

## BROADBAND

# STRATEGIES AND POLICY OPTIONS FOR BROADBAND ACROSS WISCONSIN

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# EXECUTIVE SUMMARY

Expanding access to internet services, and in particular broadband, across Wisconsin requires a breadth of strategies to address infrastructure, affordability, and adoption. Wisconsin communities and state-level leadership are already involved in many efforts to address these issues but additional work is required. There are many examples of success outside Wisconsin that we could learn from—examples of business models, partnerships, new technologies, and policies that have been part of expanding broadband. In surveying the range of strategies available we offer several conclusions:

- Where there is no major internet service provider to build infrastructure (i.e. laying fiber), cooperatives, anchor institutions, and municipalities can all play various roles in expanding access and helping communities identify feasible technologies and service management.
- Most support funding has gone toward infrastructure, but community strategies for broadband should also consider affordability and adoption as key components of success. To improve access, new infrastructure must be available at an affordable price to people who want the service. This suggests that programs focused on cost and education to spur demand will be critical throughout Wisconsin.
- Partnerships with providers, surrounding areas, anchor institutions, and other organizations are essential for communities to expand access. Partnership can be the key to accessing essential expertise, aggregating demand, developing local leadership, reducing risk, and identifying opportunities.
- Data quality is an ongoing challenge for communities as FCC data, an often-used source of broadband coverage and assessing eligibility for public grants and loans, can overstate coverage. Other states and some local communities have overcome data challenges by generating their own data through surveys and implementing their own or borrowed mapping technologies.

Ultimately, communities have a wide range of options for expanding broadband. There are multiple provider models and several technologies to consider. There are several examples of innovative funding and financing strategies, as well as strategic partnerships, that we can learn from. In all cases, however, communities will need to foster local broadband leadership and partnerships to champion the efforts and work strategically to find the best strategy for their stakeholders.

# INTRODUCTION

From the perspective of economic development and community well-being, access to quality, reliable and affordable broadband has become a necessary condition. An analysis by Conroy et. al. (2021) documents that access to broadband is associated with stronger rates of economic growth, higher student achievement, and better health outcomes. Many residents and communities across Wisconsin see broadband not as a luxury, but as a necessity and are working diligently to address local shortcomings to broadband access. Nonetheless, access to quality and affordable broadband internet remains a challenge. Based on the 2019 American Community Survey, 13.5% of households do not have an internet subscription and 14.0% do not have a broadband subscription of any type. This means that almost 322,500 Wisconsin households do not have ready access to the internet while 333,600 do not have access to internet with broadband connection speeds. Of those households with a broadband connection, only 69.1% have access via cable, fiber optics or DSL.

The current COVID-19 pandemic has placed an even brighter spotlight on broadband deficiencies in rural and urban regions alike. Schools, both K-12 and institutions of higher education, have moved classes on-line. Workers who are able have been encouraged to telecommute or work from home. Data on internet access from the 2019 U.S. Census Bureau's American Community Survey (ACS), however, estimates that 13.4% of U.S. households do not have any type of internet subscription with Wisconsin ranking 26<sup>th</sup> nationally. The lack of the necessary physical infrastructure results in many people and businesses in rural areas without service. Even if the infrastructure is in place, the cost of service can still be a barrier (Conroy et al. 2021). The same 2019 ACS data estimates that 35.6% of U.S. households and 35.4% of Wisconsin households with an annual income under \$20,000 do not have an internet subscription.

The differential access to broadband by income group as well as across the rural-urban continuum highlights broadband as an equity issue (Figure 1).<sup>1</sup> While it is clear that low-income households are the least likely to have internet in the most rural areas of Wisconsin, low-income households in urban areas are also likely to lack internet. A third aspect of equity in relationship to broadband is that of racial equity. Nationally, the share of the population without broadband or a computer is largest among the Black and African American as well as Hispanic communities (Census 2017).<sup>2</sup> Similarly, Pew Research, a policy research organization, finds differences in home broadband usage (Pew 2020). According to their analysis, 79% of White adults are home broadband users, compared to 66% of Black or African American adults, and 61% of Latinx adults. These disparities can add to the already urgent sense of need for strategies that expand broadband and support the argument for doing so equitably.

While federal and state governments have devoted significant dollars to expanding broadband infrastructure, there remain significant gaps in the digital divide. In low-income and sparsely populated communities where the service is insufficiently profitable for the internet service provider, securing investments in infrastructure continues to be difficult. Less access to broadband among low-income, rural, and communities of color may be the result of what some refer to as “digital redlining”. The Robert Wood Johnson Foundation defines digital redlining as “major network providers systematically excluding low-income neighborhoods from broadband service—deploying only sub-standard, low-speed home internet” (Hall, 2020). The result is that some neighborhoods, including many of those that faced redlining by banks and insurance companies, now face exclusion from broadband service.

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<sup>1</sup> The American Community Survey figures for statewide totals are drawn from the 2019 sample year and all county level analysis data are drawn from the 2014-2018 five-year averages.

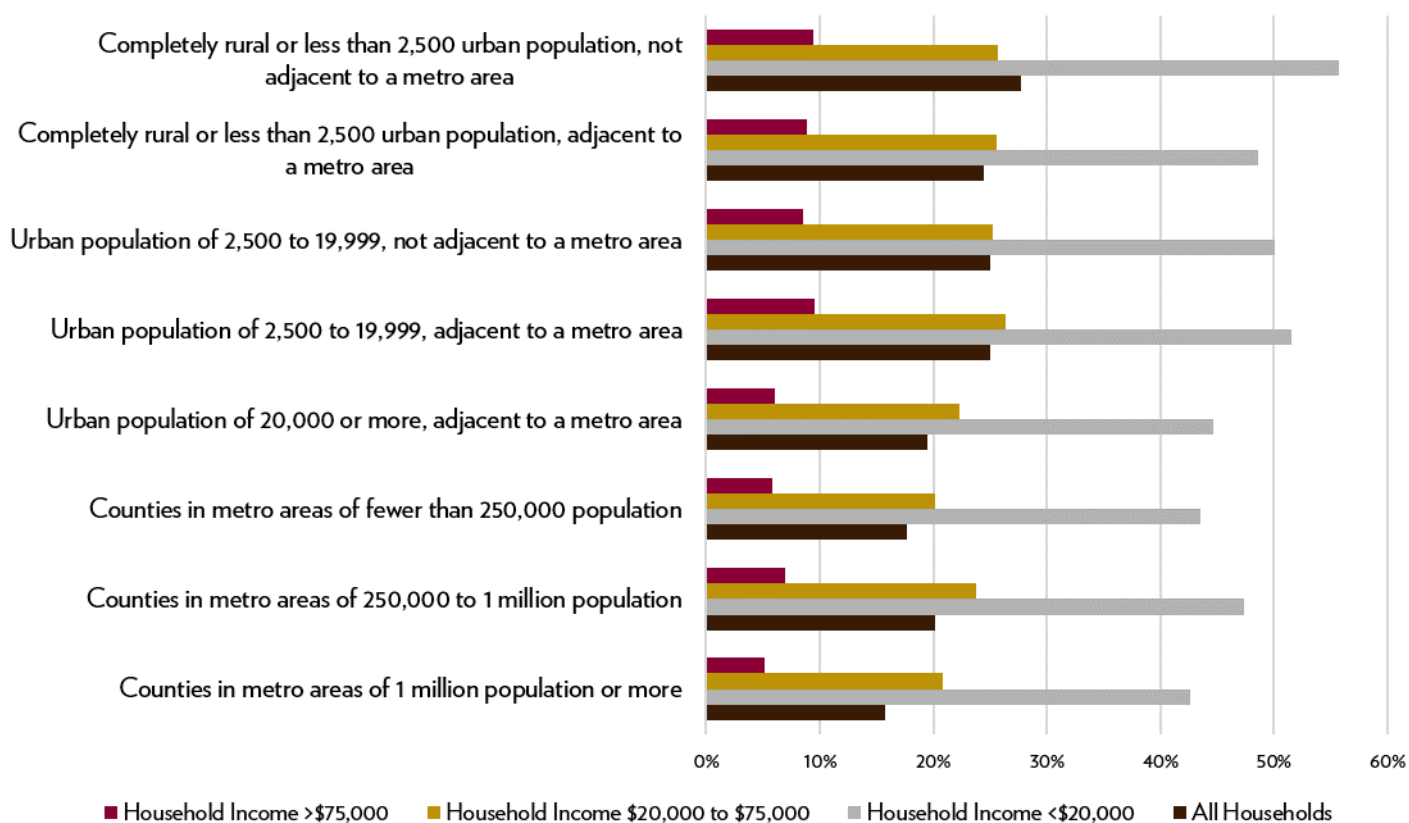
<sup>2</sup> Disparities for the U.S. and in Wisconsin persist as of 2019 based on data from the American Community 1-year estimates.

In some cases, limited state and federal dollars available for infrastructure have gone toward improving the existing infrastructure rather than expanding the network. To reach as many businesses and households as possible, public dollars are needed for investing in “last mile” connections—the part of the infrastructure that connects to housing units and businesses—rather than in “middle mile” infrastructure. While investment in the “middle mile” improves quality of services to those customers that already have access, they do not necessarily expand services to those who do not have access. There is also a need for strategies that improve broadband adoption by addressing affordability and spurring demand with educational and training opportunities.

Given these challenges, the question remains: What are the best policy options and strategies for addressing these shortfalls in access to broadband? While both the federal and Wisconsin state government have earmarked millions of dollars for grants to expand access to broadband, what additional strategies can communities, along with the state, pursue to expand access to broadband? This Policy Brief as part of The Wisconsin Economy Series, aims to outline the current environment and some options for expansion with several examples of novel approaches undertaken by states and communities across the U.S.

FIG 1

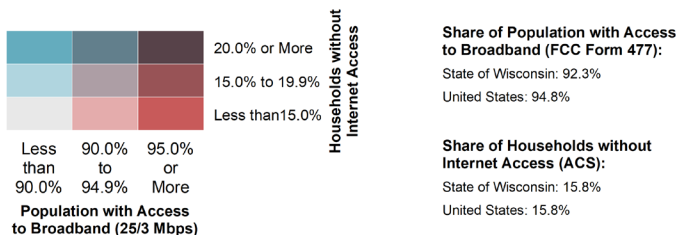
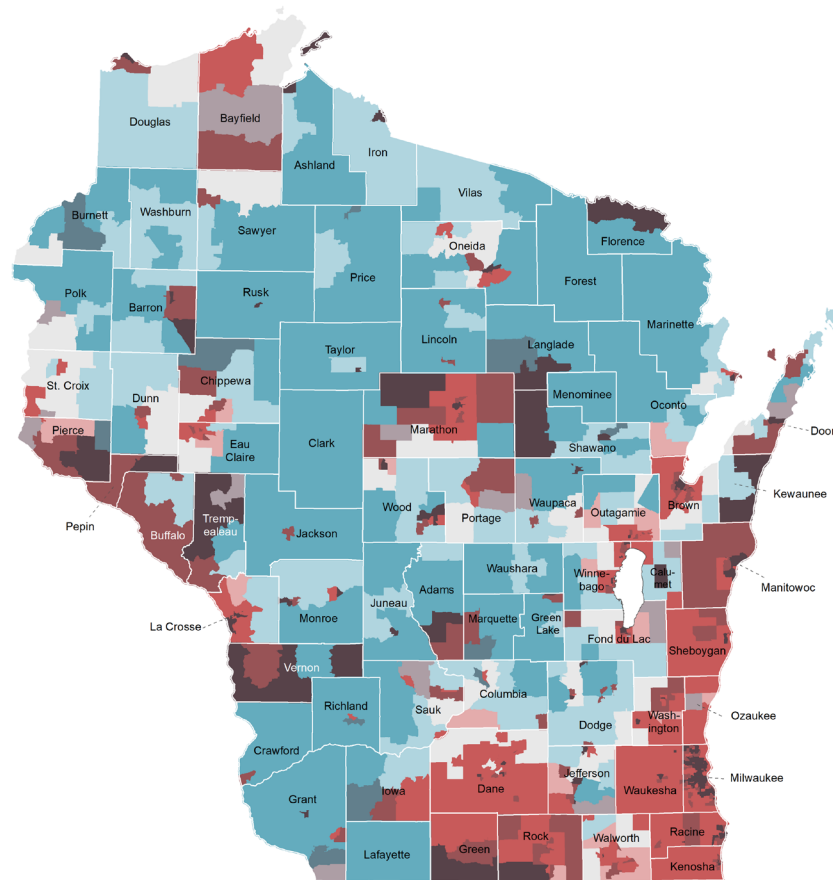
## PERCENT OF POPULATION WITH NO ACCESS TO THE INTERNET BY HOUSEHOLD INCOME ACROSS WISCONSIN RURAL-URBAN CONTINUUM



# THE NEED FOR A BREADTH OF BROADBAND DEVELOPMENT STRATEGIES

MAP 1

## SHARE OF POPULATION WITH ACCESS TO BROADBAND VS. SHARE OF HOUSEHOLDS WITHOUT INTERNET BY WISCONSIN CENSUS TRACT



Access to broadband is often measured using data from the Federal Communication Commission Form 477. Data from the most recent Form 477 data (June 2019) suggests that 7.7% of Wisconsin residents do not have access to broadband internet service compared to a national average of 5.2%. While these figures suggest that a small percent of residents do not have access, the FCC data often overstate internet access. Specifically, Form 477 data are based on internet service providers (ISPs) indicating whether they serve at least one location in a given census block despite the presence of other addresses that may not have access.<sup>3</sup> Importantly, access to broadband does not necessarily mean that a household has broadband service as households may choose not to subscribe for personal or financial reasons.

The U.S. Census Bureau's American Community Survey (ACS) also provides data on household internet access. As the ACS is indeed a survey, its accuracy is partly dependent on the responses of households and their inherent knowledge of types of internet access (i.e., access via different technologies, how broadband is defined, etc.). That is, a household may or may not respond properly to whether their household has upload and download speeds that meet the necessary thresholds for broadband. It is reasonable to assume, however, that households know if they have internet access of some type. Estimates from the 2019 American Community Survey suggest that approximately 13.5% of households are without any internet access in both the State of Wisconsin and the United States.<sup>4</sup> It is unknown whether this lack of access is by choice, due to budgetary constraints or preferences, or a lack of necessary infrastructure..

<sup>3</sup> Suppose a census block has 100 household and the ISP provides service to one household in that geographically defined block. For the FCC data, 100% of the households in that block would be classified as having broadband internet, whereas in reality only 1% of households do.

<sup>4</sup> See footnote 1.

To provide another perspective on internet access, FCC Form 477 data on broadband availability is merged with 2018 ACS five-year (2014-2018) average data on households reporting no internet access (Map 1).<sup>5</sup> In combining this information from the providers' and consumers' perspectives, we see several distinct categories of access among Wisconsin census tracts:

- Not surprisingly, many households reporting no internet access in the ACS data also reside in census tracts with below average availability of broadband based on the Form 477 data. Most of these tracts (in **dark teal**) are in rural areas and likely reflect a lack of sufficient infrastructure. The long-standing lack of broadband in many rural communities is well known by elected officials, economic development organizations and individual households located in these areas. Indeed, listening sessions of the Governor's Blue Ribbon Commission on Rural Prosperity raised several issues pertinent to the future of rural Wisconsin, but access to quality and affordable broadband has risen to one of the highest areas of concern. When considering strategies to expand broadband access, these areas may want to prioritize efforts that encourage the development of equipment and other physical resources needed to provide access.
- In contrast, Wisconsin has several census tracts that suggest high levels of broadband availability in the FCC data, but also with 20.0% or more of households reporting no internet access in the American Community Survey data. This suggests that many households are not utilizing service, despite it being available based on infrastructure. Many of these census tracts (in **dark gray**) are found in areas with lower household incomes, particularly in urban areas such as Milwaukee, Madison, Green Bay and Racine. As suggested earlier, low-income households are much more likely to lack internet access than high-income households. A lack of broadband in these areas may not arise from a lack of infrastructure, but rather household cost constraints. Accordingly, strategies to help expand broadband access cannot solely focus on developing infrastructure. Additional approaches that consider affordability are also needed.
  - Other of these census tracts with reported high levels of broadband availability in the FCC data and a high share of households also reporting no

internet access may suffer from an overstatement of broadband access due to the aforementioned issues with the Form 477 reporting requirements. As an example, Marathon County reports that many rural residents do not have access to broadband despite the FCC data suggesting otherwise. Several of these potential discrepancies are depicted on Map 1 and ground-truth this assessment. Expanding access in areas where the FCC data does not accurately depict broadband availability could benefit from policies that improve the precision of broadband data or allow for alternate measures of showing need.

- Finally, census tracts that suggest high levels of broadband availability in the FCC data and a high share of households reporting no internet access in the ACS data could be affected by a lack of broadband adoption by households. A lack of adoption could be due to a choice or a lack of knowledge about broadband. Some households in these areas may benefit from outreach, education and adoption strategies that help to increase take rates for internet service providers.

In sum, access (or infrastructure) and affordability are two key challenges to expanding broadband to more households. Infrastructure investments have been supported by grants, but remedying infrastructure gaps can also require improving broadband data on access. Effective investment strategies hinge on the quality of the data upon which those investments are based. Improving data may uncover places that have a large share of households without service despite seemingly having access as reported by the FCC Form 477.<sup>6</sup> If households do in fact have affordable access but choose not to subscribe, education around use of the internet may help stimulate demand.

## TAKE RATE

The percentage of potential subscribers offered the service that actually subscribe.

<sup>5</sup> As the 2014-2018 ACS data used in Map 1 were collected over a five-year period, it may be that some households reporting no internet access in a prior year may have since gained access through one means or another.

<sup>6</sup> In March 2020, the Broadband Deployment Accuracy and Technological Availability (DATA) Act was passed in an effort to improve FCC data. It is unclear the length of the lag time between passage of the Act and actual improvements in the quality of the data.

# STRATEGIES AVAILABLE TO COMMUNITIES

The challenges of broadband are multifaceted and unique to each locality. In some areas, physical access to infrastructure is the primary barrier, which requires supply-side interventions to encourage provision. In other areas, adoption is the more pressing constraint suggesting that demand-side interventions that address affordability and offer education on effective uses of the internet may be more effective for expanding the reach of broadband services. For many communities, the digital divide has elements of both supply and demand constraints. Progress towards solutions can be complex and require a high amount of coordination, industry knowledge, and engagement. States and communities have pursued a range of options that offer lessons-learned and potential paths forward. Wisconsin is already engaged in many such strategies.

## BROADBAND ACCESS

Strategies at the federal, state, and community level most commonly focus on addressing access by expanding infrastructure--these are supply-focused strategies. Traditionally, there are three broad strategy options pursued across the federal and state levels: (1) creating a broadband program led by an administrative unit with designated responsibility for broadband strategies, (2) providing and utilizing funding for investment in broadband infrastructure, and (3) identifying alternatives to the traditional ISP model of providing broadband services.

### 1. Creating a Broadband Program

The administrative structure varies from state to state, but the large majority have established a broadband program tied to a unit with designated responsibilities for broadband such as a broadband office or equivalent (Pew, 2019a). In Wisconsin, we have the Wisconsin Broadband Office (WBO) within the Public Service Commission agency which is generally responsible for regulating public utilities in Wisconsin. There is also the Governor's Task Force on Broadband Access created in 2020. For comparison, Minnesota has a variation with the Office of Broadband Development located within the Minnesota Employment and Economic Development Agency. In Illinois there is the Office of Broadband housed within the Illinois Department of Commerce and Economic Opportunity and Department of Innovation and Technology. In Connecticut, the Office of State Broadband is within the Office of Consumer Counsel.

The placement of the broadband program can have important implications on the roles they play, both directly and indirectly.

The placement can determine if broadband is framed as a regulatory question, an economic initiative, a strategic technology, a critical infrastructure, or as a component of public education, among others. Placement can also influence which funds are available, the appropriate role of the agency, and, ultimately, the direction it takes. In Connecticut, broadband is viewed more within the framework of consumer protection. In some states, broadband is an interagency program that pulls together multiple relevant perspectives to address the complexity of broadband expansion.

Despite the variation across states in the exact leadership, unit, and mandate, these broadband programs take on largely similar tasks. First, they are engaged in communicating with state and local stakeholders involved in broadband such as nonprofit organizations, local and tribal governments, and utilities. (See Case Study 1 for an example of how the broadband program in North Carolina used local input to shape their broadband strategy.) Second, broadband programs also play a crucial role in planning expansions across the state. Often these plans must interface with local planning efforts and address a wide range of issues including land use and housing. Third, they are engaged in data management and improvement. For example, the FCC Form 477 data tends to overstate coverage making it difficult to accurately assess needs. State broadband programs can have a role in initiating and supporting data collection to determine needs across their states more precisely. In Wisconsin, the Department of Public Instruction is gathering detailed data on student access to broadband in response to COVID-19 driven remote learning. Many Wisconsin communities are supplementing FCC, Census, and school district (DPI) data to gain a better understanding of the digital divide. These data are important not just for identifying need but in measuring impact and evaluating program effectiveness. Last, many state broadband programs administer grant programs.

Specifically, in Wisconsin, the mission of the Wisconsin Broadband Office is to:

*"...make Wisconsin more competitive through advancing the availability, adoption, and use of broadband technologies. Since 2009, the WBO has been collecting and mapping broadband coverage information for improved planning purposes. As part of the Public Service Commission of Wisconsin, the WBO works with stakeholders to build partnerships with providers and consumers to enhance broadband across the state."*

Ultimately, the WBO is empowered with the ability to administer state broadband grants and help facilitate access to federal grants, work with internet service providers (ISPs) to expand services to rural and low-income communities and provide limited technical resources to communities that want to pursue investments in internet access and broadband.

In Wisconsin, as in many other states, there is also a task force in addition to the Broadband Office. In July 2020, Governor Evers created the [Governor's Task Force on Broadband Access](#) which is charged to look at innovation, policy recommendations, and finding solutions to access,

affordability, and adoption issues. Their first report will be due to the Governor in the coming year. In general, task forces and councils across the various states complement the ongoing programmatic efforts through coordination, opportunity identification, and policy recommendations. They often represent an opportunity to revisit current issues, assess current policies and strategies, and evaluate alternative approaches to addressing the identified issues. Their recommendations, however, may require legislative action or administrative rule changes, which are outside the dominion of the task force or council.

## CASE STUDY 1: NORTH CAROLINA - GETTING LOCAL INPUT

The Broadband Infrastructure Office (BIO) is located within the North Carolina Department of Information Technology. BIO was tasked in 2015 by North Carolina's legislature with developing a state broadband plan. To gather information for the plan, focus groups were held throughout the state that targeted different regions and business sectors. A total of 3,500 local leaders participated in the focus group efforts. That formed the basis for the strategic direction of the BIO. One key recommendation that emerged from the focus groups fueled a better understanding of the "homework gap." This caused BIO to survey North Carolina students in 2016 with and without home internet access. The result was that BIO partnered with the North Carolina State Library System and local libraries "to provide Wi-Fi hotspots to students who lack internet service at home and provide digital literacy training to students and their parents." In so doing, North Carolina capitalized on the strength of community anchor institutions to help deploy broadband infrastructure.

## 2. Funding

Depending on the methodology, estimates of the cost to connect rural America range from the tens to hundreds of billions of dollars (Levin 2019). Even at the local level, the costs can be daunting. Fortunately, there are several ongoing federal grant sources—the National Telecommunication and Information Administration counts 57 federal broadband programs, across more than a dozen federal agencies, offering billions of dollars in loans, grants, and other support. Among these programs, the United States Department of Agriculture leads the Reconnect Program, which awards grants and loans to entities capable of providing broadband service to rural customers that currently lack adequate service. This program was expanded with additional funding in the Coronavirus Aid, Relief, and Economic Security (CARES) Act. The FCC is also offering support through the Rural Digital Opportunity Fund which uses a reverse auction to distribute support for connecting households and businesses in rural areas. A discussion of all federal opportunities is beyond the scope of this report, but the database from [BroadbandUSA](#) could be helpful for those looking for more information.<sup>7</sup>

At the state level, the funding mechanisms for broadband are relatively consistent, generally consisting of grants and loans that mirror Federal programs (Pew 2019b). These grants and loans are typically available to ISPs, cooperatives, and local governments. The funds generally come from one of three sources: special and general funds, state universal funds, and other revenue streams. Special funds are designated money, set aside for supporting broadband. Some consider special funds advantageous in that they reduce the potential for dollars to be reallocated for other purposes such as more general infrastructure (Levin 2019).<sup>8</sup> In absence of a special fund, money often comes from the state general fund. States have the option to appropriate money for broadband through an annual appropriations bill, for example. In funding broadband this way, it competes with the breadth of state priorities such as education, health care, and other public services.

Wisconsin, along with ten other states, has a state universal service fund (USF) to support broadband (Pew 2019b). These funds were originally established by the federal government and states to support "universal service"—universal telephone service, that is. Under the Telecommunications

<sup>7</sup> Database available at <https://broadbandusa.ntia.doc.gov/new-fund-search>.

<sup>8</sup> There is a concern that a significant portion of some grants are being used to reinvest in the "middle mile" to upgrade services to existing users and not the intended use of "last mile" investments. A simple strategy is to better target how these funds can be used and improve the monitoring of how the funds are used.

Act of 1996, which was broadly aimed at deregulating the telecommunications industry and promoting competition, it became possible to use USFs for internet connectivity. These USFs are supported by fees collected from telecommunications providers and passed on to consumers. The money is used to mitigate the costs of connecting phone and internet service in areas that are without access or too expensive to service. The intent of these funds is to assist low-income and at-risk individuals in accessing telecommunication (telephone) services.<sup>9</sup>

In addition to the general, special, and universal service funds, there are a variety of other revenue streams to support broadband used by states. These include charging ISPs for the right to place their infrastructure alongside public infrastructure such as roads and sidewalks, more generally referred to as right-of-way fees. For example, in the State of New York, a major cell phone service provider negotiated a master agreement with the New York State Thruway Authority to access rights-of-way along the state's 640-mile highway corridor. Some states use civil penalties such as money collected from civil lawsuits against providers and some states use money from legal settlements. As an example, Virginia has used money collected from their tobacco settlement to fund broadband ([NetworkComputing 2004](#)). Revenues from toll roads have also been used to fund broadband investments in some states such as Indiana.

States vary, however, in how funds are used and the mix of state and local funding. Funding is often used to get service to unserved and underserved communities often by focusing on "last mile" infrastructure which brings broadband to end users. The definition of "unserved" and "underserved" varies from state and can even vary within a state. In Wisconsin, one of just four states with a definition, "underserved" refers to having access to fewer than two providers (based on FCC Form 744 which has limitations). In other states, "underserved" is defined based on speed and technology. Most states require a match for their loan and grant funds meaning awardees (communities, ISPs, cooperatives, etc.) must fund some portion of the project. The match requirement, however, is different across states. In some states, awardees must fund most of their projects, upwards of 80%, whereas in others states most of the funding comes from one of the funds described above.

Outside of grants and loans, tax incentives and revenues from government issued bonds can also incentivize broadband expansion. Some states have special tax deductions or exemptions to encourage broadband investment (Pew 2019b). For example, this might include allowing providers to claim a tax credit for investing in broadband equipment, as in Maine.

In some states, such as Iowa, government bonds are used to finance publicly owned broadband networks as is more typical for other infrastructure projects such as roads. To the extent that broadband initiatives overlap with other public policy initiatives, there is also potential to use funds under a different funding umbrella, such as community development or housing, for broadband. An example is using public funds dedicated to the development of affordable housing to ensure that adequate broadband is available much like water, sewer and electricity.

There are also examples of communities financing broadband through government debt financing, or bonds. Because the interest income earned on these government issued bonds tend to be tax exempt, the interest rates and resulting costs of borrowing tend to be lower. Those cost savings can be passed on to the ISP. In Utah, a group of communities issued municipal bonds to finance a fiber network to homes (Andriole 2020). By borrowing, these communities were able to pay for equipment, construction, and onboarding service providers. Because the network is open access, all qualified service providers can share the infrastructure and access new consumers without taking on infrastructure expenses themselves. The chance for multiple providers to access the network can also lower the price for consumers. In other states, some communities have used property tax revenue to invest in broadband (Hovis et al. 2016).

Another approach is to build on existing community foundations which can tap into donations from community members and businesses for community investments. There is a growing number of non-profits and charitable organizations that are turning their attention to the digital divide and may be viable partners for many communities. For example, the [Blandin Foundation](#) in Minnesota and their Robust Network Feasibility Fund Grants and their Community Broadband Resources Network have proven to be an invaluable resource for many Minnesota communities looking to invest in broadband. Another is the [Internet Society Foundation](#), an international organization based in Virginia, which aims to provide technical and some financial support for low-income and at-risk communities. The [Maine Community Foundation](#) has devoted resources to their new (2018) Community Broadband grant program to help seed fund community efforts. In its first two years, this program has provided \$230,000 to support 20 projects across Maine. Another is the [Post Road Foundation](#) in California that works with communities to adopt intelligent broadband investment strategies. These community foundations and non-profits can be valuable partnerships to help communities move forward on addressing the digital divide.

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<sup>9</sup> An example of how some of these funds are used for "at-risk" individuals is to provide victims of domestic violence with emergency cell phones.

### 3. Alternative Models of Providing Broadband Access

In some communities, commercial Internet Service Providers may determine that providing service is infeasible given the return on investment. In these settings, alternative models may offer opportunities for procuring service. These models include municipal broadband, cooperatives, and service through anchor institutions to the more experimental Starlink satellite-based service (See Case Study 2). Several examples of cooperatives and anchor institution engagement already exist in Wisconsin.

#### *Municipal Broadband*

The [Institute for Local Self-Reliance](#) lists more than 500 municipalities with broadband networks. (See Case Study 3 for an example of municipal-provided broadband.) Expanding access in this way is limited in Wisconsin along with more than 20 other states that have statutory constraints on municipal-provided broadband. Municipal broadband is historically contentious as it involves a public entity (e.g., municipality) directly competing with private firms within the market (Kruger and Gilroy 2016). Proponents argue that in the absence of adequate service provided through private market providers, communities and local governments should be able to pursue their own provision to meet community needs and support economic development. In some cases, proponents argue that broadband has become so essential to a modern economy, and service is so uneven because of private market provision, that it should be treated as a utility. Specifically, some of the largest broadband service providers exert substantial market power that has been viewed as monopolistic in some cases. An example would be a large service provider working to undermine smaller providers from entering new markets. Under-provision and high prices can be harmful to consumers and signal a competitive market failure. On the other hand, opponents argue that government-supported municipal broadband constitutes unfair competition with private providers and may discourage their investment. Opponents argue that broadband is distinct from other utilities and that municipalities are ill-equipped to build, operate, and maintain such networks. For a discussion of the debate of broadband as a utility see the Sidebar.

At the Federal level, the FCC has played a role in navigating this question of public versus private provision. In 2015, the FCC released a Memorandum Opinion and Order granting the petitions filed

### CASE STUDY 2: STARLINK

Space X (short for Space Exploration Technologies Corporation), founded by Elon Musk, created Starlink, a constellation of artificial satellites providing satellite internet service. Space X has launched thousands of small (weighing 260 kg. or 572 lb.) satellites into low-earth orbit (defined as being 1,200 miles or lower in altitude) for the purpose of providing low-latency, high bandwidth internet service. Starlink's current service offering is called the Better Than Nothing Beta program, that Starlink's website says, "will deliver high speed broadband internet to locations where access has been unreliable, expensive or completely unavailable." They are targeting service in the northern U.S. and Canada in 2020 and expanding to "near global coverage" by 2021. The technology holds promise but, at a monthly service cost of \$99 and installation kit fee of \$499, Starlink is currently too expensive for most customers. Starlink is banking on more consumer purchases to drive the price down through economies of scale.

### CASE STUDY 3: FAIRLAWN, OHIO MUNICIPAL NETWORKS

FairlawnGig is one example that has been touted as a successful municipal network. Located in Fairlawn, OH, (population 7,534) right outside of Akron, Fairlawn offers 1 gigabit (1000 Mbps) of residential broadband service through its FairlawnGig network advertised for \$75 per month. At these speeds the Fairlawn municipal network is one of the fastest providers in the U.S. The city (Fairlawn) financed FairlawnGig with a 30-year industrial development revenue bond and a guarantee of one year's worth of debt service from an agreement with the Development Finance Authority of Summit County. One year after its launch, the city reported that the network was serving 1,800 customers, 250 of which were commercial. This represented about 45 percent of the combined personal and commercial market share, far exceeding the network's initial goal of 35 percent usage. In 2019, the network serviced more than 50 percent of Fairlawn residents. Beginning as a municipal network, FairlawnGig has grown exponentially into a financially solvent regional provider and has expanded into neighboring areas in Medina County, including Parma and more of Akron, Ohio.

by two municipal broadband providers in Wilson, North Carolina, and Chattanooga, Tennessee, to preempt state laws in their respective states that limited community broadband services. The order was the subject of controversy and was eventually overturned in a court of appeals. In the past, Congress has also taken the issue of public and private provision under consideration (Kruger and Gilroy 2016). Bills under consideration have ranged in intent from prohibiting states from placing limitations on community broadband to restricting the FCC from contradicting state statute (see for example S. 240 and HR.1106 from the 114th Congress). At the Federal level, however, there has yet to be a bill passed.

### *Cooperatives*

Aside from the municipal model, there are other models of provision that have been or could be successful in Wisconsin. In areas where traditional ISPs are not providing service, some communities have turned to the cooperative business model of utility provision like those established for electric and telephone service. The cooperative option can be attractive to communities that view the customer ownership model as a way to prioritize service delivery and accountability.

In providing broadband service, electric and telephone cooperatives have the cost advantage of having some existing infrastructure (i.e., poles) and service provision in place. Even with this cost advantage, it can still be prohibitively expensive to invest in and provide service in sparsely populated areas. Specifically, the cost associated with the “last mile” is one of the largest hurdles facing many rural communities. Rural cooperatives are also facing more competition, particularly for the more densely populated rural areas. This competition may interfere with the ability of the cooperative to use the more profitable service delivery areas to subsidize service delivery to the least densely populated service areas of its customer base.

One way that cooperatives can overcome challenges is through partnership. Cooperatives have already proven to be a valuable partner in addressing broadband. As part of their mission to provide service to their customer members (rather than focus solely on profits), cooperatives can pursue partnerships with similarly focused businesses, organizations, or community-based entities to deliver better broadband services. This approach to partnerships between entities can bring together local technical, financial, and organizational capacities, and may offer a realistic cooperative solution to better broadband service. A partnership with another cooperative, for example, can be a way to increase growth potential and mitigate risk. Cooperatives, or independent telecoms, already have the technical capacity for service delivery, and may be looking for expansion opportunities to leverage their fiber investments. One such partnership success is WIN, the largest independent fiber network in Wisconsin, created by an independent and cooperative telecoms partnership in the 1990s. (See the Case Study 4 on The Blue Ridge Mountain Electric Membership Corporation for another example of cooperative partnership.)

Cooperatives may be an especially valuable partner for municipalities. Municipalities with one or fewer broadband utilities may build a service, so long as the municipality does not operate it (one of the limitations referred to above). In this way, it may make sense for municipalities to work together with local cooperatives or other private entities to build out infrastructure with public dollars and then hand over the operation of the service to a private or cooperative company. The existing statutes, however, prohibit this from being an exclusive relationship, and once the public infrastructure is built, the municipality must offer the infrastructure to any entity that would like to use it including national providers.

## **CASE STUDY 4:**

### ***BLUE RIDGE MOUNTAIN ELECTRIC MEMBERSHIP CORPORATION (BRMEMC)***

The Blue Ridge Mountain Electric Membership Corporation (BRMEMC) (northern Georgia and western North Carolina) has been leveraging partnerships with smaller ISPs for 17 years. Their strategy is to build out a network of smaller ISPs to leverage economies of scale. Of particular interest is their targeted aim of promoting telecommuters into these high amenity rural areas. They have formed partnerships with local real estate agents to find clusters of properties that could be marketed to telecommuters who prefer a high amenity rural lifestyle but work for urban based companies. One targeted focus are boomerang migrants, or individuals who may have moved away from a community and have a desire to return. Their success stems from a consistent willingness to think strategically, promote new ideas, and leverage local and regional partnerships.

## Anchor Institutions

Partnerships with anchor institutions can also be key to providing broadband access. Anchor institutions are generally those that provide fundamental public services such as schools, libraries, hospitals, and government offices. These institutions use broadband to deliver essential services to broad swaths of their communities. Anchor institutions have been central to expanding access to broadband as they often have high demand for broadband and can reach large populations. Consequently, anchor institutions have been viewed as a vehicle for getting broadband to communities, particularly low-income communities where households may not be able to afford residential service. They are also essential from a provider's perspective in that the demand from these institutions, combined with the demand of the larger surrounding area, can make providing service feasible.

Initially, broadband within anchor institutions themselves was the focus as schools, hospitals, and libraries need broadband onsite to best conduct their operations. Some programs do focus on these institutions. For example, the federal E-rate program provides discounts to libraries and K-12 schools and while this has been a largely effective program, many communities still do not have sufficient funding available to reach the program's connectivity goals (Sallet, 2019). Needs have also expanded. Now, the ability to optimize services requires not just that these institutions have service within their walls, but also those that they serve have broadband in their homes. For doctors and nurses to meet with patients and monitor their health at home, patients need service at their residence. For students to fully engage with educational resources, access materials, and complete their homework, they need to have broadband at home.

With broadband at home and local businesses becoming inseparable from anchor institutions' abilities to deliver their services, more of these anchor institutions are stepping into roles that help deliver broadband. For example, some libraries are experimenting with not just library book check-outs, but Wi-Fi hotspot check-outs as well. When local leaders in South Bend, Indiana, were frustrated by high prices, they formed an open access provider. To help finance the project, several anchor institutions including a university and three hospital systems, jointly invested in expanding an existing fiber network in exchange for guaranteed service for ten years. The project has resulted in substantial savings. In Green Bay, Wisconsin, the school system has become more involved in delivering service to students in their homes by loaning mobile hotspots. During the current COVID-19 pandemic many schools across Wisconsin are pursuing similar strategies, but these are short-term efforts to address remote learning during the pandemic. While there are discussions within some school districts to make these strategies longer-term, concerns over reoccurring costs have dampened those discussions.

Schools aren't alone in their limited capacity to expand service. Upwards of 60 percent of rural anchor institutions lack sufficiently robust connections to scale and expand service and the costs associated with building out additional connections are prohibitive (Sallet, 2019). That said, perhaps there is an opportunity for some institutions, such as hospitals, to become the source of broadband—through loaned hot spots, a patient network, or as an important linkage for middle-mile to last-mile technology—as part of providing care to their patients. Again, partnership may be key. Anchor institutions who partner with other public interest entities (such as cooperatives) may be best positioned to contribute to expanding service.

## BROADBAND ADOPTION

Adoption of broadband, or demand, is another challenge. A simple "build it and they will come" approach is insufficient. Even if households and businesses have the option to subscribe to service, they may choose not to adopt often due to the cost but perhaps also due to personal preferences. In other words, if demand for broadband is low it is difficult to expand connectivity. Federal policy initiatives have largely focused on supply or access with less than one-quarter of total spending on rural expansion going toward affordability and adoption programs (Humphreys 2019). Yet, successful expansion relies on households subscribing to service when it becomes available. Low demand can make it more difficult to entice private-sector investment even when Federal programs are in place to support expansion (Humphreys 2019). This makes increasing the take rate, or the share of households subscribing to service, by bolstering demand an important component of strategies to expand broadband but this likely requires market development.

Market development may be especially important in rural regions where low adoption is prevalent. A study by Whitacre and colleagues (2015) found that, though adoption rates have increased over time, nonmetropolitan adoption rates persistently lag metro adoption rates by 12-13 percentage points and that the gap is mostly due to demographic characteristics of rural areas rather than infrastructure. In rural areas, low adoption has been attributed to lower income and education attainment, as well as an older population compared to urban areas. The demographic features often amount to less willingness to pay for service (i.e., lower valuation of service), affordability challenges, less prevalent computer ownership, and digital literacy gaps (Humphreys 2019; Whitacre et al. 2015).

Focusing on the end user shifts policy in two directions: costs of access and ability to utilize. As noted earlier, the analysis by Conroy et al. (2021) indicates that the cost of internet service is a serious barrier for lower income individuals and households. For many low-income households, basic costs of \$40/month can be too great of an expense. Data compiled by the Government Accountability Office shows that for low-income households with school-age children, affordability is the primary reason for not using internet at home (GAO 2019). Tanberk (2020) estimates that 44% of the population in Wisconsin has access to wired broadband for \$60 per month or less, suggesting that the majority of Wisconsin residents either do not have wired broadband service or it is cost prohibitive. In general, affordability has not been a major focus of federal broadband programs (Humphreys 2019). The FCC does offer the Lifeline Program, established in 1985, as part of the Universal Service Fund and administered by the Universal Service Administrative Company (USAC), which is aimed to lower the cost of a monthly subscription for qualifying low-income households, but enrollment rates are relatively low (Humphreys 2019). One community strategy could be to encourage eligible low-income households to take advantage of such programs to offset service costs.

Addressing the cost barrier so that households can afford service is complex as several factors affect subscription costs. For example, in a rural area if infrastructure expense is high relative to the number of potential customers, due to rugged terrain for example, that cost can be passed through to consumers which can lead to low take rates among the already thin pool of customers. This combination of expensive infrastructure, high service prices, and low take rates makes it difficult for for-profit businesses to make a financial case to serve such areas. Similarly, building broadband infrastructure in urban areas with a high density of existing buildings and other obstacles can also be costly. Even though the potential customer base is dense, providers may still have to charge a relatively high price for service provision to be feasible. If these urban neighborhoods are also low-income and/or have lower levels of educational attainment, the take rate for services may be low.

As pricing is related to the cost of building infrastructure, many of the infrastructure strategies that are focused on access can be extended to also consider affordability. For

example, by reducing the cost of building infrastructure through grants, providers may be able to forward cost savings to consumers so that service is available at affordable rates. Public funding, or private through foundations as an example, shifted from building the infrastructure to subsidizing subscriptions could make previously prohibitively expensive subscriptions more attractive to potential customers. At affordable prices, providers may also see an increase in the take rate which can increase their return on investment for building infrastructure.

Cost can also be linked to a lack of competition. Conventional economic theory would suggest that competition between companies would lead to lower prices. Yet many rural communities have trouble finding one provider let alone multiple providers to compete on price. If there is only one service provider, that provider is a de facto monopoly, which can lead to market failures. This is particularly true if the sole service provider is sufficiently large to exert monopoly powers such as making it difficult for a competing provider to enter the market. In this situation, the discussion surrounding internet services being a utility becomes relevant.

In absence of at least two competing providers, the presence of a provider with an alternative business model may offer a path to lower costs. For example, rather than profit maximization, cooperatives' mission is to serve their members, which can lead to different pricing models. Similarly, as an educational entity, Northern Michigan University (NMU) is committed to an educational mission which can lead to different pricing structures. For example, full- and part-time students, or their families, face one pricing schedule while those taking continuing educational courses face another schedule. (See Case Study 5 for how NMU has participated in broadband expansion in Northern Michigan.) Thus, partnership opportunities with different types of providers, such as an anchor institution, may also come with varying pricing that communities can explore.

Though municipalities in Wisconsin face barriers in providing service (see Wis. Stat. 66.0422), municipal-provided broadband has offered a path to lower prices in at least some cases (Kruger and Gilroy 2016). One study, however, found that more than half of municipal providers studied were not cash-flow positive over a five-year period, calling into the question the viability

of this model (Yoo and Pfinninger 2017).<sup>10</sup> This study, though, did not consider federal or state subsidies to infrastructure costs that may have significant fiscal impact and has been criticized on other grounds as well (Levin, 2017). Some have pointed out that conventional metrics of profitability are part of the challenge for reaching underserved areas and alternative ways to think about rates of return on infrastructure investments may be needed.<sup>11</sup> In many states, local governments that implement fees and charges for services cannot structure those fees and charges in such a way that generates “profits”. It is important that, for some municipal-provided broadband, the sustainability of the service may require ongoing subsidies through general purpose taxes. These subsidies, however, could lead to perceptions of unfair competition with private providers. Here a policy contradiction can become apparent: the business model does not support the case for a private company entering the market, yet continuous public subsidies for municipal-provided broadband is viewed as unfair competition.

The City of Madison experimented with subsidized broadband subscriptions for one low-income apartment complex in two ways. First, the city paid the costs for retrofitting the building so that every unit had a physical wire, and second, it subsidized the monthly subscription payment to \$20/month. Unfortunately, after 18 months the city closed the program because at even \$20/month the costs were too high for most renters suggesting that further analysis may be necessary to determine how sensitive consumers are to price at various subscription levels. One strategy might be to encourage landlords to integrate broadband into rental rates so it is not a separate utility bill. Some low-income apartment complexes could use local or state grants to subsidize broadband access and incorporate it into monthly rents. This option would be similar to rental contracts that have utilities included in the rent. Connections could be hardwired into individual units or offered as a community (apartment building/complex) wireless service. Grants can be used to retrofit older apartment buildings and building codes can regulate new complexes looking forward. Such programs, however, may also need to consider how consumers use the internet

and their primary devices—cell phones and personal computers may lead to different online usage and service preferences, for example.

Aside from cost, some people choose not to adopt broadband because they do not see the benefit or have the skills to make use of the service. This is often linked to the educational levels of the individual, household or business owner. From an economic development perspective, there is mounting evidence that once new users in rural communities, particularly rural businesses, gain access to broadband, they are unaware of how to best use this new resource. Demand-oriented policies can help demonstrate the value of broadband through local classes that share practical everyday uses of broadband or programs that improve digital literacy. Examples of such programs include Microsoft Tech Changemakers Program, which has partnered with state and local 4-H programs to provide digital training, or Cyber Senior programs where youth or young adults work with seniors to help bridge the digital divide. These programs may be especially effective when aimed toward the demographic groups with the lowest adoption rates.

For some businesses, the difficulty is not learning how to use the internet for e-mail, or Facebook or even Netflix, but how to use the internet to expand their businesses through marketing, on-line sales, on-line ordering of inputs or even professional development and continuous training opportunities. For these consumers that have some amount of digital fluency, their experience can similarly be enhanced with educational support. Increasingly, having a strong “web presence” is vital to businesses, particularly those that are in the service industries such as tourism. The notion for businesses that “if you don’t have a web presence, you don’t exist” is becoming increasingly true. Further complicating this notion is that a web presence that might have been adequate ten years ago is no longer adequate. Consider a family from Chicago looking for a weekend trip to Wisconsin: the decision on where to go hinges largely on first impressions from web presence. Accordingly, there must be professional development opportunities available to community residents, particularly businesses, on how

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<sup>10</sup> One could argue that the reason these municipalities entered the market is because there could not be a business case made for a for-profit provider to enter the market. The lack of a positive cash flow is a reflection of why the municipality entered the market.

<sup>11</sup> The Electronic Frontier Foundation (EFF), a nonprofit defending civil liberties in the digital world, argues in their report to the California Public Utilities Commission that public policy prohibiting deployment of broadband service results from the unregulated profit formulas of Internet Service Providers. According to EFF, a driving factor of systematically underserved areas for fiber deployments stems from the 3 to 5-year return on investment formulas major ISPs have self-imposed. EFF and others champion the idea that “a longer 10-year return on investment formula substantially changes the deployment plan of an ISP...”

to effectively use the internet. With clearer benefits alongside the skills to take advantage of what broadband has to offer, we might expect adoption to increase.

Cooperative Extension has been active in offering these types of classes along with nonprofit institutions. The U.S. Small Business Administration's programs to help businesses learn to effectively use social media for marketing is such an example. The University of Wisconsin-Madison Division of Extension recently offered a series of courses for retailers on marketing via Facebook. Some communities have partnered

with philanthropic organizations, libraries, and service providers to similarly make educational opportunities available. Given the importance of these demand-oriented programs, however, Hauge and Prieger (2010) conclude that there is little rigorous evidence to determine which programs work best. They encourage communities to include an assessment of the effectiveness of these programs and use evaluation to measure progress toward the desired goal. Rather than counting the number of businesses, for example, that participated in a program assess how many businesses have adopted new approaches.

## **SIDEBAR: THE DEBATE OVER BROADBAND AS A UTILITY**

Treating broadband as a utility has been debated as a strategy to expand broadband access. The arguments regarding whether or not broadband should be a utility conflict in their views of the current demand-driven model and the proposed utility model. Those who are against broadband becoming a utility argue that the government regulated utility model would make the broadband industry economically inefficient, incite lobbying from private companies, and discourage further innovation in the industry. On the contrary, those who believe that broadband should be a utility argue that the current demand-driven model does not offer services for all Americans, but only to those who would be profitable for the private service providers. Since the supporters of the utility model believe that every American has a right to access broadband, they argue that the utility model needs to be established as to increase connectivity across the country. In their view, the utility model will improve broadband access throughout the nation, and also maintain a level of competition between private service providers to ensure economic efficiency, lower prices, and more choice for consumers.

Under the demand-driven model, private providers take on the responsibility of building broadband infrastructure throughout the country. However, the ability of private companies to decide where to serve has meant that certain areas of the country where the return on investment would be too low go unserved or underserved. If no private providers will service these "high-cost" areas, the residents of that area have limited options to access the Internet (Crawford, 2019). Deb Socia, executive director of Next Century Cities, recognizes the inability of the current demand-driven model to provide broadband access for all Americans writing "The issue is: the market isn't solving the problem. I don't expect a for-profit company to take on an effort that will not make them money; that's not what they do, they are for-profit" (Teale, 2019). Therefore, the argument that broadband should be a utility centers around the idea that the current demand-driven model of the industry is leaving some residents out of access and therefore the model is not functioning as desired. In a utility model, broadband would be offered at least partly through a public entity to all Americans similar to electricity, water, and sewer.

In arguments both for and against broadband being treated as a utility, broadband is compared to other established utilities, particularly electricity. When the use and subsequent need of electricity increased, the progression of where electrical companies offered their services parallels the pattern of broadband accessibility. In a similar fashion to broadband, electricity was first available to municipal buildings, businesses, and wealthy urban areas and then gradually extended its service to low-income urban populations and rural populations (Crawford, 2019). Given the demand-driven model of the electricity

industry at the time, these impoverished and/or rural areas were not completely electrified until electricity became a utility when the U.S. recognized it as a necessity for all Americans. Similar to electricity, broadband has been argued to be both a right and necessity for all American people since it is a crucial resource for education, economic advancement, telemedicine, and more. For proponents, the right and necessity warrants treating broadband as utility.

Those in favor of broadband as a utility have examined other country's broadband utility-models as well as proposed plans for American broadband becoming a utility. One advocate, writing for *Broadband Communities* magazine, introduced multiple countries that have already made the shift and focused particularly on Singapore's broadband network. Singapore's government offered \$750 million of support to the construction of a fiber network that connects to all the nation's homes and businesses. After the network was constructed, all of Singapore had access to broadband and private service providers were still able to compete as they operate on the established network. Therefore, in the way that there is still competition and choice for the consumers, Singapore's broadband system is unlike other utilities because it is not a "natural monopoly." Overall, Singapore's strategy to make broadband a utility by building accessible fiber infrastructure increased the connectivity throughout the entire country and maintained competition on the market (Crawford, 2019).

Some argue that a version of this strategy could be used for broadband in the United States. Most arguments for broadband to operate as a utility follow similar plans that propose that the government funds the construction of broadband infrastructure spanning the entire country, which will then be the network that service providers offer their services on. Maintaining the principle that broadband access is a right, the arguments for these plans support connectivity for all Americans while maintaining competition to lower prices and increase choice for consumers.

In opposition to the idea of broadband as a utility, many maintain that the demand-driven model is the optimal strategy for the U.S. broadband network. The argument against making broadband a utility focuses on the differences in the nature of a broadband network compared to an established utility network as well as the economic disruptions that would accompany the shift of broadband to a utility. In sum, this view contends that broadband is categorically different from other utilities and that if broadband was a utility, the government regulation would decrease the economic efficiency of the market and stifle innovation and future growth of the industry. Broadband, it is argued, is a diverse product whereas electricity is standardized. Broadband is also distinct in this view because it is thought of as more of a luxury rather than an essential service like other utilities.

Opponents have also reiterated concerns about the economic consequences treating broadband as a utility. For example, declaring broadband a public utility would turn broadband into a natural monopoly, which would decrease competition, and further limit the innovative capacity of firms. There is also the concern that government regulation of broadband would cause more problems than it would solve. Using examples of other utilities, regulation would allow other parties to lobby for their interests and then shift the landscape of the industry. Additionally, many already established public utilities that are not receiving proper attention from the government that regulates them are facing ongoing neglect (Eisenach, 2016).

At the Federal level, there have been recent policy changes relevant to the broadband-utility debate. In 2015, the Federal Communications Commission (FCC) voted in favor of an order that allowed it to regulate internet service providers as a utility in connection to an effort to support net neutrality. In 2017, however, the FCC voted to overturn that order and has since taken a "light touch" approach to regulation of ISPs.

# CONSIDERATIONS FOR SUCCESS

## LEADERSHIP

One of the lessons learned from the efforts of several communities is that they must be organized and be strategic in their efforts before moving to an appropriate strategy. There needs to be a local champion—a person, group of people, or organization to serve as the backbone of the effort. This “leadership team” is instrumental in building awareness, identifying resources, constructing, and implementing action plans, and providing follow-up. This team could be composed of representatives from local government, businesses, schools and concerned citizens. If there is a local service provider, it is vital that it is a part of the team. For example, in Buffalo County, Wisconsin, the Cochrane Telephone Cooperative

has been a major partner in expanding broadband access across much of the county. Effective leadership also means looking outside the community and immediate region for assistance. For example, to assist local leaders in Wisconsin, the Public Service Commission in partnership with Wisconsin Economic Development Corporation (WEDC) is offering the Broadband Connectors Pilot to help communities identify and realize opportunities to increase broadband availability. WEDC will work with six communities to better understand the technical assistance communities need most. The lessons from this effort will then be shared broadly with other Wisconsin communities. This is one example of how community leadership in broadband can utilize support programs.

### **CASE STUDY 5:** ***MICHIGAN EDUCATIONAL BROADBAND NETWORKS***

Northern Michigan University (NMU) has created the Educational Access Network (EAN) to connect underserved or unserved areas across Michigan. The EAN at NMU uses the broadband infrastructure of NMU in partnership with local public schools to create a wider network of wireless connectivity. To date the program is providing 70 towers of internet service to 5,500 families across the Michigan Upper Peninsula, most of which are in hard-to-reach rural communities. Local schools must have a secure, reliable, internet connection with unlimited data which is the entry point for the EAN wireless network. Access to the network for community members requires a student enrolled in the local school or registration for an on-line course or professional development program. NMU has created several limited on-line continuing educational programs to attract individuals or households without students in the local schools to participate. Because access in these rural communities is based on wireless technology, signals can be blocked by natural obstructions, such as hills, rock bluffs and trees, as well as man-made obstructions, including buildings, travel trailers and types of building construction using low-emissivity glass (i.e., building glass designed to minimize the amount of infrared and ultraviolet light without minimizing the amount of light that enters the building). While the NMU EAN is focused on rural communities in the Upper Peninsula, similar programs could be considered for lower income urban neighborhoods.

## PARTNERSHIP

Partnership is fundamental to moving the community forward, particularly public-private partnership. For Wisconsin communities, partnership with a local or regional ISP is necessary because many opportunities for grant funding hinge on the active participation of ISPs. Public-private partnerships vary widely but have been divided into three primary categories as detailed in Hovis, 2016. First, there are models of private-investment and public facilitation wherein the public sector takes small but practical steps to enable or encourage private sector investments. Second, there are examples of private execution and public funding, which has some similarities to municipal broadband in that it involves a significant amount of public sector investment but service provision is handled by a private sector entity. Last, there

are models of shared investment and risk where localities and private partners work together to develop a broadband network by sharing investments, operation, and maintenance expenses.

One example of public-private partnership that garnered some attention recently is that between electric utility companies and private internet service providers (Levin 2020). In this model, local utility companies expand broadband infrastructure and lease unused capacity to private ISPs. For example, in Springfield, MO the city-owned electric utility company expanded its own fiber optic network to every home in the city to improve its own electric and information services. It then leased excess capacity in their network to CenturyLink, which now provides high speed internet services across the city and pays for marketing and customer service costs. This model

allows utility companies to upgrade without passing on higher rates to customers and may also be attractive to providers who can expand their coverage without taking on building the infrastructure themselves.

More generally, however, there are several partnership options that could be pursued at the community level to better position the community for necessary broadband investments and adoption strategies. In each case it is important to align all parties' interests. Hovis (2016) offers checklists useful for building a partnership that includes determining priorities, considering various models and how they relate to risk, gain, and control, reviewing statute and regulation, understanding financing options, and negotiating agreements. Some examples of partnerships include:

- Partnering with local educational institutions. As an example, Northern Michigan University's (NMU) Educational Access Network uses the broadband infrastructure of NMU in partnership with local public schools to create a network of wireless connectivity that currently serves 5,500 families in Michigan's Upper Peninsula. (See Case Study 5 for a further description of this program).
- Leveraging public library resources. An Oklahoma State University initiated program loosely called "loan out the internet" allows individuals to check out mobile hotspot devices. Such programs have been widely used in library systems across major cities for several years and is becoming increasingly popular in smaller more rural communities. While not a strategy to address community wide broadband access, it can be a piece of the larger broadband puzzle. During the COVID-19 pandemic many Wisconsin public school systems are implementing similar programs for low-income students.
- Organizing institutions (e.g., cooperatives) that leverage partnerships across smaller ISPs. The aforementioned Blue Ridge Mountain Electric Membership Corporation (BRMEMC) (northern Georgia and western North Carolina) strategy builds out a network of smaller ISPs to leverage economies of scale. Here smaller service providers can gain economies of scale by forming cooperative-type business relationships.
- Partnering with neighboring communities, tribes, and/or regions can aggregate demand and leverage local expertise. Regional approaches can have the advantage of including peripheral communities that may otherwise find it difficult to get service due to their remote location and low-density. Because investment decisions in broadband infrastructure are generally independent of local government jurisdictional boundaries, communities, particularly smaller communities, should consider working with their neighboring cities, towns and villages. Being active in regional partnerships that share common objectives and goals, and seeking out strategies from other communities that have been proactive in promoting access to the internet and broadband use may also be helpful. Forming partnerships within and across communities can enhance the flow of information and create a larger presence when asking state and federal legislators for assistance. Vital to these partnerships is the inclusion of the business community, public entities such as school districts and local and regional economic development organizations, other local institutions such as non-profits, and local elected officials. (See Case Study 6 for an example.)

## **CASE STUDY 6:** ***COLORADO – A REGIONAL APPROACH***

Colorado's approach to broadband investment has placed emphasis – including financial resources – on broadband planning at the regional level. The Colorado Department of Local Affairs (DOLA) funds regional grants in two phases: planning grants and implementation grants. At both phases, a regional approach is required, including the involvement of at least one internet service provider (ISP). Community partnerships are encouraged to consider private ownership and public-private partnerships in addressing broadband investments and services. One advantage of this regional approach is that it eliminated "winners" and "losers" where individual communities are in competition for limited resources. Another advantage is the smaller communities can expand the pool of information and expertise. Efforts in the Northwoods of Wisconsin have generally emphasized a regional approach in a concerted effort to obtain improved broadband. In addition, strategic regional investment plans provide interested service providers with a long-term perspective as opposed to piecemeal investments.

## BROADBAND MAPPING

To efficiently advance broadband services, it is important to have a thorough inventory of the relevant pieces of information. That means knowing service provider coverage, mapping infrastructure both used and potential (i.e., unused or “dark” fiber and available towers for fixed wireless service), identifying public and private lands, as well the location of households across the region. Without knowing where services are present and not present, where providers are and are not, and where there is underutilized or lack of infrastructure, it is difficult to create a cohesive, strategic, and cost-effective plan. With knowledge of these pieces, it becomes easier to demonstrate need, apply for grants, and access funds. It becomes easier for communities to identify and partner with providers in their area. It also becomes easier for state broadband programs to plan and strategically support expansion.

As noted above, the quality of the publicly available broadband coverage data (FCC Form 477) is inadequate and often inaccurate. This is troublesome because, for many federal and state grant and loan programs, documenting the need for investments hinges on these FCC data. In March 2020, the Broadband Deployment Accuracy and Technological Availability (DATA) Act was passed to improve FCC data. Until these new data are released, the inadequacies of current data can make a difficult project even more difficult.

In recognizing the importance of reliable and up-to-date broadband coverage data, some states have focused on internal mapping efforts. For instance, the [Georgia Broadband Map](#) created as part of the Georgia Broadband Development Initiative worked to identify individual locations that were unserved by ISPs. In collaboration with the Carl Vinson Institute of Government at the University of Georgia, address data provided by local governments, emergency management agencies, property appraisers and other partners was combined with data shared by existing ISPs that identified which of

these locations were served. Forty-three of Georgia’s 44 retail internet providers shared data under confidentiality protections to create the map, which reiterates the importance of public-private partnerships. The Georgia Broadband Map identified more than 500,000 unserved locations and almost 51,000 census blocks with less than 80% of locations served.

Other state broadband offices, including Wisconsin’s, also request more precise service data from ISPs on a voluntary basis. While some internet service providers do indeed share their coverage information, participation may not be as widespread as needed to accurately depict served versus underserved areas. For instance, the [Colorado Broadband Data and Development Program](#) (CBDDP) biannually collects coverage data from ISPs. However, as participation in the program is voluntary, the data is often inexact and incomplete. As a result, the Colorado 2020 Governor’s Broadband Initiatives Report recommends that Colorado Governor’s Office of Information Technology be given statutory authority that requires ISPs to provide granular coverage data.

Other data sources for demonstrating need, such as surveys, should also be considered. There are resources available to the community to help undertake such a project. The leadership team must seek out these resources and take advantage of them. As mentioned above, the Wisconsin Department of Public Instruction has undertaken several initiatives to document student access to the internet and broadband because of COVID-19 induced distance learning. Several communities have found these to be a wealth of information in better understanding the digital divide. In addition, a growing number of communities are undertaking surveys of residents and businesses to better understand not only the digital divide but also training needs for adoption. Specific examples include the City of Superior’s February 2020 community survey, Crawford County’s April 2020 mail survey of 1,157 random locations and Dunn County’s June 2017 survey of residents and business.

### CASE STUDY 7: OKLAHOMA- TELEVISION WHITE SPACE CHANNELING

Oklahoma State University is working with Pioneer Telephone Cooperative, a large phone co-op based out of Kingfisher, Oklahoma, to install TV white space transmission equipment on area towers with the goal of delivering broadband speeds of 20-25 megabits per second. This technology, commonly referred to as “white space internet”, uses a part of the radio spectrum known as white spaces (radio) associated with unlicensed spectrums. This frequency range is created when there are gaps between television channels. These spaces can provide broadband internet access that is like that of 4G mobile. The city of Wilmington, North Carolina implemented technology utilizing the white space systems that connect the city’s infrastructure, allowing public officials to remotely turn lights on and off in parks, to provide public wireless broadband to certain areas of the city, and monitor water levels. The downside to this technology is that it is unidirectional: the signaling equipment is “aimed” in a certain direction. Line of sight is not required, however. This limitation can be addressed by installing multiple antennas in a more complete 360 degree pattern.

# CONCLUSION

The digital divide across Wisconsin remains a serious issue and has placed many Wisconsin residents and businesses at a serious disadvantage. The COVID-19 pandemic and the move to remote learning for students and telecommuting for many employees has created a renewed sense of urgency to address access to quality and affordable broadband. As documented in Conroy et al. (2021), the communities with limited access to broadband tend to have lower levels of community well-being than those with higher access. The digital divide across Wisconsin is generally thought of as a “rural issue” where lower population densities make the costs of the “last mile” unreasonable. While this is true for many places, the research shows that the digital divide is also driven by income. Thus, policies aimed at addressing this divide must think beyond simply the supply of the physical infrastructure and must also consider the demand-side of the equation.

In this report we have outlined several potential policy options that could lay the foundation for future efforts at both the state and local level. While Wisconsin has invested in technical resources for communities and smaller service providers (e.g., [Wisconsin Broadband Office](#)), the level of the investment may be insufficient to meet the needs of Wisconsin residents and businesses. For example, should Wisconsin revisit the role of municipalities in addressing the digital divide as several other states have done (Whitacre and Gallardo, 2020)? Should there be stronger follow-up by the state in seeing how broadband grants are being used by service providers? Should state broadband dollars move beyond supplementing new investments and look to reduce costs along the lines of the Federal Communications Commission’s Lifeline Program? Alternatively, is it feasible to expand funding opportunities for programs like the public library-based Wi-Fi hotspot checkout?

Several Wisconsin communities have done an outstanding job of addressing the gaps in access to broadband and there are lessons that have been learned. Effective leadership within the community is vital: there must be a cross section of leaders within the community to coordinate and champion efforts. Regional partnerships across multiple communities have also been found to be fundamental to success. The partnerships

must include not only local governments but also business groups; public-private partnerships where service providers are actively involved have proven to be effective. Conversations with the Wisconsin Broadband Office, Wisconsin Economic Development Corporation, regional planning commissions, or economic development organizations may also be valuable and open opportunities to funding as well as technical support. Further, continuous conversations with state and federal representatives and senators can help the formulation of more effective policies and regulations related to broadband.

The most effective community efforts have moved beyond focusing on building out the infrastructure and have turned to expanding the capacity of users. Programs like Cyber Seniors, 4-H Clubs, and workshops aimed at local businesses have all proven to be effective. By expanding the pool of service subscribers, the business case for providing broadband services can be enhanced. Local governments can take the lead by using the internet to improve communications between government and citizens and local businesses, such as using the local government’s website to provide up-to-date information about ongoing operations, and as a potential clearinghouse of local resources. Active social media accounts are not only a reasonable way to convey information to citizens and businesses but also to gather information about current issues.

Communities can play a greater role in addressing gaps in access to broadband services. To do this, there are two necessary steps. First, communities must understand the existing gaps and disconnects in local and regional broadband access and usage. Second, they must seek innovative ways to address the digital divide. To accomplish this latter step, communities can start by learning what has and has not worked in other communities, both within and outside of Wisconsin. Additionally, conversations with state and federal policy makers and regulators can help address barriers to community efforts and identify additional resources. As with many initiatives, numerous broadband-related resources exist across Wisconsin and communities should continue to take advantage of them to create local solutions.

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