

# Columbia County, Oregon

## Broadband Feasibility Study

### Final Executive 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 was 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 was broken down into four phases with a final report due to the County in March of 2019.

VPS previously provided the County with full reports on the following phases of the Study:

- Phase 1 Provider Data Report that assessed the existing provider landscape in Columbia County.
- Phase 2 Stakeholder Report that detailed the results of the stakeholder outreach and survey results.
- Phase 3 Network Models Report that discussed a variety of network models, proposed model for the County and funding and financing options.

This Final Executive Report provides a summary of the key information detailed in each of the above Reports and provides additional recommendations and next steps for the County.

As a reminder, The Federal Communications Commission (FCC) currently defines broadband as internet speeds that reach a minimum of 25Mbps downstream and 3Mbps upstream (25/3). Speeds that fall below 25/3 are not considered to be high-speed broadband but may provide subscribers access to the internet with limitations. For purposes of this Study, high-speed broadband refers to speeds that meet or exceed the 25/3 threshold.

## Phase 1: Broadband Provider Analysis

The first phase of the Study consisted of reviewing the packages and service offerings that are available in the region broken down by zip code and **according to the providers**. The main purpose for this exercise was to understand what the providers are saying in terms of their own services and availability.

For this portion of the Study, VPS collected data directly from each provider's website, as well as from a number of publicly available sources including BroadbandNow.com. **All of the data detailed in this section is information that is self-reported by the providers to third-party sites including the FCC.** For example, each provider is required to file a 477 Form with the FCC that details their coverage. Most third-party sites utilize the 477 data in addition to other publicly available data to generate coverage maps. **None of the data and information provided is the opinion of, nor validated by VPS.**

As such it is important to understand the following:

- Providers report data based on entire census blocks and not by individual address level, so data does not accurately show where there might be gaps. Many third-party sites aggregate this data by zip code, which may further skew data.
- The speed data only shows the highest speeds of **what may be offered** by providers in an area. The speed data does not reflect what residents or businesses are actually receiving.
- It is unclear whether the FCC validates portions of the 477 data that is filed by the providers.

It is also important to note that unfortunately, most federal grant programs utilize the 477 data as a tool to determine whether an area is unserved or underserved. In other words, if the 477 data shows a provider is offering 10/1 speeds in an area – that area could be disqualified from pursuing federal funding opportunities. In addition, it would be the responsibility of the applicant to prove the negative - that an area is not actually being served if the 477 data says otherwise.

Overall, there are 8 providers (wireless, wireline and satellite) that offer services in all or parts of Columbia County. These providers are as follows:

- Cascade Networks (fixed wireless)
- CenturyLink (fixed wireline)
- Charter Spectrum (fixed wireline)
- Frontier Communications (fixed wireline)
- HughesNet (satellite)
- Viasat Internet (satellite)
- Xfinity from Comcast (fixed wireline)
- Whiz to Coho (fixed wireless)

Within this group, there is a wide-range of service and speed offerings from less than 1 Mbps to over 250 Mbps. However, there are only two that offer services in all zip codes and they are the two satellite providers - HughesNet and Viasat Internet. In addition, none of the other providers have 100% coverage in any one zip code where they offer services to residents.

In summary, the existing provider coverage across Columbia County is inconsistent. There are two zip codes (97053 and 97018) that appear to have approximately 99% coverage with multiple providers offering residential services with speeds

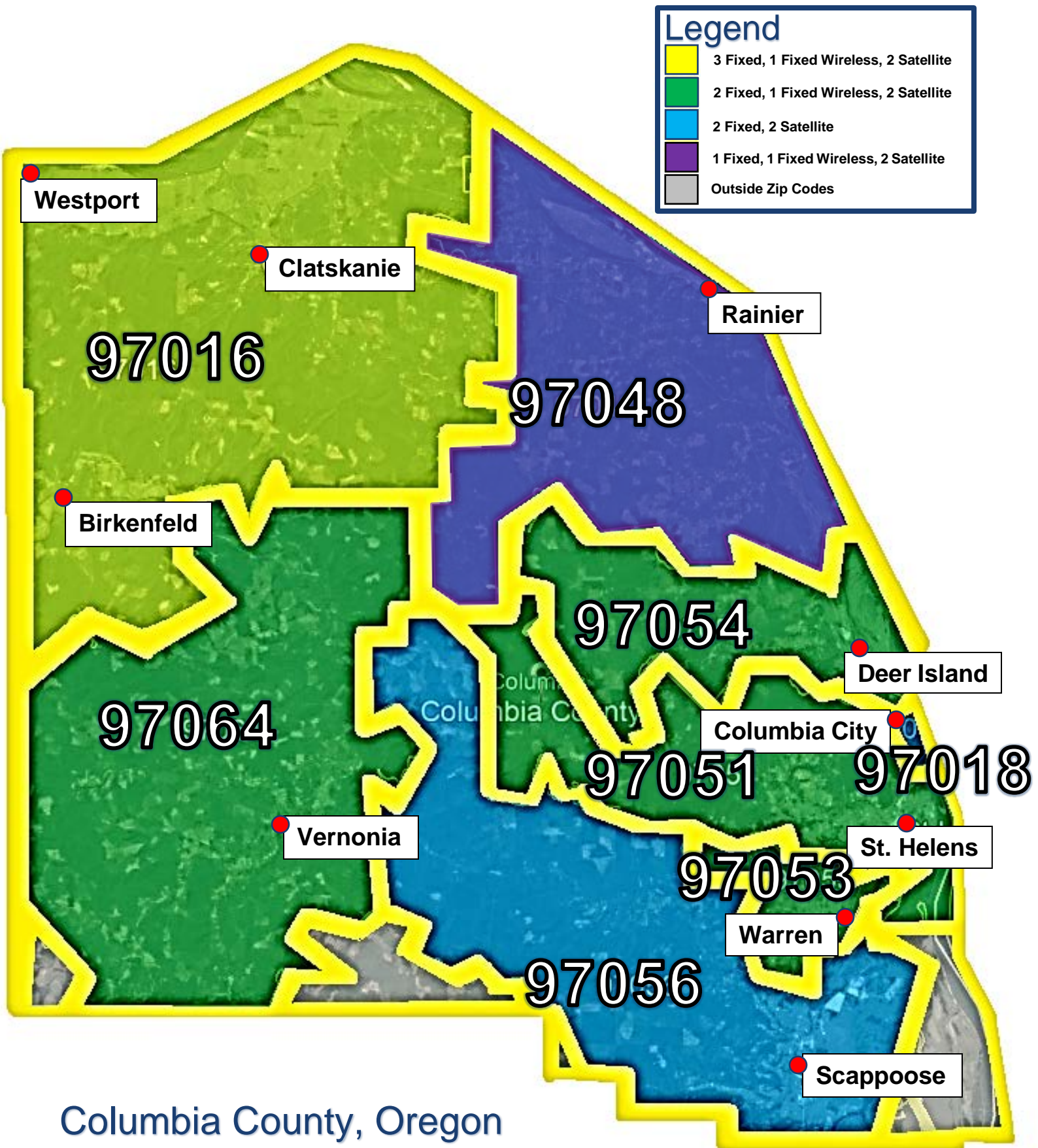
that meet or exceed the federal definition of broadband. However, it should be noted that with respect to the top two zip codes, this is a departure for Century Link which only offers speeds of between 10 – 20Mbps in all the other zip codes. As such, this data could be inaccurate.

The below chart provides a summary of the zip codes showing those providers that are meeting the 25Mbps standard.

Zip Code	# of Providers (including satellite)	Providers offering 10 Mbps	Providers offering 25 Mbps	Est. % of zip code where 25 Mbps is available
97053	5	4	Comcast, Century Link	97% - 99%
97018	5	4	Comcast, CenturyLink	96% - 99%
97051	5	4	Comcast	92%
97064	5	3	Frontier	91%
97056	4	4	Comcast	86%
97016	6	6	Frontier, Charter	41% - 48%
97054	5	4	Comcast	19%
97048	4	4	0	0

As you can see, the number of providers drops significantly when you apply the 25Mbps standard. Only three of the eight zip codes have two providers offering broadband service with the rest limited to one. With the two satellite providers, it is theoretically possible to subscribe to 10Mbps of service throughout the County.

When placing this data on a map (provided on the next page), it becomes clear that there is a geographic problem with broadband coverage in Columbia County. The southwest and southeast portions of the County are the best-served. The northwest portion has partial coverage and the areas in the northeast have virtually no access to high-speed broadband.



Columbia County, Oregon

## Broadband Provider Map



## Phase 2: Stakeholder Outreach and Survey Results

The second phase of this study primarily focused on conducting County, community and stakeholder outreach. The biggest question a broadband feasibility study must answer is “what is the problem we need to solve?” As such, the most critical task of a feasibility study is to conduct outreach in the community, in order to talk to as many stakeholders as possible. Stakeholders represent key groups of potential end-users of a municipal network such as citizens, businesses and government agencies. The purpose of the outreach is to obtain feedback regarding current levels of service, future needs and concerns.

To gather the data and information for this Report, VPS:

- Held on-site meetings in Columbia County with a variety of groups and entities. Columbia County staff participated in all of these on-site meetings.
- Conducted calls with a variety of groups that either could not attend the on-site meetings or required a follow up.
- Conducted a residential market survey. Residents were randomly selected to participate via two mailings.
- Conducted an informal residential survey. Residents were encouraged to participate through social media and other electronic methods.
- Conducted an informal business survey. Business were encouraged to participate via email.

The purpose of the residential market demand survey was to obtain key data points regarding current level of service, satisfaction with current providers, resident’s willingness to switch providers, and the level of pricing residents consider to be reasonable for high-speed broadband among other areas.

The survey itself contained a total of 26 questions (4 of which were demographic related) and was hosted on the online platform of Survey Monkey. VPS worked with National Research Council (NRC) to send a postcard and letter to a random sampling of 4001 households across the 8 zip codes in the County. Overall, VPS received 483 survey responses.

VPS also launched an informal survey to provide all residents with an opportunity to participate in the survey while preserving the random sampling of the official survey. However, even though the survey questions are identical and the results almost exactly identical, VPS did not merge the two together

Overall the data and information collected validated the “heat map” shown on the prior page. The survey showed that some areas have adequate coverage while other areas are in desperate need of better connectivity and coverage. This includes a need for better and more middle-mile fiber infrastructure that reaches areas like Vernonia. This is true for both internet access and cellular coverage.

A summary of the key findings is provided below.

- There are potential viable opportunities to partner with some existing service providers to expand last-mile services to unserved and underserved areas.
- 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.
- Schools need better, more redundant connectivity with better pricing/value.

- Public Safety has serious needs including redundancy, improved cell service, connections to all facilities, towers and infrastructure. Any solution should seek to connect to all public safety facilities in the County.
- Residents are asking for better, more reliable and faster internet service.
- 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.
- Approximately 38% of survey respondents are either very satisfied or satisfied with their current provider. This is well below the national average and indicates that there is room in the market place for a new residential provider with potential 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.
- Columbia County residents do not mind paying hook-up fees if they are reasonably priced at or below \$100. However, at \$100, this would not generate much revenue to help offset the cost of a network build for both a private or public provider.



## Phase 3: Network Models

The Phase 3 Report focused on the different types of network models, ownership models and funding and financing options. As a review, 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. Both types of networks can be considered open access if desired. All are described below.

### Last-Mile Networks

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.

### 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<sup>1</sup> that provides direct lateral connections to key institutions and enables infrastructure assets to be 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.

### Open Access 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.<sup>2</sup> Publicly funded grant programs offered by the federal and state government sometimes require networks to be open access.

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<sup>1</sup> 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.

<sup>2</sup> 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.

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<sup>3</sup> 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.

Section 1.4 through 1.6 of the Phase 3 Report provide a more in-depth discussion on the financial benefits of leasing conduit and dark fiber.

### Network Ownership Models

There are multiple kinds of ownership and operating models for the previously described municipal networks. This includes:

- **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.
- **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.
- **Public Private Partnerships (PPPs)** 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.
- **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, nonprofit or consortium.
- **Hybrid** Another option is to create a hybrid model that combines one or more of the above options.

### Funding and Financing

A key component in helping to determine the type of network and operating model is to identify all potential funding sources. Options include:

- **Public Self-Funding.** This would primarily be a general fund set-aside or creation of a capital project.
- **Revenue Bonds.** Bond funding is the most popular mechanism for municipalities to utilize to assist with funding network construction, and to support startup and maintenance costs.
- **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.

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<sup>3</sup> Conduit and fiber strands that will not be used by the municipality.

- **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.
- **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.
- **Grant and Loan Funding Opportunities.** 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.
  - USDA: Community Connect Grant
  - Distance Learning & Telemedicine Grants
  - The Rural Broadband Access Loan & Loan Guarantee Program
  - Healthcare Connect Fund (HCF)
  - ReConnect Loan & Grant Program
  - State of Oregon Rural Broadband Capacity Pilot Program

More detailed information on the funding options including grants can be found in Section 3 and Appendix B of the Phase 3 Report.

## Recommendations

The biggest issue facing Columbia County is the lack of infrastructure that is creating large gaps where residents and businesses cannot obtain high-speed broadband services. 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.

Therefore, the first recommendation for Columbia County is that:

### Recommendation #1

**Columbia County should consider building a middle-mile network. This could be done all at once or phased in over time.**

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.
- It could be phased in over time or built all at once.

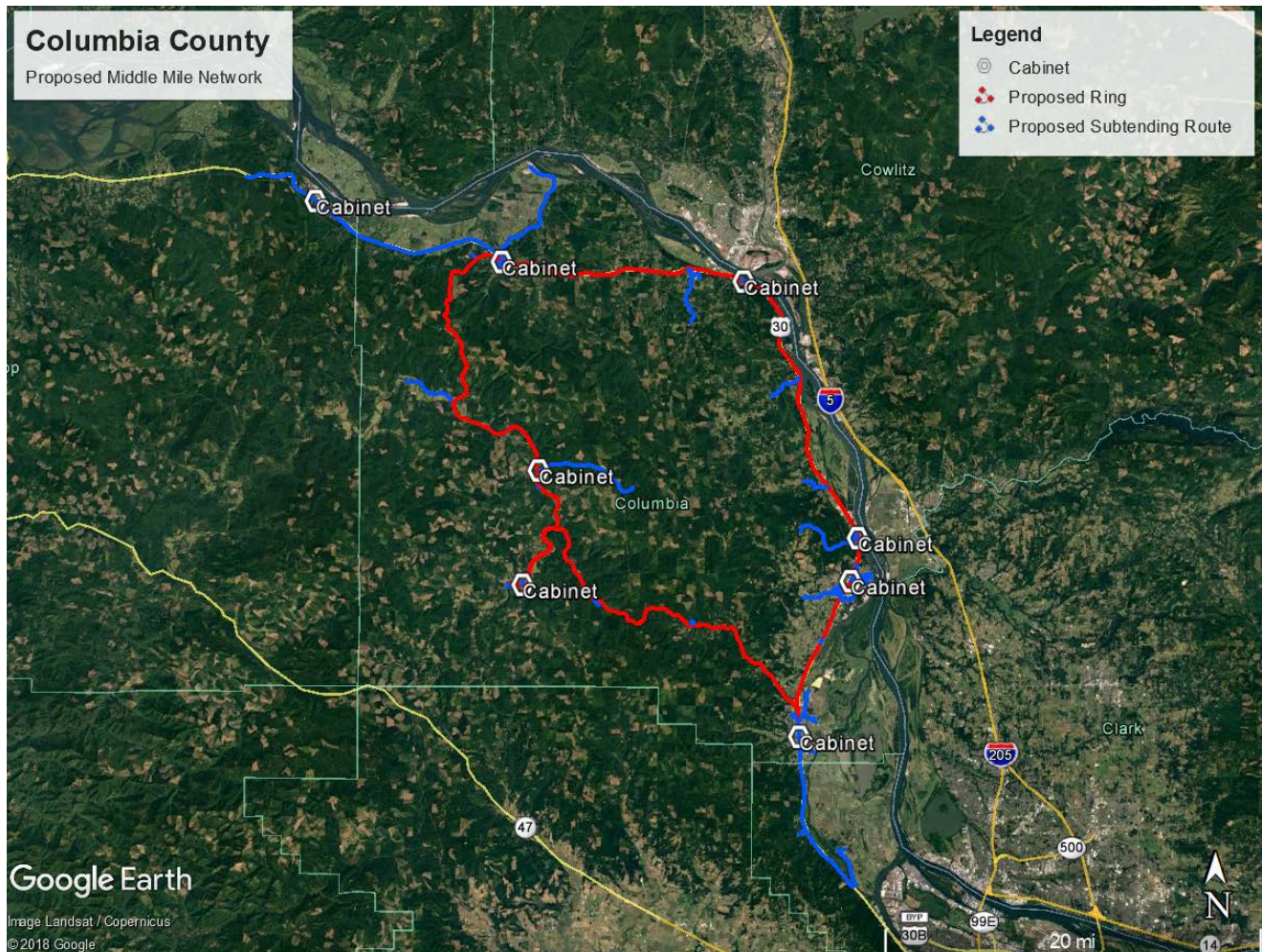
The benefits of a middle-mile network are substantial and would enable the County to:

- 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.



As a part of the project, VPS developed a buried<sup>4</sup> middle-mile model for consideration. 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. In addition, this does not include costs associated with the operational structure that would be needed to support the network. A full discussion of the model including assumptions utilized can be found in Section 4 of the Phase 3 Report.

Overall, the 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:



To develop the cost estimates, 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.

<sup>4</sup> 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.

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 building 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
	<b>Total</b>		<b>\$ 15,989,000</b>
Electronics			
	Hut		\$ 230,000
	Data Router		\$ 173,000
	Cabinets		\$ 207,000
	FTTP Electronics		\$ 204,000
	ONTs		\$ 57,000
	Install		\$ 113,510
	<b>Total</b>		<b>\$ 984,510</b>
Total Cost			
	OSP Construction		\$ 15,989,000
	Electronics		\$ 984,510
	<b>Total</b>		<b>\$ 16,973,510</b>

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

The middle-mile network model is a very large network that is expensive to build and operate. Naturally, the next question is how is the County going to fund and run the network?

Regarding funding, there is no easy answer. The most popular method for funding the creation of municipal networks is by issuing revenue bonds or creating some taxation system. Neither of these options are preferable for the County. However, the second most popular method is by either obtaining grant funding or by establishing partnerships with providers that are willing to make investments in the community.

Columbia County has four primary hurdles with pursuing grant funding:

- Grant funding is not usually available for middle-mile networks by themselves.
- Most federal grants do not allow groups or partnerships to apply directly for grants – the main applicant needs to be the network operator/provider and these relationships need to be established prior to development of the grant application.
- Grants require matching funds of cash. In-kind services do not count towards matching funds.
- The area may or may not qualify for federal grant funding. (i.e. can the County draw an area where providers are not offering a minimum of 10/1 service. See Phase 3 Report for additional discussion on challenges with grant funding).

Therefore, the best option for pursuing grant funding is for the County to engage with a partner. This is a viable option as there are several providers that were identified in the Phase 2 Stakeholder Report that could serve as a potential partner.

#### **Recommendation #2**

**The County should pursue establishing a partnership with a last-mile provider.**

Establishing a partnership can be a daunting task that may require dedicated efforts. In Section 2.3 of the Phase 3 Report, there is a short discussion of the Columbia Gorge Broadband Consortium (CGBC). Essentially, the CGBC is a regional consortium that originated from a partnership between Washington State University Extension and the Town of Glenwood. Today, the CGBC includes many other partners throughout Klickitat and Skamania Counties. In just under ten years, the CGBC was able to:

- Obtain \$3.7 million in federal funds to construct a fiber-optic “middle-mile” network in the region (through SawNet, a local Internet Service Provider).
- Secure \$170,000 to expand and form the Klickitat-Skamania Local Technology Planning Team (KSLTPT) that applied for and received additional grants.

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.



This model could work very effectively in Columbia County. The purpose of establishing a consortium is to bring together groups and individuals representing key constituencies (i.e. schools, government, public safety, PUDs, providers) whose **sole mission** is to improve broadband by identifying resources and partnerships. Most of the successful broadband networks across the Country started with a citizen broadband committee or a broader regional consortium. This consortium could be loosely formed, or it could also seek to create a more formal legal status such as a nonprofit.

### **Recommendation #3**

**Columbia County should consider establishing a Columbia County Broadband Consortium that can focus on pursuing funding and establishing partnerships for middle-mile and last-mile network deployment.**

With these three main recommendations, it is important to identify the next steps the County would need to take to establish a consortium that could pursue partnerships in order to fund and deploy a middle-mile and/or last-mile network. Identified below are the action items that would be needed to make this happen.

#### **1. Create a Consortium.** Action items include:

- Create a list of groups, entities and citizens (based on the Stakeholder Outreach in the Phase 2 Report) that could be invited to participate. A target size for the consortium would be 9-12 individuals representing groups and entities.
- Establish goals for the consortium based on this study (i.e establish partnerships by end of 2019).
- Establish timeframe for achieving the goals.

#### **2. The Consortium should establish one or more partnerships with providers.** Action items include:

- Engaging in direct dialogue with potential last-mile partners including but not limited to providers that were identified in the Phase 2 Report to determine if one or more vendors could:
  - Potentially serve as a network operator for a middle-mile network and or last-mile partner and what their requirements would be (i.e. County financial or resource support) and scope of project (territory).
  - Be the lead applicant (only one provider can be lead applicant) for federal grants (if the region is eligible).
  - Contribute financial resources to resolving the problems identified through this feasibility study (form a PPP). In other words, is the provider willing to either provide match funding for grants, invest in last-mile connections and/or share costs in building the middle-mile network.
  - Serve as a partner in pursuing financing through the IRS Opportunity Zone Program.
  - Allow their existing infrastructure to be leveraged in order to save build-out costs.
- Investigating funding sources including determining eligibility for federal grants.
- Completing a business plan for the network and operating model with the partner or partners once they have been identified and are committed to the project. Conducting a business plan prematurely without the input of a provider-partner is not cost-effective. Last-mile providers will need to be a part of the process to ensure cost-accuracy and because they will not trust numbers generated without their participation.

#### **3. Deploy Network once partnerships and funding sources have been established. Plan TBD.**