North Central Wisconsin Regional Recovery Plan

Broadband Assessment Report

North Central Wisconsin
Regional Planning Commission

Table of Contents

Broadband Assessment Report

Introduction

Broadband accessibility has become a requirement, and not just a luxury, for communities, businesses, workers, and residents in today's world. In fact, the benefits of access to broadband, and the drawbacks from a lack of access, are quickly making broadband an essential utility. Broadband accessibility is a vital resource for businesses to operate and to stay competitive in an increasingly digital economy. Broadband accessibility is also critical for residents, as those who lack access to high-speed internet have a harder time accessing jobs, education, job and skills training, and services.

The COVID-19 pandemic has magnified the significance of broadband access, as many families and businesses were forced to rapidly shift to remote work, schooling, and commerce. The quick shift to a virtual world posed significant challenges to communities across the nation, and quickly created significant disadvantages for businesses, workers, and residents alike located in areas that lack adequate broadband access.

Despite widespread efforts to improve broadband accessibility and the quality of broadband within the Region, access to high-quality broadband – or the lack thereof – continues to challenge the residents and businesses in North Central Wisconsin. Many residents and businesses in North Central Wisconsin do not have access to adequate broadband, while others have no access to broadband at all, and are thus not able to use broadband internet service, putting them at a disadvantage as the world's reliance on the internet grows.

What is Broadband?

Broadband is the provision of a high-speed connection to the internet via the transmission of data through wide bandwidths, allowing for multiple signals to be transferred at once, as opposed to dated dial-up technology where only a single-line of data can be transferred. Broadband internet access is always on and is faster than dial-up access. The Federal Communications Commission (FCC) defines broadband as any of the following high-speed technologies: fiber, cable, fixed wireless, or satellite.

There are three traits that define broadband internet access - download speed, upload speed, and latency or lag time. Download speed refers to the speed at which a device can receive data from the internet, while upload speed refers to how fast a device can send data to the internet. Latency, or lag time, refers to the delay between a user's action and the web's response to that action.

The standard for reliable broadband internet access is defined by the FCC as internet access with a download speed of 25 Mbps and an upload speed of 3 Mbps. Generally, these speeds are the minimum speeds where video streaming and a few in-home devices can work simultaneously. However, higher internet speeds are becoming increasingly important as broadband demand and data traffic rates continue to increase.

Status of Broadband within North Central Wisconsin

Broadband has quickly emerged as a requirement for many businesses, workers, and residents to prosper and is now essential for attracting workers and residents to communities. Access to broadband is one of the main factors that prospective workers and residents look at while evaluating jobs and housing within communities, especially for rural communities. A lack of broadband access not only makes it difficult for communities to attract workers and residents, it also makes retaining their current workforce and residential base more difficult.

In order to gain a clear picture on the status of broadband within the Region, it is important to examine the factors that influence broadband within the Region. Factors that influence broadband within the Region include broadband availability (especially the availability of broadband with download speeds of 25 mbps or higher), and broadband adoption rates. In order for residents and businesses to tap into broadband, it first needs to be available at their location. Broadband adoption rates are influenced by a variety of factors as well, including overall availability of broadband, household income, educational attainment, age, and employment status.

Broadband Accessibility

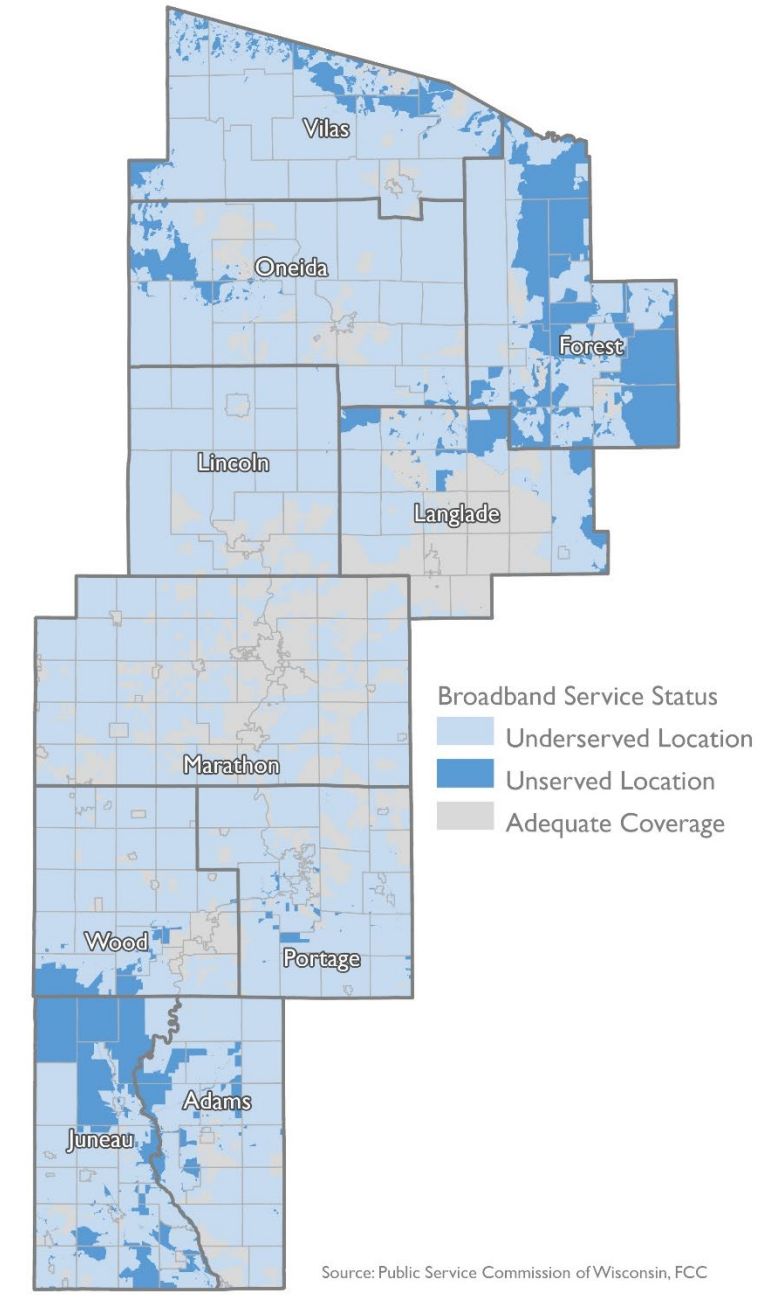
According to the Federal Communications Commission, 25 percent of rural residents within Wisconsin lack access to adequate broadband, which is defined by the FCC as broadband with a download speed of 25 mbps or higher and an upload speed of 3 mbps or higher. As shown to the right, the percentage of rural residents who lack access to adequate broadband is higher than the state average of 25 percent in nine out of the ten counties within the North Central Wisconsin Region, with only Marathon County having a higher percentage.

Percent of Rural Population with Access to Broadband by Download Speed

	25+ mbps	10-24 mbps	<10 mbps	None
Adams	67.7%	25.9%	6.4%	0.0%
Forest	54.6%	27.4%	16.9%	1.1%
Juneau	66.8%	23.2%	7.8%	2.2%
Langlade	74.9%	13.9%	11.2%	0.0%
Lincoln	64.8%	35.2%	0.1%	0.0%
Marathon	94.4%	4.6%	1.0%	0.0%
Oneida	61.0%	38.1%	0.9%	0.1%
Portage	73.7%	20.0%	6.3%	0.0%
Vilas	69.9%	28.6%	0.4%	1.1%
Wood	63.5%	20.8%	15.7%	0.0%

Source: Forward Analytics & FCC

While the North Central Wisconsin Region is behind the state in terms of rural population with access to adequate broadband, the Region compares favorably to the state in terms of percentage of rural population with access to broadband with download speeds of 10-24 mbps. While this level of broadband is now considered to substandard, accessibility to this level of broadband is still essential for many rural residents for accessing the internet, and future broadband improvement efforts should be focused on upgrading service in these locations.



Broadband Service in North Central Wisconsin

Identifying the areas within the Region that are currently unserved, underserved, and adequately served in terms of broadband service is essential for understanding the status of broadband within the Region.

The map to the left shows the current broadband service status within North Central Wisconsin. The map includes the most recent internet access as reported to the FCC. Areas on this map are either considered unserved (dark blue) or underserved (light blue).

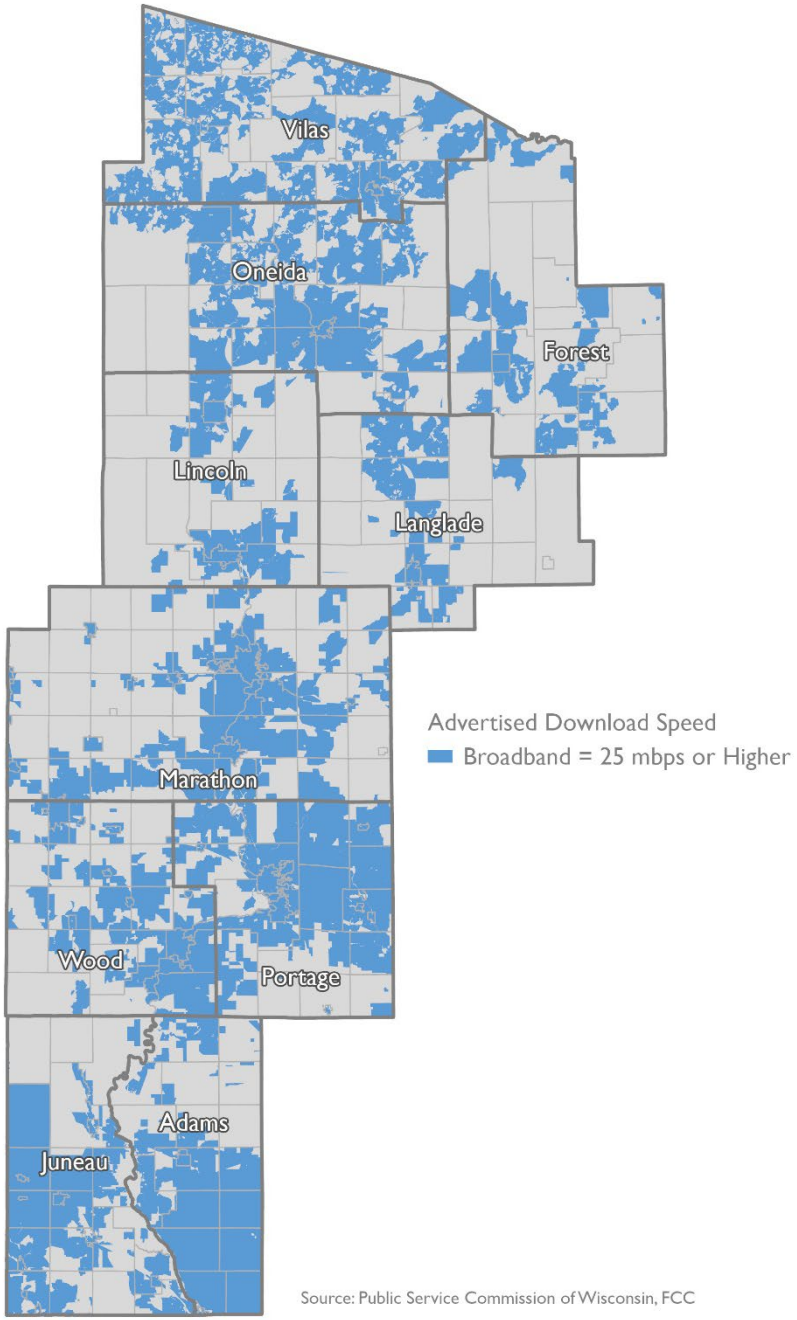
Areas shown in dark blue on the map are considered to be unserved, meaning that this area is currently not served by an internet service provider offering an internet service that is a fixed wireless or wired service and offers broadband with download speeds of 5 mbps or higher and upload speeds of 600 kbps or higher.

Areas shown in light blue on the map are considered to be underserved, meaning that these locations are served by fewer than 2 broadband service providers providing a broadband service with download speeds of 25 mbps or higher and download speeds of 3 mbps or higher.

As indicated by the Broadband Service Map, the majority of the North Central Wisconsin Region is currently underserved or unserved in terms of broadband access. This poses a significant problem for the Region as a whole, as the lack of access to adequate broadband will place the Region at a competitive disadvantage, especially as the importance of access to high-quality broadband increases over time.

Just as it is important to identify the areas within the Region that are currently unserved or underseved in terms of broadband access, it is also important to identify areas where there is access to adequate broadband service. Areas within the Region with access to broadband with download speeds of 25 mbps or higher are identified below.

Broadband Availability at 25 mbps Download Speeds



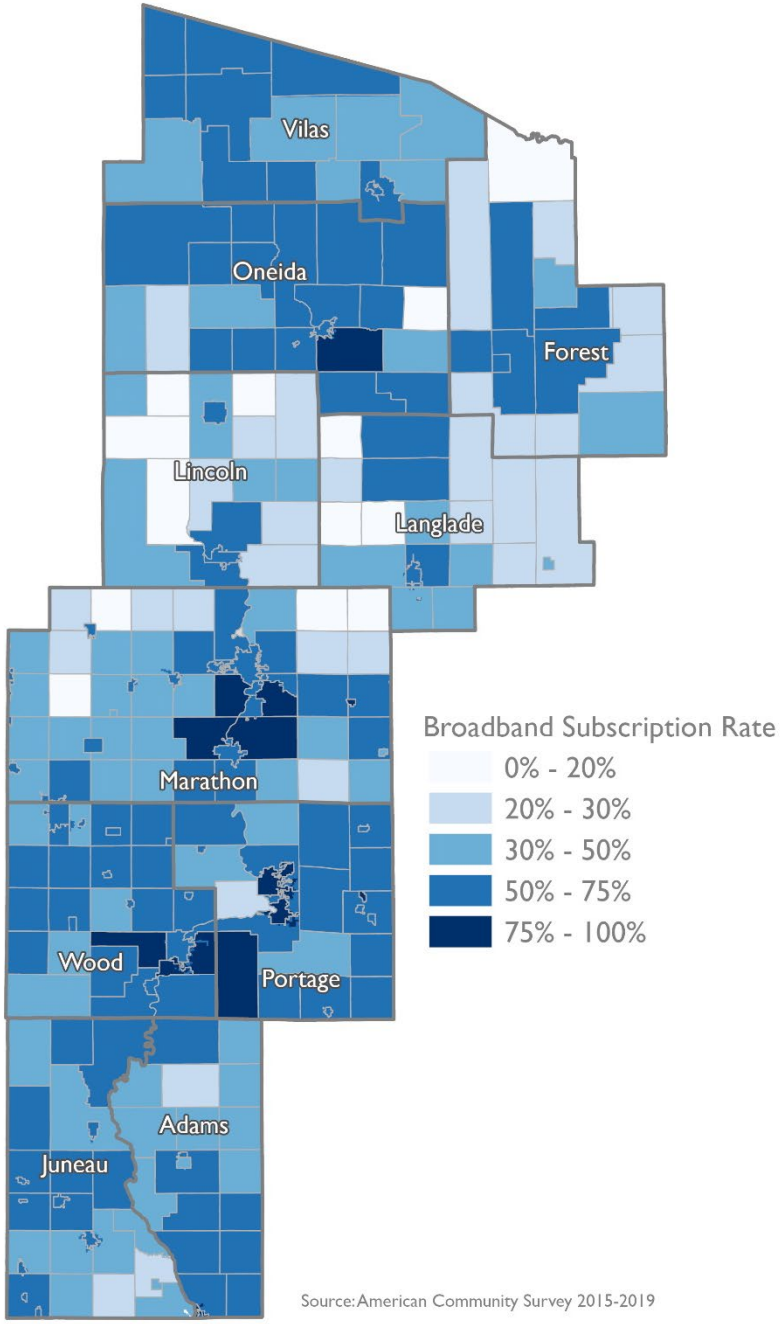
High-Speed Broadband in North Central Wisconsin

With most of the Region being rural in nature, it is no surprise that there are many areas within the Region that currently lack access to adequate broadband with download speeds of 25 mbps or higher. A majority of the locations that lack adequate broadband have access to broadband but receive substandard service and often pay a premium price for it, which poses a major challenge to the mostly rural Region.

The map on the left shows the availability of broadband with download speeds of 25 mbps or higher within the North Central Wisconsin Region. The map uses the most recent data collected by the Public Service Commission of Wisconsin. The gray areas in the map show where significant gaps in adequate broadband accessibility exist within North Central Wisconsin, while the blue areas show where there is access to adequate broadband within the Region. Unsurprisingly, most of the Region's more sparsely populated areas currently do not have access to adequate broadband, while most of the Region's densely populated locations have access to adequate broadband. While many of the Region's sparsely populated locations lack adequate broadband, there are locations throughout the Region that have access to adequate broadband and are sparsely populated, particularly in Adams, Juneau, Oneida, Portage, and Vilas Counties.

It is also important to note that not all households within areas mapped in blue receive adequate broadband access, which means that there are more households within the Region that lack access to adequate broadband than indicated within the map. Current mapping standards in the state of Wisconsin are limited to the reporting of broadband speeds by census block. This is a problem for the entire state, because if one household within the census block has access to broadband with speeds of 25 mbps or higher, then the entire census block is mapped as having access to that level of broadband, even if that is not really the case. This makes improving broadband mapping and data collection within Wisconsin a crucial priority for improving broadband within the state moving forward.

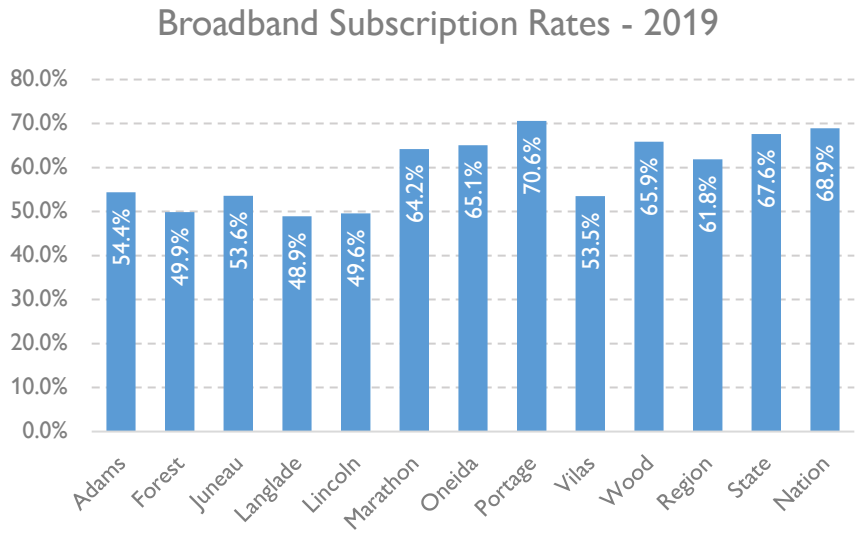
Municipal-Level Broadband Subscription Rates



Broadband Adoption Within North Central Wisconsin

Broadband adoption is typically measured in the percentage of households that subscribe to home broadband internet service. Broadband internet includes internet via cable, fiber optic, wireless or DSL service. The map to the left shows broadband adoption rates within North Central Wisconsin at the municipal level. Broadband adoption rates are based on self-reported data collected by the American Community Survey during their 2015-2019 survey period.

Overall, about 62 percent of households within the North Central Wisconsin Region have a subscription to broadband at their home, meaning 62 percent of households within the Region access the internet via broadband. Broadband adoption rates within the Region are typically highest in and around the Region's population centers, and lowest in the more scarcely populated areas. This disparity in broadband adoption rates is partly due to differences in the availability of broadband in these areas, as broadband availability is much higher in more densely populated areas than in areas with low density population. Other factors such as educational attainment, income, age, and disability status also impact broadband adoption rates.

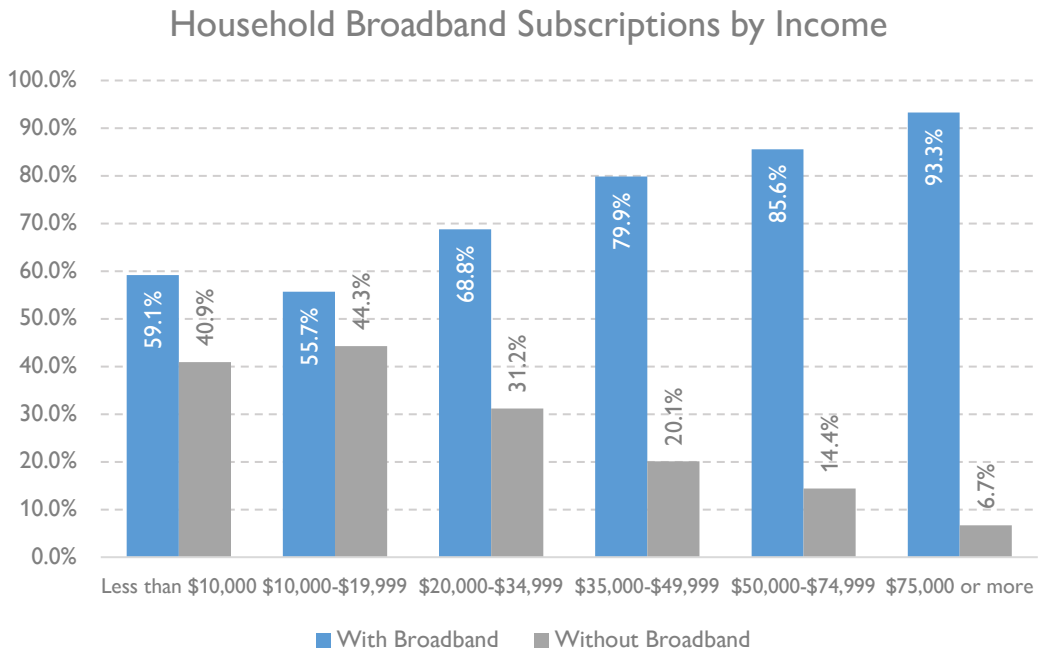


While only about 62 percent of households within North Central Wisconsin have a broadband subscription, there are still other ways to access the internet. While typically not as reliable or as fast as broadband, mobile data subscriptions and more costly satellite internet services help fill the internet gap within the Region by providing access to the internet for households without broadband subscriptions. Mobile data services are often required for households that cannot afford a broadband subscription, while both mobile data and satellite services are often required for those that do not live in an area where broadband service is readily available.

Within the North Central Wisconsin Region, about 12 percent of households rely on their mobile data subscriptions to access the internet, while an additional 9 percent of households rely on satellite internet services to access the internet. This means that about 82 percent of households within the Region have access to the internet, whether it is through mobile data, satellite service, or through a broadband internet subscription. With about 82 percent of households within the Region that currently have access to the internet at home, there are about 18 percent of households within the Region that have no internet access at home, due to a variety of factors, such as the availability of broadband, low-income levels, low educational attainment, and age or disability status.

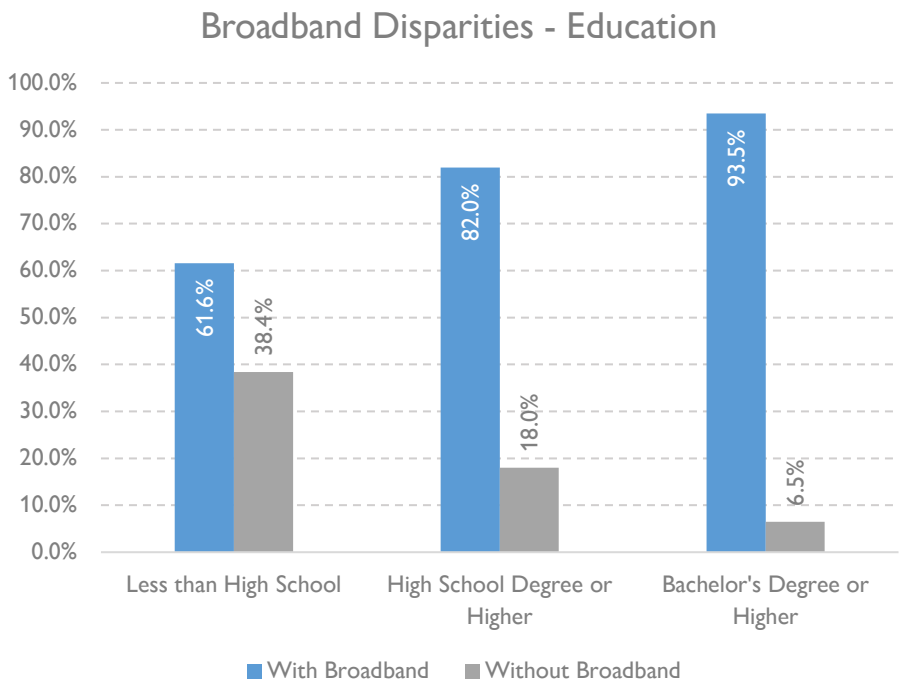
Broadband Adoption by Household Income

Home broadband subscription rates are closely related to income, as there are large disparities in broadband subscription rates among low-income households and high-income households. Low-income households are less likely to have a broadband subscription, while high-income households are significantly more likely to have a broadband subscription. Within the North Central Wisconsin Region, more than 43 percent of households with an annual income below $20,000 lack a home broadband connection, compared to only about 7 percent of households with an income above $75,000 per year. This indicates that even in areas where broadband accessibility is not an issue, that the cost of broadband is a major barrier to high-speed internet access for many households within the Region.



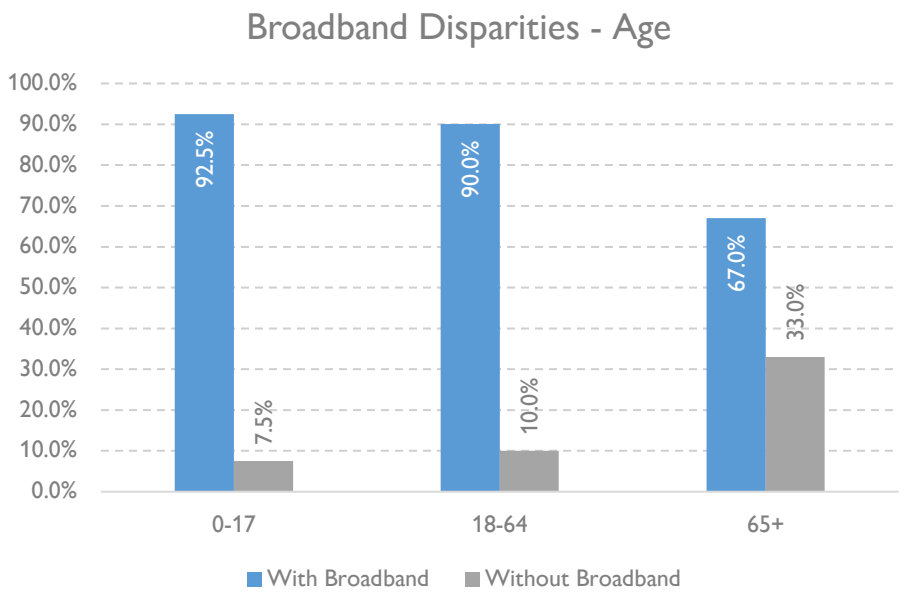
Broadband Adoption by Educational Attainment

Educational attainment is another factor that is closely related to broadband subscription rates. Households with lower levels of educational attainment are significantly more likely to lack a broadband subscription. Within the North Central Wisconsin Region, only about 62 percent of individuals without a high school degree or higher have a broadband subscription. This lags in comparison to individuals with a high school degree or higher, where 82 percent of individuals have a broadband subscription and to households with a bachelor's degree or higher, where about 94 percent of individuals have a broadband subscription. In fact, individuals without a high school degree or higher are 2.5 times more likely to lack a broadband subscription at home than individuals with at least a high school degree and are nearly 6 times more likely to lack a broadband subscription at home than individuals with at least a bachelor's degree.



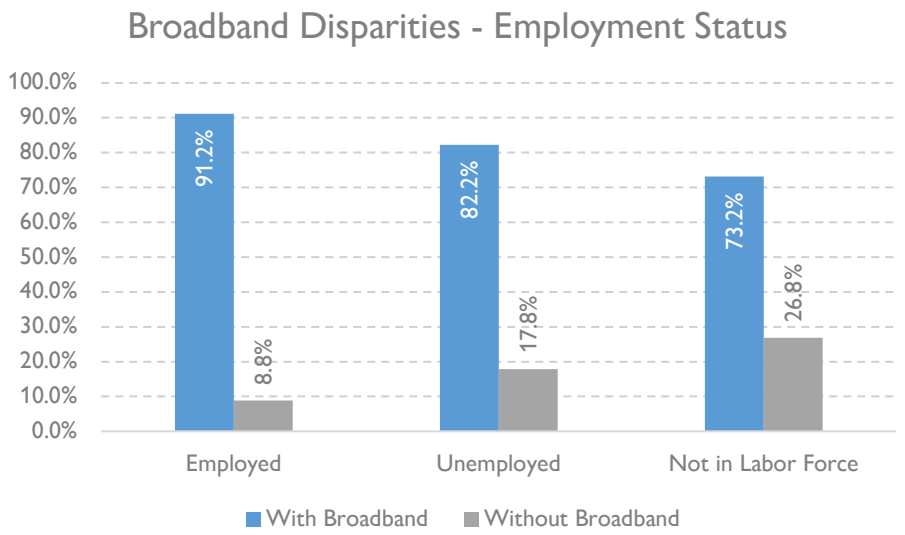
Broadband Adoption by Age

Age is also closely related to broadband subscription rates. Individuals that are older in age are significantly less likely to have a broadband subscription than younger individuals. Within the North Central Wisconsin Region, only about 67 percent of individuals age 65 and older have access to high-speed internet via a broadband subscription. Individuals age 65 and older are 3.3 times less likely to have a broadband subscription than individuals between the ages of 18 and 64, where about 90 percent of individuals within the Region have access to high-speed internet via a broadband subscription and 4.4 times less likely than individuals age 17 and younger where about 93 percent of individuals have access to high-speed internet via a broadband subscription.



Broadband Adoption by Employment Status

An individual's employment status also heavily influences whether or not their household has a broadband subscription. Within the North Central Wisconsin Region, individuals that are currently not in the labor force are significantly more likely to lack broadband access at home than those who are in the labor force and are either employed or unemployed. With only 73 percent of individuals that are not in the labor force within the Region having a broadband subscription at home, those who are not in the labor force are 1.5 times less likely to have a broadband subscription at home than those are unemployed, and three times less likely than those who are employed.



Local Efforts for Supporting Broadband Development

Through its many outreach and planning efforts throughout the state, the Wisconsin Broadband Office encourages broadband development and deployment by certifying local communities as being *Broadband Forward!* A *Broadband Forward!* Community Certification signals that a local unit of government has taken steps to reduce obstacles to broadband infrastructure investment.

Communities that become certified *Telecommuter Forward!* Communities commit to promote the availability telecommuter options within their community and designate a single point of contact for coordinating telecommuting opportunities within their community. The following communities within the North Central Wisconsin Region have been certified as *Broadband Forward!* or *Telecommuter Forward!* Communities:

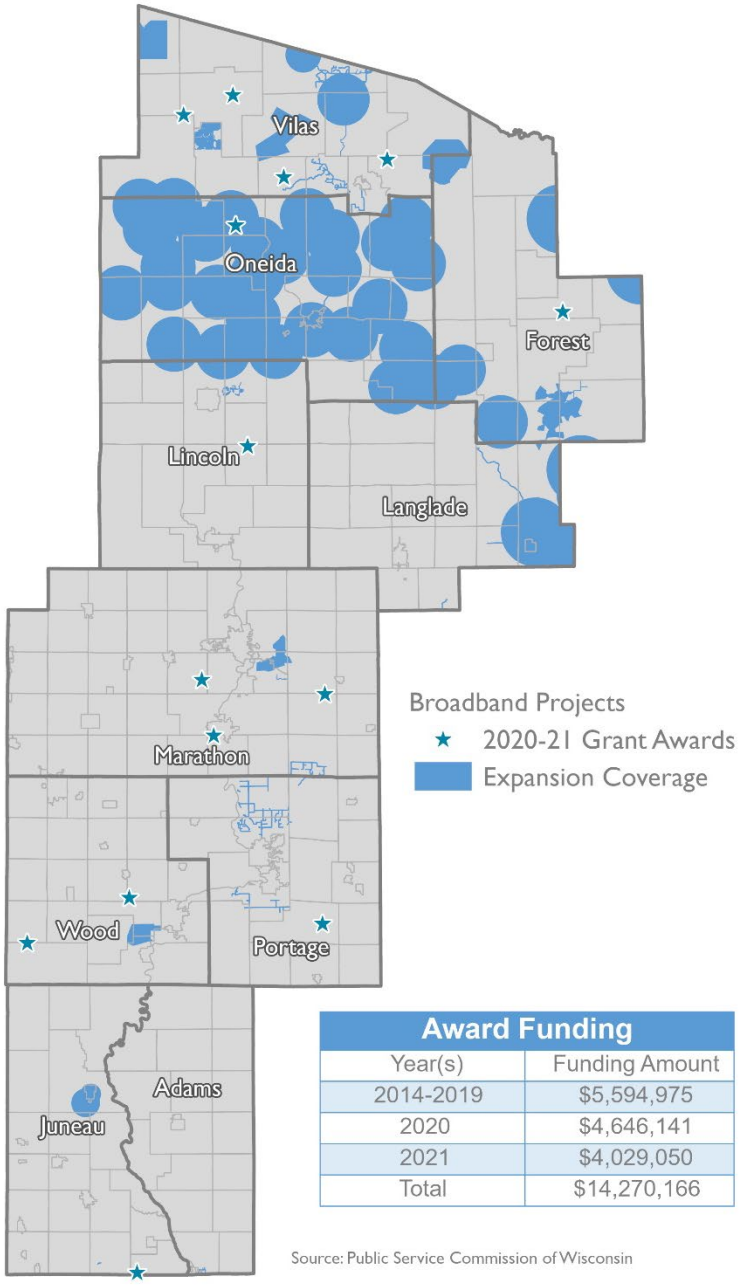
Broadband Forward! Communities

- Town of King (Lincoln Co.)
- Village of Kronenwetter (Marathon Co.)
- Town of Land O' Lakes (Vilas Co.)
- Town of Presque Isle (Vilas Co.)
- Town of Remington (Wood Co.)
- Town of Sherry (Wood Co.)

Telecommuter Forward! Communities

- Town of Boulder Junction (Vilas Co.)
- Village of Kronenwetter (Marathon Co.)
- Town of Sherry (Wood Co.)

Regional Broadband Improvement Efforts



Award Funding	
Year(s)	Funding Amount
2014-2019	$5,594,975
2020	$4,646,141
2021	$4,029,050
Total	$14,270,166

Source: Public Service Commission of Wisconsin

Efforts for Improving Broadband within North Central Wisconsin

When gauging the status of broadband within the Region, it is also important to identify the current and recent efforts to improve broadband within the Region. Efforts to improve broadband within the Region include grant projects to expand access to adequate broadband, and communities becoming certified as a *Broadband Forward!* or *Telecommuter Forward!* community. The map to the left shows current and recent broadband expansion projects within the Region and the locations of grant awards that were awarded in 2020 within the Region, as provided by the Wisconsin Broadband Office. Between 2014 and 2019 there were 39 broadband grants awarded that will expand broadband within the North Central Wisconsin Region. In 2020 and 2021, there were an additional 14 broadband expansion grants awarded within the Region. The locations of grants awarded in 2020 are depicted on the left, while grants awarded in 2021 are listed below.

Broadband Grant Awards 2021		
Applicant	Type	Amount
Bug Tussel Wireless - Wood County	Fixed Wireless	$492,988
Bug Tussel Wireless - SW Wood County & Pittsville SD	Fixed Wireless	$499,233
CenturyLink - Town of Boulder Junction, Phase 2	Fiber	$2,225,032
ChoiceTel - Town of St. Germain, Phase 2	Fiber	$598,925
Reedsburg Utility Comm - Town of Lyndon	Fiber	$40,000
Wittenberg Tel. Co. – Marathon County	Fiber	$172,872

While there have been extensive efforts to improve broadband accessibility within the Region, it is clear that there is potential for more improvement within the Region. While northern counties like Oneida, Vilas, Forest, and Langlade have had successes in receiving broadband grant awards in recent years, the other counties within the Region have not had as much success for the most part.

Issues Related to Broadband

There are several issues facing broadband within the North Central Wisconsin Region. Low levels of availability of adequate broadband within the Region and the rural digital divide – or the growing disparity between broadband accessibility between rural areas and urban areas – is one such issue. Another broadband issue within North Central Wisconsin is the high costs of broadband subscriptions. High costs for both the deployment and adoption of broadband make it harder for the Region's businesses, residents, and communities to access broadband, especially in rural areas. Digital literacy – or the ability to use the internet to find, evaluate, or create and distribute information – is another issue facing broadband within the Region. Low levels of digital literacy make broadband adoption less likely and make those impacted less likely to reap the benefits of broadband. Finally, other factors such as low income and educational levels, old age, and low labor force participation rates are also issues.

Broadband Availability & the Rural Digital Divide

Many rural areas within the Region experience a substantial digital divide that is characterized by lack of availability or reduced choice of quality and affordable broadband services. As discussed earlier, a large percentage (more than 25 percent of rural residents in nine of the Region's ten counties) of rural residents within the North Central Wisconsin Region lack access to adequate levels of broadband. Given that current broadband mapping standards within the state rely on the reporting of data by the Census block, the percentage of rural residents who lack access to broadband with download speeds of 25 mbps or higher is likelier much higher than what has been reported.

Another way to look at broadband availability and the rural digital divide is to look at the areas within the Region that are currently unserved or underserved in terms of broadband access. As mentioned earlier, the majority of the Region is currently unserved or underserved in terms of broadband access, which poses a significant problem for the Region's businesses, residents, and communities, and the Region as a whole. A lack of access to high-speed broadband within the Region will place businesses, residents, and communities at a significant economic and social disadvantage, as their ability to participate in the workforce, conduct business, and participate in the economy become severely limited by a lack of access to adequate broadband. This disadvantage will widen over time, as jobs, markets, consumer behaviors, schooling, and many other actions or behaviors become increasingly more reliant on the internet over time.

One factor that impacts the rural digital divide stems from the higher investment costs needed to establish communication infrastructure in rural areas (less densely populated areas) compared to the cost to do so in urban locations where population densities are higher. Additionally, internet service providers are more likely to make higher profits in areas with higher population densities, making it tough for them to prioritize projects in areas with low population densities, which helps to further exacerbate the rural digital divide issue.

Given that a high proportion of the Region's population live and work in rural areas, it is important to address and bridge the rural digital divide. Providing greater access to high-speed broadband in rural areas is critical to ensuring people and businesses located in these areas are able to enjoy the benefits of broadband accessibility and participate in a society and economy that is becoming increasingly reliant on the internet.

Cost of Broadband

The high costs associated with broadband are a major barrier to broadband accessibility within North Central Wisconsin in several ways. First, the high cost of a broadband subscription poses difficulties for many families, especially those that are low-income or marginalized, to be able to afford a high-quality broadband subscription. This places these individuals at a significant disadvantage, as broadband accessibility is quickly becoming a necessity to find and retain jobs, to attend and complete schooling, access routine medical care, and for commerce.

Secondly, the high costs of broadband infrastructure make it difficult to expand the current broadband network. High construction costs and return on investment trends that favor investing in more densely populated areas make it financially unfeasible for many internet providers to expand their high-speed networks into sparsely populated areas without financial help such as grants, which limits the availability of broadband in these areas.

The high costs of broadband infrastructure also make the cost of a broadband subscription higher in rural areas than in urban areas. This decreases the likelihood of rural families paying for a broadband subscription, especially when the broadband that is available to them is not as high of quality as broadband that is cheaper in urban areas. The higher costs of broadband in rural areas negatively impacts the affordability of broadband for rural residents, families, and businesses alike, which makes it harder for them to prosper in rural communities and makes it harder for rural communities to attract and retain residents and businesses.

Digital Literacy

Another threat facing broadband within the Region is digital literacy. Digital literacy is the ability to use broadband technology to find, evaluate, and create and communicate information, also impact broadband adoption rates. Individuals who do not have adequate levels of digital literacy are less likely to have a broadband subscription are therefore less likely use the internet. This makes these individuals significantly less likely to reap the benefits of broadband such as increased access to schooling, job training, remote work, commercial activity, and remote health. Additionally, research has found that individuals who lack digital literacy are less likely to find jobs, learn new skills, and successfully navigate social services than those with adequate digital literacy levels. The same can be said for businesses that lack adequate digital literacy. Lacking the digital skills that are becoming increasingly important in an increasingly digital economy such as online marketing, online sales, and setting up a remote work network, can cause these businesses to lose out on potential and current employees, and on sales and clients.

Low levels of digital literacy within also threaten the Region's residents and businesses. In an ever-increasing digital world, digital skills are becoming increasingly important for both current and prospective employees to access job opportunities. With industries that historically have not relied heavily on digital skills such as manufacturing shifting towards automation digital skills are quickly becoming a requirement for their employees, making it harder for those who lack digital skills and knowledge to access better employment opportunities. Improving digital literacy among residents is crucial for building a resilient workforce that can fill the jobs needed or fostering business growth within the Region.

Factors Influencing Broadband Adoption Rates

The factors that influence broadband adoption rates are also issues and threats facing broadband within the North Central Wisconsin Region. As mentioned earlier, income levels, educational attainment, age, and employment status are all closely related to broadband adoption rates. Individuals or households with lower income levels and educational attainment are significantly less likely to live in homes with a broadband subscription. Education and income disparities, advanced age, and labor force participation are prominent factors in broadband adoption rates. Even in areas where high-quality broadband is readily available, individuals with lower levels of income and education, advanced age, or those who are not participating in the labor force are choosing not to obtain a broadband subscription for their home.

Individuals who are from low-income households, have low levels of educational attainment, currently not participating in the labor force, or are old are also less likely to have adequate digital literacy levels. As mentioned earlier, individuals who lack the skills and knowledge to navigate the workings of the internet are less likely to have a broadband subscription at home, and are less likely find and retain jobs, learn new skills, and successfully navigate social services in today's world.

Impact of COVID-19 on Broadband

Broadband, and the importance of the role that broadband plays in today's world, was significantly impacted by the COVID-19 pandemic. Due to the necessity of social distancing, millions of people and businesses across the globe had to rely on broadband to help them in their daily activities. Access to high-speed internet soon became a requirement for many jobs, businesses, students, and residents alike, as economies and societies across the world shifted towards a digital format. The increased reliance on high-speed internet also exacerbated the already existing digital divide, as those who had access to high-speed internet were able to participate in their jobs, social circles, school, commerce, etc. while those who did not have access to high-speed internet struggled to participate.

For residents, businesses, and communities of all sizes, reliable broadband access has become essential for doing business, going to school, engaging in commerce, and attracting and retaining residents and employees in a pandemic-impacted world. Most businesses now rely on the internet in some capacity, with many businesses now requiring internet access to meet demand. Even before the COVID-19 pandemic, consumer spending was shifting more towards digital technologies such as e-commerce and online retail, a shift that has been accelerated by the pandemic. This shift has made broadband accessibility essential for helping small businesses stay afloat during the pandemic and will be essential for businesses to stay competitive during the recovery period and moving forward post-pandemic. The pandemic also made access to broadband essential for job retention, as many workers and businesses alike were forced to rely on access to high-speed internet to remain employed via remote work or in business during the pandemic. The same was true for the education system, as students of all ages required access to high-speed internet to attend school virtually, meet with instructors, and complete their homework.

The increased reliance on broadband during the pandemic also had a significant impact on the demand for the high-speed internet that broadband provides. With jobs in many industries being forced to shift into remote work and schooling, and increases in the usage of video streaming services,

gaming, and online commerce, internet traffic increased substantially in a short timeframe, and in some cases stretched the broadband capacity in homes to its limit, which impacted download speeds and increased the frequency of internet lag occurrences.

Simply put, the sudden shift to a virtual world that was necessitated by the COVID-19 pandemic posed significant challenges across the nation, and quickly created significant disadvantages to the businesses, workers, and residents alike that that lack adequate broadband access.

COVID-19 Magnified the Importance of Broadband

As the COVID-19 pandemic took hold across the globe in the first half of 2020, large disparities in broadband availability became apparent as most of the state was forced to shut down. Workers, families, and individuals were quickly forced to rely on internet access to do their jobs, conduct business, communicate with the outside world, and conduct commercial transactions. This sudden shift towards a digital society magnified the significance of broadband access. In many cases, access to high-speed internet was required in order to retain jobs by allowing workers to work remotely, for businesses to stay afloat by allowing them to remain in operation by conducting business in a virtual manner, and for the continued operation of the education and health systems by allowing students of all ages to conduct their schooling virtually and for the provision of safe medical appointments by conducting virtual appointments for non-serious issues during the pandemic.

Businesses and residents who live in areas or communities that lacked access to high-speed broadband were put at a significant disadvantage during the pandemic. As activities such as work, school, shopping, conferencing, and social networking shifted to online formats, the disparities caused by the digital divide exacerbated. Businesses and residents who were not able to access high-speed broadband were not able to work remotely, putting them at risk of losing their jobs or business, or at an increased risk of contracting the virus while working in-person. Similarly, students who lacked access to high-speed broadband were significantly disadvantaged when schooling became all-virtual, as they could not access the internet to attend class, complete assignments, or seek out help from their instructors, negatively impacting their education overall as well as their performance in school.

Access to the internet also became essential for millions of people and businesses nationwide in accessing financial aid programs such as small business grants, small business loans, unemployment benefits, and many other programs. Many of these programs relied on the internet for the promotion of these programs and the application process, which placed individuals and businesses who lacked adequate access to the internet at a significant disadvantage in accessing the benefits from these programs.

Access to broadband also impacted communities and the people and businesses that reside within them. Communities that could offer access to high-speed broadband were better able to attract relocating remote workers, a practice that became common during the pandemic, as people moved away from more densely populated areas and into less densely populated areas. Communities that had access to high-speed broadband also were able to provide the conditions necessary for their businesses and residents to participate in their day-to-day activities, which allowed these communities to better retain their residents.

COVID-19 Created Greater Demand for Broadband

With the widespread shift towards virtual daily operations for businesses, schools, and residents during the COVID-19 pandemic, the demand for broadband significantly increased. Practices such as remote work, virtual meetings, online education, online commerce, and online marketing became commonplace during the pandemic, which led to significant increases in demand for high-speed broadband service during the pandemic. As a result of the implications of the COVID-19 pandemic, access to high-speed broadband grew in importance to a point where it could no longer be considered a luxury for businesses and residents, and it has now become an essential utility for many businesses and residents, a reality that is depicted in internet usage trends. According to the Internet & Television Association's COVID-19 Internet Dashboard, Wisconsin has experienced a 24 percent growth in downstream internet traffic since March of 2020, and a 53 percent growth in upstream internet traffic.[1] Downstream internet traffic refers to internet users who download data, while upstream internet traffic refers to internet users who upload data. Increases in remote work, virtual meetings, virtual schooling, online commerce, video streaming, gaming, and social networking that occurred during the pandemic have led to this substantial increase in internet traffic.

The greater demands placed on broadband as a result of the pandemic have had a widespread impact on residents, businesses, communities, and internet service providers. In an effort to ensure low-income households could access the internet during the early stages of the pandemic, internet service providers within the state offered free or low-cost internet access options. Additionally, the importance of broadband with high bandwidth increased, as many homes had to accommodate parents working from home and children attending school online from home, which caused lag and accessibility issues for homes that had access to broadband with lower bandwidths.

COVID-19 Has Accelerated Emerging Trends

The COVID-19 pandemic has helped to illustrate the rapid growth in importance of broadband in our daily personal and professional lives. Our society has quickly shifted from the internet being a luxury as recently as the early 2000's to now being a requirement for many people to access their jobs, schooling, and social networking. With in-person activities plummeting during the pandemic due to safety concerns, the COVID-19 pandemic showed how technologies that require high-speed internet access such as video conferencing, video streaming platforms, online commerce, social networking platforms, and online courses can help bring economic and social activity to people, while also creating additional economic and social opportunities.

The COVID-19 pandemic has accelerated many existing trends that are impacted by broadband. One of the trends accelerated by the pandemic was a shift towards remote work. Before the pandemic started in March of 2020, about five percent of full-time employees with office jobs nationally worked remotely. During the midst of the pandemic, the percentage of workers who worked remotely surged to over 50 percent in April of 2020 and has remained at over 30 percent in the following months. Moving forward the trend towards remote work is expected to continue, with the percentage of office workers who work remotely expected to settle in between 20 and 30 percent, a substantially higher percentage than before the pandemic. This is largely due to the fact that many businesses found that remote work does not seem to hurt

productivity, the attractiveness of flexible work schedules for current and potential employees, and the lower rental costs associated with having employees work from home.

The COVID-19 pandemic has also accelerated the shift towards online commerce. Even before the pandemic, online shopping was becoming more commonplace as the popularity of online retailers such as Amazon and the presence of online platforms among major retailers such as Wal-Mart increased. However, once the pandemic started, in-person economic activity dropped in an instant and consumers were forced to rely more on online commerce to fulfill their needs as physical stores closed and social distancing became commonplace. According to the U.S. Department of Commerce, online commerce sales within the United States were over 32 percent higher in 2020 than they were in 2019. This led to online commerce sales accounting for 14 percent of total retail sales in 2020, up from 11 percent in 2019.[2] Additionally, about 52 percent of people reported that they shopped online more during the pandemic than they previously had, according to a survey conducted by Statista studying the change in behaviors among people during the pandemic.[3] The rise of online commerce is likely to continue into the future, driven by the convenience of online purchasing habits and the businesses striving to capitalize on a new method to conduct sales.

Benefits of Improving Broadband Accessibility

Improving broadband accessibility and quality within the North Central Wisconsin Region will have significant benefits throughout the Region and is crucial to the long-term economic recovery and resiliency of the Region. Improving both the accessibility to broadband and the quality of broadband will have beneficial impacts on the Region's residents, businesses, and communities, as well as on education, workforce development, agriculture, public safety, and health and human services throughout the Region.

Beneficial Impact on Residents

Improving broadband accessibility and quality will provide many benefits for residents within the Region. Increasing the accessibility to high-speed broadband will allow residents to better access job opportunities, by making it easier for them to search and apply for jobs, and by providing better access for them to develop the skills needed to meet job demands. Increasing access to high-speed internet via broadband will also increase job opportunities for current and potential residents within the Region by increasing their ability to pursue work-from-home jobs while living within the Region.

Increasing access to high-speed broadband will also improve educational experiences for students of all ages. As time moves forward, coursework and studying are relying more and more on the internet, which places those who do not have access to high-speed internet at a significant disadvantage, an issue that improving the accessibility of broadband would help to address. Broadband access also makes it easier for residents to access health information and services and to access remote healthcare providers which can lead to improved health.

Improving broadband accessibility so that all residents have equitable access will also help to improve social and economic outcomes for marginalized groups. Access to broadband can serve as an equalizer for marginalized groups, as it improves their access to educational materials, increases opportunities to access health services and education through telehealth, increases their opportunities for accessing job trainings to gain job skills and knowledge to advance in their professional careers and earn higher wages, and increases opportunities for social engagement by providing an additional platform to engage with others, local governments, organizations, and businesses.

Beneficial Impact on Businesses

Access to the internet also allows businesses to engage in e-commerce, which has proven to be a crucial tool for conducting sales in an ever-increasing digital world, which was especially true during the COVID-19 pandemic as many businesses have experienced drastic decreases in in-person shopping during the pandemic. Businesses that have the capacity for online commerce are able to reach a wider customer base than those without online commerce capabilities, allowing them to remain viable in rural areas. Online commerce also helps to bring outside money into local economies by making it easier for small businesses to connect with customers outside of their community and region. Improving the accessibility and quality of broadband will help more businesses and residents engage in online commerce.

Improving accessibility to broadband will also increase the resiliency of businesses throughout the Region. Throughout the COVID-19 pandemic, businesses that were able to offer online commerce platforms fared much better throughout the pandemic, due to their ability to provide services that require internet access such as online ordering at a time when in-person commercial activity was halted to fears of spreading the coronavirus. The utilization of online commerce and other online services such as marketing and communication among businesses adds additional sales, marketing, and communication channels to their business, making them more resilient to barriers that limit in-person activity, especially during disaster events, such as the COVID-19 pandemic, that limit in-person activity.

Regional and Local Benefits

Addressing the broadband accessibility challenge currently facing the North Central Wisconsin Region is a crucial step towards aiding the Region's economic recovery efforts and becoming a more resilient Region.

Broadband can also help to create more resilient communities and a more resilient Region by helping businesses and entrepreneurs become more resilient. Increasing the accessibility to high-speed internet will help to foster entrepreneurship and drive small business growth within the Region and its communities. Given the important roles that entrepreneurs and small businesses play in community resiliency, providing them with the internet access required for them to grow and sustain their businesses will help to increase community resiliency, retain, attract, and support jobs, and lead to economic growth within communities.

Expanding high-speed internet accessibility can also help to revitalize downtowns and other blighted communities by supporting co-working spaces and entrepreneur hub opportunities. Supporting co-working spaces and entrepreneur hubs can help drive small business growth leading to increased foot-traffic and activity in these downtowns or communities.

Broadband can also help to attract more visitors to the Region and the Region's communities. Broadband allows communities to promote their community in a way that is more convenient for residents, businesses, and tourists, and is able to reach a larger audience than the traditional methods. Social media allows communities a way to freely market their community, provide tours of unique facets of their community, and allows communities to provide digital platforms such as maps, information hubs, emergency information, tourism guides, and business guides that are designed to attract new and existing audiences into their communities. Increasing accessibility to broadband within the Region also improves the Region's ability to attract and capacity for remote workers, especially in locations with high amounts of seasonal housing as workers who are able to work remotely seek to move into their vacation homes.

Education & Workforce Development

Broadband has quickly become a necessity for education and workforce development. In education, coursework is quickly shifting to become more digital, requiring students to have a reliable broadband connection. Digital skills are quickly being integrated into a majority of school curriculums, creating additional requirements for broadband access. Additionally, online learning platforms and tools make it easier for citizens to pursue secondary and post-secondary education opportunities through online coursework and online classes.

High-speed internet is also becoming an essential tool in the training and certification of the workforce, helping to create a workforce that can meet the needs of employers for filling highly skilled positions. The usage of online tools and training for workforce development purposes can help to prepare the Region's labor force gain the skills and knowledge needed for both traditional and transitioning industries. The utilization of virtual reality systems can help prospective workers in blue-collar industries such as trucking, manufacturing, welding, etc. gain experience in their field before being placed onto worksites.

Access to high-speed internet also enables the Region's employers and employees to offer or accept jobs that are done remotely. Remote work allows employees the opportunity to remain in or move into more rural areas if they desire, while still being able to earn competitive wages. With high rates of seasonal housing throughout the Region, the provision of broadband to support the possibility for remote work jobs creates opportunities for rural communities to attract and retain residents.

Agriculture

High-speed internet can also have significant impacts on agriculture. High-speed internet allows farmers to utilize Next Generation Precision Agriculture technologies such as GPS-guided equipment, weather analytics, and soil sensors to help increase yields and make more-informed decisions. According to the USDA, "Next Generation Precision Agriculture can be considered an interdisciplinary science leading to breakthroughs and incremental technology advances to improve agricultural productivity, efficiency, and/or sustainability. Enabled by digital tools and connectivity, Next Generation Precision Agriculture is beginning to be applied across the entire food value chain to the benefit of both the producer and consumer."[4]

High-speed internet can also provide farmers access to tools that allow them to make informed decisions on issues such as which crops to grow and when and where to grow them, as well as when to harvest them; decide which fertilizer is best suited for their crops based on their soil conditions; and to make decisions on which areas should be targeted for applying pesticides, rather than applying them over an entire field. Reliable internet access is also essential for collecting and communicating data in the field, as workers cannot utilize most data collection software without a reliable connection to the internet.

Next Generation Precision Agriculture technologies such as GPS-guided equipment can also increase productivity and efficiency. GPS-guided equipment can remove the inefficiencies of manually driving a row field of crops for hours at a time, while automated devices such as feeders and milking devices can track animal activities and alert farmers to any problems that arise within their livestock.

Public Safety

Broadband services have become essential for communities, law enforcement, and first responders as they seek to uphold and enhance public safety. High-speed internet allows communities to relay important public health information on their websites through emails, and other online communication methods, while providing their citizens another way to access this vital information. Many of the apps that law enforcement officials and first responders use to respond to events require access to the internet, making broadband access vital for public safety within the Region.

Health

Increasing broadband accessibility will increase the capacity of telehealth within the Region. Telehealth helps to bridge the gap between rural communities and healthcare facilities that are usually located in more urban settings. Telehealth provides rural residents better accessibility to real-time medical care by allowing routine services such as a doctor's appointment to be conducted virtually. Access to the internet also helps to distribute important health information, a tactic that became essential during the COVID-19 pandemic when social distancing and avoiding multi-contact surfaces became common practices. Many low-income families also rely on internet access for accessing and applying for social support programs such as the Supplemental Nutrition Assistance Program or SNAP.

Vision for Broadband Within North Central Wisconsin

Most of the North Central Wisconsin Regional area geographically remains unserved or underserved for broadband access, the exception being more urbanized areas. Throughout the Region overall, about 62 percent of households have broadband access. Therefore, the most significant consideration is the establishment of needed infrastructure throughout the Region to allow residents to access broadband. It is also important to examine a multitude of factors that influence broadband adoption, including household income, educational attainment, age, and employment status. Other important considerations include the rural digital divide, cost, and digital literacy.

Access to broadband and the ability to use broadband is essential both for individuals and for industry. The COVID-19 pandemic has made this even more evident. Individuals require efficient and accessible broadband to access better job opportunities, to improve their educational experiences, and to access health information and services. In addition, broadband access helps to close the gap for disadvantaged and marginalized populations.

Businesses and institutions require broadband to actively engage in e-commerce, market products and services, and attract and retain talent. Above all, broadband enables businesses to build in resiliency (needed elasticity) to contract and expand when market conditions, societal conditions, or public health conditions cause shifts in supply and demand.

This section will establish:

- **Goals** and what we hope to achieve for broadband within North Central Wisconsin moving forward
- **Priorities** for enhancing and expanding broadband within the Region
- **Strategies** and **Recommendations** to create a broadband vision for North Central Wisconsin

Goals

The following goals have been identified to be most important to the vision of the broadband future of the Region. When setting the goals top considerations include successfully expanding broadband access to residences, businesses, and institutions throughout the Region, fostering quality broadband service that meets the needs of residences, businesses, and institutions throughout the Region, and optimizing digital inclusion, digital literacy, and competitive costs.

- Create universal broadband infrastructure throughout the Region.
- Bring high performance broadband service throughout the Region.
- Make broadband affordable and competitive.
- Advance digital literacy and inclusion.

Priorities

Broadband priorities for the Region were formulated to better meet the goals identified above. The main priorities in the Region include building infrastructure where there is none, enhancing infrastructure where the current standards are not met, fostering affordable and competitive service, and ensuring that residents can use this service. When considering priorities, the rural nature of the Region was considered in addition to the large amount of geographical area that remains in the unserved or underserved broadband category.

- Build broadband infrastructure in areas of the Region that currently do not have broadband.
- Upgrade service in areas now considered underserved and are therefore lacking high performance broadband service.
- Ensure that low-cost, competitive broadband service is available to residents, businesses, and institutions throughout the Region
- Promote digital literacy by providing educational opportunities and promoting accessibility.

Strategies and Recommendations

The goals and priorities established above identify the vision for the future of broadband in the Region. Strategies and recommendations have been identified to meet these goals and priorities and can be broadly organized into three main categories of emphasis:

- Infrastructural
- Service Enhancements
- Accessibility

Infrastructural Strategies and Recommendations

The first category is the broadband infrastructure that exists or does not exist throughout the Region. In terms of area, the North Central Wisconsin Region is largely unserved with broadband infrastructure. The first set of strategies and recommendations are targeted at meeting the goal of creating universal broadband infrastructure throughout the Region.

- Support state and federal broadband funding.
- Increase coordination and participation in the State of Wisconsin Broadband Expansion Grant Program funding, including providing a consolidated point of contact so that public entities, private entities, and private consumers know the status of grant applications state-wide.
- Explore public-private partnership models of broadband infrastructure development and ownership.
- Ensure that broadband coverage maps are accurate. This will help to ensure that state funded grant applications are being considered with the most relevant, accurate information.
- Increase permitting and construction coordination.
- Continue to explore creative ways to provide broadband infrastructure to rural communities, including satellite technology.
- Explore ways for local leaders to take broadband action on their own.
- Collaborate with broadband stakeholders throughout the Region and the state to share strategies that have proven effective for creating and expanding broadband services.

Service Enhancement Strategies and Recommendations

The second category is service enhancement. The Region compares favorably to the state in the percentage of rural population with access to broadband with download speeds now considered substandard. Increasing the quality of these existing services is one service enhancement strategy. It is also necessary to ensure that quality service is provided once the required infrastructure is built in unserved areas. The following recommendations would create service enhancement throughout the Region:

- Drive service enhancement in those areas that are now considered to have substandard service
- Hold providers accountable for the broadband service that they claim to provide, including in areas such as Connect American Fund Phase II (CAF II) where areas are ineligible because they have already been determined to have received funding for broadband service.
- Increase consumer protections and pricing transparency, especially in instances where providers have received grant funding so that consumers, private entities, and public entities know who has agreed to provide service, where they have agreed to provide service, and at what service level.

Accessibility Strategies and Recommendations

The third category is related to broadband accessibility. This includes issues of affordability, literacy, and inclusion. There is an issue of broadband affordability. The high cost of broadband creates a barrier for those that are low-income or marginalized, makes it difficult to expand the existing broadband network, and is especially problematic in rural areas. Digital literacy, or the ability to use broadband technology to find, evaluate, and create and communicate information, leads to increased accessibility. The following recommendations would increase broadband accessibility:

- Support the creation of a Wisconsin Internet Assistance Program to reduce the cost burden on consumers.
- Explore ways for communities to partner with governmental and non-profit entities that support digital inclusion and help to solve a wide range of adoption issues.
- Understand the reasons households do not adopt broadband and continue to reduce barriers.
- Encourage the repurposing of electronic devices through reputable channels.

Notes

1. Internet & Television Association's COVID-19 Internet Dashboard - https://www.ncta.com/COVIDdashboard
2. U.S. Dept. of Commerce: Quarterly Retail E-Commerce Sales - https://www.census.gov/retail/mrts/www/data/pdf/ec_current.pdf
3. Statista: General Lifestyle Changes During the COVID-19 Pandemic - https://www.statista.com/statistics/1105960/changes-to-the-general-lifestyle-due-to-covid-19-in-selected-countries/
4. U.S. Department of Agriculture: A Case for Rural Broadband - https://www.usda.gov/sites/default/files/documents/case-for-rural-broadband.pdf

North Central Wisconsin Regional Recovery Plan

Broadband Assessment Report