

Oklahoma Broadband Mapping

Data Submission Methodology Report

October 1, 2014



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1 Introduction

This report is submitted along with the tenth data submission for the Oklahoma Broadband Mapping Project. This submission includes all data collected to date per the requirements of the National Telecommunications and Information Administration (NTIA) State Broadband Data and Development Grant Program (Docket No. 0660-ZA29) Notice of Funds Availability (NOFA) and formal and informal clarifications to it. Specifically, it includes broadband data collected from broadband providers and community anchor institutions data compiled from various sources for the State of OK. The State of OK has retained a mapping contractor, The Sanborn Map Company to perform the work related to the Mapping Grant for this project. Data from the previous submission is now publicly accessible via the OK Broadband Program (<http://broadbandmapping.ok.gov/>).

This document is a supplement to the nine previous reports submitted with previous data submissions on May 1, 2010, October 1, 2010, April 1, 2011, October 1, 2011, April 1, 2012, October 1, 2012, April 1, 2013, October 1, 2013, and April 1, 2014. Therefore, it builds on the documents provided with those submissions. Rather than repeat the contents of the previous reports, this document makes incremental updates on various topics where changes have been made in the methodology or reiterates the methodology used. Please refer to the previous documents for further details.

2 Overall Project Status

2.1 DATA COLLECTION

This section details data collection related to NTIA deliverables which include broadband data and community anchor institution data.

2.1.1 Broadband Data

For this submission, Sanborn started data collection efforts on July 1, 2014 by sending out data update requests. These were sent to a large list of companies which were compiled from multiple lists (FCC Form 477 Filers, State Level, as of June 30, 2013 (as submitted in filings made or revised as of January 9, 2014), Wireless Internet Service Providers Association (WISPA)), Rural Utilities Service (RUS) website, and from any providers that were identified through other sources such as web research, planning meetings, State outreach, etc. Sanborn also uploaded the final data for each provider in NTIA format from the previous submission on the Sanborn provider portal. The providers were encouraged to use the provider portal and update their information on it.

We followed the same contact and follow-up protocols as the previous submissions. In brief, this involved following up with already participating providers after sending them a letter requesting data updates. For newly identified providers, we contacted them three additional times and offered any/all support to make this as easy as possible. We provided a due date for submission but worked with providers who needed more time. If participating providers did not submit updated data and did not respond to our efforts to contact them, we reused their last submitted data.

The following are some of the important changes or no changes:

- 1) We continued to request all providers to provide us their speed information in mbps rather than as a speed tier. We did this in order to better validate the data, analyze served/underserved, and identify the breakdowns in speeds within a given tier. However, we have found over the last few submissions; this has caused some confusion between what we are asking for (speeds in mbps) vs. typical speeds. Given that many providers are not providing this information, it is hard to use the data effectively for analysis.
- 2) As in the previous submission, we also requested fixed wireless providers to provide us appropriate information to do propagation analysis. We conducted propagation analysis for one provider (AirLink) this submission. For those WISP providers that provided us the data to accomplish propagation, we used Radio Mobile to do propagation analysis. Propagation analysis results were provided to the providers for review through our provider portal and Google kmz file formats to ensure validation.

- 3) As in the past, we did not include resellers in the submission.
- 4) Due to our NDA restrictions, last mile infrastructure points, if submitted by providers, are not being submitted to NTIA. Likewise, address points are not included in this submission for any provider.
- 5) Like last submission, we emphasized identifying providers that were business only and this submission (like the previous one), we did not get many providers that broke down the type of service by blocks or road segments. If the provider stated they only serve business to business customers did we filled in the "category of end user" with a code of 2, or if they told us specifically that they serve only residential, we used a code 1. Those that did not confirm their end user codes, we verified online and those we couldn't, we calculated as a 5 unless we knew from other sources that they needed to be something else.

There are four providers in OK who are identified as serving primarily business customers. These are:

- a. Cogent Communications, Inc.
 - b. Level 3 Communications, LLC
 - c. TW Telecom of Oklahoma LLC
 - d. XO Communications, LLC
- 6) This submission is being made based on the NTIA data model as of May 22, 2014 provided by NTIA.
 - 7) 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 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 spectrum, but delivering different underlying technologies such as 3G, 4G, or 4G LTE. In this case a continuous polygon is being created that represents the area that is offered for both 3G and 4G even if these polygons overlap.
 - 8) Where providers told us to reuse data from the previous submission or did not respond to our data request, we are resubmitting data that was submitted in S9. We have validated their data against new speed test points and other feedback from our Interactive Map. In comparison to previous submissions, this submission, we had a larger percentage of providers who did not provide updated data (see note below) and we are adding that list of providers in addition to the list of non-responders, resellers, and non-providers at the end of the document.
 - 9) This submission, we had a few providers who have significantly reduced their service area. Such reductions are noted in the Change and Correction documents. Significant reductions were seen in areas that were previously served by Century Link and Windstream. Sanborn

contacted both companies several times to confirm that such reductions are valid and both companies confirmed it.

- 10) We have added the following new provider in this submission:
Lake Region Electric Cooperative, Inc.

For this submission:

- 1) We have contacted a total of 223 providers in OK, of which 5 providers were contacted for the first time.
- 2) We have identified 115 potential providers, of which 93 are participating in this map to date and 22 have refused to participate. In addition, 5 providers have not responded to our efforts to contact them and we are not sure whether any of these providers are actual providers or not. A list of the non-responders, resellers and non-providers is provided at the end of the document and all of these potential broadband providers were contacted. Even if some providers were identified as non-providers or resellers in previous submissions, we continue sending out data request letters to these providers in case their status has changed in any way.
- 3) Approximately, 38% of the providers submitted new or updated data whereas for the remaining providers, we reused data from their previous submissions. This is in contrast to 43% of providers submitting new or updated data in S9 and 37% participating in S8. There was a decrease in the number of providers that provided updates this submission even though we made significant attempts to contact them. We are providing a list of the providers that did not update their data this submission at the end of the document.
- 4) We do not report areas of service for providers that have refused to participate or have not responded to our requests for data.

During this submission period, we had the following changes in providers:

- 1) Vyve also acquired Allegiance and Reach Broadband
- 2) Wavelinx acquired Precision Wireless Internet (PWI)

2.1.2 Community Anchor Institutions Data

Sanborn's Community Anchor Institutions process is as follows: Lists of required Community Anchor Institutions were compiled from various sources by Sanborn but primarily from the State of Oklahoma. The data was then processed to meet NTIA requirements for Community Anchor Institutions which involved geocoding where no geographic information was present, except for information on addresses. Once the geographic information was gathered, the information was loaded onto a crowd-sourcing web application that was designed to gather information about broadband subscription and broadband speeds. Through this application Sanborn continues to validate the location point of the Institutions. The Institutions are also asked to take a speed test if they were in the same/correct location while filling out the broadband service information form. In addition, we requested the Institutions to provide information on their Internet providers as well as identifying any additional providers on their forms. Also,

additional efforts to directly contact these Institutions were done by Oklahoma University.

The numbers of community anchor institutions which we define as having technology and speed info in Oklahoma are provided below:

Category	Name	Total in Submission 10	Total with Broadband Information in Submission 10
1	School - K through 12	1915	1758
2	Library	212	198
3	Medical/healthcare	438	305
4	Public Safety	1779	913
5	University, college, other post-secondary	77	46
6	Other community support - government	504	414
7	Other community support - nongovernmental	16	4

The CAI edits in submission10 are due to the following collaboration with Oklahoma University:

- Updated information on address so locations that were previously not include in submission 9 are now included in submission 10.
- Updated information on CAIs which are inactive (so these were removed from submission 10).
- Updated information on a handful of CAIs that had secondary connections. We had removed the secondary connections and kept the primary) for submission 10. This was three locations overall.

2.1.2.1 CAI School / Library Data Corrections

During September, we received feedback from NTIA/E-rate for Oklahoma on schools that were identified as having Fiber. Oklahoma had eleven records that were in question as these schools were showing Other Copper Wire that should be changed to Fiber per NTIA.

ANCHOR NAME	Technology of Transmission	FULL CENSUS BLOCK ID	CAID	Subscribe_Downstream_Speed	Subscribe_Upstream_Speed
CANEY VALLEY ES	Other Copper Wireline	401470013002035	402547001359	ZZ	ZZ
CANEY VALLEY HS	Other Copper Wireline	401470013004013	402547001357	ZZ	ZZ
CANEY VALLEY MS	Other Copper Wireline	401470013004013	402547001358	ZZ	ZZ
CHEYENNE ES	Other Copper Wireline	401299600003539	400750000299	8	ZZ
CHEYENNE HS	Other Copper Wireline	401299600003539	400750000300	8	ZZ
ERICK ES	Other Copper Wireline	400099665002069	401104000525	7	ZZ
ERICK HS	Other Copper Wireline	400099665002066	401104029615	7	ZZ
TALOGA ES	Other Copper Wireline	400439593002076	402943001549	7	ZZ
TALOGA HS	Other Copper Wireline	400439593002076	402943001550	7	ZZ
VICI ES	Other Copper Wireline	400439592001136	403117001727	ZZ	ZZ
VICI HS	Other Copper Wireline	400439592001136	403117029664	ZZ	ZZ

To resolve these issues, Sanborn contacted OneNet to verify that Fiber was provided at these locations. OneNet was able to provide the speed information for all but three of the locations.

Additionally, there was one library that was listed as having Fiber. We contacted the Pioneer Library System to verify that McCloud Public Library did have Fiber to the location. They also provided us the speed information which we applied to the record.

As a side note, there is no place on the CAI data model from NTIA to track which CAIs were updated with subscription information or CAID and which ones were added. However, we are tracking this information on our production databases, should NTIA be interested in knowing what was updated or added.

2.2 DATA PROCESSING

In general, Submission 10 processes followed the same basic approach that was used in earlier submissions. We started with the following base data:

Census Blocks:

For this submission, 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 Segments:

2010 Tiger Line IDs (TLID) was used for data processing for this submission. 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.

All data received went through the following processing steps:

- 1) **Triage:** All new data were quickly reviewed to understand what was received, and in what format. We also made sure we had all the required components for NTIA's data model, such as their FRN and advertised speed information. We also screened for any known issues that we might have seen before (such as Excel 2003 spreadsheets that cut off at 32k row).

- 2) **Ingest:** At this time the data is actually brought into our systems. Each provider is set up with a unique file geodatabase to store their information. Record counts of what was received are logged so that we can validate that we did not drop anything in processing.
- 3) **Data Processing:** In this step, 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. For this submission, we added the 2012 TIGER street data for better geocoding and also created a better geocoding routine for addresses missing zip codes.
 - c. If a wireline provider submits block and road information using Census data, we 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 2 square miles, 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 overlapping polygons with the technology type and spectrum. 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 unique combination of FRN, Block/Road ID, and technology type. If there are multiple records with different speeds, but all else is equal, then we selected the maximum advertised speeds.
- 4) **QC Review:** All data are 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 makes 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 is 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 are posted to a customized web-mapping tool we refer to as the Provider Portal. All providers are notified once their data are available on the site, and given a specified period for review of the data and to 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 enhancements to this tool providing the ability to highlight changes between submission 9 and submission 10. The provider portal also has a suite of markup tools that will allow the providers to edit their data, including adding or removing service areas, and making changes to the data attributes.
- 7) **Comment Processing:** All comments and feedback received from the provider portal is then reviewed and applied to the processed data set. This updated data set goes back through our QA and QC processes, and if time allows, back out to the Provider Portal, for the provider to review and sign off.
- 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 dataset 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.
- 11) **Deliver to NTIA and Publish to Web Applications:** A copy of the Append File Geodatabase is generated to be used in the provider portal web-based application. When verification feedback is received, the individual provider geodatabases are updated. After verification is complete, the Append process, including QA steps, is executed again and then submitted to NTIA.
- 12) **CAI Data:** The CAI data is also reviewed and that is covered in Section 2.1.2 above.

2.3 DATA VALIDATION

Sanborn has continued to perform the same validation on the data as the previous nine submissions (details in previous reports and a summarized version provided below). Some minor updates to the validation process are discussed below.

- 1) QC of the data at various steps – this includes when data are received (triage), when it is processed through the various processing steps discussed above, etc. This submission, there was a lot of back and forth with providers because some of the providers were making large changes. We checked with every provider to confirm that those large changes were not an error.
- 2) Spatial checks against public and commercial datasets
 - a. For Oklahoma, we continued to use the following datasets for validation:
 - i. Exchange Boundaries: for DSL boundaries
 - ii. MediaPrints: for Cable and Fiber boundaries
- 3) Speedtest data and other data collection for verification
 - a. We continue to use speedtest data collected through our interactive map and community anchor data crowd-sourced for validation purposes. No FCC speed tests were available for this submission.
 - b. We also incorporated any feedback we received through the interactive map – this included feedback such as incorrect speeds, incorrect boundaries, missing provider or areas of no service, etc.
- 4) Verification by providers – processed data are uploaded on our Provider Portal for providers to review both the outcome of data processing and any issues that we found in the third-party and crowd-sourced validation. Issues pertaining to a particular provider are highlighted and shown in the portal for that provider only. Issues that are global and cannot be assigned to a particular provider are shown to all providers (e.g. there are no providers in this area, or we tried to get service here and heard x from A provider, y from B provider, etc.). We make additional calls to We also look at any issues that the State has identified and brought to our attention.
- 5) As with previous submissions, we did a significant amount of data validation at the statewide level and used change maps to see if there were any significant anomalies in the data.
- 6) Planning workshops and local validation –
 - a. During this submission, local validation was undertaken by an independent group, the Center for Spatial Analysis at the University of Oklahoma (OU). OU provided outreach staff which worked with community leaders and participated in community-wide events or meetings in targeted rural areas to conduct interviews that resulted in gathering additional validation points. Face-to-face interviewing with business owners and employees of publicly accessible organizations was targeted to rural underserved or unserved areas with limited validation information available. From April through June, data points for validation were

- collected through traditional mail service, online, telephone and face-to-face survey methodologies. OU also encouraged individuals interviewed to refer others to take the online survey.
- b. Sanborn provided last submissions non-confidential data to the University of Oklahoma Center for Spatial Analysis for additional verification. Any conflicts noted in the data by OU based on outreach done by them are confirmed as valid by Sanborn and then given to the provider to validate/correct via Sanborn's provider portal.

2.4 SUBMISSION 10: NTIA DATA MODEL SCHEMA CHANGES

The latest data model released was released on May 22, 2014 and was the same as the previous data model. There were no changes in the data model to the best of our knowledge.

2.5 UNIVERSE OF CONTACTED PROVIDERS/NON-PROVIDERS

We have contacted a total of 223 providers in OK of which 5 providers were contacted for the first time.

We have identified 115 potential providers, of which 93 are participating in this map to date and 22 have refused to participate. In addition, 5 providers have not responded to our efforts to contact them and we are not sure whether any of these providers are actual providers or not. A list of the non-responders, resellers and non-providers, and providers who did not update their data this submission is provided at the end of the document is provided at the end of the document. All of these potential broadband providers were contacted. Even if some providers were identified as non-providers or resellers in previous submissions, we continue sending out data request letters to these providers in case their status has changed in any way.

2.5.1 Non-providers

4D Networks Corp.
ACRS 2000, Inc.
Blossom Telephone Company, Inc.
Cable West
Charter Communications
COMCAST CABLE COMMUNICATIONS, INC.
Cyber Rover
Enhanced Communications Group LLC
Fulltel
INETmax
IO-2 Services
KoehlerPro Wireless
LightEdge Solutions Inc.
Magic Wireless Internet Service Providers LLC
McLeod USA Telecom Services Inc. / PaeTec Corp
MEDIACOM LLC

OKC Broadband (Ideal Advertising Inc.)
OneLink Wireless
OneNet
Pavlov Media
PCS Internet Services
PRIDE Network, Inc.
Qwest Communications Company, LLC
RuralOK
Stouffer Communications / Granby Telephone
Stratos Offshore Services Company
Telovations, Inc.
Texhoma Wireless
The Internet Shop
Tulsa MetroNet
United Wireless Communications, Inc.
UnplugUSA
UTPhone Inc.
VectorLink
Verizon Business Global LLC dba Verizon Business
Vidia Communications, Inc.
Zayo Enterprise Networks, LLC

2.5.2 Resellers

Broadview Networks Holding Inc.
BullsEye Telecom, Inc.
Earthlink
Enventis Telecom Inc. / Hickory Tech Corp
eVolve Business Solutions LLC/Cincinnati Bell Inc.
Global Crossing Telecommunications Inc.
Greenfly Networks, Inc.
Intellectrace, Inc.
LocalNet Corp.
Logix Communications, LP
Metropolitan Telecommunications of Oklahoma, Inc.
Network Innovations, Inc.
New Edge Network, Inc.
NewRoads Telecom
Optimum
Reallinx, Inc.
Telefonica USA, Inc.
TulsaConnect
USA Digital Communication Inc.
Westel, Inc.

2.5.3 Non-Responders/Difficulty Contacting

eConnect
HDR Internet Services/ OnALot.com
ms bit
Onlineok.com

Utopian Wireless Corporation

2.5.4 Not-Participating

360 Communications
Atlas Telephone Company
Buford Media Group, LLC
CSWEB.NET
DataFlys
EasyTEL Communications
Flash-Link Internet Service
Horizon net
KPowerNet, LLC/KAMO
Lakeview Cable
LRC Group
Meetpoint Networks
Meriplex Communications, Ltd.
Picks Communication
PriceNET Wireless
RecTec
Sooner Wireless
Summit Digital, Inc.
Tahlequah Cable/WEHCO Video, Inc.
University Corporation for Advanced Internet
Upperspace.net
WPS, Inc.

2.5.5 No Updates to Data (Provider Confirmed)

Arbuckle Communications
Beggs Telephone Company, Inc.
Canadian Valley Telephone Company
Carnegie Telephone Company
Central Cellular LLC / dba COTC Connections
Central Oklahoma Telephone Co., LLC
Chickasaw Telephone Company
Cimarron Telephone Company / MBO Corp
Cox Oklahoma Telecom, LLC
Craw-Kan Telephone Cooperative, Inc.
Cross Cable LLC / Cross Telephone Co
Cross Telephone Company
Cross Valliant Cellular dba Sprocket Wireless
Cross Wireless / Sprocket Wireless
DCM – Del Nero Communications Management – WIMAX
Dobson Telephone Company
Elkhart Telephone Co., Inc.
Grand Telephone Company
Hinton CATV (THE) / Hinton Holding Co
HNS Licensed Sub LLC / Hughes Comm Inc.
KanOkla Communications Inc / KanOkla Tele Assn
Lavaca Telephone CO / Pinnacle Communications

Martineer.net
Oklahoma Western Telephone Company
Oklatel Communications, Inc.
Ozark Telephone Company / Seneca Telephone Co
Panhandle Telecommunication Systems Inc.
Plainsnet, LLC
Pottawatomie Telephone Company Inc. / MBO Corp
Seneca Telephone Company
Shidler Telephone Company
Skycasters
South Central Telephone Assn.
Southwest Oklahoma Telephone Company
Totah Communications, Inc.
United States Cellular Corporation / Tel & Data Sy
United Telephone Assn Inc
Valliant Telephone Company
Valnet

2.5.6 No Updates to Data (Provider Unresponsive)

Advanced Automation LLC (NEOKNET)
Atlas Broadband
Broken Bow Cable
Cable One, Inc.
Cherokee Telephone Company
Get Real II LLC / Get LLC
HTS Wireless/Hudson Technologies
Jab Broadband
Medicine Park Telephone Company
Omega 1 Wireless
Pine Telephone Company
Resonance Broadband
RuraliNet LLC
Southwest Oklahoma Telecommunications, Inc.
StarBand Communications Inc.
Taloga Cable
Vaxeo Technologies, LLC
Wichita Online Inc.
XO Communications Services, Inc.