

**CT Broadband Mapping
Data Processing Report
Supplement**

Submission 10

September 26, 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 is now 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. (AppGeo), and its subcontractor Sanborn, to support the data collection and mapping efforts.

Throughout the five years of this program Connecticut has been very successful in acquiring the requested information from the broadband service providers, and is utilizing this information on its own <http://CT.gov/Broadband> website as well as providing the needed information up to NTIA to support the national map.

FALL 2014 SUBMISSION OVERVIEW

To follow you will find the statistics for Connecticut's tenth and final broadband submission (S10) due to NTIA October 1, 2014.

According to both our research and lists provided to use by NTIA, there was the potential for the State of Connecticut to have up to one hundred and forty nine (149) broadband providers. The following is the list of the potential broadband providers that were researched in the State of Connecticut:

360 Networks
8x8, Inc.
Access One, Inc.
Accessline Communications Corporation
Acecape Innovative Networks
ACN Communication Services, Inc
Advanced Corporate Networking, Inc.
Airespring, Inc.
AlphaStar
American Fiber Network, Inc.

American Fiber Systems, Inc.
American Telephone Company LLC
Apptix, Inc
Aptela, Inc
A-R Cable Investments, Inc.
AT&T Corp.
AT&T Inc.
AT&T Services, Inc.
Bandwidth.com, Inc
BCN Telecom, Inc.

Bellsouth Long Distance, Inc.	IP Communications, LLC
Birch Communications	ITC^DELTA COM Communications
Boston Telephone	Kosmaz Technologies LLC
Broadcore, Inc.	Level 3 Communications, LLC
Broadview Networks, Inc.	Light Tower Fiber Long Island, LLC
Broadwing Communications, LLC	Lightyear Network Solutions LLC
BullsEye Telecom, Inc.	M5 Networks, Inc
Cablevision Lightpath CT	Matrix Telecom, Inc
Cablevision Lightpath, Inc.	MegaPath/Covad Communications Group, Inc.
Caused Based Commerce Incorporated	Meriplex Communications, Ltd.
Cellco Partnership	MetroCast Communications of CT
Charter Communications	MetroPCS
CIMCO Communications, Inc.	Metropolitan Telecommunications Holding Company
Clearwire	Network Billing Systems LLC
Cogent Communications, Inc.	Network Innovations, Inc.
Comcast	New Cingular Wireless Services, Inc.
COMCAST CABLE COMMUNICATIONS, INC	New Edge Holding Company
Connecticut DataNet, LLC. dba Lighttower Fiber Network	New Global Telecom, Inc
Connecticut Educational Network /CEN	One Communications Corporation
Cox Communications	Ooma, Inc.
CSC Holdings, Inc.	PAETEC Communications, Inc.
Custom Network Solutions	Phone.com, LLC
Cybershore	Prescient Worldwide
Cypress Communications, LLC	Proximiti Communications
DataNet Communications Group, Inc.	Qwest Interprise America, Inc.
Deutsche Telekom AG	RCN Corporation
Direct TV	Reallinx, Inc.
Dish Network	Reliance Globalcom Services, Inc.
DSCI Communications, Inc.	RingCentral, Inc.
DSLnet Communications, LLC	Sage Telecom, Inc
DSLnet Communications, LLC (Megapath)	Saturn Telecommunication Services Inc.
Earthlink	SBC Long Distance, LLC
Echostar	Sidera Networks
Enventis Telecom Inc.	Signal Point Telecommunications Corp.
Ernest Communications, Inc.	Skycasters
Fibertech Networks, LLC	SkyTerra LP
Fionda VOIP, LLC	SkyWay USA
Global Crossing North America, Inc.	Smart Choice Communications, LLC
GlobalPhone Corp.	Software Cellular Network Ltd.
Granite Telecommunications LLC	Spot On Networks
Great Auk Wireless (GAW Communication)	Sprint Nextel Corporation
GreatCall, Inc	Stage 2 Networks, LLC
Groton Utilities	StarBand Communications, Inc.
Harron Communications LP	Stella Communications
Hickory Tech Corporation	Tata Communications (America) Inc.
HNS License Sub, LLC	Telefonica Data Corp SA
Hudson Valley DataNet, LLC.	Telefonica USA, Inc.
Hughes Communications, Inc.	Telesphere Networks Ltd
i2 Telecom International, Inc	Thames Valley Communications, Inc.
IDT Corporation	T-Mobile USA, Inc.
inContact, Inc.	Trans National Communications International
InPhonex.com, LLC	Transbeam Inc.
Interglobe Communications, Inc.	TW Telecom Data Services
Intra Global Communications Inc.	Universal Connectivity

University Corporation For Advanced Internet Development	Vonage Holdings Corp
USAT	Wave2Wave Communications Inc.
VCOM Solutions, Inc	Wholesale Carrier Services
Verizon Business Global LLC dba Verizon Business	Wholesale Carrier Services, Inc
Verizon Communications Inc.	WiiTel Communications Group, LLC
Verizon New York Inc.	Windstream
Verizon Wireless	XO Holdings, Inc.
ViaSat/Wild Blue Communications, Inc.	Yellowspeed
VoiceINC.COM Corporation	Yipes Holdings, Inc
VolPnet Technologies	Zayo Enterprise Networks, LLC
VolPStreet, Inc.	

We have attempted to contact every provider on this master list to assess whether or not the company is currently a broadband service provider. If they could not be reached we also reviewed their web site to see if they were advertising broadband as a service they sell.

Forty-eight (48) Companies stated they do not provide any type of broadband service in Connecticut. Many of these are either national carriers without a Connecticut presence, or they file FCC Form 477 reports because they provide VOIP or Video Teleconference services (but not broadband).

360 Networks	IP Communications, LLC
8x8, Inc.	ITC^DELTACOM Communications
Accessline Communications Corporation	Kosmaz Technologies LLC
Acecape Innovative Networks	M5 Networks, Inc
AlphaStar	Matrix Telecom, Inc
American Fiber Systems, Inc.	New Global Telecom, Inc
Apptix, Inc	Ooma, Inc.
Aptela, Inc	Phone.com, LLC
Bellsouth Long Distance, Inc.	Qwest Interprise America, Inc.
Broadcore, Inc.	RCN Corporation
CIMCO Communications, Inc.	RingCentral, Inc.
Custom Network Solutions	Sage Telecom, Inc
Cybershore	SBC Long Distance, LLC
Echostar	SkyTerra LP
Global Crossing North America, Inc.	SkyWay USA
GlobalPhone Corp.	Software Cellular Network Ltd.
Great Auk Wireless (GAW Communication)	Spot On Networks
GreatCall, Inc	Stella Communications
Hickory Tech Corporation	Tata Communications (America) Inc.
i2 Telecom International, Inc	VoiceINC.COM Corporation
IDT Corporation	VolPnet Technologies
inContact, Inc.	VolPStreet, Inc.
InPhonex.com, LLC	Vonage Holdings Corp
Intra Global Communications Inc.	Yellowspeed

After investigation twenty-eight (28) companies turned out to be a company Doing Business As (DBA) or a legal holding name 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.
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AT&T Services, Inc.	Harron Communications LP
Broadwing Communications, LLC	Hudson Valley DataNet, LLC.
Cablevision Lightpath CT	Hughes Communications, Inc.
Cablevision Lightpath, Inc.	Lightyear Network Solutions LLC
Cellco Partnership	MetroPCS
Clearwire	New Cingular Wireless Services, Inc.
COMCAST CABLE COMMUNICATIONS, INC	Saturn Telecommunication Services Inc.
Connecticut DataNet, LLC. dba Lighttower Fiber Network	Thames Valley Communications, Inc.
DataNet Communications Group, Inc.	Verizon Business Global LLC dba Verizon Business
Deutsche Telekom AG	Verizon Communications Inc.
DSLnet Communications, LLC	Wave2Wave Communications Inc.
DSLnet Communications, LLC (Megapath)	WilTel Communications Group, LLC
Enventis Telecom Inc.	Yipes Holdings, Inc

Thirty-seven (37) companies reported that they are strictly resellers (which per the NTIA program requirements are not being included in this submission).

Access One, Inc.	One Communications Corporation
ACN Communication Services, Inc	PAETEC Communications, Inc.
Airespring, Inc.	Prescient Worldwide
American Fiber Network, Inc.	Proximiti Communications
Bandwidth.com, Inc	Reallinx, Inc.
BCN Telecom, Inc.	Smart Choice Communications, LLC
BullsEye Telecom, Inc.	Stage 2 Networks, LLC
Caused Based Commerce Incorporated	Telefonica Data Corp SA
Cypress Communications, LLC	Telefonica USA, Inc.
Direct TV	Telesphere Networks Ltd
Dish Network	Trans National Communications International
Earthlink	Transbeam Inc.
Ernest Communications, Inc.	TW Telecom Data Services
Fionda VOIP, LLC	USAT
Granite Telecommunications LLC	VCOM Solutions, Inc
Metropolitan Telecommunications Holding Company	Wholesale Carrier Services
Network Billing Systems LLC	Wholesale Carrier Services, Inc
Network Innovations, Inc.	Windstream
New Edge Holding Company	

Twelve (12) 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.	Light Tower Fiber Long Island, LLC
American Telephone Company LLC	Meriplex Communications, Ltd.
Birch Communications	Sidera Networks
Boston Telephone	Signal Point Telecommunications Corp.
DSCI Communications, Inc.	Universal Connectivity
Interglobe Communications, Inc.	University Corporation For Advanced Internet Development

Thirteen (13) Broadband providers submitted new or updated data for the Fall 2014 submission:

AT&T Inc.	Charter Communications
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Cogent Communications, Inc.
Comcast
Connecticut Educational Network /CEN
CSC Holdings, Inc.
Level 3 Communications, LLC
MegaPath/Covad Communications Group, Inc.

Sprint Nextel Corporation
T-Mobile USA, Inc.
Verizon New York Inc.
Verizon Wireless
Zayo Enterprise Networks, LLC

Eleven (11) 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.
Cox Communications
Fibertech Networks, LLC
Groton Utilities
HNS License Sub, LLC
MetroCast Communications of CT

Reliance Globalcom Services, Inc.
Skycasters
StarBand Communications, Inc.
ViaSat/Wild Blue Communications, Inc.
XO Holdings, Inc.

Summary of Submissions Provided to NTIA

For the Fall 2014 submission (S10), approximately 54% of the state providers submitted either entirely new or revised data sets. This is a slightly higher percentage of updated data sets than we saw in the last submission.

The following table summarizes the total number of providers that were identified in each submission, the number that provided new data, and the percentage that each represented:

#	Submission	Total # of Providers	# Providers that Provided Data	# Providers that Submitted New Data	% of Total New Data
1	Spring 2010	17	17	17	100%
2	Fall 2010	28	25	13	46%
3	Spring 2011	33	27	14	42%
4	Fall 2011	30	27	18	60%
5	Spring 2012	26	26	17	65%
6	Fall 2012	28	28	17	61%
7	Spring 2013	26	26	15	58%
8	Fall 2013	29	29	19	66%
9	Spring 2014	26	26	13	50%
10	Fall 2014	24	24	13	54%

In general, the submission 10 processes followed the same basic approach that was used in the previous submissions. The following section of this document summarizes the process that was followed that included the following steps:

- Submission 10 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
- CAI Data check

SUBMISSION 10 PROCESSING ASSUMPTIONS

Based on NTIA feedback and information provided by NTIA during webinar sessions that were held the submission 10 data processing workflow was 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. Unfortunately a low number (33%) of the providers provided this data to us. When provided 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 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 these 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 served 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 10 Provider data model is currently based on the NTIA May 22, 2014 data package.
8. There were no changes made to the data model for this submission.

SUBMISSION 10: REFERENCE DATA

This section describes the reference data used in submission 10.

BLOCK REFERENCE SETUP

For Submission 10, 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 S10. 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 10: PROCESSING OF NEW DATA

For submission 10, we started data collection on July 1, 2014 by sending out data update requests and technical data specifications to all providers. This incorporated all the NTIA changes released as of June 30, 2014. These were sent to a large list of companies that 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 9. We contacted them after the due date a few times but for five providers, we eventually had to just reuse Submission 9 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 could 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 closest 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, 4G or LTE in 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, 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 correct 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, it also brought up inside standardized Esri 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 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 the source data correctly. In this submission we continued to use our enhancement to this tool that provides the ability to highlight changes between submission 9 and submission 10. The provider portal also has a suite of markup tools that 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, are then reviewed and applied to the processed data set. This updated data set goes back through a quality review process, 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 set 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 that 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 ninth 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 deliver it to 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 Connecticut Education Network's (CEN) database. CEN services many schools, colleges, and libraries in the State. 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.

The last check that was performed was to review the two CAI datasets provided by NTIA on September 17, 2014 and September 18, 2014 that identified schools and libraries that had data that NTIA thought was inconsistent with data it had from the FCC's E-rate map program. In Connecticut's case there were no schools or libraries on the list provided by NTIA that had been identified for correction so no action was required.

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 from 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.

As previously mentioned 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. A typical deployment is where CEN may supply the board of education's office with a 100mb 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 100mb available to the school, but reporting that speed at each school would overestimate how much connectivity they have in total. In some cases there may be as many as 15 physical schools sharing that same uplink.