Connected Nation's Broadband Mapping Methodology

Frequently Asked Questions

As a national 501(c)(3) non-profit corporation, Connected Nation® is focused solely on closing the digital divide. Connected Nation exists to help states, communities, families and individuals realize the great economic and social advantages that occur when broadband availability is accelerated in underserved areas and broadband use is increased in all areas – rural and urban alike.

Through its advanced broadband mapping technology, Connected Nation has been at the forefront of a national movement by state and local leaders to identify and map areas with and without broadband service and to identify and implement aggressive demand-stimulation programs that are designed to increase broadband adoption and encourage network deployment. In 2008, the Wall Street Journal profiled Connected Nation's work as one of the seven best ideas for economic development around the globe (Wall Street Journal, July 28, 2008).

To download and print a PDF of the broadband mapping FAQ, click here.

What does beta version mean?
The words "beta" or "draft" mean that the maps are a work in progress and being continually improved. We strongly encourage the public to help us verify the map's accuracy and notify us if there appears to be a misrepresentation of coverage.

What states has Connected Nation mapped?
Connected Nation created the first statewide broadband inventory map in 2005 in Kentucky. Since then, Connected Nation has created or is in the process of creating broadband inventory maps in states across the nation, including Alaska, Colorado, Florida, Illinois, Iowa, Kansas, Michigan, Minnesota, Nevada, North Carolina, Ohio, Puerto Rico, South Carolina, Tennessee, Texas, and West Virginia.

Who does Connected Nation work with to produce the maps?
Connected Nation begins by forming a public-private partnership with providers and state leaders to implement a mapping strategy for that state. Broadband inventory data is obtained directly from providers, the only reliable source for such infrastructure information, which voluntarily collaborate with Connected Nation through a constructive partnership to ensure their service offerings are accurately represented on the map.

Connected Nation is proud to count as mapping partners more than 1400 providers from across the nation including large multinational firms, local cooperatives and small wireless entrepreneurs using any and all types of available technology to deploy terrestrial broadband, including fixed wireless, digital subscriber line (DSL), cable modem, fiber, mobile wireless and hybrid systems that combine different technologies.

Do large telecom providers have control over the data represented on a state broadband map?
When developing a broadband map in any given state, Connected Nation works with many providers both large and small. For example, in Minnesota, Connected Nation mapped more than 121 providers (large and small). Each provider submits their own data and retains rights to their own data. A provider has no access to and plays no role in processing data from any other broadband provider. Every broadband provider, whether or not it is a formal partner of Connected Nation, has the same level of access to the statewide broadband maps.

Is provider participation mandatory?
Provider participation is voluntary. Connected Nation goes to great lengths building relationships with providers to earn 100 percent participation within a state. Connected Nation has adopted a flexible mapping process to collect data from providers in a variety of formats based on their technical capabilities. Since the majority of broadband providers do not have data stored in any single or standard format, Connected Nation works in the field with providers to understand their data and network structure and help them "translate" this information into a useful GIS format in order to produce accurate availability maps.

How are the broadband data collected?
The data collection is done in accordance with the requirements of the Notice of Funds Availability (NOFA) and subsequent clarifications set forth by the National Telecommunications and Information Administration (NTIA) State Broadband Data and Development Grant Program (SBDD).The process begins by contacting all known providers in the state and providing information about the broadband mapping project. Information on broadband service areas is collected from each willing provider through voluntary participation. A nondisclosure agreement (NDA) is offered to all providers prior to the submission of data; the data protected through the NDA is limited to highly sensitive network infrastructure information, including middle-mile locations. Connected Nation strives to maintain a flexible mapping process in order to be able to collect data from providers in a variety of formats based on providers' technical capabilities and resources.

What types of data are required for the broadband mapping project?
As set forth by the Notice of Funds Availability (NOFA) and subsequent clarifications of the State Broadband Data and Development Grant Program (SBDD), specific data layers illustrating where broadband service is available are submitted to the National Telecommunications and Information Administration (NTIA). The dataset includes layers outlined in the technical appendix of the NOFA, such as broadband service availability by Census Block for those Census Blocks with an area of no greater than two square miles, broadband service availability by road segment in those Census Blocks larger in area than 2 square miles, and the footprint of wireless service providers (including fixed wireless, mobile wireless, and satellite). Additional information provided on service availability includes the technology of transmission, the FCC Registration Number (FRN), and the maximum advertised downstream and upstream speeds. In addition to the broadband service data, information on Community Anchor Institutions is also collected and submitted.

What do providers generally offer in terms of data?
Since the majority of broadband providers do not have data stored in any single or standard format, Connected Nation and its subsidiaries work with providers to understand their data and network structure to help them "translate" this information into a useful GIS format in order to produce accurate service area representations. Connected Nation has adopted a flexible mapping process to collect data from providers in a variety of formats based on providers' technical capabilities and resources. Data can range from ESRI shapefiles, CAD data, spreadsheets, previously existing maps of coverage areas, a list of served Census Blocks and road segments, and everything in between. The level of granularity displayed on the broadband service inventory maps depends on the type of data a provider can make available. After the received data is processed by Connected Nation and its subsidiaries, the representation of the service area is sent back to the provider for review and approval, and revisions supplied as necessary. The approved service area of each provider, whether supplied by a list of Census Blocks where broadband is available or by the actual extent of the broadband served area, is represented on the maps.

How are the broadband data processed?
Broadband service area data is processed based on the format in which it was delivered to Connected Nation and its subsidiaries. Connected Nation has adopted a flexible mapping process to collect data from providers in a variety of formats based on providers' technical capabilities. Since the majority of broadband providers do not have data stored in any single or standard format, Connected Nation and its subsidiaries work with providers to understand their data and network structure to help them "translate" this information into a useful GIS format in order to produce accurate service area representations. Depending on the type of information a provider can make available, data can range from ESRI shapefiles, CAD data, spreadsheets, previously existing maps of coverage areas, a list of served Census Blocks and road segments, and everything in between. Processing these formats into a standard GIS format includes digitization, spatial referencing, service area estimations based on infrastructure locations and capabilities, and other customized processes that depend on the format(s) provided. If a list of the Census Blocks that a provider can service was made available to Connected Nation and its subsidiaries, this should be interpreted to mean that there is broadband service available in that Census Block, rather than the assumption that all addresses in that Census Block are serviced by that provider.

How are fixed wireless broadband service areas processed?
For fixed wireless providers that do not have their footprint in a spatial format to provide to Connected Nation and its subsidiaries, information is collected on the wireless network and the individual towers to create wireless propagations. Information such as tower location, tower height, transmit frequency, azimuth, transmit antenna gain, foliage cover, etc. are collected from providers to serve as inputs into a propagation model. The resulting product depicts a graphical illustration of the theoretical propagation characteristics of a selected frequency range based on the defined variables.

Why are uninhabited or unpopulated areas shown to have broadband service?
Areas within Census Blocks with zero population were not removed from broadband serviced areas as providers have indicated, under the definition of broadband set forth in the SBDD NOFA, that service could be made available to an address in the approved service area within 7-10 business days.

What types of broadband are depicted on the maps, and how granular are they?
Connected Nation employs geographic information systems (GIS) mapping technology in partnership with ESRI – the world's leading developer of GIS software solutions. The software solutions that ESRI and Connected Nation create and customize for broadband mapping enable depiction of broadband capacity down to the street level. Connected Nation's maps provide information regarding available broadband service at the household level by type of platform (including but not limited to DSL, cable, fiber, fixed wireless, mobile wireless and broadband over power lines), percentage of homes with and without broadband by county, number and density of households in unserved areas and the average broadband speeds available at any given county.

What type of information is kept confidential and why?
The data that is protected via non-disclosure agreements is limited to highly sensitive network infrastructure information, which is processed by Connected Nation to determine the broadband availability footprint and GIS maps. In particular, the specifications of the network infrastructure and equipment, such as the frequencies and beamwidth of wireless signals, latitude/longitude coordinates of digital subscriber line access multiplexers (DSLAMs) or the specifications of fiber routes, remain confidential.

The reasons why this data remains confidential are two-fold: in order to protect the physical integrity of the backbone of the United States' communications system - an issue of homeland security - and in order to protect providers' proprietary infrastructure and equipment information. Note this recent network sabotage example in San Jose, California that left "tens of thousands of Silicon Valley residents with no phone, cell phone or Internet service."

Are the maps accurate and verifiable?
Ensuring verifiability and the accuracy of broadband maps has been a primary concern of Connected Nation's mapping program since its inception. Connected Nation's maps are designed to ensure transparency and are verified for accuracy on a continual basis. This is essential to ensure the accuracy of the original maps as they are generated and ensure they are updated in real time as new networks are deployed or upgraded.

Source data verification is a critical component of effective broadband mapping for a number of reasons:

- Providers have every incentive to be truthful as they report their broadband service territory when there is a transparent, effective method of verification of such data.
- More importantly, broadband inventory maps represent a visual, geographic estimation of broadband coverage at a given point in time. Hence, a system of ongoing verifiability is needed to contrast the data with the reality on the ground and, where needed, correct inaccuracies.
- The broadband landscape changes continuously. A map that is not updated and verified on a continual basis becomes quickly obsolete.

Connected Nation uses a combination of methods in an effort to ensure transparency and verifiability of the broadband maps:

- Connected Nation engineers conduct extensive field tests, and the results of those tests are documented and compared against provider data to ensure accuracy.
- Connected Nation conducts random quality control checks to validate the latitude/longitude of infrastructure such as digital subscriber line access multiplexers (DSLAMs), broadcast towers, and other vertical assets such as water towers. Quality control checks are also conducted via spectrum analyzer to verify the frequencies being used by known unlicensed WISPs or licensed providers.
- Connected Nation has established a transparent system for third-party verification of broadband availability data. All of the maps are available to the public on-line (e.g., www.connectmn.org) so that consumers and local stakeholders can verify the broadband availability down to the street level using the interactive Web tools. Connected Nation offers a direct link on its Web site, along with a telephone hotline, where third parties can provide instant feedback on any potential inaccuracies to be corrected immediately.
- Connected Nation also conducts statistical telephone surveys at the state and local levels among residential consumers and businesses to inquire about broadband availability, usage, speed, and barriers to adoption. This data are analyzed in comparison with the broadband maps as an additional quality control check.

What if I see an inaccuracy in the map?
Connected Nation and its subsidiaries rely on citizen feedback to verify the accuracy of the broadband inventory maps. Feedback can be provided through the Broadband Inquiry form available on each of the state subsidiary websites, as well as on the Connected Nation website: http://www.connectednation.org/_forms/BroadbandInquiries.php.

How was the household availability percentage calculated?
Connected Nation has developed a geoprocessing tool that analyzes Census Block demographics with the aggregated broadband service overlay. Rather than assume that all households are evenly distributed throughout the entire area of a Census Block, the assumption is made that households are more likely distributed along the roadline network; while this is not always the case, it is the more likely standard. Then based on area ratios between how much of the roadline network is covered by broadband service in that Census Block, the ratio is applied to the number of households in the Census Block to create an estimate for the number of broadband serviced households in each Census Block in the state. The household numbers are aggregated from each Census Block to estimate the number of households serviced by broadband at the state level.

To learn more about Connected Nation's mapping program, visit www.connectednation.org/mapping.

Connected Nation's research was featured in USA Today on June 7, 2009 as part of their coverage of rural America. To see the article, click here.

Connected Nation's mapping has garnered the support and praise of Americans across the country. To view more statements in support of Connected Nation from federal officials, state and local leaders, and citizens, click here.