NC OneMap: a Unified Open Data Platform Closing the Digital Divide in North Carolina

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NCDIT | NORTH CAROLINA DEPARTMENT OF INFORMATION TECHNOLOGY

EXECUTIVE SUMMARY

Every North Carolinian should have the technologies, tools and skills needed to access affordable high-speed internet anywhere, anytime.
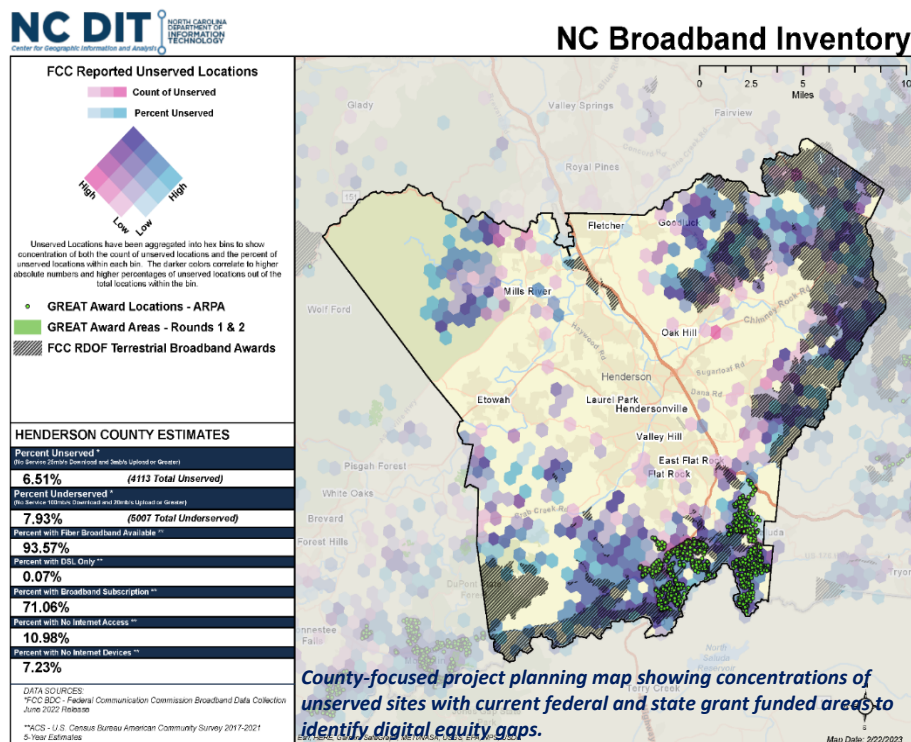
At least 1.1 million North Carolina households lack access to high-speed internet, cannot afford it or do not have the skills or devices needed to take advantage of the digital economy. With the leadership and support of Secretary and State Chief Information Officer James Weaver, the N.C. Department of Information Technology's (NCDIT) Division of Broadband and Digital Equity (the division) is implementing Governor Roy Cooper's plan to close the digital divide to achieve digital equity for all North Carolinians. Improving information about where internet coverage gaps exist is a key part of the state's strategy to expand internet access.

As the COVID-19 pandemic exposed inequities in broadband access and adoption, North Carolina, with support from the federal government, directed more than $1 billion in new funding for broadband and digital equity grants administered by the division. Accurate coverage data is essential when determining how best to allocate these funds. The Federal Communications Commission (FCC) initial maps of broadband coverage provided a good start, but they significantly underrepresented North Carolina residents without access.

To ensure that everyone in North Carolina was counted and included in programs aiming to improve access as quickly as possible, the division leveraged the state's existing expertise in geospatial data sharing and coordination to map broadband availability more accurately across the state, analyze gaps in availability and direct funding where it is most needed. The N.C. Center for Geographic Information and Analysis (CGIA) and N.C. Geographic Information Coordinating Council (GICC), both within NCDIT, created maps with a much more precise views of broadband access across the state. The division utilized CGIA and GICC's tools: NC OneMap, which was created in 2003 and catalogs and manages the state's geospatial assets, and AddressNC, which serves as the most reliable and trusted statewide comprehensive source for precise physical sites of nearly six million locations.

Combining NC OneMap and AddressNC datasets with FCC and internet service provider data has produced maps that give a more precise view of broadband access and adoption in North Carolina. **While the original federal and private-sector data indicated 70,000 unserved households in the state, these visualizations indicated the presence of more than 250,000 unserved households.**

County-focused project planning map showing concentrations of unserved sites with current federal and state grant funded areas to identify digital equity gaps.

With NC OneMap and AddressNC, the division is able to provide a dedicated distribution point for maps, applications and standardized core datasets across the state for addresses, parcels and imagery. These data sources help define broadband infrastructure needs and the communities impacted by lack of access. The resulting maps help accurately identify unserved households, track where broadband funding is going, avoid duplicating existing investments in areas that already have high-speed broadband, follow project progress and increase transparency in program funding by defining where programs are being implemented.
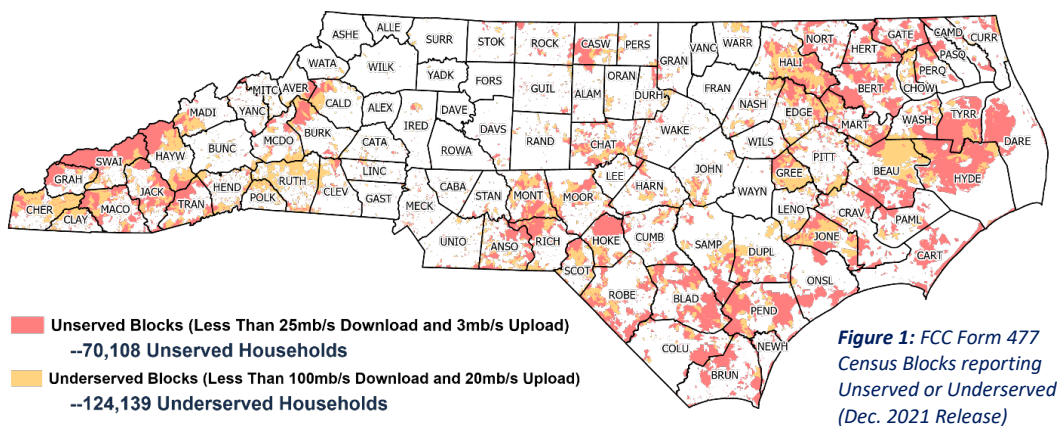
IDEA

At least 1.1 million North Carolina households lack access to high-speed internet, cannot afford it or do not have the skills or devices needed to take advantage of the digital economy. These inequities were exposed and exacerbated by the COVID-19 pandemic, which also drove North Carolina, with support from the federal government, to direct more than $1 billion in new funding for broadband and digital equity grants administered by the N.C. Department of Information Technology's (NCDIT) Division of Broadband and Digital Equity (the division). A key part of the state's strategy to improve internet access is to improve information about where internet coverage gaps exist and, therefore, where funding should be directed.

Secretary and State Chief Information Officer Jim Weaver is driving the plan to ensure that every North Carolinian should be able to access affordable high-speed internet anywhere, anytime. He wants North Carolina to become a national leader, ranking in the top five states for broadband adoption by 2025. As North Carolinians in every corner of the state can get, afford, and use high-speed internet, they can take advantage of job, education, and health opportunities that will drive the state's economy. The plan aims to increase high-speed internet subscriptions to:

- 80% of N.C. households (currently 73%)
- 100% of households with children (currently 81%)
- 80% of households across racial subgroups, including Native American (currently 57%), Black (currently 64%), Latinx (currently 68%) and white populations (currently 76%)

North Carolina started with FCC maps (Figure 1) that were not sufficiently granular. If one location in a census block was served, the maps indicated that all locations in that block were served. This significantly underestimated the number of un- and under-served households.

Unserved Blocks (Less Than 25mb/s Download and 3mb/s Upload)
--70,108 Unserved Households

Underserved Blocks (Less Than 100mb/s Download and 20mb/s Upload)
--124,139 Underserved Households

Figure 1: FCC Form 477 Census Blocks reporting Unserved or Underserved (Dec. 2021 Release)

Improving information about where internet coverage gaps exist is a key part of the state's strategy to improve internet access. North Carolina is well positioned to leverage its expertise in geospatial data sharing and coordination to provide accurate mapping of un- and under-served areas to ensure that our broadband infrastructure initiatives reach those who need them most. The N.C. Geographic Information Coordinating Council (CGIA), established by executive order in 1991 and formalized in statute by the legislature in 2001, is staffed by the N.C. Center for Geographic Information and Analysis (GICC), within NCDIT, and coordinates statewide GIS efforts and data sharing among all levels of government, private entities, academia and the public. Working with the GICC and CGIA, the division has aimed to expand broadband infrastructure since its establishment as the NCDIT Broadband Infrastructure Office in 2015.

CGIA and GICC have been collecting relevant address data provided from the authoritative local government addressing programs for many years through NC OneMap, which was created in 2003 and catalogs and manages the state's geospatial assets, and AddressNC, which serves as the most reliable and trusted statewide comprehensive source for precise physical sites of nearly six million locations. These, along with data from the FCC and internet service providers, were used to create maps that give a much more precise view of broadband access across the state. These maps help accurately identify unserved households, better inform state officials

about where federal and state broadband funding is needed, track where broadband funding is going and avoid duplicating investments in areas that already have high-speed broadband.

IMPLEMENTATION

The division, CGIA, and GICC partnership is rooted in analytical geographic information systems (GIS) and applies innovative and advanced applications to disseminate publicly available GIS data relevant to broadband to state, federal and local governments, private-sector entities and the public.
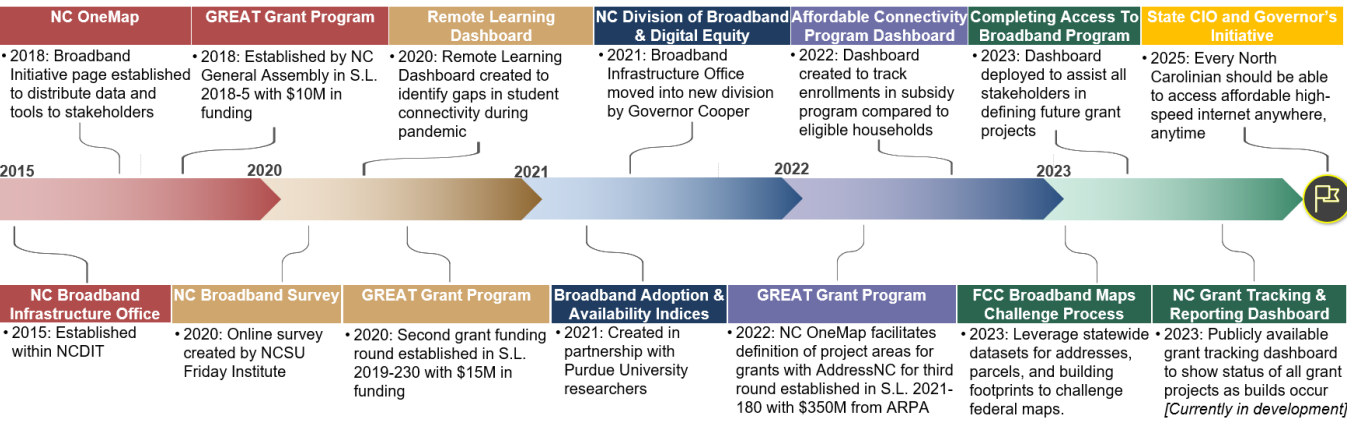

Figure 2: *Significant milestones and coordinated events in NCDIT's efforts to close the digital divide.*

Underpinning broadband mapping are CGIA's widely used tools: NC OneMap and AddressNC. NC OneMap catalogs and manages the state's geospatial assets and provides an essential platform for the discovery and dissemination of publicly available GIS data. CGIA has administrative oversight of NC OneMap and ensures the web application is available to all state residents. NC OneMap houses 280 web services, web apps, maps and other GIS resources in 20 categories of geospatial information necessary for state, local and federal government, educational institutions and the private sector geographic analysis. Its four foundational datasets – statewide parcels, addresses (updated monthly), six-inch resolution orthoimagery (acquired annually) and building footprints – total over 24 million features. In 2018, CGIA created a broadband initiative page on NC OneMap to distribute broadband tools and data to stakeholders in the state. In August 2022, the NC OneMap architecture was migrated to Amazon Web Service, which provides more robust performance and resiliency through the auto-scaling of machines to support customer demand. Related to broadband, CGIA-supplied offerings from this robust cloud infrastructure include hosted web services to support AddressNC and a no-cost geocoding service.

As the most trusted and reliable statewide comprehensive source for precise physical sites, AddressNC meets a multitude of high-profile state and federal use cases. It continually delivers quality address points on a continuous cycle through updates published in Next Generation 911 program, which ensures a sustainable solution of seamless coverage across the entire state. Standardization, consistency, quality control and dynamic updates are applied and delivered monthly. NC OneMap administers accessibility tools and web interfaces to local governments (the authoritative sources), thus stimulating incentive, confidence and improving subsequent deliverables.

For the division, the high precision of AddressNC supports the online application requirements and workflows to define project areas proposed by broadband providers as part of the various grant programs aimed at expanding

broadband availability in the state. Figure 3 spotlights the Growing Rural Economies with Access to Technology (GREAT) grant online mapping application hosted on NC OneMap. This application allows providers to select addresses from AddressNC
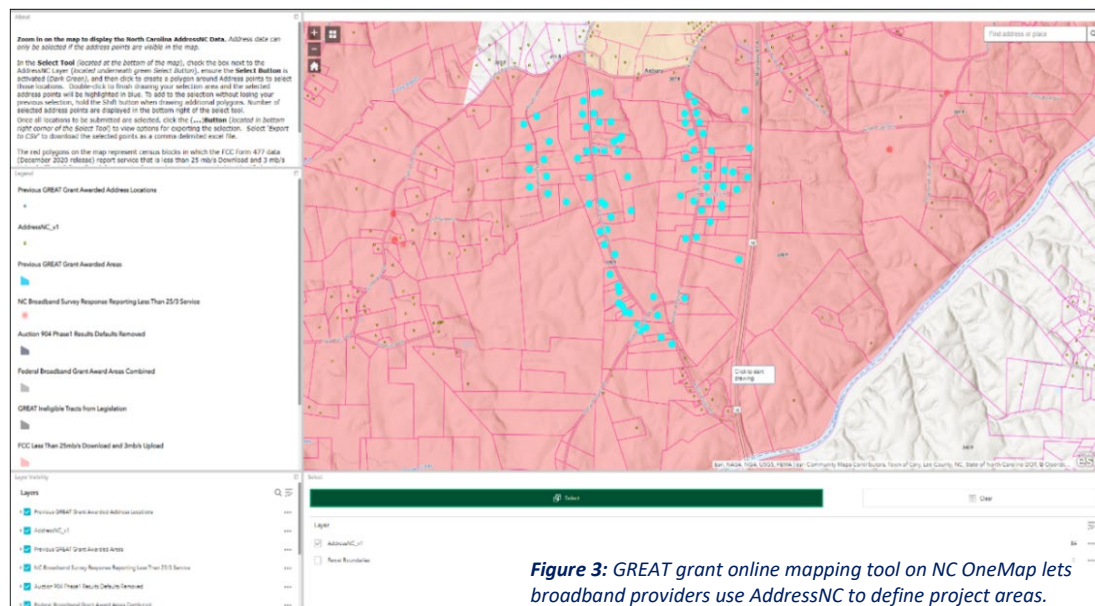

Figure 3: GREAT grant online mapping tool on NC OneMap lets broadband providers use AddressNC to define project areas.

that define their project area and to export those addresses to a datafile included with their grant application materials. This data is critical when comparing dozens of overlapping applications because it creates a standardized common view of all projects in relation to one another without introducing inconsistencies between competing datasets used by different providers.

Because AddressNC is a continuous stream, it is a vital asset to identify and quantify locations not identified by the FCC in its new Broadband Data Collection (BDC) efforts, which rely on a licensed serviceable location fabric dataset to report data from broadband providers about where they offer service and what speeds and technologies are offered at specific locations across the country. Robust geospatial datasets, such as AddressNC, statewide parcels, orthoimagery and building footprints, facilitate challenges to the FCC location data to ensure that locations are not being overlooked as the unprecedented funding opportunities for broadband become available.

NC OneMap also facilitates open collaboration between state partners, county governments, local governments and other stakeholders when defining eligibility for upcoming federal broadband funding programs. The FCC BDC availability data has been aggregated into hexagonal boundaries to represent the concentrations and percentages of unserved locations in each area to aid in identifying communities in need of broadband improvements. Figure 4 displays a bivariate map that combines both the absolute number of unserved households and the percent of unserved households in each hexagonal boundary to highlight those areas that have higher concentrations of unserved locations. This high-level view begins to outline those communities that need to be addressed with future funding opportunities.

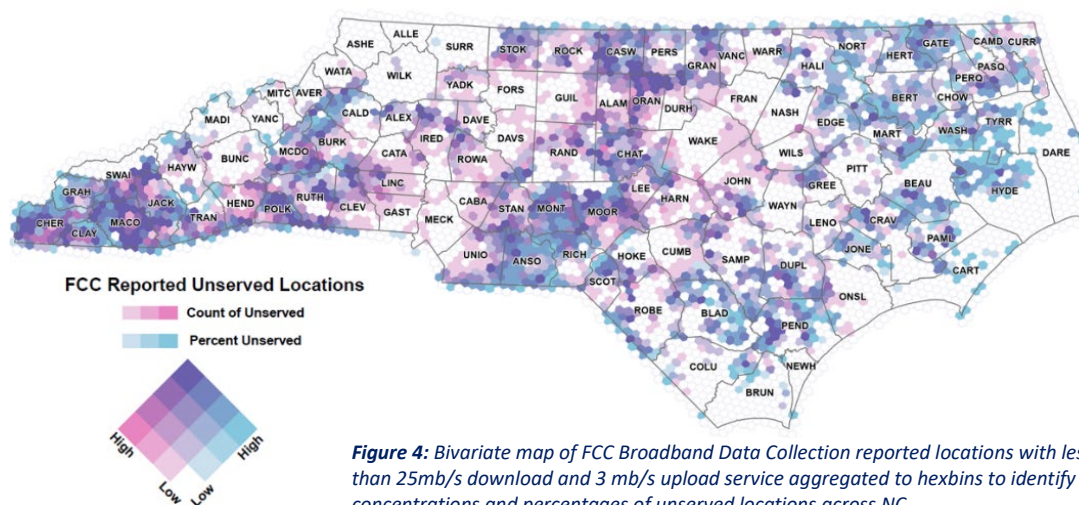

FCC Reported Unserved Locations

Figure 4: Bivariate map of FCC Broadband Data Collection reported locations with less than 25mb/s download and 3 mb/s upload service aggregated to hexbins to identify concentrations and percentages of unserved locations across NC.

Additional views of this data at a county-level overlaid with existing funding programs from both the state and federal partners are shown in Figure 5. This view is a key tool for stakeholders to begin defining future projects that can address the areas that have not already received funding to address the digital equity gaps in their communities.

Impact

With NC OneMap and AddressNC, the division is able to provide a [dedicated distribution point for maps](#), applications and standardized core datasets across the state for addresses, parcels and imagery. These data sources help define broadband infrastructure needs and the communities impacted by lack of access. The resulting maps help accurately identify unserved households, track where broadband funding is going, avoid duplicating existing investments in areas that already have high-speed broadband, follow project progress and increase transparency in program funding by defining where programs are being implemented. While parts of North Carolina are known as a tech hub, the state also has many rural counties, and high-speed broadband infrastructure is critical to expand the economic, educational, health and recreational opportunities in these areas, as highlighted in the [case of Warren County](#).
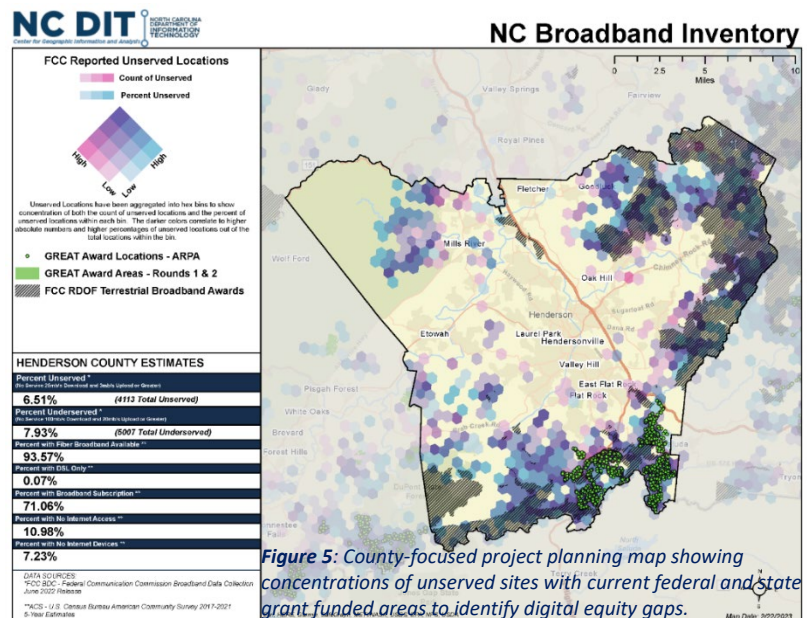

Figure 5: County-focused project planning map showing concentrations of unserved sites with current federal and state grant funded areas to identify digital equity gaps.

The division has demonstrated the importance of using the tools and data provided by NC OneMap to target funding, including the GREAT grants and Completing Access to Broadband programs. Open access to statewide datasets through the NC OneMap platform creates transparency and accountability in these funding programs by enabling residents to see exactly where the funding is being distributed and the status of projects over the next several years. The more accurate representation of broadband access streamlines the grant application process for internet service providers and reduces challenges to grant awards. Local governments and vendors can better determine where to invest broadband grant funds.

> "As a small rural county, it's hard to imagine what our future would be without broadband. We would have to consider taking on a multimillion-dollar debt to almost fully subsidize a private company to build a network here or forgo making improvements to our schools because, at this point, broadband is considered a utility, just like electricity."
>
> Vincent Jones, Warren County manager ([ESRI Blog](#), March 7, 2023).

The statewide addresses coming from the Next Generation 911 project and into AddressNC were used to expedite the grant awards for the most recent GREAT grant round in 2022. This enabled processing 305 applications from 38 different providers in 96 counties in a matter of weeks instead of months. The GREAT grant program has awarded grants to expand broadband infrastructure to more than 112,000 locations, serving nearly 110,000 homes and more than 3,600 businesses.

The division, CGIA and GICC partnership is rooted in analytical Geographic Information Systems (GIS) and applies innovative and advanced applications, including solutions listed in the table below, to close the digital divide in North Carolina.

APPLICATION	FUNCTION
NC GREAT Grant Online Mapping Application	Identifies and exports AddressNC data to outline proposed project areas for the GREAT grant Program
CAB Planning Tool	Completing Access to Broadband (CAB) program planning dashboard to facilitate collaborative project planning by state, county and local officials
NC Broadband Survey	Gathers information from citizens on locations in the state without adequate internet access and speeds
County Broadband Profiles	Static map handouts that provide overview of broadband availability, funding, and survey responses for leaders and stakeholders in all counties
Broadband Adoption & Availability Indices	Indices created by combining US Census American Community Survey data on internet adoption with FCC Broadband availability data
Remote Learning Student Connectivity	Planning resource and dashboard to analyze student connectivity across the state
Affordable Connectivity Program Dashboard	Monthly map comparing the total eligible households with the actual enrollments in the FCC Affordable Connectivity Program to identify outreach opportunities aimed at increasing enrollments
Grant Tracking and Reporting Dashboard *[In Development]*	Online dashboard tracking status of broadband projects in each county to give county and local officials, as well as citizens, access to quarterly project status reports from providers, grant agreements and other documentation

These datasets are essential to addressing the aspects of digital equity embedded within broadband infrastructure projects such as affordability, digital literacy and access to devices. The proliferation of datasets and addition of layers to maps will help the state direct funding and programs to vulnerable populations, meet federal mandates to consider equity across racial and geographic divides and analyze how obstacles to digital equity differ across demographics. Such layered maps will help drive the community-centric design of local bids for projects focused on needs in areas such as agriculture and telehealth and the use of digital equity demographics to prioritize infrastructure projects, show the impacts of projects and inform all stakeholders affected by projects.

Combining NC OneMap and AddressNC datasets with FCC and internet service provider data has produced maps that give a more precise view of broadband access and adoption in North Carolina. **While the original federal and private-sector data indicated 70,000 unserved households in the state, these visualizations indicated the presence of more than 250,000 unserved households.** As unprecedented funding opportunities for broadband have become available in recent years, having robust geospatial datasets, such as AddressNC, statewide parcels, orthoimagery and building footprints, with public access enables individuals to contest inaccurate information about their broadband service and to challenge maps that show their households as served when they are not. These efforts will help to refine the FCC's *National Broadband Map*, which is used to determine eligibility for grants and loans.