NC OneMap

A Unified Open Data Platform Closing the Digital Divide in North Carolina

Initiated: 2020
Completed: 2024

Contact: Tim Johnson
N.C. Geographic Information Officer
Center for Geographic Information and Analysis
North Carolina Department of Information Technology
919-754-6588
Tim.johnson@nc.gov

NCDIT | NORTH CAROLINA
DEPARTMENT OF
INFORMATION
TECHNOLOGY

Executive Summary

All North Carolinians should have the technologies, tools and digital skills needed to access affordable, reliable high-speed internet.

More than one million North Carolina households are impacted by the digital divide – they lack access to high-speed internet, cannot afford it or do not have the skills or devices needed to take advantage of today's increasingly digital world. With the leadership and support of Secretary and State Chief Information Officer Jim 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.

Through the $1.06 billion in federal American Rescue Plan Act funding directed to combat broadband and digital inequities exposed during the pandemic, the division is administering a series of programs to address the access and inclusion needs of all North Carolinians. Accurate internet access data is an essential component in determining how best to allocate these funds to impacted communities The Federal Communications Commission's (FCC) initial maps of broadband coverage by census block significantly underrepresented North Carolina residents without access.

The division leveraged the state's existing geospatial data sharing and coordination expertise to map broadband availability more accurately across the state, analyze gaps in availability and direct funding first to areas with the most need. NCDIT's N.C. Center for Geographic Information and Analysis (CGIA) and N.C. Geographic Information Coordinating Council (GICC) partnered to create maps with much more precise views of broadband access across the state. The division utilized the NC OneMap tool, which catalogs and manages the state's geospatial assets, and AddressNC, which serves as the most reliable, trusted and comprehensive statewide source for precise physical sites of nearly 6 million locations.

Combining the datasets from NC OneMap and AddressNC with data from the FCC and internet service providers has produced maps that give a more precise view of the state's broadband access and adoption.

While the original federal and private-sector data indicated 70,000 unserved households in the state, these visualizations indicated the presence of more than 280,000 unserved households. Using NC OneMap and AddressNC, the division can 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

More than 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 and led North Carolina to direct more than $1 billion in new federal funding for broadband and digital equity grants administered by NCDIT's Division of Broadband and Digital Equity. A key part of the state's strategy to improve internet access is to improve information about where internet coverage gaps exist and where funding should be directed.

NCDIT is implementing Governor Roy Cooper's plan to ensure North Carolinians can access affordable and reliable high-speed internet anywhere, anytime. North Carolina aims to become a national leader, ranking in the top five states for broadband adoption by 2025. Having residents in every corner of the state be able to

access, afford and have the skills needed to safely use high-speed internet will help them take advantage of job, education and health opportunities that will, in turn, drive the state's economy. The plan, which uses federal American Rescue Plan Act funds, 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%), Latino (currently 68%) and white populations (currently 76%)

The state is receiving an additional $1.53 billion in federal funds from the Bipartisan Infrastructure Law that will help connect all North Carolinians to high-speed internet by 2029.

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.
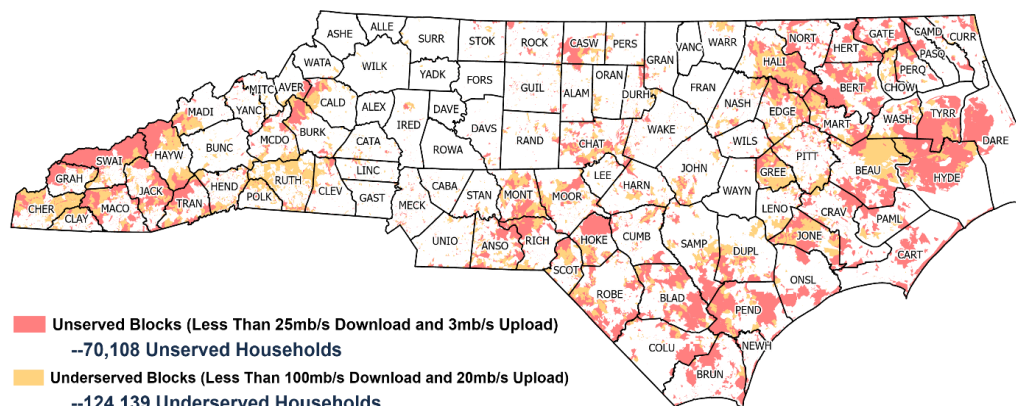

Figure 1: FCC Form 477 census blocks reporting unserved or underserved (December 2021 release)

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 its 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 expanded broadband infrastructure deployments since the NCDIT Broadband Infrastructure Office was established in 2015.

CGIA and GICC have been collecting relevant address data provided from local governments for many years through NC OneMap, which 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 provide more precise views of broadband access across the state. These maps help accurately identify unserved households, better inform state officials about locations that most need federal and state broadband funding, track broadband funding awards by location and avoid duplicate investments in areas that already have high-speed broadband.

Implementation

The partnership among the Division of Broadband and Digital Equity, CGIA and GICC 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.

Timeline (top row):

NC OneMap — 2018: Broadband initiative page established to distribute data and tools to stakeholders

GREAT Grant — 2018: Established by N.C. General Assembly in S.L. 2018-5 with $10M in state funding

Remote Dashboard Learning — 2020: Dashboard created to identify gaps in student connectivity during the pandemic

Division of Broadband & Digital Equity — 2021: Broadband Infrastructure Office moved into new division by Gov. Cooper

State CIO & Governor's Initiative — 2021: Gov. Cooper announces ambitious broadband and digital equity targets by 2025

CAB Program & Mapping Tool — 2022: $400M innovative procurement approach established by N.C. General Assembly in S.L. 2021-180; NC OneMap tool launched

Timeline axis: 2015 — 2020 — 2021 — 2022 — 2023 — 2024 — 2025

Timeline (bottom row):

Broadband Infrastructure Office — 2015: Office established within NCDIT

N.C. Broadband Survey — 2020: Online survey created in partnership with NCSU Friday Institute

GREAT Grant — 2020: Second grant funding round established in S.L. 2019-230 with $15M in state funding

Broadband Adoption & Availability Indices — 2021: Created in partnership with Purdue University researchers

GREAT Grant — 2022: NC OneMap facilitates definition of grant project areas with AddressNC in third round set in S.L. 2021-180 with $350M from federal ARPA

FCC Broadband Map Challenge Process — 2023: Leverage statewide datasets for addresses, parcels and building footprints to challenge federal maps

Grant Tracking & Reporting Dashboard — 2024: Publicly available grant tracking dashboard to show status of projects as builds occur
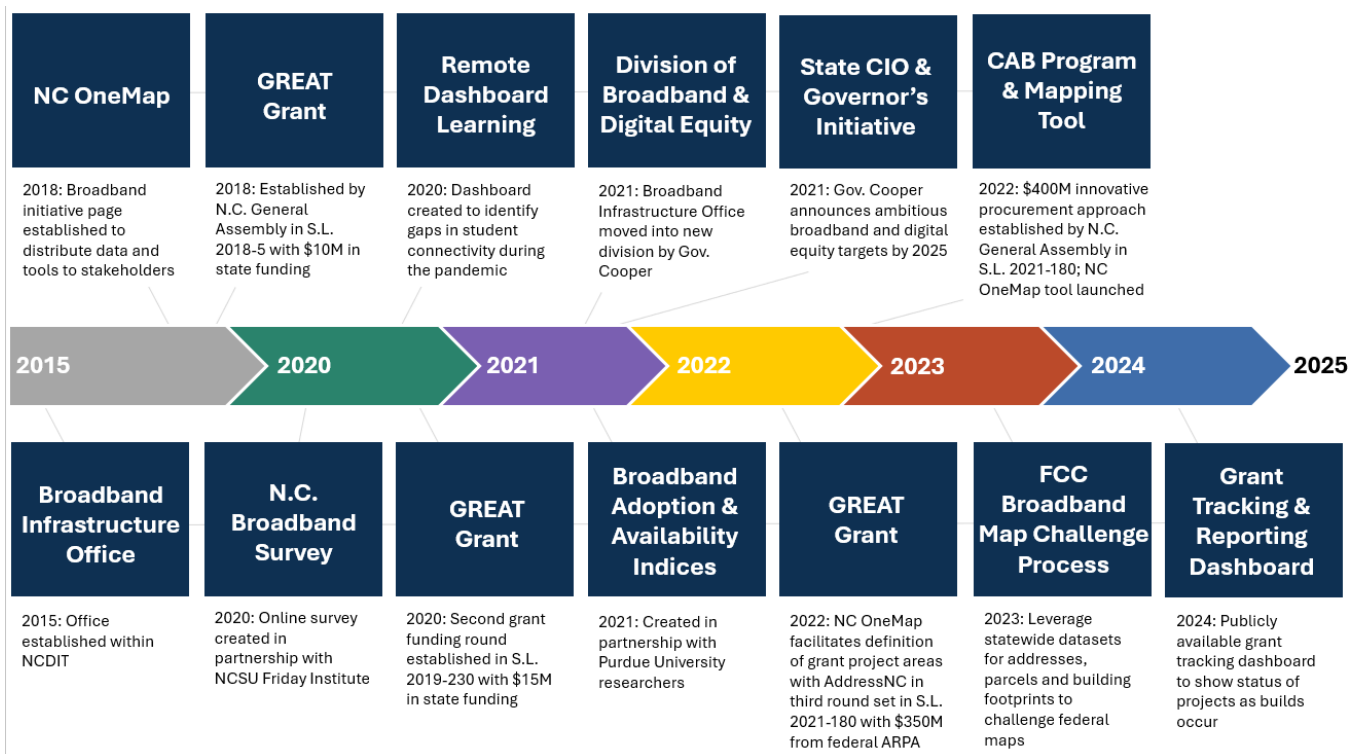
Figure 2: Significant milestones and coordinated events in NCDIT's efforts to close the digital divide.

Behind the broadband maps are CGIA's widely used tools: NC OneMap and AddressNC. NC OneMap catalogs and manages the state's geospatial assets and serves as 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 private sector geographic analysis. Its four foundational datasets – statewide parcels, addresses (updated monthly), six-inch resolution orthoimagery (acquired annually) and building footprints – total more than 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. The CGIA-supplied offerings related to broadband 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 delivers quality address points on a continuous cycle through updates published in the 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), stimulating incentive and confidence.

The high precision of AddressNC supports the division's 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 allowed providers to select addresses from AddressNC that define their project area and export those addresses to a datafile included with their grant application materials. This data was critical when comparing dozens of overlapping applications because it creates a standardized common view

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

of all projects in relation to one another without introducing inconsistencies between competing datasets used by different providers.
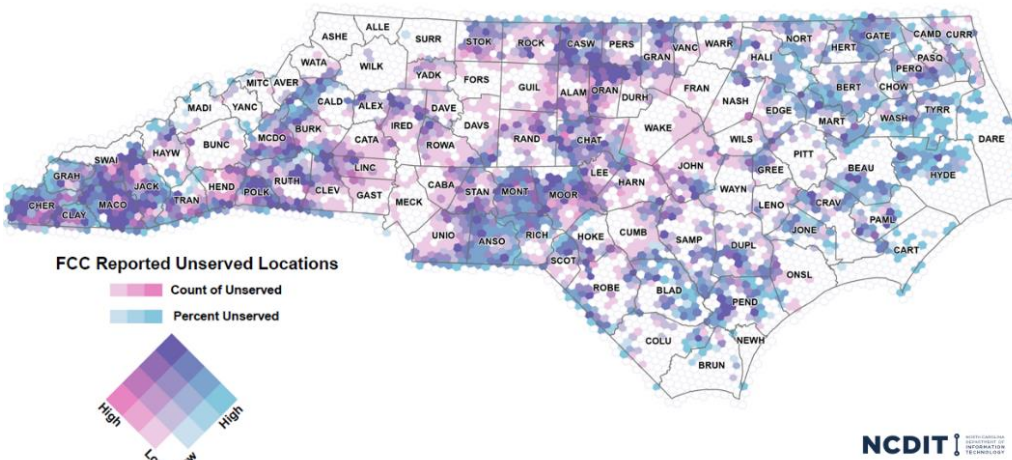
Figure 4: Bivariate map of FCC Broadband Data Collection reported locations with less than 25Mbps download and 3 Mbps upload service aggregated to hexbins to identify concentrations and percentages of unserved locations across North Carolina.

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 is aggregated into hexagonal boundaries to represent the concentrations and percentages of unserved locations in each area, which helps identify communities that need broadband access. 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.

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

Impact

With NC OneMap and AddressNC, the division can 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
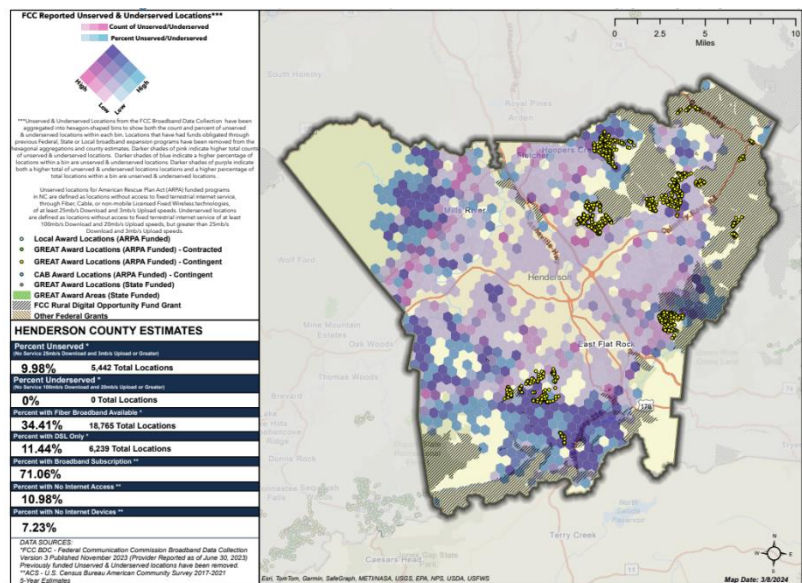

Figure 5: County-focused project planning map shows concentrations of unserved sites with current federal and state grant funded areas to identify digital equity gaps.

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 program funding transparency. While parts of North Carolina are known as technology hubs, the state also has many rural counties, and high-speed internet infrastructure is critical to expand the economic, educational, health and recreational opportunities in these areas, as highlighted in Warren County.

The division has demonstrated the importance of using the tools and data provided by NC OneMap to target program funding, including the GREAT grant and Completing Access to Broadband (CAB) program. Open access to statewide datasets through the NC OneMap platform creates transparency and accountability in these funding programs by enabling residents to see where funding is distributed and the status of infrastructure projects over the next several years. The more accurate representation of broadband access streamlines the program application process

> "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)

for internet service providers and reduces challenges to funding awards. Local governments and vendors can use these tools to better determine where to invest their broadband funds.

The statewide addresses coming from the Next Generation 911 project into AddressNC were used to expedite awards for the 2022-2023 GREAT grants. This enabled processing 305 applications from 38 different providers in 96 counties in weeks instead of months. The GREAT grant program has awarded funding to expand broadband infrastructure to nearly 130,000 homes and more than 4,000 businesses.

The partnership is rooted in analytical Geographic Information Systems (GIS) and applies the following innovative and advanced applications:

- CAB Planning Tool: Planning dashboard to facilitate collaborative project planning by state, county and local officials.
- N.C. Broadband Survey: Gathers information from North Carolinians 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.
- Grant Tracking and Reporting Dashboard: Online dashboard tracking status of broadband projects in each county to give county and local officials, as well as residents, access to quarterly project status reports from providers, grant agreements and other documentation.

These datasets are essential to addressing digital equity aspects 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. These layered maps help drive community-centric designs for projects focused on needs like agriculture and telehealth, incorporate digital equity demographics in infrastructure projects, and show the impacts of projects to all affected stakeholders.

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
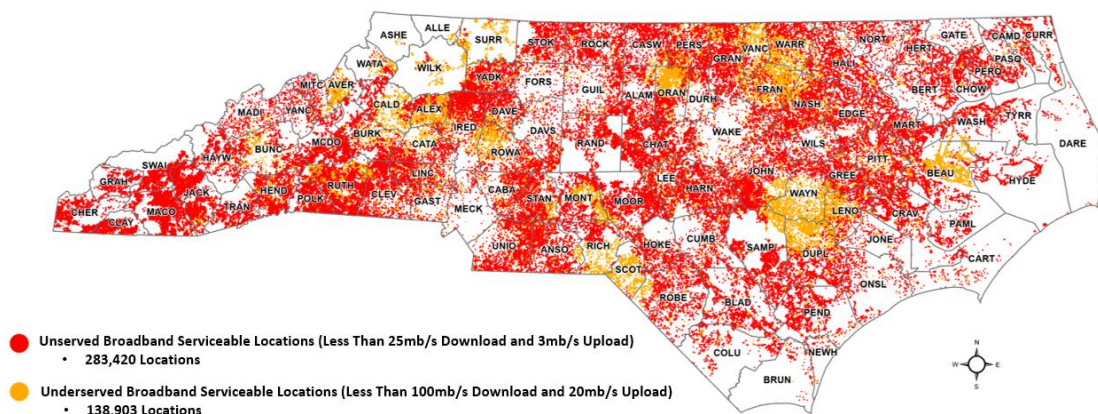

Figure 6: County-focused project planning map showing concentrations of unserved sites with current federal and state grant funded areas to identify digital equity gaps.

original federal and private-sector data indicated 70,000 unserved households in the state, these visualizations indicated the presence of more than 280,000 unserved households, as shown in Figure 6. Through this process, the division identified 115,000 additional North Carolina homes and businesses that do not have access to high-speed internet, more than any other state in the country.

As unprecedented funding opportunities for broadband have become available in recent years, having robust, publicly available geospatial datasets like AddressNC, statewide parcels, orthoimagery and building footprints 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.