Commonwealth of Virginia

Virginia Center for Innovative Technology

Virginia Information Technologies Agency

Virginia Information Technologies Agency
Virginia Geographic Information Network

Virginia Tech
Center for Geospatial Information Technology

NTIA STATE BROADBAND DATA DEVELOPMENT

ROUND 5 - Spring 2012 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 spring 2012 submission is the fifth 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 spring 2012submission 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.

There is a total of 174 broadband providers that have been identified through various source within the Commonwealth of Virginia as of April 1, 2012. There are 65 providers who are participating in the national program and 108 who have not responded to a call for data. Virginia has an on-going effort to contact the providers who have not responded to offer any assistance needed for them to participate.

Virginia Broadband Data Verification and Validation

Verification Techniques

In the fall of 2010, the Virginia broadband mapping team subcontracted with Apex-CoVantage to provide the following one-time broadband data verification techniques using standardized questionnaires for the Commonwealth of Virginia:

- Telephone interviews
- Field (door to door) interviews
- Direct mailings
- Drive Testing
- GPS data collection at field interview sites

A total of 2,421 surveys were conducted, with 616 in-person and 1,805 by telephone.

Validation Methods

Using the NTIA definitions for served/under-served/unserved combined with Census demographics and Virginia broadband availability data, the Virginia Tech mapping team produced an estimated Broadband "serve-ability" Census Block map for Virginia. From this the Apex team then identified a geographically stratified (rural/urban) statistically significant sample size for which to apply the above data verification techniques.

Results

The effort resulted in the following findings:

- Surveys confirming Wireline Provider access: 97.3%
- Surveys confirming Wireless Provider Access: 99.7%
- Surveys confirming Internet Service Provider: 91.1%

In addition, the survey questionnaires confirmed valuable location information (lat/long & address) along with details about internet service provider and demographic information.

Percentages as of April 1, 2012.

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 spring 2012had 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. An attribute join using the full

census block ID was completed to the Selection Set census block feature class. Census blocks less than 2 square miles were exported to a separate feature class to use in processing address and/or road centerline data also sent by the provider.

Address Reporting – The majority of providers reporting broadband availability on a service address basis submitted in a list format and four providers sent geospatial data for the first time. All lists were converted to spreadsheets and 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 and tied addresses were then exported as a separate feature class.

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 or VA RCL data. 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.

Community Anchor Institutions –
Virginia's CAI data has additional attribution beyond the NTIA data model due to the source of the VA data set. VGIN and Virginia Tech both house CAI data although the record counts for tables are not identical. The master VGIN geospatial feature class is used in submission to the SBDD project while changes from Virginia Tech are generally conflated.

Virginia Tech held speed tests in 2009 and this information was applied to the NTIA SBDD transfer data models of the past. With the inclusion of attribute values for subscriber upload and subscriber download speeds with the most recent NTIA model for the Spring 2012 submission, Virginia Tech provided VGIN with an export of its most recent database to include speed testing held in 2011 in the SBDD Transfer Data model CAI feature class. Included were a subset of features based on CAI category and were not the entire CAI feature class so features in the VT data were then applied to the VGIN submission feature class.

In order to apply changes from the Virginia Tech update to the VGIN NTIA submission data, the VGIN CAI point feature class as well as the VT point feature class update were imported into a staging file Geodatabase. The VT update was buffered 5 feet and output to a buffer feature class which included the same attribution as the point feature class. The point was spatially joined to the buffer feature class and values were calculated within the point data to include updates to speeds and transmission technologies where captured by VT. Of the total features, approximately 100 features did not fall within the

buffers and were not spatially joined. These values were either features which the VT feature class contained and the VGIN feature class did not, or the geometry locations were different for the same feature. These remaining buffered features were exported to a separate feature class to use in manually adding changes to the VGIN point data. For each feature not available in the VGIN CAI features, the data was copied from the Virginia Tech data and placed in the VGIN CAI feature class. For each feature that were in both databases but spatial location was different, the ESRI ArcGIS Attribute Transfer functionality was used to conflate speed values.

In order to represent the data with 2010 census geography as requested by the NTIA for the Fall 2011 SBDD submission, data was then spatially joined to the 2010 census block data and output in the working Geodatabase feature class. The resulting feature class was calculated for the full FIPS ID and this was loaded to the transfer data model in the NTIA SBDD format.

Dialogues are planned to occur between the spring 2012 and fall 2012 data releases which will allow a more efficient maintenance technique between the two participating entities.

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.

Pricing - If nominal weighted subscriber speed was available from a broadband provider, the data was placed into an excel spreadsheet for the spring 2012submission 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 spring 2012release were carried over into the spring 2012pricing 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. 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.

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 fall 2012 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
Charter Communications, Inc.	0017179383
Cogent Communications Group	0019066034
Comcast	0004441663
Covad Communications Company	0003753753
Cox Communications	0001524461
Cricket Communications, Inc.	0002963528
Highland Telephone Cooperative	0004318846

Mid-Atlantic Broadband Cooperative	0019765304
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
Sidera Networks	0006254403
Sprint Nextel Corporation	0003774593
Starband Communications Inc.	0005087457
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
Verizon Wireless	0003290673
WildBlue Communications Inc	0007843766

AT&T Mobility, LLC

AT&T wireless provided geospatial data in the form of a coverage area shape file. Middle mile data was included but the values reported were the same as reported in the spring 2011 submission and were carried over to the Spring 2012 NTIA data model.

Inside the shapefile provided by AT&T were over 1800 polygon records with identical attribution. The data appeared to be gridded for internal use. The shape file was copied for editing in the staging database and the polygons were merged into a single coverage polygon. The shape file was then loaded into the VGIN NTIA transfer data model. Upon reviewing the documentation from AT&T, their coverage area did have two spectrums so the shape file was loaded a second time into the VGIN NTIA transfer data model. The two records were then populated with attributes matching the supplied documentation.

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

Charter

Charter provided Geospatial data in the form of road centerlines and 2010 census blocks (< 2 square mile) for two different transmission types, as well as middle mile data. All were in a shape file format. No new subscriber-weighted nominal speed data was sent therefore that data was carried over from the Fall 2011 submittal.

The middle mile attributes were complete to NTIA standards when submitted by Charter and were loaded directly into the VGIN NTIA transfer data model.

The census block shp file contained only a portion of the attributes needed to meet the NTIA standards. A select by location was performed using the census block feature class in the VA Selection Set and all identical polygons matching the census blocks from Charter were exported to a shape file. All attributes were populated in the exported shape file and then loaded into the VGIN NTIA transfer data model.

In order to provide the Road Centerline data in Virginia's geometry (VBMP RCL Quarter 1, 2012) and eliminate the bulk of ancillary roads from TIGER lines, the road lines provided by Charter were used in a select by location analysis. A select by location was performed using the road centerline feature class in the VA Selection Set to select road lines that were within 2 meters of the lines submitted by Charter. The selected data was then exported to a shape file and the NTIA attributes were populated before loading into the VGIN NTIA transfer data model.

Provider Name:	Charter Communications, Inc.
DBA Name:	Charter Communications, Inc.
FRN:	0017179383
Transmission Technology	40
VA Data Category:	1
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	5345
Address Point features:	0
Road Centerline features:	314
Middle Mile features:	3
Community Anchor Institutions reported:	0

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:	320
Address Point features:	0
Road Centerline features:	2
Middle Mile features:	0
Community Anchor Institutions reported:	0

Cogent Communications Group, Inc.

Cogent is a backbone provider and submitted an email with instructions for downloading address data from their web site. The email also included the transmission technology type and advertised down and upload speeds for the addresses. The data was downloaded in a spreadsheet format from the Cogent web site and imported into the provider staging database. Geocoding resulted in a 95% match. The GIS table was scrubbed to add and populate fields to conform to the NTIA data model and loaded to the VGIN NTIA transfer data model.

Provider Name:	Cogent Communications Group, Inc.
DBA Name:	Cogent
FRN:	0019066034
Transmission Technology	50
VA Data Category:	?
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	53
Address Point features:	0
Road Centerline features:	0
Middle Mile features:	0
Community Anchor Institutions reported:	0

Comcast

Comcast provided census block and address range spreadsheets. 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.

None of the census blocks reported were over two square miles. The spreadsheet was imported to the staging database and joined to the census block feature class in the VGIN VA Selection Set. 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.

Address level data was not sufficient for the Spring 2012 submission so Fall of 2011 address point data was utilized. The points were selected by location based on the

updated block information and all points which fell outside of the blocks were used. The same methodology was used in reporting geocoded centerline data.

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:	54103
Address Point features:	11628
Road Centerline features:	325
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:	128672
Address Point features:	0
Road Centerline features:	1243
Middle Mile features:	6
Community Anchor Institutions reported:	0

Cricket

Cricket provided Geospatial data in the form of a coverage area shape file and the coverage foot print had changed from the last submittal. Middle mile data was not included. The shape file had all of the attributes needed so a staging database was not needed. The shape file was copied and pasted into the VGIN NTIA Transfer data model BB_Service_Wireless feature class and attributes were populated as listed in the source data.

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

Highland Telephone Cooperative

Highland Telephone provided a document stating they had no changes to their service area but their maximum advertized download speeds have increase. They also listed middle mile x, y values with appropriate attributes for the first time. A provider staging data base was created for importing the middle mile data and populating the attributes. The middle mile feature class was then loaded to the VGIN NTIA transfer data model.

Provider Name:	Highland Telephone Cooperative
DBA Name:	Highland Telephone Cooperative
FRN:	0004318846
Transmission Technology	10
VA Data Category:	7
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	0
Address Point features:	0
Road Centerline features:	306
Middle Mile features:	3
Community Anchor Institutions reported:	0

MBC

MBC is a middle mile/backbone fiber company and does not provide service to end users. They currently have construction in progress for infrastructure build-outs through two grants. MBC submits shape files of nodes and lines under construction along with their middle mile data but it is not processed into the NTIA data model at this point.

The middle mile shape file was copied for editing. Fields were added and populated as needed and were then imported into the NTIA transfer data model. No staging database was needed.

Provider Name:	Mid-Atlantic Broadband Cooperative
DBA Name:	MBC
FRN:	0019765304
Transmission Technology	50
VA Data Category:	7
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	0
Address Point features:	0
Road Centerline features:	0
Middle Mile features:	22
Community Anchor Institutions reported:	0

Northern Neck Wi-Fi

Northern Neck Wireless provided its submission for the spring 2012release 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 spring 2012release 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 Wireline

The NTELOS data was received late and the data format of their files was substantially changed from previous submittals. They sent in excel files of census blocks less than two square mile and census blocks over two square miles. No address or road data was received for areas outside of census blocks less than two square miles. The attributes did not contain FRNs or provider/DBA names so it was not possible to break out the data into the various companies. Due to the late submission by the provider it was decided to carry over their data from fall 2012.

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 Telecom Services LLC

RCN provided a spreadsheet of address availability and middle mile points for the spring 2012submission. A provider staging geodatabase was created and both files were imported as tables for normalization. The Address availability import table was geocoded and matched records were kept, while unmatched and tied results were exported to a separate table in the geodatabase. The matched feature class was then loaded into the VGIN NTIA Transfer data model.

The middle mile data provided this round was reviewed and had not changed from the Fall 2011 submittal so the fall 2011 data was loaded into the VGIN Carry Over data model.

Provider Name:	Starpower Communications LLC
DBA Name:	RCN Telecom Services LLC
FRN:	0003735016
Transmission Technology	40, 41
VA Data Category:	6
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	0
Address Point features:	2270
Road Centerline features:	0
Middle Mile features:	2
Community Anchor Institutions reported:	0

Shentel

Shentel provided separate spreadsheets for Shentel Cable Company and Shentel Service Company. Within each spreadsheet was a tab for road segments outside of census blocks less than two square miles, and a tab for census blocks less than 2 square miles. Spreadsheets for speed by county were also sent for both companies. 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 2010 geography so the imported block data was joined to the Selection Set census block table in ArcMap with a 100% match. The new feature class join was then exported to a new feature class and values were calculated based on joined features. The feature class of census blocks were verified as less than two square miles and loaded to the VGIN NTIA transfer data model.

The road segment data submitted by Shentel was in Virginia's road centerline geometry (VBMP RCL Quarter 1, 2012). The table was imported into the road staging database and joined to the Selection Set road table. Matched values were output to a new feature class and attributes were reviewed for completeness. This iteration of the roads was loaded into the VGIN NTIA transfer data model.

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:	10336
Address Point features:	0
Road Centerline features:	3004

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:	2381
Address Point features:	0
Road Centerline features:	669
Middle Mile features:	0
Community Anchor Institutions reported:	0

Sidera Networks LLC

Sidera provided a spreadsheet for middle mile data with addresses and an address availability text file. Sidera Networks is a backbone provider

The middle mile excel file was imported into the provider staging database and geocoded with a 100% match rate. The GIS file was scrubbed to add and populate fields as required by the NTIA data model. The feature class was then loaded into the Transfer Data Model.

The address availability text file was imported into a spreadsheet format and then imported into the Sidera staging database. The data was then geocoded with a 100% match rate. The new address feature class was compared to the Selection Set census block table and it was determined that all the address points fell inside a census block less than two square miles. The census blocks containing the address points were selected and exported to a separate feature class. The data was scrubbed to populate fields as required by the NTIA data model from the source data. The feature class of blocks less than two square miles was loaded to the NTIA transfer data model.

Provider Name:	Sidera Networks LLC f/n/a RCN New York Communications LLC
DBA Name:	Sidera Networks
FRN:	0006254403
Transmission Technology	50
VA Data Category:	0
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	2
Address Point features:	0
Road Centerline features:	0
Middle Mile features:	8
Community Anchor Institutions reported:	0

Sprint

Sprint provided Geospatial data in the form of a coverage area shape file and middle mile data was included in a text file.

The GIS shape file was loaded into the provider staging geodatabase and compared to the fall 2011 submission to review for changes. The area footprint was different so the attributes were scrubbed to match the NTIA reporting format. The data was then loaded into the VGIN NTIA transfer data model. Middle mile information had not changed from the last round so it was loaded to the VGIN NTIA 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

T-Mobile

T-mobile provided geospatial data in the form of three coverage area shp files. In the supporting documentation, T-mobile explained attribute values for each polygon feature class. Middle mile and subscriber-weighted nominal speed data was included in tabular format.

The shapefiles provided by T-mobile were named UMTS, HSPA21, & HSPA42 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 shp files were imported into the provider's staging geodatabase. The polygons were merged into a single coverage polygon in the individual staging feature class and then each was copied and pasted into the VGIN NTIA transfer data model. Attributes were populated to match supporting documentation provided by T-mobile.

The middle mile and subscriber-weighted nominal speed data was unchanged from the last submittal.

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 geospatial data for the first time as well as the csv files of Address Availability, Middle mile, and weighted speed that was the source data for their GIS data. The provider submitted data consisted of three address availability feature classes, one for each FRN, and a middle mile feature class. A provider staging database was created to review each feature class. The New Castle Telephone and Virginia Telephone address point layers were determined as acceptable but Amelia Telephone was not. The source csv file for Amelia was imported into the staging database for geocoding and all matched records were kept. All attributes were reviewed for completeness and the three address feature classes were loaded into the VGIN NTIA transfer data model.

The weighted speed information was placed into the pricing spreadsheet directly. Comparison of the middle mile data to the fall 2011 release, revealed no changes so values were carried over from the fall data set.

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:	3949
Road Centerline features:	0
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:	2416
Road Centerline features:	0
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:	2416
Road Centerline features:	0
Middle Mile features:	1
Community Anchor Institutions reported:	0

Time Warner Cable (TWC)

TWC provided Geospatial data in the form of road centerlines and 2010 census blocks < 2 square miles. The provider also included a document stating that no middle mile data had changed; and, subscriber- weighted nominal speed would be sent as soon as it was available.

The TWC data included two transmission types 40 and 41. Working in the provider staging database, census blocks < 2 square miles were joined to the Selection Set Census block data using the FIPS number text fields. 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 1, 2012), 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 NTIA transfer data model.

Provider Name:	Time Warner Cable LLC
DBA Name:	Time Warner Cable
FRN:	0013430244
Transmission Technology	40
VA Data Category:	1
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	124
Address Point features:	0
Road Centerline features:	86
Middle Mile features:	0
Community Anchor Institutions reported:	0

Transmission Technology	41
VA Data Category:	1
Wireless Polygons:	0
2010 Census Blocks <2 Square miles:	3237
Address Point features:	0

Road Centerline features:	2245
Middle Mile features:	0
Community Anchor Institutions reported:	0

Verizon Wireless

Verizon Wireless provided two service area coverage shape files and sent the associated broadband attributes in an email. No middle mile **CARRY OVER** or subscriber-weighted nominal speed data was submitted. Each shape file contained a different footprint, one of Verizon's 4G LTE area and the second of their 3G area. The 3G area was listed in the email as having three separate spectrums.

The shape files were imported into a staging database. A merge was performed in each file as each contained multiple polygons with identical attributes resulting in a single polygon for 3G and one for 4G. Fields were created in the 4G shape file to match the NTIA BB_Service_Wireless feature class document. The 4G shape file was then loaded to the VGIN NTIA transfer database; and, the 3G shape file was loaded three separate times to create three records in the feature class. Attributes were populated in the VGIN NTIA transfer database using the email attribute information with each of the 3G records having a different spectrum. The final geometry was three stacked polygons for the 3G coverage area and one polygon for the 4G area.

Provider Name:	Cellco Partnership and its Affiliated Entities
DBA Name:	Verizon Wireless
FRN:	0003290673
Transmission Technology	80
VA Data Category:	7
Wireless Polygons:	4
2010 Census Blocks <2 Square miles:	0
Address Point features:	0
Road Centerline features:	0
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:	110853
Address Point features:	0
Road Centerline features:	15403
Middle Mile features:	12
Community Anchor Institutions reported:	0

WildBlue Communications, Inc

WildBlue is a satellite provider and sent Geospatial data in the form of a coverage area shape file (the entire state) with attributes for transmission technology, spectrum and advertised speeds. A staging database was not needed and the coverage area polygon was cut and pasted to the BB_Service_Wireless feature class in the VGIN NTIA transfer database. Attributes were populated to match the original shape file.

Provider Name:	WildBlue Communications, Inc
DBA Name:	Wild Blue Communications, Inc
FRN:	0007843766
Transmission Technology	60
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

Many providers did not submit updates for the spring 2012 so their data from the fall 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 fall 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
Buggs Island Telephone Cooperative	0002031698
CenturyTel, Inc.	0018626853
Citizens Cablevision Inc.	0009485343
Citizens Telephone Cooperative	0004381422
Cox Communications	0001524461
FairPoint Communications	0002071116
Level 3 Communications	0003723822
MetroCast Communications	0018547471
MGW Networks	0019225366
Midatlantic Broadband Cooperative	0019765304
Nelson Cable	0000900287
New Hope Telephone Cooperative	0002071579
Nextlink Wireless	0014286934
Roadstar Internet, Inc.	0013445358
Scott County Telephone Cooperative	0002069862
Sunset Digital Communications	0000826322
The Wired Road	0020153854
Verizon Wireless	0003290673
Virginia Mountain Micro	0018713800
XO Communications	0006275945

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 and no errors were reported.

The spring 2012 SBDD data submission was also quality controlled using the latest python script made available by NTIA on March 23, 2012. The script produced both warnings and failures and the data was scrubbed to correct as many as possible. A few items were noted and skipped due to inconsistencies in the NTIA GP check model as described in the March 23, 2012 conference call for all SBDD states with NTIA. The final run of the script resulted in speed tier warnings and failures which have been documented in detail in the READ ME_NTIA_SPRING_2012_SCRIPT_ERROS included in the data submittal.

Data Issues/Considerations

A major issue with Virginia Broadband data observed from the python QC output is address data. Some providers do not send parsed address data which causes a failure in the script. VGIN plans to review providers who only send concatenated address data to determine if the provider can change the source data or if VGIN can find or develop a tool to assist with this.

Virginia has worked to improve communications directly between VGIN and the technical staff of each provider to review their maps, attribution and data formats. We are striving to make more of the data sent in by providers to conform to the most desirable format for greater speed and efficiency in processing. Our effort has started to pay off with several providers who either sent data spatially for the first time or changed their format. We are encouraged and will continue to work on feedback looping with every provider who submits data.