The Era of the Broadband Public-Private Partnership: New Trends and Opportunities in the Wake of COVID-19

Joanne Hovis, Ryland Sherman, and Marc Schulhof
CTC Technology & Energy

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Author Biographies

Joanne Hovis is president of CTC Technology & Energy, where she heads the firm's work in public broadband strategy, network business planning, market analysis, and policy. Joanne advises states and local governments on how to build strategy and opportunity for public–private partnerships in broadband. She leads the CTC teams that have developed broadband strategic guidance for the states of Alabama, Connecticut, Delaware, Georgia, Maryland, New Mexico, and Vermont. Joanne is co-founder of the Broadband Equity Partnership and serves as CEO of the Coalition for Local Internet Choice. She is also on the boards of Consumer Reports, the Fiber Broadband Association, and the Benton Institute for Broadband & Society.

Ryland Sherman, a broadband economics and policy researcher at CTC Technology & Energy, focuses on federal and state broadband strategy and policy frameworks; mapping and funding programs; and digital equity initiatives. Prior to joining CTC, he provided significant research support for the development of the Benton Institute for Broadband & Society's comprehensive broadband agenda, Broadband for America Now, analyzing broadband competition issues and the economic impacts of broadband. He holds a Ph.D. and a law degree from Indiana University's Media School and Maurer School of Law, respectively.

Marc Schulhof is a principal analyst and director of editorial services at CTC Technology & Energy, where he collaborates on the development of broadband strategy, market analysis, partnership approaches, grant funding options, and network business models for local and state government clients.

Contents

1. Introduction

It is the era of the broadband public-private partnership. As of the fall of 2021, a remarkable wave of public-private collaboration in broadband is underway—a wave that began in the early months of the COVID-19 pandemic and will likely reach a crest in the next few years as many tens of billions of dollars of public and private capital are invested in next-generation broadband.

1.1 The pandemic's impact on broadband public-private collaboration

The pandemic accelerated a number of important preexisting trends:

1. The influx of private capital—including both private equity and major increases in investment by incumbents—that has supercharged the fiber-to-the-premises market;[1]
2. The growing willingness of state and federal appropriators to invest in deployment of best-in-class broadband facilities;
3. The urgent willingness of local policymakers to invest in broadband infrastructure, with particular focus on working with private ISPs; and
4. The growing willingness of various types of ISPs to work with local communities to achieve win-win outcomes that meet local broadband policy goals and improve private network deployment economics.

These trends predate the pandemic, and, indeed, all of these dynamics emerged in the 2015–2020 time period. But COVID-19 demonstrated to American policymakers the absolute need for plentiful connectivity and the crises faced by those who don't have it—and simultaneously demonstrated to private investors the economic potential of best-in-class, future-proof broadband.

1.2 How public-private collaboration shifts capital flows and risk allocation—and accelerates broadband deployment

Public-private collaboration creates new patterns for flow of both public and private broadband dollars. The wave of collaboration is shifting the traditional dynamic of where public and private capital flow—and attracting private capital to communities that had not previously been of interest to private investors.

Public-private collaboration creates new patterns for flow of both public and private broadband dollars.

Historically, private broadband capital has focused on already-served, high-return markets. The areas with the least robust infrastructure tend to be those in which the private-sector business case for investment is weakest. Private capital—for both new networks and upgrade of existing networks—predictably flows to the areas that offer the greatest potential return, which are usually those in which population density is high, construction cost is modest on a per-household basis, and household and disposable income are high.

In contrast, most public capital is directed to unserved markets where private investment has not materialized because higher per-customer construction costs and lower revenue expectations result in

lower (or nonexistent) return on investment.

The potential for public-private collaboration changes that binary and attracts private investment to areas where return is low or nonexistent but can be improved though collaboration with the local community. And the potential for collaboration unlocks local public investment in already-served communities where policymakers want better broadband but prefer to do so in partnership with the private sector.

1.3 Guide to this document

This document discusses these trends and reviews how recent changes in broadband performance demands, federal and state funding programs, and community and investor interests have increased the potential for new public-private partnerships in broadband.

This document was commissioned by the Communications Workers of America and prepared by CTC Technology & Energy in the summer and fall of 2021. The document is arranged as follows:

- Section 2 discusses the public policy goals that are animating local decision-makers to innovate new public-private partnerships—and the wide range of communities that are doing so.
- Section 3 considers the range of private entities that are interested in broadband public-private collaboration, including both competitors and incumbents, as well as other types of providers and investors that are new to the broadband marketplace.
- Section 4 describes the types of business arrangements that are emerging in this new, dynamic environment.
- Section 5 describes how federal and state funding programs are increasingly incentivizing and supporting public-private collaboration.
- Section 6 offers considerations for localities—including guidance for what local governments should be doing right now to take advantage of these unprecedented opportunities. This section also describes best practices for local governments in considering how to protect and meet community needs through a public-private partnership model.

2. The new collaborations span a wide range of communities and reflect a broadening range of public policy goals

The wave of collaborations is happening in a wide range of communities, both those that are currently served with broadband and those that are not.[2] The interest in collaboration, fueled by federal and state funds that can be used for broadband public-private partnerships, has arisen in every type of community across a wide range of geographies, demographics, and levels of existing broadband. No longer is the broadband public-private partnership limited only to rural, unserved areas.

Of all broadband infrastructures, community-wide fiber-to-the-premises represents the pinnacle: a robust, infinitely scalable transmission medium with a lifetime of many decades.

At the local level, the value of public-private collaboration is clear to policy makers. Local governments have a fundamentally different perspective on the basic value proposition for broadband investment than do private businesses, yet they recognize the roles that private entities can play in meeting local broadband goals.

Localities are fundamentally tasked with meeting the economic and social welfare needs of their communities, so they value the significant public benefits resulting from better, more affordable broadband access. In effect, localities treat as a goal the benefits that private businesses treat only as externalities. Localities can also make longer-term investments without concern for short-term profitability, so they can facilitate otherwise infeasible infrastructure deployments that slowly but surely pay for themselves over decades, in exchange for their private collaborators offering operations and market expertise.

2.1 Broadband expansion in rural areas

As with all infrastructure categories, the economics of rural broadband deployment and operations cannot be addressed purely by market forces. Because of high capital and operating costs per potential customer, areas with low population density struggle to attract private investment in capital infrastructure. The challenging economics are directly correlated with low housing density and the location of many rural homes far from arterial roads or on large parcels of land. Long distances between homes, as well as long driveways or setbacks from the road, greatly increase the cost to deploy infrastructure to those locations.

For rural communities, public-private collaboration represents a critical tool to make broadband in those areas economically viable.

2.2 Community-wide access to infrastructure in urban areas

Like rural areas, America's cities largely recognize that broadband has joined the ranks of essential utilities, alongside others such as water and electricity. Specifically, broadband infrastructure is a key component of a built environment that is ripe for business expansion and workforce development. This has never been more apparent than through the COVID-19 crisis and subsequent economic crisis—the internet is required for participation and competition in today's world.

Even as fiber-based broadband has become a critical infrastructure element for cities, fiber deployment has emerged unevenly in most American cities. While some companies, like AT&T, have commenced significant fiber builds, others, like Verizon, have committed to far less, and others, like Lumen, are in the early stages of fiber planning and deployment. Even in those cities where companies are most committed to deploy fiber, that deployment tends to focus on higher-income residential areas and larger business districts where return on investment is highest. And while the cable networks reach most—though not all—residences, cable's hybrid fiber/coaxial infrastructure does not allow for the remarkable speeds that fiber does. The combination of geographically limited fiber and capacity-limited cable broadband means that residents of many American cities worry about their ability to compete in the long term—and the stark differences in options across different parts of their communities.

The cities' goals are to ensure that the opportunities afforded by broadband are distributed widely, to all residents rather than only to those who live in neighborhoods where the private sector has an investment incentive to deploy. This requires ubiquitous fiber infrastructure.

2.3 Broadband affordability

Many local communities work to develop public-private broadband collaborations because they believe that very-high-speed broadband internet is vital for all their residents and that, for those residents who lack home internet, cost is likely among the most important barriers to adoption.[3]

Even for those lower-income residents who purchase internet services, high costs mean that they frequently purchase lower tiers of service, below the Federal Communications Commission's (FCC) benchmark speeds for "broadband"[4] and far lower than most communities believe to be essential to the lives of their residents. These low-speed, asymmetrical connections limit residents' ability to take full advantage of the economic, educational, and health care opportunities that depend on high-speed, symmetrical connections.

The wave of collaborations is happening in a wide range of communities, both those that are currently served with broadband and those that are not.

Students in these households may have trouble accessing enough bandwidth to watch video lectures, upload homework assignments on time, or work in collaborative ways with other students on shared projects. Elderly and chronically ill members of the community may make regular, unnecessary trips to the hospital because their home connections are too slow to support remote monitoring and videoconferencing applications. Beyond the cost to the individuals, the entire community pays a social cost when low-income members of the community lack the high-speed connections that enable more efficient and effective delivery of goods and services.

While low-cost service tiers, like Comcast's Internet Essentials and AT&T's Access, offer low-income households some level of access to the internet, they still leave a divide between those households that have an abundance of bandwidth and those that must restrict their internet usage and avoid high-bandwidth applications and services. Many of the families and individuals that stand to benefit the most from the opportunities that broadband provides are not able to afford high-speed connections on their own.

As a result of this concern, many communities seek public-private collaboration not only to develop

new, competitive broadband infrastructure but also to partner on broadband subsidy mechanisms that cover some or all of low-income households' bills for their home broadband connections.

2.4 Attracting private broadband capital

Communities recognize that private investors are unlikely to bring best-in-class broadband to all parts of the country.

Localities treat as a goal the benefits that private businesses treat only as externalities.

The lack of a business case for private investment in low-density rural areas is well known. Less recognized in national policy, but clear to local policy makers, is that private-investment patterns in urban and suburban areas focus on high-volume customers such as large businesses and institutions, and on wealthier residential areas where broadband revenues are likely high.

Communities further understand that, in their efforts to attract private capital, they are effectively competing with their neighbors, both locally and regionally, and with other communities throughout the country.

As a result, many communities seek to entice private investment through public-private collaboration, including through local public investment (or efforts to jointly secure state or federal funds) to bridge the business case in areas that otherwise offer insufficient return to attract private capital.

2.5 Economic and community development

Finally and most critically, most American communities fully recognize that broadband has joined the ranks of essential services.

For America's local governments, broadband infrastructure is recognized as a key component of a built environment that is positioned for business expansion, education, workforce development, access to health care, and civic engagement.

As a result of this recognition, communities seek to achieve the following economic and community development goals through their public-private collaborations:

- Support the growth and development of anchor institutions
- Create more jobs locally by making remote positions viable
- Create an environment fertile for entrepreneurship
- Support existing industries and enable the growth of new industries
- Enable upskilling and reskilling through online resources, allowing residents to participate in workforce development on their own time, schedule, and budget
- Grow the talent pipeline locally by connecting students to skills training, job opportunities, mentorship, and other resources
- Allow local employers to attract and retain talent through work-from-home arrangements

- Encourage local businesses to develop new e-commerce features to innovate their product offerings and grow their reach
- Enable the use of telehealth applications, including for emotional and mental health support, especially for at-risk, recovering, and elderly residents
- Provide a reliable, flexible option for city government to connect emerging Smart City technologies
- Enable full distance-learning participation by students of all ages

3. The new collaborations span a wide—and sometimes surprising—range of private ISPs

It comes as no surprise that private ISPs seek engagement with public entities during a time of unprecedented public investment in broadband. Public contribution to a project—federal, state, or local—is generally designed to improve the return-on-investment calculus for a private investor, making investment in the community substantially more attractive for private capital. And, indeed, the past year has demonstrated that there is a market of willing, hungry private ISPs for public capital grants and subsidies. These range from smaller, competitive ISPs that cannot enter new markets without some support to incumbents that sense the current opportunity and are ramping up fiber deployment.

What comes as more of a surprise is the breadth of companies that are open to more innovative, shared-risk public-private collaboration than the standard public grant to a private ISP.

What comes as more of a surprise is the breadth of companies that are open to more innovative, shared-risk public-private collaboration than the standard public grant to a private ISP. In these collaborations, the public funder functions not only as a source of funds and potential customer but also, in some cases, as holder of equity in the effort, owner of the infrastructure, or recipient of some financial benefit.

The types of companies that have embraced public-private collaboration include smaller competitors, such as Wyyerd Group, which manages "local operating entities" that provide fiber-based internet to communities in five states. These local teams are run by local general managers who work closely with local leaders to ensure that the needs of the local community are met.[5]

There is also a growing interest among incumbents in such efforts. For example, Consolidated Communications in New England has entered into partnerships with numerous small communities to build fiber-to-the-premises, with the community financing the deployment and Consolidated responsible for designing, building, maintaining, and operating the networks.

4. The new collaborations use a wide range of business models

The current wave of partnerships includes a wide range of collaborative business models. The key commonalities involve strategies that improve the return calculus for private investors—attracting private capital to areas to which it would not otherwise flow, and maximizing the benefits of public investment. At their core, these collaborations are designed to shape private investment and change private service models by inserting public financing or funding to facilitate physical infrastructure deployment, in return for commitments regarding some combination of buildout, service levels, pricing, and future investment.

When compared to either typical private deployments or municipal broadband services, the collaborative model opens up a range of deployment opportunities that would not be available to either the private or public partner alone.

When compared to either typical private deployments or municipal broadband services, the collaborative model opens up a range of deployment opportunities that would not be available to either the private or public partner alone. These partnerships enable the parties to allocate costs, responsibilities, and benefits based on their relative capabilities and priorities, thus creating efficiencies that might not otherwise exist.

Google Fiber, for example, has frankly acknowledged its challenges deploying fiber and the superior capabilities of some public entities to build infrastructure for public use.[6] Given this hard-learned reality, Google Fiber appears deeply engaged in an effort to seek public partners that will deploy fiber or conduit in part based on long-term contractual commitments to lease some of that public infrastructure and provide services wherever it reaches. Google Fiber has entered into contracts of this sort in Huntsville, Alabama, and West Des Moines, Iowa.

While there exist a wide range of types of public-private collaboration, two types of models have clearly emerged to meet the current moment. Each offers variations of financing, construction, and network ownership choices that fit current opportunities.

4.1 Model 1: Public financing of private infrastructure

In this model for public-private collaboration in the current environment, communities award grants and provide other support to private partners that make binding, enforceable commitments to deploy and operate infrastructure. The terms of the collaboration provide that the locality contributes support funding, the potential to tap federal or state funds, and other assistance to the private partner, but the private partner constructs and generally owns the resulting network.

In exchange for the public partner's assistance, the private partner agrees to certain deployment and service requirements that meet the locality's broadband public policy objectives, including buildout requirements to all households in an area.

As a result, the private entity performs most of the deployment, as it would without a public partner, but it benefits from local public funding, better grant opportunities, and other benefits resulting from closer coordination with the locality. In exchange for funding, the public partner can attach

a set of requirements to the private partner's deployment plans and resulting services, including mandatory fiber-to-the-premises buildouts to all homes in the area, affordable service packages, and/or other local benefits.

This model represents the most common approach of the current era, in part because American Rescue Plan Act funds are usable for broadband purposes and this model allows for fast commitment of funds by a local public entity to meet its broadband public policy goals.

Competitive process. Generally, the collaborations developed under this model involve a competitive process that leads to a grant of public funds to the private partner to design, build, maintain, and operate a communications network over some considerable period of time.

In either a rural or urban/suburban context, the community undertakes a competitive grant program to make an award to a private entity willing to build infrastructure in those areas designated by the community. The locality then makes an award to the qualified bidder that offers the best value and/or lowest bid, assuming adequate financial, technical, and managerial qualifications.

Ownership. Generally, under this model the private partner will have ownership of the network, including those parts funded with the grant, and will hold all related risk, including construction cost increases and lower-than-anticipated revenues. The community, in turn, makes a capital contribution but passes both construction and market risks to its partner—and secures its broadband deployment goals at a reduced cost enabled by the competitive process and the attractiveness of the public funding.

Considerations. While enormously promising, the model also can be somewhat perilous for communities. In the current moment, various entities are marketing broadband solutions—some real, some not—to localities. In some cases, neither the so-called solution nor the company promoting it is capable of the outcomes promised.

For this reason, communities are well advised to seek guidance regarding the viability of the technology solutions and regarding the managerial, professional, and financial capacities of their would-be partners. And the localities should seek to ensure that the promises made by their selected partner are enforceable by contract and that the company has the creditworthiness to meet all those contractual obligations.

4.1.1 Case Study: Powell County, Kentucky

Slade is a small, unincorporated community of about 300 residents in Powell County, Kentucky. Slade is tucked within Natural Bridge State Resort Park and is home to campgrounds, cabins, resorts, climbing shops, and restaurants clustered along Route 11.

Until 2020, the only options for connectivity in Slade were satellite or DSL services, neither of them meeting the FCC's threshold for broadband and neither of them adequate to meet the needs of Slade's residents and businesses.[7]

KentuckyWired, the Commonwealth of Kentucky's backbone fiber network, includes capacity along Route 11. The presence of KentuckyWired enabled Powell County to develop a partnership model in which its private partner could connect to the internet backbone over KentuckyWired and deploy last-mile connectivity within Slade.

The county identified as its partner Eastern Telephone & Technologies, which is located in nearby Pikeville, and which has provided connectivity services in the region since 1983 and has been offering internet services for about six years—primarily as a reseller—to about 1,000 customers.

Under the partnership agreement, the county contributed $20,000 to Eastern Telephone to build 2.4 miles of new last-mile fiber infrastructure.[8] The new infrastructure is owned by Eastern Telephone and connects to the existing backbone infrastructure that follows Route 11.

Under the terms of the deal with the county, Eastern Telephone paid $5,000 back to the county once the network had 13 subscribers.

Construction began in the spring of 2020, and service was activated later in the year. Eastern Telephone offers symmetrical 100 Mbps service for $200 per month to about 40 businesses, and symmetrical 50 Mbps for $70 per month to about 10 homes in Slade.

4.1.2 Case Study: Charles County, Maryland

Charles County, which includes some of the outer suburbs of Washington, D.C., and extensive rural areas, entered into a partnership with ThinkBig Communications in 2020 that guarantees that unserved rural areas will get ubiquitous fiber-to-the-premises deployments.

In return for ThinkBig's deployment commitments, the county made a grant to the company and served as applicant to a state broadband funding program that unlocked additional funding for ThinkBig.[9]

ThinkBig in turn committed not only to the deployment but also to meeting a wide range of county public policy goals:

- Pricing and services will be benchmarked to the region, ensuring that Charles County consumers are offered comparable pricing to their metropolitan neighbors
- Maintenance of the network will be benchmarked to industry best practices, ensuring that the company continues to invest in the network and keep it state-of-the-art
- Dark fiber throughout the new network will be made available to the county for non-commercial uses
- The fiber network will be expanded into additional areas over time[10]

4.1.3 Case Study: Scott County, Kentucky

Scott County, in central Kentucky, has committed modest county funds to secure a far larger commitment from a private partner to deploy fiber-to-the-premises throughout the county.

Like many counties, Scott County has suffered from uneven broadband connectivity, with cable broadband present in the population centers but no broadband in rural areas. To address these issues, the county used a competitive process to enter into a partnership with Charter Communications. Under the partnership, Charter makes binding commitments to build fiber-to-the-premises throughout the unserved areas of the county and to upgrade existing coaxial cable in served areas to fiber.

In return for Charter's $18 million commitment[11] to deploy new and upgraded fiber infrastructure in the community, the county's commitments include:

- A $3 million capital contribution[12]
- A point-of-contact liaison to facilitate company-county efforts
- Permitting assistance
- Access to county infrastructure and assets
- Support in applying to state and federal funding programs

4.1.4 Case Study: Vanderburgh County, Indiana

In September 2021, Vanderburgh County, Indiana, and AT&T announced[13] that they had entered into a nearly $40 million public-private partnership to deliver world-class broadband to unincorporated sections of the small county, which is located in southwestern Indiana, across the Ohio River from Kentucky.

While Evansville, the county seat and primary population center, is serviced by several broadband providers, approximately 21,000 addresses in the rural areas of the county have been left without broadband.

"It's too expensive [for them] to get [broadband]," County Commissioner Cheryl Musgrave told the Evansville Courier & Press in May 2021. "These situations exist all over Vanderburgh County, and they are putting us at a competitive disadvantage."[14]

The county made a first step toward addressing those gaps when it issued a request for proposals and later signed a $600,000 agreement with Watch Communications, funded by American Rescue Plan Act (ARPA) money, to build infrastructure in small sections of the north and northwest portions of the county.

The county issued another request for proposals a month later, and received four bids. AT&T's was deemed to be the best. Under the agreement, AT&T will invest $29.7 million in the network, which it will own and operate, and the county will add $9.9 million in ARPA funds.

The request for proposals had called for building a network with the symmetrical capacity of at least 100 Mbps that can be upgraded when bandwidth needs grow, although the county indicated that it would accept 20 Mbps as an upload speed in places where 100 Mbps was not feasible, provided it was scalable.[15] When the network is completed, the previously unserved addresses will have access to symmetrical fiber capable of 2 Gbps for residents and 5 Gbps for businesses.

4.1.5 Case Study: Campbell, Kenton, and Boone Counties, Kentucky

In late July 2021, Cincinnati Bell announced it will spend $181 million to deliver gigabit-speed fiber in three Northern Kentucky counties: Campbell, Kenton, and Boone. The project is expected to take two to three years to complete, at which time the entirety of the three counties—approximately 207,000 residential and business addresses—will have access to gigabit-speed fiber.[16]

The counties worked together to prepare a request for qualifications (RFQ) in September 2020. Of the four responses received, Cincinnati Bell, which already provides gigabit-speed fiber to 112,000 (54 percent) of the addresses in Boone, Campbell, and Kenton, was determined to be the preferred vendor. Boone County made its decision in March 2021; [17] the other two counties, which delayed their votes due to lack of immediate funding, followed suit in July.

In total, 95,000 addresses will be served, with the counties collectively contributing slightly less than $30 million—one-sixth of Cincinnati Bell's investment. The counties' planned investments are as follows:[18]

- Boone County: $13.6 million to serve 40,000 addresses
- Campbell County: $4.5 million to serve 17,600 addresses
- Kenton County: $10.8 million to serve 37,000 addresses

Under the agreement, Cincinnati Bell will also spend $1.1 million, through its UniCity organization, to fund Smart City initiatives in all three counties.

4.1.6 Case Study: City of Greendale, Indiana

Greendale, Indiana, with a population of 4,000, is located less than 15 minutes from the Cincinnati airport but a world away from big-city-type broadband services. A cable company serves Greendale, but it does not operate a state-of-the-art network—and residents, businesses, and government agencies report insufficient service.

City leaders undertook in 2020 to develop a public-private collaboration strategy, seeking to understand their leverage and tools, and recognizing that they did not want to follow the example of their neighbor, Lawrenceburg, which had embarked on a municipal fiber venture. Rather, the city hoped to incentivize a private partner to invest in new fiber infrastructure on a city-wide basis.

The city identified two important assets: First, the city's electric utility could offer to waive pole fees. Second, the city was awarded a $625,000 Governor's Emergency Education Relief (GEER) Fund grant from the state of Indiana to pay for residents' customer-premises equipment as part of an education initiative.

To test the market, the city prepared a request for proposals that demonstrated its seriousness in wanting to find a private partner—and that was designed to help the city determine how much it needed to invest to make the city of Greendale an attractive opportunity for that partner.

The city requested proposals for an entity to build, own, and operate a broadband network. To enable concrete responses, the city included mapping data for all pole locations.

As a result of this process, the city selected Cincinnati Bell as its partner, based on the company's proposal, which limits the city's financial commitment and overall risk.

In exchange for the city's commitment to waive its pole fees and invest up to $625,000 for customer-premises equipment, Cincinnati Bell has committed to build fiber throughout the city.

4.2 Model 2: Public financing of public infrastructure to be operated by the private sector

In this model for public-private collaboration, the community funds, constructs, and owns the fiber infrastructure, and its private partner leases the fiber, activates it for services, and delivers services to the public. Stated otherwise, the public partner makes the capital investment to construct the fiber, and the private partner takes responsibility for operations.

In one illustrative example, the town of Dublin, New Hampshire, has used bond proceeds to enable its ISP partner to upgrade a copper network to fiber. The ISP will pay the town on an ongoing basis in an amount calculated to cover the town's debt service and will operate the new town-owned infrastructure.

Community-wide approach. This model can be expansive and community-wide or can be focused in particular areas where the private-sector business case is insufficient to make privately funded broadband feasible. In both cases, the locality partners with an ISP that commits to build fiber-to-the-premises throughout the community, with the community funding—and owning—that portion of the fiber network that is built with public funds.

Ownership. The community might own all the fiber if it fully funds the network, or the community might own some portion of the network, potentially in those areas where the private investor would not otherwise invest its own capital because projected returns are insufficient. In either case, the community's funds are not granted to the private entity but serve rather to build an asset that is owned by the community.

Targeted approach. The more targeted, limited version of this model represents an interesting innovation in the way that localities and their private partners can distribute network ownership across a region, enabling the locality to fund fiber infrastructure specifically to the unserved homes that need it most. This approach allows the locality to focus its funding on areas of greatest need when market forces and other grant funding sources are sufficient to reach most of a town or city. As a result of the smaller project areas, these projects may be eligible for a wider range of funding opportunities, some of which may facilitate competitive buildouts in areas where an incumbent ISP offers only higher-priced services at slower speeds and has otherwise declined to perform upgrades in an area.

Considerations. Through this shared investment strategy, communities can ensure ubiquitous fiber deployment, including in those low-income neighborhoods where the need is greatest. In scenarios in which the community's funds are intended for only those neighborhoods, the community's investment in the lower-return neighborhoods serves as an inducement to private investors to enter that community, benefit from the community's investment, and invest their own funds in other neighborhoods, where public funds are not necessary. In those areas where the fiber network is built with public funds, the community seeks to own the broadband infrastructure and to lease access to its private partner (and perhaps other ISPs), with the private sector providing network maintenance, operations, and service.

Competitive process. As with the private-ownership model described above, public needs are best met through a competitive process that protects the interests of the community and allows for selection of the bidder that offers the optimal combination of qualifications, terms, and cost.

Variations. In one interesting variation on this model, the locality initially has ownership of the network, particularly if the terms of the grant or loan require the public grantee or borrower to own the new infrastructure. However, contract arrangements can provide that ownership will transfer to the private entity after the loan term is over or once other terms of the partnership are satisfied. In Chesterfield, New Hampshire, for example, a network built with town funds will be the property of the town for the term of the financing but will transfer to the town's private partner once all debt is repaid; this contrasts with the similar model in nearby Dublin that is described earlier, in which the town will retain ownership of the fiber.

4.2.1 Case Study: Southern Vermont Communications Union District

The Southern Vermont Communications Union District (SoVT CUD) is an entity of more than a dozen Vermont towns that formed in the spring of 2020 under a Vermont law that enables local communities to undertake broadband projects and to access state funds. Following a feasibility study and consideration of all options, SoVT CUD leadership decided to release an RFQ to select a private partner to deploy fiber to the unserved areas of the district.

To determine the interest of the private ISP market, SoVT CUD initiated discussions with ISPs regarding what the CUD would need to commit for the private entities to commit in turn to fulfill the CUD's universal service plan.

SoVT CUD then issued an RFQ in the summer of 2021 to select a partner willing to fulfill its requirements as well as those of state and federal grant makers.[19] The CUD selected local incumbent Consolidated Communications and worked with Consolidated to submit a federal grant application and prepare for state applications.

Under the agreement, the parties will collaborate to seek grant funds from both federal and state sources, a likelihood that is greatly increased by the decision of the state of Vermont to prioritize CUDs for rural broadband funds. The funds will be used by Consolidated to deploy fiber-to-the-premises throughout the unserved areas of the SoVT footprint and to offer services and pricing agreed to by the parties. Consolidated will take all construction and market risk, while SoVT CUD will hold ownership of the new fiber. Through this mechanism, SoVT CUD will achieve its broadband goals, largely through its creative efforts and its ability to secure private partner commitments by leveraging new rural broadband deployment funds.

4.2.2 Case study: Jacksonville, Illinois

The city of Jacksonville, Illinois, successfully secured its key broadband goal—universal access to state-of-the-art fiber for all residents and businesses—through public-private collaboration that utilizes this model.

After careful consideration of alternative models, the city entered into an agreement with Illinois-based ISP i3 Broadband. Under the agreement, the city paid part of the infrastructure cost to bridge

the business case for i3 in those neighborhoods where the anticipated return on investment was insufficient for the private company to build using only its own capital.

According to city leaders, the likely cost of a citywide fiber network was four to eight times the amount that the city contributed to i3, and the city met its policy goal of ubiquitous fiber deployment. In addition, the agreement provided that the city would have long-term use of dark-fiber strands for non-commercial, municipal purposes in such areas as downtown and connecting key public facilities.

5. The role of federal and state support and funding

Recently, both federal and state appropriators have taken notice of the potential of public-private collaboration to improve and accelerate broadband deployment. Officials at both the state and federal levels have either developed grant programs designed specifically for public-private partnership efforts or adapted their rules to facilitate them.

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For example, under the Consolidated Appropriations Act, 2021, the National Telecommunications and Information Administration's (NTIA) new Broadband Infrastructure Program requires that applicants establish public-private partnerships. And the Coronavirus State and Local Fiscal Recovery Funds program, created in the American Rescue Plan Act, specifically designated broadband as an eligible use of the funds by state and local recipients, with an eye toward how states and localities could work with private ISPs to deploy.[20]

Several states—including Virginia, Maryland, Maine, and Vermont—have special grant programs specifically for public-private efforts. The Virginia Telecommunication Initiative (VATI) can provide up to 80 percent of project costs to eligible partnerships, requiring that applicants provide only one-fifth of the deployment cost from other sources.[21] To involve a nongovernmental entity, Maryland requires that the local jurisdiction enter into a partnership with "[a]ny other legal entity, including a cooperative, private corporation, or limited liability company organized on a for-profit or not-for-profit basis" in order to apply.[22] Maine encourages communities applying for grants to partner with one of the telecommunications providers already serving customers in Maine.[23]

6. Practical and strategic considerations for local communities

The combination of funding opportunities currently available presents a unique opportunity for communities.[24]

The following are some practical considerations for any community that is evaluating public-private collaboration in broadband.

6.1 Act expeditiously

The current moment represents a remarkable time for broadband deployment funding that will likely not repeat itself in the future. This moment favors localities that are already planning and implementing their broadband strategies.

Because localities across the nation are eligible for the same opportunities, there will soon be significantly higher demand for limited broadband planning and construction resources, along with potential deployment partners.

Because localities across the nation are eligible for the same opportunities, there will soon be significantly higher demand for limited broadband planning and construction resources, along with potential deployment partners. For a community seeking to leverage this moment with one or more private partners, the earlier it starts the search for partners, the better options it will have. Localities that act slowly will likely pay more and have fewer options.

6.1.1 Follow best practices

Among other short-term tasks, best practices demonstrate that communities should quickly:

1. Bring together local broadband champions, a range of stakeholders, and the digital equity community to coordinate needs and efforts
2. Engage planning and funding specialists, as well as state-level resources
3. Review local assets, needs, and practices to ensure that they will maximize the interest of potential private collaborators
4. Develop a strategy for identifying and selecting potential private partners
5. Leverage the benefits of a competitive process, but do so efficiently and with best practices in mind

Procurement can be a significant factor in the time and cost of execution of a broadband strategy, but the competitive process will almost certainly yield the best results. Communities thus should develop strategies for efficient procurement based on a range of issues, including their selected public-private business model, availability of existing contract vehicles and vendors, and the trade-offs among speed, cost, and control inherent in the procurement options.

6.1.2 Case Study: Scott County, Kentucky

As is described in the discussion of Model 1 earlier, Scott County, Kentucky, has developed a robust public-private partnership in which the county commits modest county funds to secure a far larger commitment from Charter Communications to deploy fiber-to-the-premises countywide.

The partnership resulted from efficient, deliberate planning and a multiphase competitive process. First, the county used a customized request for information to describe the opportunity to potential partners, yielding considerable information from potentially available partners about the most effective offerings the county could make to attract an outstanding partner.

Second, given the county's fiber-to-the-premises goals, it then developed a design and cost estimate for a deployment that would maximize the benefits of the KentuckyWired backbone, which enabled a financial analysis of the level of capital subsidy the county would need to provide to motivate an ISP to build and operate the network.

At the same time, the county performed a countywide street-by-street survey of existing infrastructure as a baseline for a rigorous cost comparison of respondent offers.

The request for information (RFI) resulted in interest from seven companies. Based on the RFI responses, the county developed a request for proposals (RFP) that offers potential partners a bundle of opportunities in return for their commitments to deploy services. The RFP process resulted in multiple bids, and the county selected the local cable broadband company, Charter Communications, as its partner. The resulting partnership commits Charter to build fiber-to-the-premises throughout the unserved areas of the county and to upgrade existing coaxial cable in served areas to fiber.

6.2 Avoid snake oil, unenforceable promises, and unrealistic projections

Frankly, many of the "partnership" options being pitched to localities either are not true partnerships, in that they involve primarily community cost and private profit with no enforceable public-interest commitments on the part of the private entity, or are quite simply technologically or financially infeasible—effectively, too good to be true.

This singular opportunity has increased localities' options for investing in their own fiber future. At the same time, there are areas of real peril associated with the current moment, including the fact that localities are being inundated with questionable proposals from "partners" regarding how communities can spend their ARPA funds on broadband.

Frankly, many of the "partnership" options being pitched to localities either are not true partnerships, in that they involve primarily community cost and private profit with no enforceable public-interest commitments on the part of the private entity, or are quite simply technologically or financially infeasible—effectively, too good to be true.

With any proposal that appears promising, communities should thus require the following:

1. **A showing of technology performance.** Even where there is promise to the technical model, network performance should be rigorously tested and a track record should be demonstrated. Absent this, communities should question whether the technical model entails uncertainty and risk that make the public

spending risky. Vendor promises about wireless broadband should be rigorously tested, given the performance challenges of wireless as a broadband medium. For example:

- Wi-Fi antennas mounted outdoors may not provide consistent service to residents inside their homes.
- Large Wi-Fi mesh networks may not deliver consistent performance if a user is more than a few "hops" from the connection to the internet.

2. **Likelihood of promised revenues.** Communities should also rigorously test vendor representations about future revenues from the networks, which are frequently speculative and unrealistic. For example, revenue expectations for lower-income areas should be set at a reasonable level, in light of the price sensitivity of lower-income consumers. Rural revenue promises should be similarly scrutinized, as should commercial revenues in such areas as mobile backhaul. To the extent that the business case for community participation in the partnership anticipates commercial revenues, revenue projections should be based on scientific surveys and empirical data rather than on sheer speculation or wishful thinking.
3. **Technical, financial, and managerial track record.** A community financial commitment through a partnership inevitably entails some risk. To mitigate that risk, the community should ensure that its would-be partner has demonstrated capacity to deliver. This might include submission of information on the ISP's existing subscriber revenues, its financial statements, and other evidence of its ability to successfully build, operate, and maintain a viable broadband network.
4. **Enforceable commitments by the private partner to key public policy priorities.** In return for the financial commitments required of the community, the company should be required to make enforceable, contractual commitments to such local priorities as:
   - Equity in access, pricing, and service levels: The community might require its partner to commit to offering the same access to services, as well as the same services and pricing, to all residents and businesses passed by the new infrastructure.
   - Service affordability efforts: The community might require its partner to participate in federal broadband subsidy programs, and to enable qualified low-income consumers to receive those subsidies.

6.3 Include workforce opportunities and training requirements

A public-private collaboration also creates the opportunity for a community to collaborate with the existing local telecommunications workforce and increase the participation of its local labor pool in the broadband industry. The community can build into the requirements of the partnership that the private partner endeavor to include local labor—for local knowledge, for the ability to scale, and to take part in local workforce development.

Communities can also endeavor to include in the collaboration with the partner a shared commitment to work with local and state-based workforce development initiatives that support job

pipelines for traditionally marginalized communities. Labor unions and other worker representatives have expertise in training and workforce development and can serve as partners in this process.

Given the growing demand for workers in the broadband infrastructure construction and maintenance fields, stakeholder entities can work together to develop local training programs that could create opportunity for new workers as well as provide continuing education credits and advanced certifications for those already in the industry who choose to maintain and upgrade their skills.

Such an instructional approach could have benefit for a wide range of communities. For example, in the next few years, billions of dollars will be spent on building broadband on Tribal lands, and the employment opportunities will be significant for Native American and other communities who could benefit from training to participate in this growing employment sector.

As digital equity efforts and new public and private funding increase deployment demands, such skills will be in higher demand. For the most part, these jobs do not require a bachelor's degree and are relatively stable and well paying. In parts of rural and semi-rural California, skilled telecommunications technicians earn an average of $57,000 per year, and in much of urban California, these technicians earn an average of $84,200 per year.[25]

Several communities have designed broadband education programs to address the need for skilled telecommunications professionals in their respective markets and to create viable new paths for career development for local workers. For example, the city of Wilson, North Carolina's municipal broadband operation, Greenlight, previously offered a 10-week Fiber Optic Basics course through the local community college. The course provided an overview on "what fiber-optics are, the types of fiber-optic networks, and how they are spliced, tested, installed, and maintained."[26] The course included hands-on opportunities for students to learn technical skills, such as fiber splicing. Greenlight and Wilson Community College also developed a five-day "boot camp" version, intended in part to draw students from outside Wilson. Affordability was a focus of the program: Both the 10-week course and the five-day boot camp were available for about $145 each.

Greenlight and Wilson Community College announced in August 2021 that they will pilot a Fiber Broadband Association-accredited program that combines classroom instruction with a 2,000-hour apprenticeship at Greenlight. Participants will receive an optical telecom installation certification.[27]

6.4 Develop the partnership to reflect best-in-class broadband infrastructure goals

The current moment is singular. The current availability of funding to address broadband challenges is unprecedented—and unlikely to materialize again at this scale.

As this document has noted many times, the current moment is singular. The current availability of funding to address broadband challenges is unprecedented—and unlikely to materialize again at this scale.

For communities, this moment offers the opportunity to address broadband challenges in the long run, and they should therefore target their efforts toward infrastructure that will serve them in the long run.

Of all broadband infrastructures, community-wide fiber-to-the-premises represents the pinnacle: a robust, infinitely scalable transmission medium with a lifetime of many decades. Access to fiber's gigabit-and-beyond speed

allows businesses to compete and grow at a global scale through strategies like cloud computing, e-commerce, business-to-business relationships, and operational efficiencies. Access to best-in-class broadband allows workers to upskill and reskill online, work remotely, and develop entrepreneurial pursuits. And such access removes constraints on residential use, allowing for home-based business, telemedicine, and distance learning.

This is the infrastructure favored by markets, investors, and consumers—and that is increasingly a key differentiator for those communities that have it.

Our lives spent working, learning, and socializing remotely through the long quarantine have forced most policy makers to recognize that the FCC's 2015 speed thresholds for broadband (25/3 Mbps service) no longer reflect the average U.S. household's broadband demands. As the internet continues to play an increasing number of roles in our lives, Americans have continually consumed more and more data. The average household downloaded 462 GB of data per month in first quarter 2021, an amount that had steadily increased by 25 to 40 percent annually for the last several years before the pandemic.[28] Videoconferencing applications have also tested the limits of networks' upload capacities. Internet monitoring company OpenVault found that average monthly upload usage increased 63 percent between the end of 2019 and the end of 2020, from 19 to 31 GB per month.[29] A growing number of upstream super-users have nearly reached the limits of certain networks; OpenVault noted that there have been "an increasing number of incidents in which upstream traffic exceeded 80% of node capacity," requiring that network operators pinpoint bottlenecks and take action to improve upstream connectivity.

This demand for bandwidth is reflected in the types of service packages that people actually subscribe to when they are available. Nearly 10 percent of broadband subscribers have 1 Gbps service, an amount that grew 300 percent throughout 2020.[30] As of Q1 2021, 80.4 percent of broadband-subscribing households had adopted services providing downloads of at least 100 Mbps.[31] This level of high-speed broadband adoption where available suggests that a significant majority of the 27.5 million unconnected people across the nation are missing out on the opportunities that the rest of us now take for granted.[32]

Increasing minimum download speeds: Federal and state broadband policy makers have taken notice of the significant increase in actual broadband use by increasing the speed standards employed to set broadband deployment goals, define "unserved" and "underserved" areas, and establish minimum buildout requirements. The FCC has identified that a family of four who telecommute and use remote education may need access to download capacity of at least 100 Mbps to work simultaneously.[33]

This 100 Mbps download standard has been justified by the ever-growing demand for bandwidth and has become more acceptable as states and federal programs have increasingly adopted it. By 2026, Minnesota plans to provide all its citizens with ubiquitous access at speeds of at least 100/20 Mbps.[34]

Some federal programs have increased the minimum required performance standard for funded deployments, such as NTIA's Broadband Infrastructure Program requirement that deployments be capable of at least 100/20 Mbps.[35] Other federal programs place strong incentives to meet this minimum standard. For example, the Rural Digital Opportunity Fund (RDOF) strongly prioritized

service offering speeds of at least 1 Gbps, which resulted in a number of cable and primarily DSL providers proposing fiber deployments in order to receive deployment rewards.

Increasing minimum upload speeds: Upload speed requirements that are a mere tenth of download speeds are also gradually being replaced by standards that recognize the growing necessity of teleconferencing applications. As the Treasury explained, "some videoconferencing technology platforms indicate that download and upload speeds should be roughly equal to support two-way, interactive video meetings."[36] To meet the growing demand for upload capacity, some states have required symmetrical download and upload speeds. Vermont aims to have symmetrical 100/100 Mbps available to all Vermonters.[37]

Scalable infrastructure: Scalability has also become important as a factor for eligibility for a number of federal and state programs.[38] Minnesota and Illinois have established scalability as part of their minimum technology requirements, allowing slower initial speeds only if they can be affordably upgraded to speeds of at least 100/100.[39]

Taken as a whole, these changes have narrowed the range of suitable technologies. Simply put, fiber offers the best mix of technical attributes to meet this ever-increasing list of requirements. Other technologies cannot satisfy the range of current demands and requirements being placed on broadband networks.

Of primary interest to federal, state, and local governments needing to ensure a long-term return on their significant public investments, fiber is reliable and affordably scalable, with an incredibly high bandwidth limit. A strand of standard single-mode fiber-optic cable has a theoretical physical capacity in excess of 10,000 GHz, far in excess of the entire wireless spectrum combined. Generally, only the equipment used to activate the fiber needs to be upgraded to provide more information bandwidth and take advantage of fiber's incredible long-term potential. For this reason, the vast majority of the world's broadband backbone is fiber, powered by light relay devices that continually push performance boundaries and fuel electronic innovations that make ever-improving middle- and last-mile relays more affordable.

Fiber's most direct technological competitor, the coaxial cable, illustrates many of the reasons fiber is the only real option for future-proof networks. The cable companies have done an impressive job of improving coaxial cable's performance characteristics, enabling the current DOCSIS 3.1 transmission standard used in most areas to achieve download speeds of 1 Gbps or more. However, coaxial cable's substantially higher resistance across distances and other technical limits have required that cable networks employ heavy use of fiber. Coaxial cables send signals via electrical impulses, so coaxial networks must repeatedly boost the signal every few hundred feet to overcome resistance losses. In contrast, fiber-optic cable can carry the equivalent capacity over several miles without amplification. As a result, nearly all networks using coaxial cables are actually hybrid fiber-coaxial systems. Cable companies have been deploying fiber deeper and deeper into most neighborhoods to achieve better performance, leaving only tens of feet of cable between subscribers and their core fiber-based networks.

As upload speeds have become more important, coaxial-based services have gradually been outclassed as well. DOCSIS 3.1-based services generally only offer upload speeds of between one-eighth to one-tenth the download speeds provided to subscribers. In contrast, fiber can easily offer symmetrical

services, with offered upload speeds matching download speeds. As a result, lower-tier fiber plans have offered substantially better opportunities for upload-heavy applications like videoconferencing, video uploading, and file transferring than cable services with equal or even greater download speeds.

Similarly, marketing claims surrounding 5G wireless technologies have often suggested that they are substitutes for wireline broadband service, but they depend upon an underlying fiber network for "backhaul," the process of sending and receiving signals to the entirety of the internet beyond the local area. As each cellular broadcast node handles more information to and from mobile devices over the airwaves, it must increase its use of fiber accordingly.

This fiber requirement is also increased by other properties of 5G wireless networks. Due to the performance characteristics of the sections of the spectrum allocated to them, 5G services actually offer two different sets of performance characteristics.

The millimeter wave band of spectrum has been lauded for its ability to produce speeds of 1 Gbps or more in certain circumstances. However, this section of the spectrum cannot be transmitted longer than about a mile in optimal point-to-point conditions and approximately 1,000 feet in point-to-multipoint use—and can be completely blocked by a variety of surfaces, including some glass windows and trees. 5G millimeter wave transmission antennas must be deployed significantly more densely than 4G antennas to improve signal reliability, and they require even more fiber, deployed more closely to end users, to connect those towers to the internet. As a result, these high-speed wireless services are likely to be cost feasible only in dense areas that justify the deployment expenses, such as stadiums, airports, and busy city centers.

In contrast, the other portions of the 5G spectrum, such as the highly anticipated mid-band, offer incrementally better performance characteristics relative to 4G LTE services—but these improvements are not capable of satisfying most users' current wireline broadband demands, let alone keeping up with the rapid annual increase in broadband demand.

6.5 Insist on qualifications, standards, and best practices that promote quality and safety

A community entering into a public-private partnership has an opportunity to ensure that its partner holds the technical, financial, and managerial qualifications that will serve to protect the community's interests and financial investment—as well as increase the competitiveness of any grant application to the state that is part of the effort.

The community can also ensure through the selection and contracting process that the qualifications of and work done by its partners align with best practices in quality and safety, for the public, for the partners' employees, and for any subcontractors involved in deployment.

These critical, protective performance standards and safety requirements should ideally be built into the competitive selection process and into robust contractual commitments under which the partner agrees to such best practices as a condition of the partnership.

The following examples illustrate the types of considerations communities can include in their selection processes for purposes of ensuring safety and quality.

6.5.1 Technical capabilities

In the technical area, bidders should be required to demonstrate that they use staff skilled and experienced in each project discipline. For example, in outside plant construction, these disciplines may include:

- Excavation
- Restoration
- Microtrenching
- Directional drilling
- Splicing
- Aerial placement
- Pulling fiber through conduit
- Detailed engineering design (requiring professional engineering certification in the state)
- Permitting—including right-of-way, environmental, and historic
- Project management
- Logistics

Bidders should demonstrate that their team members and any subcontractors involved in deployment have professional and training certifications appropriate for the work performed and title. These include professional engineering licenses, BICSI certifications, and certifications from the manufacturers of the materials and systems used. Partners should be required to disclose the identity of any subcontractors involved in construction and provide evidence that those contractors are properly licensed and bonded and have a demonstrated track record of safe and high-quality work.

6.5.2 Managerial capabilities

In the managerial area, bidders should be required to demonstrate that they have executive and technical leadership, with people who have successfully led projects of similar scale and technical challenge.

6.5.3 Safety

Bidders should also demonstrate their track record and commitments regarding worker and public safety. For example, they should explain that they comply with standards and frameworks such as ISO 18001 and ISO 45001 (occupational health and safety management systems) and ISO 45005 (work in a pandemic).

They should demonstrate a program of in-house or external safety training (such as OSHA 10 and OSHA 30), including training specific to the processes and technologies they use.

Safety training and certification should cover general construction safety as well as specialty areas, including:

- Confined space
- Traffic control
- High voltage
- Work on aerial utility lines
- Bucket truck operation

Further, bidders should be required to provide their compliance track record and records of incidents, as well as the methodology for collecting the data. Ideally, the community would know of any violations of Occupational Safety and Health Act and other federal laws designed to protect workers and the public.

Based on best practices, bidders should describe how they verify compliance with safety standards and practices and demonstrate how continuous improvement takes place. Each should have processes for monitoring safety and implementation of training, identifying policies and procedures related to health and safety, developing performance indicators, reviewing incidents, and performing audits. And communities should recognize that reasonable expectations regarding deployment timelines constitute one element of compliance with safety practices; given that contractors and subcontractors are sometimes paid by the job, they are effectively incentivized to rush work, cutting corners on both safety and quality. Reasonable timelines and robust oversight are important safeguards of safety and performance compliance.

Endnotes

1 Based on public statements from incumbents, including AT&T, Verizon, Lumen, Frontier, Windstream, Consolidated Communications, Cincinnati Bell, and others, as well as recent private equity investments in competitors like MetroNet and Wyyerd, we estimate investment of $40 billion to $60 billion in fiber-to-the-premises infrastructure in the next decade.

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38 "Coronavirus State and Local Fiscal Recovery Funds: Interim Final Rule, 31 CFR Part 35," p.70, 75; "Broadband Grants," Office of Broadband, Illinois Department of Commerce & Economic Opportunity, Broadband Grants, https://www2.illinois.gov/dceo/ConnectIllinois/Pages/BroadbandGrants.aspx accessed (October 20, 2021); "Broadband Acceleration Grant: Program Guidelines FY2021," Kansas Office of Broadband Development, https://www.kansascommerce.gov/wp-content/uploads/2020/11/Broadband-Acceleration-Grant.pdf (accessed October 20, 2021); "Universal Broadband: Deploying High Speed Internet Access in NYS (Jul. 2017)," New York State Association of Counties, https://www.nysac.org/files/BroadbandUpdateReport2017(1).pdf (accessed October 20, 2021).

39 "Annual Report of the Governor's Task Force on Broadband," p.14, Minnesota Governor's Taskforce on Broadband, December 2020, https://mn.gov/deed/assets/2020-bbtf-annual-report_tcm1045-466512.pdf (accessed October 20, 2021); "Connect Illinois Broadband Grant Program: Frequently Asked Questions (FAQ)," p. 1-2, Office of Broadband, Illinois Department of Commerce & Economic Opportunity,, https://www2.illinois.gov/dceo/ConnectIllinois/Documents/Connect%20Illinois%20FAQ%202.24.20.pdf (accessed October 20, 2021).

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