadband providers submitted covered street names and street ranges. In these cases we performed a manual analysis trying to link to specific segment names and address ranges within covered Blocks. Sometimes this was a simple process because a provider used a TIGER derived street database. In other cases we could not determine the source of the provider's street data. Street and Address matching tended to yield a relatively good result (typically between 30% and 100% of possible segments in the Block), but was very time consuming. Where yield rates were low, our result was a shredded segment coverage pattern, like the image shown

below.[16]

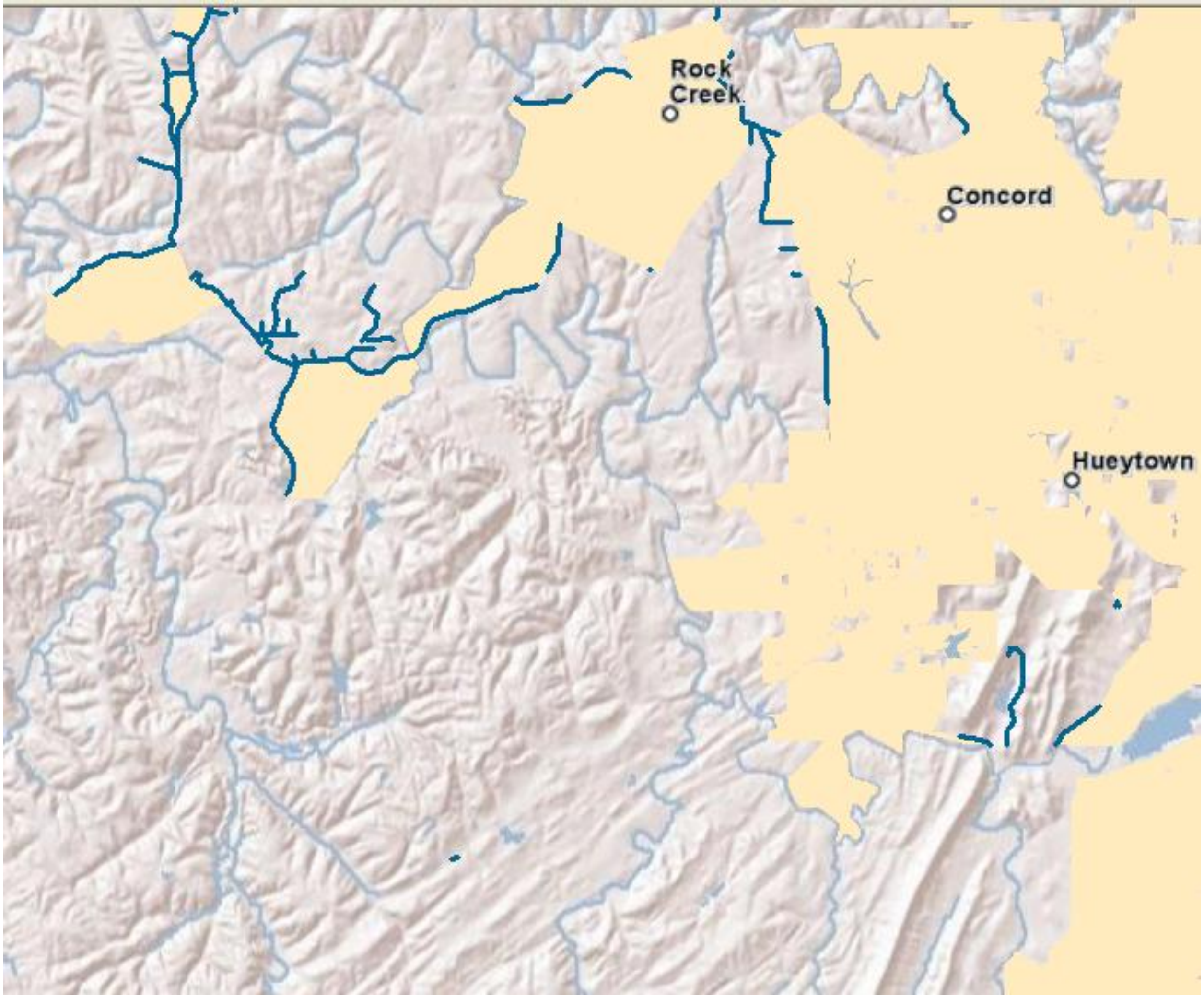


Figure 12-Blue road segments adjacent to peach covered small Blocks

A number of providers submitted geographic objects. In this case, our manual process was directed toward a conflation of data sources. The goal was to take provider submitted segments and put these segments in terms of our TIGER 2010 basemap. Although there is a trade-off in the accuracy using non-provider submitted segments, we felt it was more important to have a road set that would edgematch our Block features and remain consistent with the Block size standards we used for other providers. This is important for the appearance of the online maps, as well as potential verification work where we are attempting to judge a feature based upon its attachment to a covered small Census block. The figure below shows street segment input data.

[16] We continue to hear providers expressing concern that our request for either a geographic object or TIGER Line ID is beyond the scope of the NOFA clarification. Therefore, they cannot supply additional information to us.

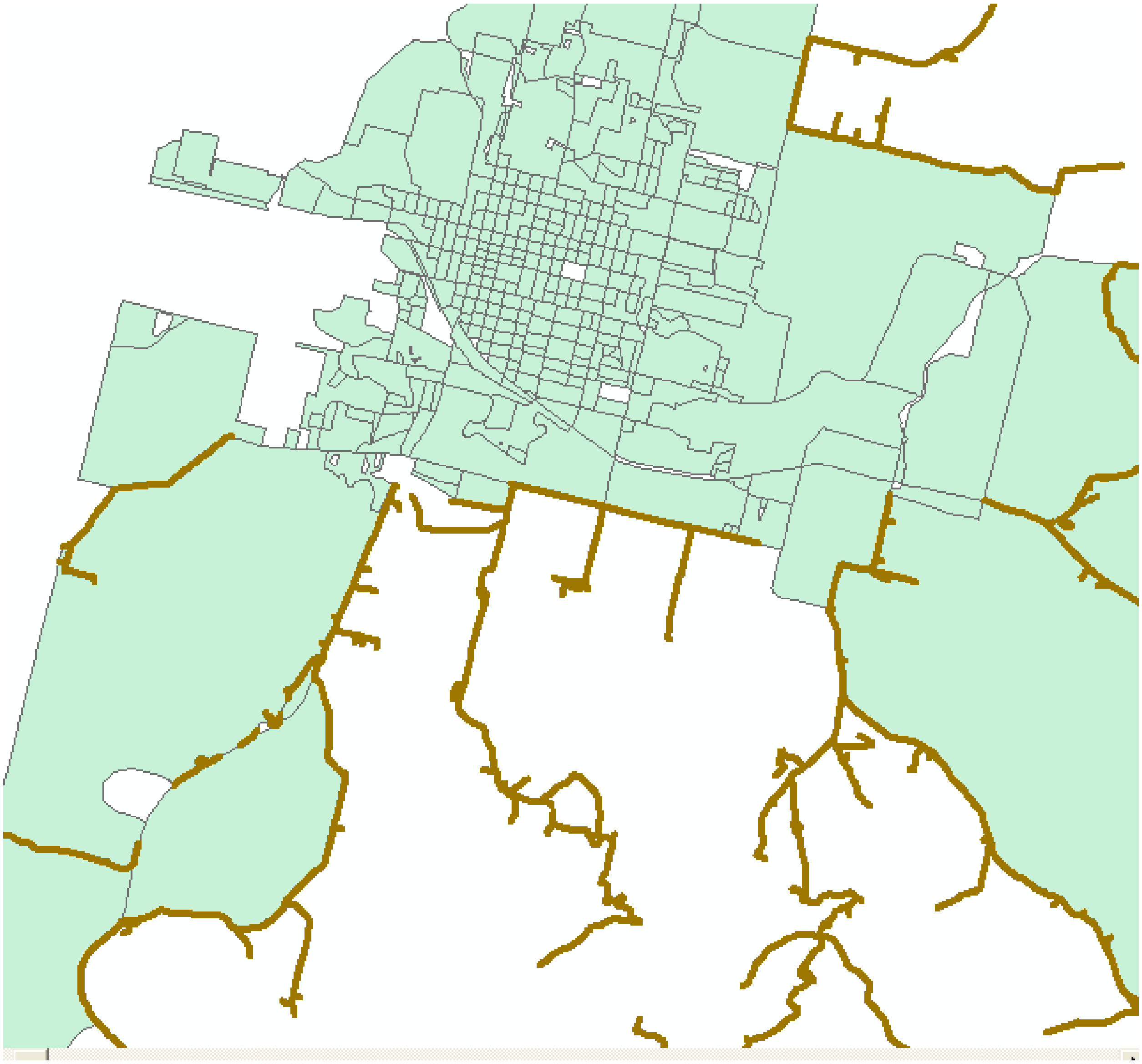


Figure 13-provider Submitted Street Segment Objects. The segments don't edge match the Blocks nor are they continuous.

The figure following demonstrates the same area after the conflation process. Blue segments are the conflated TIGER roads which will be passed to NTIA.

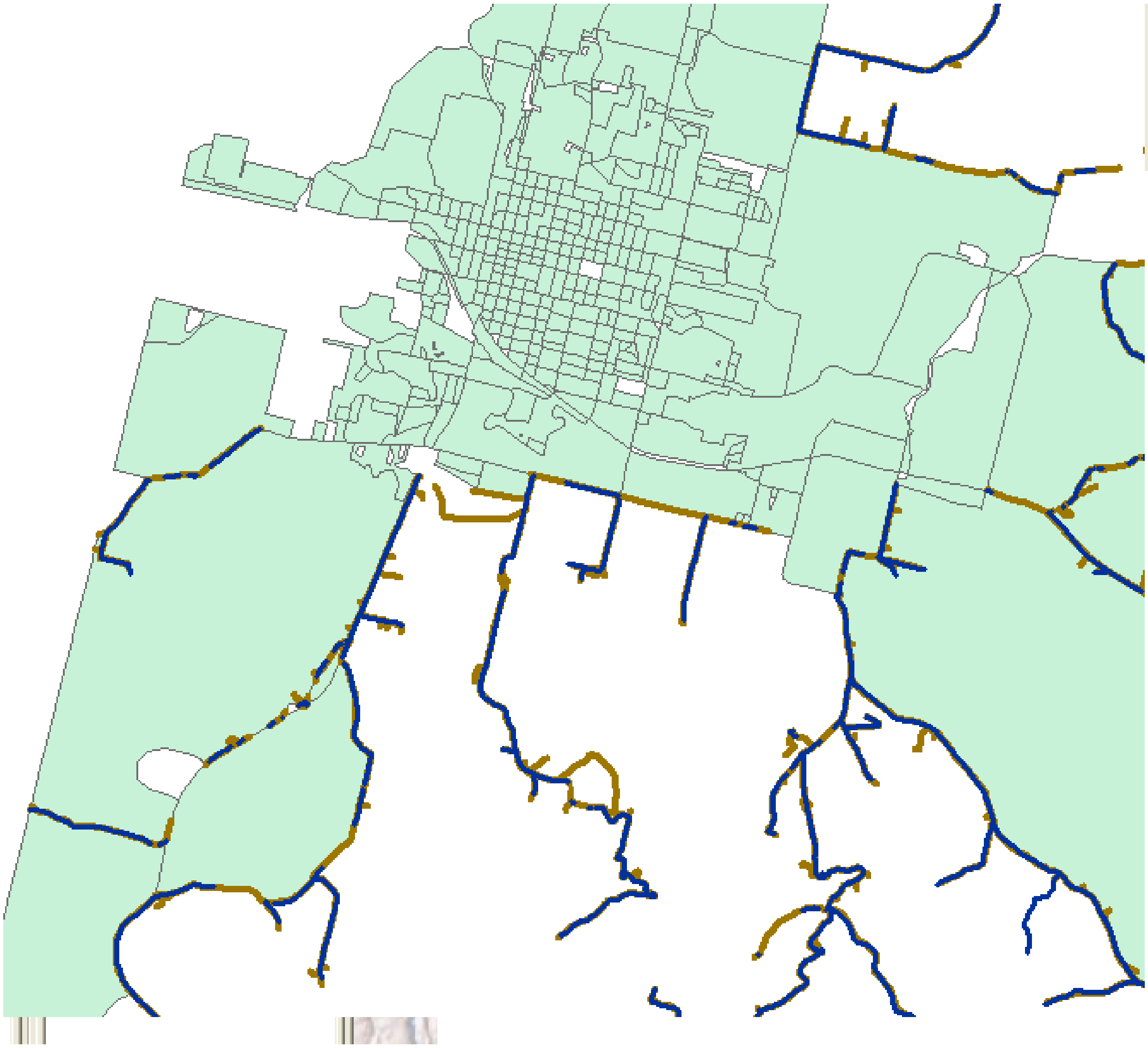


Figure 14-provider submitted segments in gold, selected TIGER in blue—Conflation result; in many cases what was a continuous segment is made discontinuous because even with a distance buffer the TIGER segment doesn't always intersect the provider segment

The final segment process was used when we were supplied with a Broadband covered area polygon. In this case, we found the segments within covered areas and eliminated those segments inside of Blocks less than or equal to 2.00 square miles.

Because there was more control over the format of the inputs (we knew we had a boundary and were working with TIGER segments), this was an automated process that followed this general format:

1. Select large covered Blocks by provider ID (from updated Large Block table)
2. Select TIGER 2010 road segments (MTFCC like 'S%') that face (CB = CBLeft2010 or CB = CBRight2010) covered large Blocks for provider

4. Select segments as distinct records, max speed with corresponding technology, join in feature names, export selected records to temporary DBMS table
5. Join TIGER roads feature class to temporary table on TLID
6. Select covered segments (Python script)
7. Select service area polygons for provider
8. Clip selected facing segments with selected service area
9. Export clipped segments to staging feature class, keyed by providerID

In this figure, orange represents covered small Blocks; black lines are covered segments in large Census Blocks (light blue). The service area boundary is shown in grey. Based upon feedback from providers, we have elected to clip segments at the end of a coverage boundary.[17]

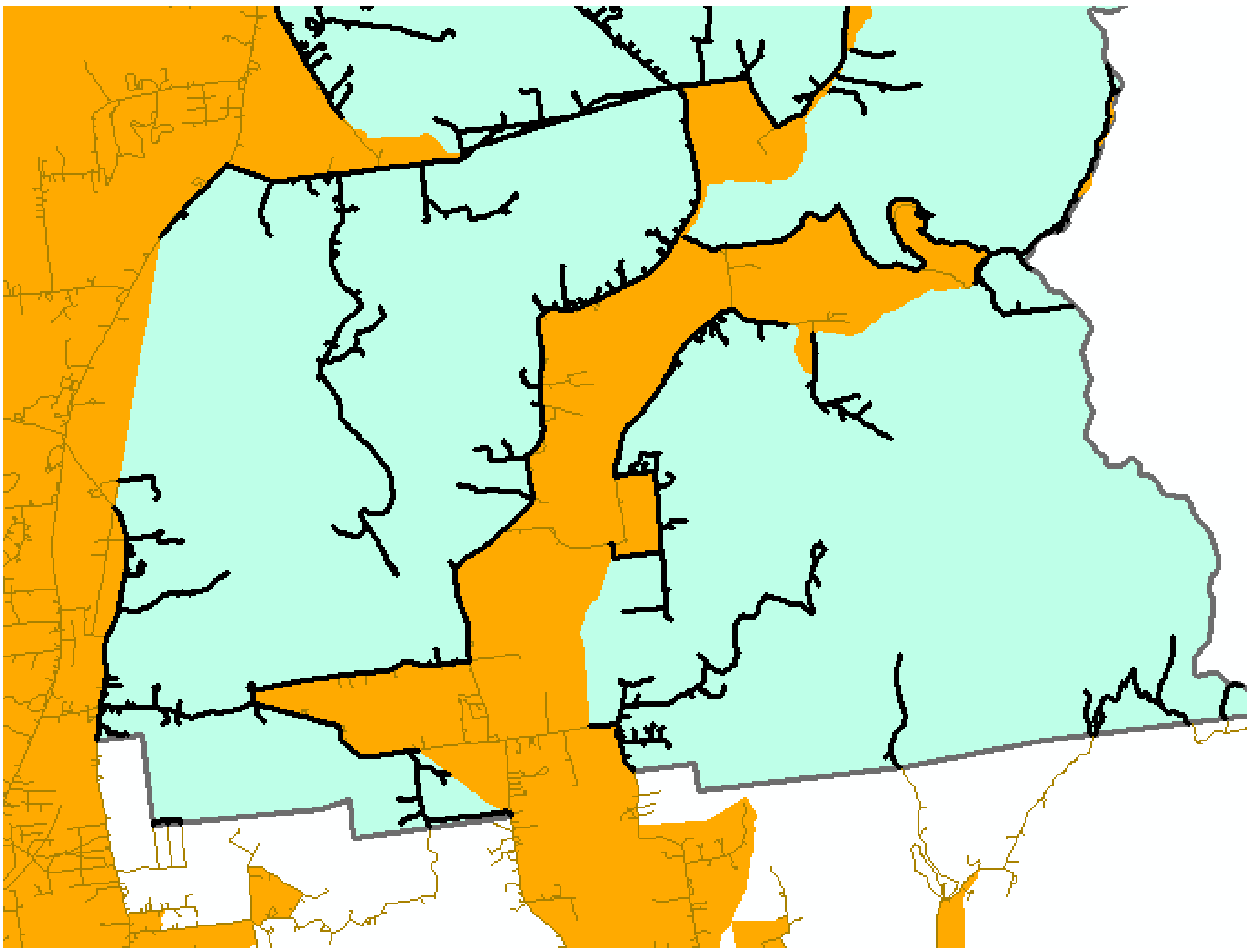


Figure 15-Output of the Segment Process

Wireless Coverage Process

In general, most providers of mobile Broadband submitted coverage information in a NOFA-compliant format. Other than attributions for spectrum and speed, little was done to this coverage.[18]

[17] An outcome not discussed here is how to handle address ranges on segments. As NTIA is asking for a Min and Max on the segment, deriving theses values for clipped segments is very problematic. Also the prevalence of alphabetic characters in addresses makes the min/max selections very arbitrary. We are grateful that addresses are nullable data elements.

LinkAMERICA continues to make aggressive efforts to bring additional WISP coverage into the NTIA dataset. For the most part, our outreach was with providers who were unable to supply sufficiently granular data in the past or those that could only submit wireless address points which is no longer a valid submission format.

In Round 4 fixed wireless providers generally either supplied coverage information or infrastructure from which coverage estimates could be derived. Many allowed us to use their tower locations, antenna heights and direction/spread of coverage to derive a line of sight coverage estimate. In our experience, this is a conservative and reasonable derivation of coverage.

Some wireless providers submitted RF studies. When this was done, there was a request that the signal strength be removed from coverage data. The request was honored.

Other fixed providers were able to supply us with hand drawn maps or polygons/polylines drawn in Google Earth format. In these cases we did our best to georeference and verify the coverage areas with the WISP.

When we received coverage information in KML format, like the image below, we accepted the data as it was presented to us.

[18] Some polygon data did exceed the node count threshold. In these cases, data was rasterized to 100m cells and then converted back to polygons. The polygons were dissolved to multi-part geometry. This addressed the node count concern.

As the image above shows, in some cases we were provided hand-drawn coverage, as well as infrastructure. Instead of estimating their coverage using a line of sight or RF study, we elected to stick with the provider's supplied information. Our decision was guided by two primary factors:

- If the provider is advertising using this coverage they must have specific confidence in its accuracy.
- If the provider can supply coverage, as well as infrastructure that reasonably supports the coverage, there is a very high likelihood in the accuracy of the information.

The downside, of course, is the polygon shown on the map may not represent our notion of how wireless coverage should appear.

In general we note several interesting trends in the wireless data. First, we can be successful in increasing the amount of WISP coverage when we aggressively pursue WISPs. This means we have to be willing to accept data on their terms and convey it into SBI formats. Some of our WISP submissions have taken over 12 hours to normalize into SBI formats. Second, we have to accept that some WISPs will not be able to supply FRNs. There remains a minority of WISP providers who are not aware of the FCC FRN. Third, there appears to be some variation on how the NOFA coverage definition is met. In other words, there seems to be a disparity on the necessary strength (e.g. -80 dB, -98 db, -120 dB, etc) to provide the appropriate quality of service for data services. Fourth, it was very difficult getting providers to identify spectra used for Broadband data services[19]. We are unsure if this is a competitive concern, or if the same coverage pattern is yielded for multiple frequencies. Typically, the spectra returned were those that a provider was licensed for. At this point, we have no reliable way to locally determine what set of frequencies are used to provide Broadband data services in a local area.

Service Address Point Process

A handful of providers have requested that customer level, service address point data be submitted to NTIA. In these circumstances we have done minimal processing to preserve the provider's intent with this deliverable and not bias downstream NTIA use.

Our verification included checks against commercial or Public Utility/Public Service Commission exchange boundary maps. Points not contained within one mile of a boundary are not submitted to NTIA. The percentage of excluded data variesacross providers.

We retain from the provider the provided latitude and longitude, as well as Census block. For some coverage data, if a provider is unable to supply a longitude, latitude or Census block, we fill in these attributes. In those circumstances where we do not have a Census block, but we do have a longitude

[19] One provider responded by email, "This mapping program is to provide the coverage area for Broadband provided by a company. Not to keep a detailed account of every aspect of a companies (sic) network."

and latitude, we accept the given longitude and latitude and use that as the basis for our Census block assignment.

With point data we have tested for comparable geocoding success rates but do not overwrite provider information.[20] From this type of analysis we note the amount (usually little more than 10%) of addresses that seem to locate with less than street segment certainty. Deriving a thematic representation of the points on speed also illustrates some of the locational certainty issues in this point level data.

Coverage Estimation Process

Although the derivation of Broadband coverage into Census Blocks, street segments, or wireless coverage files is, in itself, a bit of an estimation process, there was an explicit estimation process required in cases where a Broadband provider either refused to participate in our survey, or provided such a threadbare submission that no carrier-based coverage information could be gleaned[21].

We typically resorted to three possible estimation paths.

For Cable (HFC) providers who did not provide any coverage information, we fell back to Media Prints data. Rather than using the entire Census Block Group gathered by Media Prints, we used only those Census Designated Places carrying the same or similar names to the Media Prints p_com field. Our reasoning was that Cable systems tend to be franchised on a municipal or at least administrative basis so the coverage will likely follow a governmental boundary. As a general rule, cable infrastructure is not available in the public domain[22] and what could be found was poor in quality and difficult to ascertain for validity.

For DSL providers who did not provide any coverage information, we estimated road-based coverage from their Central Offices[23]. We only used Central Offices that showed evidence of DSL or fiber-based services in the NECA 4 tariff. Road-based engineering areas were derived via ESRI Network Analyst to 18kft. These segments/boundaries were clipped to commercial wirecenter boundary edges.

For mobile Broadband providers who were non-responsive to our requests, we fell back to American Roamer coverage patterns. We generalized the American Roamer coverage to ½ km in order to protect the licensed information.

For fixed wireless providers who provided no coverage information, we relied on their public websites to derive coverage maps. When these maps were available, we georeferenced them and tried to use the

[20] We will make a second geocoding pass on locations with no longitude or latitude from provider. We typically pick up ~5% from our second geocoding pass. Typically the issue is address quality but also difficulties in geocoding in very rural areas.

[21] We report estimated submissions to NTIA as a non-responsive provider but we have data in the submission for them. This is the reason for datapackage.xls entries which are non responsive but contain submitted data.

[22] The team tried to use data from the FCC Coals system and 321/325 fillings but this seemed to be a bit non-uniform in quality.

[23] Central Office location was derived from MapInfo ExchangeInfo Professional. Wirecenter boundaries also came from this commercial product.

outer polygon boundary to represent their serving area. In other cases, when only a tower could be provided, we used a view shed analysis and estimated coverage at 10mi per tower[24]. Because much wireless propagation is driven far below the Census Block and much engineering information isn't known (frequency in use, polarization of the signal, coverage pattern of antenna(s), local terrain/land cover) this was the most complicated group to estimate.

Speed

Speed attributes are reported both at the block (typical) and higher levels (maximum advertised and subscriber weighted). We note that in many cases, providers did not supply typical or subscriber-weighted speeds. In some cases, it appears--although we cannot verify--that their maximum advertised speeds were used to populate typical speed columns.

We do have limited testing data on reported speeds, but we have been careful to not use our typical reported values with carrier-provided information. If we do not have a speed value from a provider, we report an empty value.

Several service providers claim they do not have data on typical speeds available, but estimate a 20% overhead factor between the advertised speed and what may be experienced by an end user.

We continue to request advertised speed at the block level. Nevertheless we appear to be getting speeds that do not vary over a large geographic area – leading us to believe that providers may still be submitting the maximum speed advertised in local media for the entire market. For the most part, we have been unsuccessful in messaging that advertised speed should not correspond to a market area, but instead, the maximum speed, which can be provided to a household—what some may describe as a 'qualified speed.'[25]

As a general rule, in circumstances where a provider supplies a range of speed attributes, we assign NTIA categories based upon the midpoint of the range. We follow this rule unless we can determine other grantees are handling the same submitted information differently.

To support NTIA program office requests, we have also modified the structure of the Service Overview table. Even if Maximum Advertised Speed is supplied at the market or county level, we push that speed down to the contained Blocks. The only records that remain in this table, will be those wireline records with either a non NULL nominal weighted speed or ARPU value.

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[24] In some cases we had an approximate radius of coverage but no height. In this case we used a 50' height estimate and then clipped the coverage to the provided coverage range. We also clipped wireless coverage to honor state boundaries but did not look for providers serving coverage with out of study state facilities.

[25] As an example of a response to our request for Block level advertised speeds, we received the following comment from one anonymous provider, "This is and of itself does not require anything new of us – just states the NTIA supports efforts focused on getting that information on the CB level." It would be helpful to have broader messaging so that providers understand this new direction.

Community Anchor Institutions

In the first submission, the Community Anchor Institution (CAI) process was referred to in terms of a learning curve. This continues to be an appropriate metaphor. The mapping team continues to focus on data that will support and help inform policy makers and the SBI planning process.

In the first submission, the team gathered information on what data was available and what resources will be required to engage these categories of important institutions. In the second submission we continued to obtain additional connectivity information. For the Spring 2011 collection, the team began a survey process to directly engage these important organizations. As the October 2011 submission represents a transitional phase, much of the CAI effort encompassed getting this dataset stabilized for work outside the LinkAMERICA team.[26]

In the current submission we worked to achieve four goals

1) Modify the source data so as to no longer pass NTIA any connectivity estimates

2) Propagate administrative capabilities in our Community Anchor Verification System (CAVS) systems to the Regional Planning Teams

3) Verify the available connectivity information based upon new survey information

4) Update the Federal record identifiers (NCES codes, etc).

CAI Philosophy

Our work with CAIs is guided by three principles.

First, CAIs are important stakeholders within the planning process. Our goal is to engage participants in regional planning that have strong ties into the CAI categories identified by NTIA. This has a direct benefit of engaging an established stakeholder community. It also allows Broadband planning to tie into existing organizational and planning networks. In each of our states, key relationships with education, public safety, libraries, and economic development sectors are being identified and developed.

Second, we believe that CAIs will likely be one of the primary beneficiaries of targeted Broadband funding. Our belief stems from the sense that many of the benefits of Broadband will extend from these community 'anchor points'. In other words, it isn't solely the existence of Broadband at a library that provides a benefit. It is people using applications that work only on a Broadband network to upgrade their skills (e.g., online training) and gain access to online content (e.g., job postings, goods and services), etc. The targeted use of a specific application--that can only take place with Broadband networks-- is what produces the priority benefit. Put another way, there seems to be a realization that

[26] LinkAMERICA began transitioning the CAI data collection effort in the state of Alabama to ConnectingALABAMA in Round 3. For Round 4 ConnectingALABAMA assumed full responsibility for the CAI data collection effort in Alabama. To facilitate the reporting process, the ConnectingALABAMA team continued to use the Community Anchor Verification System (CAVS) to store CAI data collected or modified. CostQuest maintained responsibility for the CAI data submission for Alabama for round 4.

things are less about pure connectivity (for the sake of connectivity) than about connectivity in terms of an application (for the sake of the benefit obtained through the application).

Third, we continue to use a rational and targeted approach to derive information. This means we will utilize our planning teams for as much ground work as possible. This also means that a goal of our CAI process is not an exhaustive Census of anything that could be a CAI; rather, it is the discovery, inventory and integration of Broadband planning activities into those CAIs that stand to produce the greatest synergies with the SBI planning process.

The above implies two significant points. First, the team's goal is to document community anchor institution connectivity within a broader context of regional and statewide planning objectives. Second, if a particular category of CAI has an independent Broadband planning effort underway, we will encourage that organization to take the lead, and we will provide relevant expertise and support as warranted. For example, in one of our states, the public safety community is already engaged in a mobile Broadband survey effort. We have aligned our CAI data collection process with that effort and are sharing information and expertise (e.g., hosting a survey) to support their mission. In another state we are attempting to glean connectivity information from a municipal government survey. There may be some downside to this collaborative approach in that we may have to work with data spanning different times or we may not have all of the location-specific information we need, but this does prevent the same user from receiving multiple inquiries.

Anchor Institution Survey

During the third submission period we designed and developed a simple on-line survey system called CAVS (Community Anchor Verification Survey). The intent of the survey was to both verify received connectivity information and garner additional connectivity information from CAIs. For round 4 we continued the use of the on-line survey process. Although we have found that reaching out to central contacts, for specific institution groups, is the most fruitful way of collecting connectivity data we find value in inviting individual anchor institutions to participate through means of a survey. From our perspective this approach gives the individual institutions an opportunity to become engaged in the broadband planning process. The link for the survey is housed on the Home Page of the website developed for each state, thus providing the added opportunity for responding institutions to learn more about activities in their state.

The survey remains open between collection periods to provide opportunity for the Regional Planning Teams to update information as they engage with the community and to allow responding institutions to update their data as necessary.

Anchor Institution Trends

At this point we have focused our CAI attention on schools and libraries, with respect to connectivity. We benefit from strong relationships throughout the education sector (K-12 and Post-Secondary). We have also found excellent resources within State librarians in all States.

To supplement the education and library information we have formed organizational relationships with the major hospital associations within each state. Our goal with this relationship is to cull information from their planning process. We continue to formalize/advance this relationship.

As in the prior submissions, we rely on public domain sources of information for the public safety-category . Collecting connectivity data for this group continues to be one of our most significant challenges. Our hope is that in subsequent submissions, we will reduce the size of this category and connectivity information specific to root nodes of the public safety network--such as County Emergency Operation Centers.[27] At this point we have had minimal success gaining this information.

Because we have a wide ranging population of CAIs in our data set we have a variety of Broadband services that don't always fit NOFA parameters. Services like PRI or T1 are classified into "other copper," We also had difficulty obtaining both the upstream and downstream channel capacities. In most instances, when it was logical to do so, we made the speeds symmetrical, but this is an assumption on our part. If a site records bandwidth across several services (eg. video and data), we record the total bandwidth to give a picture of available site bandwidth. We are also working to standardize our response to NTIA in circumstances where an entity shares a Broadband connection among a campus which is fiber fed. In this case we use the total campus bandwidth and use the primary campus Internet connection.

As a final verification step, we attempt to screen the CAI data for duplicate values. Because many CAI are closely clustered together we perform the de-duplication based upon the ANCHORNAME within the ZIP5.

Middle Mile

Middle Mile information was collected directly from providers via survey or interview. Middle Mile is a "chicken or egg" type of challenge in that it is possible to verify that the infrastructure exists, but extremely difficult to know what is the site is doing without engineering level assistance. Although most providers submitted "something," there was a significant variance in what that "something" represented.

The purpose of this section is to record some of the comments and questions we have received about Middle Mile. We hope this provides better context for our data submission.

[27] Within the public safety category, it is also very difficult to derive precise locations as many CAI are addressed to PO boxes.

Within the NOFA, Middle Mile was defined as (a) a service provider's network elements (or segments) or (b) between a service provider's network and another provider's network, including the Internet backbone. (Collectively, (a) and (b) are "middle-mile and backbone interconnection points.")[28]

Given the existence of the "or" in this definition, providers submitted a variety of information. Based upon the NOFA example, several fixed wireless providers interpreted Middle Mile in terms of the connection points from their towers to their own serving backhaul location. The topology was commonly Microwave from their distribution towers to their NOC. The NOC and towers were listed as the Middle Mile points. This seems to be consistent with the first definition clause (a).

Telephone, Mobile Wireless, and Cable providers tended to remain either silent on the question, or would provide a single location in which Internet peering occurred (clause b). A number of participants explained that the NOFA was quite ambiguous with data traffic moving back and forth over both TDM and IP networks--it was unclear where the distinction should be drawn. As a general rule it seemed like many providers listed a single location where Internet Peering occurred.

A number of providers refused to answer the question on grounds of confidentiality[29]. Others would not disclose as their Middle Mile points are not owned--another company provides the physical and electronic connection to their network. In other words, the entity providing Broadband is not the entity providing Middle Mile.

Additionally, based upon the new Provider Type classification of "other," we have started to integrate points provided by Broadband service providers not meeting the NOFA definition. This includes POP locations and aggregation points for public / private networks.[30] Within a given submission there were two final attributes that tended to concern respondents. First, speed should be measured in terms of only data capacity and what exactly is "data" (e.g., can/should you segregate out voice or video), and is the relevant capacity of the physical connection, channelized to a specific virtual circuit on their network.

Finally, a number of other providers were unsure of the height above grade measure (is this their floor, the street outside, etc). We seem to have a combination of height above or below grade, as well as heights above mean sea level (AMSL).

To the extent possible in our timeframe, we verified the location of a sample of Middle Mile points. Where we could see infrastructure that appeared to be consistent in location with other provider

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[28] From http://broadbandusa.gov/files/BroadbandMappingNOFA(FederalRegisterVersion).pdf at 54, visited March 28, 2010

[29] As received in email 9/30/10, "Due to security concerns and the risk of public disclosure of highly sensitive data, whether inadvertent or otherwise, ***REDACT***response to the Middle Mile and backbone interconnection request is limited to publicly available information available on {remainder not included}"

[30] As discussed in our readme.txt file, a number of middle mile points were lost in validation due to their location in adjacent state. This will cause a decrease in some providers relative to prior submission.

infrastructure, we felt that the location was accurate. In some cases, the point provided seems sensible (is on a road, near other equipment), but using imagery, we couldn't find a place where this type of connection could occur. This wouldn't be unforeseen, in that Middle Mile connectivity likely takes place in a protected environment much smaller than a standard Central Office installation.

Mobile Wireless Coverage

We have received mobile wireless coverage from most mobile Broadband providers in each state. At this point we have cleaned the geometry of the data and attributed it with spectra and FRN as required.

Provider derived coverage has been reviewed against the commercial licensed product for consistency. To a limited extent we also use licensing locations and tower infrastructure to spot-check supplied coverage. This mode of verification remains complex, given the lack of facility-based information with mobile wireless.

Finally with respect to mobile Broadband services, we note several trends.

First LinkAMERICA used the NTIA supplied frequency tables to report speeds consistent with other grantees. In circumstances where a provider supplied a range of experienced speeds, we used the portion of the range consistent with the most frequently reported Grantee value.

Second where a provider reports multiple frequency bands in use but doesn't distinguish these bands by submitted SHP file, we submit identical geometries but attribute one geometry to each submitted spectrum value.

Third we are seeing a trend toward increasing Broadband speed. As of this writing, there is not consistency across providers in how they attribute the advertised 4G speed values. In other words, for some providers 4G means advertised speed categories increase. For other providers, the speed value did not change.

Verification

Almost by definition, data verification is an ongoing and evolving process. Clearly, with each new data submission there will be a validation process at hand and at the same time, our team continues to expand and improve the efficiency and effectiveness our data verification routines. Consistent with the movement toward an fGDB export database and use of a data receipt script, much of our validation effort was spent in supporting the ETL processes into the required formats. In future data submissions we will continue our work to stabilize and improve the business process that normalizes provider submissions into NOFA formats and expands in more depth on the confidence analysis within the data.

Verification Standard

Our overall verification standard is focused on the level at which we supply processed data to NTIA. This means that the vast majority of our verification process will be focused on ascertaining coverage for Census block's less than 2 square miles and covered road segments.

We are learning that Verification has multiple dimensions.

Provider verification is finding providers who supply Broadband and discriminate out providers not meeting Technical Appendix A's definition of Broadband.

Identity verification is taking the provider's categorized in the first step and ensuring that the provider either has a valid FRN or is assigned a default FRN. Identity verification is very complicated because of the Technical Appendix A's mandate to record data at the FRN, provider Name and DBA level. Each of these attributes could be unique for a single provider going to market under different or the same names. As a result, rolling up each provider into an identity collection that matches either the FCC data integration team or a third party Broadband provider's data view, is very, very time intensive. Identity verification is discussed in the earlier section-- Developing the provider List.

Coverage verification is a broad term, but in our definition it boils down to determining if Broadband coverage is in the right place. For a given provider, the question is whether the coverage is assigned to appropriate Census Blocks, road segments or area features. Coverage verification can be further broken out into two distinct classes:

- Technology verification, which is determining if the provider is listed with a technology consistent with their marketing information.
- Speed verification, which is determining if the speed supplied for that block, road segment, point area file or market area is consistent with the technology and the marketing information received.

The final verification dimension is consumer feedback and crowd-source verification. This is a dynamic set of steps we are beginning to implement. One side of this is responding to consumer concerns. The second is using the crowd sourced data to validate provider claims and, if appropriate, update the map and the underlying data.

At this stage, our working hypothesis (confirmed by our experience) is that there will not be a single dispositive measure to indicate Broadband coverage availability in a Census block or along a segment. From prior work, and examining our current provider submissions, we believe that there is too much variation below the submitted record to make a single binary yes/no indication. Rather, there will be a series of measures that combine to provide qualitative confidence (a classification scheme) in our indication of Broadband availability at the block, segment, or wireless polygon level. We believe such a qualitative confidence scheme is both relevant to and supportive of NTIA interests, as well as the interests of our end-user community – that is, the states and citizens we serve through this program.

The intent of this section is to illustrate why we are moving toward a particular verification methodology. Our team is learning as we go along, and will adjust and improve this thinking. But given our experience to date, this is where we are heading. As stated above:

- First, coverage verification is at the level of data submitted to NTIA.
- Second, coverage verification is enhanced when there is a secondary measure of availability (such as infrastructure presence or serving area boundaries)
- Third, given the limited resources of this effort, the most important coverage verification process to implement is the erroneous dispersion of coverage. These are the “islands” of coverage isolated by significant distance from other covered areas. . In other words, Broadband Internet likely doesn’t exist far away from other areas with Broadband Internet access.

Before explaining our overall verification thought process, we have several examples, which illustrate the complexity of coverage verification.

The first example is taken from a gentleman who requested a map change in Alabama. His home is near the yellow dot. The darker grey Blocks are covered Census Blocks. The black lines are covered road segments. He cannot receive DSL from his incumbent provider, although his neighbors can. The incumbent carrier does have at least one structure in that block from which Broadband services can be provided; unfortunately his home is not served.

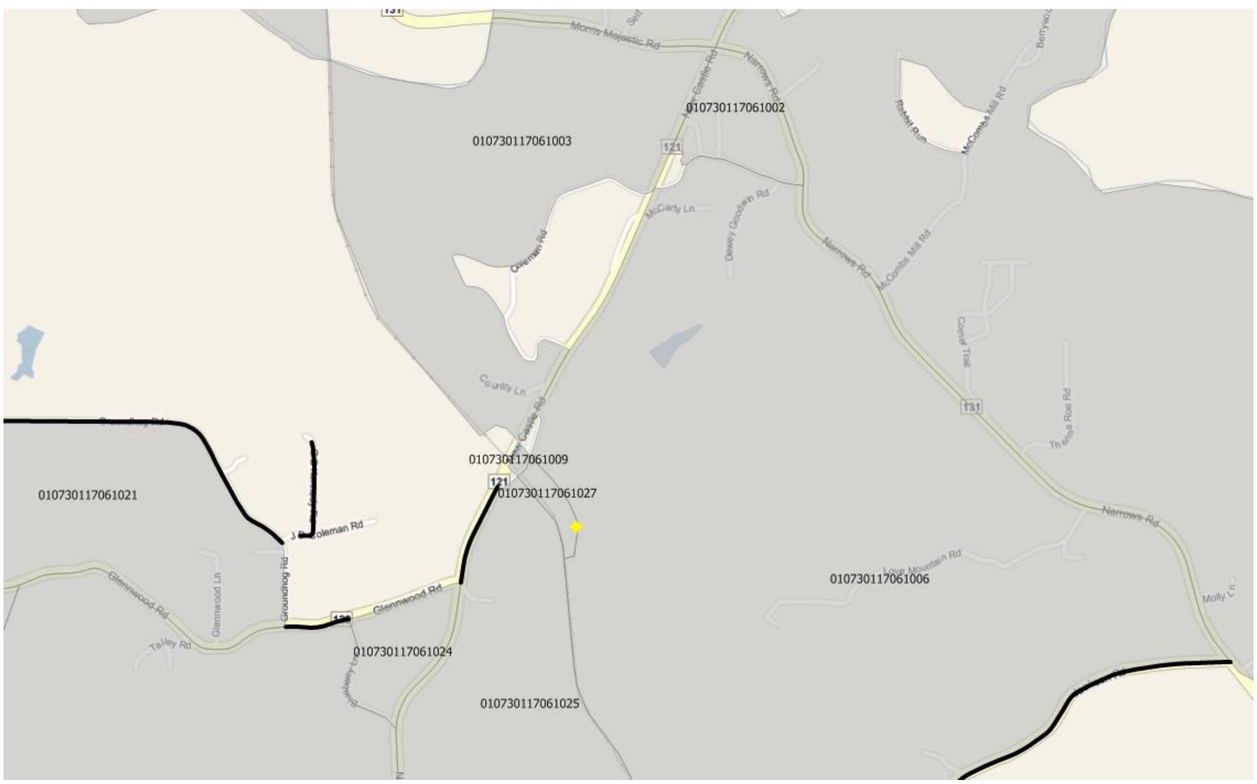


Figure 16--Sub block variation

Because the SBI program requires the depiction of coverage at the block level, the above map has been correctly generated. However, from the customer's point of view, the map is inaccurate. This requires us to explain that the maps are not intended to be a structure-level qualification, at which point some consumers question the value of the maps when seeking service information. Of course, we also share this information with the incumbent carrier in the area so they are aware of a potential customer market.

Beyond this type of one-off structure-level qualification, sometimes, as shown below, we have even larger gaps in provided coverage. The image here shows an "outlier" block that could be an error, or it could indicate missing Blocks along a major road that should have been filled in. In this figure, the outlier block is highlighted in turquoise.

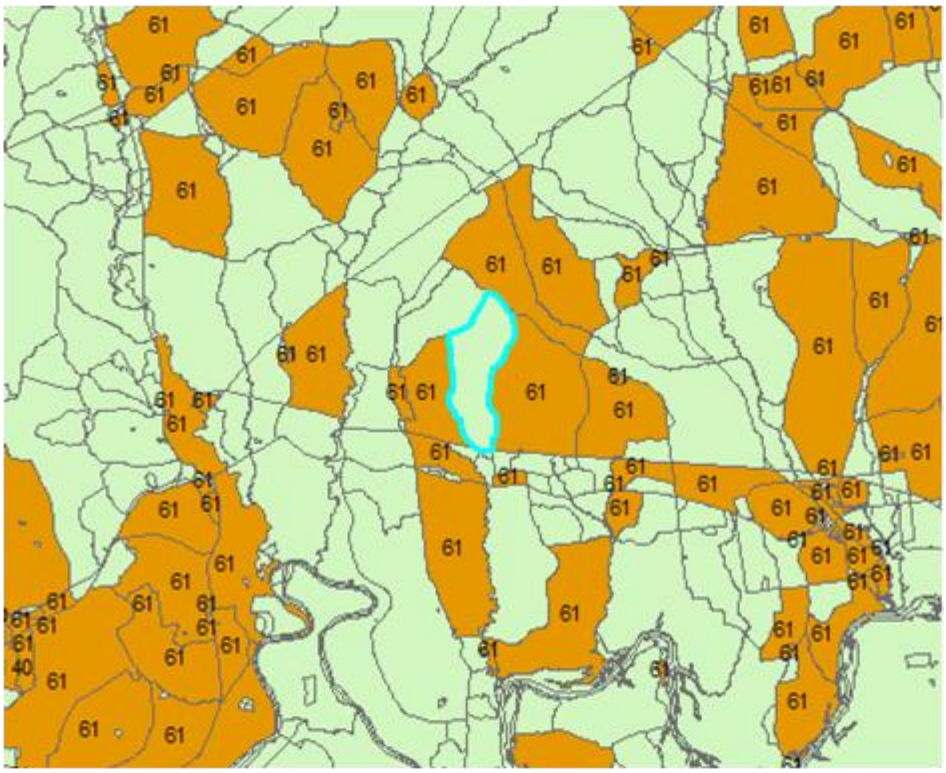


Figure 17--Dispersion in Submitted Data

In this particular case, we are faced with a different verification question. Based upon the properties of the neighbors, we believe this block should likely be covered (coverage interpolation,) but supplied data from the incumbent says otherwise.

The next example shows where an interpolation process could require some adjustment. The figure below shows a town level. There are some smaller Blocks that are likely covered by interpolation logic, but we also do not want to extend coverage beyond a franchise boundary as in the areas shown in a box on the bottom of the map.

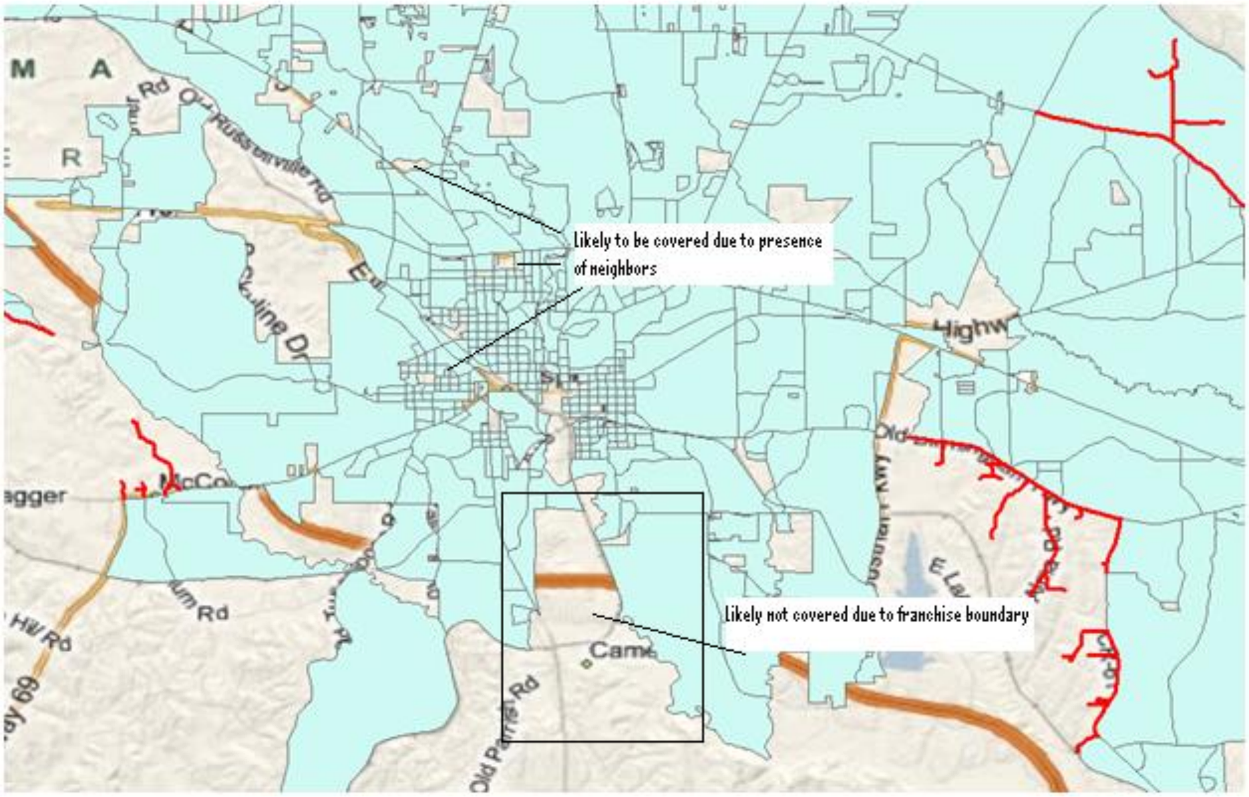


Figure 18-Where do you stop interpolating?

From what we can gather from some providers, the submitted data—data with consistently high degrees of dispersion or coverage holes—tends to come from geocoded billing records. In this paradigm, this means where there are no customers; service is not identified on a map. The interpolation verification question then takes on two dimensions.

> First, if a provider has no customers in an area, how can we know if they would be able to provide service in a 7-10 day interval?
>
> Second, if we use the properties of neighboring Blocks to interpolate coverage, when should we stop (e.g., at a franchise boundary, at a certain distance, etc.)?

We continue to work with providers to get additional information to help us better understand and contend with this type of circumstance. However, we have not been entirely successful at getting franchise boundaries that would address much of the issue.

The final map shows this dispersion problem, but to an even larger degree. This solitary large block is likely the result of a bad geocode, but we don't know, given the data that has been submitted by the provider and the "single customer in a block standard" set by the NOFA clarification.

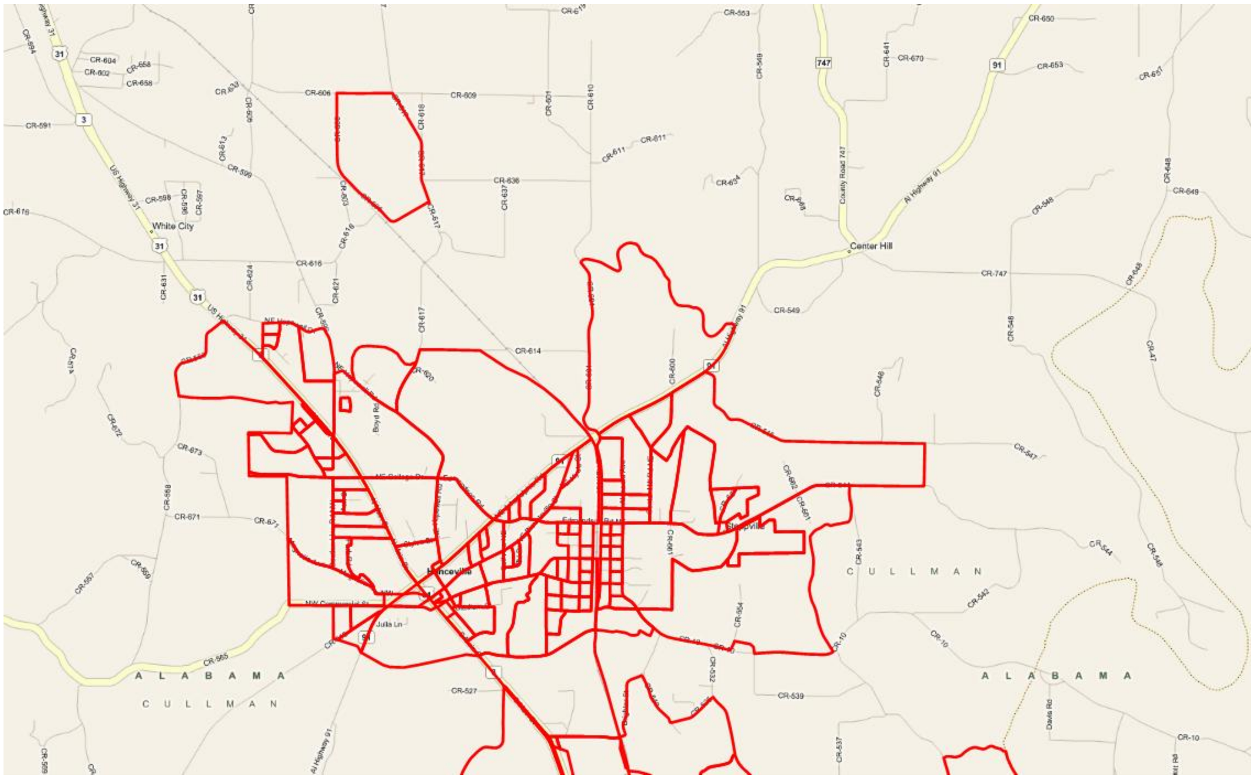


Figure 19-Dispersion in covered Blocks

Due to the fact that this situation is quite obvious in display, this type of problem is one that we are more aggressively trying to resolve. Where a single block has no neighbor offering comparable coverage and is a specified distance beyond an exchange boundary, our approach has been to filter these Blocks out. As of now, this filter is limited to incumbent DSL providers because we have a good source of exchange boundaries.

The exchange boundary dispersion verification method breaks down when examining smaller providers who are more likely to CLEC into neighboring territory. In the figure below, the black line represents the exchange boundary, while the continuity in the DSLAMs likely points to coverage extending along a road into another provider's territory.

Figure 20--DSL Coverage outside of exchange boundary

In sum, the variability in our source data continues to suggest that our dynamic verification process is relevant, appropriate and evolving in a manner consistent with the overall program. And, as noted above, we believe the more meaningful outcome of our verification processes will likely be a series of qualitative indicators or expressed confidence levels. Our concern, as with the development of any sort of classification process, is how rigid we should make this classification given the variation in our input data and the varied perceptions of service providers, map viewers and down-stream data consumers.

Verification Work Process

To support our dynamic multi-factor verification process, we have implemented the following steps.

First, when data is received, an analyst reviews the submission and any immediate questions or concerns are sent back to the provider as quickly as possible. We have found this gatekeeping step very helpful in making sure we understand the intent of the submission.

Second, for all providers who submitted data to us in the third round, they received both a tabular data summary and mapped output[31]. Prior to releasing the "check maps" to providers, we had a team of analysts visually inspect each provider's coverage area. The focus on this QC effort has been to identify and flag suspect Blocks. After this in-house review, we solicited a second level of feedback from providers and received a number of requested changes and corrections used in the development of the October, 2011 round 4 dataset.

For those providers who submit only block or segment level coverage (i.e., in those cases where we have no infrastructure to test with) we test for coverage containment within known service boundaries. The intent of this validation step is to remove Blocks that are obviously erroneous. We also verify the submitted speeds against the typical speed ranges in the NTIA frequency tables. If we note a value outside of typical range, we ask the provider for clarification.

As mentioned in the sections above, we have implemented a check on dispersed Blocks, but we have implemented less with respect to coverage interpolation (holes in coverage). We continue to work on a series of mechanical tools to assist with the inspection process but have run into challenges related to geographic basemap and timing.

As our submissions have moved online, we have also begun to benefit from crowd source feedback. In some cases this has helped us identify and fix errors in our underlying data. In other cases, as we have shared with NTIA, we have encountered some perceptual issues rooted in how the data are developed and modeled to comply with the NOFA. Depiction of uniform coverage in small Census Blocks continues to be a challenge. Despite our best efforts to explain the full block coverage requirement, we continue to receive complaints that the coverage shown on the map is not accurate for a particular location within that block.

[31] For the verification of round 3 data, we submitted both PDF and KMZ (Google Earth) format check maps. Some providers prefer to work with the Google format as it supports easier modification. Others continue to submit marked up PDFs.

Consumer and Provider Responses to Deliverables

Here, we segue from internal verification to external verification. We view responses to our work product as a form of validation and verification. On the one hand, this gives us the opportunity to fix mistakes and then generate QA steps to make sure that the problem does not reoccur. We also learn how to improve what we are doing or better explain what we are doing to a community not always familiar with the NOFA and program office framework. On the other hand, listening and learning from this feedback helps us better target our mapping deliverable to meet the needs of our external customers. In this second case, external feedback not only provides feedback on perceived qualities (or lack of quality) in the data, it helps us to learn if we are developing data that is truly helpful to downstream users.

At this point, our external deliverables take three forms: State Broadband Maps, data transfer to NTIA used for the National Broadband Map, and text format data requested by outside parties.

Online Map Experiences

With our State maps are online, we continue to harvest viewer feedback and comments. Because an online map allows someone to zoom in far below the scale of the data, a large number of comments reflect sub-Census block concerns. While important to the citizens reporting these issues and to our Broadband planning teams, this level of data is outside the scope of our core validation process, which as noted above, is focused on the level of data submitted to NTIA.

There are several other themes that our team believes are important to share. These comments are actually quite helpful because they also improve our data processes to better meet the needs of map viewers. For example, we have invested significant time in harvesting more segments from provider data. Because the appearance of segments is so important, we are putting time into ensuring a visually appropriate edge match between the roads we harvest and the Blocks/roads we will show online. On a technical level, we also believe that a good segment process will help us understand more about dispersion in the data, and what is valid versus what is not valid.

Online Display of Consumer Feedback

We have completed development of a consumer feedback layer for our online maps.

The intent of the new layer is to show viewers the feedback of other map viewers. We anticipate the feedback layer will go live when the Round 4 data is posted on our state maps. We expect this to be prior to the end of October, 2011.

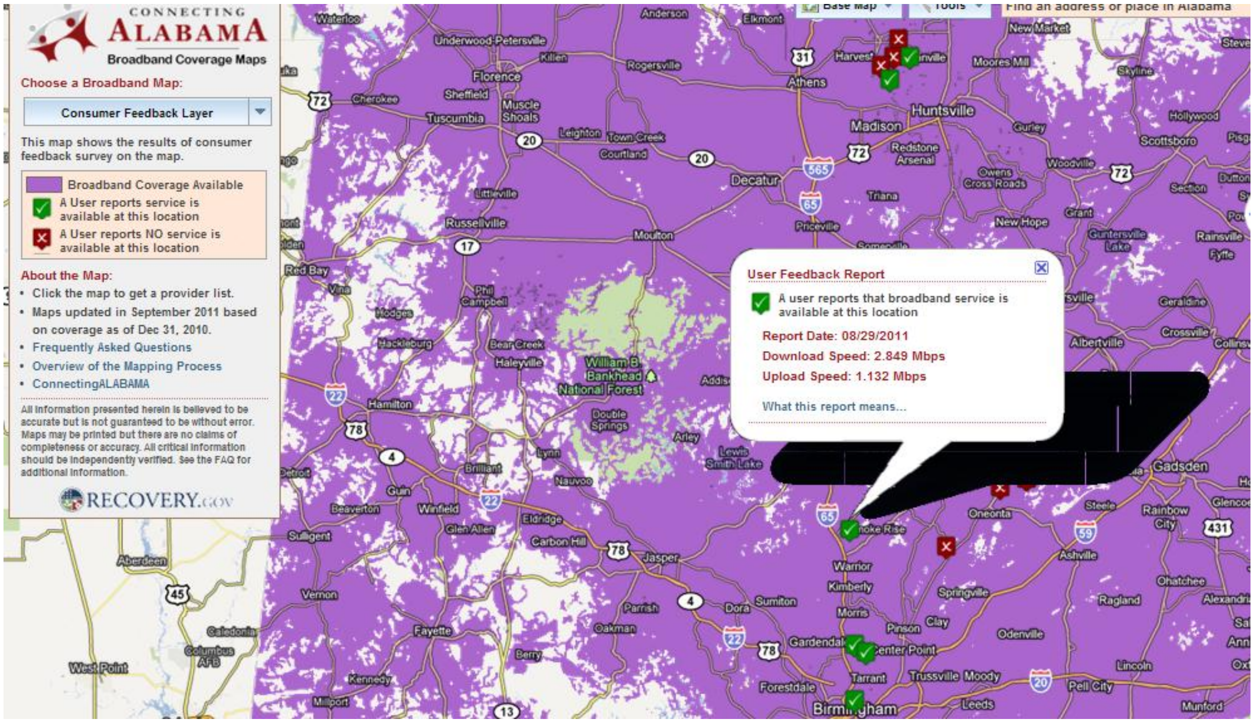
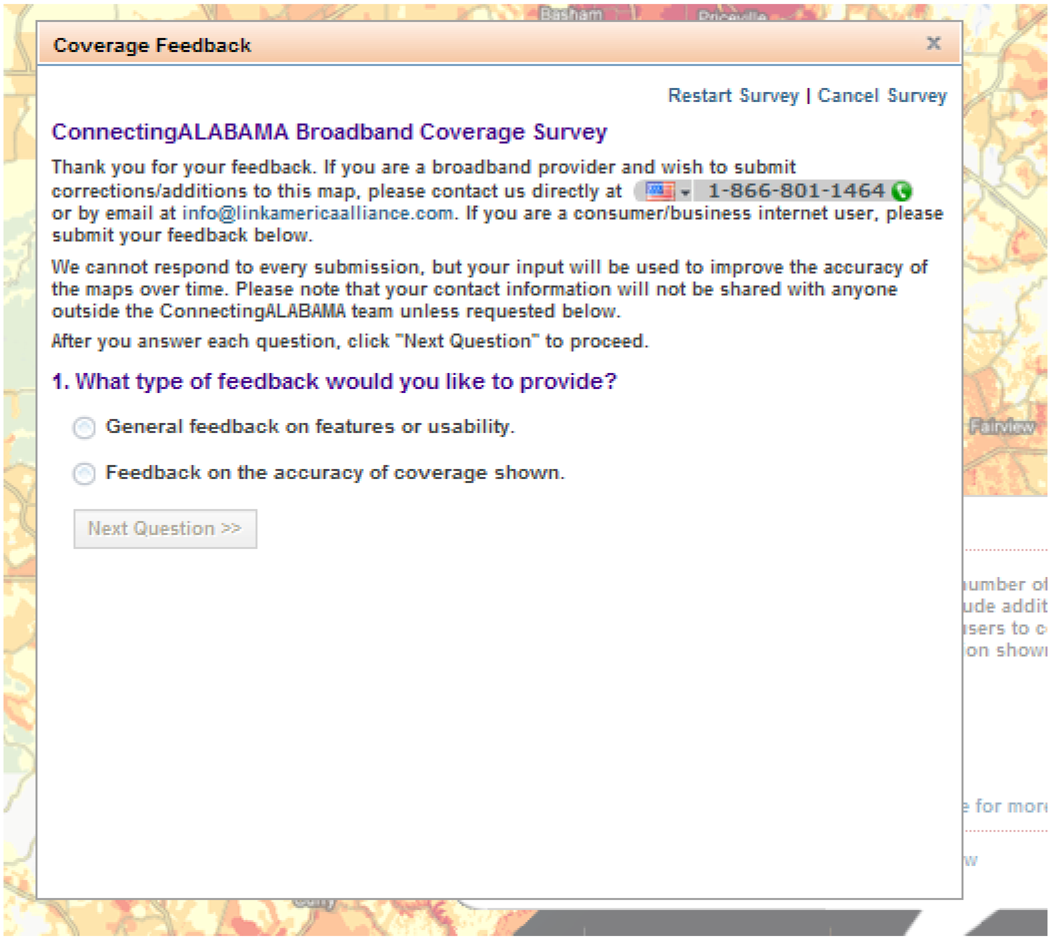


Figure 21--Consumer Feedback Layer

To gather feedback, we use a survey wizard which asks the end users to categorize their concerns. The survey went through several iterations of design and usability testing. Our experience has been unless we get a way to constrain the user feedback into manageable categories, it becomes very difficult to act upon.



As mentioned by other Grantees we struggle with how to use all of the feedback we receive. The qualified data points seem to fall below a volume in which we can infer significant modifications to the map data. Nevertheless, we believe it is important to gather structure and display the feedback to support project transparency.

Perception of Unfair Treatment Across Technologies

Several Broadband service providers have expressed strong concerns regarding how wireline services are displayed, as contrasted to how wireless coverage is displayed. This is an artifact of the SBI data model. As an example, consider the figure below.

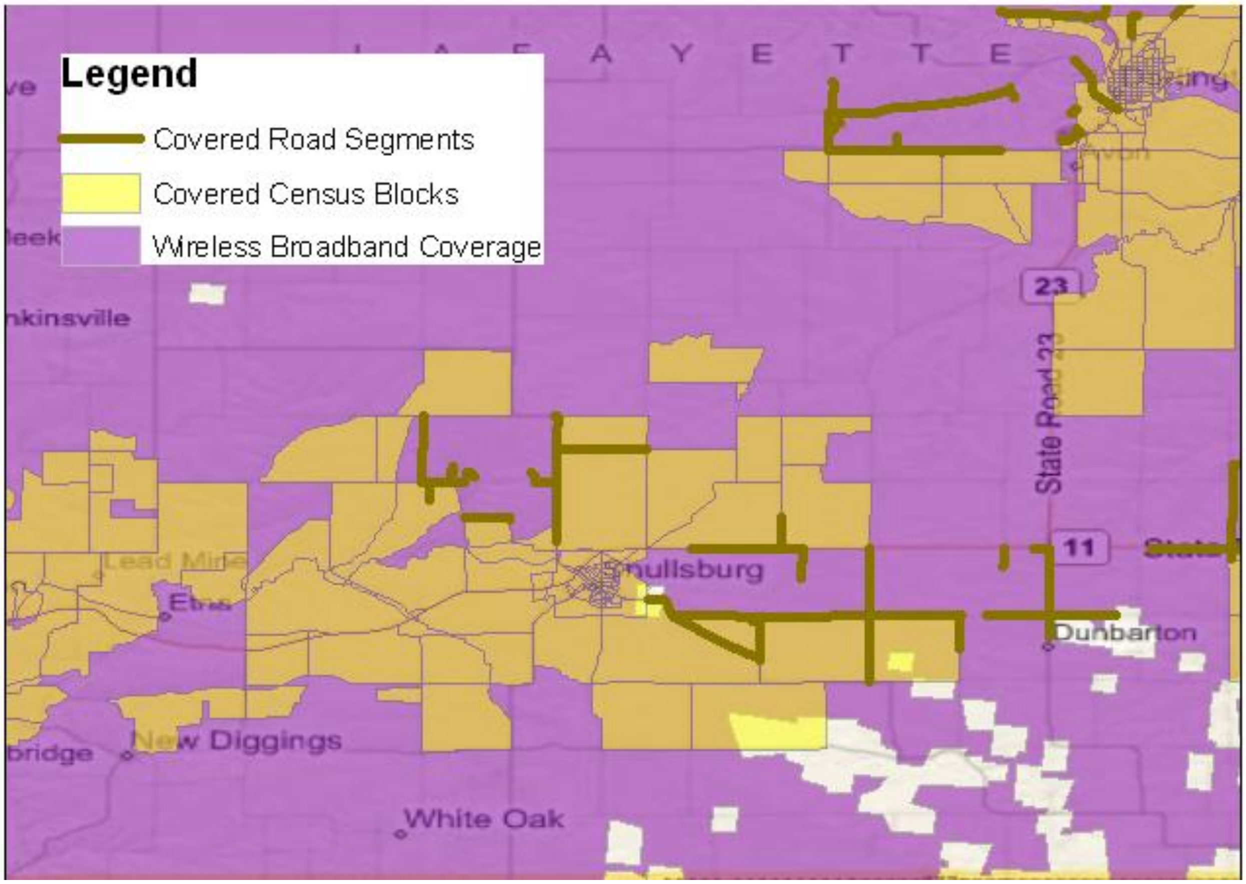


Figure 22--Multi Network Coverage portrayal

In this image, covered Census Blocks are light gold. Covered road segments are a darker gold and wireless coverage is purple. The concern seems to come down to how a wireline provider's coverage is shown in the large Census Blocks (greater than 2.0 sq mi). Some wireline providers have expressed dissatisfaction because their coverage is only tied to road geography, which leads to a visual "hole" in their coverage map. At the same time, they feel that it is unfair that the wireless provider's coverage is shown to be uniform in the same area. Put another way, if our maps show wireline in terms of Blocks and segments, why don't our maps show wireless the same way?

Perceptions of Carrier of Last Resort (COLR) Obligations

Some wireline providers have also expressed dissatisfaction because online maps limit the distance of coverage from a road segment. In our current online maps we buffer a wireline carrier's service 300' from road centerline. A number of providers have expressed that they are mandated to provide voice coverage (which Broadband will accompany) anywhere in the Exchange. There seem to be many dimensions to this argument, but the basic concern comes down to not being able to accurately reflect the scope of their COLR obligation within the mixed block/segment view. Their ability (or lack thereof) to actually provision such services for new users within a 7-10 day period adds yet another level of complexity when attempting to fairly portray their coverage capabilities.

Intentions of Coverage Mapping

When a viewer of an online map clicks on the map (or zooms to an address), they are provided with a pop-up of service provider coverage in the area. The critical question is this: what is the area to which that pop-up window responds to? In the past, we reported back to the specific Census block, or buffered road segment intersected by the user click. As far as the map was concerned, once we move off of that road, or out of that segment, we have a new area to examine.

Our sense, given feedback received, is that our provider view should be a bit more tilted toward finding providers in a general area, rather than finding providers at a single-click location. If the goal of the map is to get someone to call a provider for service, our bias should be to include all of the potential providers in the general area, rather than giving potential customers a method to self-disqualify. That is, we want to cast a wider coverage net, rather than one too narrow. The problem with this approach is that it will create a number of false positive Broadband reports. As of this date we cannot determine if the claims of inaccurate coverage in online maps are due to the looser provider view standard or not. We keep this looser standard in place to minimize the likelihood of self-disqualifications.

CAI Survey Fatigue

We are beginning to note an increase in survey fatigue among CAIs. Sometimes, as part of a direct survey process an end user will tell us how unhappy they are with the repeated Broadband survey efforts. Within several states BTOP grants are in effect that also survey Community Anchor Institutions.. As stated earlier we will defer to other Grantees when there are overlapping survey efforts.

Appendix One

Data Collection Challenges

This section summarizes some of the challenges we have experienced with data collection and processing. The team believes it is important to categorize these challenges as they help inform the geoprocessing and verification methods used. It is also our hope that some of the more global issues can be discussed and decided within the Grantee community.

We begin with several global issues and then continue toward more granular challenges.

Global Data Collection Issues

Census Block and Road Standards are not clear

We receive a variety of Census data. Some were able to supply 2010 Census blocks. Others continued to provide Census 2000. Managing this set of heterogeneous inputs has proved to be a challenge.

There seem to be several methods by which providers are calculating the Census block area. So the distinction between at 2.00 square miles can be uniform, it would be ideal to articulate an operational area calculation definition as early as possible.

Providers Not Wishing for Block Level Aggregation of Their Data

Both ***REDACT*** have supplied address point level data. Both carriers want NTIA to have the point level information, and they have asked CostQuest/LinkAMERICA not to aggregate their coverage to Blocks. Other than a verification to make sure that point data were contained within, or fell within 1 mile of exchange boundaries, the only other processing was normalization into NTIA formats.

Broadband providers not Meeting the NOFA "provider" Definition

PBWorks appears to reflect a concern among a number of grantees about what a Broadband provider is--and how that definition impacts mapping.

If the 7-10 day provisioning rule is to be strictly enforced, it would seem to eliminate a number of prominent Broadband providers[32]. Further, the need for clarification around a facilities-based provider, versus the reseller, has injected even more ambiguity into the mix. Right now we are unclear on how strictly to interpret either of these important distinctions, but we are concerned that we are beginning to create an NTIA exclusion criteria that is going to confuse downstream consumers of the data.

[32] By email ***REDACT*** informed us they could not provision in 7-10 days, but they also supply information on qualified locations to the address point level. Therefore, we draw a distinction between an incumbent provider owning the facility--which terminates at a customer premise--who cannot turn up service at a qualified location, versus a provider not reporting any specific qualified locations in which they cannot turnup service in the 7-10 day window. In the first case we have a sense of where service can be offered and verified. In the second, we have no evidence that a service could exist there until a specific location becomes a customer.

Again, we do not want to exclude a service provider, but we believe there needs to be further clarification around the 7-10 day ”rule,” the definition of a “reseller,” and better interpretation of facility-based providers, versus equipping UNEs, SpA or leased lines.

We have used the provider Type of ”Other” to classify a number of providers who offer Broadband services, but we do not offer them in a manner consistent with Technical Appendix A definitions.

To What Extent Should We Begin “Classifying” the Data and Maps?

The question immediately preceding gets to the intent of a Broadband provider. This question gets to the intent of the Data and Maps.

Earlier in this document we discussed the question of what type of bias we should introduce to our online map messaging. In an online environment, do we want to more likely create an overstatement of coverage for a provider than an understatement? In other words, is the larger problem allowing a consumer to self-disqualify, versus calling a number of neighboring providers? There is a related issue to this. Clearly in our maps there is a lot of scatter in data that we believe should be more continuous. These are the islands of coverage from an incumbent provider[33]. There are a number of processes that could be put in place to deal with this type of scatter, but without more information from the service provider-- essentially the last mile facilities-- it will be difficult to perform this clean up in an informed manner. On the one hand, we can aesthetically clean the maps up and reduce the scatter, but we have little sub-block engineering information upon which to make this decision. Right now our preference is to put out a somewhat aesthetically messier deliverable and work with providers to get better information to clean their submission. If that isn't forthcoming, we are limited in what can be done given the lack of facility level information. In summary this yields two questions

1. In our online maps should we error on overstating coverage to prevent consumer self-disqualification?
2. In our online maps should we work to clean up a lot of the scatter that we see without having facility-based evidence from which to remove it?

Granular Data Collection Issus

Non-Uniform Submission Standards

It is clear among providers that there isn't a consistent method used to derive Broadband coverage. Some providers appear to be use a geocoding approach and then point in polygon or point on segment process. Others may be using GPS locations. In some cases, it is difficult to infer what reference data was used to georeference plant (is it the carrier's roadbase?). This leads to uncertainty regarding the input data scale or accuracy relative to other base layers. Although we may be trading off absolute

[33] For a provider who sells opportunistically (not within a franchise area) it becomes even more problematic to classify their coverage because the points are more related to the type of consumer purchasing the service than a bounded offering. In a matter of speaking, the ProviderType is more determined by the technology and/or location than a type of business. The core intent of the NOFA and our grant application was centered around the 7-10 day providers but we believe maintaining information on provider Type “Other” and “Reseller” is important to assist in validation and market segment analysis as resources are available.

accuracy, our standard has been to conflate submitted data to TIGER 2010 Blocks and TIGER 2010 roads. We perform our verification against this conflated data product.

Temporal

We are unsure of how well the data are temporally consistent. Some providers gave us their best effort to control to June 30, 2011. We note that some providers were clear that the submission was as of extract date without any way to move back in time. They have no means to control for time and cannot provide any audit support beyond when the data are released to us. Some data-especially loop qualification data-may change from day to day. It will be very difficult to clarify why something was changed from a given point in time.

Perceived Inaccuracy with Respect to Internal Standards

The NOFA is clear on submitting a list of Blocks in which a provider delivers Broadband service. This is a different objective than perfectly reflecting service territories. If a firm's accuracy standard is a reflection of their service area, then the data created under the NOFA will not meet their perception of accuracy. This leads to two other issues: First, using Census Blocks rather than serving area may overstate or understate a particular provider's Broadband serving area. This was a significant concern of ***REDACT*** who specifically required us to submit only address-level qualification data. The second issue this brings up is how or if, there should be some standard on how much of a Census Block needs to be covered to call it covered.

Confidentiality

Several providers have noted concerns with CPNI-related issues and have stated this as a reason for non-participation. We have also heard expressions of comparable concern regarding identifiable responses to Anchor Institution information.

Unclear on Definitions

As discussed earlier, several providers claimed confusion on several key terms involved in Middle Mile. We note a consistent stream of questions around the interpretation of Maximum Advertised Speed. Some providers understand this to be the most common speed package bought within the mass market, while others view this as a speed that can be purchased for an additional cost above a mass market offering (eg. a Turbo option for an additional fee per month). Others interpret this as the fastest speed that is available for that particular location--in terms of xDSL, a structure qualified speed, for example.

Perception of Data Use

There seems to be some hesitancy releasing speed information because no one is sure of how the information will be used, or what the speed is intended to reflect. A number of providers have verbally indicated that typical speed will be about (on average) 80% of purchased speed due to overhead. But there are many other factors (such as a user's home network) that influence speeds measures. Providers are concerned about introducing statistics without a clear understanding of how those statistics are derived and will then be used. Also, as advertised speed is pushed down to a block level, we sense more trepidation to report speed values. This quickly begins to touch on parity across network types (why is wireline down at the block when wireless is half the state, etc.). Finally we note a

significant increase in speed reported to us. This may be due to network upgrades or competitive concerns to match the theoretical network speed.

Location Uncertainty In Source Data

Within this document we have noted concerns about the impact of source data accuracy. Our geoprocessing methodology provided what we believe is a relatively conservative tolerance to account for the scale issue in the source data, but we are unsure of how this may impact downstream users. Clearly, it also impacts the verification process because we can't attempt to verify received data beyond a scale at which it was developed.

Covered Segment Process

Deriving those Broadband covered segments in Census Blocks greater than 2 square miles has proved to be a challenge. Moving from a NOFA specified tabular deliverable to a requested geographic deliverable also increases the complexity of the effort.

Record Level Metadata

It would be helpful to have one or two additional fields in each feature class transmitted to NTIA. One User Defined field could be helpful as an expression of record level confidence. The second field could be used as a Key between the transfer geodatabase and our systems. Ideally, both fields could be large text fields (50 char) so the Grantee can use them to express a variety of attributes.

Miscellaneous Data Collection Notes

We note the following important observations regarding our data submission:

1. There are Middle Mile plant records for providers who are not present in the Census block, segment or wireless area feature classes. This is due to classification as non-NOFA Broadband providers.
2. In some cases, we have trimmed wireless coverage estimates to honor state boundaries.
3. We believe some providers are trimming their coverage to honor license area boundaries.
4. As a departure from past practice, where a provider submitted Middle Mile points out of state, we are no longer passing those points to NTIA as they fail the validation script. We experienced validation errors for BroadbandServed=N records in the CAI table. These records were attributed a Technology of Transfer=0. This cleared validation.
5. In tables with mandatory Street and Zip5 attributes(Service Address), if the value is unavailable it is filled with N/A. was not available, we have inserted 'N/A
6. As with submission three, there remains a tension between the Data Model, Data Model Default Values and the Python Validation Script. As an example the data model allows a NULL for the Maximum Advertised speeds in a Census block record. A default 'zz' is available for this condition as well but zz will fail the validation script. In the case where we have data which is missing Maximum Advertised Speeds, we are holding that data back to prevent downstream validation problems.
7. We have a significant amount of VDSL, ADSL 2 and ADSL 2+ coverage categorized into the xADSL category. This introduces a variance in speed availability as some providers are using VDSL, shortened loops and/or pair bonding to increase speed over 10 Mbps.

8. We have left in the data Middle Mile locations with above grade elevations that appear to be unreasonable, given review of orthoimagery. This seems to be confusion between above grade request and above sea level readings.
9. All fGDB have passed validation except in cases where attributed speeds did not agree with domains associated with technology of transmission (eg Upstream Speed of 2 with ADSL). We have modified the Python script to allow for conditions in the CAI table in which default data model values are disallowed in the Python submission script.
10. We note a few providers who have speeds seemingly inconsistent with their technology of transmission. This is either very low speeds with optical fiber, or very high speeds with non DOCSIS 3.0 systems. We have verified on provider websites that the reported speeds are available in the area but these speeds will fall out of the NTIA frequency table analysis.
11. We have a small number of providers who serve an area with both a residential and business speed tier. In cases where we cannot distinguish which speed tier offering to use, we use the lower of the speed tiers.
12. Per NTIA request we have modified the manner in which we handle Wireless coverage polygons. If a Provider submits a single geometry but specifies multiple spectrum codes in use in that polygon, we duplicate the polygon for each spectrum code. In other words the geographic object is identical but the attribute data for the object is unique.
13. In point level data submissions (Service Address and CAI) we note points that are spatially coincident. With respect to Service Address points our thought is these represent multi-unit dwellings or businesses but we don't have enough address detail to determine if these are multi-unit structures or duplicated customers. Because we cannot determine the reason for the duplication we leave spatially coincident records in our submission. We also leave in our CAI submission points which may be the same physical structure but have slight variations in addressing.
14. In point level middle mile data, we are finding a variance in the quality of the geocoded longitude and latitude returned. Given the data received we are unsure if this is an issue where the plant address is difficult to geocode or if the longitude and latitude provided to us is different than what would be returned in geocoding.
15. We note two important issues in our datapackage.xls. First the number of records in the provider tab will not sum up to the total record count. This is due to the requested grouping within the Excel table.. Second for estimated broadband coverage, we internally mark that coverage as an estimate but the provider is described as non-responsive within the datapackage.xls.
16. We made one modification to the NTIA supplied verification script. For the CAI layer we The query to check the TRANSTECH field now includes: "AND TRANSTECH <> -9999"

Appendix Two

This appendix contains the confidentiality clarification supplied in a series of emails between CostQuest and NTIA.

Feature Class	*Metadata*	*NOFA Confidential?*	*Online Map*	*Public Disclosure*	*Exemption*
Last Mile	Constraints on accessing and using the data	Yes	No	No	None
	Access constraints: None				
	Use constraints:				
	This data is confidential as defined in the NOFA.				
Middle Mile	Constraints on accessing and using the data	Yes	No	No	None
	Access constraints: None				
	Use constraints:				
	This data is confidential as defined in the NOFA.				
Service Address	Constraints on accessing and using the data	No	No	Yes	
	Access constraints: None				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
CAI	Constraints on accessing and using the data	No	Yes	Yes	NO attributes on any record in this feature class are considered confidential

	Access constraints: None				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
Census Block	Constraints on accessing and using the data	No	Yes	Yes	NO attributes on any record in this feature class are considered confidential
	Access constraints: None				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
Service Overview	Constraints on accessing and using the data	No	Yes	Yes	The only provider who may not show up this table is a provider who has provided only confidential data (last mile, Middle Mile,

					address point with provider name)
	Access constraints: None				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
Road Segment	Constraints on accessing and using the data	No	Yes	Yes	NO attributes on any record in this feature class are considered confidential
	Access constraints: None.				
	Use constraints:				
	There are no restrictions on distribution of the data by users.				
Wireless	Constraints on accessing and using the data	No	Yes	Yes	NO attributes on any record in this feature class are considered confidential
	Access constraints: None				
	Use constraints:				

	There are no restrictions on distribution of the data by users