

Madison County Broadband Community Profile

June 2019



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Developed by Land of Sky Regional Council for Madison County
June 2019



SUMMARY:

Broadband is a significant innovation in communication technologies with diverse and impactful benefits such as creating jobs and transforming education. To stay competitive in a technologically advancing society, Madison County is working to improve its deficient broadband infrastructure. As a small rural county with a low population density and difficult mountain-related environmental challenges it has suffered a lack of widespread connectivity despite multiple carrier offerings. Madison County is a desirable place to live with increasing population growth, replete with leadership that moves the county forward without leaving the people of the community behind. However, as education opportunities, occupational development, and public services become increasingly technological dependent, those on the wrong side of the digital divide will be left further behind.

Broadband internet is no longer a luxury, but an essential component to education and opportunity comparable in effect to a service utility. Homework is delivered online at a rate of 70%, and students with internet access are 6-8% more likely to graduate from high school. A 1% increase in broadband service adoption is associated with a 0.3% increase in employment. Closing this digital divide is a critical component to improving the quality of life for Madison County citizens, particularly those transforming their opportunities through education.

The 2013-2017 American Community Survey estimates that 67% of Madison County households have an internet subscription. Little information is available to address connectivity concerns at the local level. This study seeks to identify comprehensive information about broadband concerns of the community in order to increase availability, adoption, and inclusivity in an effort to catalyze broadband resources for the community.

ACKNOWLEDGMENTS:

The Madison County Broadband Strategy Plan was a cooperative effort in the community. In particular, we acknowledge the efforts of the following people and organizations for their assistance and leadership in making Madison County a more digitally equitable place:

MADISON COUNTY BOARD OF COMMISSIONERS

Norris Gentry- Chair
Wayne Brigman- Vice- Chair
Craig Goforth
Matthew Wechtel
Mark Snelson

COMMUNITY PARTNERS

Madison County Government
Madison County Schools
Madison County Economic Development
Land of Sky Regional Council of Government
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Town of Marshall
Town of Mars Hill
Town of Hot Springs
Madison County Sheriff Department
Madison County Chamber of Commerce

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BACKGROUND:

As a state, North Carolina does not allow local governments to treat broadband as a public utility; therefore, local and county governments have historically shied away from inserting themselves in the broadband discussion. Madison County recognizes that adequate broadband service is essential to its citizens and economy; therefore county officials have taken a more active role in recent years to entice greater competition and service offerings. Currently, (2019) North Carolina has been working to amend legislation and funding potential for areas to increase broadband resources in the state.

Madison County is comprised of approximately 21,746 residents (or 46 people per square mile) with a median household income of \$40,408. Much of the County's terrain is rugged, heavily forested, and sparsely populated. [1] The State of North Carolina's Broadband Infrastructure Office performed a state-wide survey [2] that showed the following issues as most important: expanding broadband access (particularly for K-12 students), increasing adoption and digital literacy for all citizens and businesses, and developing statewide policies that enhance access. Furthermore, the State report calls out FCC reports that show North Carolina as ranking 9th in the nation in broadband deployment with an estimated 93 percent of NC households having access to broadband. The report shows that 52 of North Carolina's 100 counties have a deployment rate equal to or greater than the US average (90 percent) however, 89 percent of North Carolina households without access live in sparsely populated areas. More specifically, the State also points out that the FCC's estimate that seven percent of North Carolinians do not have access to adequate bandwidth speeds is likely too low. As Madison County is specifically concerned, the State shows that Madison County is one of the North Carolina Counties that has the lowest adoption rates (being at least partly due to broadband availability). The State calls out a White House brief that shows Madison County's adoption rate is between 47% and 59%. The reason is partly due to broadband availability, but also due to factors like income, the level of education, age, and disability.

The County has experienced gains as evidenced by French Broad Electric Membership Corporation's (FBEMC) limited fiber to the home construction (FTTH), but the majority of county residents receive 6 Mbps download (DSL), 10 Mbps (point-to-point wireless), or up to 25 Mbps (satellite) Internet service. Greater Internet service offerings at competitive prices are needed throughout the County.

Madison County leadership identified specific concerns regarding their broadband issues:

1. Improved Accessibility- Madison County has identified several unserved/underserved areas of the county that are considered unserved or underserved that need improved connectivity.
2. Digital Inclusion/Homework Gap- Students being able to complete assignments and use broadband resources to further their education.
3. Public Safety- Communications for Emergency Management teams to take care of the health and well being of the community.
4. Economic Development- Stay competitive in a technology driven economy.
5. Healthcare- Provide excellent healthcare for the county through digital communications.

In addition to desiring better residential connectivity, the county has worked since 2014 to remove barriers to the recruitment of technology based companies. Barriers to this effort include broadband access, workforce, housing, and other factors, all of which the county is working to address in collaboration with multiple partners. As a result of the county's planning in this area, Madison County was designated in 2016 as a White House TechHire Community.

RESEARCH FINDINGS:

Digital data and insight survey results exist at the state and national level, few represent locally led granular data. As a result, Madison County decided to pursue implementing a demand aggregation study that began in 2016 and continued in the WestNGN Phase II demand aggregation study facilitated by Land of Sky Regional Council in 2018/2019. The survey was marketed to the community widely with specific targeting to some predicted underserved/unserved areas. The survey addressed questions related to the service (if any) customers were able to get from local providers and what kinds of digital activities people are most engaged with.

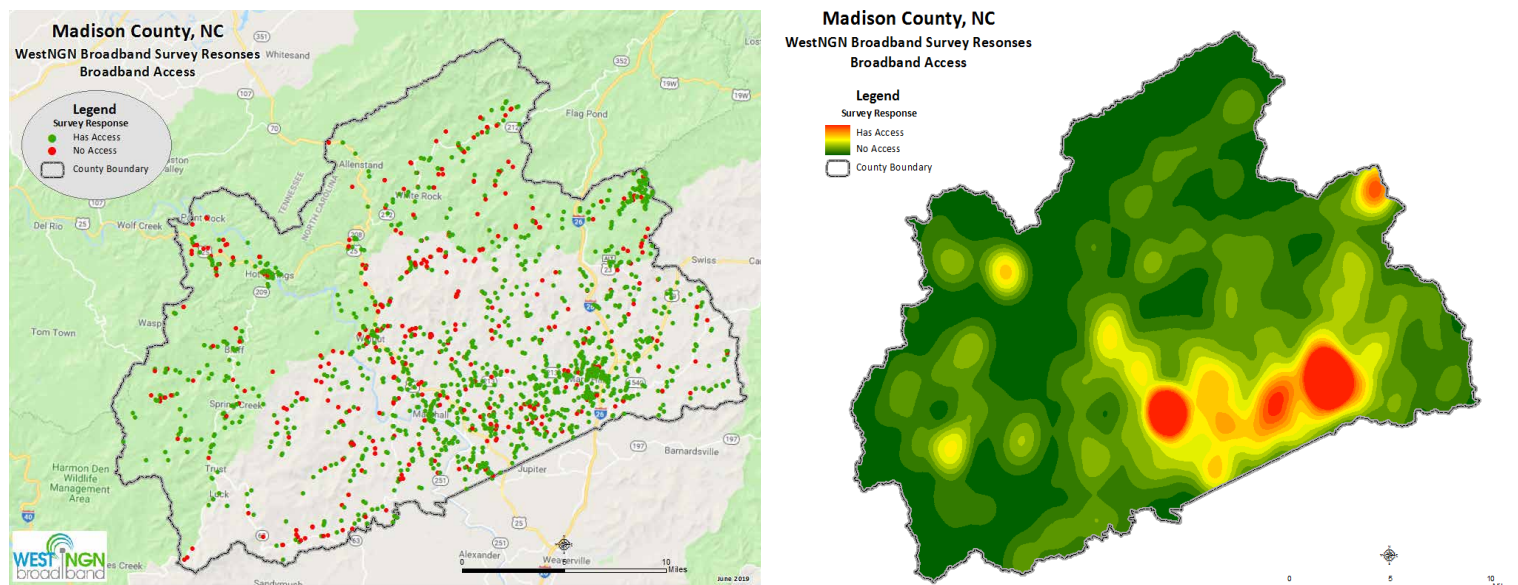
SURVEY DEPLOYMENT:

- Paper copies and digital marketing were provided at many public spaces including libraries and community centers
- Paper copies were sent home with every public school student
- Link to the digital survey were marketed to many non-profits and community partners
- Link to the digital survey was sent to higher education partners
- Link was distributed to industrial and commercial businesses in the county through Economic Development and Chamber of Commerce
- Madison County produced a comprehensive marketing plan including social media, flyers, articles, and cross departmental participation
- Some members of the community in unserved/underserved populations presented themselves to help distribute to their local geographic area.
- French Broad Electric Membership Cooperative delivered paper copies to each of the residents power bill

These efforts resulted in 2,386 participants from the community representing 11% of the county's population.

In 2016 Madison County completed a demand aggregation study that showed that over 22% of survey respondents (Figure 1) lacked Internet coverage at their home. For full survey results see Appendix A.

Figure 1 and 2: Madison County Survey responses showing clusters of service and no service.

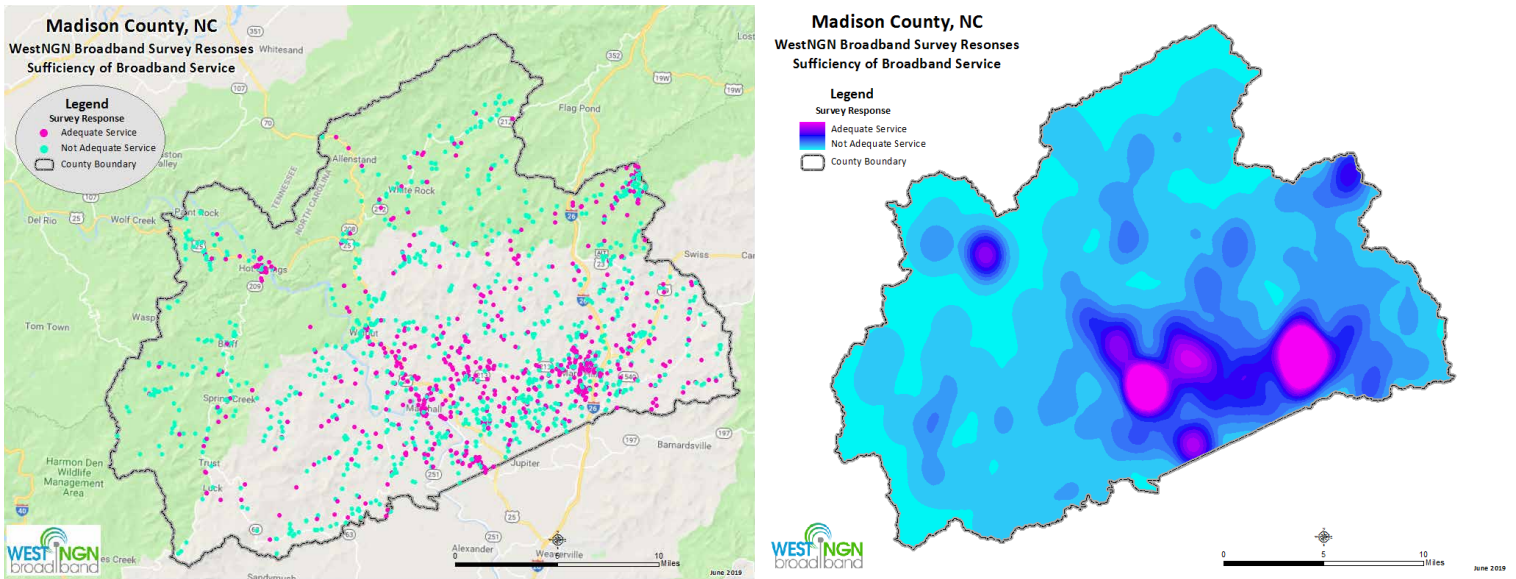


Since the information was gathered from an internet-based survey, and recognizing that there were barriers to receiving responses from the most under-served areas of the county, it is anticipated that closer to 26%-28% of the Madison County population is considered unserved.

The study showed that of the respondents reporting lack of coverage over half identified having no option or poor options as their reason for selecting this reason, and over 30% responded that cost is the largest contributing factor to lack of coverage.

For survey respondents that replied they did have coverage at their home nearly 66% stated that they were unsatisfied with their service (Figures 3 and 4). Top responses for problems with service include speed, cost, and reliability. Additional questions in the survey reviewed what citizens were willing to pay and over 60% responded they would be willing to pay over \$50.00 a month, but only for service that would meet their needs.

Figures 3 and 4: Over 65% of survey responses claim not to have sufficient service. The areas of highest sufficiency are clustered around the most population dense areas.



The Madison County government has taken considerable steps to assess broadband needs, understand local assets (vertical assets, cell towers – see Attachment B), and develop its own strategic plan toward improving connectivity options. They are interested in pursuing hot spot-to-go programs, providing wifi on school buses, developing a fiber ring between the three towns, and pursuing a dig once policy.

These efforts are being accelerated as they are combined with the Land of Sky Regional Council's (LoSRC) West Next Generation Network project (WestNGN; www.landofsky.org/westngnbroadband.html). The WestNGN project is a regional effort to attract and leverage private investment from telecommunications companies that will expand operations into the LoSRC footprint and offer competitive broadband service. While Phase I of the WestNGN project focuses on more populated areas in the region, Phase II of the initiative includes Madison County.

TABLE 1: Primary service providers for Madison County (broadband is described by the FCC as 25 Mbps download and 3 Mbps upload)

PROVIDER	SERVICE	BROADBAND SPEEDS (up to)
FBEMC	FTTH	1 Gbps - standard service 25 Mbps
Spectrum	cable modem	100 Mbps
Frontier	DSL	6 Mbps
RidgeComms	wireless	15 Mbps
Skyrunner	wireless	10 Mbps ("Metro" service) - 6 Mbps ("Enhanced service")
HughesNet	satellite	25 Mbps

("broadband" as defined by the Federal Communications Commission is defined as 25 Mbps download and 3 Mbps upload)

As seen in the above chart, advertised Internet speeds for standard services are between 6 and 1Gbps. These speeds, however, are most consistent in the larger towns (Marshall, Mars Hill) but most importantly a consistent service is not offered across the County. The primary delivery method of Internet service in rural Madison County is DSL and wireless service. But, in general, and due to the County's topology, there are significant gaps in coverage throughout the County, but especially in the areas of Laurel, Ebbs Chapel, Beech Glen, Upper Shut-In, Rice Cove, Walnut, Spring Creek, and Sandy Mush.

During the demand aggregation study some providers expanded service and new providers entered the market. The county is now able to identify places that private industry is unlikely to serve and has worked to seek funding opportunities to cover remaining sections. The French Broad EMC has been successful at pursuing funding for several of these areas: Laurel, Revere, Upper-Shut In, and Hot Springs. Based on information from the survey there may be additional areas that could be eligible for various funding programs.

NOTE: Within the framework of this document, cellular service is not being considered a satisfactory means of providing Internet connectivity because cellular service is most prevalent along the I-26 corridor and in Marshall and Mars Hill.



RECOMMENDATIONS:

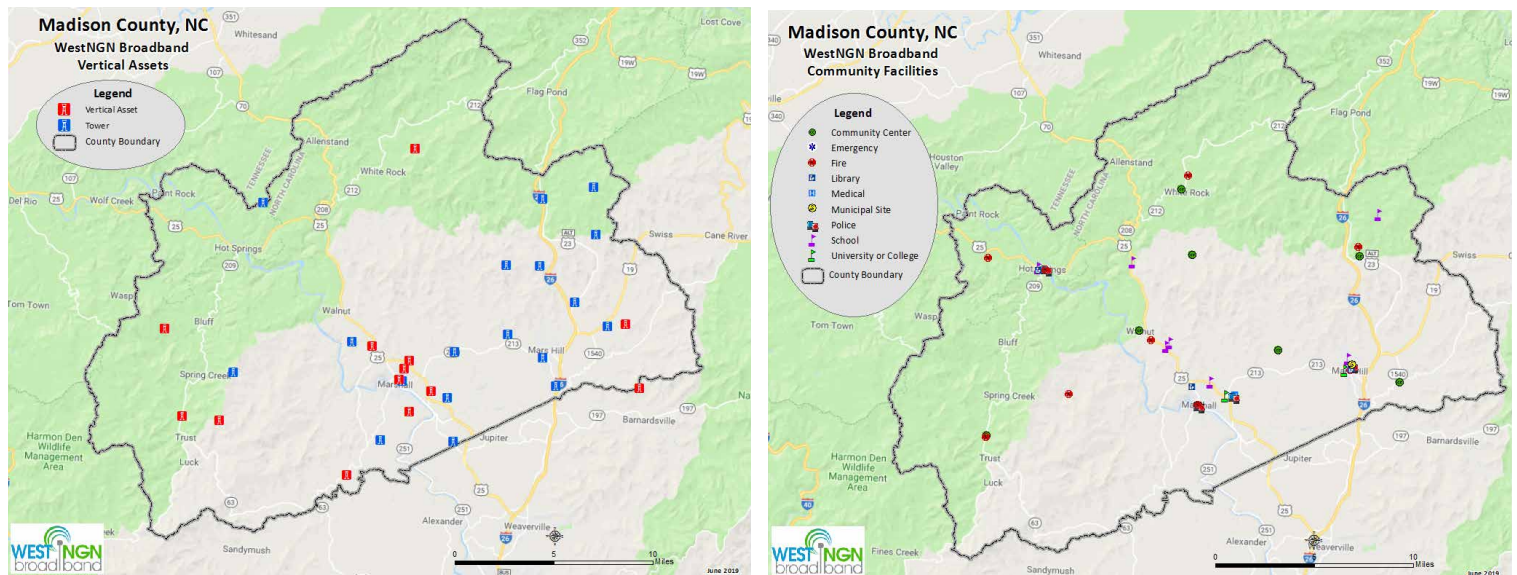
Madison County should consider short-term and long-term options for the expansion of coverage to the greater community that results in improved access for all residents. Due to unknown variables with a variety of potential technology offerings it is unknown what a cost of deployment would be. To determine cost for a project a feasibility study would have to be completed.

ACCESSIBILITY:

Options for local governments to consider that may accelerate broadband deployment include:

- A. There are many groups in Madison County interested in improving the broadband issue. Forming a Madison County broadband committee with various stakeholders from the community to help continue the conversation around broadband issues. It is suggested that the team work to identify progress and deficiencies in broadband access for the county. This approach will ensure that county wide efforts are being addressed as they are able. It will also encourage less redundancy of programming, improved viability for future funding prospects, and ability to leverage additional funding.
- B. Adopting public policies that will lessen the cost of entry for new service providers, and, by offering county resources to said providers (for example, a “Dig Once” or “Build Once” policy or simplifying the permitting process - note that the State of North Carolina is considering implementing its own “Dig Once” policy - for more information please see section 8 of North Carolina Governor Roy Cooper’s Executive Order Number 91, dated March 14, 2019 - <https://governor.nc.gov/documents/executive-order-no-91-establishing-task-force-connecting-north-carolina-promoting>).
- C. Installation of strategically placed towers and connections to all anchor institutions could be beneficial to help deploy additional fixed wireless assets to the community as well as increase public safety. By creating an RFP (see page 10) to access these resources new providers and incumbents can increase broadband offerings to the community.

Figure 5: Vertical and Community Asset in Madison County. See page 21 and 22 for larger maps. .



Pursuant to North Carolina Governor Roy Cooper’s Executive Order Number 91, dated March 14, 2019 - <https://governor.nc.gov/documents/executive-order-no-91-establishing-task-force-connecting-north-carolina-promoting> - section 5.d. speaks directly to creating recommendations to “..leverage state property and reduce barriers to the deployment of broadband infrastructure .. in partnership with ISPs.” And, in section 5.e., the order goes further to “..facilitate the use of state property and rights-of-way for broadband deployment.” This would include gaining access to State-owned vertical assets.

- D. A majority of Madison County is served by the French Broad Electric Membership Cooperative. Working with and educating legislators about the need to change existing North Carolina laws to support rural broadband expansion. If successful, this will lower barriers to entry as well as increase infrastructure deployment. For example, the present House Bill 387 (Senate Bill 310) would allow Electric Membership Corporations (“EMC” or “EMCs”) to provide telecommunications and broadband services. See <https://www.ncleg.gov/Sessions/2019/Bills/House/PDF/H387v0.pdf> for more information.
- E. Create public/private partnerships with private and/or nonprofit providers to extend services and increase adoption.

- F. Continue to deploy a County network for governmental use (including, for example, connecting government facilities via fiber optic cable and/or developing a public safety network) and allowing service providers to lease excess strands (lessening their investment) or by performing “joint builds” to lower deployment costs for everyone.
- G. Work with providers to encourage extension of existing infrastructure to capture more customers or improve existing services such as fiber to the home. In locations where some communities may have financial resources they may be able to individually incentivize a company to improve services in their area.
- H. Utilize varying technologies such as fixed wireless and wireline to fill in the gaps of service to underserved sections of Madison County.

SHORT TERM:

As a short-term option the County should partner with FBEMC to accomplish two goals: (a) blanket Marshall and Mars Hill with its fiber optic broadband solution, and (b) to construct fiber optic cable to all fire stations while creating community wireless hotspots for local broadband access. By providing funds, the County should negotiate its allotment of a number of fiber strands for its internal governmental use (or commensurate capacity) as well as a promise of free service for a period of three years (at a level to be negotiated). FBEMC is an ideal partner for this short-term solution due to its existing middle-mile broadband infrastructure into key communities as well as the EMC’s willingness to expand its broadband business. Connecting fire departments would serve critical emergency response centers while also deploying fiber into remaining isolated and rural communities of the county.

LONG TERM:

For a long-term opportunity, the County could put out a Request for Proposal (RFP) to a point-to-point (or multi-point) wireless provider to create a blanket wireless solution for the entire County. Not only would this create enhanced competition, but it would also support the need for basic Internet services throughout the County.

Grant monies will be required to support this long-term solution. If the County finds, applies, and receives the funds, then the winning respondent to the RFP should be prepared to negotiate community friendly offerings. This means the provider must hold constant an entry level basic service offering for an initial term. After three years, the provider awarded the contract may allow the market to dictate an appropriate price and speed.

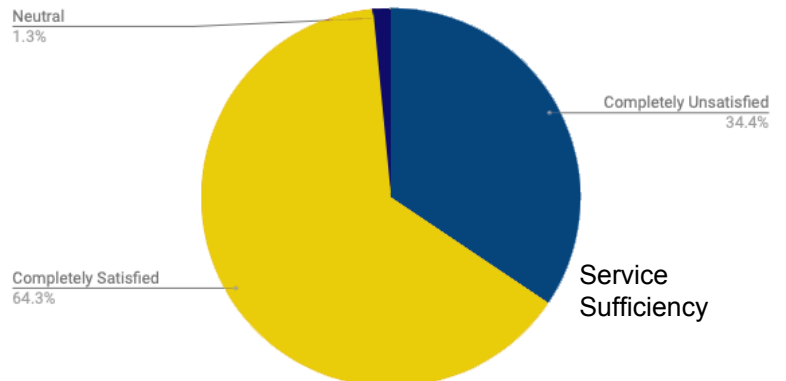
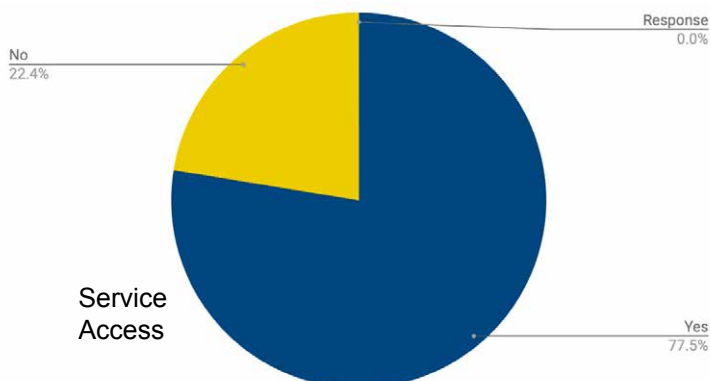
Last, the County could position itself to work with qualified provider(s) in support of anticipated Rural Utility Service funds in 2019. This work should begin now as suggested above.

DIGITAL INCLUSION:

Ideally every citizen who desires internet access would be able to receive it, but unfortunately there are gaps in coverage for various reasons.

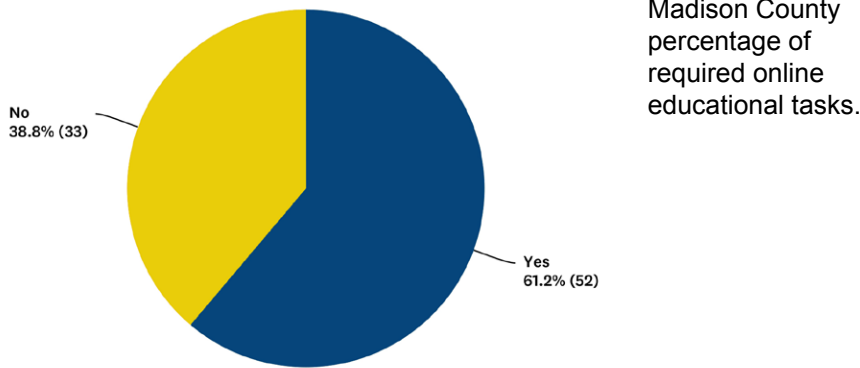
Over 65% of survey respondents said their service did not meet their sufficiency needs and 22% of survey respondents don’t have access at all. Madison County may want to consider some digital inclusion activities to help meet the needs of the community. Of survey respondents answering they don’t have service, “cost of service” and “service availability” rank as the top barriers to internet adoption.

Figures 7 and 8: 224% of Madison County survey responses respond by having no service and 64% of responses say service does not meet their sufficiency needs.



Madison County Schools is currently implementing a 1:1 program for their students to have a device at home. The 2017 ACS data reports that over 77% of households have a computer. These devices will be better utilized with increased adoption rates and other digital inclusion activities for the community. Over 61% of the population reported someone in their household needing to do school work or training tasks online.

Figure 9: 61.2% of survey responses claim someone in their household is required to perform educational tasks online.



To help alleviate cost burdens to communities the county may consider implementing additional low cost mobile service solutions and public access locations.

1. HotSpot-To-Go Programming- HotSpot lending programs assist with providing individuals access who can't afford regular service or do not possess consistent broadband needs. These programs are often administered by libraries, schools, non-profits, or faith-based institutions and are available for determined periods of time for free, or at a low cost.
2. Implement low/cost mobile service solutions- School district, public agencies, and private facilities can create additional community wifi spots to provide better coverage for unserved/underserved communities.

Examples of locations include: school buses, public transportation, community centers, parks, schools, libraries, churches, downtown districts, and businesses. Madison County currently operates a traveling bookmobile that can serve as a roaming hotspot. Using this type of resource as a model could leverage better community connectivity.

3. In areas where broadband competition is viable encouraging competition in the market will help reduce cost barriers.
4. Help encourage private companies to offer low cost plans to qualified customers.

Additionally- the county may consider organizing and branding this initiative locally by creating a map of these public and private locations. Places participating in the program can get a sticker for their window/front desk that indicates participation in helping the community make sure it has broadband resources. As high quality broadband is created and marketed to these locations residents will become more familiar with the services broadband offers. This may lead to an increased demand for service as the value placed on adequate broadband rises.

EMERGENCY MANAGEMENT:

It is important for Emergency Management teams to have the ability to communicate well in order to help manage calls in remote areas. Broadband plays a critical role in improving emergency communication systems. Upgrading broadband resources can aid in the prevention of emergencies and decrease response time in their event. Improvement will also make available a spectrum of new technologies to be utilized as avenues of communication when these situations transpire.

The creation of additional towers in the county could help improve access to both the resident and emergency responders, especially in rural areas where fewer towers exist. And, pursuant to North Carolina Governor Roy Cooper's Executive Order Number 91, dated March 14, 2019 - <https://governor.nc.gov/documents/executive-order-no-91-establishing-task-force-connecting-north-carolina-promoting> - government agencies across the State will also be the beneficiaries of additional broadband infrastructure. Emergency management systems would be a beneficiary.

1

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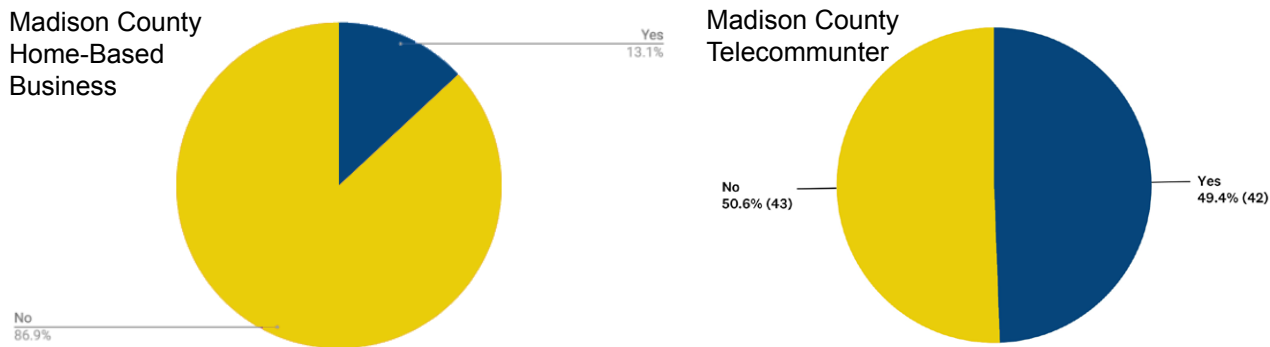


ECONOMIC DEVELOPMENT:

Madison County is one of the more rural areas of Western North Carolina, but has a steadily growing population. In order for Madison County to properly compete for economic development projects the availability of secure, reliable, competitive, and sustainable broadband infrastructure is essential to meet citizen's needs and is a powerful catalyst for job creation that drives economic modernization. Any business or industry, small to large, rural to urban, could benefit from access to broadband. Broadband access is especially important to small, rural, and home based businesses because it provides a global marketplace to their location.

Broadband access can reduce overhead costs through telecommuting. According to survey data over 13% of the population operates a home based business and over 49% of the population telecommute for work.

Figures 10 and 11: Business needs and potential for economic growth would be strengthened by improved broadband resources in Buncombe County. Figure 10 shows that over 13% of responses operate a home based business and over 49% say they currently telecommute to work.



Madison County reports that some current Economic Development sites are well covered with connectivity, while others could benefit from improved services. Improving fiber assets into more areas of the county will increase commercial viability in unserved areas. Through deployment of broadband resources, redundancy, and multiple carrier options, Madison County will increase its ability to develop more Economic Development sites and recruit more ED projects to the community. Funding opportunities for projects associated with Economic Development and business services are available and have been leveraged in the past for Madison County projects.

HEALTHCARE:

Increasingly, healthcare options are accessible at one's home and satellite sites. Madison County is well served in healthcare opportunities from the Hot Springs Medical Health program and other private providers, but does not have a local hospital or many medical specialists.

In order to support access to said services, a vibrant broadband connection is required. For example, the North Carolina Telehealth Network ("NCTN", <http://nctn.web.unc.edu/>) supports eligible healthcare providers' access to broadband services across the State through a Federal Communications Commission ("FCC") program (the Healthcare Connect Fund). See <https://www.fcc.gov/document/healthcare-connect-fund-fact-sheet> for more information.

Quality broadband is a requirement for viability of telehealth opportunities in rural areas. According to the FCC, in order to support high definition video teleconferencing the required minimum broadband speed is 6 Mbps. Madison County has a hospital and urgent care facilities, but bringing specialized care to the community via telehealth will increase overall health services.

1. Bring together healthcare stakeholders to discuss how broadband speeds can work to improve the health of the community.
2. Identification of strategic sites (such as community centers, business districts, etc) that co locate with other needed service offerings could help customer participation in a variety of resources.
3. Working with healthcare providers to create a pilot program to deploy telehealth service offerings.

FUNDING OPPORTUNITIES:

To support any recommendation, Madison County will need access to capital. The following groups may have grants available in support of broadband infrastructure deployment (note this list is not complete). Each respective group must be contacted to determine if a project is eligible for funding:

1. USDA – please refer to footnote 2. There are community connect grants available to eligible applicants - www.rd.usda.gov/programs-services/community-connect-grants
2. Connect America Funds (CAF) – are available to rural areas in the county. These funds would be accessible directly to the provider. See <https://www.fcc.gov/consumers/guides/connect-america-fund-phase-ii-faqs> for more information.
3. Appalachian Regional Commission (ARC) – The ARC has made funds available for rural broadband access projects- www.arc.gov/program_areas/index.asp?PROGRAM_AREA_ID=18
4. The GoldenLEAF Foundation –GoldenLEAF has made funds available for economic development programs that include broadband telecommunications - www.goldenleaf.org
5. State of North Carolina – the Broadband Infrastructure Office, as authorized under S.L. 2018-5, is providing grants to private providers of broadband services to facilitate the deployment of broadband service to underserved areas of the State. The Growing Rural Economies with Access to Technology (GREAT) Grant program funds eligible projects only in Tier One counties. These funds are not presently available to Madison County due to its status as a Tier Two county. Madison County officials may consider making their legislators and other state officials aware of this barrier for Tier Two counties and work to remove elements of the program that make it inaccessible to counties like Madison. The Broadband Infrastructure Office also lists possible funding organizations in its online toolkit.
6. Implementation of leasing vertical and community assets to private companies could leverage additional funds to deploy additional broadband related resources to the community.
7. Building a philanthropic model of corporate and public dollars to address highest needs among different barriers to adoption will increase deployment and reduce digital inclusivity concerns for the county.

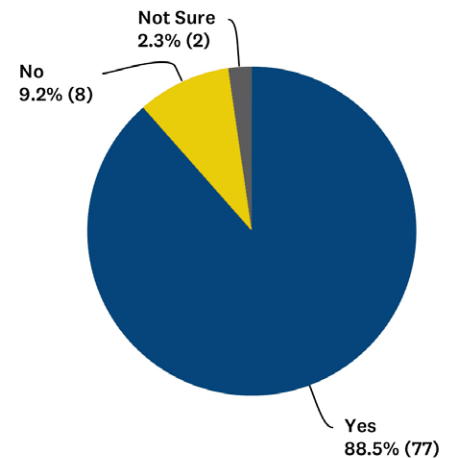
CONCLUSION:

Over 88% of survey responses from Madison County indicate that they consider internet access to be as essential as other basic services such as water, sewer, and electricity. In another question regarding a scale of importance respondents registered importance of internet access at 91 out of 100. The value of these resources from the community are very high.

Due to the high cost of implementation of fiber resources there is no fast track to closing the digital divide for Madison County, so helping improve connectivity access will require a collaborative approach among the community's partners. A better coordinated effort across the public, private, and non-profit sectors could significantly close the gap. Identification of highest priorities for the county could help play a role in leveraging funding from various resources to facilitate project implementation. This will likely require a comprehensive look at fiber, fixed wireless, and wifi/mifi improvements to close the digital divide countywide.

Telecommunication patterns follow a supply and demand model, so making sure providers in the region know where the opportunities and issues are located are critical to improving connectivity. Through this project Madison County, the North Carolina Broadband Infrastructure Office, and Land of Sky Regional Council now have this data to leverage private support to improve broadband resources.

Figure 12: 88% of Madison County survey responses say that they consider internet access to be an essential piece of infrastructure. 22% sa



[1] All demographic information was taken from <https://www.census.gov/quickfacts/madisoncountynorthcarolina> and https://en.wikipedia.org/wiki/Madison_County,_North_Carolina

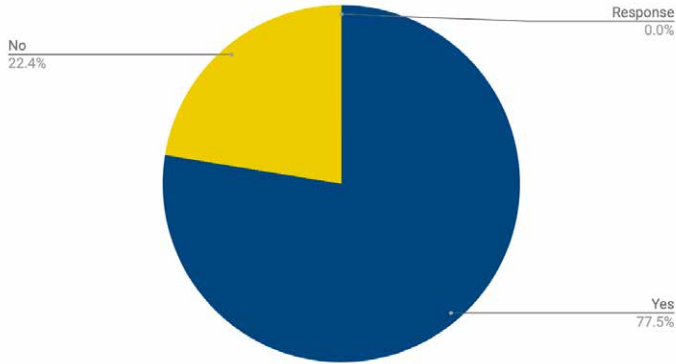
[2] Taken from the North Carolina Broadband Plan https://www.ncbroadband.gov/wp-content/uploads/2017/02/NC-Broadband-Plan_2017_Online_FINAL_PNGs3www.pdf

[3] The United States Department of Agriculture's (USDA) Rural Utility Service (RUS) will direct this program and rules for participation have not been released. Competition for these funds will be considerable and interested groups should start preparing now with business/technical assessments, cost analyses, engineering plans, and financial viability studies. In sum, these capital projects should be "shovel ready". <https://www.federalregister.gov/documents/2018/07/27/2018-16014/broadband-e-connectivity-pilot-program>

ATTACHMENT A: BROADBAND SURVEY RESPONSES

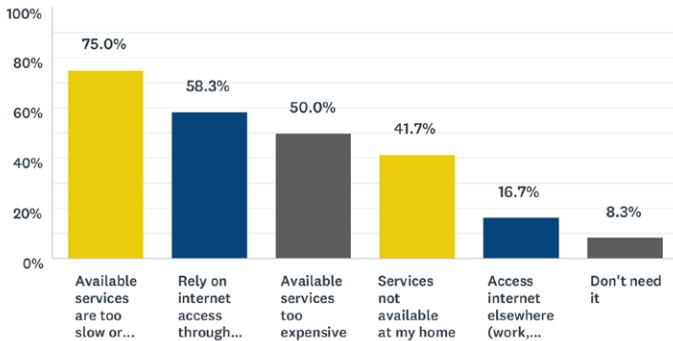
Does your household currently have Internet access?*

22.4% of Madison County residents claim they do not have access to Internet.



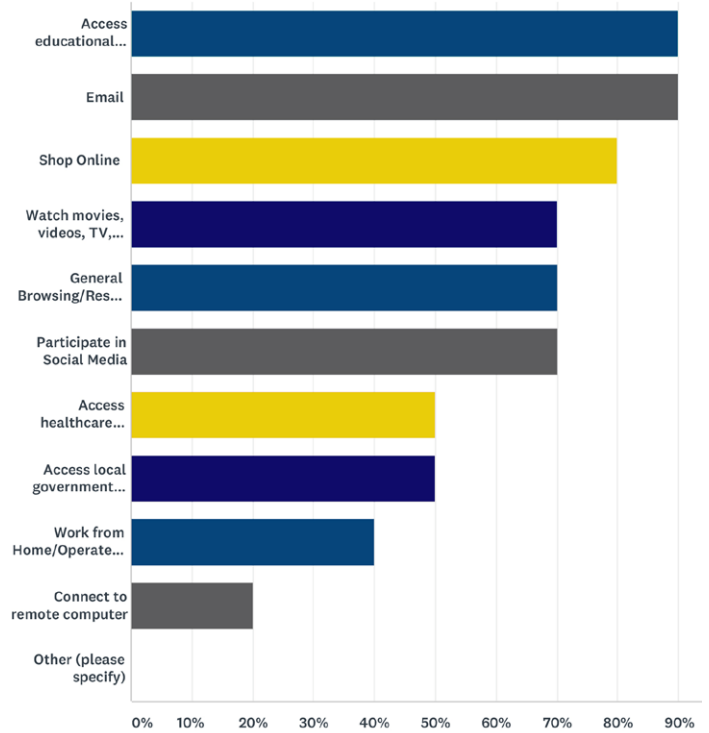
Why doesn't your household subscribe to Internet services? (For those who do not have Internet access)

75% of Madison County residents claim speed of service as the most significant barrier to internet adoption. Over 50% of the survey responses claim that services are too expensive or they rely on another way to get service. (Survey respondents were able to check all that apply)



If you could access Internet service in your home what activities would be most important to you? Select all that apply

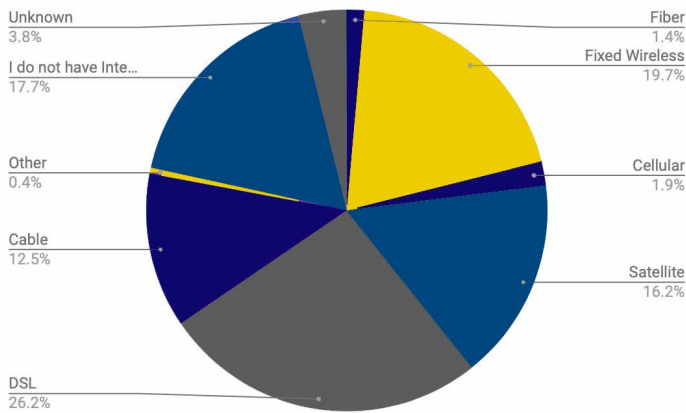
Madison County residents claim Access to Educational Materials, Email, and Shopping as their top desired activities if they had access to the Internet.



*These questions have integrated survey data from both Madison County 2016 survey and 2018 Land of Sky 2018/19 survey.

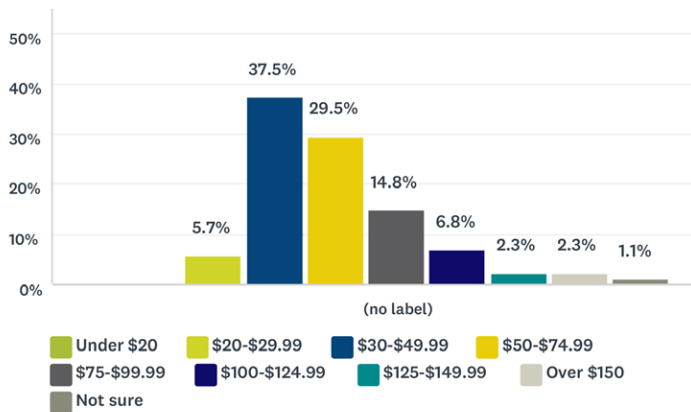
What is the primary source of Internet service that you have at your house? (for those who do claim to have Internet access)*

26.2% of survey responses claim to have DSL as their primary source of Internet. 19.7% of the responses claim Fixed Wireless as their primary Internet source. Few responses came in as other sources such as satellite, cellular, and fiber. Many people may not understand how their Internet service is delivered.



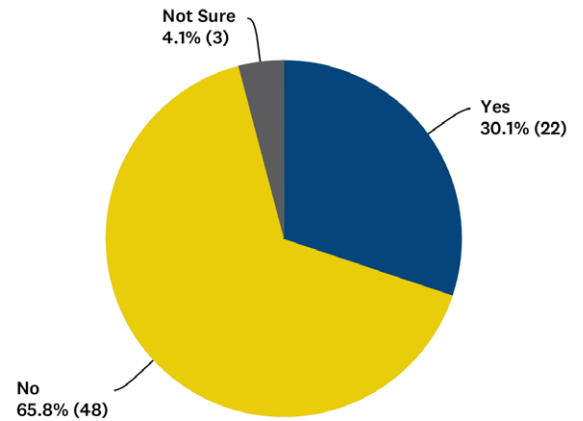
How much does your household pay each month for Internet service, including taxes and fees? If part of a bundle or package deal, please consider only the Internet portion of your monthly bill.

Over 37% survey respondents spend an average of \$30-\$49.99 each month on their Internet service. Almost 30% claim to pay \$50-\$75.00 per month for Internet service.



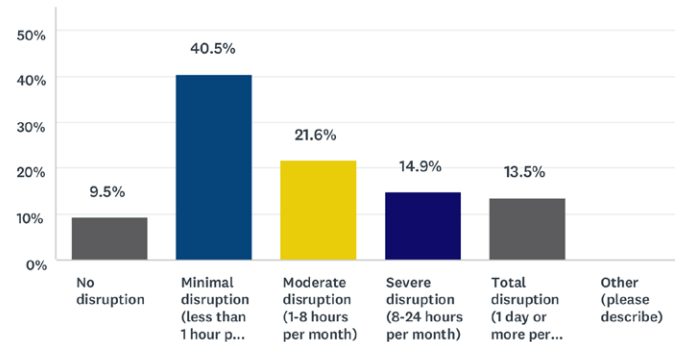
Do you think your Internet service provider sufficiently meets the needs of your household?

Over 65% of survey responses from those who have Internet service claim the service does not meet their needs and over 4.1% aren't sure.



Do you have any problems with the quality of your home Internet connection? Consider issues like service reliability, unacceptable speeds, service outages, etc. that occur during a typical month.

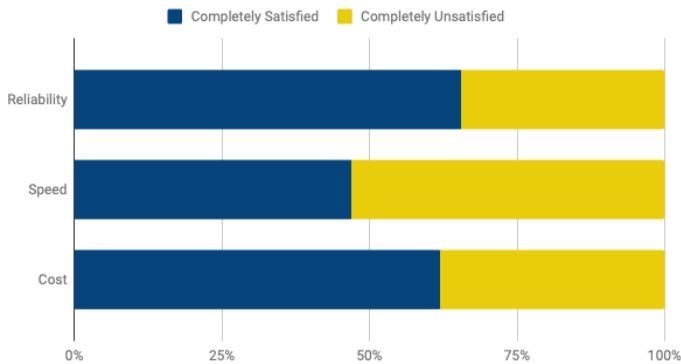
Over 70% of Madison County survey responses claim that service disruptions are less than 8 hours per month and 11.6% claim there are no disruptions.



*These questions have integrated survey data from both Madison County 2016 survey and 2018 Land of Sky 2018/19 survey.

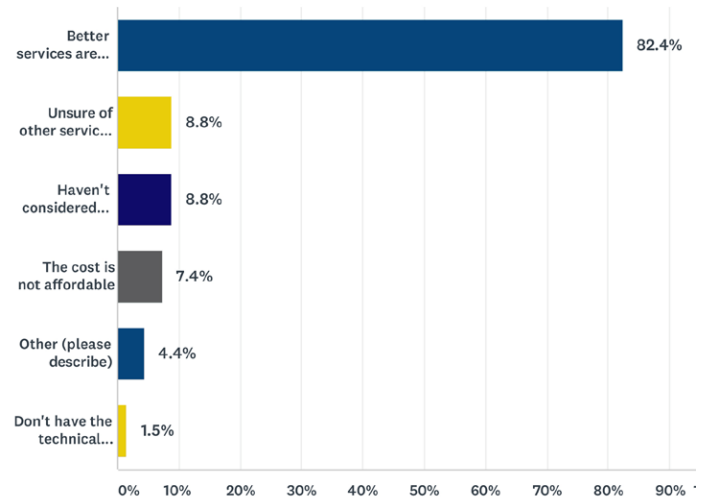
Please rate your level of satisfaction with your home service:*

Over all Madison County is most unsatisfied with speed as advertised. They are most satisfied with Service Reliability.



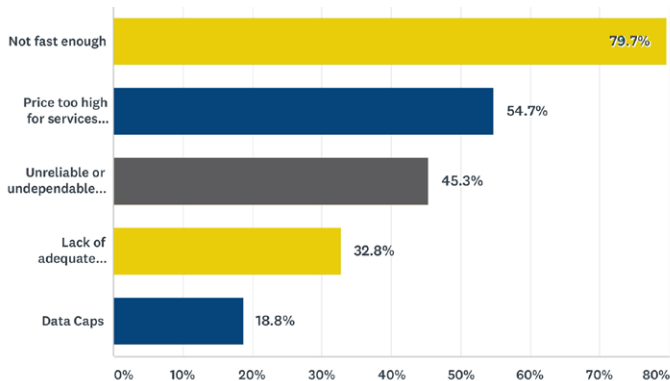
Why haven't you upgraded your residential service?

82% of the survey responses claim that they have not upgraded their service due to a lack of better options.



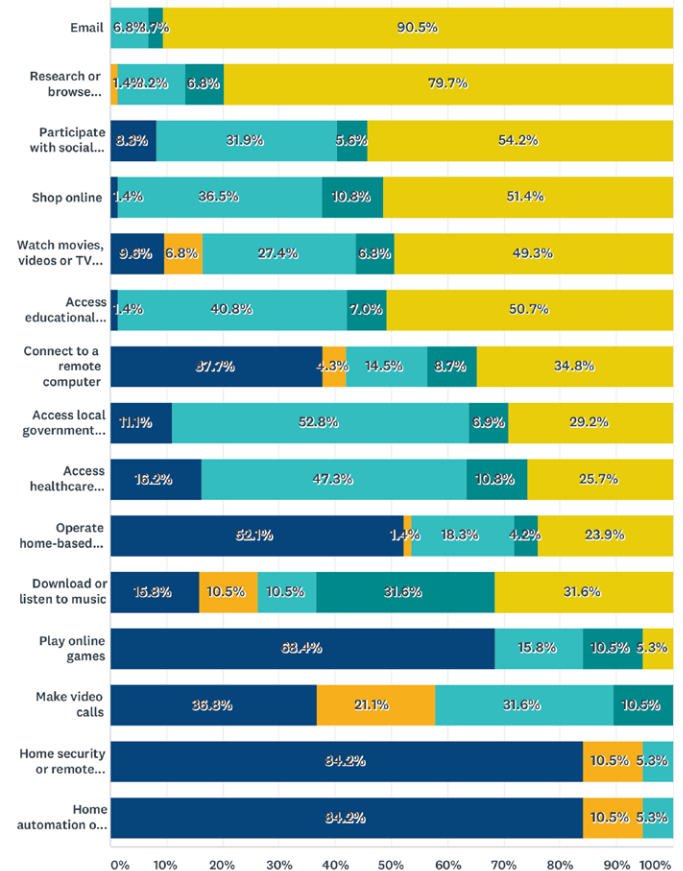
What would you like to improve about your Internet Service?

Consistent with the previous question nearly 79% of survey responses claim they would like for prices for the service provided to decrease, additionally customers expressed concerns about their speed and reliability.



What activities do you do through your home Internet service?

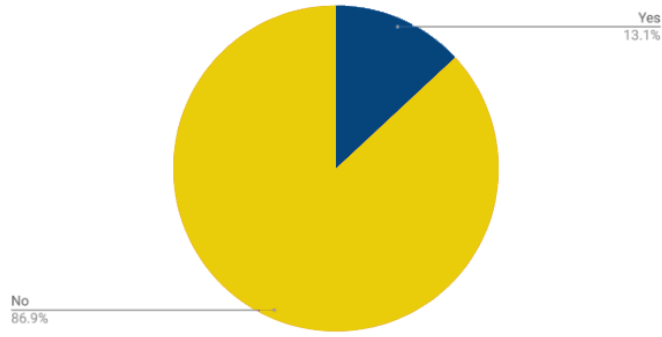
Madison County residents use the Internet for diverse reasons, basic activities such as email, research, entertainment, shopping, and social media rank among the most popular.



*These questions have integrated survey data from both Madison County 2016 survey and 2018 Land of Sky 2018/19 survey.

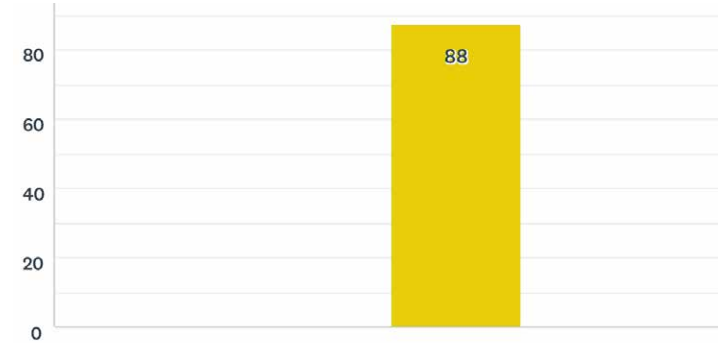
Does anyone in your household operate a home-based business?*

13.1% of survey responses claim to operate a home-based business.



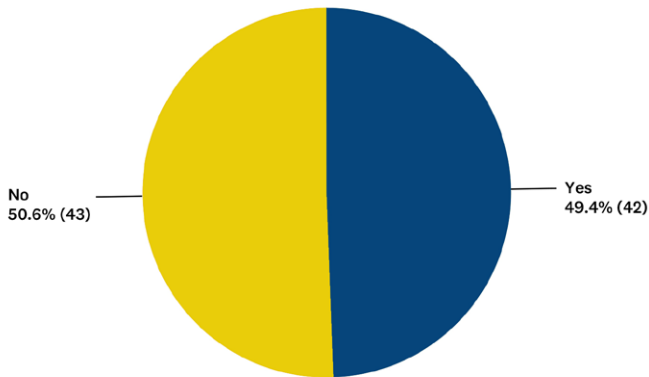
How important is the Internet to your household?

On a scale from 1-100 Madison County ranks the importance of Internet access as 88.



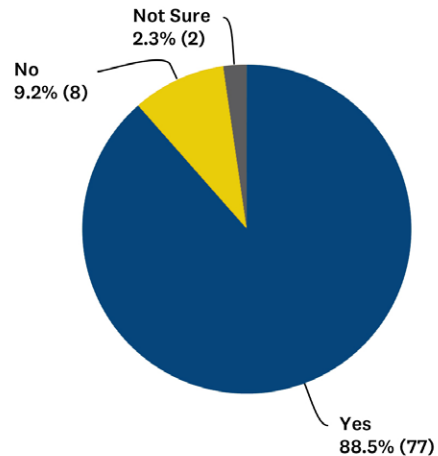
Does any member of your household telecommute or occasionally work from home from an outside employer?

Over 49% of survey responses claim to telecommute to their jobs. Based on several open ended questions at the end of the survey, the option to work from home came up as something Madison County residents would like to participate in.



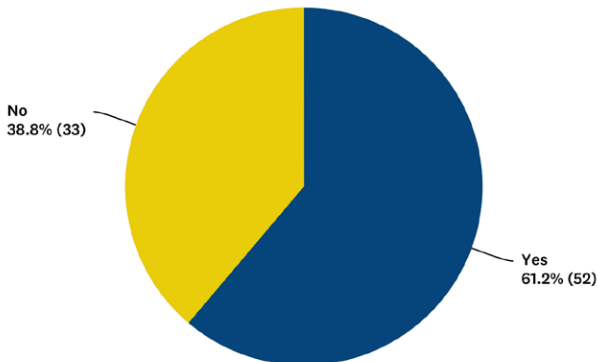
Do you consider Internet access to be an essential service; much like water, electricity, and other utilities?

Madison County feels very strongly (88.5%) that Internet access has become a basic utility.



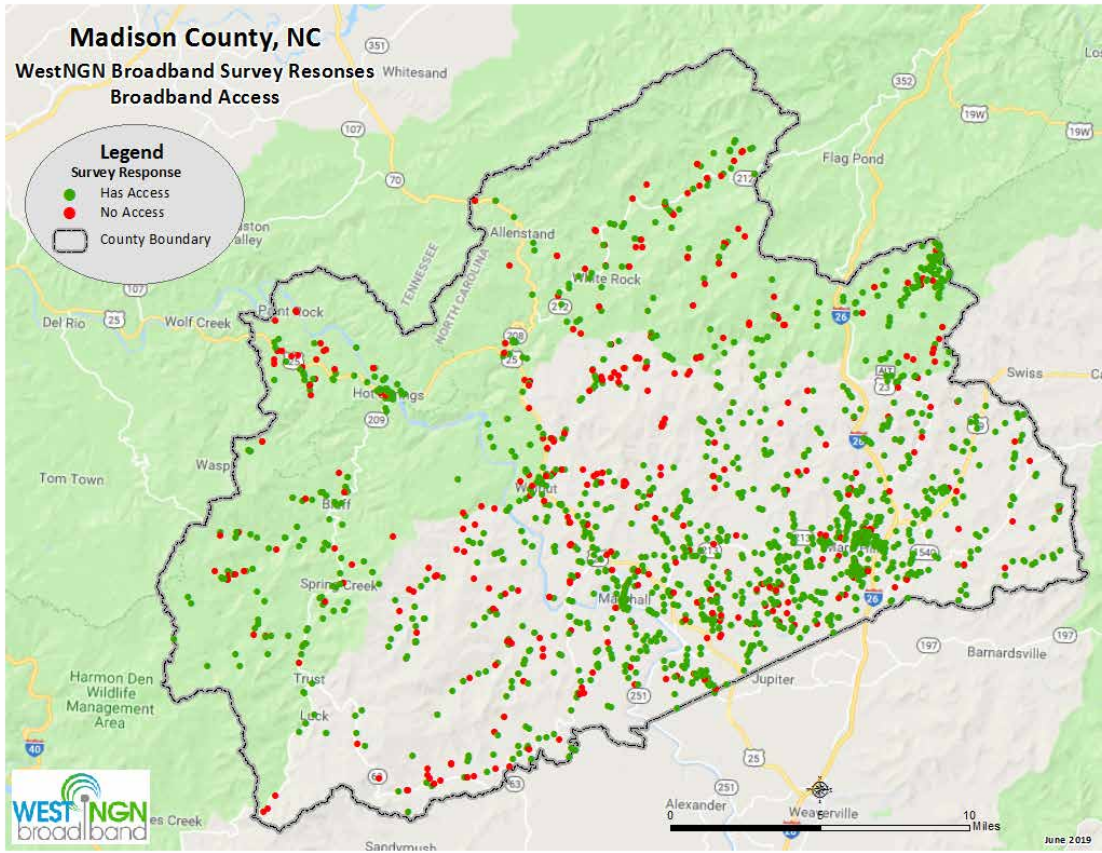
Are any members of your household required to perform schoolwork or training tasks via the Internet?

61% of survey responses claim that someone in their household is required to perform schoolwork or training tasks.

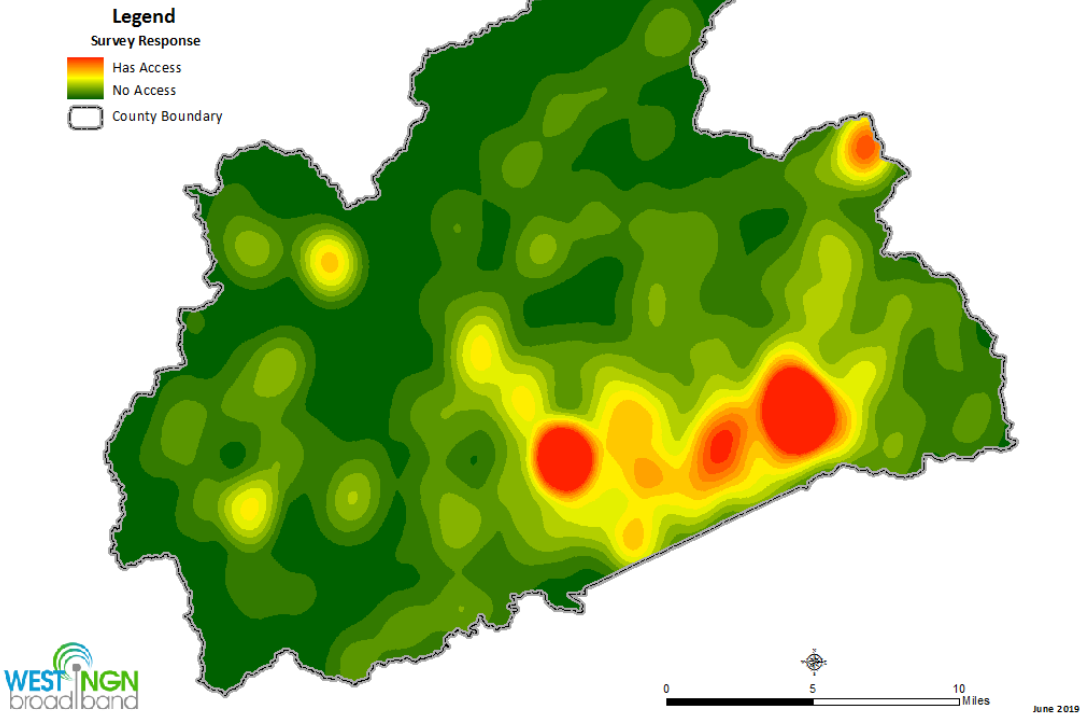


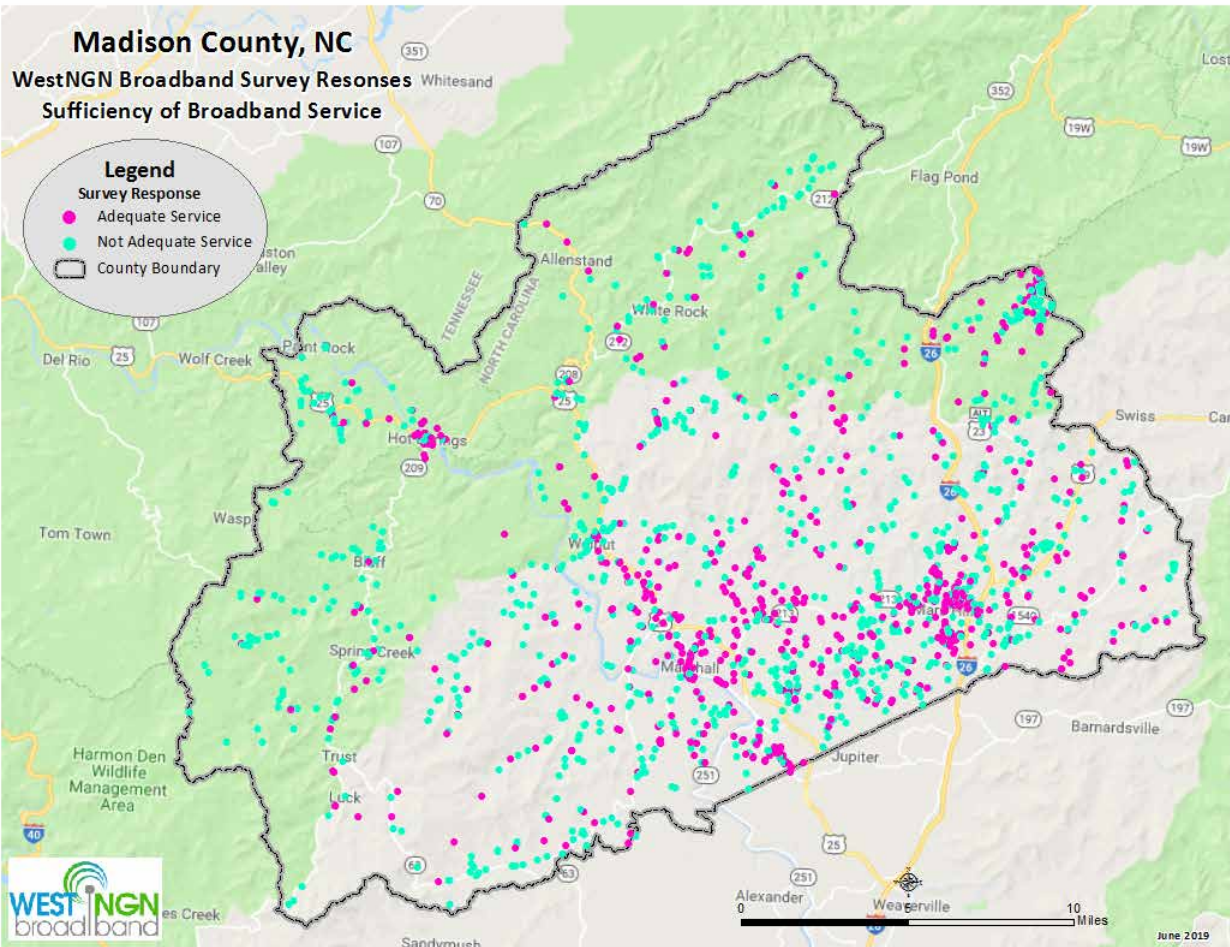
*These questions have integrated survey data from both Madison County 2016 survey and 2018 Land of Sky 2018/19 survey.

ATTACHMENT B: MAPS

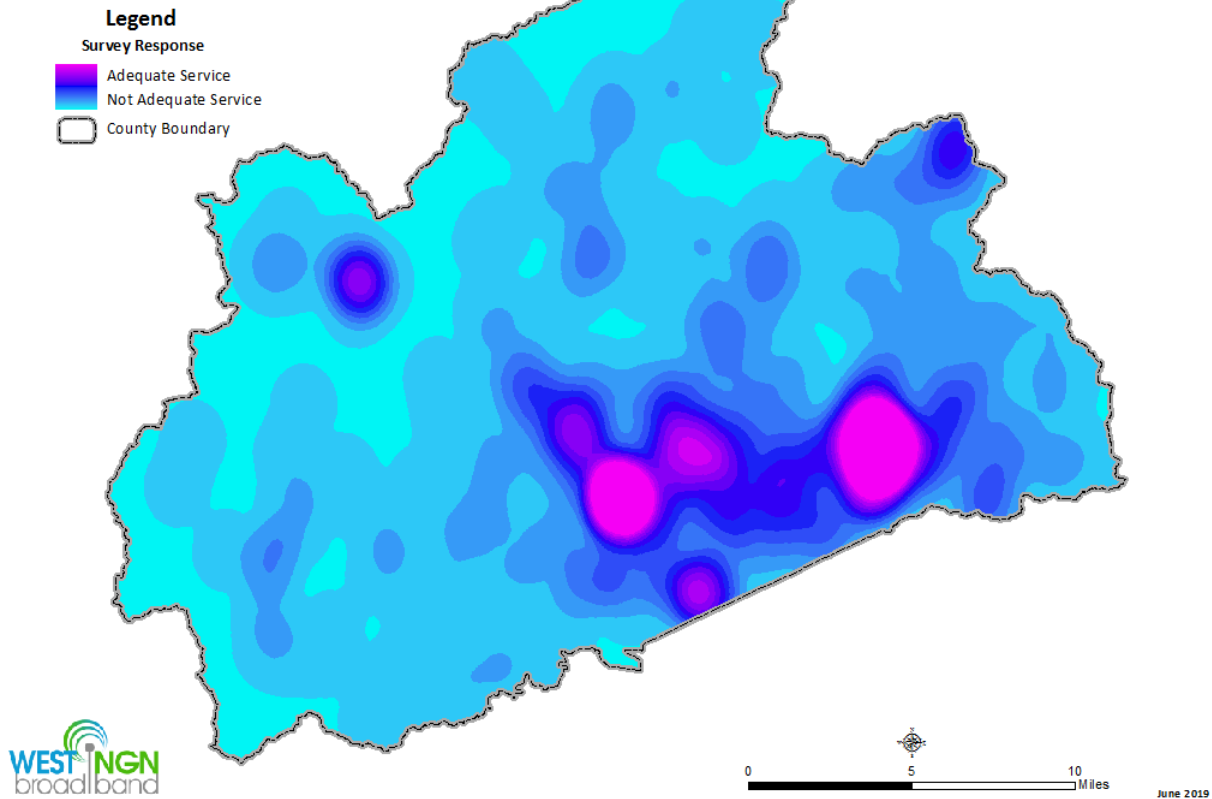


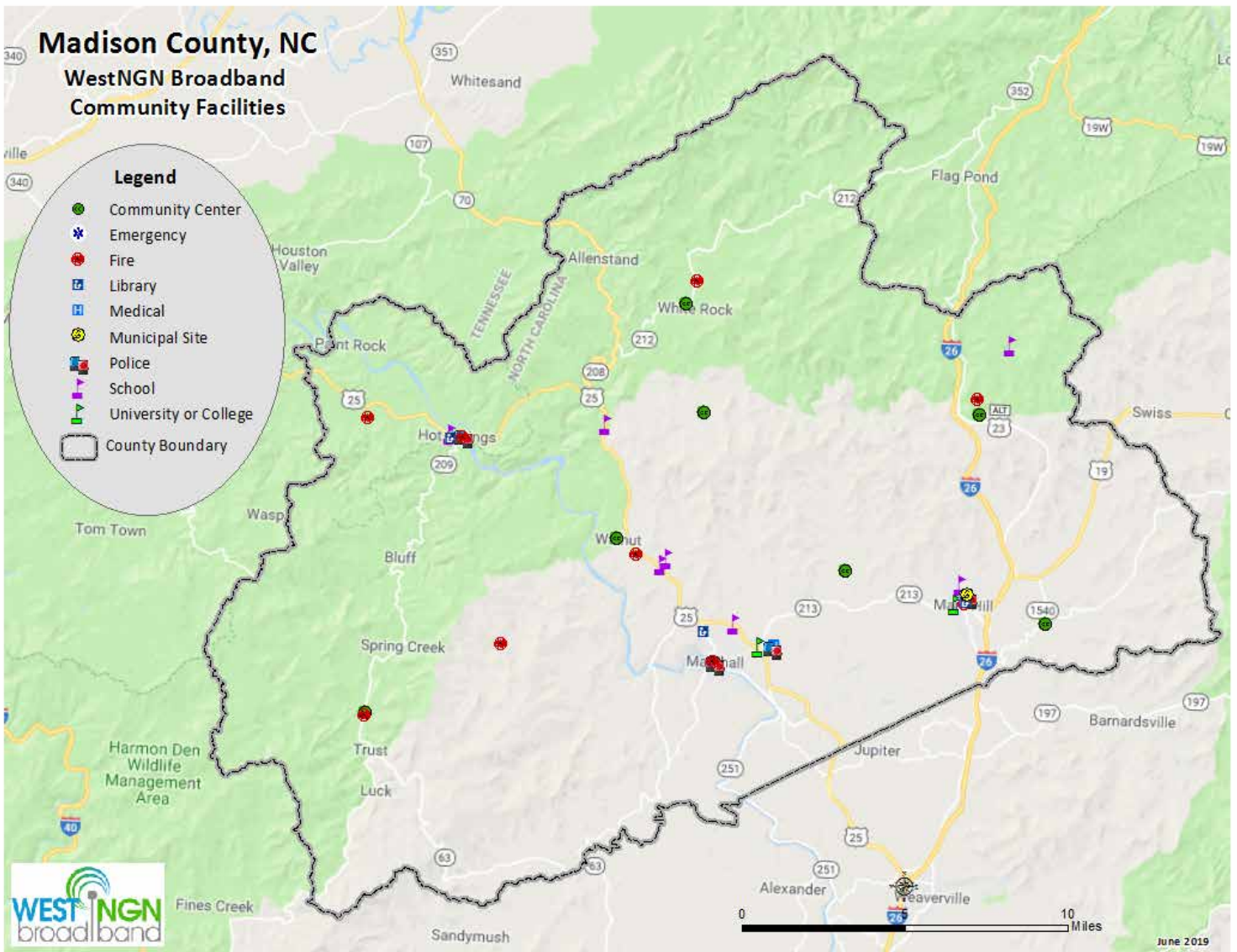
Madison County, NC WestNGN Broadband Survey Respones Broadband Access





Madison County, NC WestNGN Broadband Survey Respones Sufficiency of Broadband Service





Community Center

- Beech Glen Community Center
- Center Community Center
- Ebbs Chapel Community Center
- Laurel Community Center
- Marshall Community Center
- Revere-Rice Cove Community Center
- Spring Creek Community Center
- Walnut Community Center

Emergency

- Hot Springs EMS

Fire

- Big Pine Volunteer Fire Department Incorporated
- Ebbs Chapel Volunteer Fire Department Incorporated
- Hot Springs Fire Department
- Laurel Volunteer Fire Department Incorporated
- Mars Hill Fire Department
- Marshall Community Volunteer Fire Department
- North Carolina Division of Forest Resources District 1 - Madison County
- Spring Creek Volunteer Fire Department Incorporated
- The Country Volunteer Fire Department Incorporated
- Walnut Community Volunteer Fire Department

Library

- Hot Springs Branch Library
- Madison County Public Library
- Mars Hill Branch Library

Medical

- Hot Springs Health Program
- Madison County Health Department
- Mashburn Medical Center

Police

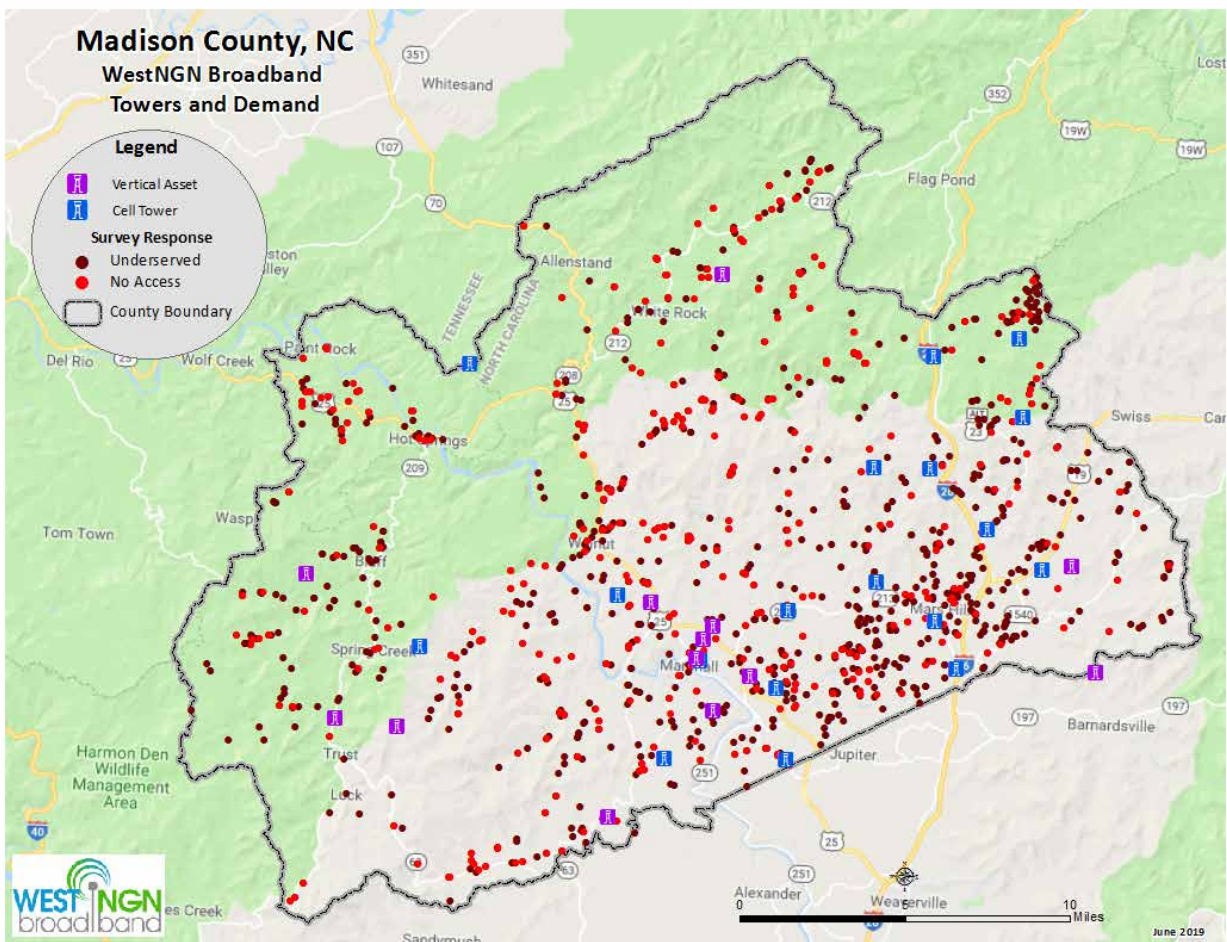
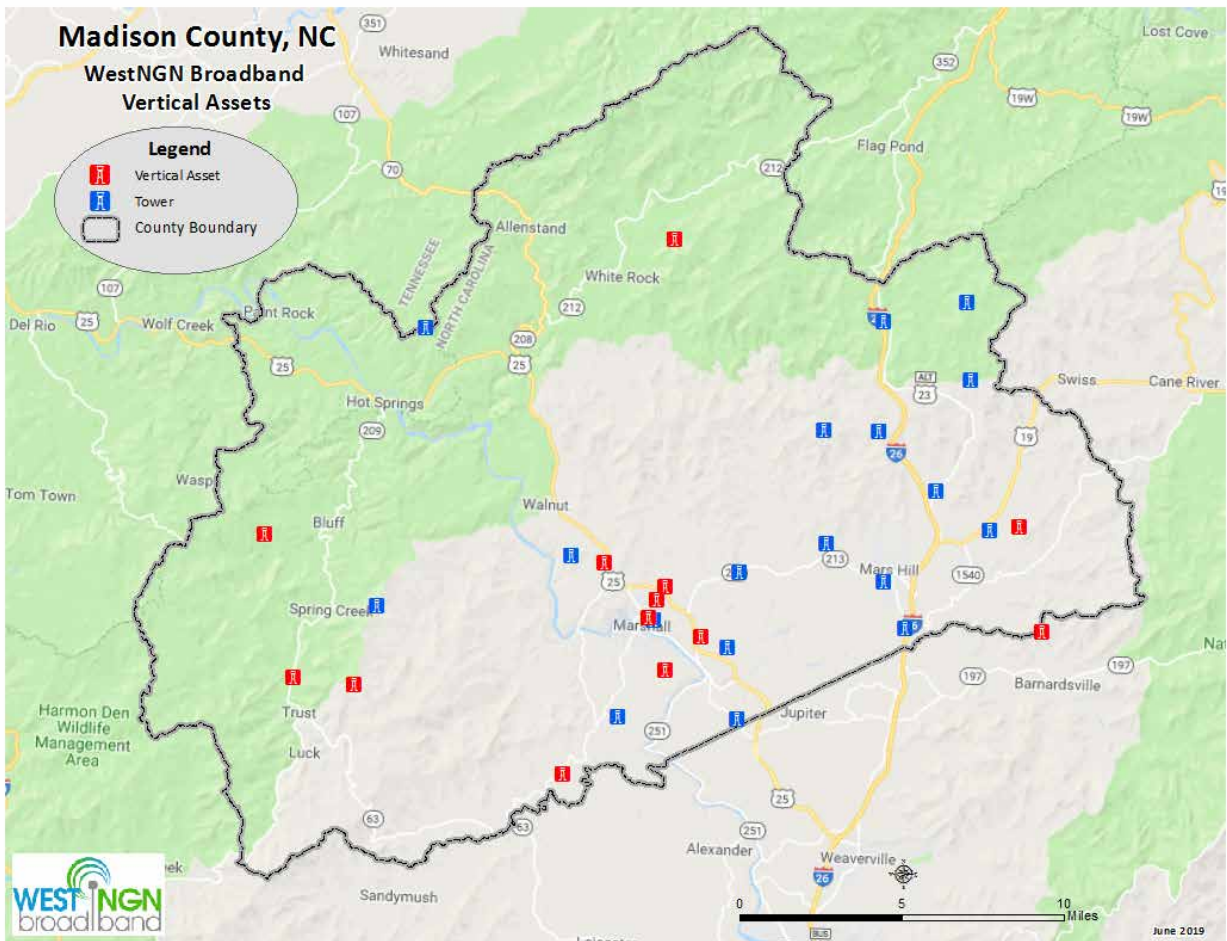
- Hot Springs Police Department
- Madison County Sheriffs Department / Madison County Jail
- Mars Hill Police Department
- Marshall Police Department

School

- Hot Springs Elementary
- Woodson Branch Nature School
- Brush Creek Elementary
- Hot Springs Elementary
- Madison High and Madison Early College
- Madison Middle
- Mars Hill Elementary
- Wolf Creek Academy

University or College

- Mars Hill College
- Asheville Buncombe Technical College Madison Branch







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