Rural Broadband

8 Actions to Ensure Fiber Deployment Success

Introduction

It is estimated that 22.3% of rural Americans do not have access to fixed high-speed broadband[1] and are marooned by the digital divide. To help close this gap, the U.S. is prioritizing rural broadband, enabled by fiber, to connect rural citizens and foster much-needed innovation across services, businesses, and industries such as healthcare, education, and agriculture. Rural electric cooperatives (co-ops) may be the linchpin of closing the digital divide because they can deploy fiber successfully despite a very challenging business model.

This eBook discusses the rural digital divide, how broadband transforms rural communities, and why co-ops are ideal leaders of fiber deployment. Finally, as experts in advanced communications infrastructure, Black & Veatch outlines eight actions that co-ops can take to remove hurdles, accelerate schedules, garner public interest and acceptance, and minimize costs of fiber deployment.

[1] Federal Communications Commission. 2020 Broadband Deployment Report. April 24, 2020.

The Rural Digital Divide

In 2015, the Federal Communications Commission (FCC) defined 25/3 Mbps as the threshold download/upload speeds for reliable, high-speed fixed broadband (internet). As most of the U.S. leverages fiber and other technologies to harness internet of things (IoT) capabilities, many rural areas are without fiber networks to enable reliable, high-speed broadband. The FCC estimates that 22.3% of Americans in rural areas do not have access to fixed high-speed broadband, compared to only 1.5% in urban areas.[2] Rural areas that are connected have slower service compared to nonrural areas.[3]

With a mix of urban and rural areas, most states contain digital haves and have-nots. Urban areas are wired, while fiber broadband in rural areas is unevenly applied. For example, 88.6% of Alabama residents have access to fixed broadband 25 Mbps or faster. About 475,000 residents have fixed broadband, but speeds are slower than threshold, and 226,000 residents have no wired broadband options at their home. In Loachapoka, the fastest average internet download speed is just 0.16 Mbps[4]—far below the FCC threshold and the average U.S. broadband download speed, which is 94 Mbps for fixed broadband.[5]

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[2] Federal Communications Commission. 2020 Broadband Deployment Report. April 24, 2020

[3] Pew Research Center. 2019. Digital Gap between Rural and Nonrural America Persists

[4] No author. "Internet Service in Alabama." BroadbandNow. June 19, 2020.

[5] Ookla. "Global Speeds." Speedtest. July 20, 2020 update.

The Rural Need for Speed

Reliable broadband is vital because advanced communications are quickly becoming the chief influencer on quality of life in communities, and an indicator of which businesses and industries stay competitive. Our digital world is evolving rapidly, and many think the FCC 25/3 threshold does not adequately reflect our digital experience, which is continuously shaped by input from thousands of connected, data-hungry devices.

For instance, a household that has 25/3 internet will see lags under multi-person use. Four users who in parallel browse the internet, conduct multi-party video conferencing, download video, and telecommute will require more than 25 Mbps.[6]

Hospitals, businesses, and industries have the same hefty speed requirements. Rural hospitals require a minimum of 100 Mbps to provide telemedicine, remote monitoring, real-time image transfer, and high-quality video consultations.[7] Small to medium businesses require 75 Mbps to support five to 10 connected employees who share files frequently, use email, and run numerous point-of-sale transactions.[8] And in agriculture, the production of row crops and specialty crops are now 30-50% dependent on broadband. In a report by the U.S. Department of Agriculture, one farmer stated that 100 Mbps is essential to support his 10-year plan, but he has no way to get it.[9]

Hitting required speeds is prohibitive with typical rural broadband technologies such as current satellite internet, dial-up and Digital Subscriber Line (DSL), mobile broadband, or fixed wireless broadband. These services have high-latency and/or low-bandwidth and are affected by weather, line-of-sight obstructions, and distance to towers or antennae.

Spotty broadband means that citizens struggle to work remotely, reliably run their businesses, look online for jobs, take advantage of telehealth options, or participate in virtual classes. For this reason, communities deploy fiber as the gold standard for municipal communications, broadband services, and internet access. Fiber is a lifeline for disconnected rural areas—especially during this time of the COVID-19 pandemic, which drives entire communities to move their lives online.

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[6] No author. "Household Broadband Guide." Federal Communications Commission. Updated February 5, 2020

[7] No author. "Frequently Asked Questions." HealthIT.gov September 10, 2019.

[8] No author. "Six-minute Read." Business.org. March 19, 2020.

[9] United States Department of Agriculture. April 2019. A Case for Rural Broadband.

Fiber Fortifies the Future

Fiber sends large amounts of data securely over long distances with high reliability. With nearly unlimited data capacity, it supports a range of apps and technologies, and scales alongside future needs and capabilities, like 5G use cases. Once fiber is in place, the network can reach exponentially higher speeds with simple radio equipment additions.

While fiber networks in the U.S. have grown remarkably—up 17 percent in 2019[10]—network growth in rural America has lagged. The bottleneck is due to a challenging business model: rural areas have low-density populations that are spread across expansive geographies. These conditions require significantly more miles of fiber to connect communities than urban or suburban settings where homes are tightly packed. With fewer resident subscriptions to pay for service, the return on investment (ROI) period lengthens—or worse, cannot be realized. Often, these scenarios are non-starters.

But, rural electric cooperatives (co-ops) have already deployed thousands of miles of fiber in rural districts—enough to account for 30% of rural fiber service.[11,12] Co-ops may be the linchpin of closing the digital divide because they can deploy fiber successfully despite the challenging business model.

Fiber Deployment in Rural Colorado

(Platte River Power Authority)

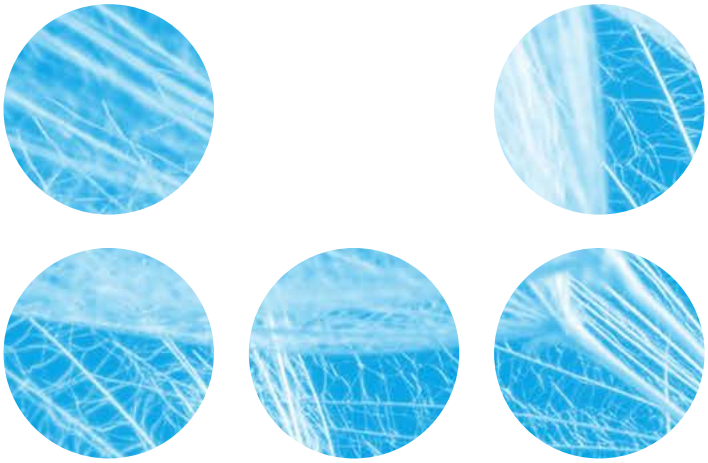
Severe storms left the Town of Estes Park cut off from a reliable communications network. Black & Veatch identified routes, designed 32 miles of fiber and the install specs, and planned land acquisition, procurement and construction. The fiber link connects Loveland to Estes Park, and reestablishes durable, high-speed communications in Estes Park.

NextGen Ag at Black & Veatch:

With expertise in telecommunications, AgTech, and sustainability, Black & Veatch applies digital technologies to innovate how food is produced, packaged, and brought to market.

[10] Buckley, Sean. "Industry Analysis." Broadband Communities. January/February 2020.

[11] Trostle, H et al. "Cooperatives to Fiberize Rural America: A Trusted Model for the Internet Era." Institute for Local Self-Reliance. May 2020.



Electric Cooperatives are Infrastructure Leaders

Historically, co-ops have invested in the success of their rural communities. Decades ago, electric co-ops established electricity in rural areas. And recently, when COVID-19 closed local libraries and coffee shops often used by citizens as Wi-Fi hotspots, rural co-ops installed free Wi-Fi in school parking lots, churches, parks, restaurants, and co-op offices.[12] As COVID-19 calls attention to rural dead zones, co-ops are once again well-positioned to lead technology deployment in their communities. As an indication of support, state and federal lawmakers have relaxed regulations around co-op broadband deployment, partnership, and financing.

There are 834 electric distribution co-ops in the U.S.,[13] and 111 were building fiber broadband projects for their members in 2019.[14] Many projects extend the co-op fiber backbone deployed for grid modernization. In our interconnected world, when an industry innovates, the ripple effect on other societal elements is often profound. This is particularly true in rural communities as electric co-ops modernize their grids, which creates two-fold benefits. First, a 50,000-member co-op could realize $10 to $16 million in economic benefits today and $15 to $25 million by 2027, depending on specific implementation and regional load.[15] Second, co-ops create the opportunity to expand fiber broadband networks across their districts, effectively closing the digital divide and establishing a lightning rod for innovation across their communities. Co-ops are ideal infrastructure leaders because they are:

- Member-owned, non-profit, and have access to a variety financing options. Co-ops can tolerate longer ROI periods.
- Accustomed to low-density rate-structures.
- Rooted in the community and own poles, equipment, and rights-of-ways that can be used for fiber broadband deployment.
- Able to use existing billing and customer support systems for broadband use.
- Owners of smart grid fiber backbones. They can lease dark fiber to other companies or help provide retail broadband throughout the community, often without having to plan an entirely new network.
- Familiar with their state and local permitting requirements, which streamlines the process.
- Connected to agricultural facilities, which enables next-gen agriculture.

[12] Cash, Cathy. "Broadband." National Rural Electric Cooperative Association. April 21, 2020.
[13] Trostle, H et al. "Cooperatives to Fiberize Rural America: A Trusted Model for the Internet Era." Institute for Local Self-Reliance. May 2020.
[14] Buckley, Sean. "Industry Analysis." Broadband Communities. January/February 2020.
[15] NRTC, NRECA, Ericsson. 2018. The Value of a Broadband Backbone for America's Electric Cooperatives. A Benefit Assessment Study.

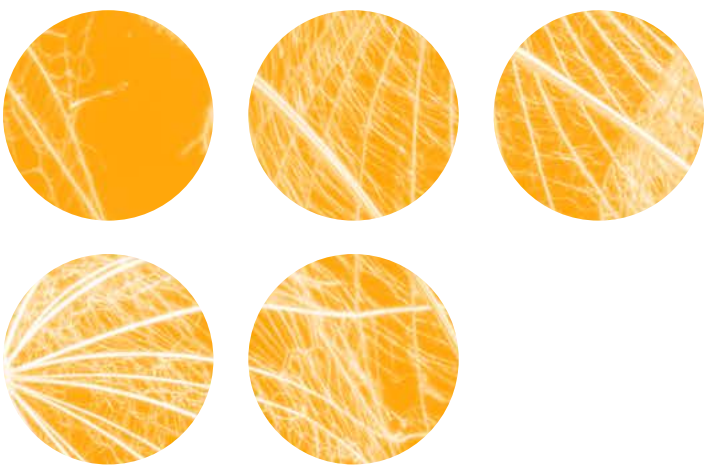
The Broadscale Benefits of Rural Broadband

Resilient, reliable networks are vital in our digital world. Communities that deploy fiber broadband fundamentally change their industries, healthcare, education, and economy to enable greater social mobility and quality of life. The benefits of broadband are comprehensive:

Boosts Economy: A lack of digitalization stunts local economic sectors. If 75% of currently underserved homes in rural co-op areas adopt broadband, then the economic value would exceed $100 billion over 20 years.[16]

Delivers Critical Healthcare: Rural citizens drive an average of 34 minutes to reach an acute care facility.[17] With fiber broadband, telehealth provides at-home treatment, relieving critical care shortages in rural communities.

Facilitates eCommerce: More than 90% of small, rural commercial buildings do not have fiber access to network services, yet rural businesses have the same bandwidth requirements as their urban counterparts.[18] Fiber broadband enables businesses to develop an online presence, and expand customer channels, direct-to-consumer sales, and market access for better revenue generation and retention.



Enables Digital Education: About 28% of rural students use the internet for homework almost every day,[19] and as classes shift online due to COVID-19, reliable high-speed broadband at home and school is critical. Yet, there are 743 U.S. schools without a fiber connection, and 750,000 students do not have access to the minimum bandwidth recommended for digital learning (100 kbps/student).[20]

Supports Precision Agriculture: In 2019, 52% of farmers used a smart phone or tablet for business; 26% connected to satellite and 22% by DSL. About $18-23 billion per year could be realized from digital farming technologies connected by rural broadband.[21]

Slows Generational Decline: From 2000-2016, prime-age (25-54) employment in urban communities grew 12%, while rural communities saw an 11% decrease.[22] Communities with high-speed broadband attract businesses and lead to increased education, employment, and innovation opportunities.

Unlocks Innovation: With a digital foundation, communities, businesses, and industries modernize and pivot towards new ideas that help them grow and profit. Higher broadband speeds push innovation throughout the digital ecosystem to benefit whole communities.

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[16] National Rural Electric Cooperative Association (September 2018). Business & Technology Report. "Unlocking the Value of Broadband for Electric Cooperative Consumer-Members."

[17] Lam, Onyi et al. "FactTank News in the Numbers." Pew Research Center. December 12, 2018.

[18] Buckley, Sean. "Industry Analysis." Broadband Communities. January/February 2020.

[19] Auxier, Brooke et al. "FactTank News in the Numbers." Pew Research Center. March 16, 2020.

[20] Education Superhighway. (2019) State of the States.

[21] USDA. (August 2019). Farm Computer Usage and Ownership.

[22] Parker, Kim et al. "Social and Demographic Trends." Pew Research Center. May 22, 2018.

8 Actions for Successful Fiber Deployments

Transitioning electric fiber to broadband use is a complex design process that involves splice points, placing routes, last-mile connections, premise equipment, and broadband interconnections. In addition, the fiber design should accommodate a range of potential broadband models like utility direct retail, public-private partnership, or internet service provider leasing.

Advanced communication networks are multi-faceted, capital-intensive infrastructure deployments that require careful coordination and have long lead times for engineering, procurement, and construction. Now is the time to start planning, and many co-ops begin by completing a feasibility study. Beyond this study, Black & Veatch observes that these eight actions ensure that individual networks meet current and future capacity, receive strong support from the community and stakeholders, and make the best use of existing assets and obtained funding/financing.

1. **Review Cost Assumptions and Business Plan:** A feasibility study is a relatively high-level assessment that helps a community understand the viability and options for a broadband initiative. Studies are rarely completed to the same scope or depth, so it is important to continue the positive momentum by adding definition and surety to the model and business assumptions. The steps in a fiber deployment project may not be sequential, but the most important step is forward progress.
2. **Map Existing Fiber Assets:** While time-intensive, this information is invaluable to the formal design process and impacts the project financials. While some entities include this action in their comprehensive engineering contract, others prefer to start the process in-house.
3. **Resolve Outstanding Program Hurdles:** The feasibility study points out technical, logistical, or regulatory issues that need resolution. Tackle tough issues head-on and address long lead-time items early. This might include "make ready" pole arrangements, railroad crossings, or billing system integration.
4. **Evaluate Ownership Models:** Ownership models affect the deployment planning process and as the building blocks of your community's fiber network. Evaluate the pluses and minuses. A publicly funded model gives a community the most use flexibility and revenue potential, but it could conflict with other community investments. On the other hand, a privately funded model gives power to an internet service provider to manage the network, but it could set the most efficient path to meet community goals. Many communities find that a public-private partnership is a good balance of all the costs and benefits.

5. **Conduct Comprehensive Design and Engineering:** The feasibility study typically provides enough engineering analysis to validate the project landscape and business case considerations. Detailed engineering in preparation for construction is essential and could be contracted directly or performed by a private partner. A deeper examination of the project assumptions, often based on maps and GIS data, influences the selection of an engineering or design-build partner.
6. **Consistent Internal Communications:** A clear understanding of objectives and expectations is a characteristic of successful fiber projects. This requires consistent messaging and dialogue through all levels of the organization. One best practice is to consider recruiting an individual from each department to be the project liaison.
7. **Effective External Communications:** The driving revenue source for any fiber deployment is business and residential subscriptions. Just because fiber is available does not mean citizens will sign up. Strategic and consistent communications with the community will amplify the service provider marketing efforts and increase subscriptions.
8. **Conduct Mapping and Deployment Tracking:** Interaction with the public occurs during construction and when individual service is activated. Black & Veatch uses real-time mapping and tracking tools to not only manage construction but to aid in external communications. Construction data is scrubbed to remove private information and seamlessly transferred to a public website to support external communication campaigns.

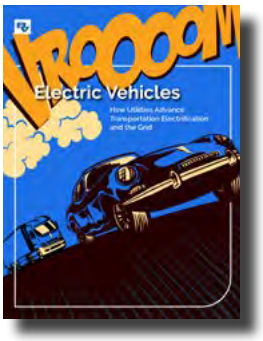
Efficient Network Build-Outs in Missouri

Black & Veatch formed a multidisciplinary national Municipal Relations Team (MRT) to study how to make network deployments easier. The purpose of this team is to foster stronger partnerships with municipalities and to build a more efficient permitting process to reduce turnaround times and costs. This expertise means municipalities get the support they need. In Missouri, Black & Veatch MRT helped the jurisdiction identify key synergies that led to an amended permitting process and reduced cycle time.

Conclusion

The rural digital divide is often simplified to numbers and percentages, but lack of connectivity is more complicated than that. Summaries do not convey what each community loses without adequate broadband internet. From innovation lapses and missed business opportunities to everyday difficulties like the inability to search online for jobs, telework, complete homework, use online banking, or safely see a doctor via telehealth. The big and the small losses all add up, and rural communities will continue to struggle economically and socially without investment in fiber broadband networks.

As co-ops begin to plan fiber networks, Black & Veatch can provide the insight around design decisions that impact longevity, scalability for future growth, and ROI. As a qualified, experienced telecommunications company, Black & Veatch provides valuable analysis and design, engineering, and construction of fiber networks with better outcomes in design, costs, and time-frames. We are a leader in converged, intelligent communication networks, with expertise in connected communities, grid modernization, and emerging technologies. Accelerate the future with Black and Veatch.



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