



CENTER *for* RURAL AFFAIRS

ACCESS GRANTED: RURAL BROADBAND OPTIONS, OBSTACLES, AND SOLUTIONS

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I. INTRODUCTION

Along with the weather, broadband access is a safe topic for small talk in rural communities. It is an issue for everyone in one way or another—whether directly or via grandkids who struggle to connect to classes, employees who drop out of Zoom meetings, or simply an inability to look up a recipe on Google. Exacerbated by the COVID-19 pandemic, inequity caused by lack of broadband has opened the eyes of those who have the precious asset and presumed universal access.

Broadband is core infrastructure. Without it, people cannot participate fully in our economy and society. If service is unavailable, unaffordable, or “dirty” (unreliable, weak, long lag time, etc.), it can affect the viability of a community. Growth, development, and prosperity require excellent internet access more and more every day. Broadband access is no longer a matter of convenience and entertainment, but overall quality of life.

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HOW FAST IS FAST ENOUGH?

The federal government has an outdated and inconsistent definition of high-speed broadband. The Federal Communications Commission (FCC) defines high-speed broadband as download speeds of up to 25 megabits per second (Mbps) and upload speeds of up to 3 megabits per second (25/3 Mbps). Alternatively, the U.S. Department of Agriculture (USDA) defines it as just 10/1 Mbps.¹ As internet use has evolved from simply surfing and streaming to work and study, bandwidth requirements have changed. Internet users not only consume content, they also produce and participate, which require significantly more bandwidth, particularly on the upload side.

On March 4, 2021, a bipartisan group of senators sent a letter to Agriculture Secretary Tom Vilsack, Commerce Secretary Gina Raimondo, FCC Commissioner Jessica Rosenworcel, and National Economic Council Director Brian Deese urging the Biden Administration to dramatically increase the definition of high-speed broadband to 100 Mbps download/100 Mbps upload, also known as symmetrical 100 Mbps.

The letter also asks federal agencies to uniformly adopt the modification to simplify the current patchwork system of classification around broadband.

Part of the rationale for the update is to stop subsidizing development that is out of date as soon as it is completed. This is an opportunity for the standards to lead the way and ensure funding meets the needs of the 21st century. Unfortunately, as of April 2020, the FCC indicated it stands behind the standard of 25/3 Mbps and is against setting an aspirational standard for what qualifies as high-speed broadband.²

1 “Rural eConnectivity Program.” Rural Utilities Service, Feb. 25, 2021, [regulations.gov/document/RUS-20-TELECOM-0023-0001](https://www.regulations.gov/document/RUS-20-TELECOM-0023-0001). Accessed November 2021.

2 “2020 Broadband Deployment Report.” Federal Communications Commission, April 24, 2020, docs.fcc.gov/public/attachments/FCC-20-50A1.pdf. Accessed November 2021.

II. NO LONGER A LUXURY

Although the cost for quality access is high, so are the benefits. The following are reasons expanded broadband access is a necessity along with the impact it will have.

A. EDUCATION

Since the evolution of computers and the internet, educators have gradually incorporated technology into the classroom. The COVID-19 pandemic forced the system to a completely digital format for 50 million K-12 students in the U.S. But, approximately 16 million of those students lacked either adequate internet access or devices to attend class virtually and 9 million lacked both devices and access.³

Students’ need for quality internet will remain after the pandemic, likely with more intensity than before. In early 2020, more than 3 million Americans were pursuing college degrees entirely online.⁴ At the K-12 level, internet use in curriculum has increased steadily over time. In Nebraska, for example, one in five teachers assigns the majority of homework online.⁵ After a year of digital education, the new level of familiarity, growth of online learning tools, and changing of old norms—like swapping snow days with remote learning days—will place a

3 Chandra, Sumit, et al. “Closing the K-12 Digital Divide in the age of Distance Learning.” Common Sense Media, Boston Consulting Group, 2020, commonsensemedia.org/sites/default/files/uploads/pdfs/common_sense_media_report_final_7_1_3pm_web.pdf. Accessed November 2021.

4 Hussar, Bill, et al. “The Condition of Education 2020.” National Center for Education Statistics at Institute of Education Sciences, U.S. Department of Education, May 2020, nces.ed.gov/pubs2020/2020144.pdf. Accessed November 2021.

5 “Rural Broadband Task Force 2019 Report Appendices.” State of Nebraska, ruralbroadband.nebraska.gov/reports/2019/RBTF2019appendicesall.pdf. Accessed November 2021.

high premium on internet access for students at home.⁶

Rural communities suddenly plunged into virtual classrooms are met with different challenges than those in metro areas. While 21% of urban students' households lack sufficient broadband access, 37% of rural students' households lack the service they need.⁷ There often aren't Wi-Fi-enabled public spaces close by, and there isn't always coverage for mobile hotspots. Parking outside of a local library or McDonald's isn't necessarily an option for a rural student. In Wi-Fi dead zones such as these, teachers spend time and resources creatively educating. Some have gone to the lengths of mailing packets to homes or even spending time and resources loading coursework onto flash drives.⁸

The extreme measures taken to create a virtual classroom beg the question: Who is responsible for a student's broadband? Educational institutions are expected to provide safe, equitable learning environments that extend to the digital space, but schools are not going to build towers and drop fiber in the district. If we are to rely on virtual classrooms, which appears to be a foregone conclusion, shouldn't connectivity be a basic requirement?

Access to a virtual classroom is not only determined by whether a student lives in a dead zone, but also whether his or her family can afford the service available. What if the only service available is prohibitively expensive? In rural communities, it's not unheard of that a household will have only one option for internet service.

6 Nicosia, Mareesa. "The Pros, Cons and Lessons Learned from Schools that Do Virtual Snow Days." EdTech Magazine, Jan. 27, 2021, edtechmagazine.com/k12/article/2021/01/pros-cons-and-lessons-learned-schools-do-virtual-snow-days-perfcon. Accessed November 2021.

7 Chandra, Sumit, et al. "Closing the K-12 Digital Divide in the Age of Distance Learning." Common Sense Media, Boston Consulting Group, 2020, commonsensemedia.org/sites/default/files/uploads/pdfs/common_sense_media_report_final_7_1_3pm_web.pdf. Accessed November 2021.

8 Levin, Dan. "In Rural 'Dead Zones,' School Comes on a Flash Drive." The New York Times, Nov. 13, 2020, nytimes.com/2020/11/13/us/wifi-dead-zones-schools.html?smid=tw-share. Accessed November 2021.

So, with the advent of the virtual classroom at some schools, should free and reduced internet service be offered?

B. HEALTH CARE

The trend to increased use of telemedicine not only protects people during a pandemic, but it also has lowered barriers to entry—particularly for people in rural areas—thereby promoting positive health outcomes. In rural areas, picking up the phone is much easier than driving miles to health care facilities that are few and far between. Additionally, rural residents are allowed to shop for quality telehealth services if they have sufficient access to the internet.

Patients can't get a shot or a physical exam remotely, however there are countless ways in which care can be accessed via secure internet connection. Psychiatric care does not require in-person participation, and patients seeking support in rural areas are grossly underserved. For every 100,000 people in urban counties, there are 10.62 psychiatrists; for the same number of rural residents, there are 3.28 psychiatrists.⁹ Rural areas make up more than 60% of the nation's Health Professional Shortage Areas, and, in mental health specifically, more than 26 million rural Americans live in a shortage area.¹⁰ Rural patients must drive farther, they must battle the full schedules of providers, and they must hope the option available is quality, because there may not be an alternative.

Telepsychiatry allows for privacy, which promotes participation. Patients can avoid the stigma of having their vehicle recognized or bumping into someone they know when seeking mental health

9 Beck, Angela J., et al. "Estimating the Distribution of the U.S. Psychiatric Subspecialist Workforce." University of Michigan School of Public Health, Behavioral Health Workforce Research Center, December 2018, behavioralhealthworkforce.org/wp-content/uploads/2019/02/Y3-FA2-P2-Psych-Sub_Full-Report-FINAL2.19.2019.pdf. Accessed November 2021.

10 "Designated Health Professional Shortage Areas Statistics." Bureau of Health Workforce, Health Resources and Services Administration (HRSA), U.S. Department of Health and Human Services, Oct. 1, 2021, data.hrsa.gov/Default/GenerateHPSA QuarterlyReport. Accessed November 2021.

care since they no longer need to go in person. Since the pandemic began, the percentage of telehealth services accessed for mental health treatment has increased more than threefold.¹¹

Pandemic expansion of telemedicine has enabled access to care previously challenging for rural communities. Simple health care, such as standard check-ups, promote positive outcomes for everything from diabetes to prenatal care. The most common specialties using telemedicine with patients are psychiatry, radiology, and cardiology, the latter two primarily to review scans and test results.¹²

When health care becomes competitive, it is accessed most often via the internet. When the time came for Americans to be vaccinated, the most current information was found online. Vaccine eligibility, availability, notification, and sign-ups were handled primarily via applications and websites, leaving behind the least connected residents who needed the vaccine most—elderly, low-income, minority, and rural.

C. ECONOMIC DEVELOPMENT

Along with classrooms and clinics, businesses and professional offices went virtual. Remote work will continue because professionals have demonstrated through stay-at-home orders that it is possible and, in many cases, more convenient and economical to work remotely. Freedom from high-cost-of-living locations could also be a win-win for employees and employers alike by driving down costs on both sides.

The following are some ways broadband access affects rural economies:

11 Wicklund, Eric. “Telehealth Survey Sees More Users for Behavioral Health Than Physical Care.” mHealth Intelligence, xtelligent Healthcare Media, Jan. 12, 2021, mhealthintelligence.com/news/telehealth-survey-sees-more-users-for-behavioral-health-than-physical-care. Accessed November 2021.

12 Robeznieks, Andis. “Which medical specialties use telemedicine the most?” American Medical Association, Jan. 11, 2019, ama-assn.org/practice-management/digital/which-medical-specialties-use-telemedicine-most. Accessed November 2021.

1. ENTREPRENEURSHIP

Online spending in 2020 accounted for approximately 20% of all retail spending—a \$900 billion increase from the prior year.¹³ Businesses offering online commerce have a large market to draw from, as well as room for growth.

2. TECHNOLOGICAL ADVANCEMENT

Increased connectivity in agricultural regions is directly linked to improved yields. According to the FCC, doubling the number of 25/3 (Mbps) connections per 1,000 households in agricultural areas is associated with a 3.6% increase in corn yields, as measured in bushels per acre.¹⁴ Soybean yields increase by a slightly higher margin, at 3.8%.

Better connection at the homestead allows for more efficient data processing and deeper understanding of what is happening on the ground. This reduces and fine-tunes inputs, compounding the benefits to agriculture production and the producer’s net income. Even increasing access to slow internet, just 10 Mbps download, resulted in a 6.5% decrease in fertilizer expense and a 3.4% decrease in seed expense.¹⁵

These results can be attributed to improved access to precise and customized data, broader exposure to markets to source materials at better rates, as well as online information to support greater efficiencies and negotiating positions. As the USDA puts it, “e-connectivity is the backbone of digital technology and drives

13 Repko, Melissa. “Consumers spent \$900 billion more online in 2020. Here’s who will keep the biggest gains.” CNBC, April 6, 2021, [cnbc.com/2021/04/06/consumers-spent-900-billion-more-online-in-2020-mastercard-report-says.html](https://www.cnbc.com/2021/04/06/consumers-spent-900-billion-more-online-in-2020-mastercard-report-says.html). Accessed November 2021.

14 LoPiccolo, Katherine. “Impact of Broadband Penetration on U.S. Farm Productivity.” Office of Economics and Analytics, Federal Communications Commission, Feb. 19, 2021, docs.fcc.gov/public/attachments/DOC-368773A1.pdf. Accessed November 2021.

15 Ibid.

much of the value by making it possible to aggregate, analyze, and act on the data collected.”¹⁶

The market for commodities is no longer regional or domestic. Farmers must be aware and on top of global markets to be most competitive. Between planning, production, and market analysis, the stacking benefits significantly impact the bottom line of farm income before any subsidies.¹⁷ As younger, more tech-savvy farmers take the lead in the industry, the demand and requirement for quality internet service will grow.

3. ACCESS TO HIGH-PAYING REMOTE POSITIONS

The USDA estimates rural median income lags behind urban median income by roughly 25%.¹⁸ Enabling remote work evens the playing field by allowing people living in rural communities to earn higher wages and, in turn, having higher disposable income to spend in their communities.

The pandemic demonstrated how people in metro areas took advantage of the opportunity to migrate to rural areas. According to Upwork, an online freelance marketplace, 14 million to 23 million Americans are planning to move as a result of remote work, and more than 20% of those moving are leaving large urban areas.¹⁹ Those workers will not be able to relocate to places without adequate internet infrastructure as their livelihoods depend on internet access.

16 “A Case for Rural Broadband: Insights on Rural Broadband Infrastructure and Next Generation Precision Agriculture Technologies.” U.S. Department of Agriculture, April 2019, usda.gov/sites/default/files/documents/case-for-rural-broadband.pdf. Accessed November 2021.

17 Ibid.

18 “Rural America at a Glance, 2017 Edition.” U.S. Department of Agriculture, Economic Research Service, Economic Information Bulletin 182, November 2017, ers.usda.gov/webdocs/publications/85740/eib182_brochure%20format.pdf?v=0. Accessed November 2021.

19 “Economist Report: Remote Workers on the Move.” Upwork, upwork.com/press/releases/economist-report-remote-workers-on-the-move. Accessed November 2021.

4. RECRUITMENT AND RETENTION

Recruiting employees for work that isn’t entirely dependent on internet access is still hurt by lack of access. The personal life of the individuals must be taken into consideration—what they are accustomed to and what their families need to work or study. People aren’t going to relocate to areas that don’t support the life of their entire family or feel like a sacrifice to their lifestyle, which likely includes online entertainment such as Netflix, Hulu, etc. This is a huge opportunity for well-connected rural communities to attract new residents.

D. EQUALITY

Compounding factors exacerbate inequality. According to the FCC, deployment of advanced telecommunications capability on certain Tribal lands, particularly rural Tribal lands, lags behind deployment in other, non-Tribal areas.²⁰ Including lower-income populations results in shameful access levels, revealing how the current approach to connectivity does a disservice to so many. Low-density, low-income populations do not have enough revenue potential to incentivize development in rural communities and Tribal nations.

The FCC admittedly overestimates coverage and, even with the overestimates, recognizes the vast inequality in service. Of residents in rural areas in 2018, 22.3% lacked coverage from fixed terrestrial 25/3 Mbps broadband, and the same is true for 27.7% of those in Tribal lands, compared to 1.5% of residents in urban areas.²¹ When considering more productive broadband levels, the disparity grows. Speeds of 100/10 Mbps are available to all but 2.6% of urban residents, whereas 37.4% of rural and 40.1% of Tribal residents are left out.

Exacerbating the issue of access is affordability and adaptability. Just because there is fiber outside of someone’s home doesn’t mean they are able to connect to it. Roughly 3 in 10 adults with household incomes below \$30,000 a year (29%)

20 “2020 Broadband Development Report.” Federal Communications Commission, April 24, 2020, docs.fcc.gov/public/attachments/FCC-20-50A1.pdf. Accessed November 2021.

21 Ibid.

don't own a smartphone. More than 4 in 10 don't have home broadband services (44%) or a traditional computer (46%).²² Without the financial ability to acquire the hardware and internet, large sections of our communities remain unable to participate in the virtual economy and classroom.

E. CLIMATE IMPACT

Precision agriculture allows farmers to use high-tech software and equipment to determine the inputs required to get the maximum possible outputs from their fields. This increase in efficiency allows farmers to not only save money, fuel, fertilizer, and time—creating a powerful economic effect—but also conserves our natural resources. According to USDA, agriculture accounts for 10% to 15% of carbon emissions.²³

Similar to reducing carbon emissions, maximizing efficiency through technology reduces unnecessary utility usage, and preventing excess is much easier than making up for overuse in other ways. BP estimates total demand for electricity could be reduced by 25% by 2050 with implementation of digital technologies.²⁴ Everything from managing in-home electricity and water consumption through smart appliances that respond to demand, to industrial-scale technology to save money and energy can contribute to widespread reductions in demand for electricity and water.

22 Vogels, Emily A. “Digital divide persists even as Americans with lower incomes make gains in tech adoption.” Pew Research Center, June 22, 2021, [pewresearch.org/fact-tank/2019/05/07/digital-divide-persists-even-as-lower-income-americans-make-gains-in-tech-adoption](https://www.pewresearch.org/fact-tank/2019/05/07/digital-divide-persists-even-as-lower-income-americans-make-gains-in-tech-adoption). Accessed November 2021.

23 “A Case for Rural Broadband: Insights on Rural Broadband Infrastructure and Next Generation Precision Agriculture Technologies.” U.S. Department of Agriculture, April 2019, [usda.gov/sites/default/files/documents/case-for-rural-broadband.pdf](https://www.usda.gov/sites/default/files/documents/case-for-rural-broadband.pdf). Accessed November 2021.

24 “BP Technology Outlook 2018: How technology could change the way energy is produced and consumed.” BP, [ourenergypolicy.org/wp-content/uploads/2018/03/bp-technology-outlook-2018.pdf](https://www.ourenergypolicy.org/wp-content/uploads/2018/03/bp-technology-outlook-2018.pdf). Accessed November 2021.

A home-based workforce eliminates the need for an office, which requires all of the inputs that contribute to climate change. Our homes will always be climate controlled, but our offices may no longer need to be. We saw how dramatic the impact of reduced movement can be in 2020. Overall, greenhouse gas emissions were reduced by about 7% in 2020 from 2019, or a reduction of about 2.6 billion metric tons of CO₂.²⁵ Exactly how much of this can be attributed to increased work from home will take time and data analysis to identify, but closing the office contributed to the reduction.

Climate benefits can also come from a variety of reductions. The wear and tear to public infrastructure such as highways will be reduced by working from home, requiring less maintenance. Less travel to work and school results in reduced greenhouse gas emissions. Meeting online reduces the need for paper materials that are immediately recycled or thrown away.

Without widespread broadband, maximizing impact through emerging technologies will be impossible, and rural communities will further be at a disadvantage compared to urban and global counterparts.

III. BARRIERS TO EXPANSION AND IMPROVEMENT

A. CONNECTIVITY OPTIONS

Not all broadband connectivity options are created equally. Outlined below are the pros and cons of several of the most widely available options. We encourage system leaders to consider four key elements when weighing each technology—time x2 and cost x2: How long will deployment take? How long will the system last? How much will

25 Friedlingstein, Pierre, et al. “Global Carbon Budget 2020.” *Earth System Science Data*, Volume 12, Issue 4, Dec. 11, 2020, [essd.copernicus.org/articles/12/3269/2020](https://www.essd.copernicus.org/articles/12/3269/2020). Accessed November 2021.

TABLE 1: CONNECTIVITY OPTION COMPARISON CHART

Connectivity option	Pros	Cons	Download speeds	Upload speeds
Fiber-optic	Fast, future proof, reliable, no congestion, increased productivity, quality isn't compromised at long distances.	Expensive, takes more time and planning to deploy.	250 to 1,000 Mbps	250 to 1,000 Mbps
DSL	Widely available in rural areas.	Antiquated, no longer supported or built out, deteriorating speed, low capacity, high latency.	5 to 35 Mbps	1 to 10 Mbps
Cable	Mid-range speeds, doesn't suffer from latency.	More widely available in metro areas, more widely available in rural areas than fiber but less than DSL, congestion, limited upload capacity.	10 to 500 Mbps	5 to 50 Mbps
Fixed wireless	Easy to deploy to multiple users at once, relatively inexpensive, low latency.	Obstruction, mid-range speeds, weather interference, can be more expensive, important factors depend on provider.	Speeds range widely depending on provider and can reach 1 Gbps.	
Mobile hotspot	Targeted usage, widely available, mobile.	Weather interference, slow in rural areas, rain fade, many factors depend on the plan.	Speeds range widely depending on location. 50 Kbps to 2 Mbps (3G), 5 Mbps to 50 Mbps (4G).	
Satellite	Potential, capable of reaching difficult to access areas with fast speeds.	Higher latency, rain fade, obstruction, unreliable, expensive.	100 to 200 Mbps with brief periods of no connectivity. Potential to increase as more satellites are deployed.	

installation cost? And how much will the system cost users? See Table 1 for additional connectivity option comparisons.^{26, 27,28}

1. FIBER-OPTIC

The gold standard of broadband and easily the most future proof option, fiber-optic is what most would choose if all else were equal.

26 Cooper, Tyler. "DSL vs Cable vs Fiber: Comparing Internet Options." BroadbandNow, Oct. 27, 2021, broadbandnow.com/guides/dsl-vs-cable-vs-fiber. Accessed November 2021.

27 Chandra, Sumit, et al. "Closing the K-12 Digital Divide in the Age of Distance Learning." Common Sense Media, Boston Consulting Group, 2020, commonsensemedia.org/sites/default/files/uploads/pdfs/common_sense_media_report_final_7_1_3pm_web.pdf. Accessed November 2021.

28 "Order Starlink." Starlink, starlink.com. Accessed November 2021.

Fiber-optic offers the fastest speeds and is the longest-lasting infrastructure option. Fiber doesn't get congested when multiple users are active and is the best option for not just consumption but productivity. For example, to stream movies via the internet the download speed is important, but to have two-way interaction with video conferencing (for example, Zoom), users need adequate upload bandwidth, which fiber can provide.

At \$1 to \$6 per foot before installation, fiber is also one of the most expensive options.²⁹ The cost is why rural areas are rarely served by fiber. Organizing the installation and putting it into the ground also takes longer. The larger investment in time and money to install fiber networks is rewarded by longer-lasting, higher-quality, and more reliable infrastructure.

29 Collins, Tom. "How Much Does it Cost to Install Fiber Optic Internet in My Building?" Atlantech Online, Jan. 15, 2020, atlantech.net/blog/how-much-does-it-cost-to-install-fiber-optic-internet-in-my-building. Accessed November 2021.

Although costs are higher to deploy fiber, it pales in comparison to other projects. For example, constructing a two-lane, undivided road in a rural locale will set you back between \$2 million and \$3 million per mile.³⁰ Suddenly, the \$20,000 to \$30,000 per mile price for fiber deployment doesn't seem so bad.

Local governments should use public funds for infrastructure that will last, and broadband infrastructure that has the longest longevity is fiber; therefore, targeting public money for deployment is the smartest investment.³¹ The private sector can invest in shorter-term assets, but the public funds should target fiber networks. The cost of implementing fiber, when amortized over the life of the infrastructure and combined with the benefits, make it a clear winner.

2. DSL

Digital Subscriber Line, more commonly referred to as DSL, is the most-used broadband technology in rural communities in the U.S.³² Although it is prevalent, it is often the slowest option, and speeds deteriorate the farther the location is from the internet source—an issue for rural areas where homes are spread out.

DSL is the copper wire telephone companies have run to homes for phone lines. If your internet bill includes a phone number for a landline or a modem is connected to a phone jack, you probably have DSL internet. Since these networks were originally designed for voice transmission,

they don't have the capacity for current needs and are usually around 6 Mbps download.³³ DSL also suffers from latency issues, which are a problem for gamers and remote meetings alike.

Large providers, such as AT&T, have started phasing out service and repairs to DSL networks with no plans to replace them with something else.³⁴ Areas where DSL is the primary option need to begin developing alternative technologies for when the network fails.

3. CABLE

Cable is the last primary in-the-ground option. Cable is distributed by television companies like Comcast or Charter Communications for cable television, hence the name. It is the coaxial cable we screw into our televisions to receive more channels and it is capable of transmitting data for the internet. Cable is more widely available in urban areas, and it is still more widely available in rural areas than fiber optic, but it has less of a footprint than DSL in rural areas.³⁵

Similar to DSL, the purpose of cable was originally for something other than internet, so it is not an ideal option for modern-day internet usage. It also has limited upload speeds, which affect productivity and congestion during peak usage.

30 Elswick, Frank. "How Much Does It Cost to Build a Mile of Road?" Midwest, Jan. 5, 2016, blog.midwestind.com/cost-of-building-road. Accessed November 2021.

31 Machles, Maren. "Speed Vs. Longevity: Rethinking How We Fund Rural Broadband." Community Networks, Community Broadband Bits Podcast, Episode 455, April 13, 2021, muninetworks.org/content/speed-vs-longevity-rethinking-how-we-fund-rural-broadband-episode-455-community-broadband. Accessed November 2021.

32 Gallardo, Roberto, and Brian Whitacre. "A Look at Broadband Access, Providers and Technology." Purdue University Center for Regional Development, August 2019, pcrd.purdue.edu/wp-content/uploads/2020/09/008-A-Look-at-Broadband-Access-Providers-and-Technology-4.pdf. Accessed November 2021.

33 "What Kind of Internet Connection Is DSL?" What is my IP Address, whatismyipaddress.com/dsl. Accessed November 2021.

34 Brodtkin, Jon. "AT&T's DSL Phaseout Is Leaving Poor, Rural Users Behind." ARS Technica, Oct. 5, 2020, arstechnica.com/tech-policy/2020/10/life-in-atts-slow-lane-millions-left-without-fiber-as-company-kills-dsl/2. Accessed November 2021.

35 Gallardo, Roberto, and Brian Whitacre. "A Look at Broadband Access, Providers and Technology." Purdue University Center for Regional Development, August 2019, pcrd.purdue.edu/wp-content/uploads/2020/09/008-A-Look-at-Broadband-Access-Providers-and-Technology-4.pdf. Accessed November 2021.

4. FIXED WIRELESS

Fixed wireless internet comes from a device on a tower or other tall structure distributed to nearby receivers at the user's location wirelessly—think satellite TV that aims at a visible tower rather than space. The tower is connected to a fiber optic line and transmits that signal through the air. This technology requires line-of-sight, so physical obstructions, such as trees, geography, and buildings, can prohibit users from access. Areas that suffer from spotty cell phone reception often struggle with fixed wireless, too (i.e. valleys).

The ease and relatively low cost of installing an access point can help promote competition in rural areas and give users an option. This option is often slightly more expensive to the end user for the speed received, which may be due to the ownership model. Fixed wireless companies are typically smaller, have smaller customer bases, and are more agile in responding to issues.³⁶

Anything that isn't in the ground can suffer from not only obstruction issues, but also weather interference. Rain and snow can temporarily lower speeds due to micro obstruction, referred to as "rain fade."

5. MOBILE HOTSPOT

Mobile hotspots are a way to spot-treat connectivity. During the pandemic, we saw many school districts give hotspots to their students as a quick fix to accessing remote classrooms. Smartphones can serve as hotspots, and separate hotspots can be purchased from cell service providers. The devices use cellular networks to provide internet on a limited basis.

The biggest advantage of a mobile hotspot is in its name—it's mobile. Users can take it with them wherever there is sufficient cell coverage by the same provider.

In rural areas where cell phone coverage is weak and 3G or 4G isn't always available, mobile hotspots will not work. Users in metro areas with more robust cellular networks, including 5G,

36 Cooper, Tyler. "Fixed Wireless Internet in the USA." *BroadbandNow*, March 23, 2021, broadbandnow.com/Fixed-Wireless. Accessed November 2021.

are more likely able to use mobile hotspots without issue.

However, mobile hotspots can be expensive for what the user gets, particularly if there is a data cap included in the user's plan.

6. SATELLITE

Satellite is still the wild card of broadband internet. It has historically come with a slough of problems, including lag, rain fade, slow speeds, unreliability, and it is expensive to both the user and provider. The advantages are that it can provide internet access in previously "unservable" areas, such as extremely remote locations and places with extraordinarily difficult terrain. There is potential for sweeping coverage but with an entirely different set of challenges than other technologies.

In an effort to fund space travel to Mars, Elon Musk has established a satellite service called Starlink that may help rural communities get connected.³⁷ In the U.S. alone, the market for Starlink is \$20 billion—15% to 20% of the population that is unserved and underserved by traditional broadband markets. The current costs limit the market penetration. The setup kit sells for \$499, plus a subscription of \$99/month. However, considering the cost per Mbps, it may be worth it to many users.

Starlink is deploying more and more low-orbit satellites to which users can connect. These satellites are close to Earth, which reduces latency, a common complaint of other satellite systems. As more satellites are put into orbit, user experience will improve via better speeds, less latency, more availability, and fewer outages. Due to strictly limited availability to people who live between 44 and 53 degrees latitude in the orbit of Starlink satellites, this is not a viable option for all communities.

Also, a completely clear line of sight is required for Starlink to work, so trees, outbuildings, and even poles will cause outages.

37 Condos, Davis. "How A Project To Get Humans To Mars Could Solve The Rural Internet Problem." *National Public Radio*, Feb. 16, 2021, npr.org/2021/02/16/968457180/how-a-project-to-get-humans-to-mars-could-solve-the-rural-internet-problem. Accessed November 2021.

Starlink isn't the only satellite option and has competition, including another big name in the tech space. Project Kuiper by Amazon isn't as far along in the process, but the prototype offers speeds up to 400 Mbps.³⁸

B. POOR MAPPING

The FCC admits its data is flawed, writing in a report, "It is not necessarily the case that every household, housing unit, or person will have coverage from a given service in a census block that this report indicates is served. Therefore, as the Commission has previously explained, this analysis likely overstates the coverage experienced by some consumers, especially in large or irregularly-shaped census blocks."³⁹ The FCC continues to use the census block data metrics to maintain consistency and measure progress, though determining exactly who and where is underserved is impossible if relying on the FCC alone.

Corporations that receive federal dollars to build broadband networks are asked to self-report to the federal government upon completion. This can be a problem because they use the same standard as the FCC—census blocks. The federal government's maps then reflect this self-reporting. Under that system, companies can provide service to one home in a block and claim it is covered while the neighbors are left disconnected.⁴⁰ This practice ends up blocking rural competition because it is no longer cost-effective for another company to come into the same area to build up the network because it is not eligible for subsidies since, as far as the federal government is concerned, the region is covered.


38 Kan, Michael. "Amazon's Satellite Internet Service Starts to Take Shape With Antenna Prototype." PC Magazine, Dec. 16, 2020, pcmag.com/news/amazons-satellite-internet-service-starts-to-take-shape-with-antenna-prototype. Accessed November 2021.

39 "2020 Broadband Development Report." Federal Communications Commission, April 24, 2020, docs.fcc.gov/public/attachments/FCC-20-50A1.pdf. Accessed November 2021.

40 "Broadband Infrastructure Program." BroadbandUSA, National Telecommunications and Information Administration, broadbandusa.ntia.doc.gov/resources/grant-programs/broadband-infrastructure-program. Accessed November 2021.

STARLINK

Starlink is now available for order to a limited number of users in your coverage area. Placing your order now will hold your place in line for future service. Orders will be fulfilled on a first-come, first-served basis.



During beta, users can expect to see data speeds vary from 50Mb/s to 150Mb/s and latency from 20ms to 40ms in most locations over the next several months as we enhance the Starlink system. There will also be brief periods of no connectivity at all.

As we launch more satellites, install more ground stations and improve our networking software, data speed, latency and uptime will improve dramatically.

The Starlink team will provide periodic updates on availability as we launch more satellites and expand our coverage area.

Starlink is targeting coverage in your area in mid to late 2021. You will receive a notification once your Starlink is ready to ship.

Hardware	\$499.00
Service	\$99.00 /mo
Shipping & Handling	\$50.00
Est. Tax	calculating...
Due Today	\$99.00

Fully refundable. Depending on location, some orders may take 6-8 weeks to ship.

The author of this white paper lives in southwest Minnesota and qualified for Starlink Beta. She was sent this information by Starlink in February 2021. | Screenshot by Molly Malone

A desire to compensate for mapping shortfalls is why grassroots initiatives exist for individuals to self-report their internet availability and speed. This crowdsourcing approach attempts to fill the gaps left by census block tracking of federal systems.

The FCC has a speed test for individuals to take from anywhere in the U.S. to demonstrate actual, rather than reported, speeds. Unfortunately, it's not as simple as going to a website and requires users to download an application to run the test. The app can be found in major app stores by searching "FCC Speed Test."⁴¹

Still, demand remains for a standardized tool for accurate and equal comparisons that is easily accessible.

C. COSTS

Costs are a primary barrier to broadband expansion in rural communities.

Rural areas run into the same problem with broadband as with other infrastructure projects and services. Rural communities are often left unserved or underserved simply due to economics—the return on the investment is so far into the future these areas get pushed to the bottom of the expansion list without subsidies.

The pandemic so drastically demonstrated the need for internet access that more funding than ever has been dedicated to broadband expansion.⁴² According to some estimates, getting all of rural America online will take at least \$80 billion, and recent federal funding totals about \$60

billion, leaving a gap of \$20 billion.^{43,44} The federal government has demonstrated the ability to reallocate funding in response to pandemic needs and could do so again for broadband infrastructure development. Direct government payments to farmers in 2020 totalled \$46 billion when the previous record was \$10 billion.⁴⁵ There is a clear, demonstrated need, and a one-time, targeted allocation similar to the boost in farm payments could connect rural communities in one fell swoop.

Costs include not only building out infrastructure, but also ensuring affordability. There will always be expenses for internet service providers, including network maintenance, customer service, taxes, and new expansion. The businesses need to be able to earn enough to cover these costs, which can be a higher percentage of earnings in rural areas when compared to urban areas. To cover costs for customers in sparsely populated areas, prices may be higher, effectively pricing out customers from connecting despite service being available. According to one study by Cornell University, a rural internet service provider would need to charge \$231 per month for its high-speed service option to be feasible.⁴⁶

41 "Broadband Data Collection Consumer Information." Federal Communications Commission, fcc.gov/BroadbandData/consumers#speed-test. Accessed November 2021.

42 Varn, Jake. "Governors Start 2021 By Expanding Access To Broadband." National Governors Association, Feb. 16, 2021, nga.org/news/commentary/governors-expanding-access-broadband-2021. Accessed November 2021.

43 de Sa, Paul. "Improving the Nation's Digital Infrastructure." Federal Communications Commission, Jan. 19, 2017, fcc.gov/document/improving-nations-digital-infrastructure. Accessed November 2021.

44 "Bipartisan Infrastructure Investment and Jobs Act." The White House, Aug. 2, 2021, whitehouse.gov/briefing-room/statements-releases/2021/08/02/updated-fact-sheet-bipartisan-infrastructure-investment-and-jobs-act. Accessed November 2021.

45 Charles, Dan. "Farmers Got A Government Bailout In 2020, Even Those Who Didn't Need It." National Public Radio, Dec. 30, 2020, npr.org/2020/12/30/949329557/farmers-got-a-government-bailout-in-2020-even-those-who-didnt-need-it. Accessed November 2021.

46 Dean, James. "Building networks not enough to expand rural broadband." Cornell Chronicle, Cornell University, March 5, 2021, news.cornell.edu/stories/2021/03/building-networks-not-enough-expand-rural-broadband. Accessed November 2021.

D. LOCAL RESPONSIBILITY

Federal programs exist and continue to be developed to support broadband expansion and access, but they are riddled with delays, mismanagement, and subpar standards.

The \$3.2 billion Emergency Broadband Benefit program provides families with up to \$50 toward their internet expenses and \$75 if on Tribal lands. It also chips in up to \$100 toward the purchase of a device.⁴⁷ However, the program was launched in spring 2021—a full year after the pandemic forced us all into our homes. The program expires six months after the pandemic is declared over by the U.S. Department of Health and Human Services, or when funding dries up.⁴⁸

Local governments are better positioned to respond quickly and efficiently to their constituents' needs. In general, metro areas have better connectivity options, but that isn't always the case. In Minnesota, the No. 1-ranking county for 25/3 broadband is Red Lake County, population just over 4,000, located in northern Minnesota, with 99.9% coverage. The second is Rock County on the border of Minnesota and South Dakota. Hennepin County, home to Minneapolis, ranks ninth.⁴⁹

How did these rural counties top the densely populated metro areas for coverage? They had local champions who aggressively sought funding and partnered with providers. Unfortunately, not every community has a local champion or the capacity and expertise to navigate the complex sources of funds. The funding that has come out in response to the pandemic is often overwhelm-

47 "Emergency Broadband Benefit." Federal Communications Commission, fcc.gov/broadbandbenefit. Accessed November 2021.

48 Romm, Tony. "Millions of low-income Americans to get up to \$50 subsidies for their monthly Internet bills under newly finalized U.S. program." *The Washington Post*, Feb. 26, 2021, [washingtonpost.com/technology/2021/02/26/broadband-internet-subsidies-coronavirus](https://www.washingtonpost.com/technology/2021/02/26/broadband-internet-subsidies-coronavirus/). Accessed November 2021.

49 Treacy, Ann. "2020 MN Broadband County Ranking for 25/3 speeds – how do you rank?" *Blandin on Broadband*, Blandin Foundation, May 22, 2020, blandinonbroadband.org/2020/05/22/2020-mn-broadband-county-ranking-for-25-3-speeds-how-do-you-rank. Accessed November 2021.

ing, and sorting through the programs could be at least a full-time job. Rural, sparsely populated areas may not have the resources to manage funding systems. Many townships burned by burdensome applications and reporting requirements from prior federal funds neglected to apply for hundreds of thousands of dollars in American Rescue Plan funding that could have been used for broadband projects.⁵⁰ With the average size of a township in Minnesota totalling just 513 residents, it doesn't take much for one of the 1,781 townships to deem it not worth it.⁵¹

IV. ACTIONS FOR IMPROVEMENT

The following are ways to improve broadband via a variety of approaches.

A. CONSUMER ACTION

The FCC is aware its mapping via census blocks is faulty and needs input directly from consumers to improve, and it has developed a tool for consumers to share their real-life experiences with broadband.⁵² In 2020 alone, the FCC received more than 18,000 complaints through its Consumer Complaint Center about internet availability and more than 6,000 complaints about internet speed.⁵³ Although the form is easy to complete, it lacks clear instructions and feels informal for a federal agency. Data collected will

50 Van Berkel, Jessie. "As deadline looms, hundreds of Minnesota townships could lose out on American Rescue Plan." *Star Tribune*, Sept. 30, 2021, [startribune.com/as-deadline-looms-hundreds-of-minnesota-townships-could-lose-out-on-american-rescue-plan-dollars/600102491](https://www.startribune.com/as-deadline-looms-hundreds-of-minnesota-townships-could-lose-out-on-american-rescue-plan-dollars/600102491). Accessed November 2021.

51 "Providing Townships With Resources & Support." *Minnesota Association of Townships*, mntownships.org. Accessed November 2021.

52 Engebretson, Joan. "To Help Improve Broadband Maps, Consumers Will Have Input on FCC Broadband Data Collection." *Telecompetitor*, March 23, 2021, [telecompetitor.com/to-help-improve-broadband-maps-consumers-will-have-input-on-fcc-broadband-data-collection](https://www.telecompetitor.com/to-help-improve-broadband-maps-consumers-will-have-input-on-fcc-broadband-data-collection/). Accessed November 2021.

53 "Internet Issues Associated with Complaints 2021 YTD." *Federal Communications Commission*, opendata.fcc.gov/Consumer/Internet-Issues-Associated-with-Complaints-2020YTD/3jay-prd4. Accessed November 2021.

be used to inform policy making and potential enforcement. Find the form at consumercomplaints.fcc.gov.

If there is an office of broadband development in your state, it may have a similar tool for submitting complaints. Users can also contact their internet service provider or neighboring internet service providers if speeds are not what is being paid for or to express interest in a nearby service to encourage expansion.

In Nebraska, residents can test their speed as part of a statewide initiative launched in February 2021.

Nebraska and Minnesota offer a similar speed test for their respective states. The tests not only show where gaps in coverage exist, but also what providers are available, costs, and the speed they provide to actual users.

Find the Nebraska test at nebraskaspeedtest.org and the Minnesota test at mnruralbroadbandcoalition.com/speedtest.

B. COMMUNITY ACTIONS

Internet service providers are already operating where they know they are going to make money. What is left are the places where there isn't a high return on their investment—often rural and poor communities. Consideration is important for the following four factors to avoid waste and maximize utility: time to build, longevity of the final product, cost to deploy, and cost to the end user. Each factor will affect decisions throughout the planning process and adoption of the final technology in practice. The project isn't cheaper if the price to the end user is more expensive.⁵⁴

For example, if deploying one type of technology is quick and cheap, one must consider how long it will last. Investing in something too short-term may not be the best use of resources as it won't serve consumer needs as they use more and more bandwidth. FCC statistics show data usage in an

54 Machles, Maren. "Speed Vs. Longevity: Rethinking How We Fund Rural Broadband." Community Networks, Community Broadband Bits Podcast, Episode 455, April 13, 2021, muninetworks.org/content/speed-vs-longevity-rethinking-how-we-fund-rural-broadband-episode-455-community-broadband. Accessed November 2021.

average household in the U.S. has increased 38 times in just 10 years.⁵⁵

Conversely, if the longest-lasting technology will end up being so costly to both the installer and the users that only a few users will both have access and be able to afford it, other options may be better. In rural communities, the best solution is often a mix of technologies.

A broadband task force can work to organize, plan, prepare, and seek funding. This includes determining exactly who, what, and where to focus. Who are the providers and potential providers in the community? Do local electric co-ops provide service? Could they? Who lacks access? Where are connectivity gaps? What type of technology would suit the needs of the people and the terrain? What do users need and want? Where can funding come from? What are potential ownership structures and which fit? Trust is critical to the success of a community task force to ensure information is accurate and solutions actually solve problems.

Representatives from the community can contact providers and simply ask what they need to build out their infrastructure in the area. One item an internet service provider may request is a letter of support from stakeholders, including businesses and institutions. Organizing letters of support to bolster applications is a tangible, free way to increase the chance of better connectivity. For some types of funding, internet service providers and local governments may need letters of support from the community.

Lead for America has partnered with Land O'Lakes to create the American Connection Corps.⁵⁶ According to Lead for America, the Corps will "mobilize leaders to return to their hometowns to coordinate broadband development and digital inclusion locally, and across the country." The Corps launched in 2021 with 50 fellows in 12 states for two-year placements.

55 Toledo, Rob. "Report: The Average Household's Internet Data Usage Has Jumped 38x in 10 Years." DecisionData.org, April 17, 2020, decisiondata.org/news/report-the-average-households-internet-data-usage-has-jumped-38x-in-10-years. Accessed November 2021.

56 "American Connection Project." Lead for America, lead4america.org/american-connection-corps. Accessed November 2021.

Communities can apply to host a fellow, and individuals can apply to be a fellow. The program takes a “homecomer” approach and tries to place fellows in communities they consider home to maximize connection and impact.

The Island Institute offers a detailed guide to community-driven broadband at islandinstitute.org/priorities/building-resilient-communities/broadband. This approach is geared toward rural communities and offers worksheets to facilitate the process.

Even if funding isn’t identified, communities must plan now to identify shovel-ready projects. Infrastructure-heavy projects like broadband have longer timelines and can take around two years from inception to completion—sometimes longer.

An example of when it would have been advantageous to have a plan in place even without funding identified was when federal assistance came to communities during the COVID-19 pandemic. Funding through the Coronavirus Aid, Relief, and Economic Security (CARES) Act, could have been used for broadband expansion at a critical time of need, but the time constraints tied to the program limited communities from using the unexpected funds for broadband projects. However, communities that had shovel-ready projects were able to significantly subsidize their broadband expansion by applying for CARES funds.

C. POLICY

Popular opinion supports expanding broadband more than ever, so now is an ideal time for lawmakers to support greater connectivity. At the same time, when public funds are used for infrastructure, it is the responsibility of those spending the money to work in the best interests of the taxpayers.

The National Conference of State Legislatures rounded up what each state was considering in 2021 with a summary of what the legislation entailed. Predictably, the year was busy for broadband, with 47 states, the District of Columbia, and Puerto Rico all considering broadband-related legislation. Most of the bills considered related to connecting those who are under-

served and in rural communities—263 bills all together.⁵⁷

The following are high-impact policies that can be broadly implemented in rural areas to expand broadband. There is no shortage of solutions to broadband expansion, however, the following have been proven successful and cover a variety of approaches.

The most common argument dismissing the feasibility of rural broadband expansion is that it is not economically advantageous to providers of the service. The cost of serving sparsely populated areas outweighs the benefits, so much so that rural users may never see reliable broadband. Without government intervention, inequality between rural and urban areas grows. Policies addressing the cost issue will have the largest impact on rural broadband expansion.

1. RURAL ELECTRICITY MODEL

Using policy to connect rural communities isn’t a novel concept. In 1935, President Roosevelt enacted the Rural Electrification Act (REA) using the Emergency Relief Appropriation Act. The goal of the REA was to get electricity to rural communities. Through low-interest loans and other policies, the agency helped the number of electrified rural farms increase from 11% to 97% by 1960. The arguments against electrifying rural areas were the same we hear against fiber-optic deployment—it is expensive to put in and companies won’t make enough money in sparsely populated areas to cover the costs. However, the REA programs cost just \$825 per mile rather than the \$1,500 to \$2,000 per mile estimated by private electric companies. By 1943, 380,000 miles of power lines had been installed.⁵⁸ Government entities may consider how this model can be adapted to the present and what rules and regulations would ensure successful implementation.

57 Morton, Heather. “Broadband 2021 Legislation.” National Conference of State Legislatures, July 7, 2021, ncsl.org/research/telecommunications-and-information-technology/broadband-2021-legislation.aspx. Accessed November 2021.

58 “Rural Electrification Administration (REA) (1935).” *The Living New Deal*, Nov. 18, 2016, livingnewdeal.org/glossary/rural-electrification-administration-rea-1935. Accessed November 2021.

2. POLE ATTACHMENTS

Scholars suggest policymakers explore eliminating property taxes on broadband infrastructure and payments to rent space on poles owned by regulated utilities, which, respectively, accounted for 16% and 18% of the proposed co-op's annual expenses. Those measures reduced an expanding rural utility high-speed fee to 25% above market rates.⁵⁹ The Nebraska Legislature attempted to take a step in this direction in the 2021 session by passing Legislative Bill (LB) 455, the Broadband Pole Attachment Act, which encourages broadband development with regulation facilitation pole attachment.⁶⁰

3. EASEMENTS

Similar to pole attachments in that it uses what is already established, allowing electric co-ops to do double duty by using their existing easements facilitates the process of laying fiber. Minnesota Senate File 1304 allows an electric cooperative, affiliate, or another entity pursuant to an agreement to use an electric transmission or distribution easement for broadband infrastructure and to provide broadband service.⁶¹ The process includes provisions to properly notify landowners and the county so progress is made amicably.

4. DIG ONCE

Leveraging existing infrastructure expansion is an efficient and straightforward way to reduce costs to maximize expansion. Opening a trench is the most expensive aspect of laying fiber. Dig-once legislation can reduce the cost of broad-

band infrastructure development by allowing local and state entities to lay “shadow conduit” with other public works when the trench is open. Types of projects where additional conduit could be installed might include sidewalk improvements, street light and trails construction and maintenance, road construction and road-widening projects, and any underground utility project.⁶²

Dig-once policies typically have a notice period for utilities to make governments aware of when and where they plan to have an open trench and give them an option to coordinate fiber deployment. Not only does this reduce costs from \$25 to \$35 per foot down to \$1 to \$7, it also reduces disruptions to communities and landscapes, and minimizes risks of damaging existing underground infrastructure.⁶³ Several states, including Minnesota, have implemented Dig-once policies (statute 116J.391).⁶⁴

The National Governors Association produced a report titled, “Governor Strategies To Expand Affordable Broadband Access” in 2020, including a table of federal funding opportunities and state-level policies for broadband.⁶⁵

An effective strategy adopted by more than 20 of the states in the report is to have a state agency dedicated to broadband. Key factors determining success of these agencies include adequate funding, freedom to work across agencies, and authority to bring stakeholders to the table via task forces, work groups, and partnerships with local government agencies and private institutions.

59 Dean, James. “Building networks not enough to expand rural broadband.” Cornell University, March 5, 2021, news.cornell.edu/stories/2021/03/building-networks-not-enough-expand-rural-broadband. Accessed November 2021.

60 “LB455 - Adopt the Broadband Pole Attachment Act.” Nebraska Legislature, Jan. 15, 2021, nebraskalegislature.gov/bills/view_bill.php?DocumentID=43909. Accessed November 2021.

61 Westrom, Sen. Torrey N. “S.F. No. 1304 – Electric Cooperatives Use of Existing Easements to Provide Broadband Service (As Amended by the A-1 Amendment).” Senate, State of Minnesota, March 11, 2021, senate.mn/departments/scr/billsumm/2021/SF1304.pdf. Accessed November 2021.

62 Kruse, Diane. “Policies and Ordinances that Facilitate Broadband Deployment.” NEO Connect, broadband.ramsmn.org/wp-content/uploads/2019/08/Dig-Once-and-Shadow-Conduit-Policies-Best-Practices-and-Impacts.pdf. Accessed November 2021.

63 Ibid.

64 “2021 Minnesota Statutes, 116J.391 Coordination of Broadband Infrastructure Development.” Minnesota Legislature, Office of the Revisor of Statutes, revisor.mn.gov/statutes/cite/116J.391. Accessed November 2021.

65 Rogotzke, Matthew, et al. “Governor Strategies to Expand Affordable Broadband Access.” National Governors Association, October 2021, nga.org/wp-content/uploads/2020/11/Broadband_White_Paper_Final.pdf. Accessed November 2021.

5. REMOVE BARRIERS

As of May 2021, 18 states have policies in place restricting municipal broadband. Removing these barriers will allow more options for getting rural communities connected.

Nebraska has some of the most restrictive rules in the nation that ban any public entity from providing broadband.⁶⁶ Some cities, like Lincoln, have found ways around the language of the law with limited success.⁶⁷ Legislation enabling municipal action on broadband has not passed in the Nebraska legislature.

Iowa has a referendum requirement that can be difficult to satisfy—51% voter support and a four-year waiting period if it fails—and Minnesota has a similar referendum requirement—65% voter support and proof it doesn't compete with a company now or in the future.^{68,69} These policies protect enterprises at the detriment of rural users.

D. STANDARDS

When comparing broadband expansion programs, changemakers should beware of:

- Expansion language can be a red flag. Expanding on existing infrastructure may be most affordable but fail to meet the needs of users if the current systems are subpar. For example, if funding is applied to expanding a slow copper line system, users will not see the benefit needed to live and work in a digital world. Instead, there should be concrete goals or deliverables that meet present day and future

needs. As previously mentioned, lofty goals are not necessarily a bad thing as consumers increasingly need more bandwidth at ever-increasing rates.

- Set sights on hard wiring as much as possible. Similar to telephone service, a hard-wired line is more reliable and the quality is better compared to over-air technology. Thunderstorms, structures, and vegetation didn't prevent calling a friend from a land-line in the 1990s. Dead spots don't exist with hardwired tech.
- Look to providers with experience in the region and the desired technology or require proof of concept. The largest recipient in a recent round of federal Rural Digital Opportunity Fund (RDOF) grants was LTD Broadband. The \$1.32 billion LTD received is for 1 gigabyte speed service deployment. It's possible to achieve high speeds via fixed wireless, but 1 gigabyte service typically requires fiber infrastructure, something the primarily wireless company does not have a lot of experience with.⁷⁰ Experienced hardwire providers expressed concern over whether LTD will be able to pull off its promise of speeds of at least 1 Gbps down and 500 Mbps up at the quoted rate. The decade-long project is a big bet with taxpayer dollars, and progress checks with the option to rebid would be prudent to ensure rural connectivity.

66 "Nebraska Revised Statute 86-594." Nebraska Legislature, April 27, 2021, nebraskalegislature.gov/laws/statutes.php?statute=86-594. Accessed November 2021.

67 "Nebraska Revised Statute 86-575." Nebraska Legislature, nebraskalegislature.gov/laws/statutes.php?statute=86-575. Accessed November 2021.

68 "388.10 Municipal utility providing telecommunications services." Iowa Code 2021, Section 388.10 (14, 0), Iowa Legislature, Nov. 24, 2020, legis.iowa.gov/docs/code/388.10.pdf. Accessed November 2021.

69 "2021 Minnesota Statutes, 237.19 Municipal Telecommunications Services." Minnesota Legislature, revisor.mn.gov/statutes/cite/237.19/pdf. Accessed November 2021.

70 Orenstein, Walker. "The feds just announced over \$400 million for rural broadband in Minnesota - three quarters of it is going to one small company with limited fiber optic experience." MinnPost, Dec. 10, 2020, minnpost.com/greater-minnesota/2020/12/the-feds-just-announced-over-400-million-for-rural-broadband-in-minnesota-three-quarters-of-it-is-going-to-one-small-company-with-limited-fiber-optic-experience. Accessed November 2021.

V. CONCLUSION

Connecting users who are unserved is a long process—but it's possible. We've connected even the most rural corners of this country to electricity, water, and telephone. Internet is the next standard home utility.

Borrowing from an old adage, the best time to install broadband was 20 years ago; the second best time is now.



ABOUT THE CENTER FOR RURAL AFFAIRS

Established in 1973, the Center for Rural Affairs is a private, nonprofit organization with a mission to establish strong rural communities, social and economic justice, environmental stewardship, and genuine opportunity for all while engaging people in decisions that affect the quality of their lives and the future of their communities. This institution is an equal opportunity provider and employer.

