BECOMING BROADBAND READY

A Toolkit for Communities

JANUARY 2019

WWW.NEXTCENTURYCITIES.ORG

Next Century Cities

Becoming Broadband Ready:
A Toolkit for Communities

Please include the following attribution when citing this toolkit:
Next Century Cities. "Becoming Broadband Ready: A Toolkit for Communities." Washington, DC: Next Century Cities, January 2019.

https://nextcenturycities.org/becoming-broadband-ready/

Next Century Cities is a non-profit membership organization of over 190 communities, founded to support communities and their elected leaders, including mayors and other officials, as they seek to ensure that all have access to fast, affordable, and reliable internet access. Next Century Cities celebrates broadband successes in communities, demonstrates their value, and helps other cities to realize the full power of truly high-speed, affordable, and accessible broadband. For more information, visit www.nextcenturycities.org.

Next Century Cities would like to thank **Neighborly** and the **Internet Society** for their generous support of this toolkit.

Neighborly connects communities with the capital they need to fund vital public projects like schools, libraries and parks, and next-generation resilient infrastructure like solar microgrids and community broadband networks. Neighborly makes it easier and less expensive for communities to reach investors; easier for investors to direct their dollars towards the world positive projects that matter to them; and more seamless for investment institutions to leverage the best technology to maximize impact portfolios for their clients. With Neighborly, individuals and businesses can invest directly in their communities and the civic projects they care about. Investors include Emerson Collective, 8VC and Ashton Kutcher's Sound Ventures.

Founded by Internet pioneers, the **Internet Society** (ISOC) is a non-profit organization dedicated to ensuring the open development, evolution and use of the Internet. Working through a global community of chapters and members, the Internet Society collaborates with a broad range of groups to promote the technologies that keep the Internet safe and secure, and advocates for policies that enable universal access. The Internet Society is also the organizational home of the Internet Engineering Task Force (IETF) and the Online Trust Alliance (OTA).

Table of Contents

Introduction

In 2018, the time has long passed since broadband access was optional. The internet has grown out of its luxury status and is now a bedrock ingredient for resilient communities. Fast, affordable, reliable broadband is essential to the long-term success of a community and to the health and happiness of its residents.

Cities, towns, and counties have an extraordinary amount of resources that can be leveraged to encourage investment in broadband infrastructure and ultimately lead to greater connectivity. While there is no one connectivity model that works for every community, there are common threads that run through thee diverse array of successful projects. This toolkit is a compilation of those practices and a first-stop resource for any community seeking strategies and solutions to connect its residents.

Establish Leadership

A common element that appears in many cities' success stories is having a dedicated staff member leading the effort. Having a staff member in a leadership role who is passionate about connectivity in your community is a prerequisite for any successful broadband project.

This role can take on a variety of titles, from Chief Technology Officer to IT Director to Broadband Manager. The formal title is less important than the employee's ability to clearly articulate why the community wants and needs better broadband. An important duty of this project leader is to help inform elected officials in your community about a broadband project's goals, the value it will bring to the community - such as remote work opportunities, new jobs, economic development, and improved public safety, healthcare, education, and transportation - and project details, such as the build timeline and who exactly will be getting service.

Next Century Cities' guide to hiring a broadband manager identifies traits that many successful project leaders share, including:

- Interpersonal and communication skills

- Flexibility and problem-solving skills
- Empathy
- A big-picture outlook
- A passion for broadband
- Out-of-the-box thinking

In addition to having a dedicated employee spearhead the issue, it is essential that local elected officials take on a leadership role. As with any municipal project, top-down support can make a big difference in a broadband project. Local leaders should understand how an investment in broadband infrastructure will impact the longevity of their community, and that connectivity means "more than just Facebook." Examples of positive impact can include:

- Youth staying in or returning to the community
- Improved opportunities for local businesses
- Making your community more attractive for new businesses
- Educational opportunities
- Telehealth applications
- Improved real estate values
- Elevated civic engagement
- Resources available for elderly population to age in place
- Public safety applications and other municipal innovations
- Overall improvement in quality of life

Further reading

The Anatomy of a Community Broadband Manager (Next Century Cities)
"More Than Just Facebook" Internet Connectivity Fact Sheet (ILSR)
What Fiber Broadband Can Do For Your Community (Broadband Communities Magazine)
Community Broadband Bits Podcast: Political Will and Local Broadband Initiatives (ILSR)

Establish leadership checklist

- ❑ Understand how broadband access would impact your community
- ❑ Talk with your local elected leadership about the importance of investing in broadband access

Build a Community Movement

Community interest in and support of high-speed internet is imperative when attempting to attract investment and competition, and is critical to the long-term sustainability of local projects. Hosting events, engaging the community in conversation, and maintaining high transparency can bolster constituent engagement.

Charlotte, North Carolina began a grassroots campaign called Charlotte Hearts Gigabit when Google Fiber announced that they were considering expanding to the city. Community members were concerned that there wasn't enough citizen interest in high-speed internet, so Charlotte Hearts Gigabit was formed to begin a conversation in the hopes that it would help attract Google.

Charlotte Hearts Gigabit engaged citizens by talking about how gigabit internet would positively impact individuals and the community. The group discussed specific use cases and hosted in-person events and hands-on demonstrations of applications and technology powered by high-speed internet.

Not only did Google Fiber decide to invest in Charlotte, but AT&T announced plans to offer fiber service in the city, and Time Warner Cable increased its speeds. The robust community interest in high-speed internet encouraged investment in the city and eventually led to a more competitive local market. The initiative has since expanded into a statewide effort - NC Hearts Gigabit - to attract, support, and champion the universal availability of broadband in North Carolina.

Fort Collins, Colorado's Broadband Core Team led an investigation into broadband solutions for the city following a need identified during a Budgeting for Outcomes (BFO) outreach effort in 2014. The Team explored a number of solutions, and developed four options which they brought to citizens for preference. When the city decided to pursue a municipal broadband network, Fort Collins saw a citizen-led effort to educate the local electorate. Colin Garfield, the campaign lead for Fort Collins Citizens' Broadband Committee, noted that keeping the community consistently informed can make a big difference for engagement.

Even if a project isn't yet underway, maintaining transparency through consistent updates helps maintain interest and trust. For example, Larimer County, Colorado created a newsletter to share updates about broadband projects. While Fort Collins was considering building a network, the city launched an interactive map on which residents could drop pins where they wanted fiber built, in addition to a broadband project website that could be visited for updates and information. The city also hosted several public outreach sessions to engage citizens.

A grassroots group was also formed in Fort Collins to keep momentum going. The group Broadband & Beers is a self-described "independent, public outreach group founded… to inform residents and educate decision makers about bringing municipal gigabit internet service to communities across the country." The group hosted frequent events at breweries to talk about the city's path to municipal broadband, and also led a social media campaign that organically reached tens of thousands of voters.

Further reading

Charlotte Hearts Gigabit
Larimer County Broadband Newsletter
Community Broadband Bits Podcast: Organizing for a Community Network, Against Big Cable (ILSR)

Building a community movement checklist

- ❑ Use the convening power of the city, town, or county to bring together stakeholder groups for conversation, information sharing, and brainstorming
- ❑ Consider the anchor institutions, community groups, and local businesses that could help involve residents in a discussion about broadband
- ❑ Identify individuals who are trusted members of their community (faith-based leaders, activists, nonprofit staff, etc). Seek their advice and keep them well informed of the process and progress.
- ❑ Brainstorm methods of communication that make sense for your municipality and your community (for example: an email newsletter, Facebook page, mailings, etc)
- ❑ Create a communications plan that is consistent, transparent, and inclusive

Identify Goals

Once leadership is established and the community has been engaged in the conversation, community leaders need to think deliberately about what problem they are hoping to solve with broadband access. It is best to approach investing in broadband with end goals in mind from the start, so leadership should define the problem statement by asking, "What are the pain points that might be mitigated if high speed internet was available?"

Community leaders should strive to meet the principle of "Build With, Not For." This philosophy puts community residents first, and strives to meet the *actual* needs of residents, as opposed to the needs that leaders assume exist. In order to successfully "build with," leaders must build trust in the communities that they aim to serve. The Internet Society offers additional recommendations for supporting networks that empower communities.

Common community concerns include, but are not limited to:

- Residents can't sell their homes
- Students can't complete homework
- Young people are leaving the community and not returning
- Grandparents can't Skype with grandchildren
- There are limited options to age in place
- Telehealth applications are not available
- There is limited communication available for public safety personnel
- Local businesses are leaving and new ones are not locating in the community

Further reading:

Five Lessons for Tech-Powered Civic Engagement (Next Century Cities)

Evaluate the Current Circumstance

After goals have been thoughtfully established, the next step is to organize information about your municipality's current circumstance.

Asset mapping

Asset mapping is when a municipality collects data on the public and private infrastructure assets scattered across the community. Assets can include fiber, conduit, towers, and more. Does the city have dark or lit fiber? Available conduit? Rooftops? Tower access? Right-of-way across bridges or railroads? Where is it located and what are the options for sharing, leasing, or using those assets to support broadband expansion?

When evaluating options for broadband, the city of Missoula, Montana contracted a third party to compile a map of all privately-owned fiber assets within the city. That map showed that there was a significant amount of fiber already in the ground in Missoula - much of which wasn't being used to its full potential - and the city was able to strategize and build partnerships accordingly.

The city of Boston, Massachusetts created a publicly available map that displays the location of "shadow conduit" - conduit put in the ground alongside a primary construction project, as per the city's Joint Build Ordinance - and city-owned conduit that could be utilized by public or private projects.

Tools like VETRO FiberMap and ESRI GIS can help communities manage infrastructure mapping and can support planning, budgeting, design, construction, sales, and more.

Measuring demand

The community needs an accurate reading of the level of demand from residents and businesses for broadband before they can responsibly take on a new project. Consider:

- Who in your community is online?
- Who wants to be online and is not?
- Who needs better bandwidth?
- Is cost preventing residents from connecting?
- Is sufficient bandwidth available to meet the needs of residents, large and small businesses, and anchor institutions such as schools, libraries, and healthcare organizations?

Tools like Crowdfiber and COS Service Zones can also help measure and evaluate demand data.

It would be helpful to have information from your community's current providers: what are their tiers, where is service offered, and what is the price of service? However, many providers will not share this information. As an alternative, communities can turn to crowdsourcing this data from projects like Measurement Lab or SpeedUp USA, an open source nationwide map that pulls individual internet speed test data from M-Lab and breaks down the results on maps and charts by points, census blocks, ISP, date range, and speed. Louisville, Kentucky created the original source code for this with SpeedUpLouisville in order to evaluate the cost and quality of internet service offered in the city.

Evaluating the current circumstance checklist

- ❑ Map all municipally-owned fiber, conduit, and towers and create a simple system to allow you to share with relevant parties
- ❑ Develop policies and a contract template to simplify leasing these assets
- ❑ Ascertain the level of service offered by current service providers. Is it sufficient to meet the needs of businesses, anchor institutions, and residents? Are residents able to afford the cost of the existing service?
- ❑ Evaluate if there are private assets that could be leveraged to support better service to residents

Establish Policies and Procedures to Support Investment

There are several policies that municipalities can adopt that encourage the deployment of broadband.

Dig Once

A "Dig Once" policy encourages the placement of fiber or conduit in the ground any time the road is dug up for a public works project.

Because construction costs represent the most expensive line item in a broadband deployment budget, as opposed to the fiber and conduit itself, a Dig Once policy is a common sense method of reducing the cost of communications infrastructure deployment. Proactive placement of conduit can be estimated to save anywhere from $30,000 to $100,000 per mile compared to the costs of revisiting streets and digging them up again. A report by consulting firm CTC Technology & Energy estimated that the cost of a provider or locality pulling fiber in *existing* conduit is 10 percent of the cost of underground construction *without* the conduit.

By lowering cost of deployment, Dig Once breaks down barriers of entry for new market entrants, creating a competitive marketplace that ultimately can result in more options, lower prices, and higher quality of service for consumers. Dig Once can also greatly reduce strain on a community by minimizing traffic, noise, and safety concerns of constant construction work.

Santa Monica, California adopted a Public Right-of-Way Ordinance 20 years ago that regulates the time, place, and manner of installations in the right-of-way. The city coordinates fiber and conduit installation with other internal city capital infrastructure projects. This practice reduces the cost substantially and bundles funding for projects that otherwise would not have been approved. The city leases fiber cable to private ISPs, creating competition for consumers, and uses its fiber network to connect commercial buildings, affordable housing, city buildings, and to provide free Wi-Fi in the public parks and transit corridors.

Lincoln, Nebraska created a 350 mile conduit network along abandoned water lines, traffic conduit, electric conduit, and gas lines. The city has leased out the conduit to seven different carriers and has generated nearly a half a million dollars per year in lease revenue. The city is predicting over $1 million in annual revenue for 2019.

Mesa, Arizona was an early adopter of Dig Once, and also made a point to take advantage of "non-traditional" existing infrastructure, eventually building a 150-mile fiber network throughout the community. The city actively works with carriers to coordinate new infrastructure deployments. On an episode of the *Community Broadband Bits* podcast, Alex Deshuk, the former Manager of Technology and Innovation for Mesa, explained: "We have regular meetings with incumbent carriers… Sit down with them and show them our street construction activities, so there's a chance to co-locate and reduce their expenses. We show them our assets, as we add assets to the infrastructure underground -- fiber and conduit and utility pipes." This practice saves carriers money and encourages increased investment of infrastructure in Mesa.

Further reading:

- *Community Broadband Bits* Podcast: Mesa's Focus on Dig Once and Fiber Leases Pays Off (ILSR)
- *Community Broadband Bits* Podcast: Dakota County is Fiber Rich Thanks to Dig Once Approach (ILSR)
- Do the right thing in the public right-of-way (Santa Monica, Calif.)
- Gigabit Communities: Technical Strategies for Facilitating Public or Private Broadband Construction in Your Community (CTC Technology & Energy)

One Touch Make Ready (OTMR) or Climb Once

Read more about pole attachment regulations on page 15.

One Touch Make Ready (OTMR) is similar in concept to Dig Once in that it streamlines the deployment of new infrastructure, therefore lowering costs and encouraging investment.

Typically, in order for a new provider to attach wires to a pole, each owner of the currently attached wires must be asked to assess and move their wires if necessary -- a process called "make ready." Incumbent providers don't have any incentive to move quickly, and the process is time and capital intensive for new providers, who must bear the cost of all make ready work. In addition, the ongoing work creates noise, traffic, and temporary service interruptions for residents.

OTMR replaces this practice with one much more streamlined. OTMR policies allow a single contractor, or a select group of contractors, that all existing pole owners agree upon to conduct all new make ready work. Benefits of this practice include faster and safer work, and decreased capital cost and therefore lower barriers to entry.

Louisville, Kentucky passed an OTMR ordinance in 2016 in order to streamline the pole attachment process and incentivize new providers to deploy in the area. The legislation states that an applicant for attachment must first receive approval from existing pole owners, at which point it may contract a pre-approved construction crew to perform all make ready work at its own expense. Pole owners and pre-existing providers whose wires were moved may choose to do post-make ready work inspections and call for remedial work if needed, at the new provider's expense.

While OTMR is a best practice for many communities, some incumbent providers have pushed back on local ordinances. Those opposing OTMR policies, including Comcast and AT&T, have argued that each provider has its own internal process for make ready work, and OTMR does not do enough to take these processes into account. Furthermore, they state that they have their own trusted contractors that they train to handle their wires, though in reality, many contractors work for multiple providers.

Municipalities adopting OTMR should work to educate stakeholders and bolster public support in order to prepare for pushback. It also helps to understand your state's specific pole attachment regulations. Cities like Louisville have been able to overcome litigation and maintain landmark OTMR policies.

In July 2018, the Federal Communications Commission adopted a Report and Order to establish a new OTMR framework for pole attachments, writing that "OTMR should accelerate broadband deployment and reduce costs by allowing the party with the strongest incentive to prepare the pole to efficiently perform the work itself."

Most local governments have authority over the public rights-of-way, including the utility poles in the rights-of-way. Cities can use this power to create policies that would make them the best partners possible for deployment of fast, affordable, and reliable broadband access in their communities.

Further reading:

Next Century Cities' Guide to Pole Attachments
"One Touch" Make-Ready Policies: The "Dig Once" of Pole Attachments (Next Century Cities)
One Touch Make Ready (*POTs and PANs*)
Memorandum on the FCC's Report and Order on Pole Attachments (Baller Stokes & Lide PC)

Template lease agreements

The city of Saint Louis Park, Minnesota created a template lease agreement for leasing out their fiber assets. The template includes lease rates that were determined through a fiber study conducted by CTC Technology & Energy. The template agreement provides structure so that the city won't be caught "flat footed" when approached by parties hoping to use their assets. At the same time, it allows for modifications in order to accommodate specific needs. Find the city's template lease agreement here.

Additional example lease agreements: Weatherford, Texas and Huntsville, Alabama.

Simplified permitting practices

Complex permitting processes can discourage investment. Confusing bureaucratic application systems and unpredictable waiting periods for approvals can discourage vendors and slow down investment in your community. Communities that simplify and streamline this process provide vendors with this needed predictability and can encourage investment. This preparation is especially important as vendors seek to deploy more and more small cells. Next-generation networks will require many small cells for every one macro cell tower relied upon by current wireless networks, and cities across the country are already grappling with an influx of permits.

Creating a set of pre-approved small cell designs can greatly simplify this process. The city of Huntington Beach, California worked with providers to create four pre-approved designs for small cells. The city's Sustainability Manager, Antonia Graham, describes the benefit:

> "These designs are now integrated into our permitting process, so if carriers' deployments fit one of the four standards, they are free to follow a streamlined, over-the-counter application process to receive permits from the city. As we developed these design standards we had a few carriers push back with their own ideas, and we

> actually ended up incorporating their designs into our permitting process. Collaborating with carriers to develop these designs was integral to ensuring that the permitting process would work for not only the city, but the providers as well."

Other cities, including Denver, Colorado, have included equipment shrouds in their small cell design guidelines in order to simplify and standardize deployments throughout the city.

Creating an organized process to make information about permit applications accessible and easy to understand helps investors take action. In addition, putting work into this process shows that your municipality is a conscientious and effective partner. Centennial, Colorado's comprehensive small cell permitting parameters create clear definitions, use standards, and more that help ensure the deployment process will be smooth for both providers and the city (see Sections 12-2-305 and 12-2-425 for the siting of Wireless Communications Facilities).

The city of Riverside, California created a "One Stop Permitting Shop" in order to address complaints about its disorganized and confusing permit application process. The shop, located on one floor of city hall, brings together representatives from all seven departments that are involved in city permitting, and a triage process ensures that applicants know exactly what steps they must take in order to apply for their permit. The shop also uses customer data to ensure the process is as smooth and pain-free as possible.

Lincoln, Nebraska simplified the permitting process by breaking "department" molds and grouping all city staff together that work on locating utilities in the city rights of way. This method made communication easier among staff and cut a clearer path forward for wireless providers seeking permits.

Further reading:

> Huntington Beach Achieves Small Cell Deployment Through Collaboration (Next Century Cities)

Create clear review processes for historic, scenic, or theatre districts

Creating specific, predetermined requirements for infrastructure deployments within special districts - such as historic, scenic, oceanfront, or theatre - can help a municipality maintain control over areas of significance. The earlier these specifications are in place, the better.

The city of Boston, Massachusetts wrote specific exceptions for historic districts into its small cell agreements with providers. Boston's agreement with American Tower includes: "ATC further acknowledges that it cannot use any historically or architecturally significant light poles located on the public rights-of-way or other street furniture, except as may be otherwise expressly authorized in a specific permit issued by the PIC."

Leverage municipal assets

Municipalities should take into account their public assets that are of value to industry collaborators. For example, fiber, conduit, and physical siting locations all present opportunities for wireless firms and/or the intermediary companies that work with wireless firms in deploying technology. Municipalities can leverage these assets to create mutually beneficial agreements and to negotiate specific terms.

For example, Boston does not own the poles in the city, however, it does own property like street lights that are interesting to wireless companies. Boston worked with licensees to collaboratively develop designs for replacement lights. These design standards focus heavily on aesthetics, concealment, and historic character.

In Lincoln, Nebraska, the city leveraged its extensive conduit system to negotiate several public benefits in return for offering deployers a quick process to deploy on public street lights.

Further reading:

Boston's agreement with Verizon
Lincoln's agreement with Verizon

Competition in multi-dwelling units

Apartment buildings and condominiums, known as multi-dwelling units or "MDUs," present a unique challenge in the effort to ensure everyone has high quality internet access. MDU owners and managers often strike exclusivity deals with incumbent cable and telephone companies. Despite efforts to unwind this practice in the past, many MDUs still lack basic internet choice. But local policies can provide these buildings with more competitive options.

San Francisco adopted a local statute in 2016 to ensure that MDU residents are able to choose from multiple providers. The statute renders landlords unable to block ISP access to a physical building, and also allows landlords "just and reasonable competition" to defray any costs from ISPs installing their equipment. This compensation is a key incentive for landlords, as many buildings, especially older ones, do not have wiring ready to accommodate multiple ISPs.

Boston recently integrated the Broadband Ready Buildings Questionnaire into a form within the Boston Planning and Development Agency's Article 80 design review process for large real estate development projects. Created through a collaboration with WiredScore, the questionnaire asks for information about the technical readiness of the prospective development to serve the current and future connectivity needs of residents and businesses. The city hopes that gathering information early in the development process will encourage behavior that will support choice and competition as a part of overall building readiness.

Fixed wireless providers present a unique solution to the MDU dilemma, because they can deliver high-capacity networks to MDUs without running fiber in the street. They do still need good wiring within the building, but providers like Monkeybrains in San Francisco and netBlazr in Boston are growing rapidly in metro regions.

Further reading:

The New Payola: Deals Landlords Cut With Internet Providers (*Wired*)
Boston's Broadband Ready Buildings Questionnaire (Next Century Cities)

Establish policies and procedures checklist

- ❑ Consider your municipality's priorities when it comes to small cell design
- ❑ Consider municipal districts in which you might want specified designs, such as historic, oceanfront, or theater districts
- ❑ Evaluate your municipality's structural assets
- ❑ Identify or create a system for mapping those assets throughout the community (see *asset mapping*)

Prioritize Digital Inclusion

According to Pew, 11 percent of adults are not online. It is clear who is and who is not connected: Seniors, the disabled, those with limited incomes, those who have not obtained a high school diploma, rural residents, and indigenous and tribal communities are the least likely to be online at home. When asked, those not online at home identified cost as the number one factor. Other factors include the cost of device ownership and digital skills training.

How can cities improve their statistics for online access? There are several best practices that can support a move toward digital equity.

Create a digital inclusion plan

Several cities have developed very specific digital inclusion plans that help to guide decision-making and measure progress. Examples include plans from Austin, Texas, Kansas City, Missouri, Charlotte, North Carolina, and Louisville, Kentucky.

Provide digital inclusion grants programs and funding opportunities

More and more cities are finding ways to incentivize local organizations to provide digital inclusion programming and to support the expansion of existing programs. One of the first in the country to do so was Seattle. Others include Austin, Boston, and Charlotte.

An emerging model involves the city using pole attachment fees to support digital inclusion efforts. San Jose has been at the forefront of this effort and has an interesting plan in place where the pole attachment fees are dedicated to a Digital Inclusion Program Fund.

Use your convening power

Municipalities have the unique opportunity to bring together city staff, residents, community organizations, nonprofits, schools and universities, libraries, faith-based communities, and others. Such convenings can provide an opportunity to hear directly from those who are impacted by lack of access and can lead to collaborative problem solving, shared ownership of the solution, and a plan to intervene.

For example, in Boston and Chattanooga, the cities participated in finding a solution that would include a wide swath of city and community support. In response to their convenings, they have each implemented a project called Tech Goes Home. These projects provide a device, training, and support to find low-cost home access. Training takes place in community anchor institutions across the city, with a wide range of trainers and learners participating.

Support housing authority access projects

Several communities are finding solutions to connectivity issues within their housing authority properties.

- Wilson, North Carolina's municipal network, called Greenlight, provides 50 mbps symmetrical for $10 per month for residents in housing authority facilities.
- In San Francisco, California, private company Monkeybrains has partnered with the San Francisco Housing Development Corporation to provide gigabit service for free initially, with costs limited to $20 per month after two years.
- In Boston, Massachusetts, a pilot program in partnership with Starry will bring free high speed broadband to common areas in a housing community for elderly and disabled residents.
- Santa Monica, California is providing training to residents and gigabit service to Community Rooms used for afterschool education and job training programs in affordable housing buildings. Residents can request a fiber drop and gigabit access in their housing unit for an installation cost of $48, and monthly service cost of $48.
- Finally, Google Fiber has supported free access in the housing associations in markets where they provide service.

Note a new rule passed by HUD in 2016 requires the agency to include the installation of broadband infrastructure in any new construction or substantial rehabilitation of multifamily rental housing that is funded or supported by HUD.

Investigate and elevate low-cost options

Not every city has a local or regional provider that is able or willing to provide low-cost options for service. However, there are plans that can help to provide home access.

Some examples include:

- Mobile Beacon and Mobile Citizen provide mobile hotspots for educational entities, for nonprofits, and for social welfare agencies.
- PCs for People provides the opportunity for individuals or organizations to obtain refurbished computers and/or a mobile hotspot and low-cost service. PCs for people has partnered with Mobile Beacon and Mobile Citizen to allow individuals to purchase a mobile hotspot and low-cost monthly service.
- Some of the larger providers have plans to support low income consumers. For example, Comcast Internet Essentials offers 15 Mbps download speeds for $9.95 per month, available to families whose children receive free or reduced lunch in school, for those receiving HUD housing assistance, for low-income veterans, and low-income seniors in 12 pilot locations who receive state or federal assistance. Note that there are some caveats, so it is important to check the specifics on the site. EveryoneOn has a portal that lists low-cost options and programs that make refurbished devices available.
- Many local libraries provide mobile hotspots for internet access. For example, in Santa Clara, California, there are both Chromebooks and hotspots available for loan. Some libraries in Los Angeles, California also have mobile hotspots for loan through their Tech2Go program. The New York Public Library allows households with school age children and no home internet access to borrow hotspots for the entirety of the school year for free.

Further reading:

Webinar: Connecting Residents in Low Income Housing (Next Century Cities)
Austin, Texas' Digital Inclusion Strategy
Kansas City, Missouri's Digital Equity Strategic Plan
National Digital Inclusion Alliance Resources
The Digital Inclusion Coalition Guidebook (NDIA)
Five Digital Inclusion Trends in the United States (NTIA)
Low-Cost Internet Service & Affordable Devices (EveryoneOn)
Gauging Household Digital Readiness (Purdue University)

Prioritize digital inclusion checklist

- ❑ Consider who in your community is unconnected and why
- ❑ Make a list of organizations and anchor institutions that work with unconnected populations. How might they be able to help?

- ❑ Convene a group of leaders - community members, business, faith based, school, library, nonprofit, housing authority, and other interested parties - to brainstorm collaborative solutions
- ❑ Create a digital inclusion master plan that includes action steps and goals
- ❑ Learn about the options for low-cost access in your community
- ❑ Work with trusted anchor institutions, advocacy groups, and nonprofits to alert low-income residents about options for low-cost access

Identify Legislative and Regulatory Barriers

Small cells

At the time of writing, 21 states have passed or are currently considering legislation that limit municipalities' control over small cell deployment. For example, a Florida law passed in 2017 caps all annual collocation rates at $150 per utility pole.

In September 2018, the Federal Communications Commission passed an Order that significantly limits the ability of local governments to negotiate in the public interest around small cell agreements. Notably, the Order creates a "safe harbor" for application and use fees of the public rights-of-way, and puts the burden on municipalities to demonstrate cost if they wish to charge higher fees.

Laws and policies such as these limit municipalities' ability to negotiate in order to create agreements with providers that are mutually beneficial. In June 2018, San Jose, California created agreements with AT&T, Mobilitie, and Verizon to deploy more than 4,000+ small cells throughout the city where lease rates are reduced as carriers commit to larger deployments across the city, incenting comprehensive, large-scale investment. The agreement with AT&T and Verizon involves roughly $10 million to be paid over the span of a 15-year lease agreement, as well as an additional $1 million contribution each to the city's Digital Inclusion Program Fund. A key element of the project was the negotiation that AT&T and Verizon would deploy the small cells ubiquitously throughout all of San Jose, regardless of the differing income levels of each neighborhood. Over ten years, an estimated $20-24 million will be generated for the Digital Inclusion Program Fund from the leasing of city-owned streetlights.

This is an example of the type of partnership that can be achieved when cities have the ability to negotiate attachment fees and other elements of an agreement - including funding the people, processes and technology required to meet industry permitting needs - while achieving digital inclusion goals. The agreement would not have been possible had California Governor Jerry Brown not vetoed a state bill just months prior.

Further reading:

Municipal Action Guide: Small Cell Wireless Technology in Cities (NLC)
Guide to state restrictions on small cell deployments (SmartWorks Partners)

Pole attachments

Read more about One Touch Make Ready policies on page 7.

There is no one universal rule governing pole attachments. The Federal Communications Commission controls attachments and regulations in 29 states, but the other 21 states and the District of Columbia have each implemented their own regulations.

States are subject to the regulations issued by the FCC under the authority granted by Section 224 of the Telecommunications Act, which attempts to streamline the pole attachment process in order to more quickly deploy broadband infrastructure while ensuring that pole owners are fairly compensated for their property.

However, any state that certifies to the FCC that it has written and executed effective rules and regulations regarding the rates, terms, and conditions of pole attachment agreements may exercise the authority to regulate those agreements within the state. Importantly, the FCC recently wrote that any state which has opted out of the FCC's authority has the ability to allow One Touch Make Ready policies.

Municipal broadband

At the time of writing, 19 states have barriers in place that prevent or limit municipalities' ability to build and own their own broadband infrastructure. For example, Chattanooga is prohibited by state law from serving people just outside of its electric territory who have no broadband service. This is because Tennessee limits municipal fiber networks tightly to areas where a city-owned electric board offers electricity.

In 2015, the FCC released an order preempting North Carolina and Tennessee's prohibitions of municipal provision of broadband service. While this order was later overturned, the document offers an in-depth analysis of barriers to municipal networks and how those barriers harm communities.

How to work around barriers

Many state laws create barriers to investment, but that doesn't mean there aren't steps your community can take to encourage improved access. Motivated communities should seek innovative ways to invest, even when state laws pose a challenge.

For example, Nebraska has a state law that prohibits municipalities from leasing out fiber. The city of Lincoln, Nebraska instead built an impressive conduit network to lease out to providers.

Municipalities can speak up for local control by crafting a written response to FCC proposals. Submitting comments to the FCC is a powerful way to add your municipality's voice to the debate. The perspective of local communities and governments is often underrepresented at the federal level, so speaking up can go a long way. Next Century Cities' step-by-step guide to submitting comments (with screenshots) makes this process simple and accessible.
Staying apprised of actions, proposals, and legislation at the federal and state level is the first step in defending local rights. Join your state's municipal league to stay informed about federal and state policies and to gain access to resources. Municipal leagues can provide information about navigating barriers - such as the "opt-out kit" provided by Colorado Counties, Inc. and the Colorado Municipal League.

Municipalities can join Next Century Cities - a municipal membership organization that is dedicated to helping communities get fast, affordable, reliable broadband - for free. Among other things, Next Century Cities closely monitors federal actions and policies that affect local choice and connectivity opportunities. Each week, the organization sends an email newsletter to update members about relevant actions at the FCC and in Congress.

Further reading:

How-To: Submit Comments to the Federal Communications Commission (Next Century Cities)
The Future of 5G: The Bitter Battle for Local Control (*GovTech*)

Advocating for local control checklist

- ❑ Join Next Century Cities
- ❑ Join the Coalition for Local Internet Choice
- ❑ Connect with your state's municipal league
- ❑ Research existing or pending laws and policies that could limit your local control:
    - ❑ SmartWorks Partners' guide to state restrictions on small cell deployments
    - ❑ Baller Stokes & Lide, PC's guide to state restrictions on community broadband services
    - ❑ Community Broadband Networks' map of state restrictions on community broadband networks
    - ❑ Next Century Cities' state-by-state guide to pole attachments

Explore Connectivity Options

There is no single "correct" way to connect a community. Many models have successfully brought broadband access to cities, towns, and counties. These models are each unique in their distribution of responsibilities and risks among participating parties. Performing a thorough and thoughtful inventory of your community's assets, needs, and priorities is a good place to start when thinking about your own best model.

Municipal networks

Municipal networks are built as a municipal effort and are owned by local governments. These networks take many forms, from modest networks serving a few businesses to networks that are available at every address across a community. Some are run by the city and others are managed by an ISP under contract. More than 500 communities have invested in municipal networks using a variety of models to achieve a variety of public policy goals, from creating a better business climate to digital inclusion to lowering prices for residents. Examples include Chattanooga, Tennessee; Wilson, North Carolina; and Sandy, Oregon.

Further reading:

- The Deep History of Chattanooga's Fiber Network (ILSR)
- Wilson Gives the Greenlight to Fast Internet (ILSR)
- SandyNet Goes Gig: A Model for Anytown USA (ILSR)
- Community Broadband Networks
- Community-Owned Fiber Networks: Value Leaders in America (Harvard)

Open access networks

Open access networks allow multiple ISPs to offer service over the same fiber infrastructure. The network owner (which could be the city, the utility, or a private entity) builds and owns the actual fiber infrastructure. For example, the city of Ammon, Idaho built the infrastructure and multiple providers offer services to residents using this infrastructure. Open access networks allow for subscribers to have multiple options, which can drive down cost and drive up the quality of service while encouraging innovation in services available.

Further reading:

- Ammon case study: Enabling Competition and Innovation on a City Fiber Network (Harvard's Berkman Klein Center for Internet & Society)
- Ammon Model video (ILSR & Next Century Cities)
- Why I Believe Open Access is The Right Choice for Communities (Next Century Cities)
- Open Access Resources (ILSR)

Public-private partnerships

Municipalities and private companies can collaborate to share the risks and rewards of a network investment. Public-private partnerships can take many forms and can divide responsibility and roles between municipalities and vendors in a variety of ways. Public-private partnerships offer an alternative to an entirely government-owned and operated municipal network. The city of Westminster, Maryland has a very successful public-private partnership with private provider Ting.

Further reading:

- Westminster and Ting: The How and the Why (ILSR)
- Successful Strategies for Broadband Public-Private Partnerships (ILSR)
- Navigating Public-Private Partnerships (Next Century Cities)
- Library on Broadband Public-Private-Partnerships (CLIC)

Institutional networks

An institutional network is a network that connects municipal buildings such as the town hall, city office buildings, schools, public safety, and libraries. They do not serve homes or private businesses. However, institutional networks can serve as the valuable fiber backbone to support a wider build-out in the community. Montgomery County, Maryland has an institutional network that has brought tremendous cost savings and higher-quality telecommunications to public facilities.

Further reading:

- Institutional Networks Resources (ILSR)

Electric co-ops

Rural electric cooperatives brought electricity to communities and created a template later modified to ensure universal telephone service. Now, many of these organizations are expanding to deliver higher-quality internet access to their rural regions than is available in major metro regions.

Further Reading:

- Cooperatives Connect America (ILSR)
- Co-op case studies library (NRECA)

Working with incumbent providers

Many communities have successfully partnered with incumbent providers, whether large national companies or smaller, local ISPs. Smaller incumbents, especially telephone cooperatives, tend to be especially receptive to partnerships with local communities.

Explore connectivity options checklist

- ❑ Consider your community's priorities when it comes to ownership and risk. What aspects of a network do you prefer to keep in-house, and what aspects do you prefer to outsource?

Explore Financing Options

There is no single best way to finance your broadband network, and each community should work out what model will be the best fit for their unique needs. That said, it is very important to think about financing early in the process so that you can accurately design the project and have informed conversations with decision makers, such as city finance managers or Chief Financial Officers (CFOs). A major mistake many communities make is not considering financing options and not engaging the city Finance Director or CFO early on in the process. Finance Directors are often the most risk-averse people within a city government, and for the most part, that's a good thing!

There are more than 500 publicly owned networks successfully serving local communities and the vast majority of municipal networks have not used taxpayer dollars.

Financing models

There are many financing options to consider:

- **Public municipal bond offering:** A local government or utility issues revenue bonds that are secured by the revenue source from the broadband buildout. Note that these bonds do not need to be sold in traditional $5000 denominations. These bonds are sold to investors, including local residents. Examples include Fort Collins and Longmont, Colorado.
- **Private municipal bond offering:** A local government or utility issues revenue bonds, or other debt instruments, that are sold privately, often to high net worth individuals or institutions, and would not be available for purchase by local investors. Ammon, Idaho is an example.
- **Direct loan/private loan (debt financing):** A good example of this is when a bank provides a short-term loan to get the network off the ground. A loan like this could cover initial construction costs and then the community could find another financing solution if needed to continue. Examples include Downeast Economist Development, Maine and Reedsburg, Wisconsin.
- **Internal loans:** A department within the local government loans another department the necessary capital for building the network. Many states regulate the minimum interest rate and requirements for such a loan. Chattanooga, Tennessee is an example.

- **Private equity financing:** A third party investor provides the startup capital and then owns the network for an agreed-upon period of time before giving the community a buy-back option. Examples include Monmouth, Independence and Dallas, Oregon.
- **Avoided costs:** A local government redirects existing funds used to lease connections from an existing provider to build and operate its own network, often resulting in faster connections at lower prices. If payback is longer than one year, bonds may be issued and repaid with the budget that had been used to lease lines. This approach is most common with smaller networks built incrementally, not citywide projects. Examples include Santa Monica, California and Ammon's LID 1.

Neighborly is a mission-driven startup connecting communities with the capital they need for impactful public projects. They have helped communities finance a wide range of public infrastructure. Learn more about how they support broadband projects on their site.

Note that these financing options can be mixed-and-matched, and combined with state and federal grants, too. Many federal programs support the deployment of broadband through grants, loans, or both. The majority of these programs are housed within the Federal Communications Commission and the Department of Agriculture.

Federal Communications Commission (FCC)

The FCC houses the federal Universal Service Fund (USF). USF supports four programs, all administered by the Universal Service Administrative Company (USAC):

- **Lifeline.** This program provides monthly discounts for voice and broadband services to low-income consumers. USAC is in the process of rolling out a National Eligibility Verifier, an online centralized system that determines subscriber eligibility.
- **High-Cost.** This program, also known as the Connect America Fund (CAF), allows eligible carriers who provide service in rural, insular, and high-cost areas to recover some costs.
- **E-Rate.** This program provides discounts to schools and libraries for telecommunications and information services, internal connections, managed internal broadband services and basic maintenance of connections. Discounts for services range from 20 to 90 percent based on the local poverty rate.
- **Rural Health Care.** This program supports three initiatives: the Healthcare Connect Fund, the Rural Health Care Telecommunications Program, and the Rural Health Care Pilot Program. All three provide discounts for eligible health care providers to access telecommunications and information services. This program and E-Rate are both notable in part because connections to anchor institutions can often provide a backbone for building out to the rest of a community.

Department of Agriculture (USDA)

USDA and its Rural Utilities Service (RUS) coordinate several grant and loan programs that work to help build out broadband in rural America. Most USDA programs are available to state and local governments, tribal communities, non-profits, for-profit businesses, cooperatives, and consortia:

- **Community Connect Grants.** This program helps fund broadband deployment in rural communities where it's not economically feasible for private providers to build out. State and local governments, tribal communities, non-profits, and for-profit corporations in communities that lack 10/1 Mbps service are all eligible.
- **Distance Learning and Telemedicine Grants.** This program awards grants to entities that provide education or health care through telecommunications, including state and local governments, tribal communities, non-profits, for-profit businesses, and consortia.
- **Rural Broadband Access Loan and Guarantee.** This program provides loans and loan guarantees to help pay for the construction, improvement, or acquisition of facilities and equipment needed to provide broadband in areas that are underserved.
- **Telecommunications Infrastructure Loans and Guarantees.** This program provides financing through loans for the construction, maintenance, improvement, and expansion of phone and broadband services in communities with a population of 5,000 or less.
- **E-Connectivity Pilot Program.** USDA is currently developing the e-Connectivity Pilot Program, which will, upon implementation, support rural broadband deployment.

USDA has a tool to identify the field representative that covers your area. The representatives can help you navigate the agency's offerings, determine your eligibility for participation, and more. It can be helpful to ask about reporting requirements and then to ensure that your team has the internal capacity to manage potential grants.

Community Reinvestment Act (CRA)

The CRA requires banks to invest in low- and moderate-income neighborhoods in the surrounding community. Several communities have leveraged the CRA to support broadband expansion as a form of community development. Examples include cooperative RS Fiber in rural Minnesota; Palmer Wireless in Foley, Minnesota; GreatWave Communications in Ashtabula County, Ohio; and Uniti Fiber in Monroe County, Alabama.

Special investment districts and Opportunity Zones

Communities may consider providing incentives such as tax cuts in specific districts in order to incentivize investment in targeted neighborhoods. The city of Ammon, Idaho created an innovative Local Improvement District as a method of financing their fiber infrastructure. The city council created a district from five subdivisions where residents could opt in or out of

participation in the new fiber-to-the-home network. Improvement bonds are sold to those who choose to opt in, funding the construction of the network. The bonds are then paid for by an assessment on each of the properties that benefit from the network - the households that chose to opt in.

Recently developed federal Opportunity Zones can also encourage investment in low income communities through preferential tax treatment. For example, the city of Erie, Pennsylvania is planning to first offer their upcoming public Wi-Fi program within federal Opportunity Zones because of the high demand and tax incentives.

State programs

In addition to federal programs, many states have their own set of programs to promote broadband access and adoption.

Further Reading

- How public finance can make universal internet access a reality (Neighborly)
- How Municipal Networks are Financed (ILSR)
- Universal Service Support Mechanisms (FCC)
- Broadband programs (USDA)
- USDA's Rural Broadband Boost -- With More to Come (Benton)
- How CRA Can Close the Digital Divide: Banking the Unbanked (EVERFI)
- Closing the Digital Divide: A Framework for Meeting CRA Obligations (Federal Reserve Bank of Dallas)
- Expanding Internet Access: Bank Financing for Rural Broadband Initiatives (Office of the Comptroller of the Currency)
- Ammon's Local Improvement District Gets City Council Blessing (ILSR)
- Opportunity Zones Frequently Asked Questions (IRS)

Explore financing options checklist

- ❑ Bring your community's Finance Director or CFO into a project as early as possible
- ❑ Explore available financing mechanisms early in a project's life
- ❑ Gauge your community members' appetite for public investment
- ❑ Determine if anchor institutions in your community are already receiving grants or loans from federal broadband programs
- ❑ Determine your community's and anchor institutions' eligibility for existing federal and state programs

Be a Clear Collaborator

In order to promote investment in your community, it's necessary to be a deliberate, open collaborator with the private sector and other stakeholders. Partnerships in any form require compromise and communication, and are often most beneficial to involved parties when the time is taken to discuss goals, opportunities, and priorities.

Consider your community's priorities

Thinking through your municipality's priorities prior to meeting with a potential partner can help ensure you end up with an agreement that reflects community needs and desires. It's important to have a good handle on what aspects of a project you want firmly in your wheelhouse, and which you're comfortable with or enthusiastic to outsource. Various partnership models entail different levels of risk and reward for a community, and local governments should be prepared to assess their own risk tolerance before creating a partnership.

For example, the city of Westminster, Maryland knew that while they needed improved internet access for residents, they weren't up for taking on the role of a municipal broadband provider. On the other hand, they did want to make sure that any infrastructure that was invested in would be publicly owned. The city ended up finding its perfect partner in private company Ting, and developed a plan together that suited both parties' strengths and priorities.

Designate a point person

It is often helpful to appoint one municipal employee to act specifically as a point person between the community and its partners. This can streamline information sharing and help eliminate crossed wires between various contacts and the siloing of departments. Implementing this practice early on, during the RFP stage, shows investors that your municipality is easy to work with and would be an effective partner.

In Kansas City, Missouri, Assistant City Manager Rick Usher served as the main point of contact for Google Fiber. He wrote about the importance of communication and collaboration between the city and its partner in a piece for *Government Technology*:

> "The most important service we are providing Google Fiber is the bi-weekly technical team meetings where city staff and Google Fiber's design and construction teams review upcoming design challenges in the project, resolve construction issues in the field, identify opportunities for sharing resources and team up on projects to expedite installation of conduit for the current and future use of both parties."

It can be helpful to prioritize bringing on a point person throughout the negotiation process of a new partnership. In a recent agreement between Saratoga Springs, N.Y. and SiFi Networks, SiFi agreed to contribute $45,000 to the city annually in order for a Department of Public Works employee to serve as the contact person between the city and the company.

Know your resources

Research who at the state level - and what other departments within your municipality - might be working on similar issues. Being aware of synergies and complementary efforts before a project gets started can enhance work and minimize redundancy.

Further reading:

Hiring Guide: The Anatomy of a Community Broadband Manager (Next Century Cities)
Westminster and Ting Go Together Like Milk and Cookies (Next Century Cities)
Lessons from the Kansas City Google Fiber Deployment (*GovTech*)
For Wireless Broadband, Raleigh Finds Common Ground Through Relationships (NLC)

Be a clear collaborator checklist

- ❑ Establish your community's priorities in a partnership. On what are you willing to compromise? What is non-negotiable?
- ❑ Create a system for smooth communication; selecting a one person contact within city hall can make the process simpler for the partner and therefore less likely to create confusion
- ❑ Research similar or complementary initiatives within other municipal departments or at the state level

Measure Success

As with any project, it's important to define measurements of success. While "success" will vary depending on the community and the type of project, there are a few places to start:

- **Take rates.** How many households and businesses have gotten online?
- **Diversity of institutions on the network.** Are the benefits of connectivity reaching all corners of your community?
- **Financial stability.** Is the network's business model sustainable based on take rates and returns on investment? This calculation will take different variables into consideration based on the type of project. For example, a municipal network breaking even can be considered a net positive, because the public investment will have brought additional tangible and intangible benefits to the community.
- **New businesses.** Have new companies chosen to set up shop in your community? Are existing businesses taking advantage of new opportunities?

- **Mutually beneficial partnerships.** Have partnerships been formed with stakeholders that maximize benefits and mitigate risk for all parties?
- **Engaged community.** Is the community involved in and supportive of the project? Does the project work to serve true community needs?

Manage expectations

Acknowledge from the onset that the project itself will likely change significantly throughout its course, and be sure to adjust expectations accordingly.

Maintain communication

Maintaining open communication with stakeholders and the public throughout the course of the project is key to its success.

Measure success checklist

- ❑ Hold a community listening session to receive feedback about the project and explore ways in which it could improve
- ❑ Maintain a communications strategy that keeps the public informed through all stages of the project

Next Century Communities Checklist

Establish leadership

- ❑ Understand how broadband access would impact your community
- ❑ Talk with your local elected leadership about the importance of investing in broadband access

Build a community movement

- ❑ Use the convening power of the city, town, or county to bring together stakeholder groups for conversation, information sharing, and brainstorming
- ❑ Consider the anchor institutions, community groups, and local businesses that could help involve residents in a discussion about broadband
- ❑ Identify individuals who are trusted members of their community (faith-based leaders, activists, nonprofit staff, etc). Seek their advice and keep them well informed of the process and progress.
- ❑ Brainstorm methods of communication that make sense for your municipality and your community (for example: an email newsletter, Facebook page, mailings, etc)
- ❑ Create a communications plan that is consistent, transparent, and inclusive

Evaluate the current circumstance

- ❑ Map all municipally-owned fiber, conduit, and towers and create a simple system to allow you to share with relevant parties
- ❑ Develop policies and a contract template to simplify leasing these assets
- ❑ Ascertain the level of service offered by current service providers. Is it sufficient to meet the needs of businesses, anchor institutions, and residents? Are residents able to afford the cost of the existing service?
- ❑ Evaluate if there are private assets that could be leveraged to support better service to residents

Establish policies and procedures to support investment

- ❑ Consider your municipality's priorities when it comes to small cell design
- ❑ Consider municipal districts in which you might want specified designs, such as historic, oceanfront, or theater districts
- ❑ Evaluate your municipality's structural assets
- ❑ Identify or create a system for mapping those assets throughout the community (see *asset mapping*)

Prioritize digital inclusion

- ❑ Consider who in your community is unconnected and why
- ❑ Make a list of organizations and anchor institutions that work with unconnected populations. How might they be able to help?
- ❑ Convene a group of leaders - community members, business, faith based, school, library, nonprofit, housing authority, and other interested parties - to brainstorm collaborative solutions
- ❑ Create a digital inclusion master plan that includes action steps and goals

- ❑ Learn about the options for low-cost access in your community
- ❑ Work with trusted anchor institutions, advocacy groups, and nonprofits to alert low-income residents about options for low-cost access

Advocate for local control

- ❑ Join Next Century Cities
- ❑ Join the Coalition for Local Internet Choice
- ❑ Connect with your state's municipal league
- ❑ Research existing or pending laws and policies that could limit your local control:
    - ❑ State restrictions on small cell deployments (SmartWorks Partners)
    - ❑ State restrictions on community broadband services (Baller Stokes & Lide PC)
    - ❑ Community Broadband Networks' map of state restrictions on community broadband networks
    - ❑ State-by-state guide to pole attachments (Next Century Cities)

Explore connectivity options

- ❑ Consider your community's priorities when it comes to ownership and risk. What aspects of a network do you prefer to keep in-house, and what aspects do you prefer to outsource?

Explore financing options

- ❑ Bring your community's Finance Director or CFO into a project as early as possible
- ❑ Explore available financing mechanisms early in a project's life
- ❑ Gauge your community members' appetite for public investment
- ❑ Determine if anchor institutions in your community are already receiving grants or loans from federal broadband programs
- ❑ Determine your community's and anchor institutions' eligibility for existing federal and state programs

Be a clear collaborator

- ❑ Establish your community's priorities in a partnership. On what are you willing to compromise? What is non-negotiable?
- ❑ Create a system for smooth communication; selecting a one person contact within city hall can make the process simpler for the partner and therefore less likely to create confusion
- ❑ Research similar or complementary initiatives within other municipal departments or at the state level

Measure success

- ❑ Hold a community listening session to receive feedback about the project and explore ways in which it could improve
- ❑ Maintain a communications strategy that keeps the public informed through all stages of the project

Glossary

This glossary was developed in partnership with the Institute for Local Self-Reliance

5G

5G, or fifth generation, is the next iteration of cell phone networks. 5G service will be faster and have lower latency than 4G LTE, and will require densely deployed “small cells” rather than the macro cell towers commonly used for 4G. Because many 5G small cells must be deployed closely together in order to create the network, the technology is best suited to densely populated cities. Industry-wide 5G technology standards are still being finalized, and it is not clear when 5G service will be commercially available.

anchor institutions

Flagship community institutions, including but not limited to: schools, health care centers, and libraries. Anchor institutions are sometimes connected to fiber even when fiber service is not commercially available in the community. Because of this, they can act as a connection to the internet backbone.

asymmetrical

Internet connections have two components - a downstream and upstream. When the two speeds are not comparable, the connection is termed asymmetric. Typically, phone and cable companies offer much slower upload speeds than download, in part because the Internet tended to be a download-centric system in the 90's and early 00's. However, users increasingly need faster upstream connections to take full advantage of modern applications.

backhaul

A general term for the segment of a network between the core and the edge. An example: the connection from a community network hub in a small town to a carrier hotel where it connects to the Internet backbone.

bandwidth

The rate at which the network can transmit information across it. Generally, higher bandwidth is desirable. The amount of bandwidth available to you can determine whether you download a photo in 2 seconds or 2 minutes.

bit

The base unit of information in computing. For our purposes, also the base unit of measuring network speeds. 1 bit is a single piece of information. Network speeds tend to be measured by bits per second - using kilo (1,000), mega (1,000,000), and giga (1,000,000,000). A bit is a part of byte, they are not synonyms. Bit is generally abbreviated with a lower case b.

broadband

A speed benchmark set and updated by the Federal Communications Commission. The benchmark was last updated in 2015 to define broadband as 25 mbps download speeds and 3 mbps upload speeds. “Broadband” is generally shorthand for quality internet service.

BTOP

Broadband Technology Opportunities Program - established by the 2009 stimulus legislation, a program to disburse $4.7 billion to improve broadband access and literacy throughout the country.

byte

The base unit for file storage. Comprised of 8 bits (just to confuse you - if you don't like powers of 2, stay away from computer science). A 1MB (megabyte) file is made of 8 million bits. Bytes generally refer to the size of storage whereas bits are used frequently when discussing how rapidly files may be moved. Byte is generally abbreviated with a capital B.

cable modem system

Cable television companies have offered Internet access via their cable system for more than a decade. The network architecture uses a loop that connects each subscriber in a given neighborhood, meaning they all share one big connection to the Internet. Over time, needs have increased faster than capacity on these networks. Because the cable network shares the last mile connection among hundreds of subscribers, a few bandwidth hogs can slow everyone's experience.

cloud

Some refer to the entire Internet as a cloud - the idea being that all the information is just out there and it does not matter where. More commonly now, cloud computing refers to services such as Amazon's S3 where users pay a fee to store information on Amazon's servers without ever really knowing the physical location. As we gain access to faster Internet connections (particularly on the upstream) cloud services may offer cheaper means of accomplishing tasks and more reliable back ups.

conduit

A reinforced tube through which cabling runs. Conduit is useful both to protect fiber-optic cables in the ground and because one can place the conduit underground when convenient and later "blow" or "pull" the fiber cabling through the conduit.

cooperative (co-op)

A non-profit, member-owned organization that provides a needed service. Members pay a small fee to join and have voting rights within the organization.

CPE

Customer Premises Equipment - typically describes the box on the side of a house that receives and sends the signal from the network, connecting the subscriber.

dark fiber

Unused fiber infrastructure that has not been “lit” with internet service. When someone is building a fiber network, the cost of adding more fiber than immediately required is negligible and the cost of having to add more fiber later is very high. Therefore, many include dark fiber in projects - fibers that can be leased to others or held in reserve for a future need.

data center

A large group of networked computer servers typically used by organizations for the remote storage, processing, or distribution of large amounts of data.

digital equity

The state of all members of a community having equal access and sufficient digital literacy to use communications technologies.

digital inclusion

The actions required in order to achieve digital equity.

DOCSIS

This is a technical specification that allows modern cable networks to offer two-way data transmissions. Every few years, the standards are improved to offer higher speeds. DOCSIS has historically offered much slower upstream and downstream but that is expected to change for very high speeds in both directions in the years after 2020.

downstream

Internet connections have two components - a downstream and upstream. Downstream refers to the rate at which the user's computer can receive data from the Internet.

Synonyms: download

DSL

Digital Subscriber Line - or Internet access offered over the phone lines. DSL allows users to use the Internet at speeds greater than dial-up while also using the phone line for telephone conversations. DSL uses frequencies not used by human voices. Unfortunately, these frequencies degrade quickly over distance, meaning customers must live within a mile or even much closer to the central office to get the fastest speeds. In any event, upstream speeds over DSL tend to top out at 5 Mbps.

duopoly

A situation in which two companies own all or nearly all of the market for a given type of product or service.

fiber-optic

A system that uses glass (or plastic) to carry light which is used to transmit information. Typically, each side of the fiber is attached to a laser that send the light signals. When the connection reaches capacity, the lasers may be upgraded to send much more information along

the same strand of fiber. This technology has been used for decades and will remain the dominant method of transmitting information for the foreseeable future.

FiOS

Verizon was the first large carrier to build a FTTH network. This network is called FiOS.

fixed wireless

A connectivity model that uses stationary wireless technology to bridge the “last mile” between the internet backbone and the subscriber.

franchise

A cable company wishing to provide television services in a community historically signed a franchise agreement with the municipal government. The agreement would specify what the community would receive from the cable company in return for access to rights of way (such as telephone poles). However, this arrangement has changed in many states, where states have preempted local control. Cities have not been permitted to offer exclusive franchises since 1992.

FTTH

Fiber-to-the-home. As most telecommunications networks use fiber in some part of it, FTTH is used to specify those that use fiber to connect the subscriber. Some claim they have a fiber-optic network because they use fiber to the node even when they use phone lines or a cable network over the last mile. FTTH may be more expensive to install, but offers significant savings in terms of maintenance when compared to copper alternatives.

FTTP/FTTU

Fiber-to-the-Premise or Fiber-to-the-User are used somewhat interchangeably with FTTH to describe full fiber networks.

Gbps

Gigabits per second - or one billion bits per second. 8 Gbps means that 8 billion bits are transferred each second. 1 Kbps (Kilobits)<1 Mbps (Megabits)<1 Gbps

Gig

Shorthand for 1 gbps (1,000 mbps) download speeds. More colloquially, a speed fast enough that any number of applications can use the network without creating congestion.

greenfield

A plot of land that will soon become a residential development. Building a broadband network is cheap in greenfields because roads, sidewalks, lawns, and buildings are not yet impediments to running the necessary wires.

HFC

Hybrid Fiber-Coax - a network that combines some fiber-optic elements (typically from the head end to a node in the field) and coaxial cable (typically the loop that connects the node to subscribers).

I-Net

Short for Institutional Network. This is the network a municipal government requires to carry out its duties. I-Net frequently refers specifically to a network built for city uses (connecting schools, for instance) by the cable company as part of the franchise agreement with the city. Cities are increasingly seeing the value of owning their own network.

Synonyms: Institutional Network

Internet of things/IoT

Reference to internet-connected devices -- anything from laptops and smartphones to “smart” streetlights or thermostats.

Kbps

Kilobits per second - a measure of speed. 8 Kbps means that 8 thousand bits are transferred each second. Using an 8 Kbps connection, it would take 1 second to transfer a 1 KB (Kilobyte) file - a text file, for instance. 1 Kbps<1 Mbps (Megabits)<1 Gbps (Gigabits)

last mile

Describes the final leg of a connection between a service provider and the customer. In DSL and cable systems, this is the most frequent bottleneck and the most expensive to resolve. The service provider may run a faster fiber-optic network into the neighborhood but deliver the last mile (which could be considerably less than a mile -"last" is the operative term) with a phone lines that cannot sustain fast speeds.

Synonyms: first mile

latency

The amount of time it takes for a bit to move from point A to point B. In the words of Dr. Stuart Cheshire: "If you want to transfer a large file over your modem it might take several seconds, or even minutes. The less data you send, the less time it takes, but there's a limit. No matter how small the amount of data, for any particular network device there's always a minimum time that you can never beat. That's called the latency of the device."

lit fiber

Fiber infrastructure that is being used to provide internet service.

macrocell

A cell used to provide cell network coverage to a large area (compared to small cells, which cover a smaller area). Often mounted on towers.

Mbps

Megabits per second - a measure of speed. 8 Mbps means that 8 million bits are transferred each second. Using an 8 Mbps connection, it would take 1 second to transfer an 1 MB (Megabyte) file - a photo, for instance. Don't get lost in the details - when it comes to Mbps, more is faster. 1 Kbps (Kilobits)<1 Mbps<1 Gbps (Gigabits)

MDU

Multiple dwelling unit - most frequently apartment buildings. MDUs can offer a challenge when building a FTTH network due to the need to negotiate with building owners and rewiring that may be necessary to bring fast speeds to each unit.

middle mile

Middle mile is a term most often referring to the network connection between the last mile and greater Internet. For instance, in a rural area, the middle mile would likely connect the town's network to a larger metropolitan area where it interconnects with major carriers.

municipal network

A broadband network owned by a local government. These networks take many forms, from modest networks serving a few businesses to networks that are available at every address across a community. Some are run by the municipality and others are managed by an ISP under contract.

NATOA

National Association of Telecommunications Officers and Advisers. NATOA is comprised of local government officials and employees that work on cable and broadband issues - from public access television to managing the community's rights-of-way.

NTIA

National Telecommunications and Information Administration - a division of the Department of Commerce in Washington, DC.

open access

An arrangement in which the network is open to independent service providers to offer services. In many cases, the network owner only sells wholesale access to the service providers who offer all retail services (ie: triple play of internet, phone, tv). Open access provides much more competition from which potential subscribers can choose.

overbuild

To create a network that goes into competition with an incumbent provider.

passed

Residences or businesses that have access to the network. As a ftth network is constructed, it will generally be built through a neighborhood before individual houses or businesses are connected via a drop cable (which is also a fiber-optic cable). When a house or businesses is"passed,"it means they are eligible to sign up for services (which may still require a technician to hook up the drop cable).

peer-to-peer

This is a type of network that allows computers to connect directly to each other rather than organizing them via hierarchical connections. This term is most often used to describe a type of file sharing that has greatly increased bandwidth usage and allow faster downloading of the same file from multiple computers. These networks are more difficult to surveil because traffic does not reliably pass through bottlenecks. Synonyms: p2p

PEG

PEG is an acronym for Public Access, Educational, and Government video programs. These are common programming options made available to the community by the cable company in return for access to the community's rights of way.

PoP

A Point of Presence is an access point that provides a connection from one location to the rest of the Internet. ISPs have multiple PoPs within their networks.

PPP

A public-private partnership divides risks and responsibilities of an infrastructure project between public and private entities.

RUS

Rural Utilities Service - a branch of the US Department of Agriculture. RUS offers loans and grants to entities deploying broadband in rural areas in addition to supporting other utilities in rural regions.

small cell

Small cells provide wireless service via a connection to fiber optic networks. These units are much smaller and exist closer to the user — often attached to telephone poles and light posts — than macro cells (“cell towers”). Small cells already exist in many cities to provide 4G service.

smart city

Used generally to describe a community that uses IoT technologies and data to optimize quality of life.

symmetrical

Internet connections have two components - a downstream and upstream. When the two speeds are comparable, the connection is termed symmetric. Fiber-optic networks more readily offer symmetrical connections than DSL and cable, which are inherently asymmetrical. Ultimately, purely symmetrical connections are less important than connections which offer robust connections in both ways. However, modern asymmetrical connections via DSL and cable networks offer upload speeds that are too slow for a household to concurrently use modern applications.

T1

A data circuit that transmits at 1.544 Mbps.

Synonyms: T-1, T.1

take rate

The number of subscribers to a service - typically expressed in a percentage of those taking the service divided by the total number of people who could take the service. If a community fiber network passes 10,000 people and 6,000 people subscribe, it has a take rate of 60%. When planning the network, it will be built to be profitable at or above a certain take rate as defined in the business plan. Generally, networks require a few years to achieve take rates due to the long time it takes to connect each customer.

telco

Telephone company - a provider of telecommunications services such as voice (telephony) and data services. Also called common carriers or LECs (Local Exchange Carriers); ILECs are incumbent providers, like AT&T or Verizon.

telehealth/telemedicine

Health care initiatives supported by a broadband connection. Telehealth applications are especially reliant on high-capacity, low-latency service. Goals include the ability to bring quality health care to those living far from hospitals or to elderly patients wishing to age in place.

telepresence

This term refers to a variety of attempts to use modern technology to make it seem like a person in a remote location is in the room. The more bandwidth available, the more realistic the remote person will appear. Modern telepresence applications are impressive, using sophisticated algorithms with multiple video cameras and microphones to go far beyond video-telephone systems.

triple-play

The three main services offered over these networks - television, phone services, and Internet access. Many people like to get all three from the same service provider on the same bill. Service providers frequently offer deals that will lower the cost on these packages. Typically, television breaks even or loses money whereas the service provider makes the most profits from phone and Internet access.

upstream

Internet connections have two components - a downstream and upstream. Upstream refers to the rate at which the user's computer can send data to the Internet. DSL and cable networks frequently offer upload speeds at only 1/10 of the downstream speeds. This is one of the main reasons DSL and cable networks are insufficient for the modern Internet.

Synonyms: upload

USF

Universal Service Fund - a federal program with four programs: high cost (subsidizes the high cost of services in rural areas), low income (includes Lifeline and Link Up discounts to those in poverty), rural health care (reduced rates to rural health care providers to ensure they have access to similar services as urban counterparts), and schools and libraries (E-Rate subsidizes telecommunication services to schools and libraries).

vendor

A private company that sells broadband equipment, builds infrastructure, or provides broadband service.

Wi-Fi

This is a suite of protocols that allow wireless devices to exchange information using unlicensed frequencies. Equipment carrying the Wi-Fi brand is interoperable.