State of Arizona



Arizona Broadband Assessment Project (AZ BAP)

Methodology White Paper Excerpts

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Note: For more project methodology details as well as in-depth maps and statistics, see the full AZ BAP Methodology White Paper 2014_Fall, as well as the AZ BAP Arizona Broadband Coverage Report 2014_Fall and AZ BAP Arizona Broadband Coverage County Addendum 2014_Fall documents.

Submission 10 - October 1, 2014

For Fall 2014

Arizona Broadband Assessment Project (AZ BAP) Overview

The purpose of the Arizona Broadband Assessment Project (AZ BAP) is to identify both the availability and speed of broadband services, the location of broadband infrastructure throughout Arizona including middle mile infrastructure, and the presence and characteristics of Community Anchor Institutions (CAIs). This project is provided through the American Recovery and Reinvestment Act of 2009 (ARRA) and the Broadband Data Improvement Act (BDIA), and in conjunction with the National Telecommunications and Information Administration (NTIA) and the Federal Communications Commission (FCC). AZ BAP is managed by the Arizona Strategic Enterprise Technology Office (ASET) under the Arizona Department of Administration (ADOA), in partnership with the Arizona State Land Department (ASLD), contractor Data Site Consortium, Inc. (DSCI) and their GIS subcontractor, TerraSystems Southwest (TSSW).

Submission 10 for Arizona broadband availability and the associated CAI data set was duly submitted to NTIA prior to the October 1, 2014 deadline. Fall 2014 was the tenth and final of the scheduled semiannual submissions by the State of Arizona and serves to capture and reflect broadband availability and conditions in the field as of June 30, 2014. See the complementary **Arizona BAP Broadband Coverage Report for Fall 2014** for details of the submittal along with statistics and maps of Arizona broadband coverage data in this submittal.

There are several ongoing **Digital Arizona Program (DAP)** initiatives at the state level. The **Arizona Broadband Map** (<u>http://www.digitalarizona.gov/Maps/Arizona_Broadband_Maps.html</u>) offers interactive insight to broadband coverage across the state and the community planning version integrates substantial demographic and economic data to aid policy analysis and planning. DAP continues to gather crowdsourced speed test data through their **Arizona Broadband Speed Test** as well as under contract with **Mobile Pulse** for wireless results and in partnership with EducationSuperHighway (ESH) for focused K-12 speed testing. DAP has made substantial progress in gathering and verifying Community Anchor Institution (CAI) data across education, libraries, healthcare, and public safety domains into a rich data set. Further, DAP has partnered with the Governor's office, Arizona Ready, and the State Department of Education to analyze and plan remediation of critical K-12 broadband gaps and deficits.

As the wind-down of the NTIA grants approach, Arizona has developed a plan for sustaining the benefits and capabilities that were supported by the grants. Broadband mapping will continue in partnership with the AZGEO GIS Clearinghouse utilizing FCC 477 broadband data and a sophisticated public GIS analysis and planning tool. As a result of broadband planning efforts, communities throughout rural Arizona are now actively engaged in conversations with their stakeholders and providers about how to encourage new investments in broadband infrastructure. Educators throughout the state have been engaged to help remediate the significant shortfall in availability of broadband capacity that is available (or actually purchased) for many schools.

By revamping a new statewide contract for the purchase of carrier and broadband services a long term legacy has been created that will facilitate the creation of geographic consortia of CAIs who will have increased buying power for these services in poorly served rural markets. By making contract terms more conducive to infrastructure investment by providers the new state contract is expected to create new broadband service markets for existing and new providers, especially in these rural areas.

With the progress made these past five years under the NTIA grants and by better understanding details of where Arizona is regarding broadband coverage and capacity today, the roadmap to a better broadband future now has a platform on which to rest.

Arizona Broadband Policy Initiatives

We have been engaged as partners in various Arizona broadband grant related initiatives, some of which are described below:

The State of Arizona, through the Arizona Strategic Enterprise Technology Office (ASET - <u>http://aset.azdoa.gov/</u>), continues to define and develop an array of broadband policy and planning initiatives including a Digital Arizona Council (DAC) comprised of government, institutional, and private sector participants. The ASET team has involved many in the broadband provider community in discussing Arizona broadband deployment issues and working towards creative and effective solutions. There are six established DAC Task Forces. The DAC Strategic Planning Task Force developed a draft Arizona Broadband Strategic Plan that can be found in three versions of varying length at <u>https://digitalarizona.az.gov/dac-strategic-broadband-plan</u>. ASET engaged WestGroup Research (<u>http://www.westgroupresearch.com/</u>) to interview Digital Arizona Council (DAC) members and further survey the extended community of engaged stakeholders.

ASET has continued to evolve the Arizona Broadband Project Portal also hosting the Digital Arizona Project (DAP) content and resources at <u>http://www.digitalarizona.gov/</u> for this project as well as other broadband initiatives. Due to emerging ADOA standards for State of Arizona agency websites, the DAP site was recently converted to a Drupal implementation to be compliant with State standards, incorporating an improved graphic design, user interface, and navigation.

In March 2013, ASET launched an Arizona broadband speed test and associated campaign designed to gather critical broadband metrics and serve the public. Arizona licensed the core speed test capabilities from Ookla and created a portal for end users to test their connections, answer some mandatory questions, and optionally answer additional survey questions. The speed test and associated survey was promoted during its first six months by the Arizona State Lottery system to obtain actual performance numbers from users who access the Lottery website. The non-profit Arizona Telecommunications and Information Council (ATIC - http://arizonatele.com/), donated several iPads as prizes randomly awarded among those who took the speed test and the survey. The Arizona Department of Education (ADE) has been soliciting participation from all Arizona teachers and staff personnel complemented by marketing efforts of the community broadband consultants and other partners. The available records are processed and geocoded for use in verification. However, many are not able to be geocoded as addresses because they are incomplete/unsatisfactory or an intersection or nearby landmark were entered by the end user.

In order to enhance the breadth of sources available for gathering speed test data, ASET has contracted with Mobile Pulse, Inc. (http://www.mobilepulse.com/), who provides tools for mobile broadband measurement and analytics. The Mobile Pulse app is installed on mobile devices to periodically collect network performance data in the background and securely sends it to Mobile Pulse. Gathered data is analyzed and clearly presented on a web-based dashboard featuring detailed maps, comparisons and reports, as well as being made available for download for post processing and analysis. A campaign to enlist participation by the public safety community, by other select communities, and by the general public is pending. It is anticipated the complementary State mobile speed testing results will become available in great abundance and considerably enhance mobile verification and policy analysis capabilities in the future.

In order to make effective decisions in upgrading every school to a high-speed Internet connection, administrators and policy makers need information about the state of Internet infrastructure in schools today. ASET has joined with EducationSuperHighway (<u>http://www.educationsuperhighway.org/</u>) who is currently outreaching to Arizona's K-12 schools and school districts and getting teachers and students to run multiple speed tests. Their SchoolSpeedTest is being used by K-12 schools around

the country to create a database of the available bandwidth in America's classrooms. The online application measures the bandwidth actually experienced in the classroom by teachers and students. Since those results are inherently associated with the named institutions and shared with the State, it is anticipated they will provide significant benefit to our verification and policy analysis capabilities in the future. ESH is also capturing and digitizing E-Rate Item 21 submissions for K-12 connection types, speeds, and costs which will be used internally for policy analysis and planning, as well as brought into a public map portal. A secondary purpose is to provide the FCC with data for a new national school connectivity map.

The Arizona State Land Department (ASLD) is maintaining the related Arizona Broadband Map at http://broadbandmap.az.gov/map/ loaded with the most recent broadband data set. Additionally, there is a special Community Planning version of the broadband map available at http://broadbandmap.az.gov/CommunityPlanningMap/ and loaded with demographic data and special analysis tools that will aid community broadband analysis and planning. An internal secured variant of the Community Planning map holds additional provider confidential and proprietary information primarily related to middle mile infrastructure utilized for policy analysis and planning processes. These tools are designed to mutually serve both Arizona's broadband consumer and provider consumers to provider web sites and information about their broadband offerings, hopefully becoming an important tool in the BPs' marketing efforts. A variety of documentation and demonstration videos have been developed to support end user learning and use. The underlying broadband information is made publicly available as both Esri shapefile layers and KMZ files.

ASET has contracted with Arizona State University (ASU) Institute for Social Science Research's GIS Services (www.asu.edu/gis) to produce a new platform for State broadband and demographic mapping data with a sophisticated planning view optimized for ease of use with a broad set of visualization and analysis capabilities. A series of interface and capability enhancements have been identified and proposed for potential follow-on development. The intent is for this new platform and view to replace the current State broadband mapping portal, which uses Esri ArcGIS Viewer for Flex, and further provide a flexible platform for other mapping datasets and applications in the broader Arizona GIS community. The new interface accesses the same data sets and a variety of additional contributed and open source ones, but in a more user-friendly and flexible manner. In the future, primary Arizona broadband coverage data will be utilized from broadband provider submissions under the FCC revised Form 477. Two screen shots of the user interface are shown on the following page.

Following the conclusion of the federal grant, sustainability will be provided by consolidating the Arizona broadband website with the Arizona Geospatial Clearinghouse (AZGEO) being developed under the auspices of the Arizona Geographic Information Council (AGIC) (<u>https://arcgis2.geo.az.gov/agic/</u>). This will synergize the broadband data with massive GIS and demographic data sets that are curated by government agencies at the city, county, state and federal levels, as well as by universities and open sources. A full set of role-based and individual access authorization and granular privileges will be available.

Cluster of Contiguous Rural Communities Showing School Locations and Reported Broadband Speeds

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Same Clusters Showing Census Blocks with Broadband at Various Speeds



Arizona's rural communities have been receiving Community Broadband Planning and Technical Assistance help under the NTIA grant for some time. ASET and its contractor, the non-profit Arizona Telecommunications & Information Institute (ATI Institute - <u>http://aztii.org/</u>), qualified and approved a cadre of consultants from which several were selected by regional government coalitions to provide broadband gap assessment, strategic planning, technical assistance, and grant writing, broadband training and assistance across Arizona's rural areas. Regional broadband steering committees have been formed with broad participation among regional economic development, educational technology, transportation, government IT, healthcare, and public safety stakeholders. Round 1 activities were completed in all four rural regions of the State in 2013. Further Round 2 activities were completed in all four rural regions of the State in 2014 with a focus on regional transportation infrastructure relative to broadband deployment and a number of specific focus areas or projects within each region. These reports can be found on the DAP website on the Rural Outreach page at https://digitalarizona.az.gov/about-us/rural-outreach.

The Arizona Telecommunications and Information Council (ATIC - <u>http://arizonatele.com/</u>) under contract to ASET produced a full day statewide broadband summit in 2013 and four regional half day broadband summits further engaging regional economic development, educational technology, transportation, government IT, healthcare, and public safety stakeholders in 2013 and 2014. These were coordinated with the ongoing rural regional broadband consulting endeavors and used to deepen public awareness and engagement in broadband matters.



Extensive project documentation and resources have been added to the Digital Arizona Project's (DAP) site (<u>http://www.digitalarizona.gov/</u>). DAP's **Arizona Mapping & Policy Overview** page at <u>https://digitalarizona.az.gov/maps/about-maps/mapping-polices-overview</u> showcases this document, the **AZ BAP Methodology White Paper**, as a good introduction to the NTIA-funded mapping and policy activities. The complementary **AZ BAP Broadband Coverage Report** provides a good high-level view of the statewide broadband statistics and map visuals from the semiannual broadband data

collection. Then there is the **AZ BAP Arizona Broadband Coverage County Addendum** which complements the statewide broadband coverage maps and includes detailed county and population center broadband coverage maps by technology type. Finally, there are links to the online **Arizona Broadband Map** and its underlying data sets in both Esri shapefile and KMZ formats. All reports and data will be updated to the Fall 2014 submittal in the near future.

Further, DAP's **Rural Outreach** page has been recently updated and can be found at <u>https://digitalarizona.az.gov/about-us/rural-outreach</u>. The first document, the **DAP Broadband Grants & Resources Guide**, is a wide-ranging broadband grants introduction and otherwise an extraordinary broadband resource source that is national and international in scope with an Arizona in-depth focus for selected topics. Then there are the deliverables from the broadband Business Case Analysis (BCA) and Broadband Technical Reports, followed by its regional broadband coverage report for Spring 2014 with detailed maps for the counties and population centers, soon to be updated for Fall 2014 data.

An Essential Infrastructure for Information Delivery study was performed by DSCI in the fall of 2011 and produced an Arizona roadmap for reducing barriers based in Arizona law, policy, and rules hindering establishing public rights-of-way as essential infrastructure for information delivery. Herein, we identify the many Right-of-Way (ROW) issues encountered by government, industry, and broadband customers, both commercial and residential and offer up insight on current trends, national policy evolution, and the State of Arizona's opportunities to undertake positive actions where appropriate and practical.

The Essential Infrastructure for Information Delivery study seeded the opportunity for ATIC to develop and drive new legislation, Arizona SB1402, the Digital Arizona Highways Bill, which was passed and signed in the 2012 legislative session. Specifically, the bill expands existing rules governing ADOT's management of State ROW to include transportation-of-information as well as vehicles and to make available conduits in the ROW to private broadband providers on a cost-recovery basis. The result will be more utilization and streamlined access to the ROW for constructing broadband conduits, thereby accelerating and improving availability of broadband services to unserved areas of Arizona. ASET and ADOT are working together to launch one or more demonstration projects deploying fiber conduit along state highways in cooperation with providers to provide critical middle mile digital capacity for mobile wireless backhaul, community fixed wireless delivery, and support of other connectivity needs.

Because of the passing of SB1402 ASET's SBDD program is working closely with our Public Safety Interoperable Communications (PISC) Office which has responsibility for FirstNet planning and outreach. This office also reports to the state CIO and is exploring synergistic ways of using SB1402 to potentially lower the costs of expanding rural backhaul infrastructure for use by FirstNet and also sharing those expanded resources to benefit educational, healthcare, and economic development uses in rural communities.

ASET has developed a Highway Conduit Deployment Prioritization Matrix to support the evaluation and prioritization of the Digital Arizona Program (DAP) Proof-of-Concept demonstrations and support statewide conduit buildout staging and sequencing processes. The Prioritization Matrix tool assists the decision making process by analyzing some 90+ individual road segments rather than individual communities as the basis for evaluation. It supplies empirical (data driven) analysis rather than subjective evaluation methods incorporating some 59 prioritization matrix data variables. The Prioritization Matrix supports a Management by Objective (MBO) framework oriented around three high level objectives:

- Highway segment socioeconomic impact (Educ., Health, Public Safety, Econ. Dev. [cell towers, application readiness])
- Highway segment ROI (Scope/Cost [terrain], Ownership, Market Determinants [population, demand, current infrastructure])
- Highway segment interconnect ability (Technology [carrier hotels along segment], SONET Ring viability and redundancy [does it further an interconnect])

ASET and DSCI have had several interns working at ADOT to review land ownership and use along State highways as divided into a number of road segments and capture relevant data and associated documents.



Source: Arizona Strategic Enterprise Technology Office (ASET)

ASET and DSCI have initiated a separate middle mile infrastructure project to identify and aggregate broad and deep information on Arizona's fiber and wireless assets. Building from the NTIA collected middle mile points reported by some providers, we are adding significant additional data on wireless towers from public and licensed sources (GeoTel), fiber pathways from Provider contributed KMZ files and a variety of other public and proprietary sources down to the level of fiber access handholds and regeneration points where practical, and known Central Offices (COs), wire centers, and data centers. Due to the rich mix of data and various constraints on the use of sources, this data can only be used internally for broadband analysis and policy purposes and is currently available to selective staff on a secured variant of the Community Planning map. The current Arizona Department of Administration (ADOA - <u>https://doa.az.gov/</u>) procurement effort underway to establish new long-term Carrier and Broadband Provider Services contracts with multiple vendors require that proposers include detailed facilities, fiber, and broadband infrastructure map in KMZ format, which will yield substantial incremental information for internal use in policy analysis and planning going forward.

An example of a tactical model being developed and promoted in Arizona is where middle mile fiber is available or freshly deployed in highway ROW to feed towers from which mobile and fixed wireless broadband can be distributed to nearby communities and populations.



Digital Arizona Tactical Model Illustration

"Two Highways for Nearly the Cost of One"

Source: Arizona Strategic Enterprise Technology Office (ASET)

Regional broadband planning has introduced an innovative method for leveling the playing field, creating Internet access parity among rural and urban communities, and benefiting the private sector providers. The method involves securing pledges of support from the various stakeholders including the community institutional users, local government entities, broadband providers, Arizona state government agencies, banks and investment institutions, and end users. This can be accomplished at the community level at no additional cost to taxpayers and improve the ROI for broadband providers considering new investments as illustrated below as a cycle of pledges.



Source: Arizona Strategic Enterprise Technology Office (ASET)

The Arizona Department of Administration (ADOA - <u>https://doa.az.gov/</u>) has a current procurement effort underway to establish new long-term Carrier and Broadband Provider Services contracts with multiple vendors. It is expected than an expanded universe of buyers beyond the State Executive Branch agencies will utilize these contracts including education (K-12 and higher education), healthcare, public safety, regional government, and non-profit institutions. New, special accommodations have been added to synchronize with K-12 e-rate cycles, as well as encourage and enable rural broadband investment through longer-term contracts and allowing early termination fees to insure recapture of new network infrastructure investments. The State Procurement Office (SPO) anticipates the vendor proposal evaluations, selections, negotiations, and new contracts will be complete by January 2015 in time for utilization in the next K-12 e-rate cycle. Vendors are required to include with their proposals detailed facilities, fiber, and broadband infrastructure maps in KMZ format, which will yield substantial incremental information for internal use in policy analysis and planning going forward.

Another significant piece of legislation related to broadband in rural areas, SB1353, the telemedicine parity bill, was promoted by ATIC and was signed into law by the Governor in 2013. It requires private health insurers to provide coverage in rural communities for services delivered via telemedicine at a comparable rate to those provided in person. Services covered include trauma, burns, cardiology, infectious diseases, mental health disorders, neurological diseases and dermatology. Significant collaboration between healthcare stakeholders and telemedicine interests built a coalition and solid support for the bill.

During the last legislative session, the Governor proposed Four Cornerstones of Reform, one of which included funding to improve Internet connectivity to Arizona K-12 schools. Based on an annual assessment of \$15 per student, it was estimated that if implemented, some \$100 million would be generated during a six (6) year funding period and applied in such a way as to encourage Internet Service Providers, Telecommunications Carriers, and Network Developers to extend fiber-based network to schools to enable internet services at a minimum of 100Mbps, scaling to 1Gbps over time. This specific proposal didn't make it through the legislative process, however the legislature did create in statute a study committee for educational broadband that is expected to begin meeting by the end of this year or early next year. Analysis of district and schools data rates as well as was the disparity between Arizona and other states such as Utah were and remain motivating forces for improving Internet connectivity for Arizona schools



To Scale

Better Internet For Arizona Education

🗖 ADOA - ASEI

12 Mbps Arizona K-12 Median Data Rate Per K-12 Campus

9/24/14

The State of Arizona recently formally expressed an interest in participating in the Rural Broadband Trials announced at the January 30th FCC Open Meeting anticipated under the Connect America Fund (CAF). ASET identified and offered two separate projects each designed to meet a critical and worthy Arizona broadband need and to provide opportunities suitable for experimental treatment: a project in La Paz County implementing the Digital Arizona Tactical Model utilizing highway ROW fiber, towers, and high capacity point-to-point and point-to-multipoint wireless to connect key community anchor points and in Santa Cruz County in conjunction with Tucson Electric Power (TEP) to connect an isolated network of fiber near Nogales to other network segments reaching to Tucson and incorporating fiber wholesale access from regular breakout points. ASET has analyzed the recently announced FCC program for \$100M in grants for Rural Broadband Experiments (http://www.fcc.gov/encyclopedia/rural-broadband-experiments) and has concluded due to the nature of the call for grant that the State will not directly apply, but rather encourage consideration by qualified entities.

ATI Institute partnered with Microsoft Corporation (<u>http://www.microsoft.com/</u>) and their Shape the Future team to have a Digital Inclusion Economic Impact Model for Arizona executed by their partner The Arnold Group (<u>http://www.the-arnold-group.com/</u>) at no cost to ATI Institute or the State. The model is designed to measure the economic impact of digital inclusion initiatives and has been performed across the U.S. in five states and seven cities to date including Arizona. Now that the statewide study is complete, the tool as provided to ATI Institute can be freely used with local communities by government, consultants, and the communities themselves, so they too can begin to understand the benefits of digital inclusion at a local level.

Primary Logic

- The logic of the economic model is based on the US Federal Reserve Bank report from 2008, that suggests that empowering school aged children with home PC+Broadband access increases their chance of graduating high school by 6-8 ppt¹.
- Primary economic benefits are derived from the 6-8 ppt increase in graduation rates of these affected individuals pursuing higher learning and receiving higher wages.
- The 6-8 ppt is discounted based on other variables such as level of educational infrastructure, current high school graduation rate, existence of PCs in homes, etc.
- As there are likely other members within the household, such as children <5, adults 18-64, and adults 65+, these other household members are also
 potential beneficiaries of this access.



Note: https://federalreserve.gov/pubs/ifdp/2008/958/ifdp958.htm

ASET and ASLD have been committed to using the NTIA grants to realize significant insights to the Arizona broadband environment and to provide real benefits to broadband providers in identifying unserved and underserved markets, easing regulation and right of way issues, and otherwise contributing to robust broadband availability and a favorable broadband provider environment for investment and growth.

As the wind-down of the NTIA grants approach, we have developed a plan for sustaining the benefits and capabilities that were supported by the grants. By merging the broadband database and servers with the new AZGEO GIS Clearinghouse, we have found a funding source that will support the maintenance and continued development of the Arizona broadband database and GIS planning tool. Communities throughout rural Arizona are now actively engaged in conversations with their stakeholders and providers about how to encourage new investments in broadband infrastructure. Educators throughout the state have become painfully aware of the significant shortfall in availability of broadband capacity that is available (or actually purchased) for many schools throughout the state and the disproportionally high cost of doing so compared to other states.

By revamping a new statewide contract for the purchase of carrier and broadband services a long term legacy has been created that will facilitate the creation of geographic consortia of CAIs who will have increased buying power for these services in poorly served rural markets. By making contract terms more conducive to infrastructure investment by providers the new state contract is expected to create new broadband service markets for existing and new providers, especially in these rural areas. By changing the contract terms to harmonize with current and future e-rate supported products and terms, it is expected that large numbers of schools will be able to significantly increase their Internet capacity over the next several years and take full advantage of e-rate reforms.

With the progress made these past five years under the NTIA grants and by better understanding details of where Arizona is regarding broadband coverage and capacity today, the roadmap to a better broadband future now has a platform on which to rest.

Arizona Broadband Map and Coverage

Arizona Broadband Map Overview

The Arizona Broadband Map features two interfaces, one for the general public and another for community planners or more advanced users. Both versions of the map allow substantial flexibility and usability in navigating to, framing, selecting data, and customizing views.

The Arizona Broadband Map (Basic) is a public map at <u>http://broadbandmap.az.gov/map/</u> that provides a detailed and multi-layered map showing the availability and advertised performance of High Capacity Digital Services (Broadband) in the State of Arizona by individual street address or at any point selected. Links are provided to the broadband providers' websites when the provider is identified as one of those serving an address or location.

The Community Broadband Planning Map is also a public map found at

http://broadbandmap.az.gov/CommunityPlanningMap/ and includes a large collection of map layers with a rich set of Spatial Analysis Tools to help community planners make better broadband decisions for their community. The powerful application has Population and Housing data down to the Census Block level. Community broadband consultants have also prepared profile spreadsheets for each Arizona community which are linked from the map and downloadable.

A variant of the Community Broadband Planning Map incorporates both publicly accessible and provider confidential and proprietary information primarily related to middle mile infrastructure and is only accessible by selective project participants through a password controlled portal. The current Arizona Department of Administration (ADOA - <u>https://doa.az.gov/</u>) procurement effort underway to establish new long-term Carrier and Broadband Provider Services contracts with multiple vendors require that proposers include detailed facilities, fiber, and broadband infrastructure map in KMZ format, which will yield substantial incremental information for internal use in policy analysis and planning going forward. Additionally, this internal planning tool will add road and highway Rights of Way (Row) information currently being collected and digitized in cooperation with the Arizona Department of Transportation (ADOT).

Both the Basic and Community Broadband Planning mapping applications use ArcGIS Server Technology from Esri, and are accessible by anyone with an Internet connection. ASET has contracted with Arizona State University (ASU) Institute for Social Science Research's GIS Services (<u>www.asu.edu/gis</u>) to produce a new platform for State broadband and demographic mapping data with a sophisticated planning view optimized for ease of use with a broad set of visualization and analysis capabilities. The enhanced capabilities and planned migration strategy are detailed in the **Arizona Broadband Policy Initiatives** section below.

Arizona Broadband Map Details

The Community Broadband Planning Map was designed to help Community Planners make better broadband decisions for their community and for other advanced users to optimize and exploit the available data. The central idea behind this added map version was to present a set of tools that would help planners identify their study area, find all combinations of Broadband Providers, Service Types and Advertised Download/Upload speeds, and quickly chart out the Population and Housing data showing the number of people, average median age, households, average household size, total area, etc.

What makes Arizona's Community Planning Map unique is the power and flexibility it gives users to perform spatial analysis. For example, users can perform a spatial search to find all the Libraries

within a specific Zip code. Subsequently, a 2-mile buffer can be drawn around a Library to find all the public schools that fall within this 2-mile radius. The Advertised Upload and Download Broadband Speeds and Service Types to these schools can be instantly charted. Further, all the Census Blocks falling within this 2-mile buffer can be selected and their attributes can be exported to a spreadsheet. Users can easily determine the number of people living within 2 miles of a Library; find their average median age, the total number of households, etc.

All of Arizona's Broadband Providers and their associated metrics can be easily viewed and the results saved as a Comma or Tab Delimited File for further analysis. A Community Planner can readily measure the area and perimeter of their community; find the distance from the nearest Central Office, or major road or highway; and quickly view the Broadband footprints of every provider in the vicinity. Spatial Searches can be made based on a Census Block, Census Block Group, Census Tract, Zip code, City or Town, or any arbitrary polygon drawn on the map.

Once a search area is defined, users can easily locate Community Anchor Institutions (CAIs) including Schools, Libraries, Hospitals, Fire Stations, Police Departments, etc., falling within this area and draw buffers around selected features, to continue the spatial search process and preparation of map views with great utility.



Community Planning Map with Selective Widgets Enabled

Some of the latest features added include the capability to build an SQL statement to display the Broadband Footprints of a specific Provider. For example, one can:

- Display the Broadband Footprints of a selected BP such as AT&T Mobility, showing all its speed tiers;
- Further modify the SQL Statement to display only Download Speed Tier = 7, which helps to display just the 4G coverage areas of AT&T Mobility;
- Save SQL Statements to Notepad for later use;
- Build similar SQL Statements to display the 4G coverage areas of some other carrier, such as Verizon; and
- Display the combined 4G coverage areas of AT&T and Verizon.

We were among the first of the states to have this mapping capability to isolate and display Broadband Coverage areas by a given BP and a given Speed Tier and have continued to enhance and evolve these capabilities over time. The screen shot below shows one of the earlier stages of the above example process.



All Arizona Broadband Map layers in Esri shapefile format are made available for use by any interested parties under ArcGIS Explorer Desktop or other GIS platforms/toolsets at http://broadbandmap.az.gov/web/shapes/list.htm with a support document available at http://broadbandmap.az.gov/web/shapes/list.htm with a support document available at http://broadbandmap.az.gov/web/shapes/list.htm with a support document available at http://broadbandmap.az.gov/web/shapes/list.htm with a support document available at http://broadbandmap.az.gov/web/shapes/ArcGIS_Explorer.pdf.

A set of KMZ files optimized for utilization under ArcGIS Explorer Desktop, Google Earth or similar tools are made available for use by any interested parties at http://broadbandmap.az.gov/web/KMZ/list.htm with a support document available at http://broadbandmap.az.gov/web/KMZ/list.htm with a support document available at

Arizona Broadband Map Tutorials

Twenty-four tutorials on how to use various features of the map are available on a dedicated YouTube channel at <u>http://www.youtube.com/user/ArizonaBroadband</u>. In addition to providing instructions on how to use the map they demonstrate functions such as:

- Finding an Address,
- Identifying Broadband Providers,
- Displaying the Map Layers,
- Identifying Community Buildings,
- Buffering Points,
- Graphical and Text Search,
- Spatial Search and
- Using the Select Widget.



Note: For more details and in-depth maps and statistics see the AZ BAP Arizona Broadband Coverage Report 2014_Fall and AZ BAP Arizona Broadband Coverage County Addendum 2014_Fall documents.

Arizona Broadband Coverage Table for Fall 2014

	State	wide	Ru	ıral	Sparsely Pop. Rural		
All Broadband Tech							
(Except Satellite)	Population	Household	Population	Household	Population	Household	
1 or More Providers							
≥ 768 Kbps Down	99.60%	99.60%	97.99%	98.13%	96.08%	96.59%	
≥ 3 Mbps Down	98.97%	98.82%	94.84%	94.40%	89.94%	89.78%	
≥ 6 Mbps Down	98.40%	98.32%	92.00%	92.08%	86.65%	86.74%	
≥ 10 Mbps Down	98.33%	98.23%	91.61%	91.64%	85.88%	85.93%	
All Broadband Tech							
(Except Satellite)	Population	Household	Population	Household	Population	Household	
2 or More Providers							
≥ 768 Kbps Down	98.97%	99.04%	94.84%	95.44%	91.27%	92.47%	
≥ 3 Mbps Down	98.05%	97.89%	90.21%	90.03%	84.60%	84.33%	
≥ 6 Mbps Down	97.14%	96.86%	85.68%	85.18%	78.99%	77.71%	
≥ 10 Mbps Down	96.88%	96.53%	84.34%	83.60%	76.82%	75.28%	
All Broadband Tech							
(Except Satellite)	Population	Household	Population	Household	Population	Household	
3 or More Providers			<u> </u>	<u> </u>			
≥ 768 Kbps Down	98.29%	98.23%	91.44%	91.64%	86.39%	86.88%	
≥ 3 Mbps Down	97.09%	96.85%	85.41%	85.11%	78.77%	78.02%	
≥ 6 Mbps Down	95.44%	94.99%	77.15%	76.31%	70.06%	67.44%	
≥ 10 Mbps Down	94.82%	94.13%	74.71%	73.34%	66.70%	63.15%	
DSL, XDSL &	Population	Household	Population	Household	Population	Household	
Other Copper Tech		00.00%	-	77 700/		00.05%	
2 768 Kbps Down	94.22%	93.89%	77.67%	(1.12%)	65.07%	66.65%	
2 3 Mbps Down	89.86%	89.16%	63.42%	63.35%	49.20%	49.79%	
2 6 MDps Down	03.21% 74.00%	01.90%	50.85%	50.31%	39.14%	39.30%	
2 10 Mbps Down	74.90%	73.40%	41.90%	41.60%	30.52%	29.91%	
Cable Modem Technologies	Population	Household	Population	Household	Population	Household	
≥ 768 Kbps Down	89.37%	88.77%	55.74%	55.69%	31.98%	33.55%	
≥ 3 Mbps Down	89.24%	88.63%	55.27%	55.20%	31.76%	33.24%	
≥ 6 Mbps Down	89.18%	88.57%	54.99%	54.89%	31.39%	32.87%	
≥ 10 Mbps Down	89.18%	88.57%	54.99%	54.89%	31.39%	32.87%	
Fixed Wireless Technologies	Population	Household	Population	Household	Population	Household	
≥ 768 Kbps Down	94.62%	94.30%	75.69%	75.44%	68.01%	67.90%	
≥ 3 Mbps Down	62.17%	63.03%	63.65%	62.70%	54.36%	52.63%	
≥ 6 Mbps Down	53.79%	54.64%	54.33%	54.28%	46.11%	43.95%	
≥ 10 Mbps Down	27.12%	27.85%	48.70%	48.27%	41.50%	39.65%	
Mobile Wireless	Population	Household	Population	Household	Population	Household	
Technologies	Population	nousenoia	Population	nousenoia	Population	nousenoiu	
≥ 768 Kbps Down	98.91%	99.08%	94.52%	95.64%	91.51%	93.30%	
≥ 3 Mbps Down	98.13%	98.08%	90.62%	90.95%	85.86%	86.44%	
≥ 6 Mbps Down	97.72%	97.61%	88.55%	88.70%	82.50%	82.69%	
≥ 10 Mbps Down	97.71%	97.60%	88.53%	88.67%	82.47%	82.64%	
	Population	Household	Population	Household	Population	Household	
Animono Totala	Count	Count	Count	Count	Count	Count	
Arizona Totais (2010 Census)	6,392,017	2,844,526	1,274,234	601,889	651,358	329,022	

AZ BAP Community Anchor Institutions (CAI)

Data for the Community Anchor Institutions (CAIs) resides in many different locations throughout Arizona and were collected from data custodians and/or data integrators throughout the State. Additional federal, public and organizational sources were used as well. This effort has two major components, the identification and geo-location of the CAI entities and the collection of data related to the status of their broadband usage to complete NTIA compliant records as best as possible. We also collect and integrate other demographics and data points of interest to support policy analysis and planning, especially in the educational arena. Both of these components have significant challenges for development and maintenance. The State does not currently have any centralized databases that could serve as a core basic backbone for CAI data development. Thus a sizeable data collection and standardization effort has been undertaken and matured over time. The Arizona Broadband Assessment Project (AZ BAP) provides impetus for one of the first State efforts to consolidate CAI data into one database.

A considerable effort in basic data development working with local government websites and one to one contacts has been required to address some basic aspects of the CAI data collection. Numerous organizations in Arizona maintain locational information regarding some categories of CAI data but these are all of varying formats and currency. In many cases the project has had to assist CAI location data custodians in the update of some aspects of the basic locational data. The Project also is, in most cases, the first time that CAI managers have developed information regarding the level of broadband services for their institutions. This poses a host of challenges regarding a large number of existing processes in many organizations.

Prior to the Fall 2013 submittal, Arizona had not properly included CAIID values generated from federal school and library identification codes, but has completely remediated that issue in the Fall 2013 submittal and this one. A significant number of CAI records were not usable from past submittal cycles due to non-compliant addresses, particularly those with post office boxes, intersections, and rural mailboxes along highways. These non-compliant addresses were largely remediated during the last two cycles, though some work remains for a small residual group. Further focus was given to improving the inclusion and having correct naming of school and library entities, as well as the addition of some limited incremental broadband information, especially for libraries from the mining of e-rate applications that USAC had granted. ASET and DSCI have added a number of additional CAI record elements to the master spreadsheets associated with different categories of CAIs to inform and assist other broadband related processes and policy initiatives.

For the Fall 2014 submittal cycle, the DSCI team focused on further reductions in non-compliant addresses, additional improvements in K-12 broadband information and addition of selected demographics, confirmation and augmentation of public safety CAI information, and the addition of substantial numbers of additional healthcare CAIs, mining data from several licensing or tracking sources. Additional columns were added allowing for the indication of the source for broadband data, geolocation, and other critical elements. The master spreadsheet also makes accommodation for the addition of speed test average results, number of tests, and date range of testing for multiple crowdsourced results sets (State portal, ESH, Mobile Pulse) going forward.

Since the master CAI data set has consistent State and/or federal IDs (or a key record number), a number of separately maintained school, school district, and library spreadsheets used for various policy analysis and strategic planning can be reliably linked to update or exchange data where necessary. A metadata dictionary developed for team reference in CAI data applications can be found in Appendix B.



Note: For more details and in-depth maps and statistics see the AZ BAP Arizona Broadband Coverage Report 2014_Fall and AZ BAP Arizona Broadband Coverage County Addendum 2014_Fall documents.

Arizona Community Anchor Institutions (CAI) Data for Fall 2014

For the Fall 2014 submittal cycle, the DSCI team focused on further reductions in non-compliant addresses, additional improvements in K-12 broadband information and the addition of selected demographics, confirmation and augmentation of public safety CAI information, and the addition of substantial numbers of additional healthcare CAIs, mining data from several licensing or tracking sources. In the Spring 2014 submittal cycle, we performed a comprehensive review and update of public safety CAIs and added over a thousand new Wi-Fi (Category 7) CAIs.

This cycle, additional columns were added to the master CAI spreadsheet allowing for the indication of the source for broadband data, geolocation, and other critical elements. The master CAI spreadsheet now also makes accommodation for the addition of speed test average results, number of tests, and date range of testing for multiple crowdsourced results sets (State portal, EducationSuperHighway, and Mobile Pulse). A total of 10,514 CAI records were developed, reviewed, and maintained of which 10,348 (98%) were able to be submitted (up from 7,827 in the Spring 2014 cycle and 6,299 in the Fall 2013 cycle) as follows:

CAICAT	САІ Туре	Total Records	Federal ID Present	BBService		•
				Yes	No	Unknown
1	School - K through 12	2,932	95.6%	46.4%	0.0%	53.6%
2	Library	231	95.2%	92.2%	0.0%	7.8%
3	Medical/Healthcare	2,497		4.4 %	0.0%	95.6%
4	Public Safety	1,240		40.0%	0.0%	60.0%
5	University, College, Other Post- Secondary	251	25.8%	43.0%	0.0%	57.0%
6	Other Community Support - Government	2,047		44.7%	0.0%	55.3%
7	Other Community Support - Nongovernmental	1,316		99.8%	0.0%	0.2%
Total		10,514				

Changes between Spring 2014 and Fall 2014

Spring caicat	Description	Spring total	Spring IDed	Delta description
1	Public education	3,019	92.9%	Lower number (-87) because of duplicates, miscategorized, and does-not-exist status
2	Library	231	96.0%	Higher number (+2) Added Nogales and Pinetop libraries.
3	Medical/Health	194	-	Higher number (+2,303) because sourced ADHS database and allowed multiple entities at the same physical address.
4	Public Safety	1,238	-	Higher in fall (+2) because of fire entities sourced USFD.
5	Post-secondary	211	-	Higher in fall (+40) because of sourcing from federal IPEDs database and other local sources.
6	Other government	2,051	-	Fewer in fall (-4) because of duplication and non-existence.

NTIA Data Submittal Speed Tier and Technology Codes Table

	NTIA Speed Tier Codes											
		2	3	4	5	6	7	8	9	10	11	
		> 200 K < 768 K	> 768 K < 1.5 M	> 1.5 M < 3 M	> 3 M < 6 M	> 6 M < 10 M	> 10 M < 25 M	> 25 M < 50 M	> 50 M < 100 M	> 100 M < 1 G	>1G	
NTI	A Technology Codes											
10	Asymmetric xDSL		Maximum Upstream Range									
		Maximum Downstream Range										
20	Symmetric xDSL	Maximum Downstream Range										
	Symmetric XDSE		Maximum Downstream Range									
30	Other Copper Wireline	Maximum Upstream Range										
			Maximum Downstream Range									
Cable Modem - DOCSIS			Maxi	mum Ups	tream Ra	ange						
	3.0									Max Down Range		
41	Cable Modern - Other	Maximum Upstream Range										
41		Maximum Downstream Range										
50	Optical Carrier/Fiber to				Мах	timum Up:	stream Ra	ange				
50	End User					Maximum	Downstr	eam Rang	je			
60	Satellite	м	aximum l	Jp Range								
00	Galenite			Maxim	um Dowr							
70	Terrestrial Fixed	Terrestrial Fixed				ange						
70	Wireless - Unlicensed	Maximum Downstream Range										
71	Terrestrial Fixed	Maximum Upstream Range										
~	Wireless - Licensed	Maximum Downstream Range										
80	Terrestrial Mobile	Maximum Upstream Range										
00	Wireless		M	laximum I	Downstre	am Rang	е					
Maximum Upstream Range												
90		Maximum Down Range										

Note: For more project methodology details as well as in-depth maps and statistics, see the full AZ BAP Methodology White Paper 2014_Fall, as well as the AZ BAP Arizona Broadband Coverage Report 2014_Fall and AZ BAP Arizona Broadband Coverage County Addendum 2014_Fall documents.