Technical Whitepaper
Arkansas Broadband Data Submitted for October 1, 2013 to NTIA

Submitted By Connect Arkansas

Connect Arkansas

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

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

Identification of Broadband Providers

As of September 1st, 2013, Connect Arkansas has identified by Holding Company name Seventy-Nine (80) Broadband Providers in the state of Arkansas. These providers are identified as having infrastructure in the state and are not identified as being resellers. Of these providers, Seventy-Two (72) submitted to Connect Arkansas at least partial data to map coverage. Of the remaining seven (7) Broadband Providers, six (5) have agreed to provide data in the future.

Data Collection and Processing

For the Fall 2013 data set all providers were contacted first via mail, then email, and finally with telephone calls to the point of contact for each company. Twenty-Five (25) companies updated coverage information as far as speed or coverage area. Twenty-Five (25) participating Broadband providers chose to display data as unchanged from the Spring 2013 NTIA Data Submission. Thirty (30) participating Broadband providers either were unable to update coverage information by deadline, or were unresponsive for this round of data collection.

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

ArcGIS Shape files
AutoCad DWG files
Adobe PDF files
Tab delimited files of Address Ranges
Tab delimited files of Addresses
Physical maps of coverage
Tower information for propagation
Shape files were easily formatted to conform to standards in the SBI Data Model.

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

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

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

In census blocks greater than 2 square miles, that also have had address points have been completed by Arkansas Geographic Information Office, Connect extracted and submitted the address points that corresponded to the adjacent street segments as produced based on the Broadband Provider's submitted data. Please note that at this time the Address Point base set for Arkansas is still under construction by Arkansas Geographic Information Office.

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

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

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

Community Anchor Institution data is information received from 3rd party sources in regards to institutions as outlined in the NOFA. The data collected for Public Safety and Health locations was compiled from phone surveys to each location. In some cases difficulties were presented in finding a suitable technical point of contact to collect information. Only Community Anchor Institutions that could be geolocated were included. Arkansas School data was received by Connect Arkansas from

Arkansas Department of Information Services and Arkansas Science and Technology Authority via Arkansas Geographic Information Office in July, 2013. Updated Library information was received September, 2013 from Arkansas State Library. In cases where phone surveys found additional connections or higher speeds this was submitted. Connect Arkansas is also including commercial locations with publically available broadband (typically via WiFi).

Verification Processes

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

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

General Notes

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

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

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

Several Cable companies in Arkansas currently report technology of DOCSIS 3.0, although the max speeds offered are well below the capabilities of the technology. This has been confirmed with the providers via in office visits, telephone conversation, email, or by letter. The reason for this is the lack of demand for higher speed tiers in their locations. The providers that fall in this category are Clinton Cable Inc., Comcast, Conway Corporation, Fusion Media, Ritter Communications, and Suddenlink.

In the past the Check Submission Tool also flagged Warnings for several DSL providers that offer speed tier 7 for DSL. These providers AT&T, PGTelco, Ritter Communications, TDS Telecom, & Yelcot Telephone all confirmed offering 10 Mbps or higher speed offerings via DSL. In some of these cases, for example AT&T Uverse (high speed variant of ADSL implementing Fiber to the Node (FTTN)) speeds much higher than 10 Mbps are available. Also flagged for Warning was the T-Mobile's offering of speed tier 7, via HSPA+ 42 networks in limited areas. This technology is advertised to support speeds between 10Mbps to 27Mbps in some markets.

Warning flags have also been returned for Community Anchor locations that have Wireless technologies as the primary source of Broadband access. These results were from phone surveys conducted summer 2011, and have not been confirmed via survey due to budgetary concerns. This data will be verified in future surveys. However it is notable that in several communities in Arkansas it is not uncommon for an exchange of services in regards to Broadband access to take place. Fixed

Wireless providers in some cases will provide service to municipal structures such as court houses and fire stations in return for access to infrastructure such as water towers, for placement of broadcast antennas.

A satellite entry for ViaSat was flagged with a warning for speed tier 8, however ViaSat's Exede Service is advertised as "Up to 12 Mbps Downstream" on www.exede.com.

The large number of Broadband Providers Submitted Maximum Advertised Speeds at the MSA/RSA level, or overall coverage areas which in some cases represent a large portion of land, in some cases several counties. At the direction of Andrew MacRae (Fall 2011) with NTIA, Connect Arkansas has pushed these speeds down to the census block and road segment level. Some inaccuracies can be seen in the data as actual Maximum Advertised Speeds in some cases vary from zipcode to zipcode in some cases. Also at the direction of Andrew MacRae (Fall 2011), in the case of large providers, Connect Arkansas attempted to obtain the max advertised speeds from the Broadband Providers' websites; the results of which follow:

CenturyLink

CenturyLink provide a system to check availability and speeds at address level. CenturyLink's system allows users to select city, street, and address in sequence via drop down lists. After making these selections the user is brought to page that display Max Available Download speeds for that address. Upload speeds are not mentioned. The download speed is then recorded in the spreadsheet that has been provided for this purpose.

This process captured roughly half the cells. The remaining cells were then checked to see if there were duplicates in the spreadsheet and then filled in by researching the city associated with the ZIP code and checking it against the list of cities CenturyLink provides and filled accordingly. This process still leaves some ZIP codes with the appearance of being unserved. The speeds for these remaining areas were then based on speeds submitted on the MSA/RSA level.

Windstream

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

Cox

The representative from Cox Communications specifically said the speeds were consistent across their coverage area.

Allegiance

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