



OWN YOUR INTERNET:

HOW TO BUILD A PUBLIC BROADBAND NETWORK

by Bill Coleman, Community Technology Advisors
for American Association for Public Broadband



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for Public Broadband

Published by the Benton Institute for Broadband & Society
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FOREWORD

For decades, public broadband networks have been successfully serving hundreds of communities with fast, robust, and affordable internet access. Unlike private-sector networks, municipal, tribal, and other community- and member-owned broadband networks are focused on ensuring universal, robust connectivity at affordable prices. The results have been remarkable. Small cities and regions like Chattanooga, Tennessee; Wilson, North Carolina; Morgan, Utah; and the Massachusetts Berkshire region have been transformed into vibrant centers of economic opportunity, education, and culture.

The COVID-19 pandemic awakened a new interest in public broadband. In an instant, children had to attend classes online, workers had to do their jobs virtually, families and friends had to connect via the internet, and the sick had to visit with their doctors remotely. When it became clear that private network operators were not going to ensure that everyone had an affordable and fast broadband connection, cities and towns took matters into their own hands and started building their own networks.

The growth of public broadband networks has been striking. The Institute for Local Self-Reliance recently reported that as of the end of 2023 there were nearly 450 community-owned networks across the United States, with dozens more projects in the planning and construction phases. In addition, the National Rural Electric Cooperative Association reports that there are more than 200 member-owned cooperative broadband networks. Public broadband networks consistently score at the top of customer satisfaction surveys—indeed, Longmont, Colorado’s NextLight was named PCMag’s Reader’s Choice award for Top Home ISP for 2023. With communities looking to promote economic development, build smart cities, and attract new residents, it is clear that this is public broadband’s moment.

Yet for all of the progress that public broadband networks have made in recent years, there are still many communities that want to explore network ownership but don’t know where to begin. That’s why the American Association for Public Broadband (AAPB), partnering with the Benton Institute for Broadband & Society, has developed this handbook. It sets out, in simple terms, the key decisions a community and its leaders must make, as well as the concrete steps they must take to build a successful public network. The handbook also provides a list of resources that can help with both—including law firms, financial advisors, public relations firms, construction firms, equipment vendors, grant applications and management platforms, operational and business support systems, and firms that design, build, and operate networks.

Developing and executing a plan to build a public network is not an easy task for any community. There will be challenges—be they logistical, technical, financial, or political. But the economic and social benefits of community network ownership will certainly be worth it. This handbook is designed to help you address those challenges so your community can benefit from everything that broadband enables.

An online counterpart to this handbook will be updated with more information and resources. In the near future, AAPB will add a mentorship program that seeks to pair a community considering building a public network with another that has successfully done so. The goal is to double the number of public networks over the next five years. Given the resources available for broadband deployment and the increased interest in the public broadband model, AAPB believes that this goal is achievable.

I want to thank Bill Coleman for his diligence and patience in taking on this project, Kevin Taglang for his careful eye and thoughtful edits, Adrienne Furniss for putting Benton's resources behind this handbook, and the AAPB board—Angela Bennink, Bob Knight, Scott Menhart, Kimberly McKinley, and Peggy Schaffer—for having the vision and the drive to create this vital organization.

Gigi Sohn

Executive Director

American Association for Public Broadband

INTRODUCTION

Residents and businesses are asking community leaders for competitively priced, affordable, and reliable broadband services to support all connectivity-dependent uses, including work, education, health care, and business—and deliver ever-increasing capacities. In today’s world, that means gigabit per second (Gbps) symmetrical services, far beyond the Federal Communications Commission’s outdated 25 megabit per second (Mbps)/3 Mbps national standard. Clearly, communities will not be competitive in attracting new residents and business investment without world-class broadband.

There are multiple pathways, ranging from Active to Proactive, to better community broadband infrastructure. Here are some examples:



This handbook focuses on the steps that can lead to a publicly owned broadband network. While every community will take its own unique path, there are well-established critical steps necessary on a successful decision-making and implementation journey.

There is not a single definition of public broadband. While some consider a public broadband network to be only networks owned and operated as a public utility with the public entity as the

REQUEST for PROPOSALS / REQUEST for INFORMATION

Internet Service Provider (ISP), the AAPB includes many public-private partnerships and cooperatives under the category of “public.” For the AAPB, the common denominator is that the community owns some portion of the communications network infrastructure. Public-private partnerships in which the public role is limited to providing a financial subsidy to a private-sector network owner/operator would not be considered in this definition.

Public officials are often too quick to discount the public broadband option. Discarding this option too early bypasses consideration around a wide array of public network benefits and surrenders a valuable negotiating tool in dealing with incumbent providers.

Hesitancy factors:

- Lack of technology knowledge
- Time and expense necessary to determine feasibility
- Uncertain path forward
- Fear of taking on significant new government responsibilities
- Fear of multimillion-dollar network construction costs and public debt
- Incumbent provider lobbying
- Public-sector broadband challenges
- Lack of awareness of success stories

Communities may find that by just considering a public broadband network, they may bring increased attention from incumbent providers and stimulate short-term network investments and promises of more upgrades. These public discussions also attract prospective ISP partners and discussions of public-private partnership.

What Are the Best Roles for the Public Sector in Broadband Infrastructure?

According to the U.S. Department of Homeland Security’s Federal Emergency Management Administration (FEMA), infrastructure “includes, at a minimum, the structures, facilities, and equipment

Throughout the public broadband planning process, a public entity may choose to use either a [Request for Proposal \(RFP\)](#) or [Request for Information \(RFI\)](#) process, or a combination thereof, to select vendors and/or project partners. Communities must always be aware of and follow their own state’s and local procurement and contracting processes before finalizing purchase or partnership arrangements. Most public entities use either RFPs or RFIs on a regular basis for all kinds of public construction and services.

These RFP/RFI tools may be useful during both planning and implementation phases. There are many examples online. In the planning phase, communities may be selecting vendors for surveys, marketing, engineering, and business planning, as well as selecting ISP partners. During implementation, there would be many selections of equipment vendors, contractors, and finance and marketing services.

In general, an RFP is a formal document that describes a project and desired services in detail to ensure a competitive bidding process. The RFP describes the necessary qualifications of prospective bidders, the overall project scope, specific work tasks, and required timelines. A bidder would describe their qualifications, previous relevant work experience, key staff dedicated to the project, hourly billing rates, and/or total price for the desired services.

The RFP would describe how projects would be evaluated and any scoring system. Once proposals are received, they are generally reviewed by an internal team, possibly assisted by an external advisory team, to independently score and evaluate the

for roads, highways and bridges; public transportation; dams, ports, harbors, and other maritime facilities; intercity passenger and freight railroads; freight and intermodal facilities; airports; water systems, including drinking water and wastewater systems; electrical transmission facilities and systems; utilities; broadband infrastructure; and buildings and real property; and structures, facilities, and equipment that generate, transport, and distribute energy including electric vehicle (EV) charging.”

City, county, and state governments are often the primary infrastructure providers—roads, sewer and water systems, and airports and ports are prominent examples. Beyond these traditional infrastructures, the public sector is also quite adept in delivering electrical services. According to the [American Public Power Association](#), one in seven Americans, representing more than 2,000 communities, are served by public power utilities, with lower rates and higher reliability than investor-owned utilities. According to [Statista](#), there are more than 450 municipal electric utilities in the United States.

Existing municipal electric utilities are likely to diversify into broadband services for the following reasons:

- They already deliver utility services to the entire community, often with an excellent track record.
- They have existing back office, technical support, billing systems, utility poles, and trained technicians.
- Fiber-optic and/or wireless networks are already used to connect substations and meters due to growing requirements for smart grid management and to monitor smart meters and connected electric devices, including electric cars and solar systems.
- Electric utility policymakers recognize the community benefits of locally owned utilities.

The [Institute for Local Self-Reliance](#) calculates that there are approximately **450 community-owned networks** in the United States. In addition, there are an **additional 200 or more cooperatives** offering broadband services, many of them delivering services across wide swaths of America, including both small communities and the rural countryside.

proposals. Cost may or may not be the most important scoring factor. Public entities are generally required to select the proposal with the highest score.

An RFI is a less formal process that public entities can use to select project partners. An RFI is generally used to promote an opportunity for various vendors to make themselves known to a public entity seeking services. An RFI describes the general opportunity, though not necessarily a specific and detailed work plan. Respondents describe their firms, relevant experience, and key staff. They also describe their approach to the work. RFIs generally do not include pricing. An RFI can be used to narrow the field of vendors under consideration.

There are also public-relations reasons to be mindful of how project partners are selected. In particular, the process used to select a broadband provider partner is critical to overcoming community and/or provider objections. Incumbent providers could use the absence of a transparent ISP partner selection process as a public-relations wedge to derail the public broadband project, no matter what the scope of public involvement.

Which Broadband Problem(s) Are You Trying to Solve?

Planning, financing, building, and operating a public broadband network is intense and complex. Success requires a smart blend of community consensus building, engineering, financing, construction management, marketing, and customer service. Understanding why you, as a community leader, would take your citizens down this community decision-making path is critical.

Leaders of successful public networks cite these reasons:

AFFORDABILITY

Public entities often cite affordability as a driving force for broadband network deployment and Internet service delivery. Public entities have significant cost advantages over the private sector: long-term financing, no requirement for shareholder return on investment (ROI), and no outlandish management salaries. Affordability can be one of the key values of a public utility that can support other community goals of quality education, economic development, community building, and other considerations. In addition, public entities can offer more consistent and transparent pricing schedules so that customers have a clear understanding of the cost of the service.

UNIVERSAL SERVICE

When considering a broadband deployment, a public entity is likely to set a goal of high-quality broadband that extends equally to all residents and businesses. Community broadband planners often identify wide variations of service availability across their city or county, no matter which technology is in place—fiber, fiber-coax, copper telephone lines, or fixed wireless. Private-sector operators may determine that some community locations are financially unfeasible for new network investment or infrastructure upgrades, leaving customers behind and extremely frustrated. Public entities are likely to be more responsive to these customers' concerns and complaints.

LACK of COMPETITION

Many communities suffer from a lack of broadband competition. At best, there may be the two legacy incumbent providers—a cable operator and a telephone company. (Cable networks generally have much higher capacity.) In most communities, the cable company dominates the local marketplace. The telephone company's DSL service generally provides attractive pricing, but at much slower internet speeds. Even where the incumbent telco upgrades its network to fiber-to-the-home (FTTH) or fiber-to-the-curb (FTTC), thus providing two wired options, the nature of the competitive marketplace is unlikely to significantly change.

When communities attract a third wired provider, especially when it is a FTTH network, the local marketplace drastically changes. Providers must compete to maintain the minimum market share necessary for profitability and sustainability. Incumbents generally boost speed and/or cut subscription fees to maintain market share, especially as the new network is being constructed.



OUTDATED INFRASTRUCTURE

Historically, legacy cable TV companies use a fiber-coaxial cable network. While these networks can deliver a gigabit download speed, upload speeds are generally in the 40-50 Mbps range. New cable modem technology promises symmetrical speeds in the future, but many legacy cable companies have switched to FTTH technologies in new housing for capacity and cost reasons.

Legacy telephone companies use a fiber/twisted-pair copper network to bring fiber to DSL access nodes. While these companies may market speeds of up to 100 Mbps, speeds vary significantly across neighborhoods due to varying distances from the electronics nodes and the condition of the copper. Communities doing due diligence may find that DSL customers may receive speeds of less than 10 Mbps/1 Mbps. These network shortcomings are exposed in the incumbent company's own online DSL ordering tools where prospective customers can enter their address and find expected DSL speeds.

UNSATISFACTORY CUSTOMER SERVICE

Many business stories document Americans' frustrations with large-ISP customer service. From the ordering experience to billing to troubleshooting and repair, these companies often fall far short of customer expectations. Community broadband surveys allow respondents share their stories of slow speeds, outages, and slow response. These surveys can generate page after page of customer tales of woe.

In smaller communities and due to repeated service calls, residents may be on a first-name basis with the repair techs who struggle to keep obsolete networks in working order.

LACK of COMMUNITY ENGAGEMENT

Large ISPs often fail to be active community partners. Community engagement is demonstrated through financial support and/or leadership time and talent. Economic development and digital equity initiatives are two areas in which ISPs should have an enlightened self-interest in community participation. Wide-ranging experience with community broadband initiatives shows that many community officials would have no knowledge of even whom to contact at their ISP to discuss their participation.

Why Might Public Broadband Be the Solution?

When considering a public network solution, it is critical to remember that the public and private sectors have significantly different decision-making lenses. The private sector, whether publicly traded or privately held, has profit as its prime motivator. The profit and loss statement (P&L) and the balance sheet are the key measures of success. In fact, the leadership of a publicly traded company has a fiduciary responsibility to seek the highest possible return on investment for the shareholders. A privately held company—especially a small, locally owned firm—can consider other factors as well.

A public network has community benefit as its primary purpose.

On the other hand, a public network has community benefit as its primary purpose. The network's P&L and balance sheet include additional lines absent from those of private network owners, such as school technology initiatives, public health, and economic development. Budgets are indicative of an organization's values, and public networks' budgets clearly express their community-focused priorities.

Fiber-optic cabling, fiber conduit, and network operations centers all have a useful life of at least 25 years. Cities and counties generally use long-term bonds to finance infrastructure, matching the term of the loan to the infrastructure life span. This patient capital increases the network's financial viability and spreads costs to current and future users. In contrast, private companies and their lenders require a much faster return on the capital investment with shorter borrowing time frames.

In addition to financial sustainability, key community goals might include:

- **Ensuring that all residents have high-quality, affordable access**
 - Provide free internet to students
 - Offer pricing to match the benefit of the FCC's Affordable Connectivity Program (ACP)
- **Spurring economic development**
 - Serve on local economic development boards
 - Provide dark fiber as an economic development incentive
 - Promote a tech-savvy community

Dark fiber is fiber-optic infrastructure that is unused or not yet "lit," and can be leased out to companies or organizations that need a network solution.

EXPECT OBJECTIONS

- **Supporting the local education system**
 - Interact with the education system at all grade levels
 - Offer job shadowing/internships
 - Provide connectivity
- **Providing good local jobs**
 - Offer full-time jobs with benefits
 - Offer career path ladders
- **Supporting the local health care system**
 - Enable telehealth applications
 - Provide tech support to homebound residents
- **Keeping dollars local**
 - Ensure that subscriber dollars stay in the community
 - Use local suppliers
- **Improving quality of life**
 - Reinforce that all the above make a community a better place to live

Public infrastructure can also be a strong foundation for the more effective delivery of public services, including smart city applications, public safety networks, smart electric and water meters, streetlights, and traffic signals. Local governments can easily try new innovations with little or no cost for connectivity and then broadly deploy successful applications. Imagine the ongoing costs of hundreds or thousands of connections when dependent on a non-public network—that can stop innovation before it even starts.

Another advantage is the ability to deploy public Wi-Fi access points in public buildings, parks, community centers, and targeted residential areas.

Finally, a public network provides a built-in match for grants of all types. By being able to offer free or discounted connectivity, the local government and the community not-for-profit sector become immediately more competitive.

Considering the relatively poor broadband services delivered by many incumbent providers combined with the numerous benefits described above that a public broadband network can deliver, incumbent providers recognize that deployment of a new, public-sector network is not in their best interest. Provider opposition is fueled by fear of loss of market share and revenue. Even antiquated telephone networks used to deliver slow DSL broadband generate significant revenue that is sure to plummet when consumers have a choice of a reasonably priced, high-quality fiber broadband service.

Incumbents are usually quick to mobilize and lobby government officials about the risks of publicly owned broadband networks. In addition, industry will provide financial backing to research and advocacy organizations that support the anti-public-network movement. Those organizations may actively attempt to mold public opinion with newspaper and radio ads, direct mailers, and conversations with key community leaders.

Generally, the incumbent, legacy cable company has an ongoing relationship through a franchise agreement that governs the company's use of public rights-of-way including franchise fees. These are generally long-term agreements. Periods of significant interaction arise when agreements are being negotiated. Less interaction is common once an agreement is reached. Larger communities may have more ongoing communications than smaller, rural communities.

PUBLIC BROADBAND PATHWAYS

Role of Community Leadership

Community broadband leadership can emerge from the top down—by either elected officials or top-level administrators—identifying community broadband as either a proactive strategy for economic and community development or a reaction to community complaints—or from the bottom up—with organized efforts by community activists advocating for better broadband networks. In either case, community broadband initiatives require active engagement and advocacy at all community leadership levels.

Broadband advocates need to focus on messaging that targets leaders from all sectors of the community.

From the very start, broadband advocates need to focus on messaging that targets leaders from all sectors of the community—government, schools, health care, chambers of commerce, agricultural interests, and others. Specific messaging should be developed for key demographic groups, like senior citizens and parents of school-age children. This kind of messaging can help to build a coalition that can provide both input and support through combined community connections.

Over the past decade or more, many communities have pondered the best approach to improving their broadband access. For some, getting better access to broadband is the goal and how it is achieved is not considered important. For some, the question is defined primarily as “How can we get incumbent Company A to improve broadband service in our community?” Others might say, “We need Company B to come to our community because Company A refuses to do the job.” Yet another community might say, “If we want this job done right, we need to do it ourselves!” In this category, there are some people who might think that this is the best possible approach; for others, it is a choice of last resort.

Over time, each community finds its individual path to better broadband taking into account its own unique mix of factors around geography, demography, past community experience, incumbent providers and prospective provider partners, community asset base, and community leadership. Adjacent and/or similar communities may make very different choices in achieving broadband improvements. One may take a strictly private-sector approach; another will engage in a public-private partnership; a third community

Each community finds its individual path to better broadband taking into account its own unique mix of factors.

may pursue a municipal or county utility model. These communities likely undertook steps like those below and came out in very different places. But what is most critical is that each community has the freedom to choose the broadband network that meets its residents' needs.

Defining Your Community

Public broadband networks can encompass a few blocks, a neighborhood, a city, multiple towns or cities, portions of or a complete county, or an entire rural region. Some entities like an electric cooperative may be legally or politically bound by a defined service area. A city government may decide that the easiest and clearest path is to stay within municipal boundaries.

Broadband advocates may decide that a larger geographic area would be beneficial. Operating efficiencies, regional economic development, ubiquitous coverage, and political heft are some reasons for going bigger.

Each state may have its own unique rules for how local governments can collaborate. Most local governments are already engaged in these types of partnerships for public safety, public and mental health, transportation, and/or corrections. These relationships result in joint powers boards and agreements.

Open access networks are those in which the owner/operator leases out portions of the available bandwidth to multiple providers.

Some states have created formal frameworks specifically for utilities. Washington has 28 electric public utility districts (PUDs) that were early movers on [open-access, middle-mile](#) broadband networks. In 2021, PUDs were granted authority to deliver retail telecommunications services. Vermont created a unique, broadband-centric model called Communications Union Districts (CUDs) to support regional collaboration. The state has provided startup funds, with each district pursuing its own unique strategy. Three of these CUDs are highlighted in the profiles that are part of this handbook.

Tribal governments have been engaged in broadband deployment strategies, especially large, land-based tribes with established reservation boundaries. Traditionally, tribal lands have some of the worst telecommunications services, combined with digital equity barriers. Tribes have implemented a variety of solutions, from community technology centers to reservation-wide fiber and/or wireless networks. Tribes often pursue broadband network deployment as part of a multiprong strategy for enhanced economic development, health care, education, and tribal sovereignty.

Determining the reach of a network requires considerable consideration and discussion. With larger geographies and multiple jurisdictions, a range of issues emerge, from financing formulas to construction schedules.

The middle mile of a network is the connection from the internet backbone, the data centers and major lines (including transoceanic cables) to the last-mile connections serving individual residential and commercial buildings.

Broadband Planning Steps

CREATE and SUPPORT A COMMUNITY BROADBAND TASK FORCE

When communities begin to seriously discuss improved broadband infrastructure and services, the most common first step is to recruit and appoint a task force of stakeholders to advise policymakers on options.

Most task forces have a dozen or so members, though some teams have 20 or more members.

The task force should include:

- Recognized leaders whose opinions carry weight in the community
- Diverse membership from various sectors and community groups
- Some technology experts
- Both supporters and skeptics

The task force must have logistical and administrative support from a sponsoring organization and a plan to develop a set of recommendations with a reporting deadline. This handbook provides a description of activities for the task force to consider. There is a wealth of community broadband planning toolkits—this handbook has a unique focus on publicly owned networks. A list of these resources is included in the Resources and Links section of this handbook.

GATHER and SHARE CRITICAL INFORMATION

Community surveys are critical to measure service satisfaction levels and gather data on service quality, broadband speeds, and customer interest, by location, in improved service offerings. The results can be used to inform the opinions of two important audiences necessary to move the community forward toward a decision to proceed on a broadband initiative of any form: community residents and elected officials. The survey data, at both the address and community levels, can be built into the business case and/or grant applications for the community or any prospective ISPs. Survey data at the address level create a more streamlined and targeted sales cycle for ISPs seeking new customer commitments. Gathering and reviewing customer bills is another informative tactic.

Community meetings are essential to both gather information and share project progress. Leaders can respond to questions and begin to identify and respond to objections. These meetings are also an opportunity to identify and recruit additional community champions from the general citizenry, such as technologists, tele-workers, and home-based entrepreneurs. Sector focus groups—businesses, older adults, health care providers, public safety officials, families with children—can also be used to generate market information.

Provider interviews help to build relations with the current and prospective provider communities. Initial meetings can be informal and used to collect information about existing provider services, planned improvements, and how your community is viewed as a potential market by new providers. These meetings can be a first step to developing relationships that can lead to a project partnership. Meeting with incumbent providers can be productive to spur infrastructure and service improvements. At a minimum, these meetings can provide cover from political objections by

incumbent providers. Adopting a community broadband vision in advance of provider meetings is a way to ensure that broadband providers understand community expectations.

SET A VISION, GOALS, and DESIRED OUTCOMES

Take time to develop a community consensus on vision, goals, and desired outcomes.

Take time to develop a community consensus on vision, goals, and desired outcomes. Communities need to have consensus on technologies, timelines, and roles. Keep in mind the adages “Go slow to go fast” and “Making progress at the speed of trust.”

Holding these initial discussions early in the process can help team members understand other members’ perspectives and can broaden each member’s concept of the importance of broadband. Teams will want to revisit and update these statements based on new knowledge and emerging partnership opportunities.

CONDUCT FEASIBILITY and MARKET STUDIES

A feasibility study is an essential business planning tool that combines multiple study elements into a comprehensive analysis. The feasibility study will not provide a “yes” or “no” answer, but instead a “how” to make a project financially and technically feasible while meeting community goals. The feasibility study should be viewed as a decision-making funnel where a consultant is gathering information, including that noted above, and providing implementation options. An independent third-party feasibility study provides reliable information to facilitate successful negotiations with potential broadband provider partners, construction firms, and suppliers.

The market study focuses on the total community demand for better access to broadband, combining the community survey data noted above (this can be conducted independently or as part of the feasibility study), competitive market analysis including incumbent service offerings and pricing, community demographics, and market opportunities with major customers/anchor institutions and residents.

PREPARE ENGINEERING and COST ESTIMATES

The feasibility consultant will evaluate technology alternatives considering community vision, population densities, and terrain analysis. The consultant will provide a high-level engineering plan that includes cost estimates for the entire network, including middle- and last-mile fiber deployment and all electronics—at the central office, in the field, and at customer locations.

CREATE A FINANCING PLAN

The financing plan needs to include consideration of both capital and operating costs. Capital costs are somewhat more easily and predictably financed through some combination of bonding and/or grants. Reducing bonding requirements by increasing grants is a preferred path, though many communities considering public networks may already be considered “served” by state and federal agencies, thus reducing grant availability. An increase or decrease in interest rates has a powerful impact on the financing plan and pro forma. Many states have rules restricting how a public entity can use reserve funds to make grants or loans to affiliated entities such as a new broadband public entity.

Operating funds, especially in the early years, are critical to financial sustainability. Operating costs include hiring and training people, occupancy costs for equipment and people, maintenance, and operations. Starting an ISP is resource intensive—installers, customer service representatives, technical consultants, billing systems, and more.

CONSTRUCT FINANCIAL PRO FORMA MODELS

A feasibility consultant will construct dynamic financial models that allow detailed analysis of various implementation choices. The consultant can adjust the take rate, pricing, geographic reach of the network, various expenses, technology choices, capital costs factoring in construction costs, interest rates, and grants and/or subsidies. A financial pro forma may extend out to 10 years or longer as the network operator switches from construction/start-up to operations and technology upgrades. The pro forma highlights areas of risk so that the community fully understands the impacts of construction overruns, time delays, interest rates, incumbent provider competitive response, and other factors.

Project planners need to ensure that sufficient reserves exist to pay both bonds and operating costs in the early, start-up phase of a network. The rapid growth of a network may increase the financial stress on a network plan due to higher-than-anticipated costs for customer home equipment and installation. It should be anticipated that it will take several years before a new network would be able to be cash positive—that is, have the ability to pay off both debts and all operating costs.

Implement the Project

By this time in the process, a community has exerted considerable political capital, energy, and funds to conclude to move forward in the process. Through the feasibility process, the community has most likely significantly narrowed its strategy decisions.

DETERMINE COMMUNITY ROLE

As noted early in this handbook, community involvement can range from cheerleader to direct public funder/grant application supporter to community-owned ISP. As AAPB is a strong proponent of public ownership of some or all of the network elements, this handbook will focus on public ownership strategies.

In the community profiles, readers will note that some public entities have moved incrementally into the broadband ownership arena, while for others, a publicly owned broadband network was the original and primary goal. The former may have begun with infrastructure investments primarily planned to meet the local government or utility's general internal operational needs or that of a public electric utility before expanding access to others. The latter have set out to create a broadband utility.

A broadband network has many components. In general, the farther the public entity deploys network and equipment toward the end customer, the higher the costs but also the increased likelihood that the network will be ubiquitous. A public entity could choose any of the following scenarios:

1. Install Conduit or Duct Only

STRATEGIES

- Communities may have deployed conduit in “dig once” strategies as part of road construction/reconstruction projects or deployed multiple ducts when building a public-sector/anchor institution fiber project.
- Communities may choose to deploy a conduit network as an incentive to encourage competition by enabling multiple ISPs to serve the community, especially in states with significant restrictions on public-sector broadband investment.

BENEFITS

- Communities can make the conduit available to one or more private ISPs to reach new markets at more affordable deployment costs. With proper engineering, multiple ISPs can use the same duct or micro-ducts within the conduit. This would be an “open access” conduit strategy.
- A conduit-only network can be a relatively low ancillary cost to a road construction project.

“Dig once” are policies and/or practices that minimize the number and scale of excavations along highway rights-of-way when installing telecommunications.

2. Open-Access, Middle-Mile Fiber Network

STRATEGY

- Communities can deploy multi-strand fiber-optic networks along major routes in their cities or counties. This type of network could cover a small geography like a downtown or industrial park, or involve hundreds of miles of fiber, possibly linking to adjacent counties. The public would likely choose to lease dark fiber to ISPs that would extend the fiber to customers.

BENEFIT

- Most networks of this type are constructed to support local/regional governments and anchor institutions with the additional benefit of enabling competitive providers with affordable fiber access to reach difficult-to-serve areas, like downtown urban areas with their crowded utility rights of way and concrete streets and sidewalks and as well as low-density rural areas.

3. Open-Access, Last-Mile Fiber-to-the-Curb or -Pole Network

STRATEGY

- The public sector could construct a fiber network that terminates at the curb (buried) or extends to the pole (aerial) and lease capacity on the network to one or more private ISPs that would extend the fiber drop to the home or business.

BENEFITS

- The public sector provides a platform, at significant cost savings versus a full fiber-to-the-home (FTTH) network, for enhanced and competitive broadband with minimal capital expense for the private-sector ISP's FTTH network. The private sector assumes the cost for the fiber drop and fiber termination electronics.
- By selecting this option, the first private-sector ISP to market receives a competitive advantage over later arrivals. The first ISP to market would be able to charge broadband-hungry customers for the fiber drops while those same customers would be less likely to assume that cost for a similar fiber service from a new provider.

4. Open-Access, Fiber-to-the-Home (FTTH) Network

STRATEGY

- A public entity could construct and own the FTTH network reaching from the central office to the home or business, including the electronics at the home. The public entity would lease network capacity to one or more private ISPs. The public entity or a neutral third party would operate and maintain the network.

BENEFIT

- Generally, the ISPs would pay the network owner on a per-customer basis, allowing easy and low-capital-cost market entry. Customers would be able to switch ISPs via an online portal to obtain more affordable, reliable, or unique value-add services.

5. Public Utility Fiber-to-the-Home Network with a Single Public ISP

STRATEGY

- A public entity could construct and own the FTTH network reaching from the central office to the home or business, including the electronics to the home. The public entity would serve as the ISP for all customers. The ISP could decide to offer dark fiber and other special customer services to key customers.

BENEFIT

- By owning and operating the network as a public ISP, the community has strong control over total network operations, including deployment strategies, financing, sales and marketing, and pricing. Communities can be innovative in digital equity strategies and maximize the economic potential of the network for community, economic, and workforce development.

6. Public Utility Fiber-to-the-Home Network with a Single Private ISP

STRATEGY

- A public entity could construct and own the FTTH network reaching from the central office to the home or business, including the electronics to the home, then select a private ISP partner to deliver retail internet services to community residents and businesses.

BENEFIT

- The community benefits in the long term by owning the network assets while being relieved of the responsibility of delivering retail services to its residents. Smaller communities may not have the necessary scale to stand up a complete customer-service initiative. Other communities have a preferred community-centric private ISP partner that is well known for excellent customer service.

SELECT PROJECT PARTNERS

Broadband projects involve a range of public- and private-sector partners determined by the selected community role noted above. Some may debate whether these are partnerships or customer relationships. While some of these may be short-term engagements—like the feasibility consultant or construction contractors—many of these will likely be long-term relationships. Agreements should be designed with exit provisions should the partnerships become suboptimal.

Prospective partners include:

USERS

- Other public entities, including state agencies, local and regional anchor institutions, and tribal governments
- Major private-sector users, like multi-location employers

NETWORK PARTNERS

- Feasibility, design, equipment, and construction
- Vendors selected through appropriate competitive processes provide consultation and services necessary to design, equip, and build the network
- Operations
- Installation, customer care, billing, fiber locations, etc.
- Marketing
- One or more vendors to design and/or implement marketing strategies to attract network customers
- ISP(s)
- Contract with one or more ISPs to offer internet services on the network, either as the agent of the public entity, as a sole provider on a network lease basis, or in a competitive environment where multiple ISPs are delivering services

OBTAIN FINANCING

Financing availability and terms strongly influence the financial success of a network. It is critical to create a finance team that understands public-sector infrastructure finance as well as the operational requirements for financing. See the discussion on [page 27](#).

CONSTRUCT the NETWORK

Public entities are generally used to implement large-scale infrastructure projects with the use of private contractors, but they generally lack telecommunications infrastructure experience. If there will be a private ISP operating the network, it should be a part of the construction team so that the network meets its needs.

IMPLEMENT MARKETING and SALES STRATEGY

In many of the above scenarios, there is little need for sales and marketing consulting services. However, in any case where the public entity will be the ISP, there is a need for a robust sales and marketing effort. Some existing public utilities may have strong communications capacities in place that can be utilized, alone or in conjunction with specialty marketing firms with broadband marketing expertise.

The profiles in this handbook illustrate the wide range of roles from which a community can choose. Defining community and partner roles is an important task that is dependent on community policy choices, implementation capacity, and goals. Some communities choose to limit their involvement to legal agreements and provision of funds. Others choose to finance, construct, and operate a network. There is no cookie-cutter route to follow to create a community-owned network, but rather a range of models from which to choose and/or create a unique approach.

Technology Choices



A public network owner could deploy a single technology or multiple technologies to cover its service territory. Coverage could be an urban residential neighborhood or a downtown area or business park, the entirety of a small town or large city, or one or more rural counties. Selected technologies could be FTTH, Wi-Fi, or fixed wireless, each with a different set of bandwidth capabilities, deployment timelines, and capital and operating expenses. The right technology choices depend on the community's specific goals.

A FTTH network is the gold standard of broadband infrastructure. Current fiber technology allows customers to receive up to 10 Gbps symmetrical service. Increasing numbers of fiber-based ISPs are offering minimum speeds of 100 Mbps symmetrical up to a 2 Gbps service. Fiber infrastructure is a generational investment with an expected life span of at least 30 years. As network electronics improve over time, the capacity of these networks is certain to increase. Beyond speeds, fiber is superior in reliability, expected life span, expected electronics life span, and overall maintenance costs.

Fiber networks might be the best choice when:

- Existing urban services over coaxial cable or twisted-pair copper are lacking due to capacities, pricing, and/or customer service.
- A government wants to build a fiber network to serve anchor institutions (schools, libraries, hospitals, government agencies) within a single community, a county, or a region.
- Unserved/underserved rural areas need high-quality services to support agriculture, rural business, tele-workers, and daily living, especially if the area is poorly suited for fixed wireless services.

Fixed wireless services might be the best choice when:

- An area is well suited for wireless, such as an agricultural prairie with few hills and/or trees, many options for radio placement such as water towers and grain elevators, and with available fiber middle-mile backhaul.
- A provider with a midterm goal of fiber deployment wants to build a middle-mile network that can support wireless deployment in the short term and fiber-optic networks in the mid- to long term.
- A community wants to provide free or low-cost services within targeted physical areas—such as a downtown neighborhood or to targeted populations who may live in multifamily and/or affordable housing.

Within the wireless category, there are many considerations related to licensed versus unlicensed frequencies, fixed wireless versus Wi-Fi, and delivery of end-user broadband services over wireless or wired networks. For example, with an apartment building, a provider could use fixed wireless to provide a gigabit connection to the rooftop and then use either Wi-Fi or existing building wiring to reach consumers.

Ownership and Operating Models

A wide range of ownership and operating models can be considered in planning a broadband network with public-sector involvement. Network ownership and network operations are flexible categories as well, with different options for community involvement. This is true for both wired and wireless networks.

When deciding to invest in network infrastructure, project planners should decide in advance their strategy for maximizing the value of the network and the community role in service delivery.

There are three primary scenarios with significant differences in community involvement:

- Provide broadband as a public utility whereby the community owns the network and delivers retail services.
- Build and own a network that is leased to:
 - A single provider that will deliver retail services; or
 - Multiple providers that will deliver retail services through an open-access model.
- Incentivize a private provider to own and operate a network that delivers retail services by providing a financial grant or other incentives or by committing to purchase network capacity to connect community facilities, either through dark fiber or lit services.

NETWORK REACH OPTIONS

The community could construct and own the entire network or decide to limit ownership to individual parts of the network. For example, some communities install only conduit or create a middle-mile network that reaches community anchor institutions.

A public entity could own any or all of these fiber network components:

- Network operation center (NOC or “meet me” room) and/or video head-end
- Conduit
- Fiber-to-the-node (middle mile)
- Fiber-to-the-curb (from the node to the front of the home)
- Fiber-to-the-home

In a wireless network scenario, the public sector could own the following components:

- Network operation center
- Middle-mile fiber routes
- Tower sites
- Towers

By installing large conduit or extra fibers, the community can enable private-sector investment by providing conduit access and fiber ownership/Indefeasible Rights of Uses (IRUs) or both. Communities often have existing computer rooms with redundant fiber routes, as well as backup power and cooling equipment. They could lease excess space for a prospective provider’s NOC.

If creating a multi-provider, competitive broadband marketplace is a key goal, an open-access model is a smart strategy.

If creating a multi-provider, competitive broadband marketplace is a key goal, an open-access model is a smart strategy. Open access allows multiple providers to enter the market and deliver retail services over the publicly owned network. Some communities choose to begin with a closed model to attract a single provider partner who gains a “first in” advantage and then transition to an open-access model. This can be true with both fiber and wireless network assets. The initial provider may be required to bring financial resources into the project in exchange for that competitive advantage.

An open-access model allows commercial ISPs to use the publicly owned network elements to reach their targeted customer base, ranging from large anchor institutions and business customers to specific neighborhoods to the entire community, depending on their business strategy. The farther the community extends the network into the community absorbing the majority or all of the construction costs, the easier it is for private ISPs to acquire new customers as installation costs are minimized, ensuring maximum customer choice of ISP. By building all the way to the customer, the community is supporting a very competitive marketplace with low barriers to entry for new ISPs.

If the community builds only to the node or curb, competitive providers must bear the cost of connecting each customer to the network, whether it is a significant build or just a 50-foot drop to the home. Smaller ISPs may not have the funds or construction expertise to reach customers, and the fiber termination electronics can be expensive. Once connected, that customer is less likely to have additional provider choices.

Electing to partner with a single provider can also be a good choice, especially in a smaller community. A single provider can make the investment in customer-service staffing that is supported by the customer base that might not be possible in a fragmented marketplace. A single provider might be expected to bring financial participation to the partnership in order to make the project feasible. A single provider also reduces the complexity of financial modeling and ongoing financial management. Some communities prioritize the selection of an existing or nearby well-respected community-centric provider—such as an electric or telephone cooperative—as their first choice.

OPERATIONS MODELS

Some communities may decide that a public utility is the best way to provide high-quality, affordable broadband services in their communities. It may have the scale and capacity to maintain and operate the network and thereby meet the needs of the community.

Others may determine that while investing in physical infrastructure is sound policy, delivering ISP services is beyond their capabilities or comfort level and their best approach is to contract with an ISP to manage the delivery of service.

In this case, a community could:

- **Contract with a single ISP to operate the network and deliver retail services to consumers. An agreement to sell the network over time to this provider is an option.**

- Pursue an open-access model by contracting with a network operator to manage a multi-provider environment.
- Utilize the cooperative model to:
 - Create a new broadband cooperative.
 - Encourage an electric cooperative to become an ISP.
 - Promote cooperation between cooperatives.

Targeted Strategies

Some communities may decide to take a limited or incremental approach to a public network. A community can take an inventory to better understand its current costs of purchasing internet services at what may be a long list of locations spread across a community or county. Purchasing may even be happening by individual departments within an organization. By building a public network, a governmental entity can achieve significant long-term cost savings.

By mapping these locations and prospective fiber routes connecting them, a community can identify other prospective public-sector partners, such as schools or hospitals. By sharing large bandwidth purchases, competitive pricing can be realized by the public-sector entities. It is also possible to utilize E-Rate and other federal and state broadband funding programs to minimize local costs. This type of institutional network could be a gateway to a community-wide public network. Check with your local school or hospital administrator or IT director for details on how E-Rate funds are allocated to your community.

A community could also expand its prospective partner list to include major private-sector organizations. As an alternative, this type of aggregated customer base could also serve as an attractor for a competitive private-sector provider to enter the local market and build a citywide network. This might involve a co-build where multiple conduits are installed and the public and private sectors light up their own sets of fiber to serve their respective customer bases.

A public fiber network can also be leveraged for community and economic development benefits. A network could allow public uses such as Wi-Fi in downtowns and festival areas, create smart public infrastructure—water, sewer, traffic and streetlights, and public safety through cameras and “smart shot” applications. Bandwidth-hungry and multi-location companies might be attracted or retained in downtowns and business parks by being providing with free or affordable dark fiber connecting them to their other local or regional facilities or to major internet hubs.

Enhanced digital equity can be a major benefit of public networks. Free public Wi-Fi at community centers and other locations can be supported. Multi-family buildings can be connected, with Wi-Fi provided in common areas or to each unit through either a wired or wireless connection.

Financing

There are multiple financing advantages that the public sector enjoys when compared with the private sector. Each state has a unique set of public finance rules and regulations, especially regarding telecommunications networks and services. Be sure to consult with your public finance advisors for specific information about financing rules in your state.

Local units of government fund their operations through a variety of taxes and fees—like property taxes, sales taxes, franchise fees, and water and sewer charges. Most of these taxes and fees support current operations for utilities, public safety, and other day-to-day functions.

When a government wants to make a large capital investment, it generally issues bonds whereby the private sector provides the capital, which the government pays back over time through either general tax revenue or a dedicated revenue stream. In general, the length of the bond is equal to or slightly less than the life of the financed asset. The long-term financing provides two benefits. First, the term makes capital investments more affordable. The long term also provides for some level of equity as people who may be using a facility sometime into the future will assume their share of the cost of that asset.

There are two primary kinds of government bonds: general obligation and revenue. Both give the government the ability to finance capital assets over a lengthy term—10, 15, or 20 years at affordable interest rates.

- **General obligation bonds:**

- Are backed by the full faith and credit of the local government; it is obligated to raise taxes to pay off the bonds if the identified revenue source falls short.
- Are tax exempt so that investors can collect interest tax free.

- **Revenue bonds:**

- Are usually issued to support public projects that collect fees—parking ramps, water, sewer systems, etc. These bonds are backed only by the revenue generated by the enterprise.
- Might be considered, for telecommunications projects, higher risk with higher interest rates for several reasons:
 - The public sector is entering a competitive marketplace.
 - The public might not be experienced in building and operating telecommunications networks.
- Do not obligate general tax revenue.

Bonds that are issued to serve a “public purpose” can be tax exempt, meaning that investors do not pay income tax on the interest received, thus providing a higher ROI for investors even with a lower interest rate. Public-private partnerships may not meet the “public purpose” threshold due to the involvement of private partners. Those bonds would be sold as taxable.

A 501(c)(3) nonprofit ISP can sell tax-exempt bonds, which provides a financing advantage.

PUBLIC-SECTOR FINANCING ADVANTAGES

Private-sector ISPs generally finance projects:

- For shorter finance terms
- At higher interest rates
- Requiring an investment-worthy ROI

Public-network owners can count the benefits on non-balance-sheet items such as economic development, better health care and education, and enhanced quality of life.

These three components all increase the need for higher cash flows and increase the risk for private ISPs. These considerations limit where private ISPs are willing to invest, leaving much of the country with uncompetitive markets.

The public sector has the benefit of patient capital through long-term financing. Public networks have no need to earn profits from the capital investment. Revenues need only cover the costs of the bond payments, plus operating and maintenance/upgrade costs. As noted earlier, public-network owners also can count the benefits on non-balance-sheet items such as economic development, better health care and education, and enhanced quality of life.

Alternative Funding Sources

The public sector has additional available strategies to finance broadband projects. Examples include:

- Internal loans from enterprise funds and reserves
- Joint builds with other public-sector agencies
- Joint builds with private-sector ISPs
- Philanthropy / Non-Profit Financing

INTERNAL LOANS

Well-managed public utilities—like sewer, water, and electric—often accumulate significant capital reserves to deal with upgrades, maintenance, and natural disasters. These reserves are on deposit in interest-bearing accounts. Each state has its own rules on how these internal loans can be made, usually requiring a minimum interest rate and restrictions on cross-utility subsidization.

JOINT BUILD with OTHER PUBLIC-SECTOR AGENCIES

Many times, public-sector entities will join to build broadband infrastructure, often with the goal of connecting buildings and facilities. A community can knit together various public funding sources, often from grants and E-Rate subsidies for state agencies, colleges, schools, public safety, health care, and libraries to build networks. Funds currently going to pay private-sector ISPs for service, often substantial, can be devoted to debt service payments and network operations. Aggregating demand from community anchor institutions is a well-used strategy.

JOINT BUILD with PRIVATE-SECTOR ISPs

A community can reach agreement with a private ISP to build broadband infrastructure in a city or across a county or region. Oftentimes, this involves constructing a dual conduit network with public facilities in one conduit and the private network in the other. Another option is to share a large bundle of fibers within a single conduit. In these partnerships, the public sector may decide to contract with the private ISP to manage the conduit network, including managing fiber locates and fiber breaks. This type of partnership can generate construction cost savings and provide revenue opportunities and operational savings.

PHILANTHROPY

Increasingly, philanthropic and other nonprofit organizations are working with communities to provide capital for and help build broadband infrastructure. Organizations like the Post Road Foundation and Connect Humanity provide grants and access to capital to cities and towns to plan and build public networks, provide workforce training, and promote internet adoption.

Federal Grant Programs

The federal government and some states have grant programs that can be sources of funding for public networks. Here are two examples of federal broadband grant programs:

BROADBAND EQUITY, ACCESS, and DEPLOYMENT PROGRAM

The Broadband Equity, Access, and Deployment (BEAD) Program provides \$42.45 billion to expand high-speed broadband access by funding planning, infrastructure deployment, and adoption programs across all states; Washington, DC; and territories. These funds will go directly to the states for distribution to sub-grantees to improve broadband access and use.

Each state is tasked with creating its specific BEAD program rules that must comply with federal BEAD program rules. Infrastructure projects must focus on places where not less than 80 percent of locations are unserved, defined as 25 Mbps download and 3 Mbps upload speeds. Any community anchor institution that lacks gigabit internet service is also eligible. Fiber broadband deployments are a priority. NTIA has a [robust website](#) that provides a myriad of details.

States are required to include public-sector entities as prospective grantees for both infrastructure and digital equity projects. Communities must participate and attempt to influence the state broadband planning and rules development process.

US DEPARTMENT OF THE TREASURY CAPITAL PROJECTS FUND

The American Rescue Plan's [Capital Projects Fund](#) (CPF) provides \$10 billion to the states to fund, among other things, broadband infrastructure designed to deliver reliable internet service that meets or exceeds symmetrical download and upload speeds of 100 Mbps. The program encourages states to focus on economically distressed areas, support community empowerment, and adopt strong labor practices. For a capital project to be an eligible use of CPF grant funds, it must be 1) an investment in capital assets designed to directly enable work, education, and health monitoring; 2) designed to address a critical need that resulted from or was made apparent or exacerbated by the COVID-19 public health emergency; and 3) designed to address a critical need of the community to be served by it. Co-ops, electric utilities, and other entities that build or operate broadband networks, including networks that are owned, operated by, or affiliated with local governments are all eligible to receive CPF Funds.

U.S. DEPARTMENT OF AGRICULTURE'S RECONNECT PROGRAM

The [USDA ReConnect Program](#) provides both grants and loans to extend broadband services into rural unserved communities. According to the USDA, "a rural area is any area that is not located in a city, town, or incorporated area that has a population of greater than 20,000 inhabitants or an urbanized area contiguous and adjacent to a city or town that has a population of greater than 50,000 inhabitants."

To be eligible, a project area must have at least 50 percent of the households lacking sufficient access to broadband. Grants can be up to 100 percent of project costs with no match requirement in project areas where 90 percent of households lack sufficient access to broadband. The ReConnect Program is a competitive program with specific funding rounds and application deadlines.

In a countywide approach, the ReConnect Program could fund the most rural, unserved areas, while other funding sources would be needed for areas classified as urban or served. The USDA has a reputation for not funding start-up entities due to their higher risk. Partnering with a successful ISP that is already a USDA borrower would be an option.

OTHER FEDERAL PROGRAMS

The NTIA, through its BroadbandUSA initiative, has compiled a [federal funding program guide](#). Public-sector network planners can work to package multiple programs that together can solidify a funding plan. For example, E-Rate funds for schools and libraries could be packaged with public-safety connectivity funding to help fund both capital and operating expenses. Telemedicine is another high priority for funding. Local leadership is critical to get key stakeholders to consider collaborative approaches rather than remaining in their silos.

Partnerships

With broadband projects, the phrase “public-private partnerships” or “P3” covers a wide range of interactions.

The profiles in this handbook showcase the range, variety, and intensity of public-private partnerships. Oftentimes, a “partnership” is just a contract for services. A true partnership is generally long term, formally executed, based on shared values, and designed to provide mutual benefits.

PARTNERSHIPS with PRIVATE ISP(s)

A very common arrangement is a public network owner entering into agreement(s) with one or more private ISPs to deliver retail internet services. UTOPIA and the Vermont CUDs are examples of this type of partnership. The Resources directory at the end of this handbook lists private ISPs that deliver retail internet services for public networks.

PARTNERSHIPS with OTHER PUBLIC ENTITIES

Collaboration among public entities is also quite common. One entity may be well positioned to deliver a wide variety of capacity and services to another public entity. This could include access to a middle-mile network or to affordable bandwidth or to professional or contracted services such as engineering, billing, or marketing. UTOPIA Fiber provides several examples of this, including the shared public initiative that created UTOPIA Fiber as a joint venture among Utah communities or, more recently, partnering with newer public ISP ventures such as Yellowstone Fiber. In Minnesota, many telephone cooperatives joined together to create Cooperative Network Services (CNS) to take advantage of increased scale to acquire engineering, human resources, and marketing services effectively and efficiently.

PARTNERSHIPS with VENDORS

Even public entities that are offering internet services as an end-to-end public utility are engaged in partnerships with the private sector. Public entities must select and maintain partnerships with network equipment and customer management/billing system vendors. These are very important choices, primarily because these decisions lock an ISP into a long-term relationship with high exit and transition costs. The Resources directory at the end of this handbook provides a list of vendors that provide various services to public networks.

FINANCING PARTNERSHIPS

Sometimes, public involvement is limited to providing capital, essentially economic development grants, to help fill in financing gaps for a private-sector provider/network owner. Even as this financing takes place in a moment in time, communities need to think about the desirability of the provider as a long-term community partner as well as acquiring long-term community benefits—such as access to dark fiber, low-cost public computing center connectivity and some voice in an asset transfer, such as a company sale.

PUBLIC BROADBAND POLICY CHOICES

As public entities move through a broadband decision-making process, the policymakers need to consider trade-offs between different approaches. The choices can be difficult, especially if there is a lack of consensus around the core purposes of the network. In other words, “Why are we considering this significant investment for our community?” Some of these decisions are centered on community values; some are based on ensuring a successful business and operating model. A strong community engagement process can ensure that all voices are heard and that fully informed discussion and decision-making can take place.

A strong community engagement process can ensure that all voices are heard and that fully informed discussion and decision-making can take place.

For a publicly traded ISP, the business and operating model generally drives all decisions. Profitability is the primary desired outcome. Public-sector entities have very different balance sheets than the private sector. Economic development and social equity are two key considerations of public entities. This difference is what allows public entities to be successful in achieving both financial sustainability and social goals.

When planning network deployment and operating models, communities should consider the following choices and make decisions based on their shared values and unique set of community circumstances.

Desired Outcomes?

- 100 percent broadband subscription due to affordability and availability
- Excess revenue to support digital equity initiatives
- Excess revenue to support other government functions
- Network financial sustainability

Operating Decisions

OPEN ACCESS VERSUS SINGLE ISP

- Are there enough prospective customers to attract and sustain multiple providers?
- Does the prospect of a competitive marketplace overcome the complexity of open-access management?
- Can you craft an operating agreement with a single provider that achieves the goals of open access for quality of service and affordability?

PUBLIC SECTOR ISP VERSUS CONTRACTED ISP OPERATOR

- Is there an obvious local choice to selected as the contracted ISP?
- Are there enough prospective customers to cover the costs of customer service, billing, technical support, and sales?
- What is the customer service reputation of the public-sector entity?

FIBER-to-the-HOME or FIBER-to-the-CURB

- Will building fiber to the door increase initial take rates?
- Will building fiber to the door provide significant overall construction cost savings?
- What impact will a fiber-to-the-curb network have on:
 - Families with low incomes?
 - Landlords and renters?
- Will fiber to the curb provide a more comfortable start-up scenario?
- What will public reaction be to construction disruption when the home will not be receiving service?

MOVING FORWARD TOWARD PUBLIC BROADBAND

Leadership is a key determinant of whether a community moves forward on a public broadband project. The leadership team needs to move systematically through the information-gathering process described in this handbook and determine whether to pursue a project. Once committed, a community can proceed through a decision-making funnel of project goals and desired outcomes, technology choices, ownership and operating models, and financing.

Communities that are members of AAPB provide evidence of the viability and benefits of public broadband ownership. Community members range from those who have been delivering world-class broadband services for years to those in the middle of network deployment and expansion to those in the exploration process. All are role models for those just beginning their broadband journey. Several of these examples have been included as profiles in this guidebook, but there are many more. The profiles illustrate the multitude of options by which project leaders gather the best information, examine options, and design an approach that is right for their community.

In addition to the many AAPB community champions who are willing to share expertise and experience are industry expert associate members. They make their own businesses successful by helping ISPs of all types, including public ISPs, to build and operate long-term, successful enterprises. They provide engineering, operations, marketing, and finance services so that ISPs can adopt best practices and equipment and operations strategies to deliver quality services and avoid costly mistakes. They can help communities understand the ramifications of each of the many choices required throughout the process.

In addition to its critical role in public policy, AAPB serves as an information exchange between its members. We hope that this handbook has provided motivation to community leaders interested in realizing the many benefits of public broadband. It's up to you, but we are here to help!

Economic Development Drives Fiber-Focused Community Vision

Colorado Springs, Colorado Population 483,956

Early-morning coffee discussions between the mayor of the City of Colorado Springs and the CEO of Colorado Springs Utilities (Springs Utilities) led to a focus on the growing needs for community-owned broadband infrastructure beginning in 2020. For Springs Utilities, municipally owned and citywide connectivity was increasingly necessary to manage the existing water, natural gas, electric, and wastewater infrastructure. Springs Utilities recognized that advanced technology would be required to meet its goals of providing safe, reliable, and cost-effective services in a rapidly growing community.

Springs Utilities saw that enhanced connectivity could enable its electric division to adapt to critical trends and requirements: distributed solar energy production, electric vehicle charging, and stringent carbon reduction standards. Considering regional water constraints, Springs Utilities also needed to maximize the efficiency of its water system and minimize water loss through close and intelligent systems monitoring. These challenges are supercharged due to rapid population growth.

Colorado Springs has a dynamic high-technology economy. The mayor recognizes that for the community to thrive in the future, world-class broadband services are necessary. In addition, community leaders recognize that digital equity is an important goal so that all citizens can fully benefit from technology.

Springs Utilities had a strong conviction that, for many reasons, it should own the network infrastructure itself. A key consideration in the feasibility study process was security of infrastructure control systems.

A project consultant estimated that a proprietary, Springs Utilities-only network would

PROFILE FEATURES

Open Access	Muni ISP	Private ISP(s)
Muni Electric	Co-op	Private Ownership
FTTH	Wireless	Both
Urban	Suburban	Rural

cost about \$450 million to construct. The same analysis found that to appropriately engineer and build an open-access network serving the entire Colorado Springs community would add just \$150 million to that cost. However, that additional investment would create a network that would provide significant revenue opportunities for Springs Utilities over time, making it more affordable for Springs Utilities and providing significant community benefits.



Colorado Springs Utilities
It's how we're all connected

Springs Utilities made two policy choices through the study process. The first was a decision to stick to its core competencies of infrastructure construction, maintenance, and operations and avoid having to operate in a competitive ISP environment. As a result, Springs Utilities sought proposals from private-sector ISPs to deliver retail internet services to businesses and residents. Customer service reputation was a key consideration in the selection process—as were reliability, pricing/affordability, and reimbursement (lease terms).

In a competitive process, Springs Utilities selected Ting Internet as the first anchor ISP tenant on its network. Ting will pay Springs

Utilities on a per-address basis regardless of whether Ting captures that address as a customer or not.

The second Springs Utilities policy choice was to build a fiber-to-the-curb network rather than a complete fiber-to-the-home network. Ting is building the final drop—that is, the fiber from the curb or pole to the customer’s home or business. This decision shifts the drop construction expense to the private ISP, a financing benefit to Springs Utilities. But this decision also likely increases the challenge for additional internet providers to enter the market. Springs Utilities is in discussions to lease excess fiber capacity to additional ISPs; its success in doing so will be interesting to watch. Springs Utilities also plans to lease dark fiber on its networks. Likely customers would include larger corporations seeking a direct connection to a data center or major internet node or organizations with multiple locations, such as school districts, health care systems, or bank branches.

Springs Utilities is planning on completing the network in 2028—an aggressive schedule in a growing city of just under 500,000 people. With Zone One construction complete, Springs Utilities has begun deploying in the second construction zone. Engineering efficiencies and cost minimization are driving the construction schedule.

The community is excited about the anticipated digital equity impacts of this network. Ting is an active marketer of the Federal Communications Commission’s Affordable Connectivity Program (ACP), so qualifying, low-income residents can receive free fiber internet service and a free router.

In summary, Springs Utilities and the Colorado Springs community are anticipating many benefits from this new network investment:

1. lease payments from Ting and other network users that will support the network construction, maintenance, and operations expenses;
2. enhanced efficiency and sustainability of the area’s utility services;

3. a state-of-the-art broadband network to support community and economic development;
4. a more competitive broadband marketplace that will drive better customer services and lower prices; and
5. a community-wide foundation for digital equity initiatives.

Seems like a smart investment in one’s own community!

“Cooperation Among Cooperatives”

is one of the seven principles embraced by cooperatives throughout the world. Consolidated Telephone Cooperative (CTC), in Brainerd, Minnesota, has taken that principle seriously by partnering with electric cooperatives and other public entities to build and maintain state-of-the-art fiber-to-the-premise (FTTP) networks for over 10 years. CTC has served its members with telecommunications services for more than 70 years.

Over 10 years ago, CTC established partnerships with Arrowhead Electric Cooperative in far northeast Minnesota and Mille Lacs Energy Cooperative in the lakes country of north-central Minnesota. CTC continues to assist those co-ops with system infrastructure, engineering, construction coordination, and network management services, helping to deploy broadband services to some of Minnesota’s most unserved rural areas. In addition, CTC bundled customer service, sales training, marketing, and help-desk services to fully support the operations of these electric cooperatives’ new offerings.



“The partnership we have with CTC has continued to be instrumental in the success of our fiber projects and is a cornerstone in our long-term plan,” said John Twiest, CEO and general manager at Arrowhead Electric Cooperative. “From the onset, CTC assisted us in creating a plan that would best fit our community’s needs, to ensure we were successful. Today we are able to utilize CTC’s expertise and resources to continue to grow and advance our services.”

Throughout the entire partnership and process, CTC provides direction, technical expertise, and leadership. CTC’s work in the partnership arena has since expanded to include other electric co-ops, municipalities, and tribal entities.

Across Minnesota, CTC is often the provider partner of choice for non-traditional broadband deployment, whether supporting expansion of CTC’s own broadband footprint or providing partnership support to a new broadband entity.

“The Bois Forte tribal community has partnered with CTC for a few years now. They’re professional, experienced, responsive, and have provided a tremendous amount of guidance as we navigate our National Telecommunications and Information Administration-supported project,” said Randy Long, IT director with Bois Forte Band of Chippewa. “Building an FTTP broadband network throughout our entire rural tribal community has been quite the undertaking, and I’m not sure how we would have done it without their support!”

By partnering with middle-mile provider Northeast Service Cooperative (NESC) on Minnesota’s Iron Range, CTC has been able to reach across wide swaths of northern Minnesota without the burdensome capital expense of building hundreds of miles of fiber. NESC began as a collaboration of school districts that built its own fiber network to enable distance education through videoconferencing and advanced inter-school-district innovation. Another example of cooperative principles in action!

The key to these successful partnerships lies within the customized nature of the agreements. CTC acknowledges and appreciates each prospective partner’s unique set of needs and capabilities and customizes each of the partnerships accordingly by offering a robust list of à la carte services.

According to the CTC team, developing and formalizing long-lasting partnerships takes time for each partner to learn about and get to know the other, especially the key leadership of each team. Developing that understanding is a key factor in starting serious partnership discussions. Projects move forward at the speed of trust and confidence that all parties have a commitment to project goals, foundational principles, and sustainable partnership agreements.

FairlawnGig: Community Connectivity Over Profits

Fairlawn, Ohio
Population 7,710

A leading hotelier and business leader testified, “My guests would prefer to lose the hot water rather than the internet.” This statement helped Fairlawn, Ohio, leadership envision a fiber-to-the-home (FTTH) network called FairlawnGig as essential infrastructure, just like water, sewer, and roads. The Fairlawn team—led by Mayor William Roth, Jr., a blue-ribbon task force, and professional staff—committed to that vision and combined it with strong business and network planning. The result is ubiquitous, affordable, world-class broadband, with every resident and every business in Fairlawn able to access gigabit internet service at \$55 per month. FairlawnGig recently reduced the price due to the financial success of the network; the goal is community connectivity, not profits.

Like most communities seeking better internet service, Fairlawn first approached incumbent providers to explore a partnership to invest in FTTH connectivity. Like most communities, that approach came up empty. Nevertheless, the community was determined to achieve its vision.

Failing to attract an incumbent as a partner, the city decided that it would build and own the infrastructure and then contract with a private ISP to operate the network and sell retail services. This approach would help the city avoid the anticipated steep learning curve of becoming a reliable ISP and entering the competitive marketplace. While many public broadband providers emerge from existing municipal electric utilities, Fairlawn started from its more limited utility experience in providing the standard city services of sewer and water.

Just six months after selecting an operating partner, the community realized that only the City of Fairlawn could ensure the quality customer service standards that Fairlawn residents expected. The city assumed complete control of operations and has not looked back.

PROFILE FEATURES

Open Access	Muni ISP	Private ISP(s)
Muni Electric	Co-op	Private Ownership
FTTH	Wireless	Both
Urban	Suburban	Rural

More than 60 percent of households now subscribe to FairlawnGig service, and that number is increasing. Customer satisfaction levels are over 90 percent and rising, and the community is attracting residents and business investment like never before. Residents appreciate the enhanced customer service. FairlawnGig is locally owned—and locally delivered by friends and neighbors.

FairlawnGig’s success is tied to keeping it simple: Build and maintain a great network, deliver broadband service everywhere, and offer a gig at an

affordable price. FairlawnGig offers only internet service avoiding more complicated video and voice services. They do support customers as they learn how to use streaming and other applications. The company’s installers ensure that new customers can connect all their devices to the network throughout the house and even get their streaming apps working. FairlawnGig even built a “living room” at its offices to provide low-stress individualized training sessions.

The community and economic development benefits of FairlawnGig are accelerating. Housing values are increasing faster than in adjacent communities. An international technology firm and a new hospital have recently located to the community based on network quality. Crucially, business customers tell the city that the network helps their local businesses grow.



A Unique State Approach Fosters Rural Connectivity

Vermont Communications Union Districts

If we could step back a decade and replicate the Vermont Communications Union Districts (CUDs) nationwide, our national broadband policy options and broadband maps might look very different today and going forward. The CUDs, combined with the New England structure of towns that incorporates both urbanized areas and their surrounding rural countryside, provides an interesting model to provide ubiquitous fiber broadband infrastructure in very rural places. The CUD framework allows regional leaders to think about the public-sector role at scale on a time frame that includes consideration of a regional publicly owned network. This is quite different from most federal and state policies and the resulting funding programs that deal with address-specific connectivity strategies rather than taking a more comprehensive regional approach.

Initially, Vermont's broadband initiatives began in the most developed communities, with a goal for better business broadband or for higher speeds than those being provided by the incumbent internet service provider. In a next phase, the goal was to bring better broadband throughout a school district or county. The geographic scale of these efforts inhibited a regional approach as each county tried to solve its own problem. Counties generally viewed subsidization of the private sector as their shortest and best route to better broadband.



ECFiber is a national public broadband pioneer, beginning its efforts in 2007.

ECFiber emerged

from the melding of two groups: local leaders who determined that a regional approach was the best way forward, and ValleyNet, a nonprofit ISP that was formed by the Dartmouth technology community.

PROFILE FEATURES

Each Vermont CUD has its own unique approach to structure, partnerships, and technology

F. X. Flinn, chair of the ECFiber CUD, cites a confluence of factors for its success. ECFiber initially operated as a joint-powers organization across the towns in the region. Using a very hyper-local approach, ECFiber recruited area residents to invest \$5,000 to \$10,000 each to provide early-stage capital. The goal was to use local investor funds to reach a scale that would demonstrate going-concern status. In 2014, that was achieved, and ECFiber sought to issue its municipal revenue bond. An obstacle emerged when bond issuers determined that ECFiber needed to have a more formal status to be bondable. At the request of ECFiber, the legislature created the CUDs, special purpose municipalities, as a bonding vehicle.

In 2019, when ECFiber went back to the legislature for “one-touch make-ready” rules to streamline pole attachment rules, the legislature recognized the success and the potential for statewide broadband deployment. As a result, the legislature provided grants for organizational support, feasibility studies, and loans. The work of ECFiber had laid the foundation for statewide action.

ECFiber now provides service to more than 8,000 customers and passes more than 18,000 previously unserved locations over a 2,000-square-mile area encompassing 31 towns. The district contracts with GWI to manage the network and to deliver ISP services.

The COVID pandemic accelerated regional leader interest in CUDs, and seven new CUDs were formed, joining ECFiber and CVFiber, which was established in late 2019. The legislature allocated both Coronavirus Aid, Relief, and

Economic Security (CARES) Act and American Rescue Plan Act (ARPA) funds to support CUD planning and deployment using the public infrastructure ownership/private ISP model.

The CUDs meet regularly through the Vermont CUD Association (VCUDA), which supports shared learning and spurs enhanced collaboration. CUD staff and board chairs meet regularly to get smarter, avoid pitfalls of rapid broadband expansion, and consider opportunities to do joint purchasing of services, like accounting services. The Center on Rural Innovation provides training for CUD staff and board members.

Executive Director Christa Shute says the CUD struggles to achieve a balance between ubiquitous coverage and affordability across the region. Those goals are both negatively influenced by the condition and ownership of utility poles, a challenge that is enhanced due to having multiple electric utilities serving the region. In some parts of the NEK CUD, there are gaps in pole availability due to electric boundaries. Trees and rocks make widespread fiber burial challenging and expensive.

The CUD service areas combine many residents with low incomes with part-time property owners who use their camps for year-round outdoor recreation. The network is a critical part of the region's economic development strategy.

The State of Vermont has created and supported regional public broadband development through the Communications Union Districts. These regions are all engaged in identifying their best opportunities to ensure high-quality broadband deployment and operations, making decisions about technologies and partnerships. The unique Vermont strategy of creating and supporting the regional CUDs might provide an interesting contrast with other state broadband deployment strategies over the next five years of BEAD funding.



MAPLE BROADBAND

Maple Broadband is a relatively new CUD, having just launched service in February

2023. Maple's fiber network has 38 route miles and reaches 405 locations. Maple Broadband partners with Waitsfield and Champlain Telephone Company to deliver ISP services.

According to Maple Broadband Executive Director Ellie de Villiers, "Don't outsource what you don't understand!" She believes that it is essential for the CUD staff and boards to adopt best practices in governance and oversight.

The CUDs are making big decisions in a fast-moving and dynamic environment that will have long-term impacts on their regions. De Villiers always wants to ensure that both she and her board fully understand the complicated choices that they are making. This leads to careful investigation and sound decision-making. She believes that there will be a growing number of opportunities for the CUDs to collaborate

so that both large and small CUDs can operate effectively.



Each Vermont CUD has its own unique territory. Northeast Kingdom

(NEK) is one of the most rural and faces terrain, demographic, and density challenges. NEK partners with Waitsfield and Champlain Valley Telecom, a privately owned telephone company.

City Sheds “Worst Connected” Moniker

Pharr, Texas
Population 79,697

In 2019, the National Digital Inclusion Alliance (NDIA) named Pharr, Texas, the worst-connected city in the nation based on the extent to which Pharr residents were provided access to the internet. Unfortunately, this statistic had been previously evident to community leaders. In 2015, Mayor Dr. Ambrosio Hernandez recognized that the digital divide was a result of lack of affordable service and accessibility. Due to the absence of cost-effective internet access, the city of Pharr classified the pertinent issue as a critical community project, with the intentions of bridging the digital divide in Pharr.

PROFILE FEATURES

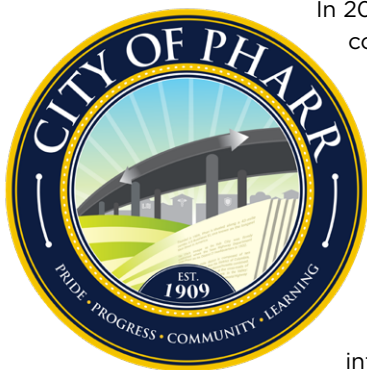
Open Access	Muni ISP	Private ISP(s)
Muni Electric	Co-op	Private Ownership
FTTH	Wireless	Both
Urban	Suburban	Rural

Currently, the city-owned broadband network extends to 75 percent of residential properties in Pharr, with the objective of having the city 100 percent connected by the summer of 2024. The city first placed high priority on extending the network to those in need of affordable, high-speed internet access, especially focusing on providing families with lower incomes and students an opportunity to excel like never before. Soon after, the city will be extending the service to small businesses, manufacturing companies, and multifamily-unit buildings in order to make a positive impact on the economic growth and development of the community.

Team Pharr.Net is off to an exceptional start, with more than 4,000 active household subscribers. Additionally, due to the high volume of business, the city continues to install internet service in an average of 120 homes per week.



Pharr-San Juan-Alamo Independent School District continues to show commitment to the issue by providing funding for service to every household that has school-age children, regardless of income. Due to PSJA’s commitment to its students, the school district has seen a 10 percent increase in enrollment. The community has developed a strong Affordable



In 2017, the City of Pharr, in collaboration with Pharr-San Juan-Alamo Independent School District, Region One Education Service Center, the Federal Reserve Bank of Dallas, and private entities such as BBVA Compass bank, announced a pilot project, Pharr Life Net, that brought free internet access to 50 families in their homes. The City of Pharr invested \$90,000 in the household study on external devices and equipment for each home, and \$100,000 was invested through a Federal Reserve partnership with BBVA Compass for a financial-impact feasibility study.

The COVID-19 pandemic intensified the community’s connectivity issues and stimulated additional conversations at all levels of government, ultimately leading to the fiber-to-the-home (FTTH) feasibility study. The results of the study ultimately prompted community leaders to make a significant investment through a combination of low-interest-rate revenue bonds and allocated city American Rescue Plan Act (ARPA) funds.

Connectivity Program (ACP) outreach effort, and school families are using ACP to go beyond the minimum home broadband service package to higher speeds and value-added services such as managed home Wi-Fi.

All residents are benefiting from the city's focus on affordability. Packages start at \$25 per month for a 500 Mbps symmetrical service. Gigabit service is \$50 per month and 2 Gbps service is available for \$80 per month.

In addition to prioritizing affordability, Pharr community leaders are focused on extracting high value from the network as they execute their strategic technology plan. Key elements include winning grants for programs that address telehealth, workforce, and small business development, and building a quality workforce. The plan focuses on closing the digital divide and on helping residents gain technology knowledge and skills.

City staff have credited other public-sector leaders and staff, as well as technology vendors, for assisting Pharr through this entire planning, construction, and service delivery process. In turn, Pharr city staff are responding to other communities as they consider their own broadband investments. While every community is different, leaders face many of the same considerations.

Pharr's community-owned FTTH network was birthed through the city's IT department rather than through a municipal electric utility or the public works and utilities divisions. IT departments generally do not have public infrastructure or outward-facing customer service staff, but Pharr successfully developed these capacities in relatively short order with high levels of resident satisfaction. City leadership has implemented a strong program of measurement and evaluation to ensure high levels of service.

A Partnership Between Yellowstone Fiber and UTOPIA Is a Win for the Community

Bozeman, Montana Population 54,539

Yellowstone Fiber, formerly Bozeman Fiber, is a 501(c)(3) nonprofit organization currently deploying a fiber-optic broadband network throughout Bozeman, Montana, with an eye to potential expansion into surrounding Gallatin County. Bozeman is home to Montana State University and is a booming, high-technology community, with active tech entrepreneurs. To illustrate community interest in connectivity, Yellowstone Fiber CEO Greg Metzger said that he has a standing offer of \$250,000 from one rural resident to finance a connection to their area.

Bozeman Fiber started as a community anchor institution network with 27 miles of fiber connecting schools, libraries, and local government entities within Bozeman. The board of directors made the decision to deploy a fiber-to-the-home (FTTH) network throughout the community. There are approximately 18,000 homes with 22,000 prospective passings in Bozeman. Yellowstone is projecting a 50 percent to 60 percent take rate over the next few years.

With an ethernet network design and deployment, each customer has their own dedicated fiber to the central office. This allows for a service offering of up to 10 symmetrical Gbps no matter their location, including those customers who require long rural fiber runs to reach homes or businesses. In addition, this network design can accommodate customers who want enhanced security and advanced services. This is in contrast with the more standard Gigabit Passive Optical Network (GPON) design, which uses optical splitters to reduce the number of fiber strands per customer passing.

Yellowstone Fiber contracts with UTOPIA Fiber, a large, publicly owned, Utah-based open-

PROFILE FEATURES

Open Access	Muni ISP	501(c)(3) Nonprofit
FTTH	Wireless	Both
Urban	Suburban	Rural

access network provider, for network design and engineering, marketing, and operations services. Yellowstone manages the construction contracting and inspections process. This partnership allows Yellowstone to ensure high quality while reducing the need for a large staff. Metzger also credits the UTOPIA Fiber relationship for providing investor assurance when Yellowstone recently issued a \$65 million revenue bond.



In addition to UTOPIA bolstering investor confidence, Yellowstone's standing as a nonprofit corporation provides a unique financing advantage, as the tax-exempt nature of the bonds reduces the required interest rate necessary to attract bond-buying investors. Metzger credits Yellowstone's relationship with UTOPIA for its ability to sell these bonds as a start-up network owner.

Yellowstone Fiber will be an integral asset to the Bozeman community and to Gallatin County, as the network supports an already vibrant local tech economy.

RESOURCES

VENDORS

Construction and Engineering

[Mears Broadband](#)

Design, Build, Operate

[Bonfire Fiber](#)

[SmartWave](#)

[Underline](#)

[UTOPIA Fiber](#)

[VETRO](#)

[Vivacity Infrastructure Group](#)

Equipment Suppliers

[Positron Access Solutions](#)

End-to-End Software Platforms, Systems, and Services (OSS/BSS)

[Calix](#)

[COS Systems](#)

Financial Advisors

[Chapman and Cutler LLP](#)

[LRB Public Finance Advisors](#)

Grant Application and Management Platforms

[Ready.net](#)

[VETRO](#)

Legal and Regulatory

[Broadband Legal Strategies](#)

[Chapman and Cutler LLP](#)

[Keller and Heckman](#)

[Moss Adams LLP](#)

Marketing and Public Relations

[Harrison Edwards](#)

Private ISPs Providing Retail Service to Public Broadband Networks

[Axiom](#)

[Sumo Fiber](#)

[Ting](#)

OTHER RESOURCES

NON-PROFIT GROUPS

Benton Institute for Broadband & Society

[Accelerate: A Community Broadband Planning Program](#)

[The Era of the Broadband Public-Private Partnership: New trends and opportunities in the wake of COVID-19](#)

[Six Community Broadband Networks Demonstrate Diversity of Approaches to Connectivity Challenges](#)

[Public Infrastructure/Private Service: A Shared-Risk Partnership Model for 21st Century Broadband Infrastructure](#)

Institute for Local Self-Reliance

[Community Networks Map](#)

[Municipal FTTH Networks Map](#)

[Indigenous Broadband Network Map](#)

[Open Access](#)

[Network Technology](#)

[Increased Wellness and Economic Return of Universal Broadband Infrastructure: A Telehealth Case Study of Ten Southern Rural Counties](#)

[Minnesota Communities and Local Providers Build Diverse Solutions for Affordable, Reliable Internet Access](#)

[Case Studies Detail How Tribes Are Expanding Internet Access](#)

Island Institute

[The Community-Driven Broadband Process](#)

Merit Network

[Michigan Moonshot Broadband Framework](#)

National Digital Inclusion Alliance

[digitalinclusion.org](#)

Pew Charitable Trusts

[Broadband Access Initiative](#)

[Broadband Expansion: What Are the Essential Components?](#)

[Vermont Takes a Regional Approach to Rural Broadband Expansion](#)

Schools, Health & Libraries Broadband Coalition

[shlb.org](#)

FEDERAL AGENCIES

Federal Communications Commission (FCC)

[Getting Broadband Q&A](#)

[E-Rate](#)

National Telecommunications and Information Administration (NTIA)

[BroadbandUSA—Planning a Community Broadband Roadmap](#)

[Introduction to Broadband and High-Speed Internet](#)

[Broadband Funding Guide](#)

United States Department of Agriculture

[Broadband](#)

United States Department of the Treasury

[Capital Projects Fund](#)

PHILANTHROPY

[Connect Humanity](#)

[Post Road Foundation](#)

ASSOCIATIONS and COMPANIES

Calix

[Calix Municipal Solutions](#)

[Broadband Academy](#)

Corning

[Community Broadband University](#)

Fiber Broadband Association

[Broadband Infrastructure Playbook](#)

Author



Bill Coleman supports community economic development and broadband initiatives through innovative training, planning, and implementation programs. Prior to creating Community Technology Advisors in 2000, he was a market development manager for a rural-focused regional telecommunications provider. Prior to that, he was a lead staffer with the Minnesota Star City Program, a state-sponsored community economic development program. Bill

combines his past education and wide career experience in urban studies, community economic development, and telecommunications to help communities develop and pursue their prosperity vision.

Bill currently serves as community broadband coach for the Benton Institute for Broadband & Society in its Illinois Connected Communities, Accelerate, and Broadband Breakthrough programs.



Broadband Delivers Opportunities
and Strengthens Communities