

**CT Broadband Mapping
Data Processing Report
Supplement**

Submission 9

March 28, 2014



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 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., and subcontractor Sanborn, to support the data collection and mapping efforts.

So far Connecticut 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.

SPRING 2014 SUBMISSION OVERVIEW

According to both our research and lists provided to use by NTIA, there was the potential for CT to have up to 149 broadband providers:

We contacted every provider on this master list.

45 Companies stated they do not provide any type of broadband service in CT. Many of these are either national carriers without a CT presence, or they file 477 reports because they provide VOIP or Video Teleconference services (but not broadband).

360 Networks

8x8, Inc.

Accessline Communications Corporation

Acecape Innovative Networks

AlphaStar

American Fiber Systems, Inc.
Apptix, Inc
Aptela, Inc
Bellsouth Long Distance, Inc.
Broadcore, Inc.
CIMCO Communications, Inc.
Custom Network Solutions
Cybershore
Echostar
Global Crossing North America, Inc.
GlobalPhone Corp.
Great Auk Wireless (GAW Communication)
GreatCall, Inc
Hickory Tech Corporation
i2 Telecom International, Inc
IDT Corporation
inContact, Inc
InPhonex.com, LLC
Intra Global Communications Inc.
IP Communications, LLC
ITC^DELTACOM Communications
Kosmaz Technologies LLC
M5 Networks, Inc
Matrix Telecom, Inc
New Global Telecom, Inc
Ooma, Inc.
Phone.com, LLC
Qwest Interprise America, Inc.
RCN Corporation
RingCentral, Inc.
Sage Telecom, Inc
SBC Long Distance, LLC
SkyTerra LP
SkyWay, USA
Software Cellular Network Ltd.
Spot On Networks
Stella Communications
Tata Communications (America) Inc.

VoiceINC.COM Corporation
VoIPnet Technologies
VoIPStreet, Inc.
Vonage Holdings Corp
Yellowspeed

26 Company names turned out to be a DBA or legal holding names for another firm that is listed in another category. So these duplicates were dropped from our list.

A-R Cable Investments, Inc.
AT&T Corp.
AT&T Services, Inc.
Broadwing Communications, LLC
Cablevision Lightpath CT
Cablevision Systems Corporation
Cellco Partnership
Clearwire
Comcast Cable Communications, INC
Connecticut DataNet, LLC. dba Lighttower Fiber Netw
DataNet Communications Group, Inc.
Deutsche Telekom AG
DSLnet Communications, LLC
DSLnet Communications, LLC (Megapath)
Enventis Telecom Inc.
Harron Communications LP
Hudson Valley DataNet, LLC.
Hughes Communications, Inc.
Lightyear Network Solutions, LLC
New Cingular Wireless Services, Inc.
Saturn Telecommunications Services, Inc
Verizon Business Global LLC dba Verizon Business
Verizon Communications Inc.
Wave2Wave Communications Inc.
WiTel Communications Group, LLC
Yipes Holdings, Inc

36 Companies reported that they are strictly resellers (which we are not including in our submission).

Access One, Inc.
ACN Communication Services, Inc
Airespring, Inc.
American Fiber Network, Inc.
Bandwidth.com, Inc
BCN Telecom, Inc.
BullsEye Telecom, Inc.
Caused Based Commerce Incorporated
Cypress Communications, LLC
Direct TV
Dish Network
Earthlink
Ernest Communications, Inc.
Fionda VOIP, LLC
Granite Telecommunications LLC

Metropolitan Telecommunications Holding Company
Network Billing Systems LLC
Network Innovations, Inc.
New Edge Holding Company
One Communications Corporation
PAETEC Communications, Inc.
Prescient Worldwide
Proximiti Communications
Reallinx, Inc
Smart Choice Communications, LLC
Stage 2 Networks, LLC
Telefonica Data Corp SA
Telefonica USA, Inc.
Telesphere Networks Ltd
Trans National Communications International
Transbeam Inc.
TW Telecom Data Services
VCOM Solutions, Inc
Wholesale Carrier Services
Wholesale Carrier Services, Inc
Windstream

9 Companies may be broadband providers, but either they indicated they are not willing to provide data, or were completely unresponsive to multiple attempts of contacting them.

Advanced Corporate Networking, Inc.
Boston Telephone
DSCI Communications, Inc.
Light Tower Fiber Long Island, LLC
Meriplex Communications, Ltd.
Sidera Networks
Signal Point Telecommunications Corp.
Universal Connectivity
University Corporation For Advanced Internet Devel

12 Broadband providers submitted new or updated data:

AT&T Inc.
Charter Communications
Comcast
Cox Communications
Level 3 Communications, LLC
MegaPath/Covad Communications Group, Inc.
Metrocast Communications of CT
Sidera Networks
Sprint Nextel Corporation
T-Mobile USA, Inc.
Verizon New York Inc.
Verizon Wireless
Zayo Enterprise Networks, LLC

12 Broadband providers informed us that there were no changes to their service area or did not provide an updated dataset for this submission:

Broadview Networks, Inc.
Cogent Communications, Inc.
Connecticut Educational Network
CSC Holdings, Inc.
Fibertech Networks, LLC
Groton Utilities
HNS License Sub, LLC
MetroPCS
Reliance Globalcom Services, Inc.
Skycasters
StarBand Communications, Inc.
ViaSat/Wild Blue Communications, Inc.
XO Holdings, Inc.

For the Spring 2014 submission (S9), roughly 50% of the state providers submitted either entirely new or significantly revised data sets. This is a slightly lower percentage of updated data sets than we have seen in the past.

In general, the submission 9 processes followed the same basic approach that was used in earlier submissions. This document summarizes the following:

- Submission 9 Processing Assumptions
- Reference Data Creation
- Processing of new provider data
- Quality control checks
- Improved validation techniques
- NTIA quality control scripts
- NTIA Submission Data Model Schema Changes

SUBMISSION 9 PROCESSING ASSUMPTIONS

Based on NTIA feedback and information provided in NTIA webinar sessions, the submission 9 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.
2. For this submission we again requested actual speed data from the providers in addition to max advertised and typical speeds. Approximately 80% of the providers provided this data to us. This data was then populated into an internal data model, was used to support validation efforts, and is being used to enhance the functionality of the state broadband web site.
3. Due to our NDA restrictions, last mile points are still not being submitted to NTIA.
4. Terrestrial Mobile Wireless and Terrestrial Fixed Wireless (licensed and unlicensed) were again 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. The exception to this rule is where a provider is using the same

technology and spectrum, but delivering different services speeds such as 4G and LTE. In this case a continuous polygon is being created that represents the area that is offered for both 4G and LTE even if this polygons overlap.

5. If a cable based wireline provider can provide both DOCSIS 2.0 and DOCSIS 3.0 service to the same area, the block or road was listed only once with a technology code of 40.
6. Most providers were only willing to indicate on a general level if they severed business, residential or both. We did ensure that a response was gathered from every provider, even if it was simply that they did not distinguish.
7. The submission 9 Provider data model is currently based on the NTIA January 24, 2014 data package.
8. The primary changes that were made to the data model for this submission were:
 - a. Technology type Code 60 (Satellite) increased in both Max Advertised Download Speed and Max Advertised Upload Speed
 - i. Max advertised download acceptable range is now Code 3 - Code 7
 - ii. Max advertise upload acceptable range is now Code 2 -Code 5
 - b. Added ZZ as default value for road segments
 - c. Removed codes 3 and 4 from End User Category in Address feature class.

SUBMISSION 9: REFERENCE DATA

This section describes the reference data used in submission 9.

BLOCK REFERENCE SETUP

For Submission 9, Census 2010 data was utilized. The data was set up as follows:

- Block size (AREA) is calculated combining the 2010 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.
- In addition, we looked at the water area in comparison to the total block area, and if the block was 100% water, it was excluded from our reference data.

ROAD REFERENCE SETUP

2010 Tiger Line IDs (TLID) were used for data processing in S9. 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 9: PROCESSING OF NEW DATA

For submission 9, we started data collection on January 1, 2014 by sending out data update requests and technical data specifications to all providers. This incorporated all the NTIA changes released as of December 31, 2013. These were sent to a large list of companies which were compiled from past collection efforts, and the revised FCC 477 list. All new data was requested using Census 2010 geography 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 8. We contacted them after the due date a few times but for **ten** providers, we eventually had to just reuse Submission 8 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 directly 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, then 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 same technology type unless the provider is offering different speeds such as 3G and 4G over the same area. 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, then we select the maximum of the advertised speeds.
4. **QC Review:** All data is then sent to a different analyst to perform a thorough 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. **QC Change Detection Review:** Data is then sent to another team for a second Quality Control 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 step involves comparing the new data set with prior submissions, developing change maps, and looking for any possible technology or speed anomalies. At this stage we also begin 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 time 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. In this submission we continued to use our enhancement to this tool that provides the ability to highlight changes between submission 8 and submission 9. 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. There is also the ability to directly exchange notes and any possible concerns with their data through this portal.
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 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. **Submission Comparison Check:** An application was written that compares this submission to the previous submission. We review any variations and assure that the changes found can be documented as being requested by the provider.
10. **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 latest version of the NTIA receipt tool at this time. If any issues are flagged as failing they are reviewed and corrected. All warnings are also reviewed and either corrected or documented in the attached document which explains that we have validated this data and it should be accepted. Any last issues are corrected, and the data is sent to the state for their review.
11. **Submission to NTIA**

As with the seventh 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. This list was then cross referenced to the federal education listing to ensure all locations with an educational ID were included.

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.

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 built and maintains the Connecticut Educational Network, which is used to provide one high speed network connection to each town in the state (typically fiber, but some outliers are still on DSL.) 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. Because of this, many 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. In addition, CEN's primary mandate is to provide site to site connectivity between towns, and so they do not feel they meet the true definition of an internet provider, and as such, do not have a FRN. CEN is also limited by regulations to only support educational facilities, so they requested that their data only be shown as address points, as they cannot provide service to anyone else in that census block.