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Columbia County, Oregon

Broadband Feasibility Study
Phase 3: Network Models Report

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Introduction

Columbia County awarded Vantage Point Solutions (VPS) a contract through a competitive bid process to conduct a Broadband Feasibility Study. The purpose of the Study is to gather data and information and assess options for what Columbia County can do to improve broadband availability and access in the County. The project is broken down into four phases with a final report due to the County in March of 2019.

VPS previously provided the County with a Phase 1 Provider Data Report that assessed the existing provider landscape in Columbia County and a Phase 2 Stakeholder Report.

Utilizing the data collected in the first two phases, this third phase of the Study primarily focuses on developing a high-level network model and solutions.

As noted in the Phase 2 Report, the biggest question a broadband feasibility study must answer is "what is the problem we need to solve?" Overall the data and information collected to date shows that the main problem is that while some areas have adequate coverage - other areas are in desperate need of better connectivity and coverage. This includes a need for better and more robust middle-mile fiber infrastructure that reaches areas like Vernonia. This is true for both internet access and cellular coverage.

Keeping these points in mind, VPS breaks down this Report in the following sections:

- Municipal Network Model Overview
- Network Ownership Model
- Funding and Financing
- Columbia County Proposed Model and Recommendations

To assist in the review of this Phase 3 Report, below we have provided a glossary that covers key terms and phrases.

Glossary

Broadband: The Federal Communications Commission (FCC) currently defines broadband as speeds that reach a minimum of 25mbps downstream and 3mbps upstream (25/3). Other FCC programs for high cost rural areas through the Connect America Fund, only require minimum speed of 10mbps downstream and 1mbps upstream (10/1). Practically speaking, even the current FCC definition of broadband is far behind what most customers perceive to be adequate for residential use. However, for purposes of this report – high-speed broadband is internet speeds that meet or exceed the federal definition of broadband.

Backbone: A high-fiber count fiber optic mainline that provides connectivity to the internet. Connections to buildings from the backbone are called lateral connections.

Conduit: A means by which something is transmitted. The conduit houses the fiber.

Dark Fiber: Refers to fiber optic cable that has been installed and is available to use but is not connected to any electronic devices and not transmitting any data. *Also referred to as excess capacity.*

Demand Aggregation: Strategy employed by network owners to determine the neighborhoods in the community that are most likely to purchase service in order to build there first.

Fiber-to-the-Premise (FTTP) or Fiber-to-the-Home (FTTH): A last-mile network that connects all buildings (residential, business and government) in a community.

Indefeasible Right of Use (IRU): Commonly used in the industry to provide long-term access to assets. Conduit and fiber deployed is leased through an agreement called an IRU.

Last-Mile Network: Network that provides services directly to homes and businesses in the community.

Middle-Mile Network: Typically defined as a network that serves community anchor institutions (i.e. Schools, libraries, government buildings, public safety agencies, hospitals, etc.) but does not directly serve homes and businesses.

Open-Access Network: A network where the infrastructure assets (conduit and fiber) are made available through leases to multiple non-network owners that meet the terms and conditions set.

Outside Plant (OSP): Commonly used to refer to the engineering and construction of fiber infrastructure assets.

Over the Top: Television provided over a data stream but utilizing the existing wiring to the household

Public-Private Partnerships (PPPs): A legal partnership created by two or more public and private partners that balances and apportions risk, benefit and control of a last-mile network.

1. Municipal Network Model Overview

Before jumping into the Columbia County network design, it's important to understand the various types of municipal networks and models that are currently in use around the Country.

There are two main types of municipal networks that serve end-users (other than networks built exclusively for internal government use) and they are most commonly referred to as last-mile and middle–mile. For purposes of this discussion, the term network is inclusive of all technologies including fiber and/or wireless. **Appendix A** includes a more detailed discussion of the various technologies.

1.1 Last-Mile Network Models

A last-mile network (also known as Fiber-to-the-Premise or FTTP) is one that is designed to provide service directly to homes and businesses in the community. Last-mile networks can also serve government buildings and other community anchor institutions.

Last-mile networks are the most expensive to deploy but can provide the biggest benefit to the community. However, municipal FTTP networks are also more-rare due to the cost it takes to deploy the infrastructure and the need to have an operator/provider who can run and manage the network. For this reason, most (but not all) of the municipal last-mile networks in existence are in communities that also have a municipal electric utility. This is because the local government (through its municipal utility) already owns utility pole infrastructure that can be leveraged to offset deployment costs. Municipal electric utilities also have operating and billing systems already in place to serve customers. Therefore, they have experience in serving customers and can more easily shift gears to offer a broadband service as a new offering rather than having to create an operational system greenfield.

The other key factor is that last-mile networks usually require a take-rate that is between 40-60%. This means that the network operator needs to obtain 40-60% of the residential subscriptions available in the community in order to recoup the capital investment, make a profit and be sustainable. Examples of FTTP networks – both those that have a municipal electric utility and those that do not - are provided below. The municipal electric networks are all very similar and so only one example is provided.

Muni Electric FTTP Network Examples	
Longmont, CO	Longmont's "NextLight" is a gigabit fiber network owned and operated by the city and its power utility, Longmont Power & Communications (LPC). In 2013 Longmont supported the network build at a 70% level, approving a $40.3 million bond issuance to cover the startup costs of the Internet service. Even the $40 million price tag would have been significantly higher if not for the existing asset of an 18-mile fiber loop within the City's limits. Longmont has 38,000 premises and 92,000 residents within its approximately 30 square miles. NextLight offers symmetrical gigabit service at $50/month for those who signed up early. This $50 rate is for both the lifetime of the home as well as the owner should he/she move within city limits. Late in 2016 the City voted to increase LPC's budget by $7 million, sourced from the Electric and Broadband Utility Fund balance to hire staff needed to support take rates significantly higher as initially predicted. Current take rates average 53%.

Non-Muni Electric FTTP Network Examples	
Sandy, Oregon	In 2001, the City of Sandy formed its own municipal internet utility in order to get the connectivity it needed to perform basic government functions. At that time, Sandy couldn't even get a DSL line from a local provider to serve City Hall. The service expanded and in 2013, Sandy decided to move from DSL and wireless to building a FTTH network to serve government, residents and businesses. What makes Sandy unique is that at that time, there were very few municipal broadband networks that were deployed without leveraging a municipal electric utility. Working with partners to implement the network, Sandy issued a bond for 7.5 million dollars to cover the costs of construction. Construction was completed in 2015 and the network is very successful with a take rate of approximately 60%. Sandy charges $59.95 for symmetrical gigabit service. Sandy is also located in Clackamas County which built its own middle-mile network as detailed below. One way they have partnered is that Clackamas County needed some conduit and space in Sandy's data center. In exchange, the County gave the city dark fiber into Portland's Northwest Access Exchange, where the city now interconnects for access to the wider Internet.
Rio Blanco County	Rio Blanco County Colorado utilized county funds and Colorado DOLA grant funds to construct an FTTP network serving its very rural community. The technologies deployed are a mix of fiber and wireless. Rio Blanco is building a fiber to the premises network in its main two population centers (Meeker and Rangley) and a shared fixed wireless solution designed to reach all other addresses. Additionally, Rio Blanco is building middle-mile fiber available for carriers to lease in the county.
Ammon, Idaho	The City of Ammon Idaho has a very unique model. Ammon has built an open access network that lets multiple private ISPs offer service to customers over city-owned fiber. The City self-funded a portion of the network. However, Ammon is using a model similar to Google Fiber's "Fiberhoods," in which construction happens first in neighborhoods where a majority of residents commit to buying service. Those who opt-in have the option to pay either an upfront fee of $3000 or pay the amount gradually over a 20 year period, excluding an additional utility fee of $16.50 a month. Should a home-owner sell their house prior to the $3000 fee being paid off – it would be the responsibility of the new home-owner to continues those payments. Conversely, should a homeowner move after paying the upfront free – the new homeowner would have the benefit of the network connection without needing to pay the connection fee. Success is yet to be determined the fee structure may not be appropriate for many communities.
Fairlawn, OH	The City of Fairlawn established FairlawnGig as a forward-thinking, economic development strategy founded on the belief that business growth, innovation, and community transformation will follow with every connection. The build cost approximately $10 million dollars (paid for by bond) and the City will connect every home and business. The City is not looking to the network to become a profit-making revenue stream. The City felt that FairlawnGig was a necessity for the community at large. The network has a take rate of just over 50% and is looking at expanding to neighboring towns.

1.2 Middle-Mile Networks

A municipal middle-mile network is typically defined as a network that serves community anchor institutions (i.e. schools, libraries, government buildings, public safety agencies, hospitals, etc.) but does not directly serve homes and businesses. A middle-mile network could either be operated directly by the municipality or outsourced to a network operator.
The purpose of middle-mile networks is generally to build a high fiber count (fiber cables with strand counts of 144 and above) backbone[1] that provides direct lateral connections to key institutions and enables infrastructure assets to be

[1] A backbone is literally the spine of the network. Backbone's are usually built along main corridors and provide transport to and from the hub site where the electronics are located to the connected entity.

leveraged and leased by others including businesses and private providers. Although, there are middle-mile networks that are built to support internal government needs only (closed network).

Middle-mile networks are much more commonly constructed by municipalities than last-mile networks due to the significantly lower cost of deployment and operations and reduced risk. Middle-mile networks can be a tremendous asset to a community in that it can generate revenue, and provide critical infrastructure needed to support government operations.

Examples of middle-mile networks are provided below.

Middle-Mile Municipal Network Examples	
Clackamas County, Oregon	In 2010 Clackamas County received a $7.8 million-dollar federal grant through the American Reinvestment and Recovery Act (ARRA) to build a middle-mile network. Clackamas Broadband Express (CBX). Today, the network extends approximately 200 miles and is expanding. CBX provides cost effective, high speed communications and data transfer services. The network is managed by the County and the fiber broadband provides public agencies and local businesses the foundation for enhancing services, improving product delivery, and gaining a competitive edge in a global marketplace. CBX initially benefitted a number of community anchor institutions, such as schools, police and fire stations, libraries, healthcare centers, governments, transportation facilities and utility companies. In addition, CBX is benefitting current broadband service providers and businesses throughout the county by providing nondiscriminatory, cost effective, high speed infrastructure. CBX is also now serving both urban and rural communities, including the cities of Milwaukie, Oregon City, Gladstone, Damascus, Boring, Sandy, Estacada, Colton, Molalla, and Canby. Extensions of this initial "fiber ring" have also brought broadband to Government Camp and Wilsonville.
City of Centennial, CO	The City of Centennial (107,000 residents) is in the process of building a fiber backbone. The City is self-funding the middle-mile portion of the network build and will own the assets. Centennial has selected Ting to be the FTTP service provider, who is currently taking signups for residential service for $89/month range for symmetrical gigabit speeds. While the network is the property of the City and eventually an “open network,” Ting partnerships typically feature an “exclusive right to operate network” term of multiple years. While the build is the responsibility of the respective cities, Ting will lease and light the fiber and provide all equipment and Internet access. Funding the build is a $5.7 million allocation from the general fund. The city council led by the fiber subcommittee looked at this funding as an infrastructure investment removing the expectation that this funding would be directly paid back.
Kent County, MD	Kent County, Maryland is a rural county on the Eastern shore of the state. Kent County determined a few years ago that they wanted to invest in middle-mile infrastructure that they could own as an asset. The County decided not to finance the network build through a bond, but rather paid for it entirely out of general funds. The County now has a 110- mile network completed and have made the assets available to be leased and leveraged by others.
Northwest Colorado Broadband (NWCB); Steamboat Springs, CO	The City of Steamboat Springs, Colorado teamed with Routt County, Yampa Valley Electric Association, Yampa Valley Hospital, the Chamber of Commerce and the Steamboat Springs School System to legally form a nonprofit. The partners supplied some of the capital along with DOLA grant funds to build a middle-mile network through Steamboat Springs. NWCB selected Mammoth Networks as its network operator who will manage, operate the network and lease fiber to interested and qualified applicants. NWCB is also talking with the City of Craig and Moffat County about being the Network Operator for a regional network.

1.3 Open Access Middle-Mile Networks

An open access network is one where the infrastructure assets (conduit and/or fiber) are made available under certain policies and procedures to multiple non-network owners. Most middle-mile networks are usually open networks and most last-mile networks are usually closed particularly those built by providers.[2] Publicly funded grant programs offered by the federal and state government sometimes require networks to be open access.

Middle-mile networks that lease dark fiber and conduit are designed to be open access. With middle-mile networks – the more users, the bigger the benefit to the network and the more revenue it generates. A private provider that is considering building in a community may have an interest in leasing middle-mile assets because it helps with reducing their costs of deployment. A provider, then, would only need to invest in the lateral connections to homes and businesses and would not have to build the backbone. Larger businesses and those with multiple office locations may also be interested in leasing fiber assets to help connect an internal network or obtain better broadband.

In most cases, excess[3] conduit and fiber deployed can be leased through an agreement called an Indefeasible Right of Use (IRU). IRUs are commonly used in the industry to provide long-term access to assets. The term of an IRU typically runs between 10-20 years.

1.4 Conduit Leasing

Conduit is something that is generally (except in extreme circumstances) part of every underground network fiber build. The most expensive part of a deploying a broadband network is the construction. The cost of the actual assets (fiber and conduit) are a tiny portion of the overall budget. Therefore, if engaging in a network build, it is cost-effective to install larger or extra conduit banks and install high-count fiber during the initial construction phase to cover all current and future needs. It is not cost-effective to have to dig more than once.

There are a variety of conduit sizes that can accommodate one or more fiber cables. Often, the network owner will install a larger size conduit than what is needed in order to lease excess space to other providers that want to install fiber. Sometimes a network owner will install multiple conduits side-by-side instead of having one larger conduit bank because some providers prefer to have exclusive rights to a single conduit for security reasons.

Conduit pricing is usually based on a per-foot basis. Pricing varies based on demand in the region and amount of conduit available. Below is a chart that provides examples of three different pricing structures for conduit:

Location	Price	IRU Term	Total Cost
Boulder, Co	$5.50 per foot	20 years	$722,271 in a one-time payment
Lincoln, NE	$65,000 per year	20 years	$1.3 million paid monthly over 20 years with an escalation clause not exceed CPI.
Baltimore, MD	$3.00 per foot (appx)	Negotiable	Depends on how much leased. City requires any new conduit built by provider to be owned by City

[2] Open access is a hotly debated topic particularly as it relates to last-mile networks because the greater the number of providers, the harder it is for a new-entrant provider to meet its take-rate goals and make a profit. This will be of particular concern for providers that are also making a financial investment. Will a provider be able to meet take rates of 40-60% while other providers are invited to compete for the same customers? Ultimately, the open access question will be determined by all the investors and stakeholders.

[3] Conduit and fiber strands that will not be used by the municipality.

Investing in conduit without building a fiber network is actually a strategy that several localities have successfully implemented. This is not being recommended for Columbia County but is provided as an example of what communities can do with limited resources.

In 2012, the City of Lincoln invested $700,000 into building an extensive conduit system. Restrictions on municipal broadband prevented them from building a fiber network, so they limited the infrastructure to conduit. The conduit was leased for several years to multiple providers including Level 3 and NebraskaLink. In 2014 the city launched a free Wi-Fi initiative with backhaul provided by NebraskaLink. In 2015, the city announced that the conduit project had attracted Allo Communications, who planned to lease the conduit and undertake a massive FTTP buildout with the goal to serve every home and business in Lincoln. As of September 2018, the project was nearly complete. Allo plans to have the project completed no later than early 2019. Allo charges competitive pricing with 1 gigabit service costing approximately $90 per month, and 300 Mbps costing approximately $65 per month.

Atlanta BeltLine is a nonprofit organization that was established to help ignite economic development in an urban area of central Atlanta. The BeltLine owns an old railroad Right-of-Way (ROW) that is a natural loop around the City. The Beltline has been building a conduit system to run under the land around the entire ROW. The BeltLine is moving forward with plans to lease the conduit to interested broadband providers and they have recently hired a company to assist them with the marketing and management of the system.

1.5 Dark Fiber Leasing

Dark fiber refers to fiber optic cable that has been installed and is available to use but is not connected to any electronic devices and not transmitting any data. Dark fiber is also referred to as excess capacity. Fiber optic cable comes in strand counts ranging from 12 strands to 1400+ strands. Any strands not in use by the owner (or other entity) are considered dark fiber strands that can leased.

Similar to conduit, dark fiber pricing is subjective and includes but is not limited to the following criteria:

- Availability of dark fiber in the area
- Market rate of other dark fiber in the area (sometimes very difficult to ascertain)
- Number of strands to be leased (minimum of two)
- Amount of footage to be leased (per mile)
- Term of years requested
- Payment up-front versus over time
- Amount of strands remaining that may not be marketable (i.e. if an entity only leases a portion of a route, the corresponding strands on the remainder of the route may not be usable. Often providers require the entire route to be leased for this reason.)

Unlike conduit, dark fiber is not based on price per foot but rather based on a per-strand, per mile, per month basis. Prices can range from $5-$750 per pair of strands with a typical IRU term of 10-20 years. Similar to conduit, payments can be made on monthly, annually or on a one-time payment. One-time payments require less administrative work and book keeping. It also provides a large infusion of cash. However, smaller entities may not be able to provide one-time payment and it is difficult to estimate market value over the course of twenty years. Ultimately, all of these considerations are discussed in the negotiating process.

Maintenance can be included in the cost of the IRU or added as an additional fee. Maintenance fees range from about $200-700 per mile, per year. The below chart shows what a rate schedule would look like for a price per pair of strands ranging from $10 - $100 exclusive of any up-front or maintenance fees.

Rate Schedule Based on Flat Fee Per Pair of Strands										
Per Pair	**Per Mile**	**Per month**	**Per Year**	**10 Yrs**	**20 Yrs**	**Per Mile**	**Per month**	**Per Year**	**10 Yrs**	**20 Yrs**
$10	1	$10	$120	$1,200	$2,400	10	$100	$1,200	$12,000	$24,000
$20	1	$20	$240	$2,400	$4,800	10	$200	$2,400	$24,000	$48,000
$30	1	$30	$360	$3,600	$7,200	10	$300	$3,600	$36,000	$72,000
$40	1	$40	$480	$4,800	$9,600	10	$400	$4,800	$48,000	$96,000
$50	1	$50	$600	$6,000	$12,000	10	$500	$6,000	$60,000	$120,000
$60	1	$60	$720	$7,200	$14,400	10	$600	$7,200	$72,000	$144,000
$70	1	$70	$840	$8,400	$16,800	10	$700	$8,400	$84,000	$168,000
$80	1	$80	$960	$9,600	$19,200	10	$800	$9,600	$96,000	$192,000
$90	1	$90	$1,080	$10,800	$21,600	10	$900	$10,800	$108,000	$216,000
$100	1	$100	$1,200	$12,000	$24,000	10	$1,000	$12,000	$120,000	$240,000

1.6 Other Conduit and Dark Fiber Leasing Considerations

When leasing conduit and dark fiber, the owner of the infrastructure must take into account the following considerations:

- A map (GIS ideally) and inventory of all assets leased and available to be leased must be kept current and active. There are several companies that offer cloud-based cutting-edge fiber management software solutions are ideal for dark fiber leasing.

- Maintenance of the conduit and the fiber generally falls to the network owner and so the owner must have policies and procedures in place to meet any service level agreements (SLAs) that the lessee's have in place. In other words – the network owner must be able to repair fiber cut within an emergency window to prevent downtime outages to the network customers.

- The network owner must have a plan in place for third-party network access.

- The network owner must have a process in place for interested third-party applications as well as templates for legal agreements and other documents.

2. Network Ownership Models

There are multiple kinds of ownership and operating models for the previously described municipal networks. Once you identify which network is preferred for your community, the operating model must be determined.

2.1 Publicly-Owned and Operated Network

This is a municipal network that is almost 100% self-provisioned. In other words, the municipality solely owns, and internally manages and operates the network and may only need to hire a few contractors for things like locates, and installations. Networks that are self-provisioned are most likely to be municipal electric utility broadband networks such as Longmont NextLight because they already have the back-office systems, trucks, and experience to add on a broadband service. However, FairlawnGig previously discussed in Section 1 is a rare example of a greenfield municipal network that is 100% self-provisioned without the City having an electric utility.

2.2 Publicly-Owned and Privately-Operated Network

In this model, the municipality owns the assets, and provides oversight, but outsources the management and operations to a third-party entity who also provides the services. This is a more common model for municipal networks and is appealing for localities that do not wish to directly become a service provider. An example of this type of operating structure is with the City of Hudson Oaks, Texas. Hudson Oaks owns the infrastructure and is leasing access to a local ISP who is serving as the service provider.

2.3 Hybrid

Another option is to create a hybrid model that combines one or more of the above options. This includes:

- Public-Private Partnerships (PPP)
- Creation of a non-profit or regional entity

2.3.1 Public Private Partnerships (PPPs)

Public-private partnerships (PPPs) are a relatively young phenomenon in broadband. A PPP is a legal partnership wherein the partners balance and apportion risk, benefit and control. Recently, more and more municipalities are exploring establishing a PPP for deploying and operating last-mile networks. There are many different types of PPPs.

They include but are not limited to the following:

- An investment entity that steps forward to provide funding for the network in exchange for a long-term payback on their investment. This is a traditional PPP. The investment entity usually requires an ownership stake in the assets and sets other conditions such as requiring the municipality to provide a credit backstop to guarantee investments. The municipality generally may or may not need to provide cash contributions. An investment entity is only likely to be drawn to projects that cost a minimum of $15 million dollars. An investment entity also generally works with another partner that is the service provider.

- A partnership wherein both the municipality and provider contribute funding and resources to the project. Both may share in ownership of the assets. For example, the municipality owns the middle-mile infrastructure, but the provider owns the drops from the middle-mile network to the customer premise.

The type of PPP depends on a number of factors, including:

- Whether the provider can make a profit with take rates that justify an investment;
- The sum total amount of financial resources the municipality can provide;
- Whether the municipality is willing to be flexible on asset ownership;
- Whether there is a private-entity that is interested and viable;
- Whether the municipality and private partner can come to agreement on terms and requirements.

Some ISPs would prefer to own their own infrastructure -including the middle-mile backbone in order to control the infrastructure. On the other hand, other ISPs need the municipality to build the middle-mile to offset deployment costs.

Despite the fact that PPPs are widely pursued as options for last-mile municipal broadband networks[4], a PPP can be difficult to establish. This is particularly true in rural areas where the cost of the build is high and the number of potential customers makes it difficult to justify the investment. This is also true in suburban areas where there are existing incumbent providers with a broad footprint that have a market share of subscribers. That said, the data and information collected in this Study indicate that a PPP in Columbia County could be a viable option for the County to pursue.

2.3.2 Joint Authority or Non-Profit Entity

For networks that may involve more than one municipality or financial contributions that are coming from more than one entity, a good option to consider is to create some kind of joint-authority entity or nonprofit. For example, Northwest Colorado Broadband that was more fully discussed in Section 1 created a nonprofit entity with six founding members that included the City, County, school system, electric association, Chamber of Commerce, and hospital. Several of the partners contributed funding and/or own assets that were part of the project to build a middle-mile network through Steamboat Springs. The founding members serve on the Board of the nonprofit and the nonprofit is responsible for overseeing the network build, and operations. Since the nonprofit does not have any staff, the nonprofit hired a network operator to manage the network, and manage the dark fiber leasing and marketing.

The nonprofit may also pursue grants, and expand services into the regional. By establishing a nonprofit, it increases the ability to share resources, share costs and create economies of scale for smaller networks that may better entice network partners. A regional entity could also more easily deploy and manage options for programs including Wi-Fi deployment, smart city applications and dark fiber leasing. An example of this is the Columbia Gorge Broadband Consortium (CGBC).

[4] A recent trend by communities interested in exploring PPPs, is for the municipality to issue a Request for Information (RFI) to invite potential interested partners to submit proposals. To date, this has not yet proven to be an effective strategy in the establishment of a PPP. This is due to a few key reasons. First, there are instances where the RFI itself has created confusion and significant delay in network planning – particularly where the RFI is issued prematurely, is open ended, vague, or includes too many difficult to meet requirements.[4] In some cases, this has resulted in situations where a community has had to re-issue the RFI with new requirements and/or hold multiple rounds of interviews. Vendors are wary of the RFIs that lead to nowhere. A much more effective strategy is to hold meetings with providers and explore this option before issuing out any RFIs or RFPs.

2.3.2.1 Columbia Gorge Broadband Consortium

In November 2007, a telecommunications committee spearheaded by Washington State University Extension formed to assist the Town of Glenwood in obtaining high speed broadband access. Over the next few years, the committee expanded partnerships throughout Klickitat and Skamania Counties. This included:

- The receipt of $3.7 million in federal funds to construct a fiber-optic “middle-mile” network in the region (through SawNet, a local Internet Service Provider).
- The securing of $170,000 to expand and form the Kickitat-Skamania Local Technology Planning Team (KSLTPT).
- Between September 2012 and June 2014, KSLTPT led planning team and stakeholder meetings, completed surveys, mapped telecommunications services, developed a framework for addressing broadband gaps, established a mobile training lab, held workshops, created a WiFi hotspot inventory, and published news releases, reports, and a broadband resource website.

The KSLTPT grants were leveraged to move toward a regional coordination model through the creation of the Columbia Gorge Broadband Consortium. The transition to a regional approach was supported by a $25,000 Google Community Grant, and continued staffing is supported by strong commitments from local entities.

Today, the CGBC is continuing efforts to increase access to the latest telecommunications technology to secure the Gorge's economic stability and prosperity for many years. Since their inception, these efforts have benefited from a collaborative approach to addressing community and business telecommunication needs.

3. Funding and Financing

A key component in helping to determine the type of network and operating model is to identify all potential funding sources. This last section briefly discusses possible funding options for municipalities separate from any private-sector partner contributions that could be possible. Depending on the amount of funding needed to support the selected model, one more of the below options could be utilized.

One thing to keep in mind is that a local government usually has a different need for building a network than a private sector provider. For example, a private provider is largely profit driven and must generate revenue for the network to be sustainable. Municipal networks – particularly those that are middle-mile usually serve a different purpose. The municipality is building the network for internal connectivity to anchor institutions, to generate cost savings, or to use for economic development purposes. Therefore, in many cases, municipal networks cannot or should not rely on network-generated revenue as a mechanism to support a bond payment or loan.

3.1 Public Self-Funding

The first funding option to consider is through general fund set-aside. Depending on the amount of funding needed, the municipality may be able to entirely fund a network build by either shifting funds or budgeting for them. Kent County, Maryland funded their entire 100-mile network build by paying for it directly out of their general funds. A municipality may also set-aside general funds to pay back a revenue bond if partially or fully funding a network out of general funds is not feasible.

3.2 Revenue Bonds

Aside from allocating capital project funds as part of the budget process, bond funding is a popular mechanism for municipalities to utilize to assist with funding network construction, and to support startup and maintenance costs. This is traditionally what many municipalities have used to finance their broadband network. Bonds can be repaid either by revenue generated from the network or through other funds. Bonding agencies have supported this movement because a fiber network is a valuable asset to a community.

If revenue from the network is expected to be relied upon as funds to pay back the bond, the business plan must support that expectation. In addition, the municipality should have a contingency in place in the event the identified funds for paying back the bond do not materialize. For example, the State of Kentucky ended up with an $11 million-dollar shortfall for bond repayment because a source of funding to pay back the bond fell-through.

3.3 Taxation

Taxation is another source of funding that local governments can consider. Some municipalities have either obtained approval to utilize other taxation revenues already in place or have opted to place a referendum on the ballot for residential approval to establish a special taxation district. These strategies are typically utilized in high-dollar builds when millions of dollars of funding is needed.

3.4 Inter-governmental Loans

The City of Fairlawn, Ohio financed their greenfield FTTP network through the Development Finance Authority of Summit County, OH which offers fixed rate/bond fund, conduit/non-bond fund, PACE program and tax credit financing arrangements for businesses located in Summit County, OH. This type of funding is like an intergovernmental loan.

3.5 Connection Fees/Liens

Another mechanism for partially funding a last-mile network is to charge a large connection fee to every home that wishes to connect to the network. The City of Ammon, Idaho has funded a significant part of their network by charging a $3000 connection fee payable either in lump sum or over a twenty-year period to every home that wishes to purchase service. The connection fee operates like a lien. If a resident moves, the payment stays with the house and applies to the next home-owner. If money is still-owed, the new resident will be expected to pay the remaining funds due. Based on the survey results, this does not appear to be an option for Columbia County.

3.6 Grant and Loan Funding Opportunities

In addition to the self-funding options, Columbia County may be able to apply for some grant funding opportunities. Below are some identified programs that may be options to pursue with the right partners. Additional information on each of these programs is provided in **Appendix B**.

- **USDA: Community Connect Grant:** This program helps fund broadband deployment into rural communities where it is not yet economically viable for private sector providers to deliver service.

- **Distance Learning & Telemedicine Grants:** This program helps rural communities use the unique capabilities of telecommunications to connect to each other and to the world. The grant helps awardees to acquire the technology and training necessary to connect educational and medical professionals with the teachers and medical providers who serve rural residents at the local level.

- **The Rural Broadband Access Loan & Loan Guarantee Program:** This program furnishes loans and loan guarantees to provide funds for the costs of construction improvements or acquisition of facilities and equipment needed to provide service at the broadband lending speed in eligible rural areas.

- **Healthcare Connect Fund (HCF):** The purpose of the Healthcare Connect Fund is to expand HCP access to broadband services, particularly in rural areas, and to encourage the formation of state and regional broadband networks linking health care providers.

- **Broadband e-Connectivity Pilot Program:** With the passage of the 2018 Farm Bill, the Rural Utilities Service established a pilot broadband program named the e-Connectivity Pilot on March 23, 2018. The program looks to bring reliable broadband to Americans who are not currently receiving 10/1 Mbps speeds.

- **State of Oregon Rural Broadband Capacity Pilot Program:** The Governor's Office approved funding of $500,000 for grant(s) to support broadband planning, engineering, and/or infrastructure deployment projects targeting rural areas lacking adequate broadband access in 2018. Columbia County received the grant to conduct this broadband Study from this Program.

3.7 Third-Party Funding

Municipalities looking to build a FTTP network often seek a PPP in order to off-set the costs and share the financial risk with a private sector partner. This is a real possibility to explore in Columbia County.

4. Columbia County Proposed Model

As previously discussed, there is tremendous benefit to a middle-mile network that provides a redundant ring backbone that can be leased out and connects to community anchor institutions. A middle-mile network could be a good option for Columbia for the following reasons:

- There are already parts of the County that have adequate residential and business service and so a County-wide last-mile network is not needed;
- There is a middle-mile infrastructure problem County-wide in that there is not enough fiber in many areas to support a robust last mile network, cell service or create a redundant network to safeguard against fiber cuts;
- The County has potential opportunities to work with one or more last-mile provider partners to operate the network and increase last-mile services to areas where it is needed.

In addition, in Columbia County, any network would need to begin with middle-mile infrastructure to support any future last-mile network builds.

The benefits of a middle-mile network are substantial and would enable the County to:

- Deploy critical infrastructure that will serve County needs for the next 30+ years
- Enable the County to deploy smart city applications with control over its own network
- Own a network with an investment cost that is much smaller with a risk much less significant than a last-mile network
- Build fiber to towers to better encourage wireless technology deployment
- Reduce costs in providing direct service to the anchor institutions
- Lease excess fiber and conduit to generate revenue and encourage private provider investments.

4.1 Columbia County Middle-Mile Network Model

This section explores what it would cost Columbia County to build a middle-mile broadband network. For this endeavor, VPS developed a buried[5] middle-mile model for consideration. For comparison, VPS also utilized a known pole line in a portion of the ring to directly compare buried and aerial construction costs. It should be noted that the estimates provide a high-level capital cost estimate only for the design, construction and implementation of a fiber-optic network.[6] In addition, these models do not include costs associated with the operational structure that would be needed to support each network option.

The model developed the core County ring in addition to routes extending from the County ring to service additional remote anchor institutions. The table below shows the basic assumptions made in the development for the model detailed in this section.

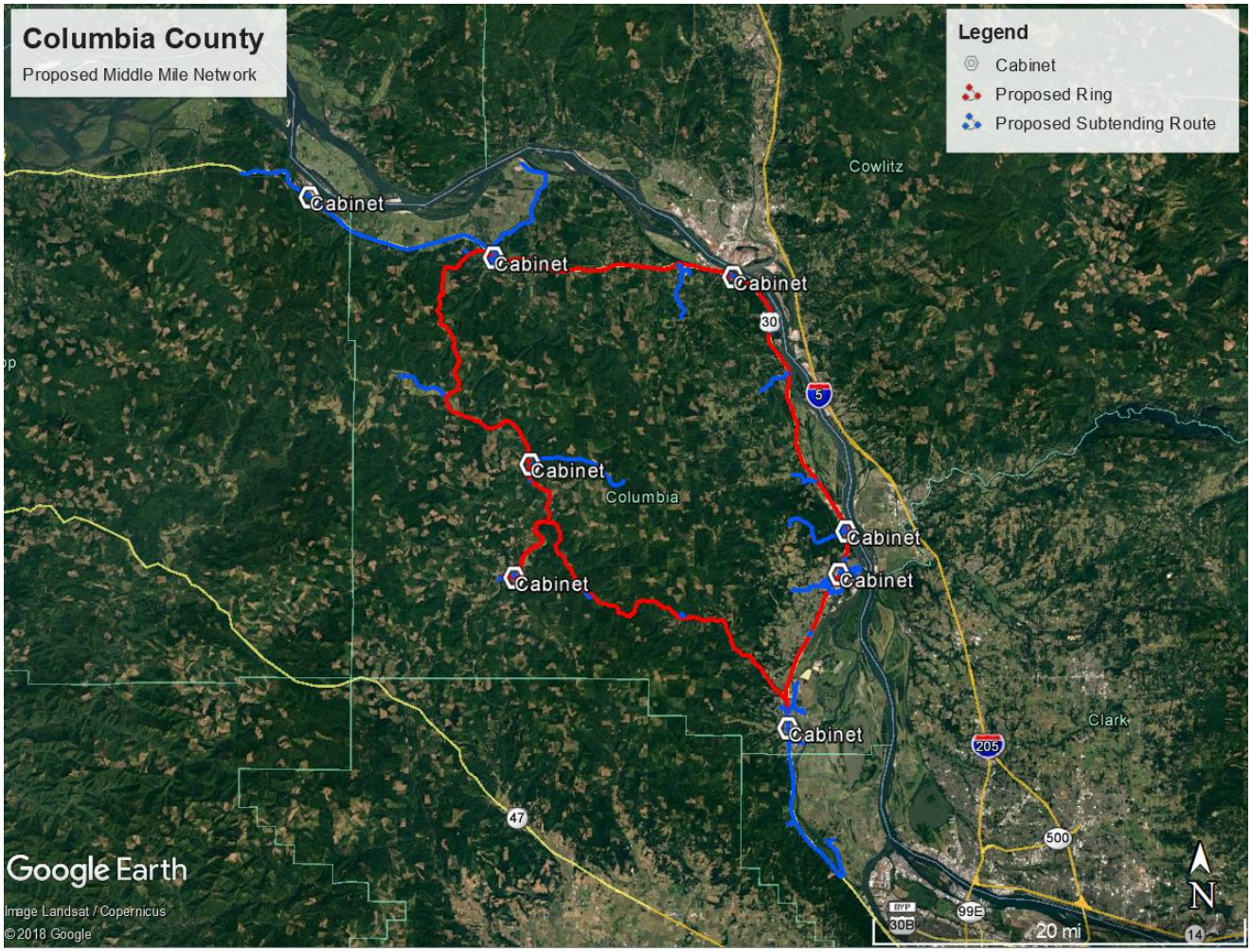
[5] While the County has opportunities to work with electric utility providers to obtain utility pole access, VPS developed a buried model to show the most-costly model. Any aerial placement would be a reduction in costs.

[6] Note: VPS was not tasked to develop a full business plan around one or all of the models at this phase of the project. We do not recommend conducting a business plan until a network design and operating model are selected. This may or may not include the selection of a provider to manage the network.

	Assumption
1	Assumes serving locations from a single hut and 7 remote cabinets (electronics mainly housed in one location with 7 cabinets in the field)
2	Location counts assume only community anchor institutions
3	Estimates include engineering and overhead
4	Buried construction cost does not include variable costs for rocky soil conditions
5	Buried drop cost does not include conduit pricing
6	Electronics and fiber management costs assume GPON architecture (includes end-user electronics)
7	Does not include costs for any ROW acquisition or pole attachment agreements
8	Costs do not include RF or IP video expenses, switching costs, data network equipment or transport to exchange

Note: VPS makes every attempt to have our estimates be within +/- 10% of the actual project cost, which is normally the case. However, it is still an estimate, there are many factors outside of our control that could result in the actual cost differing by more than 10%, such as material or labor charges, design changes since estimate, inflation, construction delays, etc. Please keep this in mind when budgeting for this project.

Overall, VPS explored a middle mile ring comprised of 175.3 miles of fiber and 163 anchor institutions. VPS identified the following as key anchor institutions to service: parks, medical institutions, government institutions, police and fire institutions, and education and library institutions. Below shows an overall map of the middle mile network proposed:



4.1.1 Buried Middle-Mile Estimate

VPS utilized the network model above to then estimate the costs to deploy a state-of-the-art broadband network to provide high speed service to the anchor institutions on the ring. VPS utilized construction costs from projects of similar size, scope, and geography as well as electronics costs to encompass the total capital expense in the estimate below. This estimate includes all the materials needed to deploy this network, the engineering, electronics and cost of construction.

Please note that the estimate does not include the cost to connect to data centers, or to interconnect to other network infrastructure in order to obtain access to the Internet. Those are costs that would be developed and identified during the network design and engineering phase of the process. This is strictly a high-level design to show the cost of developing a redundant network ring within Columbia County.

The middle-mile estimate is broken down as follows:

Columbia County Middle Mile Estimate			
OSP		**Miles**	**Cost**
	Buried Rural Mainline	144.1	$ 9,115,000
	Buried Town Mainline	31.2	$ 6,638,000
	Buried Drops	9.3	$ 225,000
	Fiber Management (166 drops)	-	$ 11,000
	Total		**$ 15,989,000**
Electronics			
	Hut		$ 230,000
	Data Router		$ 173,000
	Cabinets		$ 207,000
	FTTP Electronics		$ 204,000
	ONTs		$ 57,000
	Install		$ 113,510
	Total		**$ 984,510**
Total Cost			
	OSP Construction		$ 15,989,000
	Electronics		$ 984,510
	Total		**$ 16,973,510**

4.1.2 Buried vs Aerial OSP Construction Comparison

VPS also took a segment of the route on the north side of the proposed ring and did a comparison of aerial vs buried construction. In this segment, VPS found 9.6 miles of pole lines to traverse across a portion of the ring from information provided by Clatskanie PUD. On this same segment, VPS found a buried route of 9.5 miles. Below is a comparison of the mainline construction costs for both buried and aerial for the given segment.

As you can see, aerial construction would provide a significant reduction in costs.

Columbia County Segment: Buried vs Aerial				
OSP		**Miles**	**Unit Price**	**Total**
	Buried Rural Mainline	9.5	$ 55,000	$ 522,500
	Aerial Rural Mainline	9.6	$ 35,000	$ 336,000

5. Feasibility Study Phase 4 Next Steps

As you can see the middle-mile network model is a very large network that is expensive to build. There is no denying the benefit of building this middle-mile network. The question is how does Columbia County pay for it and make this happen? The first step is to review some key findings of the Study thus far.

As a refresher, below are a few of the key findings detailed in the Phase 2 Stakeholder Report.

- There are potential viable opportunities for the County to partner with some existing service providers to expand last-mile services to unserved and underserved areas. This could help offset costs by either working with a partner who shares in the cost of the middle-mile network and/or is willing to lease middle-mile infrastructure and invest in last-mile infrastructure in those areas where broadband is sorely needed.

- While it does not appear that any electric utility PUDs are interested in getting into the broadband business as an internet service provider, there are viable opportunities for the County to partner with the PUDs for pole access to offset deployment costs of a fiber network.

- Based on what was reported by survey respondents, Columbia county residents are generally paying a lot of money for service that fails to meet even the federal definition of broadband. Even by rural standards, Columbia County residents are often paying too much for service. This is especially true of individuals who live anywhere outside of municipal areas. This indicates that there is room for a new provider to come in either with a robust service at the same cost, or slightly higher.

- Approximately 38% of survey respondents are either very satisfied or satisfied with their current provider. This is well below national average and indicates that there is room in the market place for a new residential provider with take rates above 35-40% which is generally the threshold required for viability for a last-mile network. A lot of unknown variables can impact take rates such as pricing, ability of subscribers to terminate their existing contracts, and existing incumbent providers suddenly offering better deals. However, particularly in the non-Comcast areas, and areas where choice is limited, a new provider could have a great deal of success.

As a result, and in order to provide final recommendations VPS will work with the County to focus the final Phase 4 next steps on the following parts:

- Explore the viability of creating a PPP including having further conversations with potential partners identified in the first two phases of the Study.

- Explore the viability of creating a regional non-profit to build, oversee and manage a regional network. Including:

    - Identifying potential partners (both Board Members and others) that include regional and County entities, providers, and electric cooperatives.
    - Developing mission and vision statements and other documents that sets clear goals on achieving connectivity in the County

- Develop a funding and financing plan including:

    - Meeting with potential partners who may be able to contribute funding and/or network assets that could be leveraged to offset costs – such as the Oregon Fiber Partnership and Cooperatives.
    - Identifying the correct grants to pursue and establishing a timeline for applications.

Appendix A – Technology Background

For background and as a Broadband 101 primer, it's important to understand the definition of broadband as well as the different types of technologies referenced in this Report. Broadband technologies can be broken down into two main categories – wireline and wireless. This Appendix provides an overview of each and helps define some the terms that will be utilized in this report.

Wireline Technologies

Wireline technologies rely on a physical cable for transmission of the communication signal. These cables usually transport an electrical signal on a copper cable or an optical signal on a fiber optic cable. There are three common wireline technologies used by wireline companies today. These are:

- Digital Subscriber Line (DSL) – This wireline technology overlays a broadband signal on existing twisted pair copper cables. Broadband speeds on DSL networks are dependent on the customer's distance from electronics in remote terminals or central offices. Modern DSL technologies can typically provide 1 Mbps to 2 Mbps download speeds, depending upon the quality and size of the copper cable. However, for customers served by copper cable that exceeds 18,000 feet in length, the distortion caused by the capacitance of the cable renders the cable unsuitable for quality voice. Telephone companies have historically provided voice service over twisted pairs of copper cable. Consequently, millions of miles of twisted pair copper cables have been deployed throughout the country. However, most service providers have concluded that DSL is near the end of its useful life and will not be a long-term solution for broadband delivery. Therefore, they have been looking to fiber technology to meet the increasing customer demand.

- Coaxial Cable (DOCSIS) – Coaxial cable can also be used to provide wireline broadband services with typical speeds of 160 Mbps downstream and 120 Mbps upstream that can be shared by a large number of subscribers. Most Cable Television (CATV) providers like Comcast rely on COAX cables. The CATV industry has implemented standards called Data Over Cable Service Interface Specifications (DOCSIS), which defines how the COAX network can be used to deliver broadband services to their customers. It is important to note that the CATV coax networks are shared – meaning a single cable leaving the CATV headend is split many times to serve many customers. Often, a single cable will provide broadband and/or video to hundreds of customers. This architecture worked well for broadcast video services, since it was a "one-to-many" service, but has limitations when delivering services such as broadband, where each customer requires their own unique connection.

- Fiber to the Premises (FTTP) – This wireline technology serves all customers by a fiber optic cable. Most FTTP equipment allows between 70 Mbps and 1 Gbps of broadband to each customer and is capable of serving customers that are more than twelve miles from the central office or electronic field terminal locations.

Wireless Technologies

Wireless technologies transmit the communication signal "over the air" on a radio frequency (RF) carrier. There are four common wireless technologies used by providers today. These are:

- Fifth Generation (5G) – The Third Generation Partnership Program (3GPP) organization is in process of defining the 5G standards, expected circa 2019. Per the GSM Association, 5G will be targeting user throughputs of 10 Gbps peak, a hundred times that of 4G networks. Although inherently a mobile technology, the first wave of 5G

will be utilized for the fixed delivery of wireless broadband services. 5G is anticipated to incorporate higher-order spatial diversity (MIMO schemes, beam forming, cell splitting, etc.), self-organizing networks to minimize self-interference and new user interfaces to support the Internet of Things (IoT).

- Fourth Generation (4G) – Utilizes Long Term Evolution (LTE) licensed spectra to provide wireless broadband services, as defined by the 3GPP organization, with duplexing methodology of both time (TD-LTE) and frequency Divisions. Although inherently a mobile technology, today, nearly all terrestrial wireless providers have standardized on Long Term Evolution (LTE) with fixed Customer Premises Equipment (CPE), as the Wireless Metropolitan Area Network (WMAN) broadband technology of choice. All major cellular providers in the U.S. have deployed LTE and continue to expand their LTE footprints.

- Unlicensed Operations – Unlicensed operations on unlicensed spectra can also be used to provide wireless broadband services. Systems operating on unlicensed spectra typically utilize vendor proprietary air interfaces, Institute of Electrical and Electronics Engineers (IEEE) 802.11, or another variant of the IEEE standards. Operations in the unlicensed spectra inherently are utilized for the fixed delivery of wireless broadband services, as the utilization of fixed devices allow for additional deployment efforts to overcome interference inherent within the unlicensed bands.

- Satellite - Satellite-based broadband is not considered a viable broadband alternative due to the high latency which makes it unsuitable for many applications and unable to provide reliable, high-quality voice connectivity.

Some believe that wireless can be a substitute for terrestrial wireline connections that may be too costly to construct. While wireless can be part of the solution and should be considered for deployment in very rural areas – there are considerations that should be taken into consideration.

- Wireless technologies must be replaced every 5-7 years and they can be very costly to maintain.
- Wireless is not suited for growth. For example – since bandwidth is shared among subscribers, available bandwidth per subscriber decreases as density of subscribers or devices increases.
- Available bandwidth decreases as distance of subscriber from access point increases.
- Broadband speeds are more limited. 4G technologies might allow customers to burst up to 10 or 20 Mbps for short periods of time.
- Not well suited for large bandwidth needs and often discouraged by carriers by only allowing a limited amount of data per month.
- Geography and atmospheric conditions can and will impact service delivery for technologies that need to be in sight of each other in order to transmit a signal. Mountains, hills, valleys, buildings, and trees interfere with the propagation of the wireless signal. Some technologies such as LTE can provide non-line-of-site service (NLOS) to some extent, but at significantly reduced throughput compared to direct LOS. These terrain issues and obstacles can mean that some customers cannot receive the broadband signal or that additional towers (and investment) are required.

Wireline vs. Wireless Technology

Both wireless and wireline broadband service providers have benefited from technology advances, but *wireline* technologies have historically been capable of speeds many times faster than the best *wireless* technologies. Fiber optic cable has been used by service providers for more than forty years to build high-speed broadband networks, primarily for long haul transport routes. Over the last ten to fifteen years, fiber has also been used to increase broadband speeds to

the customer because no other technology can deliver as much broadband speed. With FTTP,[7] the broadband speed provided is not dependent upon cable length, but electronics, and each new generation of FTTP electronics allows service providers the ability to offer significantly higher broadband speeds over greater distances without having to make significant changes to their outside plant architecture. There is no foreseeable end to the amount of bandwidth that can be provided over fiber cables.

There are many reasons why fiber is the best technology to construct modern network or upgrade existing networks. Fiber is immune to electromagnetic interference, provides the most reliable services, and minimizes operational expenses. Therefore, it delivers the best voice and broadband services available for today and the foreseeable future. Over the last several years, increases in copper prices, advances in technology, and growth in broadband demand have all worked together to make FTTP a more economical wireline technology for providing broadband. Not only is a fiber network less expensive to deploy, maintain, and upgrade than other wireline technologies, but it has superior broadband capabilities, such as being able to offer telecommuting, telemedicine services, and telepresence. All of these factors make it clear that copper is a dying technology in the telecommunications industry. It would be unwise for companies to utilize copper in their network deployments going forward, except in certain very limited situations.

Once fiber infrastructure is in place, service providers are able to increase the broadband by simply upgrading the electronics on the fiber cable, which represents a relatively small portion of the overall fiber network investment. Fiber technology will allow higher speeds to be delivered to customers over time with minimal incremental investment, making it the best technology for meeting future broadband service needs.

The amount of bandwidth per customer is significantly greater for a FTTP network when compared to a wireless network. Using the technologies available today, the bandwidth delivered to a customer can be more than 100 times greater than what is possible over a wireless network under similar conditions. The bandwidth advantage for FTTP will increase significantly in the coming years due to technology advances with the electronics.

Fiber optic cable is the most-costly to construct. However, it is also an enabling technology that allows for growth. A lion's share of the FTTP investment is the placement of the cable facilities, which typically has a 30-year life, compared to the wireless infrastructure, which has a greater portion of the investment associated with faster-depreciating infrastructure. When placement costs are included over a 30-year life, the cost savings for a wireless network are significantly reduced or eliminated.

[7] Fiber-to-the-Premises is sometimes referred to as Fiber-to-the-Home (FTTH).

Appendix B – Grant Programs

USDA: Community Connect Grant

1) **Deadline:**
   a. 2019 Deadlines TBD – Please note: At the date of this report, USDA operations are currently limited by the Government Shutdown.
2) **Purpose:**
   a. This program helps fund broadband deployment into rural communities where it is not yet economically viable for private sector providers to deliver service.
3) **Eligible Applicants:**
   a. Most State and local governments
   b. Federally-recognized Tribes
   c. Non-profits
   d. For-profit corporations
4) **Approved Use of Funds:**
   a. Construction, acquisition or leasing of facilities, spectrum, land or buildings used to deploy broadband service.
   b. The cost of providing broadband service free of charge to critical community facilities for 2 years.
   c. **Please Note:** Less than 10% of the grant amount, or up to $150,000 may be used for the improvement, expansion, construction or acquisition of a community center that provides online access to the public.
5) **Requirements & Rules:**
   a. The impacted area must be classified as Rural and lack any existing broadband speed of at least 10 Mbps down and 1 Mbps up.
   b. Applicant must provide matching funds of at least 15% from non-federal sources. These funds can be used for operating costs.
   c. Buildings constructed with grant funds must be located on property owned by the awardee.
   d. Leasing expenses will only be covered through the advance of funds period included in the award documents.
   e. Grantees must have legal authority to provide, construct, operate and maintain the proposed facilities or services.
   f. Partnerships with other federal, state, local, private and non-profit entities are encouraged.
   g. For additional detail see Code of Federal Regulations 7 CFR, Part 1739.
6) **Type of Funding Available:**
   a. Grant Funding

**Rules, data and information taken from 2018 Community Connect Grant Program – Any and all information, rules and data subject to change for the 2019 program.*

USDA: Distance Learning & Telemedicine Grants

1) **Deadline**
   a. 2019 Deadlines TBD – Please note: At the date of this report, USDA operations are currently limited by the Government Shutdown.
2) **Purpose:**
   a. Helps rural communities use the unique capabilities of telecommunications to connect to each other and to the world. Helps to acquire the technology and training necessary to connect educational and medical professionals with the teachers and medical providers who serve rural residents at the local level.
3) **Eligible Applicants:**
   a. Most State and local governments
   b. Federally-recognized Tribes
   c. Non-profits
   d. For-profit Corporations
4) **Approved Use of Funds:**
   a. Acquisition of eligible capital assets, such as:
      i. Broadband transmission facilities
      ii. Audio, video and interactive video equipment
      iii. Terminal and data terminal equipment
      iv. Computer hardware, network components and software
      v. Inside wiring and similar infrastructure that further DLT services
   b. Acquisition of instructional programming that is a capital asset.
   c. Acquisition of technical assistance and instruction for using eligible equipment.
5) **Requirements & Rules:**
   a. A minimum 15% match is required for grant-only awards (cannot be from another federal source).
   b. DLT 100% grant applications are accepted through a competitive process. The application window is announced annually (typically after the first of the year) through a Notice of Funds Availability (NOFA) or a Notice of Solicitation of Applications (NOSA) in the Federal Register. Applicants are required to provide a minimum 15 percent match. Awards can range from $50,000 to $500,000.
6) **Type of Funding Available:**
   a. Grant Funding
7) **Further Information:**
   a. The application window is announced annually (typically after the first of the year) through a Notice of Funds Availability (NOFA) or a Notice of Solicitation of Applications (NOSA) in the Federal Register. Applicants are required to provide a minimum 15 percent match. Awards can range from $50,000 to $500,000.

**Rules, data and information taken from 2018 Distance Learning & Telemedicine Grant Program – Any and all information, rules and data subject to change for the 2019 program.*

USDA: The Rural Broadband Access Loan & Loan Guarantee Program

1) **Deadline:**
   a. Applications are now accepted for 2019 – Please note: At the date of this report, USDA operations are currently limited by the Government Shutdown.
2) **Purpose:**
   a. Furnishes loans and loan guarantees to provide funds for the costs of construction improvements or acquisition of facilities and equipment needed to provide service at the broadband lending speed in eligible rural areas.
3) **Eligible Applicants:**
   a. Corporation
   b. LLC
   c. Cooperative or mutual organization
   d. Tribes or Tribal organization
   e. State or local government
4) **Approved Use of Funds:**
   a. The construction, improvement, and acquisition of facilities required to provide service at the broadband lending speed including facilities required for providing other services through the same facilities.
   b. The cost of leasing facilities required to provide service at the broadband Lending speed if such lease qualifies as a capital lease under Generally Accepted Accounting Principles (GAAP).
   c. An acquisition, under certain circumstances and with restrictions.
   d. For additional detail see 7 CFR 1738
5) **Requirements & Rules:**
   a. Proposed funded service areas must be completely contained within a rural area or composed of multiple rural areas, as defined in 7 CFR 1738.
   b. At least 15 percent of the households in the proposed funded service area are unserved,
   c. No part of the proposed funded service area has three or more “incumbent service providers.”
   d. No part of the proposed funded service area overlaps with the service area of current RUS borrowers or the service areas of grantees that were funded by RUS.
   e. Communities where USDA Rural Utilities Service has previously provided funding for construction of broadband infrastructure may not be eligible.
   f. **Please Note:** In order to be counted as a provider for eligibility purposes, a provider must file a response to a Public Notice Filing for an area they operate in. Please see the Broadband Mapping Tool for more information and to sign up for a subscription to be notified when Public Notice Filings are published.
6) **Type of Funding Available:**
   a. Direct Cost of Money Loan Funding

USAC - Healthcare Connect Fund (HCF)

1) **Deadline:**
   a. The initial filing window is February 1 – May 31, 2019.
2) **Purpose:**
   a. The purpose of the Healthcare Connect Fund is to expand HCP access to broadband services, particularly in rural areas, and to encourage the formation of state and regional broadband networks linking health care providers.
3) **Eligible Applicants:**
   a. A post-secondary educational institution offering health care instruction, such as teaching hospitals or medical schools,
   b. A community health center or health center providing health care to migrants,
   c. A local health department or agency,
   d. A community mental health center,
   e. A not-for-profit hospital,
   f. A rural health clinic, including mobile clinics,
   g. A dedicated emergency room of a rural for-profit hospital, or
   h. Skilled Nursing Facilities (SNFs)
4) **Approved Use of Funds:**
   a. Under the program, eligible rural HCPs, and those non-rural HCPs that are members of a consortium that has a majority rural HCP sites, can receive a 65 percent discount from the fund on all eligible expenses.
5) **Requirements & Rules:**
   a. HCPs are required to contribute the remaining 35 percent to participate in the program.
   b. HCPs can use the Healthcare Connect Fund to purchase services and equipment, as well as construct their own broadband infrastructure where it is shown to be the most cost-effective option.
   c. Non-rural HCPs may participate and receive support as part of consortia that include a majority rural HCP site.
6) **Type of Funding Available:**
   a. Support Funding
7) **Further Information:**
   a. On June 25, 2018, the Federal Communications Commission (FCC) issued an Order that adopts rules to: (1) increase the annual RHC Program funding cap to $571 million and apply it to FY2017; (2) annually adjust the RHC Program funding cap for inflation, beginning with FY2018; and (3) establish a process to carry-forward unused funds from past funding years for use in future funding years. As noted in the FCC's RHC 2018 Funding Cap Order, the RHC Program funding cap for FY2018 will be $581 million, adjusted for inflation

Broadband e-Connectivity Pilot Program

1) **Deadline:**
   - 100% Grant Funding Application – Applications Due: April 29,2019 – Awards subject to competitive scoring
   - 50% Grant / 50% Loan Funding Application – Applications Due: May 29, 2019 – Awards subject to competitive scoring
   - 100% Loan Funding Application – Applications Due: June 28, 2019 – Awarded on first come / first serve basis

   Applicants are only allowed to apply in one of the funding categories
2) **Purpose:**
   - Provide up to $600 million in loan and grant funding to assist with building broadband infrastructure in rural areas. Provide broadband to unserved or severely underserved areas which lack 10/1 Mbps broadband speeds.
3) **Eligible Applicants:**
   - Non-Profit Entities
   - For-Profit Corporations
   - Limited liability Companies
   - Cooperative or Mutual Organizations
   - State and Local Government Entities
   - Territory or Possession of the U.S.
   - Indian Tribe Budget Control Mechanism Calculation and Per-Line Limit on Universal Service

   **CAF II Auction recipients limited to 100% loan category.*
4) **Eligible Areas:**
   - 100% Grant Funding Application – Service area is only eligible if 100% of the area lacks 10/1 Mbps
   - 50% Grant / 50% Loan Funding Application – Service area is only eligible if 90% of the area lacks 10/1 Mbps
   - 100% Loan Funding Application – Service area is only eligible if 90% of the area lacks 10/1 Mbps
5) **Requirements & Rules:**
   - Recipients must provide 25/3 Mbps to every location within the proposed funded service area.
   - Applicants must prepare a 5-year financial forecast to support financial feasibility and sustainability of the project. Key elements of these financials include:
     - Positive ending cash each year of forecast
     - Positive cash flow from operations
     - Must meet two of the following criteria:
       - Current Ratio of 1.20
       - Tier Ratio of 1.20 minimum (100% loan or 50% loan / 50% grant)
       - DSCR Ratio of 1.20 minimum (100% loan or 50% loan / 50% grant)
       - If no existing debt, not proposing new debt and only applying for grant only, the Current Ratio of 1.20 is required
6) **Type of Funding Available:**
   - Total of $200 million for projects seeking 100% grant funding - Max request limit is $25 million
   - Total of $200 million for projects seeking 50% grant and 50% loan funding - Max request limit is $25 million for loan, and $25 million for grant funding
   - $200 million for projects seeking 100% loan funds - Max request is $50 million

Special Note: Oregon Rural Broadband Capacity Pilot Program

1) **Deadline:**
   a. First Program released in 2018 – State government has not released if they plan to repeat or expand the program in 2019.
2) **Purpose:**
   a. The Governor's Office approved funding of $500,000 for grant(s) to support broadband planning, engineering, and/or infrastructure deployment projects targeting rural areas lacking adequate broadband access in 2018. These are areas that do not have broadband service available at the current FCC designation of 25/3 Mbps, excluding satellite service.
   b. The program places particular emphasis on investments that assist communities, businesses, or industries in cost-effective projects that impact retention and growth of significant traded sector industries in Oregon.
3) **Eligible Applicants:**
   a. Oregon Cities
   b. Counties
   c. Ports
   d. Tribes or Tribal organization
   e. Cooperatives
   f. Non-Profit Corporations
   g. Public-Private Partnerships
4) **Approved Use of Funds:**
   a. Planning—For projects to organize and engage rural community stakeholders to develop broadband strategic plans for the deployment, adoption, and utilization of broadband infrastructure in their respective communities.
   b. Engineering—For projects that have completed plans, a grant may be used for the design and engineering of broadband infrastructure.
   c. Infrastructure—For projects that have completed plans and engineering designs, a grant may be used for the construction of broadband infrastructure.
   d. Matching Funds—A grant also may be used as matching funds to enable recipients to qualify for grants and loans from federal and private foundation funding programs for broadband planning, engineering, and infrastructure deployment projects.
5) **Requirements & Rules:**
   a. Funding offers will be contingent upon successful completion of the application process and negotiation of contractual terms between Business Oregon and applicant.
6) **Type of Funding Available:**
   a. Grant Funding
7) **Further Information:**
   a. There were 25 applications submitted for more than $4.8 million in requested funding. Grants awarded supported broadband planning and infrastructure projects located in Baker, Columbia, Coos, Curry, Douglas, Morrow, Harney, and Tillamook counties.

**Rules, data and information taken from the 2018 Oregon Rural Broadband Capacity Pilot Program – Any and all information, rules and data subject to change for the 2019 program.*