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BROADBAND STRATEGIC PLAN

MARION COUNTY, OREGON



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The acknowledgement of the cooperative spirit from Marion County staff encourages confidence that a bright fiber-optic future is within reach for the residents, businesses and organizations across the County.

MUNICIPAL AND COMMUNITY ANCHORS

All participants in the County’s Broadband Business Survey and Business and Anchor Institution Focus Group Sessions

RETAIL PROVIDER COMMUNITY

Comcast, Wave, CenturyLink, Frontier, Stayton, Mt Angel, Datavision, St Paul, PEAK Internet



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Executive Summary

Marion County is well-positioned to realize substantial economic gains from targeted investments in broadband infrastructure. By linking its cities, natural assets, and rural areas with broadband, the County can attract investment, create economic opportunities, and operate more efficiently and effectively. Broadband and other digital technology directly enable transformation in business, education, health, transportation and other areas that make for great places, happy people, and vital enterprises. County government can be a catalyst for such transformation by making targeted investments in public infrastructure to reduce internal costs and improve operations. Such investment must align with and promote private investment, too. The keys to success are clear vision, committed leadership, and a solid plan.

Background

Broadband is essential much like education, electricity, and water/sewer. It has become a primary enabler of economic mobility and prosperity. Early in the digital revolution of the 1990s, communities realized they needed to be more proactive and could not depend solely on private enterprise for internet access. While telecom companies act as protectors of their current market positions and only invest in lucrative markets relying on their legacy infrastructure, local governments like Marion County see broadband as a critical enabler of success in communities by addressing issues such as:

- **Attracting and retaining highly skilled talent**, particularly those in well-paid industries who can live most anywhere, with great quality of life that includes connectivity
- **Automating local government operations**, sharing applications among municipalities to reduce costs and increase impact
- **Monitoring and managing natural resources** while sustainably utilizing them for agriculture, industry, recreation, and utilities
- **Expanding value creation among existing businesses and developing new private enterprises**, especially those that fit the distinct character and resource base of the area, and create high-paying jobs
- **Improving skill development and housing mobility** as well as economic opportunities for residents
- **Managing County resources, including buildings, parks, and vehicles**, and continually improving services to citizens and visitors
- **Supporting value-added production and direct to consumer business for agriculture**, increasing their revenue and profitability, creating better employment opportunities

The greatest broadband benefits come from building local economies, not just by reducing costs but by moving from consumption to production, and ultimately to



innovation-based markets. Broadband is essential for traditional industrial recruitment but enables so much more. Even with ubiquitous reliable broadband, areas without innovators and digital producers risk becoming “digital bedroom communities” where consumers spend their time and money online rather than in the actual community. Technology creates the most value when it enables the new and improves the old: automating basic business functions with technology, university-industry research collaborations that revolutionary new technologies, and startup companies disrupting markets are all examples. However, realizing the benefits of broadband, especially in areas such as Marion County that are looking to build innovative economic development strategies, depends on committed, visionary leadership.

Findings and Conclusions

Magellan Advisors’ research found that many communities within Marion County—particularly areas outside its cities—do not have the broadband they need. Gaps exist due to non-aggregated markets and existing internet service providers have not committed to addressing these gaps without significant incentives; basic economics keeps broadband out of many of the County’s rural areas. This Broadband Analysis & Strategic Plan identifies the role that the County government can play to ensure robust broadband is available and fulfilling the demand throughout the county, not just where it makes short-term profits for private telecom companies. The starting point is for Marion County’s leaders to decide that lack of broadband is more than a problem: it is a critical roadblock to solutions for numerous problems. The County should enable its communities to overcome this roadblock by playing a leadership role in not just increasing widespread availability, but in getting the greatest possible value from the technology.

This report includes input from external and internal stakeholders—those who have an interest in broadband and/or the County—gathered via in-person discussions and from a survey of households and organizations. We assessed the availability, cost, and performance of broadband services, and stakeholders’ needs for bandwidth and connectivity. An extensive consideration of opportunities for, issues with, and barriers to broadband development forms the core of this Plan. It identifies various options and recommends tactics to increase broadband availability. A key decision for Marion County leadership is role of the County in acting upon these tactics and recommendations for broadband development.

The study conducted for this Plan found that generally the urban and suburban centers of Marion County seem to have satisfactory broadband. For instance, Comcast has indicated that wherever they have service, they can deliver 1Gbps broadband depending on subscription level. Some of the smaller cities also have access to reasonable broadband within city limits from local providers such as in Gervais and Stayton. Many community anchor institutions, businesses, and residents with broadband said they need more bandwidth and reliability, as well as lower costs.



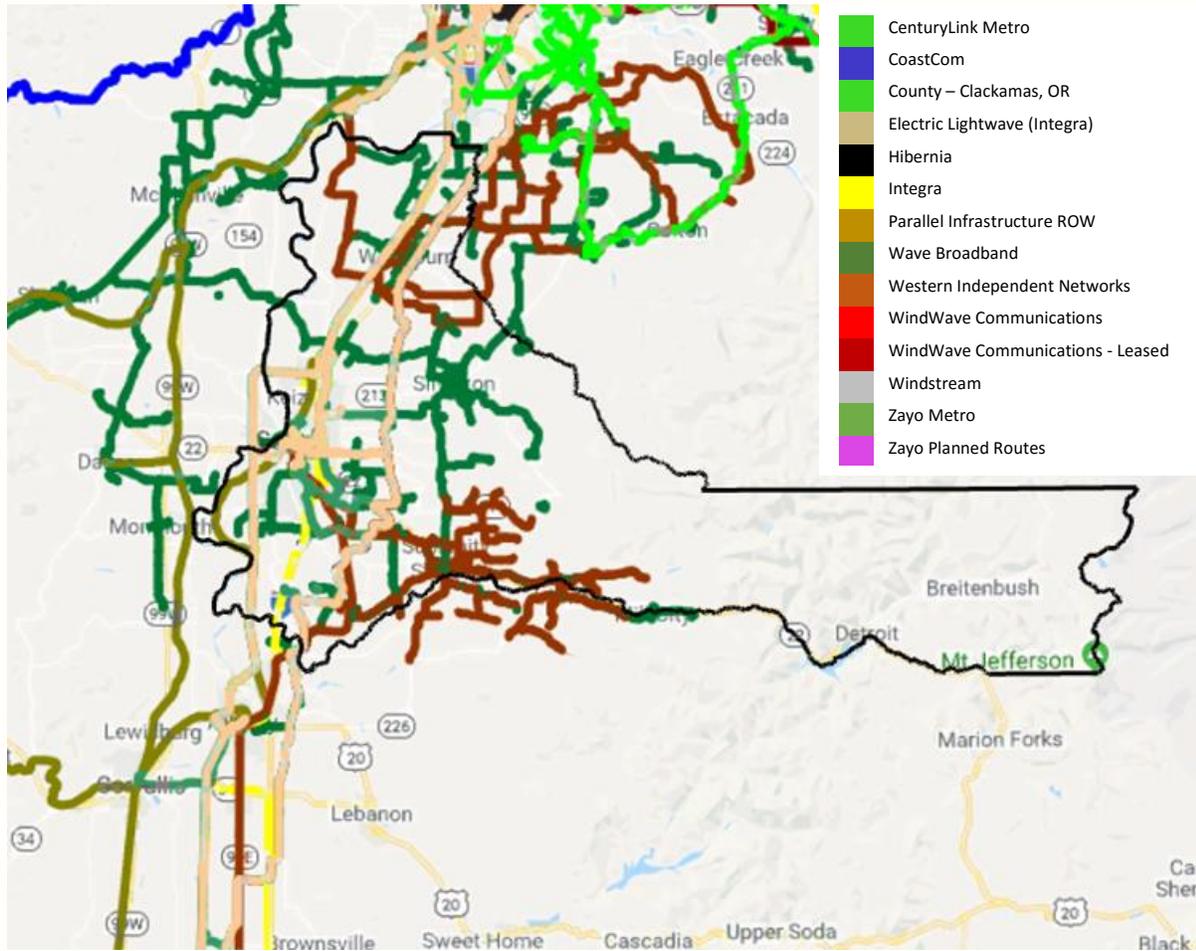
The broadband gaps are largely between the urban cities and in more remote areas, but pockets within suburban areas also have reported issues. Like other rural areas throughout the United States, costs are too high, competition is too entrenched, or market demand is too low for providers serve rural areas without public support. In particular, competition among providers in small markets leave customers with limited choices for inadequate legacy technologies. Although Marion County has numerous providers, most locations have, at best, a choice between two (2) providers, a cable company or a telephone company.

The maps in Figure 1 and Figure 2 below show where existing metro and long-haul fiber networks are located within Marion County. These were taken from an online database called FiberLocator and are not in GIS format. As demonstrated, there is significant availability of fiber along many of the main freeway corridors, but enough service is not available in many of the more rural parts of Marion County, including up the canyon along Hwy 22 in Detroit and beyond.

Long-haul and metro networks are considered middle-mile networks that often connect general areas to the world-wide-web. The owners of these networks will often sell capacity to connect an area to Point-of-Presence (PoP's) located in Portland, Seattle, Oakland, San Fransisco and beyond.



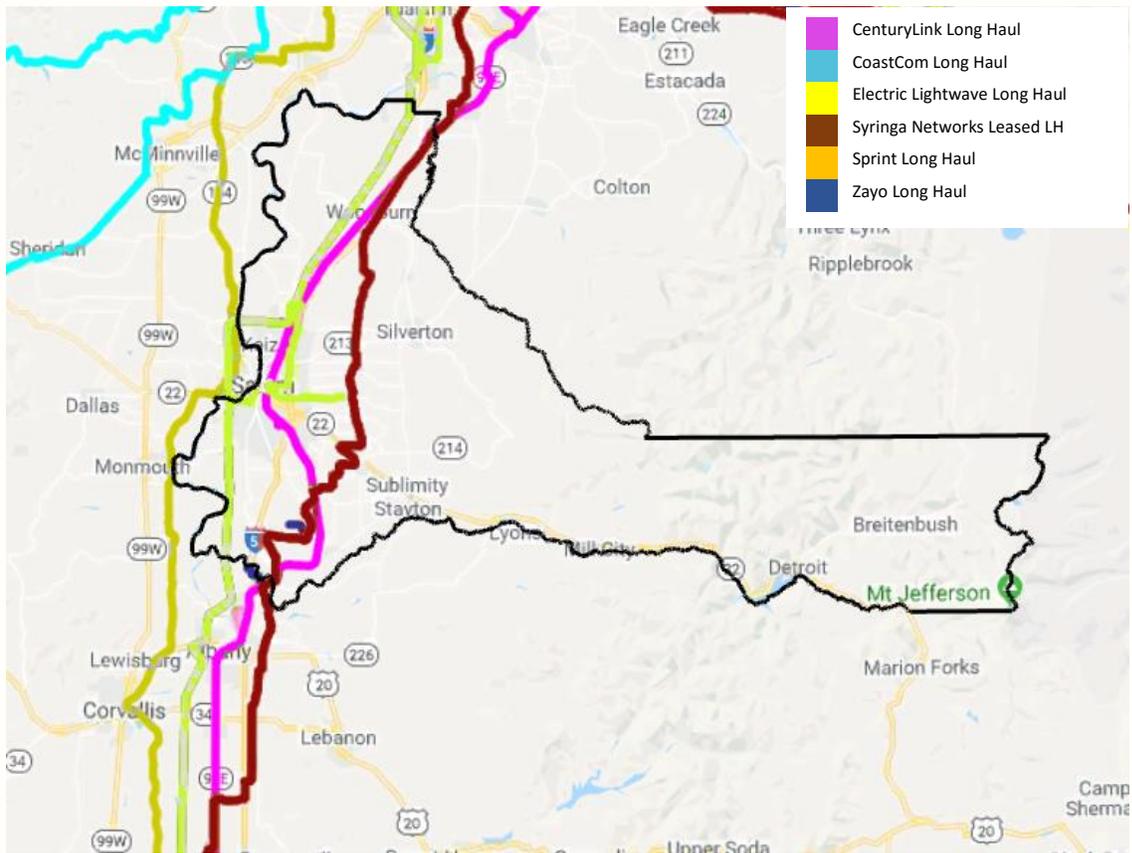
Figure 1. Metro Broadband Networks in Marion County¹



¹ Source: FiberLocator



Figure 2: Longhaul Broadband Networks in Marion County²



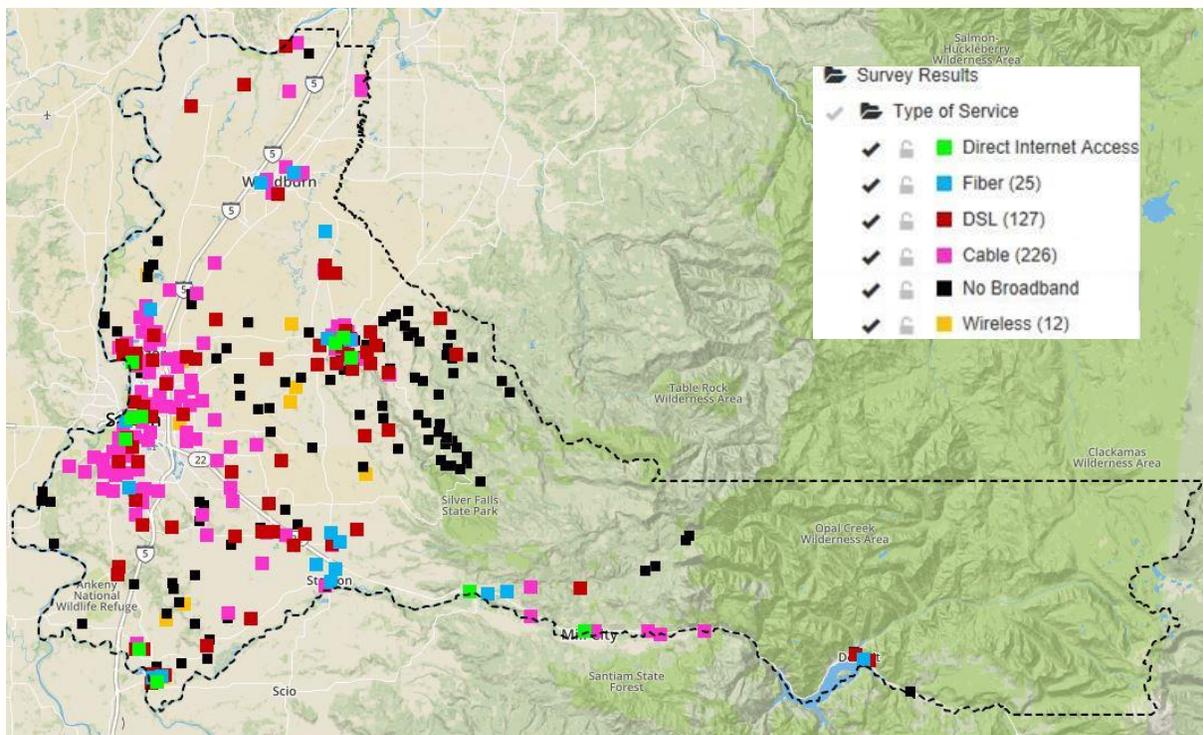
² Source: FiberLocator



Figure 3, below, displays a map of technologies reported by respondents to Magellan’s Broadband Survey throughout the County. Black dots indicate areas of no coverage, whereas the blue dots indicate availability of fiber. Magellan looked for state or federal supplied maps of services available for Marion County, but much of the data was very old or unreliable, so it was not included here. In addition, we asked many of the providers to provide us with maps of their service areas along with options provided, but all declined citing competitive reasons.

As noted, the map below represents locations from the survey respondents and the technology they reported using. There are many areas that lack “robust” broadband within Marion County. Through the survey we can conclude that the majority of broadband consumers are using low bandwidth DSL, Cable and wireless services. Fiber availability is limited and there are a large number of residents without broadband connectivity. These results are indicative of a lack of investment by the existing service providers due to the lack of a competitive broadband environment.

Figure 3. Survey Respondents’ Reported Technologies



Our speed tests found that:

- eighty percent (80%) of services have upload speeds under 10 Mbps³
- no service has upload speed over 100 Mbps

³ Details about broadband speeds and their capabilities can be found in Appendix C – Broadband Basics.



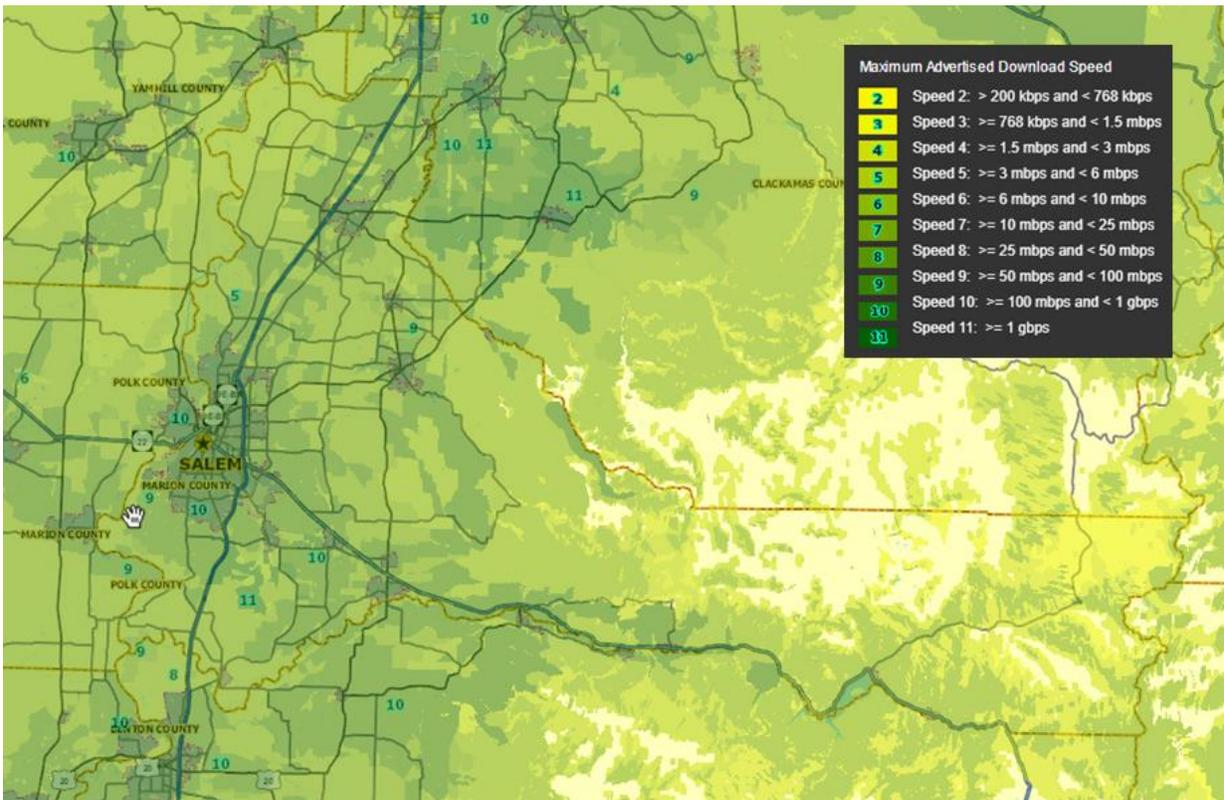
- ninety percent (90%) of services are less than the 100 Mbps download

Figure 2 below depicts broadband penetration in Marion County as reported by the Oregon Interactive Broadband Map <https://broadband.oregon.gov/StateMap/>.

Although the data is self-reported by service providers and may be inflated toward higher broadband availability, this map supports the online survey responses for connection type as shown in Figure 1 above. The service types, based on the bandwidth they can support, align with the breakdown of bandwidth availability by area.

In general, this data shows bandwidth in the County to be between 1.5 Mbps to 25 Mbps (indicative of DSL service). Greater bandwidth at 25 Mbps to 50 Mbps (indicative of short haul DSL or cable service) is available in urban and suburban areas in Salem/Keiser, Silverton and Woodburn/Gervais, as well as cities along North Santiam Highway (Hwy 22), Mill City and Stayton. Small pockets of 50 Mbps to 100 Mbps and 100 Mbps to 1 Gbps (indicative of cable or fiber-based solutions) can be found in a few areas, typically around urban centers and suburban areas in the southwest portion of the county, Mt Angel and Woodburn/Gervais.

Figure 2. Marion County Broadband Bandwidth Map



These speeds simply are not high enough to enable many functions needed for day-to-day household functions, much less for attracting key economic sectors. The County is in the unique position to address many of these issues by collaborating with



stakeholders to figure out how to close the gaps. ***Innovative approaches are required to get more, better broadband and maximize its benefits.*** There are three key reasons for this.

First, new approaches make it more practical to deploy network infrastructure in both remote rural and dense urban core areas with various levels of public involvement. Smart policies supplemented by small, targeted public investments can speed network construction and greatly reduce deployment costs. New generations of existing broadband technologies and innovative use of under-utilized resources for broadband will profoundly impact availability and costs. Many communities across the world have found creative solutions to deploy next-generation networks.

Second, it is clear that ***demand for connectivity will only increase due to new broadband applications and functions.*** This was apparent from the Willamette Valley to the Cascades mountains, in agriculture, manufacturing, and recreation. As sensors and the “Internet of Things” (IoT) are deployed in these areas, they will place new demands on infrastructure. Costs can easily soar out of control without capable technology leadership, both for local government and also for businesses and families. The very definition of governance is likely to change with broadband development, driven by cybersecurity, privacy, and social media concerns.

New applications and functions will enable Marion County to be more flexible, lean, and responsive. At the same time, they fulfill an expectation of these attributes: People want local government to be online and digitally accessible because they’ve become accustomed to accessing such service easily, conveniently, and effectively through the internet. Marion County’s cities and anchor institutions are feeling the same pressures and are struggling to find and deploy effective systems without wrecking their budgets. In much the same way as the County might facilitate broadband development, it can generate huge value by helping stakeholders evaluate, implement, and adopt strategies and policies that meet these needs and work toward addressing larger community issues. The County should look to be more of a partner than a regulator when it comes to the deployment of future broadband.

Third, ***innovation itself is a basic goal and core strategy in today’s economy.*** This third reason may be the most important, and must be addressed if broadband is to be truly beneficial. The challenge for Marion County is to strengthen its traditional economic base—agriculture, public services, precision manufacturing, recreation, and tourism—with technology while helping residents upgrade their skills, digital and otherwise, to meet new demands. If local businesses and residents are not prepared, lack of adequate broadband may prove to be a huge vacuum sucking capital out of the local economy.

Innovation creates wealth, and inclusive innovation creates broad-based wealth in a community. Connectivity is critical not just for today’s innovators—most simply won’t live where broadband is not available—but also for those who have the potential to *become*



innovators solving pressing issues in existing and future industries. Thus, widespread, affordable broadband is essential to development. The diversity of Marion County's economy and geography becomes valuable as local specialists or specialized assets are linked to each other to create synergy. For example, value-added processing can be linked with agriculture and forestry products, or urban Salem experiences combine with outdoor adventure in the NSRC for tourism. Such things are much more possible with the County's active involvement and pervasive, robust broadband.

Broadband development makes the most sense when it is explicitly aligned with community, economic, and workforce development. Technology is not the one and only solution to social ills, but it is essential to solving modern economic and social problems. Access to broadband enables new, more effective, and cheaper solutions to these age-old problems. Specifically for Marion County, broadband initiatives should be focused on addressing local issues, and meeting business, household, and internal needs (see "Summary of Issues and Needs," below for specifics).

The North Santiam River Canyon is a prime example and opportunity for broadband-enabled development. Environmental monitoring is essential for the health of the river, recreational uses, and water consumers. Digital technology makes this very practical, if there is connectivity. Inclusive economic development and growth, whether from forestry products, recreation, or support industries, benefits from environmental data and has additional connectivity requirements. Infrastructure improvements in the area such as a sewer system will drive additional technology requirements and can be leveraged to economically deploy network infrastructure.

Infrastructure improvements in the NSRC could unlock the potential for real estate development. Broadband can be used by existing businesses and residents to prepare for and benefit from private development investments. Natural resource management, power production, public safety, and recreation are inter-dependent activities in the Canyon. All benefit from connectivity, and connectivity enables them to more effectively capitalize on, complement, and contribute to each other for development and operations. Similar opportunities are evident in other areas of the County, particularly in areas between cities.

A key opportunity for the County exists in the facilitation of a profound new form of workforce development that feeds into its overall goals for economic development. ***By fostering gains in knowledge and improvements in skills, the local public sector could promote new business opportunities while increasing capacity to meet residents' critical needs.*** Marion County should identify common interests and complementary needs at a household and even individual level—and at the start-up or micro-enterprise level—and translate those into larger-scale opportunities. For Marion County, agriculture, recreation, agri-tourism and manufacturing are all strengths the County should capitalize on for economic development. Access to broadband is a required utility needed to expand these growing industries and to place Marion County at the forefront of innovation in these sectors.



Table 1. Range of County Roles for Broadband Development

	County Role			
	Traditional	User	Catalyst	Provider
Broadband Investment	None	Limited; inter-building	County-wide middle-mile backbone	County-wide carrier-class network
General Activity	Regulate development	Drive development (as a consumer)	Coordinate, facilitate, support development	Develop public broadband service
Goals	None; maintain status quo	Bandwidth and connectivity for internal purposes	Tech-enabled development and improvement	Universal broadband access
Key Documents	Broadband-friendly policies	County and departmental strategic plan	Network vision and stakeholder requirements	Broadband business plan
Key Stakeholders	Builders, providers, and utilities	Department leaders, internal users	Community anchors	Business and residential customers

Marion County can play a key role in the availability, impact, and use of broadband. The fundamental role of local government is to facilitate activities, development, and services, including generating public revenue and providing public services, to meet residents’ needs. All aspects of this are likely to be profoundly impacted by technology. County governments have the opportunity to create additional value by working for, through, and with their municipalities and regional/state institutions; they are in the position to be connectors. Options for Marion County in this context, summarized in Table 1, run from doing nothing to actively investing in broadband infrastructure or even becoming a broadband provider. **Magellan Advisors recommends a balanced approach in which the County acts as a catalyst for private infrastructure investment with smart policies and consistent, incremental, targeted public investment toward a broad, practical vision.**

There is no single right answer for Marion County, and each target community might require a different approach depending on its unique needs and capabilities. Generally, ownership and control of the assets gives local governments tools to work on a variety issues, from economic development to environmental sustainability. This Broadband Strategic Plan recommends Marion County make incremental investments in public broadband assets and partner with telecommunications and utility companies to use those assets for deploying broadband.



Recommendations

Magellan Advisors recommends that the County step into a role to help with funding, coordinate interested parties, and make County assets available for use in providing broadband services. There are four general areas and approaches we recommend for this. First, a **“Smart Canyon”** vision for the North Santiam River area would leverage planned water/wastewater projects to expand broadband and related infrastructure for resource management, outdoor recreation, and innovation in traditional industry. Second, **“Smart Agriculture”** in rural areas of the Willamette Valley would combine grassroots DIY efforts with County-led innovation-based economic development. Third, the County should **partner with small cities** to create policy that supports broadband infrastructure. Each of these three strategies can stand alone; in the long-term, they can also feed into a fourth approach, by which the County can play a **supporting role in development of a county-wide backbone network**.

Priority 1: NSRC “Smart Canyon”

Marion County, NSRC-area municipalities, the State of Oregon—including multiple state agencies: DEQ, DOT, Highway Patrol, Parks and Recreation, and others—and Federal government agencies can get much better connectivity, while enabling new economic development in the area. They simply have to work together to deploy advanced network infrastructure in conjunction with other infrastructure projects, specifically a new sewer/wastewater system for the Canyon and water flow improvements to the dams. This is a prime opportunity that should be seized by the County. Starting with the requirements and vision for a “Smart Canyon” described in this report, Marion County should engage leading technologists to create a comprehensive system with enough detail to determine network infrastructure requirements. These requirements should be incorporated into as many area projects as possible.

Priority 2: County-Wide “Smart Farm”

County-wide support for local, grassroots, DIY, community-based efforts around technology applications in agriculture is smart in several ways. First, it addresses a major economic development goal/opportunity, and serves the interests of the region’s key basic industries: agriculture and tech. Second, it empowers businesses and residents to literally take ownership of their network access. The County is essentially the conduit for citizens to act, in this case laying down literal conduit (and fiber). This opportunity is not as well defined or immediate as the “Smart Canyon” initiative, but could have broader geographic impact. Ideally, the two initiatives benefit each other, with lessons learned in the canyon informing the agriculture initiative, and vice-versa.

Priority 3: Assist Small Cities Such as Silverton and Jefferson with Policy Initiatives

Marion County has the opportunity to fulfill a leadership role in supporting local broadband initiatives among its communities. The County and its partners—business associations, cities, community anchor institutions, public agencies—should develop



governance that links broadband development to broader development goals and priorities.

The various approaches and technologies will need to be evaluated and tailored to local circumstances. Stakeholders in Silverton, Jefferson, and other cities stated the desire to more actively promote broadband, and possibly even build their own networks. By collaborating, the cities and County can better learn what works and develop tailored solutions to meet municipal needs and local broadband demand, leading rather than waiting on the private providers. This Plan may be useful to cities and sharing it could provide the starting point for such collaboration. The County's primary role may be simply facilitating a planning and policy-making process, or could be as large as working with the cities to establish a non-profit network to serve high-cost areas.

Priority 4: Marion County Backbone Network

Magellan Advisors recommends the County incrementally develop a publicly owned middle-mile network, primarily to interconnect County facilities, community anchors, and other strategic sites to each other and private service providers. County technology investment is necessary and should be both comprehensive and coordinated. Strategic partnerships with industry are essential.

We are not suggesting that Marion County provide last mile services everywhere in the County, but to create a vision and roadmap that will provide for middle mile fiber to service the County's operational needs (police, fire, connecting County facilities, future IoT) and to help provide broadband middle mile into hard to reach or high cost locations.

The County should seek funding in partnership with private providers and state and federal agencies, working collaboratively to make privately-offered service economically feasible throughout region. The County should also work to aggregate and foster demand among its traditional partners, particularly cities, law enforcement, and parks, to drive private investment. The proposed North Santiam Region Canyon water infrastructure project is an example of how collaboration between the public and private sectors can best address a difficult issue.

A long-term initiative, the primary rationale for a county-wide backbone is to improve local government operations and reduce long-term costs to taxpayers. Of course, this implies that local governments will upgrade their operations and systems to take advantage of the network. A great deal of work will need to be done toward this end, which the County might coordinate or actually do for the cities.

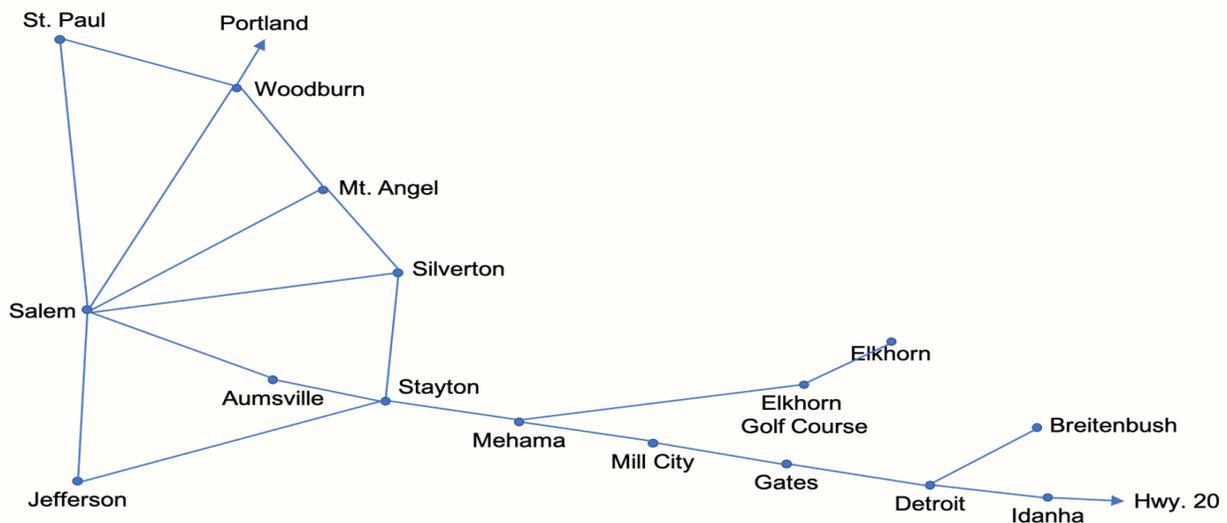
Secondary goals are to attract/direct private investment, support tech-enabled economic development, and possibly generate revenue by leasing network assets. In the nearer term, this initiative provides an end-point for planning efforts. The County must organize to achieve these goals by assigning responsibility for engaging stakeholders and establishing procedures, as appropriate. Portions of the backbone will be built whenever other infrastructure—road, sewer, water, etc.—work is done, which requires coordination across multiple departments, who should be involved as network users



(Public Works has numerous network requirements of its own, for example) as well as construction partners.

The county-wide backbone network is embedded in and supports the other initiatives. The “Smart Canyon” initiative would build a major section of the network, and “Smart Farm” would build various, specific sections of the backbone, while local broadband-friendly policies can reduce costs and resources through collaboration. Backbone network routes should be planned to pass the maximum number of city and community anchor sites and pass through “Smart Farm” areas, then prioritized based on (a) available funding and/or stakeholders’ willingness to invest, (b) other infrastructure projects that can be leveraged for broadband development, and (c) other County priorities (to win a particular industry prospect, for example).

Figure 3. Marion County Backbone Network Interconnecting All County, City, and Community Anchor Institution Sites



The County has a variety of options for funding this plan, and should explore each of those. Marion County should work to offset network construction costs with savings on telecommunications services, and generate revenue by leasing excess network capacity (conduit, fiber, and other vertical assets) to providers and other parties. In addition to the County implementing its own Dig Once, Joint Trench, and similar policies to reduce the cost of network infrastructure, it should encourage and support these in cities such as Silverton and Jefferson. The cost of building fiber networks in an urban areas are approximately \$50 - \$140 per foot; joint trenching or placing conduit into existing construction projects can reduce costs by over 80%.

The County should seek grants for broadband development and incorporate broadband into other capital improvements (the NSRC sewer project, in particular), including those



offered by the Federal Communications Commission (FCC) and the United States Department of Agriculture (USDA). Funding opportunities such as the current \$600 million Reconnect program sponsored by the Rural Utilities Service (RUS) of the USDA are ideal opportunities for Marion County to partner with the industry to benefit the community. Details about the Reconnect program can be found in Appendix A of this Plan, as well as in Exhibit B.

Methodology

Over a six-month period beginning in November of 2017, Magellan Advisors worked with Marion County’s team assess the needs, capabilities, projections, and plans for broadband throughout the County’s communities. Using a proven process that has been successful in communities around the country, Magellan’s team engaged with stakeholders including residents, businesses, service providers, utilities, and the County’s internal team to gain an understanding of struggles with internet connectivity and to develop a strategy that would allow the community’s broadband vision to come to fruition.

Figure 4. Broadband Analysis and Strategic Plan Process



In April of 2018, Magellan’s team conducted five (5) discussion sessions with area stakeholders within Marion County. Two (2) of these were attended by persons from outside the North Santiam River Canyon (NSRC) area while the other three (3) focused on groups specific to the NSRC. Stakeholder groups included cities, business and industry, and education. Jefferson, Kaiser, Salem, and Silverton were the most engaged cities and agriculture was the most represented sector among businesses. Silver Falls School District participated heavily, as did the Willamette Education Services District, and Chemeketa Community College. A wider range of stakeholders, including the local school superintendent, were engaged in discussions focused on the NSRC area. The Army Corps of Engineers, fabrication and forestry products industries, the Forestry Service, and vacation rental property managers are key economic stakeholders were not able to participate.

In addition to the sessions, Magellan Advisors surveyed households and organizations in a broad, county-wide survey. The Marion County Broadband Survey of households and organizations had a total of 871 responses, 550 of which were complete. Most of these (96%) were households. There was no sampling or selection process for



respondents, so the results cannot confidently be said to represent the population. Instead, it provides an insight on the demand of and supply to key demographics.

Respondents shared information about their internet needs and services, business and household characteristics, and a variety of factors related to technology utilization. Most responses were from households, about two-thirds of which were complete⁴. Our team also conducted conversations among the County’s internal team, regional partners, incumbent internet service providers (ISPs), and utilities in the County.

The conversations and survey responses were then weighed against Marion County’s current infrastructure and planned projects to assess how unmet needs might be addressed. Thus, the recommendations contained in this Plan represent how community needs, the current market, future demand, and Marion County’s unique situation as a mixed urban-rural area converge to create opportunities for better broadband.

The Marion County Broadband Road Map

To move from the current situation of inconsistent and generally low-performing broadband services, Marion County should invest incrementally in a methodical manner and in partnership with citizens, community anchors, and private providers. The general next steps are to get organized and build support among stakeholders. Getting organized means assigning responsibilities for broadband development activities to internal County personnel, and engaging external stakeholders on a Broadband Task Force. The Task Force will serve as the foundation for support-building activities.

Generally, the County should focus on higher-impact/lower-cost initiatives first, and use broadband policies such as dig-once and joint trench to reduce buildout cost. Infrastructure projects, such as the planned sewer/wastewater system in the NSRC area, will be key building the infrastructure economically. Each initiative or project is likely to include network applications (automation, communications, monitoring, etc.), so stakeholders should be engaged as consumers/network users as well as collaborators. An overarching goal should be to aggregate demand to attract private investment. The County should organize to add conduit—and possibly fiber-optic cable and vertical assets such as poles—anywhere the right-of-way is disturbed along network routes or in targeted areas. This means establishing a system to track the ownership and utilization of these assets, as well as simply paying for them.

Regardless of whether a county-wide network ultimately results from this buildout, governance of the buildout activities is essential to keep on track and them aligned with County goals and priorities. This Broadband Strategic Plan is a framework for broadband governance in the context of IT governance and eGovernance (using

⁴ Surveys were categorized as “complete” if the respondent got all of the way through the survey and clicked “Submit.”



technology to open up government to and involve citizens). This Plan not only provides incremental fiber buildout tactics, it also provides educational tools for Marion County's stakeholders to learn and make sound decisions about broadband, telecommunications, and technology strategy.

These initiatives allow the County to concentrate on specific projects while driving implementation of the recommendations of this Report. These projects are integral to Marion County's future economic development and will require partnerships among the County and public and private agencies. This approach combines direct public investment to meet local government requirements with local public and private investment incentivizing the private sector to serve the areas with broadband.

Marion County Broadband Action Plan

1. Develop internal capacity and engage external stakeholders
 - Prioritize broadband fiber deployment as a County strategy (potentially combine County needs into deployment plans)
 - Choose initial projects for focus to experiment with what works (North Santiam River Canyon, Agricultural Corridor, Silverton and Jefferson) This may even be rural or agricultural co-ops of people building do-it-yourself (DIY) networks.
 - Assign or acquire staff to facilitate broadband strategic plan for County across departments (governance structure)
 - Establish a Broadband Task force comprised of internal and external stakeholder representatives for "Smart Canyon" and "Smart Farm" initiatives, as well as broadband and tech sector companies
 - Create long term buildout plan and budget cost estimates with contractor with in Phase II (middle mile business plan) Timed to coincide with planned county and city investments in infrastructure
 - Identify public assets that can be used for broadband deployment
 - Seek out funding and creative opportunities to get fiber in the ground (grants, CIPs, partnerships with state and federal governments)
2. Make County policy changes along-side providers that are shareable
 - Extend offer to help localities use policy
 - Create and provide engineering standards for fiber-based infrastructure
 - Dig Once and Joint Trenching rules and guidelines to improve costs
 - Address rights of ways delays (ODOT and railways noted)
 - All new developments require fiber broadband access and all processes and planning should incorporate broadband considerations
3. Seek private partners to co-invest
 - Produce requests for information (RFIs) based on this plan and Broadband Task Force guidance.
 - Add County owned fiber and other assets to all projects



4. Aggregate demand through middle-mile fiber development
 - Engage with anchor institutions and customers to aggregate market
 - Partner with private providers to build and use to deploy last-mile connections

Why Now for Marion County?

Marion County should take action on this Plan now for several reasons:

- ***The current status quo is not good enough***— technology is advancing rapidly and the County’s residents and businesses need to keep up. The result of inaction is likely to be a continued impact of being left behind, already evident throughout the community. Not doing anything will yield the same issues the County is already grappling with today.
- ***Political will is evident at all levels of government and*** there are multiple ***funding options***. Broadband initiatives are being undertaken across the country and within Oregon itself, exemplifying that such endeavors are not only possible, but are sound investments for the futures of communities. The County should act upon the current environment of political will and funding opportunities now, while they are readily available.
- ***Broadband development aligns with—indeed, is a critical enabler of—Marion County’s economic development goals and strategic plans.*** Marion County is already seeking to build organizational capacity through collaboration between departments; adding a countywide broadband initiative to such processes as permitting will allow the County to further strengthen this collaboration. Strategic use of land is also among the County’s strategies, including building strategic infrastructure, which is precisely the goal of the incremental, opportunistic approach described in this Plan. Business opportunities, natural resource innovation, and fostering a great place to live are other County goals that will be the beneficiaries of this Plan, which seeks to attract and enable economic development, eco-tourism, and new residents seeking excellent quality of life and quality of work.
- ***Time-sensitive near-term opportunities are available to be capitalized upon now.*** The capacity of incremental, opportunistic strategies such as this one are only as effective as the timeframe in which they are allowed to unfold. An earlier start means more opportunity, and projects such as the water/wastewater infrastructure expansion are current, readily available means to jumpstart this action plan.



Marion County's Economic Overview

Marion County has two distinct geographic and economic areas: the North Santiam River Canyon and Cascade Range mountains to the east and the Willamette Valley to the west. The eastern half of the County largely consists of federal lands with several small towns—some of which are partially in Linn County, to the south of Marion—along the North Santiam River and State Highway 22 and has a population of about 6,000. The western half of the County is primarily farm land along with multiple small cities and towns. It is where the bulk of the county's approximately 330,000 residents live. The City of Salem (pop. 154,000), the county seat and state capital, is on the far western edge of the County, along the east side of the Willamette River.

Western Marion County

The Willamette River Valley is a highly productive agricultural area. Salem's geographic location and governmental activities—and the fact that it is smaller and more accessible than the state's major metros—make it a great location for commercial activities. It has a diverse economic base, but over half of all employees (over 75,000 of more than 140,000 in 2016) are in four sectors:

- Educational services, and health care and social assistance
- Retail trade
- Manufacturing
- Professional, scientific, and management, and administrative and waste management services

Arts, entertainment, and recreation, accommodation and food services, construction, and public administration accounted for another 25% of the jobs.

As shown in Table 2, retail trade and health care and social services had the largest presence in the local economy overall, followed by accommodation and food services, and then by manufacturing. Management of companies and enterprises had the highest per employee payroll (over \$60,000 per year), followed by finance and insurance. Accommodation and food services, arts, entertainment, and recreation, educational services, and retail trade and were the lowest paying sectors. Accommodation and food services had the largest establishments, while retail and manufacturing had the smallest.

While culturally important, agriculture accounted for less than 6% of jobs in 2016. The value of agriculture products sold in 2012 was \$592,856,000, compared to revenue, sales, etc., of \$3,862,230,000 for retail sales, \$3,190,000,000 for wholesale sales, and \$2,540,329,000 for manufacturing. The economic impact of agriculture apparently came from value-added production (manufacturing), direct to consumer retail, and local "farm to table" wholesale rather than traditional agricultural product commodity sales.



Table 2. Marion County Economic Sectors Superlatives (2015 County Business Patterns)

Economic Category	Top Four Sectors
Biggest payroll: Thousands of dollars per year	<ol style="list-style-type: none"> 1. Health care and social assistance: \$900,883 2. Retail trade: \$438,455 3. Manufacturing: \$414,099 4. Construction: \$371,986
Highest paying: Annual payroll per employee	<ol style="list-style-type: none"> 1. Management of companies and enterprises: \$60,946 2. Finance and insurance: \$56,112 3. Mining, quarrying, and oil and gas extraction: \$54,774 4. Construction: \$51,020
Lowest paying: Annual payroll per employee	<ol style="list-style-type: none"> 1. Accommodation and food services: \$16,368 2. Arts, entertainment, and recreation: \$18,324 3. Educational services: \$23,727 4. Retail trade: \$26,456
Most employees: Total employment	<ol style="list-style-type: none"> 1. Health care and social assistance: 18,444 2. Retail trade: 16,573 3. Accommodation and food services: 10,945 4. Manufacturing: 10,306
Most locations: Total establishments	<ol style="list-style-type: none"> 1. Retail trade: 1,125 2. Construction: 1,027 3. Health care and social assistance: 1,014 4. Accommodation and food services: 690
Largest establishments: Employees per establishment	<ol style="list-style-type: none"> 1. Accommodation and food services: 34.4 2. Finance and insurance: 29.1 3. Wholesale trade: 24.0 4. Health care and social assistance: 22.4
Smallest establishments: Employees per establishment	<ol style="list-style-type: none"> 1. Retail trade: 4.7 2. Manufacturing: 5.5 3. Arts, entertainment, and recreation: 6.6 4. Real estate and rental and leasing: 7.1

Eastern Marion County

The eastern portion of the County—particularly the North Santiam River Canyon (NSRC) area along the southeastern county line—was negatively impacted by the decline of the timber industry around the turn of the century. The area retains some of that industry and has a range of outdoor recreation and tourism-related economic activities, but still suffers from lack of jobs and related social ills. While the area has some available commercial and light industrial sites, development of these sites is constrained by lack of sewer. To make matters worse, the Army Corps of Engineers has announced plans to draw down Detroit Lake, a major reservoir on the river, for maintenance, meaning that recreational activities and wastewater treatment will be impeded for several years. On the positive side, there are plans—still tentative—to build a sewer system for the NSRC and for several recreational enhancements, and arts and cultural activities are starting to emerge in the area.



A recent economic analysis of the NSRC area estimated that improved sewer and water infrastructure could generate an additional 335 jobs.⁵ These would be concentrated in the western portion of the area—in Lyons/Mehama or Mill City—within easy commuting and day-trip distance. This study found 30 developable commercial and industrial properties in the area, totaling less than 34 acres: There simply is not much room for economic activities. A 2014 study by COG⁶ estimated the area required nearly \$53 million investment in infrastructure and services (4% for broadband), and about \$17 million for community development (primarily schools). Analysis of nearby communities suggest broadband could result in over 20% more high-paying jobs and stronger overall job growth.⁷

The NSRC economy is dominated by logging and wood-related manufacturing activities, most of which are actually in Linn County.⁸ The area's highest paid jobs are in this industry. Marion County has the bulk of the health and social services in the area, as well as retail. Wages for arts, entertainment & recreation in the area are relatively high. NSRC has higher median household income (\$57,243) than either Marion County or the nation as a whole, despite having a *lower* percentage of households earning over \$100,000 annually and substantially lower average (mean) income than the nation. This reflects the solidly middle-class nature of the timber industry worker households, with the large majority earning relatively good wages, but few among the highly affluent. Marion County and the NSRC have a smaller share of residents holding bachelor's degrees or above, versus the US overall. Note, however, that this discrepancy becomes less pronounced when comparing the percentage of residents who have attended at least some college. Median incomes and educational attainment are higher for areas outside the canyon's towns, versus within.

Strategic Plan and Core Values

Despite the many challenges that Marion County has faced over the last decades, its population and organization have remained resilient. To overcome these issues, several key initiatives, including this Plan, have been created to promote economic development and encourage growth in the area. These strategic plans are fundamentally in alignment with Marion County's Core Values, and follow a framework that focuses on strategic collaboration, fostering innovation and creativity, supporting the County's historic industries such as agriculture, and ensuring that all parts of the rural County have equal access to the infrastructure necessary to support livable, sustainable communities that embrace the natural beauty of the landscape while enabling modern conveniences.

5 Maul Foster Alongi (MFA). North Santiam Canyon Regional Land Inventory. Marion County and Business Oregon. 2016.

6 Mid-Willamette Valley Council of Governments. *North Santiam Canyon Economic Opportunity Study*. December, 2014.

7 Leland Consulting Group. *Marion County/NSRC Broadband Analysis* (draft). 2017.

8 *ibid*. Portions of this paragraph are drawn directly from this source.



Broadband Trends Affecting Marion County

Broadband as a Utility

High-speed internet services are no longer considered simply a convenience; rather, they have moved into the role of a new utility. Communities such as Marion County invest in and manage community support infrastructure across many diverse sets of capital investments. While roads, fire protection, and basic utilities are a given in day to day community planning, today’s use of digital roads (i.e., high-speed internet) has given rise to internet access being viewed as a “fourth utility.” Governments and community leaders have stepped up to ensure equitable access to those services just as water, sewer, gas and electric services have regularly been assimilated into governments when private sector providers have fallen short or are simply unable to provide an acceptable level of service.

Broadband is critical to the evolution of communities in the 21st century, and are the key to an immersive, innovative workforce environment and economic success. Broadband enables every aspect of a smart, connected community. In rural areas such as Marion, high-speed connectivity allows citizens to connect to the abundance of resources provided by the internet and its of apps, data sets, and knowledge. For residents in such rural environments, teleworking, telehealth, and other remote-oriented services can drastically improve the life of citizens by bringing services directly into their homes.

During focus groups conducted by Magellan in the fall of 2017, we found a widespread view among stakeholders within Marion County that broadband internet access has become so important to everyday life that it is a utility. Broadband is very much a necessity in the lives of the County’s residents. For instance, health insurance companies require individuals to sign up for coverage under the Affordable Care Act online and businesses can expand their customer bases by offering products and services to customers around the world. A clear need for broadband as a utility was expressed by many participants.

“I have never understood why broadband is not a basic utility”

-Focus Group Participant

“Everything in life is moving in that direction, if it’s not there already”

-Focus Group Participant (speaking about internet-enabled technology)

Housing demand and changing demographics present interesting opportunities for technology applications. On one hand there are **numerous applications related to home operations and lifestyle and healthcare support that enable people to stay in their homes longer**. Similar technologies allow them to remain productive, socially



connected, and in the workforce, if they choose. Remote interaction and work can flow both into and out of the home. Many services can be delivered electronically, others can be coordinated better, and many complement each other. Consider telemedicine: Both the patient and provider can work from home, automated monitoring can identify health issues before they arise, and smart transportation can get provider and patient to medical facilities flexibly and quickly.

On the other hand, ***new technologies are enabling new ways of building and living.*** The scale of domestic space has decreased with technology, and “third spaces”—neither home nor work, shared with others—are increasingly important. Interconnections between rural and urban spaces can be transformed via digital technologies, as can suburban neighborhoods. ***The overall challenge is keeping people and products within the area while moving them in an efficient and timely manner.*** Densification and human scale development go hand-in-hand, and both can be done better via technology. Digital technologies have impact across the scale from regional planning, to design and construction of buildings, to how people access and use spaces. Innovations in space utilization are most likely in relatively wealthy areas with high density and housing demand.

Agriculture and service sectors, particularly health services, may be prime candidates for automation, especially smaller scale and growing enterprises. For agriculture, this will likely take the form of the “internet of things,” (IoT) numerous sensors and servomechanisms connected into a control and monitoring system. Automation in health services is more likely to be interpersonal, replacing trips to the offices and even offices themselves, although smart devices with sensors will likely play a significant role in health and wellness.

Culture and hospitality-related industries have similar opportunities, except embedded in particular facilities and places. ***These sectors will need connectivity literally out in the field, so pervasive broadband is important.*** Wireless seems like an ideal medium due to the mobile and remote nature of applications. Data analysis and management is likely to be an issue for agriculture, where health services are likely more concerned with social media functionality. Automation in agriculture and health services will spill-over to affect housing issues, too: access and environmental controls, safety and security monitoring, smart appliances, etc.

This section of the Plan will report further on broadband’s implications in providing government services, economic development, and overall quality of life for Marion County’s residents and businesses.

Critical Infrastructure

Broadband is not only an essential utility; it is also critical infrastructure. Community and government organizations must be able to communicate during times of natural disasters and emergencies. For decades, local governments have depended on local government-owned and operated tower-based radio communications systems for public



safety. Today’s internet protocol (IP) enabled systems depend on high-speed connectivity and “fiber to the tower” is the preferred transport mechanism. Broadband now powers electrical systems and is the basis for tomorrow’s smart grid applications.

While a provider’s damaged networks can be detrimental during times of disaster, local government has the ability to deploy these networks underground, in a more protected fashion, as it utilizes smart broadband friendly public policy to expand its network. Marion County can take a long-term planned approach to expanding this vital infrastructure, designing and building it so that it is suited to Marion’s needs to ensure that communications are enabled in critical times.

Innovations through Municipal Fiber Networks

As communities invest in fiber infrastructure, they empower their residents and businesses to take on a multitude of technology-based initiatives. These initiatives can include expanded broadband services, collaboration opportunities, public safety applications, as well as energy and utility management functions and features.

Broadband Services

- Public Wi-Fi
- Common Internet backbone for all anchors
- City and County
- Schools and libraries
- Hospitals and clinics
- Public Safety
- Community Support
- Interconnection with service providers
- Internet of Things



IT Collaboration

- E-Government applications
- Bulk Internet purchasing
- Application sharing
- Disaster recovery
- EOC communications

Public Safety Applications

- Video monitoring
- First responder support
- Collaboration with state and federal agencies
- FirstNET preparedness

Future Energy and Utility Management

- Smart Grid and Demand Response



- Automated Meter Reading
- Advanced Metering Infrastructure
- SCADA communications and control

Other examples of applications include:

- Health wearables for livestock
 - Provide for early treatment before diseases get passed between the herd
 - Decrease use of antibiotics, reducing cost, increasing quality
- Product quality reporting/yields
- Increased use of sensors, including ground sensors for moisture to trigger irrigation when needed and optimal.

Economic Development

It is apparent that technology has become embedded into our economy and culture. From smartphones to social media, digital currency to smart infrastructure, our lives, on both an individual and a mass scale, have become inseparable from the devices and information that ensure a constant connection to those around us. Naturally, our economy has followed suit: virtualization has allowed for dynamic changes in the ways that we conduct business across every sector. With improved collaboration, open source information, expansive globalism, crowd-sourcing, and a proliferation of start-up entrepreneurship, we find ourselves in a technology-based economy.

Inventory tracking for major retailers, digital platforms for major publications, and even livestock health monitoring for agriculture are just a few examples of the ways that this new economy is becoming digitized. Governments are no exception; in fact, with the coming of Fifth Generation (“5G”) technologies, municipalities large and small find themselves at the center of enabling changes in how people live, work, and play. As these changes play out, governments will be key players in ensuring the safety, efficacy, equality, and sustainability involved in these digital interactions. The actions, plans, and decisions made will have lasting effects on the economic, social, and ergonomic futures of regions around the globe.

Attracting new businesses while enabling those that are already present in Marion County is the focal point of many of the County’s economic development strategies. Ensuring that businesses have access to broadband is vital to these efforts. From supporting the area’s historic agricultural sector to creating new markets for tourist-based industries such as restaurants, connectivity is key. Smart Agriculture and concepts like telecommuting allow residents and businesses to participate in the global economy while enjoying Marion County’s unique lifestyle and scenery.

Differentiation

In a global economy, targeting specific markets by differentiating products and services from those offered by competitors is a key to success. Differentiation is especially important and practical for small but growing enterprises, of which there are many in



Marion County. A simple example application is content creation, focused on current products and services. Product-oriented content provides value to audience members (customers) while promoting a brand, and it generates useful data from readers and viewers. Such tactics require minimal resources: Tweaking service information to “test” new markets, targeting based on interests and preferences, or simply reaching expanded geographic markets via social media advertising.

These tactics all require good data to guide marketing and messaging. Agriculture might focus on high-end restaurants, “localvores⁹,” or niche food product manufacturing. Services can focus in on specific clients and build on those relationships to generate additional business. Accommodation, arts, entertainment, food, and recreation are prime examples of sectors that are ripe for these applications. Manufacturers, who almost have to be in one or more supply chain, can differentiate in terms of quality and responsiveness via technology, while methodically seeking new ways to use their capabilities—all electronically.

Ag Technology

Technology is changing the agricultural business in many ways. Modern technology allows farmers to produce better crops with better yields at a more affordable price. Many crop farmers are using autonomous combines, harvesters and other farm equipment to help save on the labor and associated costs of farming. Tractors with GPS navigation can be programmed for more accurate harvesting routes and can work at any time of the day or night, 24 hours a day. Sensors track fuel and oil levels, electrical issues and other maintenance concerns with the equipment and remotely alert the owner or mechanics of potential issues, often before they become issues. Sensors are also used within grain bins to help determine grain levels in real-time that are then tied to current market prices allowing the farmer to have accurate awareness of the value of current supplies. Farmers are using fixed sensors, placed in the ground, to monitor and control soil samples including nutrient content for the desired crop, moisture content and to adjust the watering schedule accordingly, mold or other issues as well as soil erosion and water availability issues.

Intelligent farming equipment can be used to spread water, pesticides and fertilizer only where it is needed, rather than a wasteful blanket of product. This not only increases the efficiencies, and lowers the costs for the farmer, but also helps to protect our environment, by applying more precise, usually less amounts of chemicals, and other supporting materials.

Wineries, which are very prevalent in Marion County, are using sensors and technology to test their crops to determine the most appropriate time to harvest, recording the yields of each crop and the long-term history of each type of grape, and the resultant product with its desirability in the market. Efficient automated machines/robots are now

⁹ “Localvore” refers emerging trends that encourage consumption of food grown locally, or “slow food” movements.



being employed in vine and orchard harvesting as well. Robots with sensors determine when crops are ready to be picked, harvest them and then load into bins to final processing in preparation for distribution to the retail, foodservice and remanufactures.

Ranchers are using drones to locate and track their livestock when feeding over large areas. Traditionally, ranchers would need to physically monitor their livestock periodically, which can be difficult and time consuming, especially in inclement weather, but now they are using GPS sensors located on the livestock that drones can then use to locate, video, and report back conditions. Many are experimenting with drones as a vehicle used in the actual herding of animals to their desired locations.

Drones are also being used to collect crop information with specialized sensors looking for soil conditions, erosion, moisture content, pests and disease. Once collected, this information is entered into software applications that assist in determining the best remedies to maximize field or orchard yields.



Technology is changing the face of agriculture. It is transforming the industry into a more efficient, profitable operation and with better products, to help feed the billions of people that are accustomed to cheap and plentiful products of the 21st century, not only in the US, but around the world. The US is the top producer of agricultural products and services in the world and the application of technology will help ensure we continue to provide the best products available anywhere.

Precision Agriculture

Precision Ag, Smart Farm, Farming 4.0, all refer to roughly the same thing – the ability of science and technology to assist farmers and producers with increased profitability, efficiency and sustainability, all while doing a better job at protecting the environment.

While precision agriculture principles have been around for more than 25 years, it's only been over the past decade that they have become mainstream due to technological advancements and the adoption of other, broader technologies.



Precision Ag, or Smart Farming, support all disciplines of our food production including



farming, ranching, dairy, aquaculture, row crops, field crops and orchards. Precision Farming is about managing variations in the field more accurately to grow more food using less resources and reducing the cost of production. Today, we are seeing a new farming evolution that is triggered by the adoption of new technology targeted specifically towards the agriculture industry including satellites, higher precision GPS, smart sensors, drones, and a whole host of other Internet of Things (IoT) devices and applications.

While precision agriculture – the use of satellite navigation, remote sensing and other tools to farm each square meter as efficiently and sustainably as possible – has been an evolving reality for some time, it has now reached a point where it is not only possible to collect vast quantities of data, but also to use quite inexpensive, small processors to make use of this information to control different pieces of equipment or monitor individual animals.

Livestock farmers, using modern information technology, can now record numerous attributes of each animal, such as pedigree, age, reproduction, growth, health, feed conversion, and meat quality. The goal of precision livestock farming is to provide a mixture or ration that satisfies the animal's requirements at the lowest possible cost.

For many years farmers, ranchers and other producers have struggled to develop the “right” formulas for getting the best yields from their crops. Complex variables such as weather, soil moisture and nutrient levels, weeds, pests and diseases interact and create a mix of difficult to capture and even more difficult to address solutions. Smart farming allows the producer to collect the variables accurately and efficiently, and then using technology, it can help the producer process the matrix for appropriate solutions.

In Marion County, Coho and Steelhead Smoltes from the Dry Creek hatchery are PIT tagged with hatch date, location of release, species, and fish ID # which can be read by remote sensing devices. Fish can be tracked from Dry Creek, through the Russian River to the Pacific and the success rate can be measured by adult fish returning to Dry Creek several years later to spawn.

Rural Farming/Dairy Technologies

Dairy farming is a labor intensive, exhausting and an un-relenting business. There are no days off and no holidays, and labor costs are very high. Technology is working to help reduce the labor costs and human time needed to process dairy products and increase productivity of the cows themselves while providing a better yield in terms of product and financial considerations.

Dairyman are using sensors, located on or within the cow (wearables – think Cow FitBit™) to assist them in tracking the location of the cow, how often it has been milked, what the cow's yield is, the quality of the milk produced by each specific cow, and what the general health is of the cow so that issues can be detected before they become serious and costly.



Technology also allows the cow to determine when it wants to be milked and then “guides” the cows to the proper locations via automated gates and into the milking facility. Once there, automated machines clean and prep the cow, then attach to start the milking process – no human labor required. Once milking is completed, the yields and history are recorded, and quality is assessed and reported. If quality is suspect, an action plan

is developed for not only the specific cow, but for the herd in general and includes recommendations for different grain mixtures (which can then be automatically mixed from different bins), supplements or other options are also provided.

On the dairy farm, technology plays a role in herd management including the opening and closing of gates via sensors, temperature mitigation plans, herd location and corralling, fertilizer management, video surveillance and real-time market pricing based on product on-hand. Herd pedigree information can also be tracked and recorded ensuring the most productive cows and bulls are used for reproductive purposes. Sensors within the cows can be used to report when cows are most apt to conceive and when they are in fact pregnant. Most breeding is done via artificial means, so timing is especially crucial and efficient.

Automation is changing the face of the dairy business. Broadband is the technology that makes this new paradigm viable. Without broadband, modern small dairy farmers will be at a distinct disadvantage from those that could capitalize on the labor saving, better yielding, farm programs.

The current dairy farmers in Marion County mentioned many of these trends in technology; however, most do not have the broadband capacity and speeds to be able to implement them at this time. Magellan has spoken with many farmers around the country that operate large organic, family-run dairy farms, some with over 750 head of cattle that get milked 2-3 times per day. Cows need to be milked every day, 2 or 3 times daily, 365 days a year. Some of these farms are fortunate to have broadband access, while many colleagues do not, putting them at a competitive disadvantage.

One farm, for example, uses a product called “Dairy Herd Improvement” (DHI), developed in Utah to help manage the health of the herd. The process requires a tester to come out periodically, test the milk and send samples to Utah for analysis. DHI then sends back the results so appropriate adjustments can be made as necessary either to the feed or health of the cow. The goal is to have the appropriate mix of fat, milk and vitamins that milk buyers demand. DHI also can help determine the best time to breed the cows. Most breeding is done via artificial means, so timing is especially crucial and efficient. Genome work is being done to help identify the best stud cows,



thus eliminating the trial/error/luck methods of the past. ***Dairy farmers such as this can benefit from such technology only if they have the broadband necessary for such applications to function as intended.***

Economic Forces Driving Smart Agriculture

Innovation has been part of agriculture essentially from its start because it made economic sense. The very act of sowing seed rather than eating it was a profound prehistoric innovation and investment. Innumerable innovations have improved agriculture over the ages, demonstrating resources can be reallocated to create abundance. Not only have we learned a great deal about how innovations impact agriculture, the sector actually demonstrates basic economic concepts and theories. Two core economic theories regard ***economic scale and scope*** and ***capital deepening***. Both theories are evident in agricultural history and likely to hold true with new, Smart Ag technologies.

Economies of scale occur when it makes sense to produce more because it doesn't cost more to do so. Some farming has strong economies of scale, grains and row crops for examples. All farming is fundamentally limited by space—productive capacity—and some farmers deal with this by producing a variety. Agricultural prices are impacted by markets, weather, and other factors. Economies of scale contribute to economic stability but are also more susceptible to systemic problems. ***Economies of scope*** allows farmers to hedge their bets by bringing a variety of products to market. New market opportunities emerge in small scale and fostered by economies of scope. Economic rents (profits) accrue to those who recognize these opportunities early and figure out how to scale them. This has been the key role of technology in agriculture to increase the amount of a valued product that can be delivered with only marginal increases in resources.

Technologies of scale include hydroponic systems that increase output per acre, mechanized pickers and sorters, and distribution and transportation systems. All of these build on past innovations with interconnected sensors and servos that monitor and control parts of the farm and integrate it into agricultural supply chains. Online systems that allow specialized farmers to connect with chefs, or that give them access to resources unique to their approach or product are prime examples of ***technologies of scope***. Consider how the craft brewing industry was facilitated by the web, and how that has fed into other craft industries. Technologies of scale and scope have an important economic side effect: They create new industries and occupations. Of course, their primary effect—industries to stay competitive and relevant so they don't decline and die—is pretty important in and of itself.

Technology brings economies of scale and scope together. Technology allows small producers to deliver like larger ones, and enables large producers to differentiate their products like smaller ones. Technologies of scope are available to big agricultural conglomerates, and technologies of scale are increasingly available to small family farms. Large enterprises face issues with technological lock-in (once an organization



adopt a scale technology, it's practically stuck with it) and inability to innovate, while small enterprises simply don't have the capital necessary to scale. Both generally solve these problems by tapping the new industries and occupations that emerge around new technologies.

The second economic concept that is evident in agriculture is **capital deepening**: Over time, capital replaces labor in competitive, efficient industries. Capital deepening means less labor is required per unit produced. It's what happens under the hood when enterprises scale. Digital technologies extend this to economies of scope by allowing producers to cultivate and tap into specialized markets in which small-scale products are highly valued. The new, digital technologies are essentially replicating the effects of earlier technologies—including counting and writing—that enabled farmers to move and sell their products. At the same time, labor, traditionally a huge factor in agriculture, dwindles. The extent to which agriculture can be totally automated is unknowable, and misses a critical attribute of capital: There are many different forms of capital, and they are complementary rather than mutually exclusive.

In agriculture, the **knowledge required to operate a farm has consistently increased** with decreases in labor requirements and increasing use of technology. Economists call knowledge “human capital” and refer to the ideas behind the technology as “intellectual capital.” The best technology enables and supports relationships, which are “social capital.” Indeed, the ability to find and implement new technology is human capital that depends on social capital. Numerous studies, starting with research into what led farmers to adopt improved varieties of corn, have demonstrated that advances in agriculture depend on farmers sharing knowledge and tools as well as helping each other with labor.

As one form of capital deepens other related forms of capital become more valuable, including natural capital as well as human, social, and good old financial capital. With farm automation, for example farmers can decrease use of water and labor but need technologists and training to implement it. The economic challenge, which is exacerbated by the reality that much of the capital inheres to individuals, is to align the various forms. Cultural, human, political, social, and even natural capital are fundamentally linked to certain people. When an industry shifts its capital base—or fails to and is overrun by competitors—all forms of capital, and the people who hold them, shifts with it.

People are directly impacted as capital replaces labor. If they are unable to capitalize on these changes—increasing the knowledge, skills, and social connections—in the process, they will be left with devalued labor and less earning potential. The simple answer is that agricultural workers must be consistently increasing their knowledge and skills, and consider moving into allied industries, particularly those providing or supporting new technologies. For smart agriculture, this means infrastructure initiatives should incorporate workforce development. People's capabilities need to be developed in parallel with technological systems to maximize positive



economic impacts.

Smart Ag Innovation in Marion County

The potential for Smart Ag in Marion County depends on another basic economic concept: **Comparative Advantage**. Economic advantage depends upon providers of products and services producing whatever they offer better than anyone else, while letting others specialize in their own areas of strength.

Geography sets the context for comparative advantage. Marion County's natural attributes give producers in the area a comparative advantage in agriculture. Technology impacts comparative advantage via interactions between industry, institutions, and government agencies. Regional innovation arises from these players changing roles to bring new ideas into being. We see this in agriculture as schools adopt localvore programs, or producers collaborate to share scarce resources. Government agencies are becoming data brokers to enable commerce and value-adding activities. A simple example is cities providing space (and Wi-Fi) for farmers' markets.

Ag and tech both depend on ecosystems. The latter can and should support the former. A tech innovation ecosystem consists of basic research, entrepreneurs, investors, technologists, and, most important of all, customers. The resulting technology is only valuable if it enables other productive activities like agriculture, which it does via scale and scope. Ag can produce more, better, and faster with tech if complementary forms of capital—specifically human capital, natural capital, and real capital—are also deepened. The overall outcomes will be sustainable growth and enhanced quality of life, which are compelling rationales for building ecosystems. Unfortunately, ecosystems can't be constructed; they must be cultivated. This means **public agencies should act as catalysts for private and institutional investment**, rather than the typical regulatory behavior, to foster innovation that increases comparative advantage.

Comparative advantage also means producers in an area—from fertile farms to verdant forests—face a unique shared set of problems. If nothing else, they all share the problem of moving their products to other markets. As they have similar productive assets and produce similar goods, the producers also have similar requirements and generate similar demand for materials, labor, equipment, etc. Technology and innovation create the most value when applied to problems common in an area that impacts comparative advantage. Regional innovation systems are metaphorical scaffolding for transforming shared problems into new products that enhance traditional products. **The problem set is a critical asset for innovation** as an input to research, education, and development. Both minds and infrastructure must be improved, driven by unique local economic problems.

These trends are underway today in Marion County, and will become more mainstream as the technology improves. Silicon Valley, just a couple of hours away from Marion County, is beginning to take AgTech more seriously and start-up companies are taking



root there. Summits, Meetups, and conferences are being held in Silicon Valley which agricultural, economic development, and municipal leaders from Marion could attend, participate in, and learn about new technologies coming to market. Marion County and this Broadband Strategic Plan should look to the future, position its assets, and influence to support the evolution of its agriculture industries. Access to high-speed connectivity will be a key driver to greater adoption.

Marion County has the raw material of a regional innovation system. As the state capital and centrally located city, Salem is a natural hub for resources, particularly public ones. There are a dozen colleges or universities within 50 miles of the city. Natural attributes of the Willamette Valley make it a cornucopia of vegetable, nut, and fruit producers. The farm lands on the west are complemented by forests and rivers on the east. As with any strategy, regional innovation is more about activities than assets. It's true in ag and in tech: Someone has to do something with the materials to make them into something of value.

The County's goals and efforts toward supporting Ag Tech include "create Marion County AgTech Innovation and Manufacturing Alliance Initiatives," based on the *Strategic Marion* Action Plan. Many of the smart farming devices and innovations require connectivity for the purpose of uploading real-time data to cloud-based software and transmitting it to partners for analysis. Greater connectivity will be required to further the County's goals in this respect.

Innovation and Creativity

There are numerous innovation opportunities for manufacturers to build technology into their products, to make them "smart," which also leads to opportunities for new information and relationship-based services. This is true for other sectors, too, generally cultural, health, and place-based services that need to be location-aware. These opportunities have high potential impact because they drive demand for specialized technology products and services, creating opportunities for new technologies to be manufactured—or built, so as to include software and facilities—in Marion County.

The automation opportunities in agriculture, health services, and other sectors feed directly into opportunities to build innovative new products. Smart systems will likely use a combination of highly customized and simple, standardized components, and they will require careful design and regular upgrades. This creates





opportunities for information sector companies, especially software developers and content services, which is relatively weak in Marion County, as well as small hardware producers.

The key to all of these opportunities is “smart infrastructure,” which necessarily includes broadband—fiber and wireless—but also devices, data, and code. The County and local municipalities should determine where smart technology could benefit their community and design infrastructure accordingly that supports smart technology for today and the future. The County and cities should consider their roles as data producers. Local government has undoubtedly had numerous automation opportunities: smart city applications for environment, lighting, parking, safety, transit, waste, etc. Marion County also has opportunities to differentiate from other locales with technology. Deploying sensors, other monitoring technology, and controls in alignment with key sectors—agriculture, health services, recreation—to support local government functions multiplies the impact of technology investment. Engaging manufacturing and technology industries would further contribute to both impact and practicality of “smart” initiatives.

Marion County’s demographic and economic dynamics appear well-suited to smart infrastructure. Hybrid fiber-wireless infrastructure is clearly a critical component that directly enables opportunities related to key trends. Rapid growth in the number along with smaller size of health service companies, for example, or continued strength of manufacturing in revenue generation, and relative strength of local agriculture. Broadband provides the foundation for solutions tailored to each sector and firm’s needs. Even basic workforce demand such as is evident in education and retail can be met via technology, to some extent.

Changing demographics and economies means changing needs for capabilities, products, and skills. Local governments are no less affected by these changes. How they address them can make all of the difference. While some sectors, like manufacturing, have climbed up the technology learning curve, others are still climbing, such as agriculture. Sectors facing regulatory requirements and smaller enterprises face additional challenges. Every enterprise needs more socially and technically capable people. There appears to be an opportunity for local government to lead learning to *apply and use* technology, as well as build digital infrastructure.

There are innovation opportunities for planning in Marion County. Much of the economic activity in Marion County appears to be in private homes or other small facilities. There may be need and opportunity for more connections among and between these spaces, which will impact many facets of the community. ***Marion County should consider infrastructure and land use in terms of smaller companies with less dedicated space. Technology can enable that process.*** Social media can be used to reach home-based businesses, entrepreneurs, independent professionals, and telecommuters. They and other interested parties can use online tools to provide feedback and input. Similar methods are useful for older and younger persons to participate in planning activities. As with other applications and opportunities identified



here, this requires extensive digital connectivity across the County and somewhat specialized software tools.

By deploying advanced technologies such as artificial intelligence and the IOT in conjunction with key local industry, the County and cities can boost the local knowledge base while minimizing risk. ***The opportunity here is basically just to have a dialog among the stakeholders.*** Various sectors, including local government, are facing similar technology-driven issues and have similar technology-enabled solutions. For all, it isn't enough to get a solution, they have to apply it effectively. The opportunity is, of course, much larger than just dialog: Technology capabilities can be shared across organizations and sectors, creating new business opportunities in the process.

Ultimately, the intelligence behind the infrastructure, and which uses it to solve problems, is human. ***Broadband connects people.*** Economic statistics tell us general things about people, where they put their time, how they make a living, what they value. Those are but the starting point for data: It can get so much more detailed. But, like any infrastructure, data is only as good as its uses. The fundamental opportunity for Marion County may be to facilitate a profound new form of workforce development that equates directly into economic development.

By fostering gains in knowledge and improvements in skills, the local public sector could promote new business opportunities while increasing capacity to meet residents' critical needs. The challenge is to find common interests and complementary needs at a household and even individual level—and at the start-up or micro-enterprise level—and translate those into larger-scale opportunities. For Marion County, agriculture, recreation, agri-tourism and manufacturing are all strengths the County should capitalize on for economic development. Access to broadband is a required utility needed to expand these growing industries and to place Marion County at the forefront of innovation in these key sectors.

The Digital Divide

Among the most important considerations in the digital, global economy is ensuring equitable access to the opportunities brought about by these technologies. Because high-speed internet is necessary to employment opportunities, education, and identifying social resources, areas in which broadband is unaffordable or unreliable are at a distinct disadvantage. Many skilled jobs now require a level of digital literacy and availability, and increasingly, schools are incorporating online learning into their curriculums. Although technology provides clear advantages for communities and individuals across a variety of sectors, a schism has emerged, separating those who have broadband access from those who do not. These disparities result in an alarmingly high number of people, typically those in poverty or low-income households, who the tools they need to be successful in education, apply for health insurance, or have the digital literacy necessary in today's economy.

Policy makers and advocacy groups have termed this disparity the “digital divide, or the



digital split, as a social issue referring to the differing amount of information between those who have access to the internet (especially broadband access) and those who do not have access.”¹⁰ Efforts for closing this divide are active and several elements of “digital inclusion” have been defined by the National Digital Inclusion Alliance to close these gaps, including:

- 1) *affordable, robust broadband internet service;*
- 2) *internet-enabled devices that meet the needs of the user;*
- 3) *access to digital literacy training;*
- 4) *quality technical support; and*
- 5) *applications and online content designed to enable and encourage self-sufficiency, participation and collaboration.*”¹¹

Cities and counties are increasingly taking note of these inequities and their economic and social consequences. To mitigate these pitfalls, many are commissioning plans such as this one, in which local governments take action in ensuring the needs of all citizens are met through the use of policy, expansion of existing networks, and the creation of infrastructure to fill those gaps. Communities across the United States are trying to bridge the digital divide through using tools of digital inclusion to ensure all citizens and students have access to the tools that they need to function within the 21st Century workforce, environment, and society.

The Federal Communications Commission (FCC), who is tasked with the oversight responsibility relative to telecommunications standards and practices throughout the United States, is empowered to fulfill obligations under the authority granted by the Telecommunications Act of 1996 in respect to digital inclusion. Every year, as required by Section 706(b) of the Act, the FCC assesses the progress of the broadband industry and publishes its findings in its “Broadband Progress Report.” A key focus of the Report is to determine “whether advanced telecommunications capability is being deployed to all Americans in a reasonable and timely fashion.”¹²

¹⁰ ICT Information Communications Technologies. (2018) The Digital Divide, ICT and Broadband Internet. <https://www.internetworldstats.com/links10.htm>

¹¹ NDIA. (2018) Definitions. <https://www.digitalinclusion.org/definitions/>

¹² In the Matter of Inquiry Concerning Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion; GN Docket No. 17-199; 2018 Broadband Deployment Report; FCC 18-10/ released February 2, 2018; (Broadband Deployment Report), at paragraph 7, citing 47 U.S.C. Section 1302 (b).



Table 3: FCC Bandwidth Benchmarks – Fixed Location

Year	Download Speeds	Net Increase	Upload Speeds	Net Increase
1996	Telecommunications Act defined “advanced telecommunications capability” as “high-speed, switched, broadband telecommunications capability that enables users to originate and receive high-quality voice, data, graphics, and video telecommunications using any technology”			
1999	200 Kbps ¹³	-	200 Kbps	-
2010	4 Mbps	2,000%	1 Mbps	500%
2015	25 Mbps	600%	3 Mbps	300%
2020	TBD	TBD	TBD	TBD

Some of the most important outputs from the annual FCC study include recommendations for more precise measures of the industry’s progress. Such recommendations typically include new or revised performance benchmarks. Each benchmark is accompanied by a precise definition that explains the criteria by which the benchmarks will be measured and assessed. For example, the 2015 Report concluded that the existing benchmark standards for broadband transmission speeds were insufficient to keep pace with the current use and foreseeable demands by subscribers¹⁴.

As a result of the information collected during the course of the study, the FCC recommended that the benchmarks for bandwidth speed be increased, thereby redefining the national expectation of “advanced telecommunications capability”¹⁵. In addition, for the very first time the FCC sought comment on the adoption of a minimum speed benchmark for mobile broadband services and suggested industry benchmarks for mobile service offerings to be considered “broadband.” The intent for fixed broadband is to offer high-speed, high-capacity connections capable of supporting multiple, simultaneous users.

The recommendation to establish the wireless rate is important to note considering that a mobile broadband metric has not yet been formally adopted. In the absence of that standard and in consideration of the rapidly growing consumption of mobile data, the fixed broadband metric was suggested for both fixed and mobile communications.

¹³ Collected and compiled from FCC reports and orders.

¹⁴ Subscribers are individuals and businesses that contract for telecommunications services from federal and/or state-approved “service providers.”

¹⁵ Telecommunications Act of 1996, Pub. L. No. 104-104, § 706(a), 110 Stat. 56, 153; SEC. 706. Advanced Telecommunications Incentives; (c) (1) Definitions



On February 2, 2018 the FCC issued its 2018 Broadband Deployment Report¹⁶ to review and update consumer broadband market assessments and related benchmarks and criteria. This assessment follows the previous 2016 Report¹⁷, which found:

- Approximately 34 million Americans still lack access to fixed broadband at the benchmark speeds of 25 Mbps download and 3 Mbps upload.
- A persistent urban-rural divide has left 39 percent of the rural population without access to fixed broadband at the minimum speed, while only 4 percent of the urban population lacks such access;
- However, this is an improvement over previous years (2012: 55%; 2013: 53%)
- Fixed and mobile broadband services offer distinct functions meeting both complementary and distinct needs;
- Fixed broadband offers high speed, high capacity connections capable of supporting bandwidth-intensive uses, such as streaming video by multiple users;
- Mobile devices provide broadband access on the go and especially useful for real-time two-way interactions, mapping applications, and social media. But consumers who rely solely on mobile broadband tend to perform a more limited range of tasks and are significantly more likely to incur additional usage fees or forgo use of the internet.

The 2018 Broadband Deployment Report finds that “advanced telecommunications capability is being deployed to all Americans in a reasonable and timely fashion”, and thus reverses the negative finding in the previous FCC Report (2016).¹⁸ This reversal results from a change of perspective in the evaluation: from evaluating how close the service providers are to connecting all Americans to 25/3 Mbps broadband, to comparing deployment in the present year (2016) to deployments in previous years. Other changes from the previous Report include removing price as a factor in the analysis, and including satellite service in the availability calculations (which pares 11 million from the estimate of unserved Americans).

Additional findings of the 2018 Broadband Deployment Report include:

- The current speed benchmark of 25 Mbps/3 Mbps remains an appropriate measure;
- 18% of the US population has access to speeds of 1 Gbps (although FCC Form 477 data indicates it is only 11%)¹⁹;

¹⁶ 2018 Broadband Deployment Report.

¹⁷ Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, as Amended by the Broadband Data Improvement Act, GN Docket No. 15-191, 2016 Broadband Progress Report, 31 FCC Rcd 699.

¹⁸ 2018 Broadband Deployment Report, at paragraph 94.

¹⁹ *Id.*, at paragraph 23.



- No latency or other performance benchmarks are adopted at this time²⁰;
- Similarly, pricing or data usage allowances are not examined²¹;
- Based on 2016 Form 477 data (which overstates penetration) 92.3% of the U.S. has fixed terrestrial internet service available which meets the 25/3 broadband standard²²;
- Based on 2016 Form 477 data (which overstates penetration) 69.3% of the rural areas of the U.S. has fixed terrestrial internet service available which meets the 25/3 broadband standard²³;
- Based on 2016 Form 477 data (which overstates penetration) 99.6% of the U.S. has mobile LTE internet service available with a minimum 5/1 speed²⁴;
- Mobile services are not currently full substitutes for fixed broadband service; and,
- Analysis combines assessment of fixed and mobile wireless.

In rural locations such as Marion County, issues of the digital divide are readily apparent. Due to the unique topography of the area and low population density, many internet service providers are not incentivized to build infrastructure supporting the region since doing so would cost more money than they could expect to earn from servicing customers in these remote locations. Throughout this report, and particularly in the Market and Needs Assessment sections, the issue of the digital divide in Marion County is pervasive. Community members who participated in Magellan’s online survey, as well as those who attended the focus group sessions, indicate a clear lack of access to broadband services throughout the County, negatively affecting prospects for education, economic development, and day-to-day quality of life issues. These concerns make Marion County a prime location for digital inclusion efforts, including state and federal efforts to bridge the divide.

Local Broadband Public Policy

Dig Once Policy

“Dig Once” can be defined as policies and/or practices that foster cooperation among entities that occupy public rights-of-way, to minimize the number and scale of excavations when installing



20 Id., at paragraph 35.

21 Id., at paragraph 39.

22 Id., at Table 1.

23 Id.

24 Id., at Table 2a.



telecommunications infrastructure in the rights-of-way. Dig Once has a number of substantial benefits, including promoting and supporting the placement of broadband infrastructure (e.g., fiber-optic cable and conduit); reducing the consequences and disruptions of repeated excavations (traffic disruption, road deterioration, service outages, and wasted resources), and enhancing service reliability and aesthetics. Dig Once accomplished the goal of minimizing costs of constructing separate trenches and facilities – via shared costs of construction.

The cost savings are significant. The Federal Highway Administration estimates it is ten times more expensive to dig up and then repair an existing road to lay fiber, than to dig a channel for it when the road is being fixed or built. According to a study by the Government Accountability Office, “dig once” policies can save from 25-33% in construction costs in urban areas and approximately 16% in rural areas.²⁵ In addition, development of Dig Once standards and guidelines for deployment of conduit and fiber will facilitate economic development and growth, as it enables cost-effective staged or gradual deployment of broadband infrastructure. Sonoma County and several cities have therefore expressed interest in exploring and adopting Dig Once policies.

Dig Once policy discussions generally address the planning and coordination process for construction projects in the public rights-of-way. But the concept can also extend to required placement of conduit for fiber-optic conduits, as expressed in recent Congressional legislation. The Broadband Conduit Deployment Act of 2015 required the inclusion of broadband conduit during construction of any road receiving federal funding.²⁶

Policy approaches also differ between detailing specific Dig Once processes in ordinances (e.g., San Francisco) or stating the policy direction to require coordination of projects in the roads and rights-of-way, leaving specific implementation and management to designated city or county officials (e.g., Director of Public Works).

Magellan Advisors recommends that Marion County explore and implement this approach to coordination of projects in the rights-of-way to promote expansion of broadband infrastructure, reduce disruptive repeated excavations which cause traffic disruption, road deterioration, service disruptions and wasted resources.

²⁵ <https://eshoo.house.gov/issues/economy/eshoo-walden-introduce-dig-once-broadband-deployment-bill>

²⁶ *Id.*



Broadband in Marion County

Introduction

This section examines the demand for, supply, uses, and value of broadband in Marion County. Generally, the analysis consists of both qualitative and quantitative information. Quantitative analysis determines how available, economical, and fast broadband is. Magellan Advisors does this using a survey instrument. The Marion County Broadband Study survey was open for nearly three months and received over 500 complete responses. The data from these responses were geographically and statistically analyzed to assess broadband demand and supply. Qualitative analysis tells us what broadband means to the people of Marion County. In addition, Magellan Advisors conducted multiple discussions with representatives of key stakeholder groups, with a focus on the North Santiam River Canyon (NSRC) area. These discussions were thematically analyzed to ascertain needs and opportunities. These can only be understood in context, so this examination begins with a general analysis of the area.

Broadband Needs and Opportunities

Needs and opportunities are identified by stakeholders; those who have an interest the vitality of Marion County communities. Internal County stakeholders include appointed and elected officials. External County stakeholders are citizens, particularly business leaders as well as a range of local activists, agencies, and community groups. Internet service providers, including non-local corporations, are also important stakeholders, as are public agencies that fund or regulate broadband. Stakeholder inputs are analyzed in terms of their roles, technology-related needs (items they do not have that could enable better performance), and potential contribution to broadband in the area.

Internal Stakeholders

Magellan Advisors conducted group discussions with Marion County elected officials, department heads, and key personnel in late 2017.

Economic Development

In late 2017, the Marion County Regional Economic Development Strategy team envisioned combining the County's agricultural heritage with a high-tech future. The team, which consisted of key County officials—including two commissioners—and representatives of the Governor and Council of Governments, along with County Community and Economic Development personnel, drafted a strategy focused on natural resource innovation. The strategy emphasized investing in innovative companies and in new product development and research, leveraging existing programs at all levels, but specifics of the strategy were to be determined.

Promoting small business development and removing barriers to business opportunities were key objectives for this strategy. Aligning workforce programs with basic industries and integrating business with education were seen as key objectives for growing a



talented workforce. The team was committed to making Marion County a great place for business development and young, college-educated talent. It recognized the need to forecast land use related to the goals and promote strategic use of land, including building infrastructure and providing affordable living.

Marion County's Community Services Department includes Economic Development. The County also supports the Strategic Economic Development Corporation (SEDCOR), a membership-based non-profit with strong public and private partnerships, which is the lead economic development entity for the Mid-Willamette Valley. The Mid-Willamette Valley Council of Governments (MWVCOG) operates the economic development district that includes Marion County, along with Polk and Yamhill counties, numerous cities, and the Confederated Tribes of the Grand Ronde. Business Oregon is the state program focused on attracting, growing, and retaining basic industries ("traded sector businesses").

There are multiple local economic development entities within Marion County, and a variety of multi-county/regional entities, particularly focused on general sectors and workforce development. For example, manufacturing, micro-enterprises, and workforce are common focuses, and at least one entity focuses on forestry products.

Land Use and Real Estate Development

The State of Oregon land use laws limit property development—specifically conversion from agricultural to commercial, industrial, or residential use—to urban growth boundaries (UGB) around cities. It is difficult to annex properties within the UGB and expand the UGB. Education and public service facilities are funded via service districts that have authority to assess ad valorem property taxes and other fees and are governed by County boards of commissioners. Thus, real estate development opportunities are practically limited to areas of cities that have relatively high property values and/or abundant service facilities (specifically, for sewer and water services). State laws push multi-dwelling units, in particular, into cities. The County has some commercial redevelopment, and pockets of industrial sites, particularly in the NSRC area.

Public Works

Marion County provides public works for parks, roads, rights-of-way, and other public facilities in unincorporated areas of the County; the cities deal with assets in their jurisdictions and state departments take care of with state highways, parks, rights-of-way, etc. Marion County has building standards and zoning, but these generally apply to private property, not the public rights-of-way. Each city in the County does planning and zoning within their boundaries. Major developments in the County involved a meeting with an informal Public Works review committee, and subdivisions require a formal review. There are no clear standards for placing conduit or other broadband assets in the right-of-way and no negotiation of development plans to include such assets.

The County has some traffic signals—most of which were not connected—that are



maintained and timed by Salem, other cities, and ODOT. The City of Salem has a central traffic management center that connects to signals via both copper and fiber in conduit. The County has been working in some areas to upgrade to fiber and build in redundancy, particularly in the corridor between County Corrections (jail) and Public Works. The County is planning to attach fiber to poles, replacing Comcast dark fiber connecting the downtown Salem campus, the Public Works center, and the Health and Juvenile Detention Center, including installing some fiber for the City of Salem. PGE (Portland General Electric) generally allowed the city to use poles at no cost. The County has four offices with Metro-Ethernet connections, and gets internet access from the State of Oregon via the City of Salem's data center.

The County has a lot of radio infrastructure. Some of the towers are County-owned, some are city-owned, but most are owned by American Tower. County towers are maintained by radio shop, which is under EMA in the Public Works Department. There have been some issues with antenna placement, and the County has added towers and moved to microwave backhaul over the last few years. At the time of this report, the County was inventorying EMA towers and related assets. Banks of conduit placed in two County rights-of-way placed by providers years ago are now defunct; the condition and exact location of those conduits were not clear. There are no plans for Wi-Fi in public parks, although it is recognized as a valuable amenity.

Public Safety

The Marion County Sheriff provides law enforcement services, especially in the unincorporated the county, in conjunction city police departments. There are multiple fire districts (most are volunteer) and a mix of private and public emergency medical services (ambulances) in the County. The Sheriff has approximately 230 sworn deputies, including home probation, jail, etc., in two primary sites (Salem and Aumsville Highway). A new building is slated for the Aumsville Highway site. There are North, South, and Traffic Safety offices, too, and several cities provide offices for deputies.

Both of the major sites have County network services. The traffic safety team in Brooks has to go to the central office to upload its records. The department has about 90 vehicles, most of which are equipped with a laptop, NetMotion Mobile Performance Management software, GPS, and Verizon AirCards. All deputies have smartphones, and there are various other digital devices for search and rescue. There is Wi-Fi at some fire stations, and the Sheriff has a cellular telephone hotspot and a satellite communications trailer. The SWAT team reported having connectivity issues.

The department is moving toward PowerDMS, along with other sheriffs, for policy management, and is considering an upgraded computer-aided dispatch, jail, and records management system(s). Its mobile command center for disaster response is not sufficient, but they are developing a crash investigation vehicle that will be state-of-the-art. Much of the department's efforts in the eastern portion of the county—where cellular coverage is inconsistent or nonexistent—involves search and rescue.



The Sheriff has some cameras in the cars—video is recorded in the car then uploaded via Wi-Fi at the office—and was finishing development of a body camera policy. The goal is to use body and car cameras together, and retain video based on state requirements for case classification/code. There is an extensive camera system in the County courthouse and jail. The City of Salem also has some community cameras. The County has none but would like some. The Salem-Keiser schools had camera system that was antiquated, which public safety could not access.

The two entities that provide dispatching and E-911 services in the County use different systems. The Willamette Valley Communication Corp (WVCC), is owned by City of Salem Police, and MetCom, which handles 65%-70% of calls in NSRC area, is housed by Woodburn Police. The County financially supports both, and deals with gaps between them: A substantial amount of information must be transferred via phone call or written notes. The cost of moving to a shared 800 Mhz radio system is too much for consideration at this time.

External Stakeholders

Magellan Advisors and Marion County staff met with various external stakeholders during a dozen meetings in early April of 2018, followed by several inter-personal conversations. The general stakeholder groups were cities, business and industry, and education. Jefferson, Kaiser, Salem, and Silverton were the most engaged cities. Most business interests that participated were oriented toward agriculture. Silver Falls School District participated heavily, as did the Willamette Education Services District, and Chemeketa Community College. A wider range of stakeholders, including the local school superintendent, were engaged in discussions focused on the NSRC area.

Cities

The City of Salem was interested in broadband being built into its Annual Plan, via a general statement about Downtown. Salem's IT director will lead it, and the City has heard a lot "wants" from Downtown, including "free broadband" and higher speed. The City needs to address more than Downtown. Salem has an Urban Renewal Agency, a separate municipal corporation responsible for projects and programs to invest in and improve specific geographic areas of the City. Those areas require underground utilities and there is currently a moratorium on any more digging. Salem's franchise with Comcast has expired. The City doesn't have a common radio system for police, fire, or public safety.

City of Jefferson had formed a Technology Committee, which is leading broadband efforts, along with the Public Works Director. The City has a population of 3000, with significant population in surrounding areas. Broadband services are not good and topography is a big problem. 10/1 Mbps is the fastest offering and service is frequently down. The City is working on a new franchise agreement with one company, for which a railroad crossing was a problem.

Adaptive Broadband has put in service, leveraging connection to a seed company. Peak



Internet pulled out recently due to non-market issues. The City would also like to look at Wave, MiNet, etc., to generate investment and competition. Wave goes through town but does not offer service because it is “impossible” to get railroad permission to cross its right-of-way with fiber. There is an AT&T tower with Verizon on it, but the topography creates cellular dead spots.

There have been efforts to attract new businesses between Salem and Albany, near Jefferson, but lack of broadband has been slowing interest to a certain extent. Most schools are outside the actual city limits. A new water treatment facility was being developed at the time that the data was gathered.²⁷ These are other factors are driving demand for broadband in the Jefferson area. Local leaders expressed a desire to get better services for their citizens.

Transit

Cherriots Transit Service in Salem/Keizer also serves Marion and Polk County with shuttle services. It is located in the Courthouse Square building shared with the County and also shares its data center. That location is connected to Cherriots’ shop facility by Home Depot and its Keizer transit center, with planned connection for the South Salem transit center. Comcast and CenturyLink are not in the Courthouse building. Coordinated construction projects (Dig Once) is a big need. Cherriots has automatic vehicle location (AVL) and cameras on all busses but needs routers. It does computer-aided dispatch and uses Verizon LTE connections. The buses offload data at transit stations. They are planning to use a Google Maps-based transit app to avoid reinventing the wheel.

The City of Silverton seeks to drive conversation about broadband through a plan, rather than being reactive. Business owners are extremely frustrated with prices and service. The City set an objective of removing barriers to broadband and recently signed franchise agreements with LS Networks to serve the school. DataVision had a franchise agreement through Gervais Telephone Cooperative, but that was not renewed. The City has Frontier internet service that is not delivering the contracted speed. The hospital may have gotten a USDA grant. The City shop, community center, and waste water are all connected in via Frontier. PGE owns the light and utility poles, and there are recurring issues with underground construction in downtown Silverton. The City has a planned sewer project that will open the ground in the public right-of-way, which could be an opportunity to deploy network infrastructure.

Business and Industry

The industry focus group in Gates was attended by one person, a farmer and social service provider from Gervais. She discussed her businesses, adjacent and family associates’ businesses, and dearth of internet service, and needs for communication,

²⁷ Since the discussions for this project, as late as June 6, 2018, Salem, Jefferson, and other cities in the area experienced a bacteria bloom in the water supply that made it undrinkable. This may impact work on the water treatment facility and demand for broadband.



education, and entertainment by kids and seasonal workers. Various broadband development tactics were briefly discussed, including rural grassroots DIY fiber deployments.

Salem-area discussion groups were better attended. Participants indicated that many people operate a home office. More broadband would really help their business; slow connections are not good. People move to the Salem area from elsewhere because it is the lowest cost housing on the west coast. The number of vendors and tenants in the mall are decreasing, participants maintained, and building infrastructure was the problem. There is concern that the cities did not have the capacity to be proactive. A recent project around State Street and Corban University was cited as an example. There was interest in MiNet as a model.²⁸

Agriculture

Agriculture is a major industry in the Willamette Valley. Farmers in the area are doing real-time soil sampling for precision agriculture, according to participants. They use GPS to control steering and spraying, none of which requires any connection. Many farmers with older controllers are using thumb drives for data transfer. “In ag more than other industries,” one participant noted, “we have to support different technologies from the beginning of time.” Most did not have yield monitoring. Agricultural IoT (internet of things) would use very little bandwidth, sensors could be buried for 20 years, given battery life. Drones could be used for yield estimations.

The Farmers were looking at LoRa and LPWAN networks (proprietary very long-range transmission with low power consumption, for use in sensor networks). Tracker sensors on power boxes, for example, can make work easier and save money because farmers are always trying to track those down and have to keep an eye on them. The rate Verizon was negotiated rate down to \$5 per month, but with large numbers that was still too much. A participant with a regional retail co-op, noted that WiMax worked well in areas with flat topography and could work in the Willamette Valley if towers were strategically placed.

Many farmers used the Agworld app for planning. They would take pictures, analyze them, put it all into a plan, and share with retailers. Yield monitoring has been the last application picked up by farmers, according to participants. “Which is kind of funny because it is the end game, the validation of everything that is done,” a participant reflected, “Am I moving the needle or not?” Growers were trying to sell direct to the market, for farm-to-table, etc., which challenges internet connectivity. The new generation of employees require internet connections for their personal device, video.

There is a generational change going on in farming, participants maintained. Although there are still a lot of “mom and pop” farms, corporate farmers have been coming into the area. Wall Street poured a lot of money into ag tech, and that never went anywhere.

²⁸ <https://www.minetfiber.com/about>



Mechanization is seen as an inevitability because labor is harder and harder to find and keep. Robotics are becoming more and more interesting and innovations like autonomous tractors were not seen as far off.

Serious service quality problems were noted. Participants said farmers know where the Verizon “black holes” are. Some carriers are NOT investing, particularly in copper, according to participants, but Wave has a million dollar grant to extend the network. A participant had Frontier and Wave have fiber across the street, but no service offered, so he keeps upgrading his wireless data plan. Some feel the County could add competition by adding infrastructure. Permitting was noted as a problem: it was 9-month process to get across railroad for a Mt. Angel ag facility.

The Salem area had “tons of backhaul,” according to a local building owner, entrepreneur, and consultant. The problem was the “last mile” and building wiring, which he was addressing by deploy “air fiber” connections. There was great frustration among providers about obtaining permits because there were different permitting arms with within the City. Eight blocks of downtown Salem are designated as national historic district and it took six months for a permit to go 1000 feet because Federal, state, city, and National Historic Register sign offs were required. In another case, Northwest Natural Gas dug up the street for gas line, and no one knew. CenturyLink didn’t know, therefore couldn’t lay fiber/conduit.

Broadband Use in Winery Operations

“In wine growing, wine making, and wine selling – broadband is a necessity,” stated a stakeholder during an interview. Whether it is sensor technologies to monitor water usage and soil nutrients or data driven sales processes, broadband is affecting all aspects of a winery’s business. The stakeholder believes that broadband will change the business in many ways, with the following being the most important currently implemented or needed in the immediate future.

Sensors: Sensor technologies to monitor water usage, well water, and soil nutrients are incredibly important. Additionally, much of the data collected from these sensors will be required to upload and report to the state via online reporting portals. Use of the sensors, uploading of the data and reporting of the data will all use connectivity in some way.

Reporting/Communications: Whether it is reporting data garnered from sensors, simple label approvals, or communicating with suppliers or customers, reporting and communications occur online. Use of internet-based platforms is rapidly becoming vital to conduct business. Without broadband internet, customers are lost, and data analysis cannot occur, which impedes the business.

Employment and Data Driven Sales: Many times, people associate IoT and automation with a reduction in workforce. In the case of one winery in Marion County, this wasn’t the case. When this winery used their connectivity to utilize a point-of-sale system called Wine Direct, they needed to hire someone to use it and follow-through



with the data driven sales tactics. The customer management system assists wineries in follow up and creating sales based on historical data, increasing their direct to customer sales. After hiring the new employee, the sales generated paid for the employee the first month and one year later, the sales are up 22% over the same quarter last year. The winery attributes this to the added employee generating managing the customer base.

Local Broadband for Employees: Employees are an important part of any business, but when many of your employees are farm workers and low-income households, additional considerations come into play. This stakeholder discussed the importance of broadband to support telemedicine for these workers and their families. For example, if a child has a rash, the mother could schedule a telemedicine appointment and get medication without needing to miss work or make a long drive to a nearby town for treatment.

This particular winery is fortunate to have broadband access. Comcast provides wired cable to the winery based on a 3-year contract at a cost of \$1,500 per month with speed tests revealing approximately 100 Mbps download and 12 Mbps upload speeds. While the speeds are high for Marion County, the winery believes higher upload speeds will be necessary moving into the future for uploading of data for reporting to the cloud and in support of new sensor technologies.

Education

Broadband is two faceted for education: broadband for the schools, and broadband for the students to work at home. One school in Silver Falls finally got fiber, but that is the only fiber connection in town. Many students who do not have adequate connectivity at home are connecting via mobile app, which is not optimal. Connectivity says a lot about economic status of students. The Community College uses Blackboard, which shows heavy mobile phone utilization. Faced with paying for food and books or broadband, compromises are being made by students and their families.

Silver Falls is geographically one of the largest school districts with 4,200 students and 13 schools, many of which are K-8, located in the County around the City of Silverton, and junior and senior high schools in the city. Some kids spend 1.5 hours on the bus one way. The schools' general goals are full attendance and graduation, and to get all teachers competent in the Danielson Group's *Framework for Teaching* (<https://www.danielsongroup.org/framework/>). Educators in the school system spend two half-days per month of professional learning communities, a collaborative approach to professional development.

There is a wide range of experience and tech exposure among students. Some have little to no real exposure to internet and are greatly disadvantaged compared to classmates. There are 9 labs in the high school, which is a large 5A High School. Kids can stay after school to do homework and use internet connection, but schools and libraries are not well-connected from technology standpoint. There are two schools that don't have a library.



Silver Falls Schools don't have a 1-1 initiative at the time of this discussion, but are moving in that direction. The schools have heard from students about lack of home broadband internet access, and officials have noted poor access for constituents. Kids are not taking devices home to avoid breakage and loss issues, and the schools would have to filter content, which is difficult. If the students all had home internet access, teachers could assign higher-level material or flip the classroom. Bandwidth is an issue. Cooperatives were identified as organizations effectively providing broadband in rural areas.

Affordability isn't even seen as an issue yet because there is so little access. "If everyone was connected with broadband at home, we might look more seriously at school to home policy for devices," noted an education participant. "Given that they are not, it is not worth running the risk of loss/damage at this point. The only consistent use today is at school." The schools are moving to online curriculum but those not online have to print materials, which raises an equity issue. Kids had to do a "walk of shame" to pick up devices in class because they don't have internet at home.

The schools want to provide curriculum support for online education. Some schools had been or are slated to be closed, which fuels demand/desire for home schooling and educational support. Schools must have outside online education for parents to accomplish home schooling.

Smartphones are widespread, and many don't take calls or read emails, so the most reliable way to contact students and parents was text, although cell service is "terrible." The schools want Wi-Fi on school busses but connectivity is a challenge there, too: Many dead spots exist where schools can't communicate with drivers. All busses have video surveillance cameras but some schools do not. The school board is pushing for the "three Cs," cameras, counselors, computers.

They are focused on wires in walls—2 drops per wall and in the ceiling—for more security cameras and access controls on doors as well as classroom systems and Wi-Fi access points. There is guest wireless for kids' personal devices that is rated limited. The high school has key card access, and they are planning this for other schools (along with putting in fences). Everything is put on the network, including building controls and HVAC, etc. The e-Rate program has been a lot of help since the schools got Category 2 funding (to build facilities, not just purchase services). They have a few more years to spend those funds.

The schools are working to standardize software, specifically their library system, and deploy VoIP in all schools, possibly via open sources Asterisk VPBX. They provide online career technical education (CTE), and were looking at an LMS (learning management system; piloting Canvas, <https://www.canvaslms.com/>) and Imagine Learning (<http://www.imaginelearning.com/>), which requires 1.5 Mbps per student due to its multi-media content. They also use EduLink to send out messages to families. The schools are planning to deploy more cameras and access controls. They prefer to



purchase equipment with lifetime hardware warranty and software updates.

The IT department is working for technology equity, to get the same level of tech for all students, teachers, and classrooms. They plan to grow the student tech program and CTE/STEM program, and get more kids certified to work on computers and networks. They also want to develop more partnerships to bring in industry people to talk students (the participant was not sure about connections/partnerships with library).

The schools in Silverton got fiber from Charter (now Wave) in 2005, which was expanded to rural schools in 2013. Wave provides WAN service via hub & spokes architecture with 10 Gbps links to the high school as the hub. Wave handles the VLANs, and everything is connected to/via Wave's headend. The district office is collocated with middle schools nearby. IT is located at the high school, where it provides training to students to work on computers. Redundancy and data security were identified as key issues. The IT department has found itself, "sifting through all of the solutions to find one we can afford."

Willamette ESD (<https://www.wesd.org/>) is the schools' ISP and LS Networks (<https://www.lsnetworks.net/>) is Willamette ESD's backhaul provider. The ESD has a local service plan for schools with multiple options, one of which is internet. The ESD also provides firewall because the schools' on-site firewall was a bandwidth limiter. LS connects to the high school and provides the schools internet access, and peers with other providers at the Pittock Building in Portland. The company is expanding in the area but has taken a while to get permits, etc. Willamette ESD is a member of the Cascade Technology Alliance (<http://services.cascadetech.org/>).

Willamette ESD has a hub-and-spoke network, centered on its service center, providing data center services for districts in three counties. The network hits 10 Gbps with a connection to Northwest Access Exchange but is otherwise comprised of services from CenturyLink and Wave. The Willamette ESD works with multiple service providers and is considering a connection to the Salem-Keizer dark fiber infrastructure to increase redundancy and cut costs. It wants to connect with other ESDs and is working on partnerships.

Medical/Health Care

Health care practices have become much more data reliant, therefore much more dependent on high-speed broadband networking, both at health care facilities, and in the field.

Electronic medical records and billing data are now typically kept off-site, which is a big driver for bandwidth needs. Health care providers and practitioners require reliable connectivity to the cloud to perform their jobs. Clinics and providers enter the data, then it goes to a remote clearing house, from which the bills are sent, mostly electronically. Reliable broadband is essential.

Trauma centers share all kinds of records including MRI, CT scan, X-Ray, etc., via



electronic means. Medical practitioners especially need to do this at the more remote clinics, but do not have the bandwidth to do it in real-time.

Doctors and employees use laptops and tablets to record patient information and access EMR. Paramedics and EMT's are also using tablets to record first responder information in the field. Without broadband or cellular connectivity, the transmitting of information is delayed until returning to an area where Wi-Fi or cell service is available.

Voice-to-text applications for recording patient information are used, including scribing services. Medical imaging is shared and used via broadband between sites and for access to specialists in other parts of the state and video chats are made accessible via specialized portable carts that have screen, Wi-Fi connections, cameras, software etc. The video chats provide access to specialists such as Infection Specialists, Psychology, and Stroke Specialists.

Video conferencing is expected to expand in the future. There is a new a paradigm called Project Echo that provides for a standing live conference call with remote specialists that the doctors can join to ask live questions or receive a consultation.

Healthcare home visit services, where the practitioners visit patients using laptops equipped with Wi-Fi cards to access patient information, are also emergent, and Continuing Education in the medical professions is often facilitated via web training and web conferences. This is a vital tool, especially for busy rural doctors.

Health care providers desire to empower rural healthcare through technology. Telemedicine *is* being utilized, and health care providers would like to be able to pursue it more broadly – telemedicine is a growing field and application. In a rural area such as Marion County, where it can sometimes take an hour to get to a clinic, telemedicine is a huge improvement in care. Elderly patients can be significant telemedicine beneficiaries, given they do not always have transportation available to get to a clinic. Health care providers would like to implement more telemedicine routines, for not only treatment, but for continued health and well-being ongoing care as well.

Those interviewed suggest that many connections today are adequate, but more bandwidth is going to be needed, particularly at satellite offices. The maximum capacity at some locations is only "T1" (1.544 Mbps), which is inadequate. Health care institutions incur significant cost for redundancy, which is required given the urgent nature of health care, electronic healthcare records, collaboration between specialists at other facilities, billing, and lost business (care) due to outages. Healthcare organizations have learned lessons of outages over the years and believes it necessary to spend the money to better ensure they are up most of the time.

North Santiam River Canyon

Three community members participated in this discussion. Two were retired, one from local public land work and the other from telecommunications elsewhere. The third participant was a mother who worked at local media. Danielle Gonzalez, Marion County,



also participated in the discussion along with Magellan Advisors. The discussion started with recent events.

Mill City got an \$8.1M transportation grant to refurbish the vehicular and walking/train bridges, make road improvements, and build a transit shelter for the regional bus service (which runs two round-trips daily through Mill City, east to Gates, and west to Salem). The proposal focused on the economic impact from vehicular travel. The community raised \$300k, and Linn County contributed \$900k. There was a sense that Linn County would be willing to collaborate on future projects.

Participants had a variety of network services, but none were solid. One participant could see Verizon's cell tower, had Wave cable, which went out a lot, and didn't know Frontier's offering but didn't feel it could be very good. Another switched to Frontier because it was cheaper— Wave service has a data cap and bills for bandwidth over the cap—but couldn't stream anything. They felt Wave was expensive at approximately \$60/month, \$30 for 100x10 internet only, and extra for the required modem.

Participants felt internet service was not reliable: every time the power goes out the internet goes out, and the power goes out a lot, numerous times per month, although power reliability has gotten better recently. It also has limited capacity: The kids can't do everything at the same time. They used to stream interactive online art but can't do that anymore. The schools, which serve 1,000 square miles, use Wave. They recently updated but had to schedule testing and monitor usage data in the past. AT&T has limited cell service. Participants couldn't get cell service in the Forest Service overhead team conference room. Detroit has a massive cell tower and the County has a lot of satellite phones. Metcomm provides 911 service to NSRC area. All of the Forest Service tools are online, including the form to get equipment. Non-Forest service employees have to use separate system for access, which is often unavailable, rendering tools inaccessible when needed.

Participants felt the North Santiam River Canyon (NSRC) to be a unique place. The NSRC area is very remote and has lots of recreational use. Accidents are common along the North Fork where there are numerous parks, and there are deaths most every year. The emergency phone was broken into and destroyed but has since been fixed. Detroit is an enclave, and Idanha is completely disconnected. The area is served by several fire districts, the closest hospital is Stayton, and the only local healthcare is the Santiam Medical Clinic in Mill City. Participants felt telemedicine would be a huge benefit for the NSRC area.

Local jobs are in the service sectors, retail, or the lumber mills. Detroit has a lot of work opportunities in the summer and the marina has bunk houses for seasonal workers. Brietenbush has hiring issues. There are jobs on the Forest Service firefighting crews and Work Source Oregon offers classes in the area, according to participants. Four season recreation would be a boon to the area and stakeholders are working to extend shoulder seasons for tourism: "There are lots assets here," they said, "they're just not



coordinated.”

There are several major constraints and threats to economic development in the area. The NSRC area has extremely limited capacity for waste water. Many cities downstream use the water for drinking and rely on pristine water sources (they don't have backup sources or reclamation facilities). Oregon's "Three basin rule" effectively says no used waste water can be discharged into the river. The Army Corps of Engineers is building a fish tower at the Detroit dam so they don't send fish through the overflow since steelheads and salmon are on the Endangered Species List. The Corps has to control the water temperature, so they are building mixing system at the top damn, which could involve draining the lake. Wildfire and smoke have negatively impacted tourism; drought has also been a problem.

Several other resources were noted by participants. Pacific Power has implemented AMI to manage power customers in the Canyon. There are poles [and a fiber route] but participants did not know who owned them. SCTC was identified as the local telecommunications carrier in Stayton.

NSRC Retail-Tourism

Nine persons participated in this discussion, including representatives of the County Travel Bureau and local economic development corporation. Participants included local business owners, independent professionals, and interested citizens. They noted having internet service from Wave, Frontier, and Dish, and relying on cell phone data. The general attitude was ***“Download speed is ok, but upload is a big issue for business,”*** and ***“It's holding everybody back.”***

Lack of sewer and lack of internet are the two biggest issues. One participant noted that although he works remotely, he doesn't carry his laptop because there aren't any good options for getting online. Another talked about having to go to the library in Stayton to upload files. Participants said things like, “You see visitors waving around cell phones to get a connection” and noted that there are different gaps in coverage depending on the provider. People go into Rosie's Cafe for connection, making it a major stop between Portland and Bend.

There are businesses that operate from homes, totally by internet, and businesses needing connections for transactions. One uses cell for kayak rentals and other transactions in the middle of Detroit Lake. Faster connections would speed up transactions and cut down on people standing in line, especially during the tourist season. Some facilities haven't opened up for corporate events and meetings simply due to lack of connectivity. Local businesses need visitors to be able to find them and to perform transactions; if they can't get a signal, they won't stop. Cell service around the lake is pretty good; according to participants, Verizon had the best coverage and AT&T is catching up.

“When access isn't something you can't count on,” noted a participant, “it impacts the way people do business.” Job seekers are limited because they can't



find local opportunities and have a hard time even getting online to search. A lot of families can't afford broadband, which limits access to jobs and education. Stayton Library computers are always full, which suggests that many people in the area need more broadband. Residents have learned to live with the dead spots, gotten used to slow speeds, and come up with work arounds. They feel they're paying just as much as others who have better service with faster speeds.

The next generation wants to choose where to live then find work, participants maintained. "Younger people who would like to live here can't do without good connectivity," said one participant. Another felt the NSRC area would be a great place for a call center because it has a low skill workforce. There was a sense among participants that they don't know what they left on the table in terms of economic opportunities—people who work on a contract basis, like engineers, GIS analysts, etc. Video conferencing and other bandwidth-intensive applications are necessary for working from home.

Participants didn't see how broadband would impact emergency or rescue, and saw lack of wastewater processing capacity as the big impediment to development. They are placing most of their hope for the future in the lake. North Santiam River Country tourism presents the best opportunity based on asset and traffic counts. More "lightfoot" outdoor recreation and a multi-location festivals are two primary objectives.

They seek to weave a stronger fabric between the communities because no one community has the marketing power to do it alone. The general vision is to connect all the local outfitters, develop more destinations to reduce reliance on Detroit Lake, and expand the visitor seasons into April-May and August-September in partnership with wineries and others. The local economic development corporation is also concerned about affordability, in general, and specifically for broadband service.

NSRC Public Sector

This group consisted of personnel from U.S. Bureau of Land Management (BLM), NSRC cities, and public schools, as well as the County. Participants used both Frontier DSL and Wave. Reliability was identified a major issue, particularly for DSL, which "goes down 200 times a day...the Frontier tech who does on-site has become like a friend," according to a participant. Verizon cellular data is used as a backup connection. Some participants had offices in Stayton served by SCTC, which had deployed fiber.

The BLM has Frontier DSL at Fisherman's Bend park. They use virtual PBX systems for phones, interconnected nationwide via Verizon, but have to utilize local companies for remote sites. There are opportunities to improve network facilities, and the Bureau is looking at LTE for public safety. Overall communications are an issue. Public agencies are moving to RoIP (radio over IP) and LPWAN (wireless low power wide area network), but don't necessarily have radio towers. GPS can go over digital radio, but a lot of local governments' radios don't support digital.

Sheriff deputies have to switch radio frequency and rely on cell phones when in NSRC



because radio coverage is spotty. Radio is shared with Forest, so BLM can Rollover to Forest Service radio when there are coverage problems. They have a joint dispatch center, and BLM has a VHF link to MetCom 911. Other agencies can also use BLM as a backup. If BLM had a reliable fiber network, it could extend network access and have an app on smart phones. They are transitioning to reservation sites which require internet and feel connectivity would make the area more attractive to volunteers who are doing trail work, etc.

The Santiam Canyon School District, headquartered in Mill City, have Wave for internet and WAN, which had constant problems and been “adequate” before but improved recently. There is Wi-Fi throughout schools with capacity for 300 to 400 devices and nearly 1-1. Devices currently stay in classrooms, although 9th graders are piloting taking them home. The Santiam Canyon Schools are taken care of internally but connectivity in the area is an issue. Some families can’t get text messages from the schools.

Meanwhile, participants expressed that education is changing to occur any time and any place, not just in the classroom. There are worries that this could cause inequity because some students don’t have adequate internet access. “We’re a huge area, we go lots of directions and lots of miles,” the Superintendent pointed out, but also “We have virtual classrooms. It’s the ability to take your classroom home with you.” It seemed to some that Wave continually increases their rates and was recently acquired so there is uncertainty about what the future holds.

Overall needs and opportunities included professional education and mental health services in the area. City council information and employee training were noted as specific opportunities. NextDoor (<https://nextdoor.com/>) was cited as a good tool used for community information sharing. A planned private storage facility planned in Detroit would be fully automate and there are even more general needs for better communication. The Detroit Fire Department personnel located in Idanha have to drive to Detroit to access the internet. Campgrounds in North Fork area have two public telephones. There had been problems with break-ins at remote and the Sheriff was under-staffed in the area.

The overall goals noted by the group were to develop year-round tourism and make businesses more sustainable. They expect overall growth with more people coming through and moving to the area. Participants hoped to direct folks to less used areas, and were looking for ways to work together particularly along the North Fork. Forest fires, recreation accidents, snow storms, and traffic wrecks on Hwy 22 past Idanha were all noted as specific threats for the area. Internet access for kids and tourism, for city operations, e.g., GPS in vehicles, and for telework and telemedicine could create a lot of benefits and opportunities, participants agreed.

There was also discussion of wastewater issues and how this might fight with broadband, as Detroit and Idanha both recently received money for new water systems.



It was noted that to do a NEPA could take about 3 years. It was possible to get a finding of non-significant impact, otherwise it would be necessary to develop an environmental impact statement. This could be done for multiple projects together more efficiently than separately: It would be efficient to do broadband and wastewater together.

Summary of Issues and Needs

Technology-related issues and needs vary across Marion County. For the County itself, issues related to serving the eastern portion are very different from those for the west, as are the issues among the cities and those in rural, unincorporated areas. ***The Public Works Department and the Sheriff’s Office have the most critical and pervasive needs for connectivity, and Public Works is positioned to play key roles in addressing those issues.*** Most other departments and offices have internal-only or location-specific issues.²⁹ A primary and universal issue with County units is simply the age and variety of their information systems. While there is need for greater speed, the core issue is limited availability outside cities, especially for wireless.

The County’s issues are mirrored externally: In Salem and the larger cities, availability seems adequate but capacity is limited by permitting and other regulatory issues. Historic and urban renewal area regulations add to these issues. Outside the cities in the Willamette Valley, low population density may be the biggest barrier to market entry by broadband providers. Various fiber routes are through these areas but distances from main roads to customer locations can be long, and therefore costly. The terrain is just enough to be a challenge for wireless, especially toward the mountains on the east. Right-of-way access, particularly along railroads, appears to be an issue across the County. Consequently, broadband service availability and quality vary widely across the County.

Economic development opportunities in the western half of Marion County may be constrained by available sites due to land use regulations. Therefore, economic activities will take place in relatively limited areas. Given the lack of land for industrial use, most opportunities could be with start-ups, small business, and micro enterprises. Statistics show that local industries are mirroring the global trend toward smaller organizations. Our discussion groups showed that small businesses still face substantial access issues in some urban locations as well as most rural parts of the county.

It might make economic sense for farmers to use their lands for non-agricultural uses, but regulations place structural limits on agricultural land use. The simple alternative is for farmers to vertically diversify into production, retail/wholesale, and tourism, but that too is limited by regulation and by need for additional facilities. A more ambitious and larger opportunity may be to incubate new agricultural technology enterprises on Marion County farms. The County has already started on this, and there appears to be a strong

²⁹ Some departments, including attorney and courts, Health and Human Services, and Housing Authority may have additional needs.



ag-entrepreneur-tech ecosystem in the area.

Economic development opportunities in the eastern half of the county depend on major enhancements to water and sewer infrastructure. It would be economical to make these investments in conjunction with Army Corps of Engineers improvements to its reservoirs. And, that would also be an ideal opportunity to deploy broadband network assets, including conduit, fiber cables, and poles/towers. At the same time, it would be wise to position for market changes from the infrastructure enhancements. Business, property values, and traffic could all soar, although the impact will hopefully be more year-round.

The most obvious opportunities for the North Santiam River Canyon are related to outdoor recreation and tourism, including accommodations, food services, and retail trade. A relatively small investment in trail infrastructure and related facilities could expand and extend the visitor base. Natural resource innovation will almost inevitably involve smaller scale, more distributed and flexible activities. Opportunities in manufacturing and other basic industries in the NSRC will depend to large extent on these natural resource innovations. These could be directly linked to outdoor recreation and agriculture in the valley. Education and workforce should align with opportunities in the NSRC area but should also enable residents to be in-demand outside the area. Local employers would be able to find local employees, while local people would not be locked into working for local employers.

A broader opportunity is to approach the public lands as economic engine *and* environmental asset: How can the county as a whole best capitalize on them via technology? The answers may be difficult and non-obvious but transformative. As with opportunities in the western half of the county, the opportunities for NSRC depend on reliable, flexible, and high-capacity connections. Of course, development in the NSRC depends on waste water issues. Not only could the waste water development facilitate network deployment, the river and water have numerous issues—measuring flow and temperature, monitoring quality, etc.—that require connectivity. Indeed, complementary development across both halves of the county require such connectivity, too. The greatest value may come from connecting cities and rural areas, east and west, as well as anchor customers and beneficiaries in the state and federal governments.

All of these opportunities will require much greater bandwidth and connectivity for more, smaller enterprises; some concentrated in the cities but many scattered throughout the unincorporated county. Some will need minimal bandwidth, while others will involve rich interactive content. Maximum competitive advantage may be realized by connecting agriculture, forest product, and outdoor companies through value-adding activities on farms to small, agile, knowledge, and technology-based businesses in the cities. This would require innovations in accommodations and food services, health care and social assistance services, manufacturing, and other sectors, as well as natural resource sectors. It would also require new network platforms and software-based systems.



The consistent issue seems to be regulation and other barriers to entry. The regulatory issues are rather different between cities, unincorporated areas, and the NSRC area but they may interact to create major barriers to broadband investment. In the cities, permitting appears to be the primary issue, whereas land use that limits density is the issue outside the cities. Water quality regulations in the NSRC have impeded all development, including network development. Lack of regulation over railroad right-of-way access control is a countywide impediment to network deployment. While these regulations may have solid policy logic behind them, their impacts on connectivity—and economic development, by extension—were likely not considered.



Market Assessment

Every market has a demand side and a supply side. Stakeholder input reveals *why* broadband is important, as well as the barriers to and drivers of broadband supply. It suggests the supply is fragmented and limited and identified key barriers to infrastructure investment necessary to increase supply. Detail about demand and supply can only come directly from consumers and providers. This section reviews analysis of survey results and other research to identify what broadband services are available, at what costs, and how those services meet customer requirements.

Broadband Demand

Survey Responses

The Marion County Broadband Survey of households and organizations had a total of 871 responses (see Table 4), 550 of which were complete. Most of these (96%) were households. There was no sampling or selection process for respondents, so the results cannot confidently be said to represent the population. Instead, it provides an insight on the demand of and supply to key demographics.

Table 4. Overall Responses to the Marion County Broadband Survey

Responses		Partial	Complete
Total	871	332	550
Household	831	303	528
Organization	40	18	22

The results shown in Table 5 suggest the median age of persons represented by survey responses (i.e., all persons in the household, not just the respondent her or himself) was 40.5 years, which is substantially older than the County as a whole³⁰. The average household size of respondents was 3.7, whereas the population average household size was 2.7. Responding households tended to be larger than the size of households overall in the county, as show in Table 6, below.

Table 5. Size and Ages of Respondent Households

	Count	Max	Mean	Median	Mode	Min
Members	527	12	3.1	3	2	1
Youngest	514	80	32.0	26	2	1
Oldest	522	91	53.5	54	65	24

³⁰ The U.S. Census Bureau found the median age of persons in Marion County to be 36 years. Source: U.S. Census Bureau. *American Community Survey, 2012-2016 5-year estimate.* https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml



Table 6. Household Sizes of Respondents and Population Compared

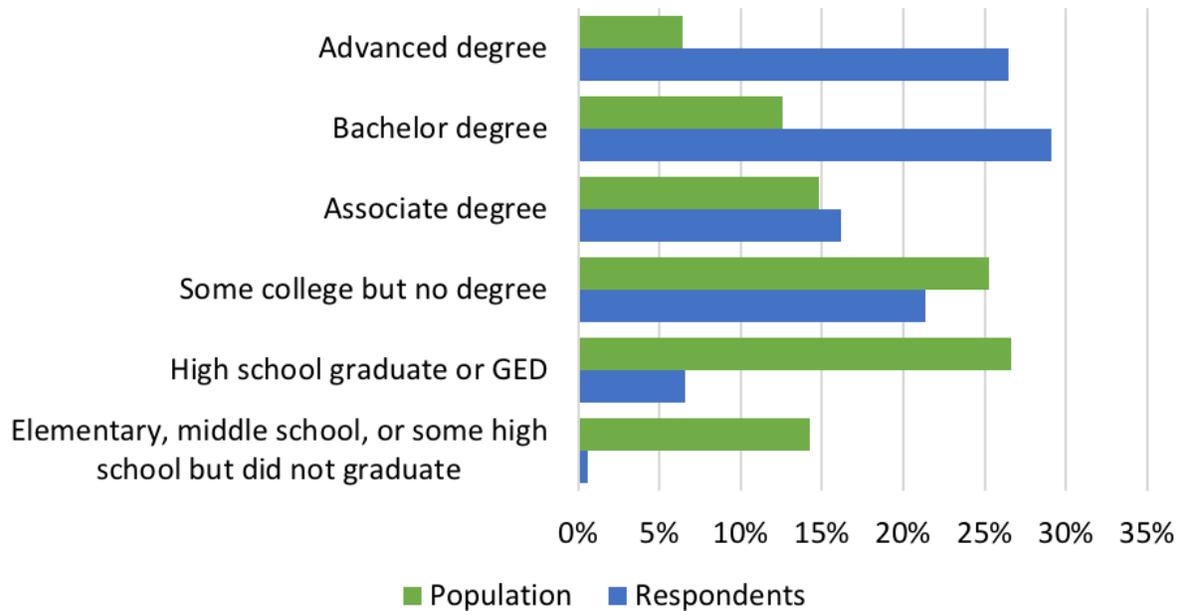
Persons in Household	Percentage of Respondents	Population
1	8.3%	25.3%
2	41.2%	33.5%
3	17.3%	15.6%
4 or more	33.2%	25.7%

As shown in Figure 5 and



Figure 6, survey respondents had higher rates of educational achievement, and were more likely to be in service, construction, and management occupations, and less likely to be retired, than the Marion County population.

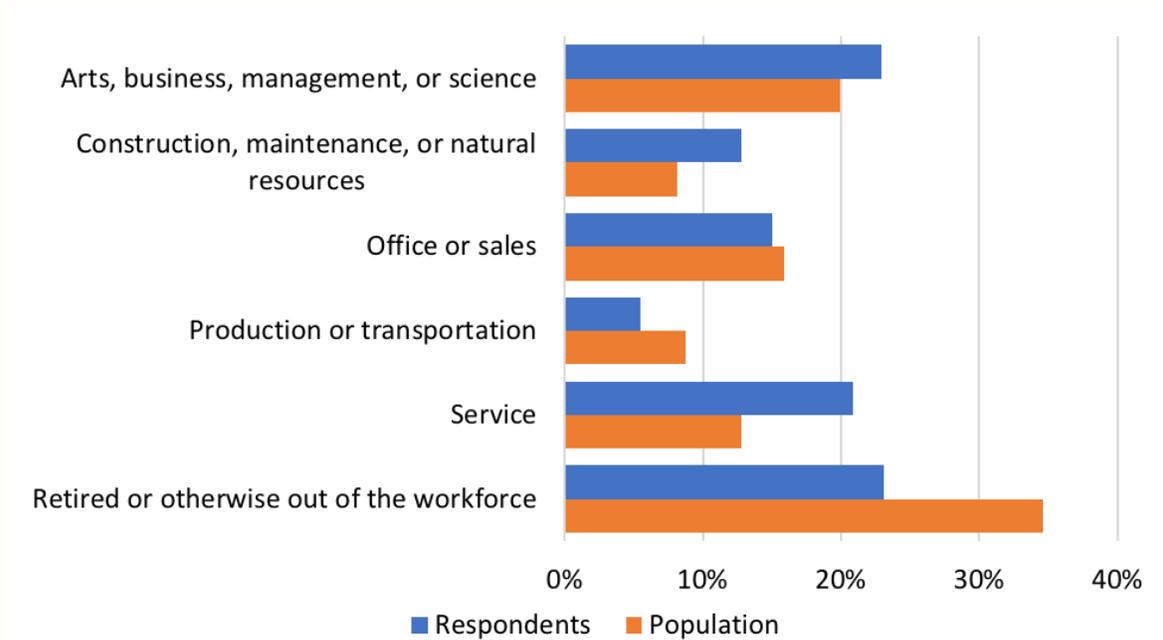
Figure 5. Survey Household Respondents' Educational Achievement Compared to 2016 Marion County Population³¹



31 Source: U.S. Census Bureau, American Community Survey, https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml



Figure 6. Survey Household Respondents' Occupations Compared to 2016 Marion County Population³²



Generally, the Marion County Broadband survey’s household respondents seem to be more middle-aged with kids at home than the County, overall. Younger and older households, and smaller households did not respond to the survey at the same rate as they exist in the population. A comparison of the geographic distribution of responses (by zip code) and population (by Census areas) suggests that responses was predominantly from areas outside Salem. Responses from the Silverton area were especially robust. The NSRC and Jefferson areas also had high response rates relative to county population. While the Salem area has nearly half the county’s population, less than one-fifth of responses came from that area.

³² Ibid.



Table 7. Geographic Distribution of Survey Responses and Population Compared

Area/City	Zip	Percentage of	
		Responses	Households ³³
Aumsville	97325	3.3%	2.0%
Aurora	97002	1.2%	1.9%
Brooks/Gervais/Mt. Angel	97305	5.0%	12.2%
Gervais	97026	0.7%	0.9%
Jefferson	97352	9.4%	1.8%
Keizer	97317	3.5%	6.8%
Keizer/Salem	97303	8.7%	12.8%
Mt. Angel	97362	1.1%	1.4%
NSRC area		10.4%	2.2%
Detroit	97342	4.5%	0.1%
Gates/Niagara	97346	1.0%	0.3%
Idanha	97350	0.2%	0.1%
Lyon/Elkhorn	97358	2.6%	0.9%
Mill City	97360	2.0%	0.7%
Salem		18.2%	39.7%
Salem	97301	9.2%	16.1%
Salem	97302	6.7%	13.8%
Salem Central	97309	0.4%	0.0%
Salem West	97304	1.9%	9.8%
Salem Southeast	97306	5.5%	9.6%
Scotts Mills	97375	1.9%	0.4%
Silverton	97381	22.5%	4.8%
St. Paul	97137	0.4%	0.4%
Stayton	97383	2.2%	3.2%
Sublimity	97385	1.1%	1.1%
Turner	97392	3.6%	1.7%
Woodburn	97071	1.3%	7.9%

³³ Based on 2010 Census Summary, U.S. Census Bureau, https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml



Organization Responses

There were only 22 complete organizational survey responses, along with 18 partial responses. It is not meaningful to analyze organizational responses separate from households due to the low number of responses. However, the responses do tell us something about the respondents, so organizational responses will be analyzed with a clear statement of respondents' particular characteristics. On average, responding organizations have just under two locations and just over eight employees each, as shown in Table 8, representing 181 employees in 42 locations, total. Eight-size percent of respondents' organizations were headquartered in Marion County.

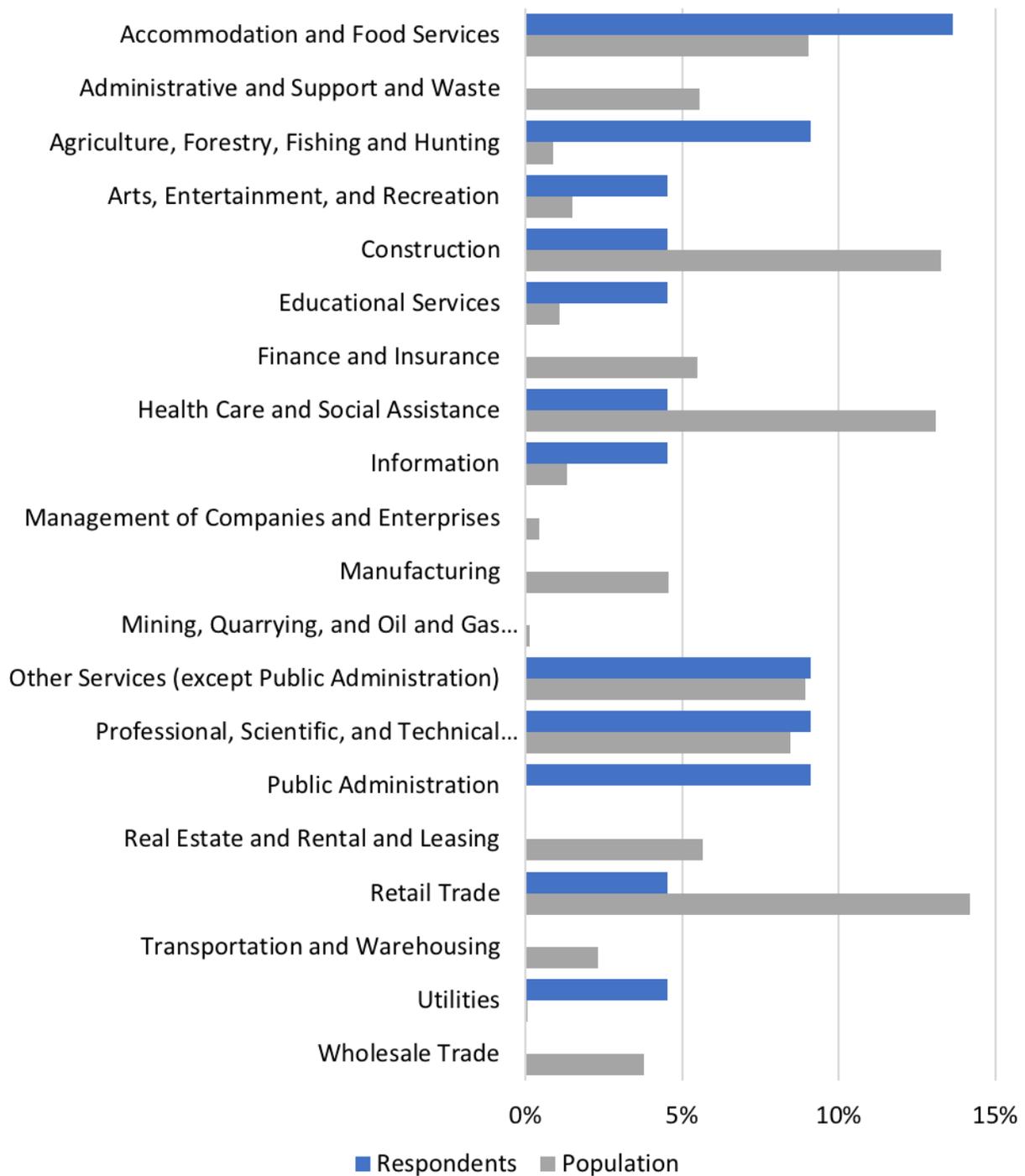
Table 8. Size Statistics for Organizational Responses

Responses	Count	Max	Mean	Median	Mode	Min
Locations						
Marion County	42	22	12	1.9	1	1
Total	25	18	6	1.4	1	1
Employees						
Marion County	181	22	32	8.2	5.5	10
Total	148	19	32	7.8	5	1

The survey had relatively high response among accommodations and food services, public, agriculture and natural resource, educational services, arts, entertainment, and recreation, and information sector organizations. Figure 7 shows how survey response rates compare to the percentage of establishments in various sectors. The level of responses was about the same as the proportion of establishments for other services and professional, scientific, and technical services sectors. The response rate was low—absolutely and relatively—among administrative services, finance and insurance, manufacturing, real estate, transportation, and wholesale sector companies. Health and social services and retail trade sectors also had relatively low response rates.



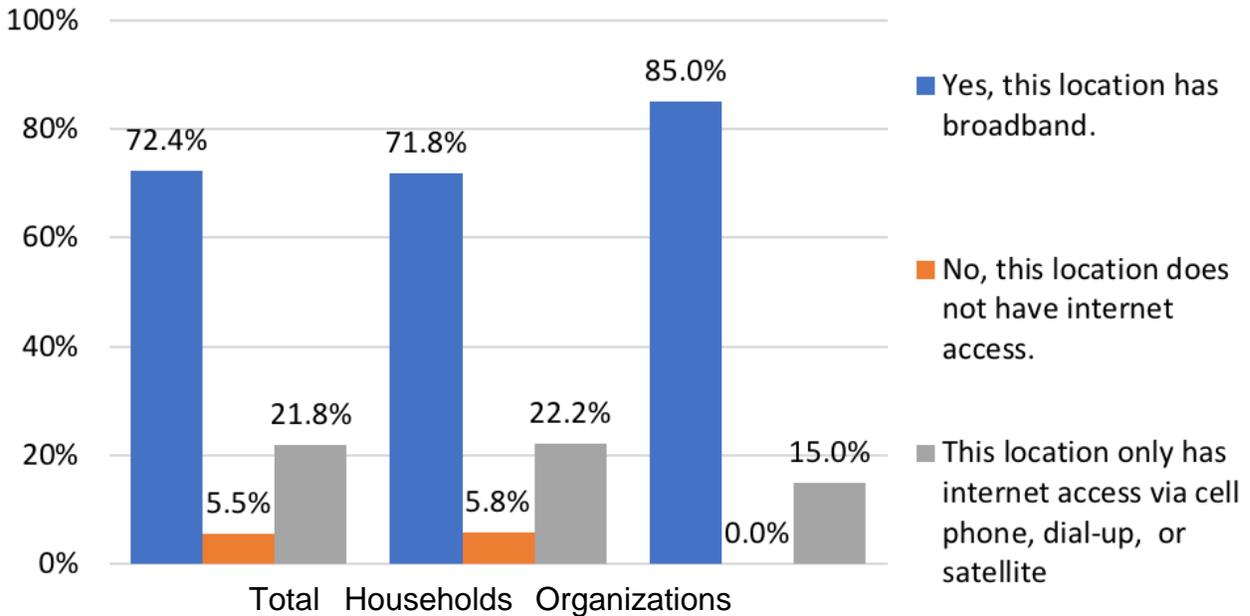
Figure 7. Organizational Responses and Marion County Industry Sectors Compared





Broadband Demand Indicators

Figure 8. Responses by Type of Respondent and Internet Connection



Most respondents (72.4%) had broadband. Over a fifth had internet access only via low speed connection (15% of organization), and over five percent had no internet access. Respondents paid an average (mean) of \$68.68 per month for broadband only, and \$101.95 for broadband and all related services (telephone, television, etc.). Most people pay less than the average, with some (businesses) paying rather high amounts.

Table 9. Service Costs Compared

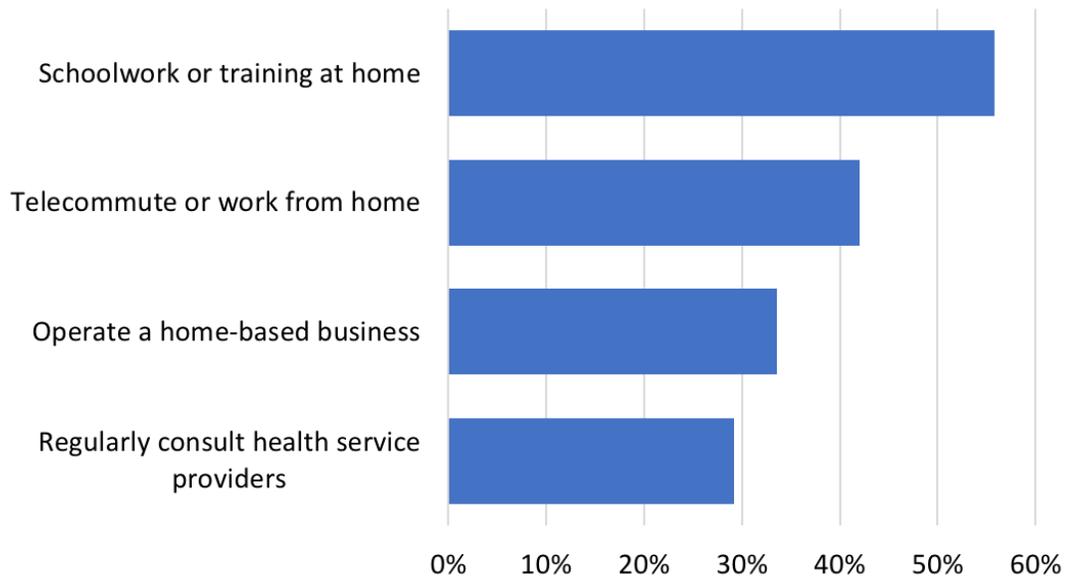
	Responses	Max	Mean	Median	Mode	Min
All Services	432	\$900.00	\$101.95	\$82.99	\$100.00	\$9.95
Broadband only	428	\$900.00	\$68.68	\$60.50	\$50.00	\$8.00

Household Demand Factors

For households, demand is correlated with age and education; other factors are activities carried out in the home. Over 50% of households contain people doing schoolwork or training at home. More than 40% work from home and about a third have home-based business. Well over a quarter regularly consult healthcare providers. Homes with broadband averaged 7.4 connected devices each, while those households without broadband had an average of 5.2.



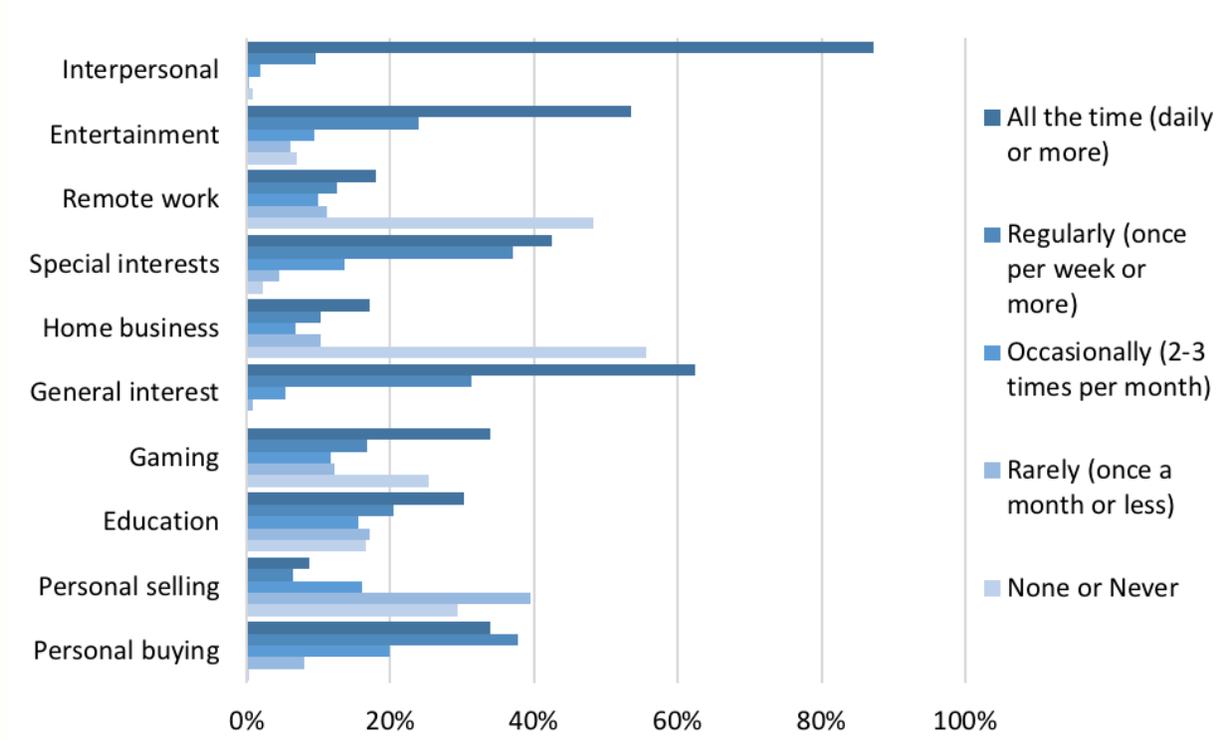
Figure 9. Activities in Respondents' Households (n = 536)



These activities translated into use, as show in Figure 10, which illustrates how frequently respondents said the internet was used in their households. Interpersonal communication (87% responded “All the time”) was the most common and largest use, followed by general interests (62%), and entertainment (54%). Just over half indicated that they never did home business and just under half said they never worked remotely. Households *with* broadband reported *never* doing these things electronically more often—23% and 18%, respectively—than those without. Approximately a third of respondents’ households have people buying, gaming, and learning online, each, at least daily. Households with broadband were more likely to have members engaged in entertainment, interpersonal communications, general education, and research. Overall, households with broadband were performing tasks online at least once a week, about a quarter more than households without broadband.



Figure 10. Household Uses of the Internet (n = 532)



Organization Demand Factors

Although relatively few responses came from organizations (4 % of responses came from organizations although organizations make up about 7% of the locations in Marion County), the results provide some sense of what broadband means for business. Digital technology enables organizations to perform and compete. As illustrated in Figure 10, at least half of all respondents felt technology was absolutely essential to every function except purchasing. It was reported as very important for buying by over 40%, and about 30% indicated it very important for outbound logistics and sales. Overall, it was least important for production, support and maintenance functions.



Figure 11. Importance of Digital Technology in Various Organizational Functions (n = 22)

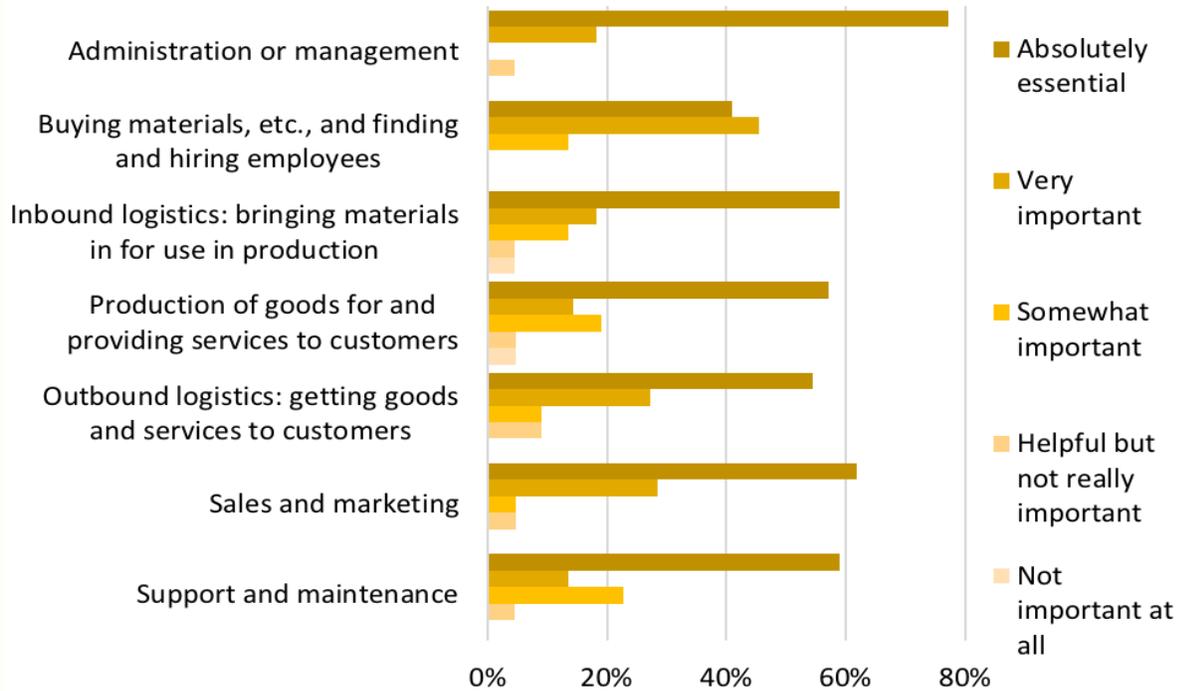
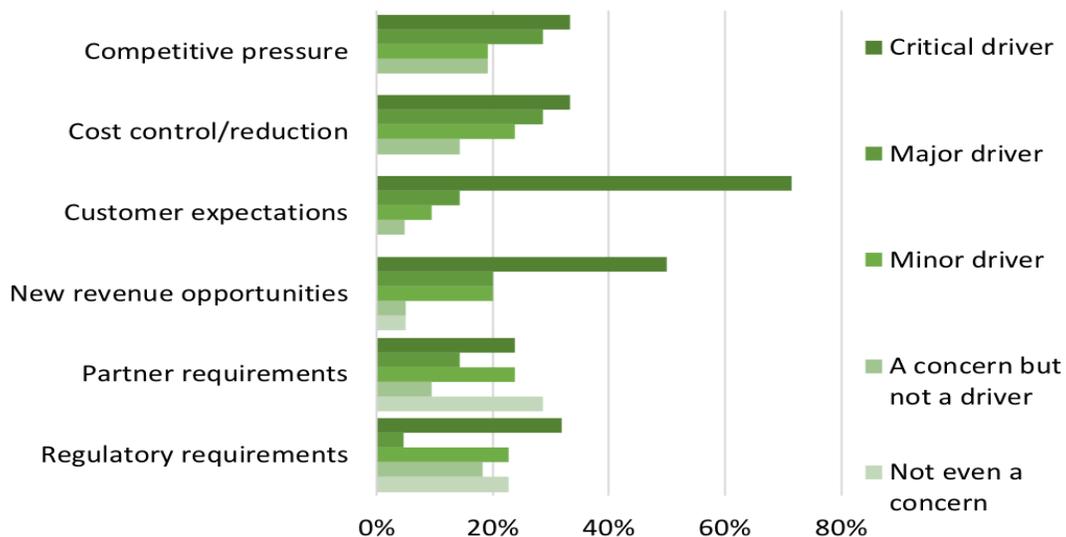


Figure 12 and Figure 13 show how respondents ranked drivers and barriers of spending on technology. Customer expectations was the strongest driver overall: Over 70% of organizations indicated this to be a critical driver. New revenue opportunities was also critical for half of respondents. Competitive pressure and cost control were substantial but less critical drivers, while partners and regulations varied with some seeing them as critical and others not an issue. No respondents selected competitive pressure, cost control/reduction, or customer expectations as “Not even a concern.”

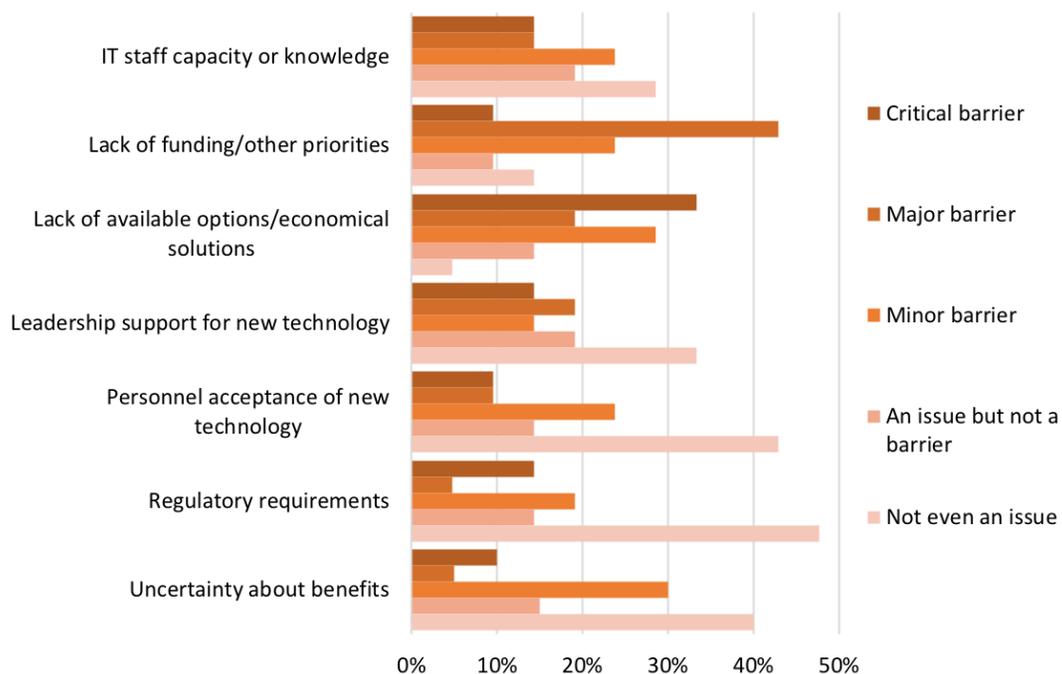
Figure 12. Drivers of IT Spending for Organizations (n = 21)





The biggest barrier for respondents was lack of solutions. Lack of funding was cited as a major barrier as often as lack of solutions, but only 9.5% of respondents found it (and personnel acceptance of new technology) to be a critical barrier. Regulations, personnel, and uncertainty were generally not seen as impediments to technology investment. Leadership support and staff capabilities were mixed: About a third of respondents did not see these as issues while 15% saw them—and regulation—as critical barriers.

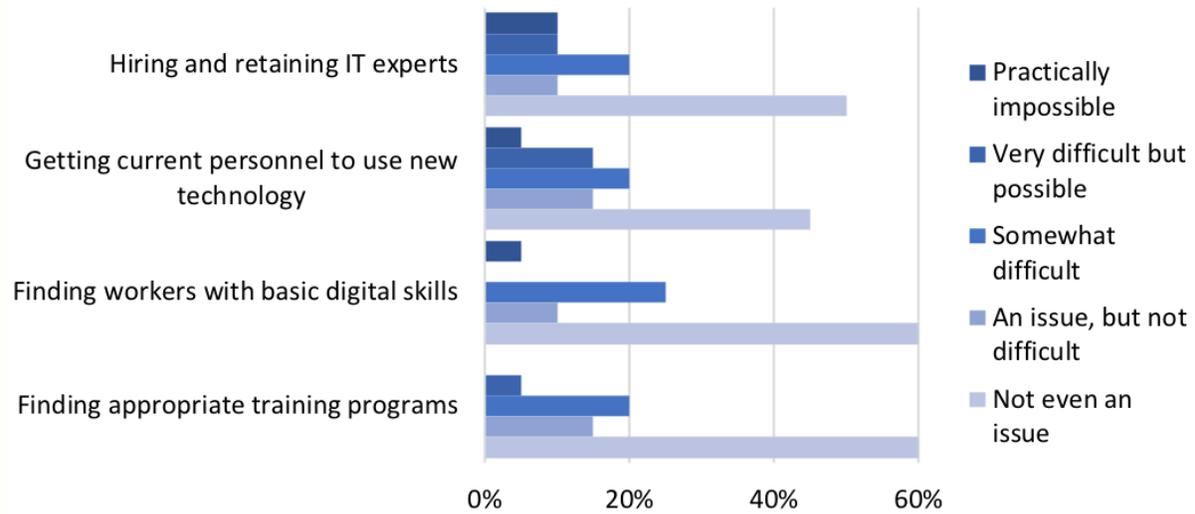
Figure 13. Barriers to IT Spending for Organizations (n = 21)



Most respondents did not have technology related-workforce issues, as shown in Figure 14. Prospective employees seem to have basic digital skills, and there are abundant training programs. Sixty percent of respondents did not even see these as issues (of course, this could be because they are not hiring and do not feel they need training). Getting current personnel to use new technology was something of an issue for about half of respondents. Twenty percent (20%) of respondents indicated that it was “Practically impossible” or “Very difficult” to get IT experts, and another 20% indicated that it was “Somewhat difficult.”



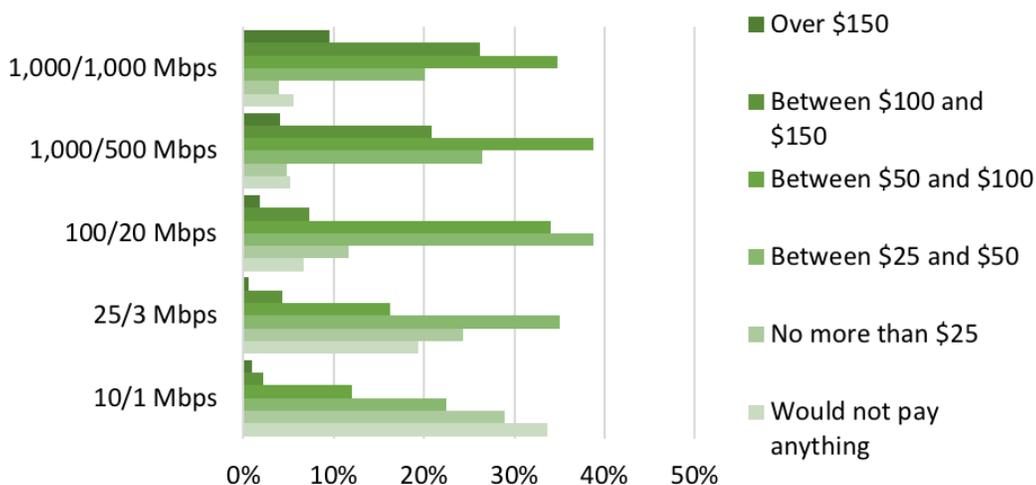
Figure 14. Technology-Related Workforce Issues Among Organization Respondents (n = 20)



Willingness to Pay

Respondents were asked about their willingness to pay for broadband from a provider with very bad service and one with very good service. Fully a third of household respondents and a quarter of organization respondents would not pay anything for non-broadband internet access. A third of household respondents would pay up to \$50 for basic broadband (25 Mbps downstream and 3 Mbps up), and nearly three quarters would pay that for fast broadband. A quarter of households would pay up to \$150 for gigabit service, and that increases 10% for symmetrical gigabit service. Organizations were even more likely to be willing to pay at least \$100 for gigabit services.

Figure 15. Willingness to Pay Among Household Respondents (n = 505)



A comparison between the percentage of respondents' willingness to pay for broadband overall and gigabit connection is shown in Figure 16. Willingness to pay nothing is cut



by almost two-thirds while willingness to pay at least \$100 per month increased 25%.

Figure 16. Comparison of Willingness to Pay for Broadband Overall and Gigabit Broadband

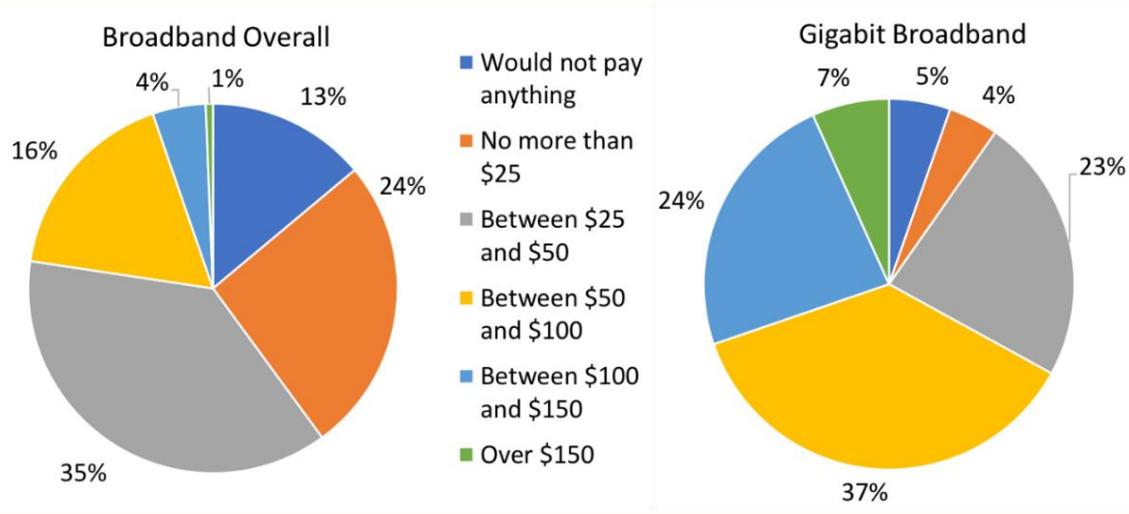
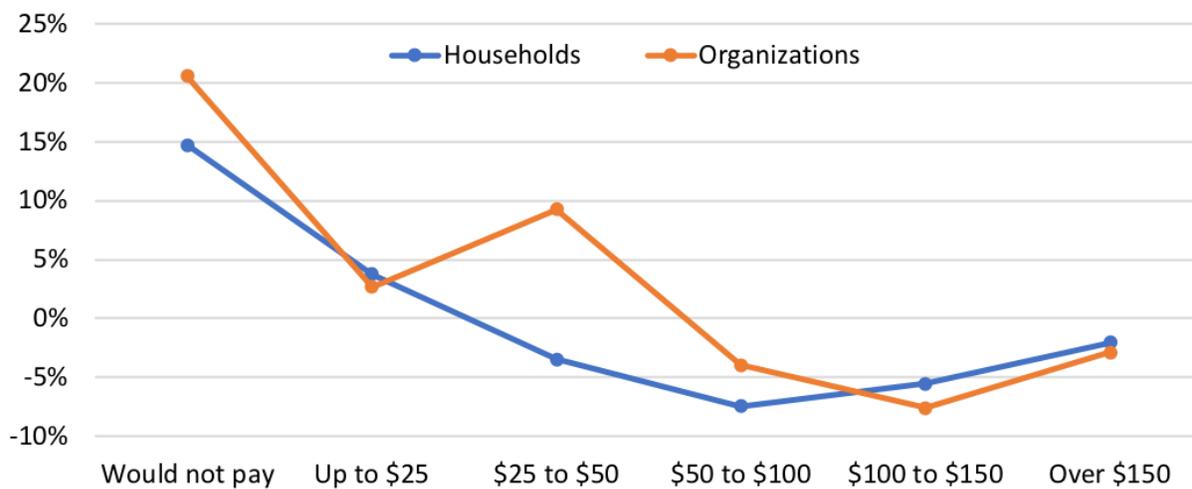


Figure 17 shows the differences between willingness to pay for good and bad broadband among households and organizations. Poor service would cause 15% of respondents to not take broadband at any price. Across all speeds, bad service reduced household willingness to pay between \$50 and \$100 for broadband 7.4%. On the other hand, good service adds 10% on of households on average that would pay between \$50 and \$100 per month for broadband, and would lead 10% more businesses to pay pay between \$100 and \$150 per month. While 35% of households indicated they would pay between \$50 and \$100 per month on average for broadband, for example, only 10% would pay that much if the provider had terrible customer and technical services.

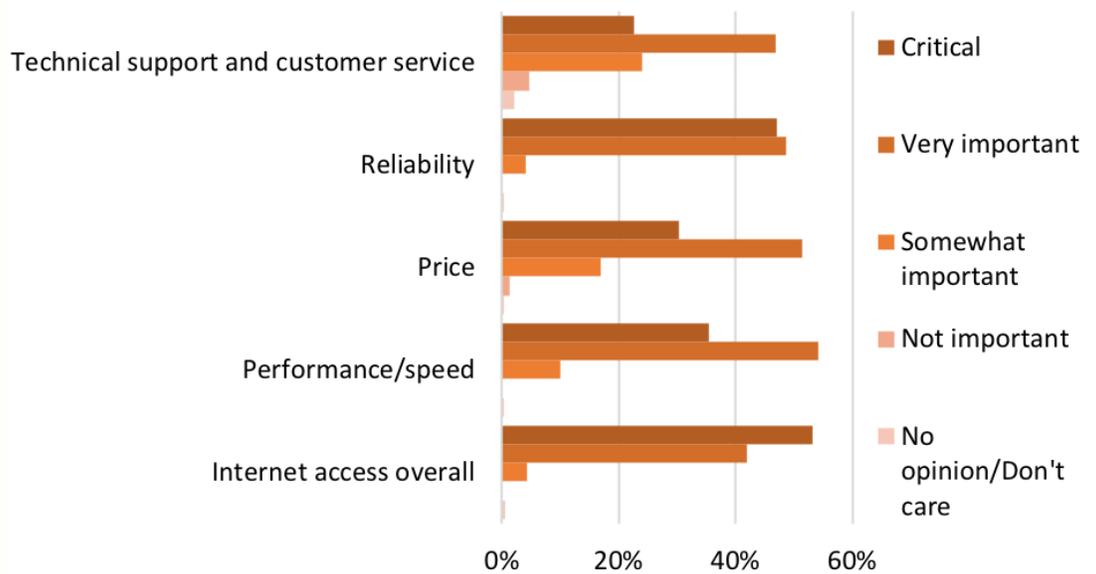
Figure 17. Impact of Poor Service Quality on Households' (n = 505) and Organizations' (n = 21) Willingness to Pay Per Month





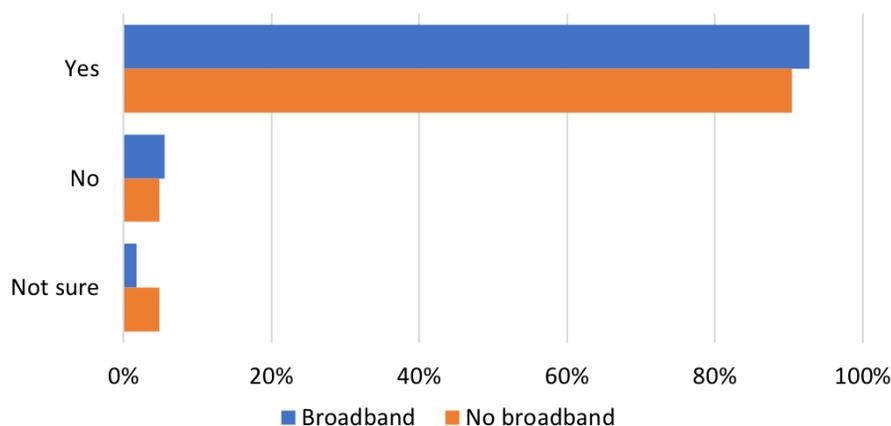
Backing up these figures, nearly 70% of respondents felt customer and technical support were critical or very important to the quality of broadband. Reliability was the most important characteristic, which 96% of respondents selected as “Critical” or “Very important.” No respondents indicated that speed, reliability, or internet overall were “Not important.” Over half felt price was a very important characteristic, only 30% felt it was critical, compared to 47% for reliability and 53% that felt that internet access itself to be critical.

Figure 18. Importance of Various Broadband Characteristics to Respondents (n = 395)



The majority of both those respondents with and without broadband indicated they considered internet to be an essential service. About 5% of respondents did not feel broadband to be an essential service. A larger percentage of persons (4.8%) without broadband were unsure about this than for persons (1.8%) with broadband.

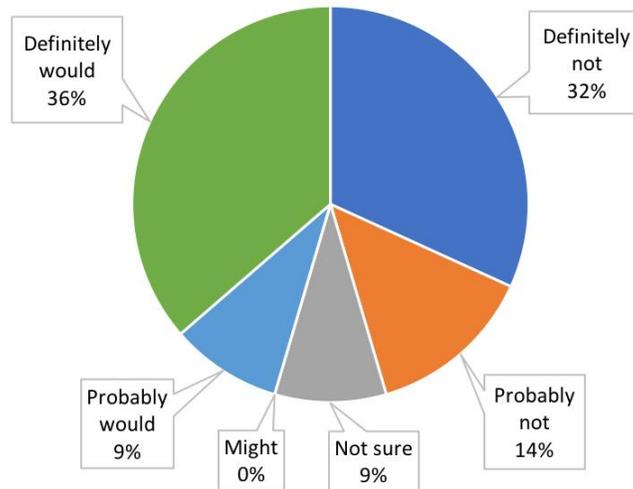
Figure 19. Respondents' Opinions about Whether Broadband is an Essential Service





The last demand indicator applied solely to organizations, of which there were relatively few respondents. Over half would move for better, cheaper, faster broadband, or were unsure. About a third said they definitely would not move for broadband. The same proportion—45.5% of responding organization—said they would and would not move. Just over 9% were unsure.

Figure 20. Respondents' Opinions About Whether Their Organizations Would Move for Better, Cheaper, Faster Broadband (n = 22)



Demand Summary and Conclusions

Marion County’s stakeholders, particularly in agriculture and education, are making substantial use of technology but are limited by poor availability. This was clear in the stakeholders’ discussions and survey results. Over a fifth of households and 15% of organizations had internet access only via low-speed connections, mainly because good broadband simply wasn’t available. Interpersonal communication, general interest, and entertainment are the major drivers for demand for households, along with school and work. Possibly the largest demand differentiator is video content, with many homes still using broadcast television while the majority has moved to streaming video. For organizations, it’s all about customers, revenue, and competitors but lack of solutions and limited resources, particularly IT expertise, can be big problems. Lack of broadband appears to limit some stakeholders’ access to development and growth opportunities.

Broadband Supply

Providers

Marion County has numerous broadband providers. Over twenty (20) companies nominally offer some retail broadband services in the area. Survey respondents had primarily five (5) providers, as illustrated in Figure 21. Comcast Xfinity and Wave are both “cable companies” while CenturyLink, Frontier, and SCTC are “telephone companies.”



Figure 21. Geographic Distribution of Marion County Broadband Providers

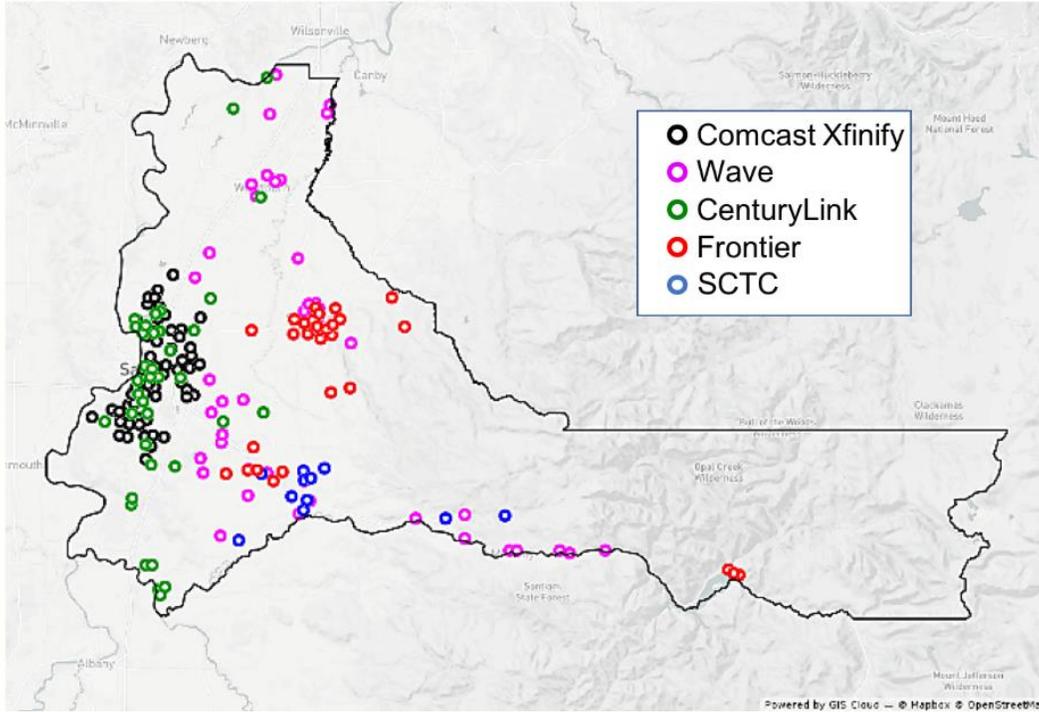
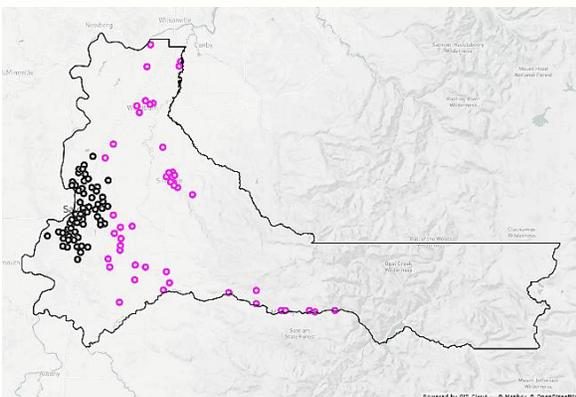
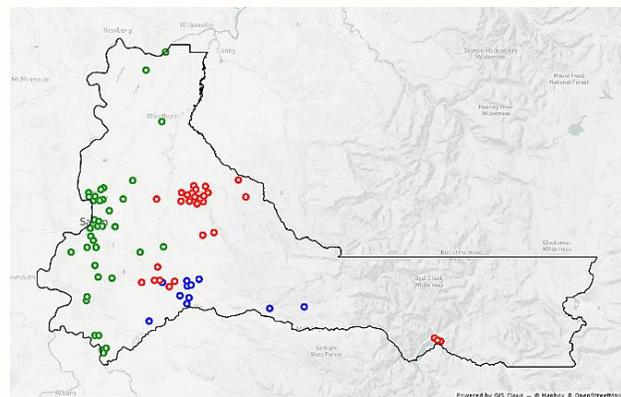


Figure 21 shows the distribution of responses by provider. Note the clustering of responses. The two (2) cable companies have different footprints, as do the three telephone companies. This is further illustrated in Figure 22 and Figure 23. The implication is that, although Marion County has numerous providers, most locations have, at best, a choice between two (2) providers, a cable company or a telephone company.

Figure 22. Geographic Distribution of Cable and Telephone Companies Compared
(Legend in Figure 21)



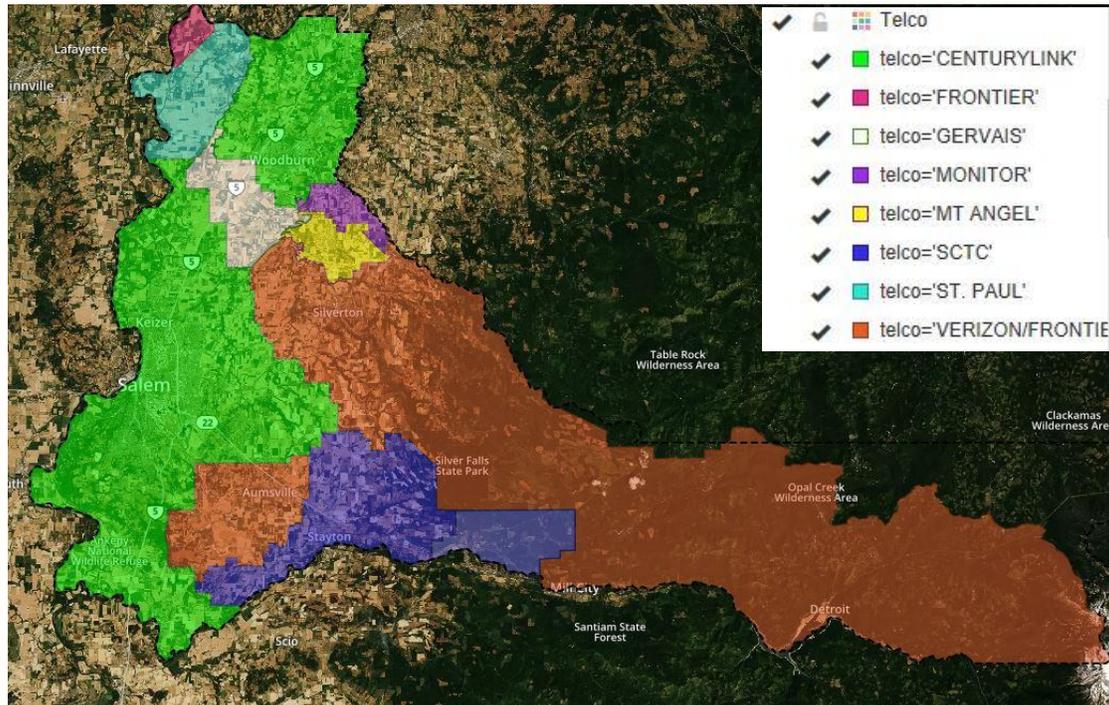
Cable Companies



Telephone Companies



Figure 23. Service Provider Boundaries in Marion County



CenturyLink (<https://www.centurylink.com/>) is a publicly traded old-line telephone company—originally founded as the Oak Ridge (Louisiana) Telephone Company in 1930—headquartered in Monroe, LA, that now provides telecommunications service in 37 states. Its current state is the result of numerous acquisitions, including former “Baby Bell” Qwest (2011) and Level 3 (2016). CenturyLink does provide service to many parts of Marion County, but has been slow in upgrading their aging systems in many parts to support 21st century broadband.

Comcast Xfinity (<https://corporate.comcast.com/>) is part of a communications conglomerate that includes NBC and Universal Pictures. Originally a cable television system operator, it grew through acquisitions including Time Warner Cable in 2014. It is headquartered in Philadelphia, PA, and now provides a full range of telecommunications, including enterprise network services and voice services. Comcast indicated that anywhere they provide services, they can deliver 1Gbps broadband. Their service is mainly available in the more densely populated areas and limited in rural communities.

Frontier Communications (<https://frontier.com/>) was originally founded as Citizens Utility Company in 1935 and began major expansion by acquiring GTE access lines in 1993. Other major acquisitions were much of former “Baby Bell” Verizon’s landline infrastructure (2010 and 2016) and Global Crossing (2001). It provides a full range of telecommunications services across New England, the Midwest, Southwest, and Western states. Frontier, like CenturyLink, has a mixed bag of services they deliver. In



some areas (as a result of their purchase of Verizon's network), they do provide Fiber to the Home (FTTH).

SCTC (Stayton Cooperative Telephone Company, <http://sctcweb.com/>) is a local telephone cooperative, founded in 1901. As a co-op, SCTC is owned by its customers (members) in its area. SCTC expanded its line of business into television with the purchase of Northland Cable Television in 1995, and extended its geographic reach by purchasing People's Telephone (Lyons) in 1995. These acquisitions made SCTC the dominant, if not only, provider in the NSRC area, offering broadband, cable television, security, and telephone services. SCTC deployed FTTH in the Stayton serving area, and extended service to Lyons and Scio in the Linn County area of the Santiam Canyon.

Wave Broadband (<http://wavebroadband.com/>) is a regional telecommunications company, serving California, Oregon, and Washington. It was founded in 2003 with acquisitions of three cable systems and is headquartered in Kirkland, WA. Wave has since grown by acquiring other, typically small and financially distressed, systems in the region. It was purchased by TPG Capital in 2017, which owns other regional providers in New England and Texas.

Other Providers include St Paul Telecom, Mt Angel, Monitor and DataVision (located in Woodburn and Gervais). These providers are similar in structure to SCTC in that they are rate-of-return carriers and receive federal USF funds.

Peak Internet is an ISP that is co-owned by CPI (Consumers Power, Inc.), an electric power cooperative, and telephone co-ops. Peak provides both last mile and middle mile services on an opportunistic basis in the area. They work closely with CPI for opportunities to provide broadband to CPI members. Peak provides connectivity for CPI's SCADA system. CPI serves Detroit and Idanha with power and may be willing to bring Peak to the area to connect its power assets as well as serve the community.

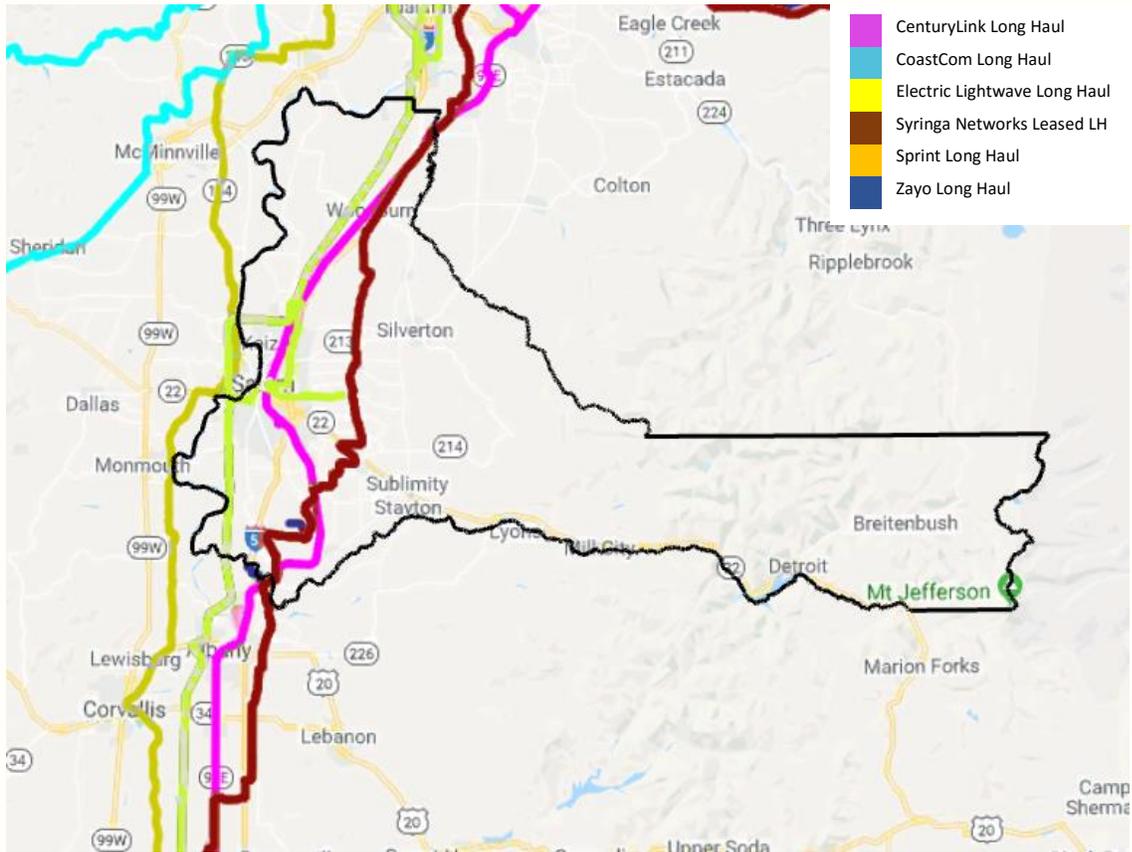
LS Networks (<https://www.lsnetworks.net/>) provides regional middle-mile and some local access services across Oregon and into northern California and southern Washington. LS primarily serves business and education markets.

Providers selected by less than 1% of responses were:

- Adaptive
- DirectLink Telecom
- Online Northwest
- Datavision Communications
- Alyrica Networks
- Monitor Telecom
- Peak Internet
- St. Paul Telecom
- Verizon
- Viser



Figure 25. Longhaul Broadband Networks in Marion County³⁵



³⁵ Source: FiberLocator



Connections and Service Offerings

Cable broadband³⁶ has effectively half of the broadband market, as shown in Figure 24, and DSL serves just over a quarter. Seven percent (7%) is fiber. Just over a quarter of households and 15% of businesses do not have broadband. Three quarters of the those—158 respondents, or 18% of all respondents—have no broadband because it is not available, and over a third of those with no broadband felt it was either too expensive or did not perform adequately. A substantial portion (8%) indicated that smartphone met their needs, and 2.3% simply didn't need internet.

Figure 24. Broadband Connection Types by Percentage of Respondents (n = 437)

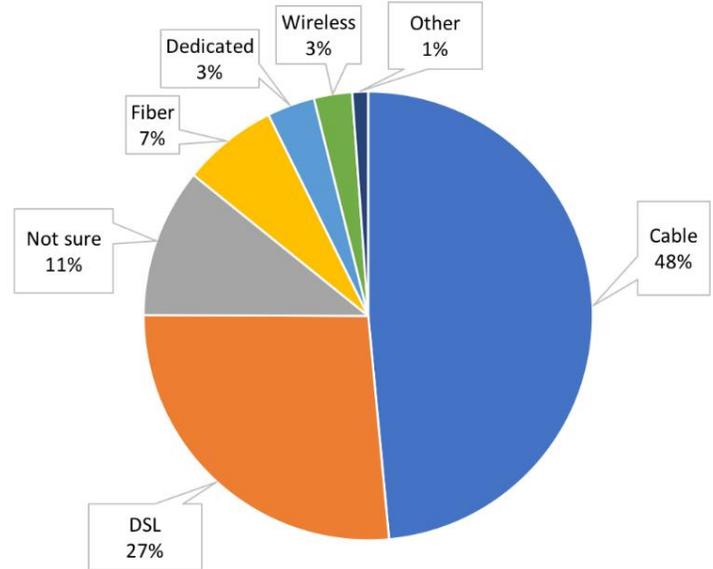
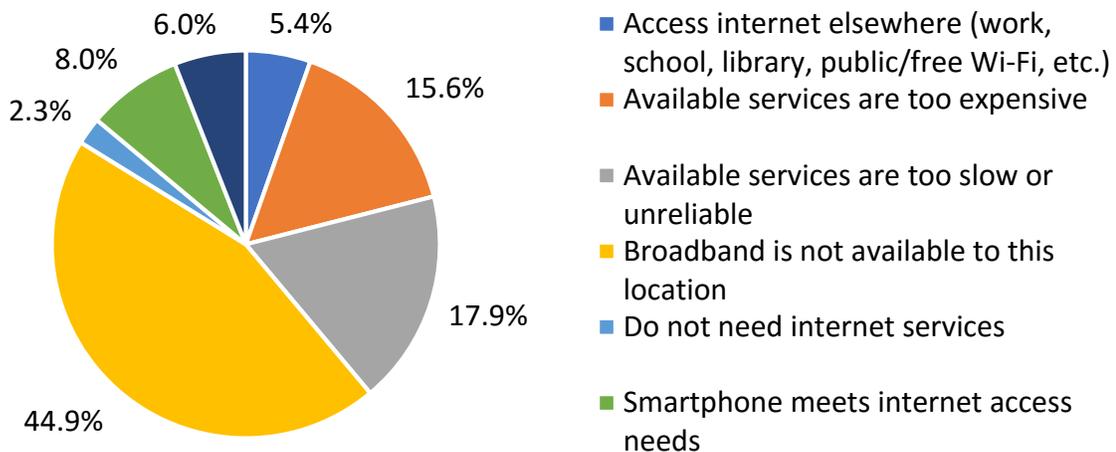


Figure 25. Major Reasons for No Broadband



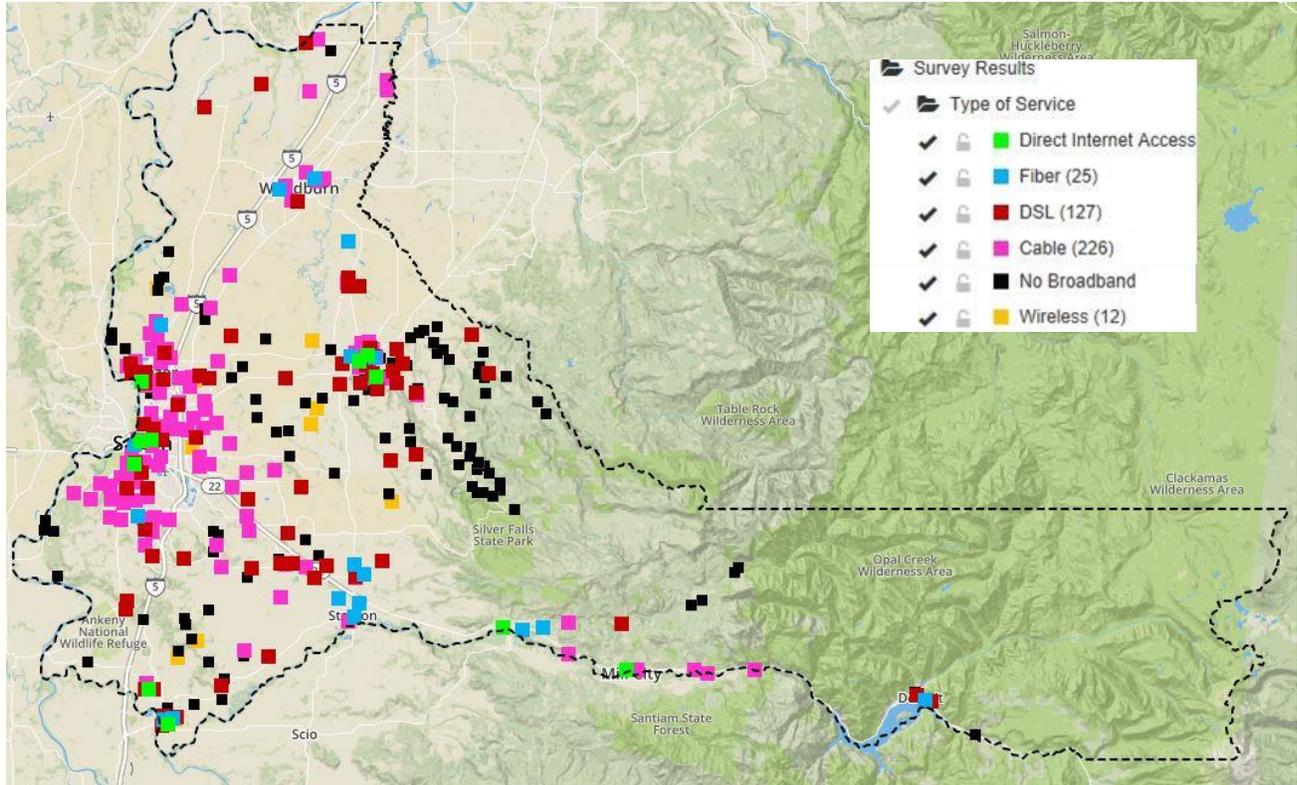
The availability of connections varies greatly across the county. Generally, connections are limited outside urban areas, particularly fiber-optic and dedicated connections, which are critical for industry. One respondent in Detroit indicated having a fiber-optic connection and 100 Mbps symmetrical service, but their test results (2.8/0.7 Mbps) suggest they actually have DSL. There are apparently no cable connections in the NSRC area past Mill City. The areas around Drake Crossing and Scotts Mills appears to have particularly acute connectivity shortages. Elkhorn and Idanha have essentially no

³⁶ Technically, Data Over Cable Service Interface Specification, or DOCSIS, the latest version of which (3.1) is capable of gigabit speeds but has limited deployment as of this report.



broadband. Areas along edges (near Aurora, Jefferson, and Keizer) and in the center of western Marion County also appear to have no or very limited broadband options.

Figure 26. Geographic Distribution of Broadband Connections, Including “No Broadband” Likelihood.



Through a federal grant, the Oregon Broadband Mapping Project collects and reports broadband Internet provider service areas for facilities-based providers in Oregon. The project team includes the Oregon Public Utility Commission, Oregon Department of Administrative Services, Oregon Business Development Department and is supported by the Oregon Department of Justice and multiple divisions within the Oregon Department of Administrative Services, as well as the National Telecommunications and Information Administration.

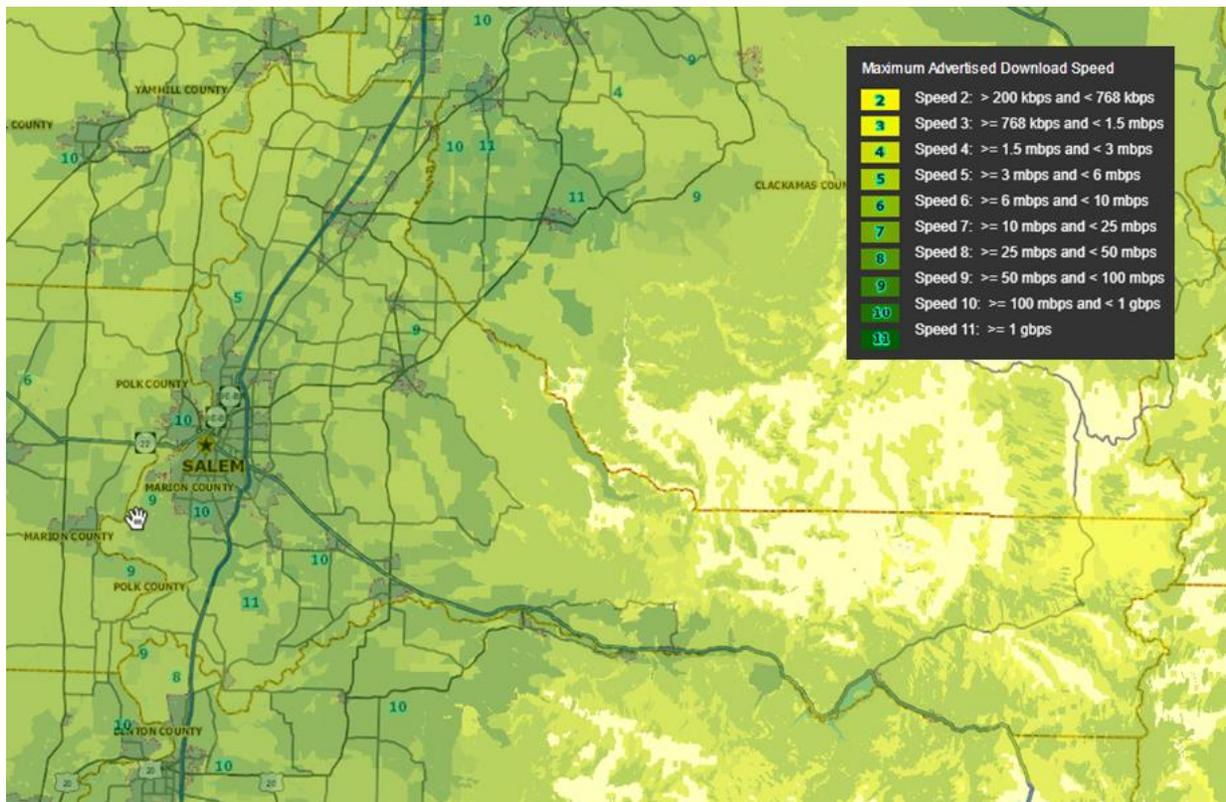
The project produced a statewide interactive broadband map in 2014 depicting many data layers, including broadband availability as self-reported by service providers. The interactive broadband map can be found at <https://broadband.oregon.gov/StateMap/>.

Figure 27 below depicts broadband penetration in Marion County as reported by the Oregon Interactive Broadband Map. Although the data is self-reported by service providers and may be inflated toward higher broadband availability, this map supports the online survey responses for connection type as shown in Figure 26 above. The service types, based on the bandwidth they can support, align with the breakdown of bandwidth availability by area. The map shows maximum broadband speeds tiered by color and by number.



In general, this data shows bandwidth in the County to be between 1.5 Mbps to 25 Mbps (indicative of DSL service). Greater bandwidth at 25 Mbps to 50 Mbps (indicative of short haul DSL or cable service) is available in urban and suburban areas in Salem/Keiser, Silverton and Woodburn/Gervais, as well as cities along North Santiam Highway (Hwy 22), Mill City and Stayton. Small pockets of 50 Mbps to 100 Mbps and 100 Mbps to 1 Gbps (indicative of cable or fiber-based solutions) can be found in a few areas, typically around urban centers and suburban areas in the southwest portion of the county, Mt Angel and Woodburn/Gervais.

Figure 27. Marion County Broadband Bandwidth Map

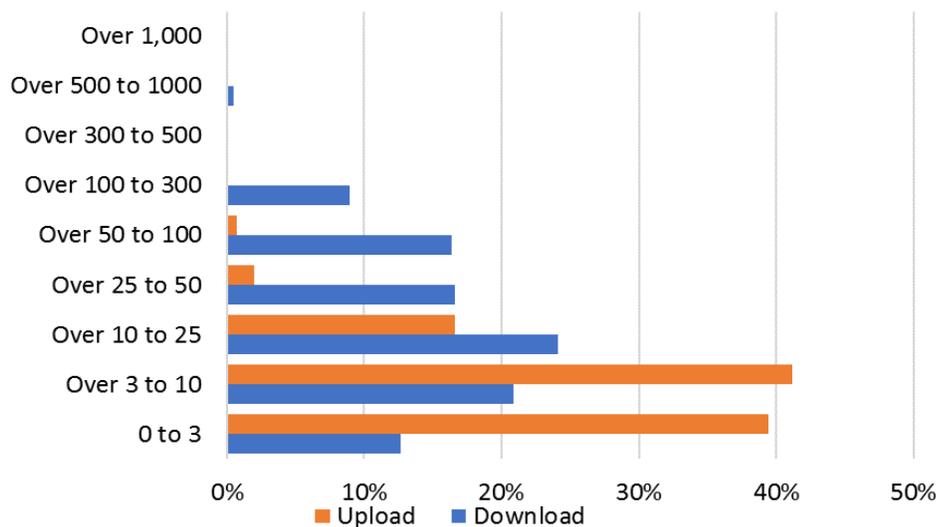


Costs and Performance

Retail service offerings include speeds as fast as 2 Gbps download and 1 Gbps up, but those are exceptions. The median speeds offered are 50 Mbps down and 20 Mbps up, with the averages of 177 Mbps and 117 respectively. The large difference tells us that most offerings are well below the mean. Minimum offerings are 1 Mbps down and 0.6 Mbps up. Similarly, costs are as high as \$4,000 per month, and as low as \$30. The median cost is \$75 and the average is \$160, so the distribution is not quite as skewed but most offerings are well below the average. Providers charge as much as \$16 per Mbps per month. Peak Internet, which serves Marion County, has the overall best deal—1 Gbps for \$79 per month, or \$0.04 per Mbps per month—but Peak currently only offers this service in Downtown Eugene via the municipal fiber network.



Figure 28. Respondents' Actual Broadband Speeds



Respondents are paying an average of about \$3.00 per Mbps per month, and getting an average total (downstream plus upstream) throughput of 32.4 Mbps. See Table 10 for details.

Table 10. Type of Broadband Connection, Including Average Throughput and Cost per Month (n = 437)

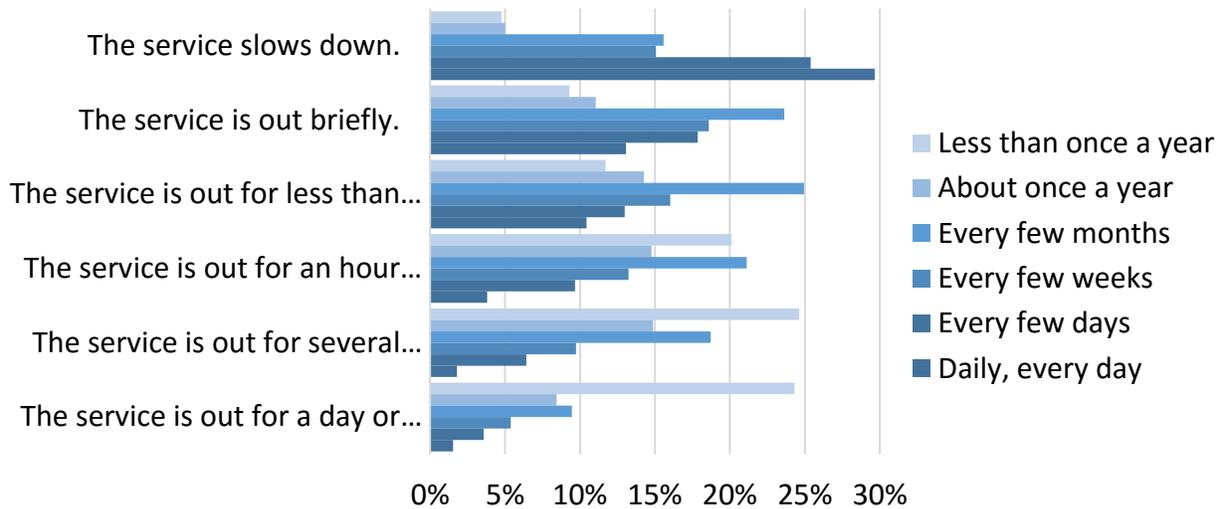
Connection Type	Responses	Average Throughput Mbps	Monthly Cost per Mbps
Coaxial cable	212	72.67	\$0.99
Dedicated line	15	35.25	\$2.10
DSL	116	11.10	\$5.49
Fiber-optic	30	40.80	\$1.70
Fixed wireless	12	19.38	\$3.87
Don't know/not sure	47	27.75	\$2.44
Other	5	19.42	\$4.33

In contrast, the average download and upload speeds reported by respondents were 40.5 Mbps and 6.3, and the medians are 18.2 and 5.6 so the distribution of actual speeds is not skewed as offered services, especially for upload: It's universally slow. Consider Figure 27: Eighty percent (80%) of services have upload speeds under 10 Mbps. No service has upload speed over 100 Mbps, and 90% of services are less the 100 Mbps download. This is not surprising considering only a fifth of respondents indicated willingness to pay over \$150 per month for broadband, and most of those would only pay that for gigabit services.



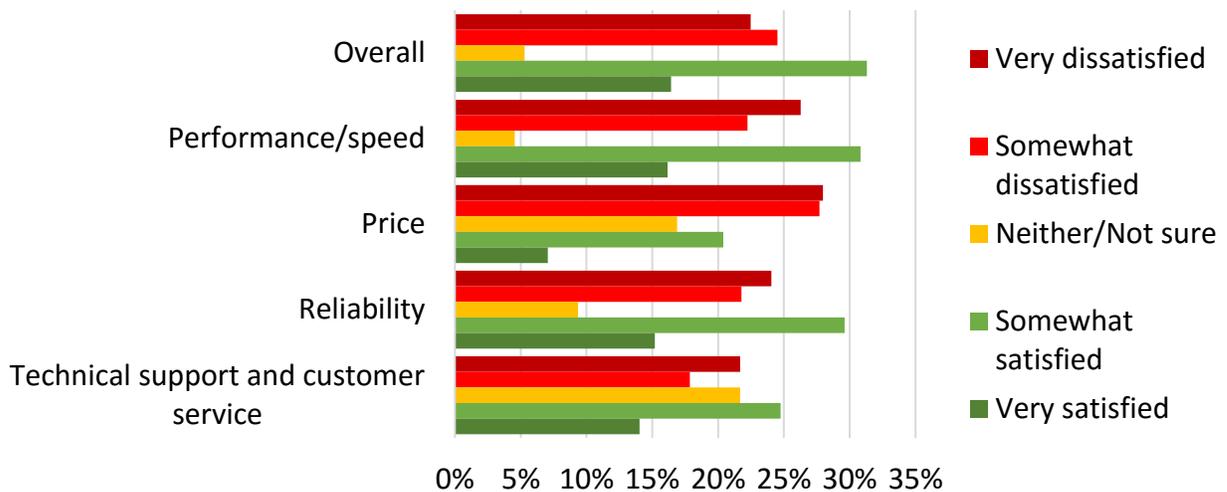
Cable broadband was the most popular, highest performing, and also the least expensive per Mbps. Nearly half of respondents had cable. They got about 73 Mbps on average and paid about 99 cents per Mbps. DSL was the second most popular but was the most expensive and slowest, delivering about 11 Mbps on average and costing nearly \$5.50 per Mbps per month.

Figure 29. Broadband Performance (n = 394)



A third of respondents indicated that their service slows daily, illustrated in Figure 29, and half indicated that they experienced service outages at least once a month. Broadband is out for a day or more at least once per year for 28% of respondents. The quality of service varies widely. Just under half of respondents were dissatisfied and satisfied overall. Other performance metrics had similar balance between satisfied and dissatisfied. The most dissatisfaction among respondents was with price.

Figure 30. Broadband Performance (n = 395)





Supply Summary

While economical, fast services are offered in the Marion County area, none of the respondents reported having these services. The price may just be too high. The average throughput of offerings in the range of respondents' average monthly spending (between \$60 and \$70) is less than 30 Mbps, including both download and upload. Respondents are actually getting less than 12 Mbps throughput on average for these prices. ***Not only are broadband offerings out of sync with customer demand, they fall far short of their bandwidth commitments.***

Actual services are geographically fragmented and inconsistent. This conclusion, clearly shown in the geographic distribution of broadband services, is reinforced by the number of nominal providers versus the actual market shares. A few areas in the County have fiber-based broadband available to them, particularly the Stayton area and Silverton from the incumbent telephone and cable company, respectively. It appears that the cable companies are beginning to deploy gigabit services (i.e., DOCSIS 3.1, see footnote 36), particularly in Salem.

Clearly, incumbent cable and telephone companies dominate the Marion County broadband market without any competition except within very limited areas. As is common, cable and telephone companies will “compete” with each other but not with other similar companies. ***Consequently, the best supply option is an expensive but reasonably high-speed connection or a cheap, slow connection.*** Other areas, particularly in the agricultural core, seem to have no option other than wireless. And, of course, remote sections of the County have no broadband, and much of it has no cellular data, either. Broadband supply is severely constrained across the county, in spite of abundance in some areas.



Findings and Opportunities

The current status quo is not good enough— technology is advancing rapidly and the County’s residents and businesses need to keep up. The result of inaction is likely to be a continued feeling of being left behind, already evident throughout the community. Not doing anything will yield the same issues the County is already grappling with today.

Broadband development aligns with—indeed, is a critical enabler of— Marion County’s economic development goals and strategic plans. Marion County is already seeking to build organizational capacity through collaboration between departments; adding a countywide broadband initiative to such processes as permitting will allow the County to further strengthen this collaboration. Strategic use of land is also among the County’s strategies, including building strategic infrastructure, which is precisely the goal of the incremental, opportunistic approach described in this Plan. Business opportunities, natural resource innovation, and fostering a great place to live are other County goals that will be the beneficiaries of this Plan, which seeks to attract and enable economic development, eco-tourism, and new residents seeking excellent quality of life and quality of work.

From a broadband perspective, Marion County has a number of strengths, which include strong and progressive leadership at the city and County levels that recognizes the growing importance of broadband infrastructure. Both the cities and the County are making support for broadband infrastructure a key priority. Marion County has proximity to Portland, Eugene and The Silicon Forest, and a tech savvy talent pool.

Political will is evident at all levels of government and there are multiple funding options. Broadband initiatives are being undertaken across the country and within Oregon itself, exemplifying that such endeavors are not only possible, but are sound investments for the futures of communities. The County should act upon the current environment of political will and funding opportunities now, while they are readily available.

Opportunities from broadband infrastructure are vast and derive significantly from connected devices and the Internet of Things. ***Marion County’s geographic location and talent pool can be the fuel for leveraging technology developments from precision agriculture and applications supported by 5G wireless deployment including sensor networks, Smart City applications, and autonomous and connected vehicles.*** Broadband infrastructure will support Marion County’s human infrastructure, including connectivity for education and personal improvement and advancement, and health care to support “aging in place.” To enable this support, a four key principles can guide the County: Strategic collaboration, innovation and creativity, supporting historical industries, and ensuring equitable access.



Strategic Collaboration

Leverage City/County Infrastructure and Purchasing Power

Currently, Marion County and the cities within it lease substantial broadband capacity at retail rates from various service providers. The County and the cities also operate and maintain fiber-optic network facilities of their own to interconnect city and County buildings and for other purposes including traffic management. Thus, the cities and the County have experience with fiber networking. The cities and County could use this experience with fiber-optic network operation to place their own fiber facilities and achieve significant lifetime savings, compared to paying continued annual or monthly lease payments to current providers. Investment in long term assets will reduce monthly costs and budgets. The dark fiber could also be used by other parties to expand broadband availability and affordability. Leveraging County and city purchasing power as an anchor tenant on a fiber network would drive widespread deployment of dark fiber in the long term to catalyze economic development. Diverse paths and redundancy would be created over time as well.

Infrastructure owned or managed by the city or County could potentially be utilized to support broadband. For example, Detroit has significant water main and sewer projects on the horizon, which provides opportunity for conduit and fiber placement. Public Works also may have some infrastructure on bridges or public rights-of-way. There also may be an opportunity to place wireless towers and antennas at County and city facilities to expand broadband, serving hundreds from locations such as rooftops of rural fire stations. State Parks do not have their own public safety system, which suggests the opportunity for a mutually beneficial opportunity to connect State Parks and public safety radio systems. However, fiber backhaul to County buildings in more rural areas is needed to support wireless deployment. While these are large potential opportunities, they would need to be vetted with stakeholders and for compliance with historic foundation requirements. For more detailed opportunities, see the separate report on efforts to provide broadband to the North Santiam Region Canyon.

Cooperation and coordination among both public and private entities are crucial to supporting opportunities. Related policy steps include implementation of “Dig Once” practices both at the County and city levels, along with placement of conduit that can be made available using the presence and purchasing power of the cities and County as anchor tenants to catalyze development. Coordination among cities and the County is also crucial for “Smart Cities” readiness, and this could start with the County and cities coordinating on Capital Improvement Plans to that end.

The County does not have a Dig Once policy. Guidance on Dig Once policy is desired by the County and cities, as well as standards and Guidelines for fiber builds they can adhere to including conduit size, bend angles, handholds placement, fiber counts, etc. During interviews and meetings with city staff, it was mentioned that dig once and joint trench policies are on the horizon, and guidance is desired around these policies, in general. See this Plan’s section on Broadband Policy for more information



regarding dig once policies.

Marion County and its cities could opt to invest the costs of such infrastructure being paid out every year as an operating expense into local capital projects within City and County rights-of-way to build a fiber-optic network capable of providing faster speeds at a lower overall cost of ownership. Cities and counties have the ability to take long-term approaches to capital investments because they tend to plan for decades of fiscal spending.

Today's investments in telecommunications assets would enable and support the local communities for the next 50 years, given the proper installation and maintenance. Not only will Marion County's telecom spend stay local, but it will permanently reduce Marion County's operating costs for decades to come, while expanding opportunities, and investing in locally owned and controlled broadband assets. These assets can be used to support community-based innovation, to support local industries and network/content providers, while generating other positive community benefits, and potential new revenue streams. The County would have the ability to make excess capacity available to the market, to support the broader goals of this Broadband Strategic Plan.

Electric Utilities

Collaboration to provide broadband internet access in Marion County with the several electric utility companies also presents an opportunity. ***Local power companies are investing and need network infrastructure.*** Consumers Power (CPI), for instance, has already expressed interest in collaborating on broadband projects for Detroit given they are the incumbent utility company and also a cooperative that wants to serve their customers. CPI is one of many providers serving Marion County. As is common to all electric utilities, many have constructed fiber networking throughout electric distribution networks for operational support purposes.

Marion County Municipal Broadband Projects

The City of Salem and the Urban Renewal Agency of the City of Salem is considering establishing City-provided/initiated broadband and/or free WiFi in downtown Salem in order to achieve various economic and social benefits. Consideration for establishment of these distinct City-provided/initiated services is currently limited to downtown Salem (designated by the Riverfront Downtown Urban Renewal Area (URA)). The City of Salem is seeking proposals from prospective contractors to execute a Broadband/WiFi Study that will help inform the separate decisions whether to implement the distinct services of City-provided/initiated broadband and/or free WiFi in downtown Salem, and if applicable, to develop a Strategic Business Plan for the recommended course of action that will maximize financial, economic, and social benefits to the City, the public, and the overall business community.



Special Note on State Provided Broadband Middle Mile Network

State Government/University Partnership

To better achieve their public policy and institutional missions, five public entities – Oregon State University, Oregon Health & Science University, the University of Oregon (including NERO), Portland State University, and the State of Oregon (through the Office of the State CIO) – have formed the Oregon Fiber Partnership (OFP) to jointly develop a new statewide network and a shared network services organization. Other partners include Oregon Health Sciences University, the University of Oregon, and Portland State University. The County can influence where the State network gets built moving forward. Current plans do not yet include fiber up HWY 22, but with the potential opportunities outlined for the region, the State may be influenced to consider this route for future expansion.

Common Purpose

Through the OFP, the partners intend to meet their shared need for a statewide network with the information-carrying capacity required to use new technologies (the Internet of Things, Big Data, etc.), which generate unprecedented amounts of data and offer the possibility of new insights into research and public policy challenges. The partners also seek to deliver more cost effective, higher capacity network services to their 600+ locations across the state, making it easier for those sites to collaborate, share information, and deliver services to the public in support of their missions.

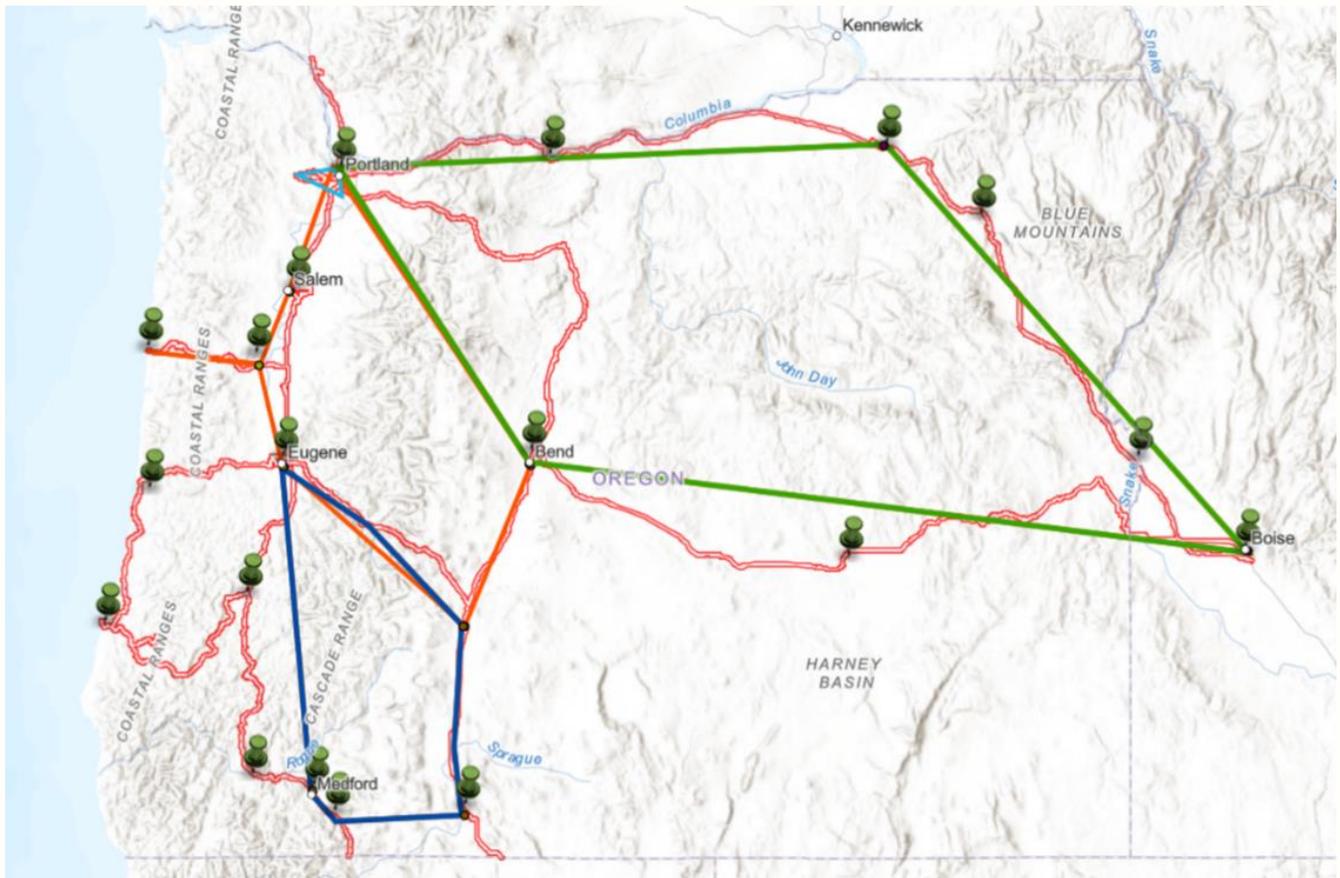
Broader Impact

In addition to meeting their direct needs, the OFP partners will also use the network and their contracts to improve the networking options available to Oregon's unserved and underserved local governments, K-12 schools, libraries, tribes, and health care organizations, many of which are located in the same communities as higher education institutions and state government offices. The OFP will collaborate with state broadband initiatives to help improve broadband access in Oregon's rural communities.

A conceptual map for this planned network are shown in Figure 31 below. ***Crucially for Marion County, the OFP does not currently have plans to add fiber along Highway 22 or through key agricultural regions.***



Figure 31. Oregon Fiber Partnership Network Map



Innovation and Creativity

There are numerous innovation opportunities for manufacturers to build technology into their products, to make them “smart,” which also leads to opportunities for new information and relationship-based services. This is true for other sectors, too, including cultural, health, and place-based services that are, by nature, location-aware. These opportunities have high potential impact because they drive demand for specialized technology products and services, creating opportunities for new technologies to be manufactured—or built, so as to include software and facilities—in Marion County. *The automation opportunities in agriculture, health services, and other sectors feed directly into opportunities to build innovative new products.*

Smart systems use a combination of highly customized and simple, standardized components, and they require careful design and regular upgrades. This creates opportunities for information sector companies, especially software developers and content services, which is relatively weak in Marion County, as well as small





hardware producers.

The key to all of these opportunities is “smart infrastructure,” which necessarily includes broadband—fiber and wireless—but also devices, data, and code. The County and local municipalities should determine where smart technology could benefit their communities and design infrastructure accordingly that supports smart technology for today and the future. The County and cities should consider their roles as data producers. Local government has numerous automation opportunities including Smart City applications for environment, lighting, parking, safety, transit, and waste management. Marion County also has opportunities to differentiate from other locales with technology. Deploying sensors, other monitoring technology, and controls in alignment with key sectors—agriculture, health services, recreation—to support local government functions multiplies the impact of technology investment. Engaging manufacturing and technology industries would further contribute to both the impact and the practicality of “smart” initiatives.

Marion County’s demographic and economic dynamics appear well-suited to smart infrastructure. Hybrid fiber-wireless infrastructure is a critical component that directly enables opportunities related to key trends. Rapid growth in the number of small health service companies, continued strength of manufacturing in revenue generation, and relative strength of local agriculture are key economic considerations in Marion County that should be supported by broadband. Even basic workforce demand such in sectors such as education and retail can be met with technology, to some extent.

Much of the economic activity in Marion County appears to be in private homes or other small facilities. More connections among and between these spaces are needed, especially among home-based businesses, entrepreneurs, independent professionals, and telecommuters. ***Marion County should consider infrastructure and land use in terms of smaller companies with less dedicated space. Technology can enable that process.*** Online tools such as social media and videoconferencing allows these small companies to collaborate digitally, provide feedback and input, and connect with potential customers across the globe. As with other applications and opportunities identified here, the growth of small companies and individual workers requires extensive digital connectivity.

By deploying advanced technologies such as artificial intelligence and the IOT in conjunction with key local industries, the County and cities can boost the local knowledge base while minimizing risk. ***The opportunity here is to create a dialog among the stakeholders.*** Various sectors, including local government, are facing similar technology-driven issues and have similar technology-enabled solutions. Dialog and strategic partnerships allow innovative capabilities to be shared across organizations and sectors, creating new business opportunities in the process.

Entrepreneurs and small businesses can have a huge impact in today's economy and Marion County can benefit from these groups in all industries. When entrepreneurs and small businesses have sufficient connectivity, they have the ability to support their work



skills, along with new innovation and technologies. Entrepreneurs and small businesses can benefit from smart city applications and technologies that result in public data collection. Public data can be used by entrepreneurs and small businesses for research and development on new and existing technologies which could allow the County and local municipalities to expand, attract, and sustain a technology driven workforce

Ultimately, the intelligence behind the infrastructure, and which uses it to solve problems, is human. ***Broadband connects people.*** The fundamental opportunity for Marion County may be to facilitate a profound new form of workforce development that equates directly into economic development. ***By fostering gains in knowledge and improvements in skills, the local public sector could promote new business opportunities while increasing capacity to meet residents' critical needs.*** The challenge is to find common interests and complementary needs at a household and even individual level—and at the start-up or micro-enterprise level—and translate those into larger-scale opportunities. For Marion County, tech innovations across agriculture, recreation, agri-tourism and manufacturing are all strengths the County should capitalize on for economic development.

Supporting Historical Industries

The data suggest that workforce is a major issue in Marion County. Unemployment is very low, there is strong employment growth in key sectors, and wages are rising. An aging population exacerbates this issue as people leave the workforce and demand additional services. The general opportunity, therefore, is to increase worker productivity in existing industries within Marion County.

Agriculture is an important sector simply due to Marion County's strength relative to the nation. Service industries are overall important in terms of employment. Knowledge and relationship-intensive service sectors such as educational, health, professional, scientific, social, and technical are growing strongest. Additionally, these sectors are seeing strong wage growth. Health and social services are also on the entrepreneurial and enterprise vanguard of more, smaller establishments. Manufacturing remains a core part of the County's economy due to its employment and productivity, especially because most of this is exported, which brings capital into the area.

Agriculture is possibly the most well-positioned sector for innovation, with multiple opportunities. Demand for services is being met by more, smaller firms. The number of agriculture establishments is strong, and the area has relatively large amount of employment in this sector. ***Digital technology in agriculture enables increased productivity in smaller scale operations, with higher margins.*** The key is connection to markets: Many high-value agricultural products must be moved quickly to niche consumers and require careful processing. Broadband and related technologies are essential to this.

Manufacturing also stands to benefit from opportunities to improve processes and outputs with technology. ***Key product innovations can be enabled by digital design***



and production technologies. Prototyping is a general area of innovation opportunity, along with one-off or small batch production—essentially “artisanal manufacturing”—enabled by 3D printing hardware and modelling software. Manufacturers can also provide value-added service such as provide design, maintenance, and technical support services electronically.

Accommodation, arts, entertainment, food, and recreation have similar opportunities, especially in conjunction with local government: Technology can be a powerful enabler for having meaningful experiences and wayfinding. ***The challenge is to add digital content to places and products.***

Ensuring Equal Access

Outreach to stakeholders in Marion County presents clear evidence of a growing digital divide among its rural populations. With the technologies available today, some rural homes may not, for the foreseeable future, get 1 Gbps because the cost to deliver those services is simply too great for any one person, company or organization to provide. There may be some within Marion County that do not get affordable broadband comparable with what is offered in urban communities in the near future, if left to the for-profit providers alone. Instead, they will rely on satellite services or other slower forms of broadband.

However, broadband in Marion County is far from a lost cause. Through dedicated planning, realistic expectations, and sustained effort, there are means by which the County can help ensure equitable access. Many of the smaller incumbent providers are doing an admirable job in providing fiber-based solutions into remote areas through the assistance of Universal Service Funds. Meanwhile, the North Santiam Region Canyon opportunity could be a catalyst for securing robust broadband in Marion County as noted in the separate study/report for that region. Additionally, there are several best practices to enhance these efforts, some of which Marion County and local organizations are already engaging in. These include working with local internet service providers to promote affordable home-based broadband for lower income families, sponsoring Youth Tech programs that aim to increase students’ digital literacy, and offering free Wi-Fi in schools, parks, and other public areas. Details on such practices can be found in the Recommendations section of this report.

These best practices should continue to be encouraged, further developed, and publicized. Many times, getting the word out is half of the battle, as in today’s society word is spread through social media and the internet, which may not be the most effective tool in reaching those that are living in “the divide.” To address these issues, the County and its partners must meet citizens where they live through outreach such as community meetings and other non-digitized mediums.

A Business Model that Fits

There is no single right answer when communities consider their role in broadband



development; each community might take a different approach depending on its unique needs and capabilities. Generally, ownership and control of public assets gives local governments tools to work on a variety of issues, from economic development to environmental sustainability.

While the private sector will always have a role in providing the next-generation broadband experience, the buildout of strategic assets such as fiber middle-mile networks may ultimately lie with local government. This Plan finds that there are key issues in Marion County caused by lack of access and availability of broadband assets and infrastructure, even as rural Marion projects are being built on the backs of investment by residents/taxpayers, and state/federal funding programs, like the Federal Connect American Fund Phase 2 (CAFII).

Business models for local government to address such issues vary widely (see Appendix B for a full examination of available business models and case studies). The table below illustrates some of these options, ranging from low-risk, low-reward models on the left to higher risk, high-impact models on the right.

Table 11. Range of County Roles for Broadband Development
County Role

	Traditional	User	Catalyst	Provider
Broadband Investment	None	Limited; inter-building	County-wide middle-mile backbone	County-wide carrier-class network
General Activity	Regulate development	Drive development (as a consumer)	Coordinate, facilitate, support development	Develop public broadband service
Goals	None; maintain status quo	Bandwidth and connectivity for internal purposes	Tech-enabled development and improvement	Universal broadband access
Key Documents	Broadband-friendly policies	County and departmental strategic plan	Network vision and stakeholder requirements	Broadband business plan
Key Stakeholders	Builders, providers, and utilities	Department leaders, internal users	Community anchors	Business and residential customers

The fundamental role of local government is to facilitate activities, development, and services, including generating public revenue and providing public services, to meet residents' needs. All aspects of this are likely to be profoundly impacted by technology. County governments have the opportunity to create additional value by working for,



through, and with their municipalities and regional/state institutions; they are in the position to be connectors. ***With this in mind, Magellan Advisors recommends a balanced approach in which the County acts as a catalyst for private infrastructure investment with smart policies and consistent, incremental, targeted public investment toward a broad, practical vision.*** This Broadband Strategic Plan recommends Marion County make incremental investments in public broadband assets and partner with telecommunications and utility companies to use those assets for deploying broadband.

Marion should look to replace its current telecommunications operating spend by instead funding a long-term capital project to build a County owned/shared fiber middle-mile network. The network over time will connect more County sites, at a lesser overall total cost of ownership, while at the same time providing much needed fiber capacity to areas and major corridors of the County. Over time, the County through its Broadband Program can incrementally expand as new opportunities or needs arise. This Broadband Strategic Plan outlines a “new option” for Marion to consider, which has the potential to cost less, while providing much greater benefits to the region over time.

The County and its local governments should take an approach that works for their individual communities. Public-private partnerships (P3s) should be considered to fund broadband projects. Broadband P3s are a great way to use public investment into critical infrastructure, with the industry perspectives of a private, or non-profit organization, who is focused on delivering a retail telecommunication service, or “utility” to a region’s constituents.

What is a Public-Private-Partnership?

A broadband public-private-partnership is a negotiated contract between a public and private entity to fulfill certain obligations to expand broadband services in a given area. In recent years, P3s have been increasingly implemented as more local governments employ public broadband and utility infrastructure in conjunction with private broadband providers. P3s leverage public broadband assets, such as fiber, conduit, poles and towers, buildings and other facilities with private broadband provider assets, and expertise to increase the availability and access to broadband services. Local governments forgo “getting into the business” of providing retail services and instead, make targeted investments in their broadband infrastructure, and make it available to private broadband providers with the goal of enhancing their communities. In this type of model, Marion County would be considered an Infrastructure Provider, operating a BIP. The County would maintain permanent ownership interest in the broadband infrastructure (e.g., conduit, dark fiber, poles) that is funded by the County or its public partners for a fee, generally a negotiated revenue share paid by the provider, or fee per use.

A P3 would provide a competitive provider with access to a new market (such as the NSRC area) one that otherwise would be inaccessible for various reasons, such as the capital requirements to construct. Marion’s residents would benefit through access to a



new fiber-based service offering in which local decision makers have the ability to influence how the community is served. Finally, the County could negotiate a revenue share based on total revenues generated from the network or a simple fee for use model. This revenue would be used to maintain and expand the network as needed and can be earmarked for other community improvements as identified by County leadership.

What is Marion County's Role in a P3?

A P3 allows Marion County to move forward with deployment of next-generation broadband services throughout areas of the County using a “shared risk” model. Dedicated funding for rural areas of the County may be available through the use of a special district or CFD or zone of benefit. A “shared risk” concept would allow Marion County to direct its investments into broadband infrastructure, while leaning heavily on its private partner to focus solely on the execution of delivering broadband services. A P3 allows the County to own this very important asset, which connects its facilities and community partners to the rest of the digital world, while significantly impacting the local telecommunications market.

Under a P3, the County could leverage a possible County owned and operated middle-mile fiber or conduit network to bring fiber access to each of the residential neighborhoods and business areas throughout the County. While this is a major effort, using a coordinated approach and proper management framework, the County will be well poised to guide, and direct more targeted investment. It is recommended that the County consider the option to build and maintain ownership of all passive network infrastructure, including backbone conduit/fiber, and any distribution conduit/fiber that may be deployed to facilitate County connections.

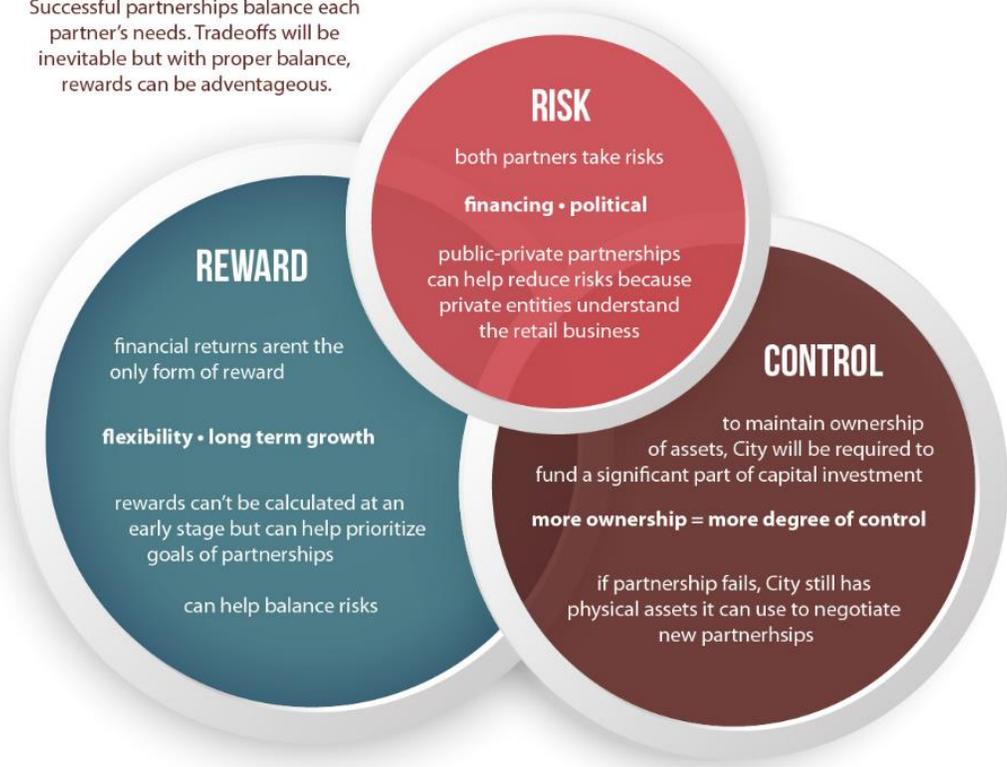
These partnerships, in a “shared risk” model, requires a careful balance between Reward, Risk, and Control. The County has the opportunity to decide what levels of each are appropriate for the potential investment, however, generally speaking the more Reward or Control Marion County would like, the more Risk it will be expected to shoulder. As outlined in Figure 32, below, concepts of Reward, Risk and Control are more fully explained.



Figure 32: Broadband P3 Partnership

BROADBAND PARTNERSHIP

Successful partnerships balance each partner's needs. Tradeoffs will be inevitable but with proper balance, rewards can be advantageous.





Broadband Strategic Initiatives and Recommendations

This Broadband Strategic Plan is meant to identify opportunities which the County can consider and execute to incentivize additional broadband investment throughout Marion County through either through direct public investment, and/or in developing key partnerships with industry.

The Roadmap and Action Plan provide the County with strategic direction and have been divided into two different sets of tasks, otherwise called Action Items; these include **ORGANIZING** and **EXECUTING**. In order for this Broadband Strategic Plan to be adopted and carried out successfully, key decisions around lead organization(s), governance approach, and internal/stakeholder organization will be required. Short Term Action Items have been identified to provide direction and guidance for the **ORGANIZING** stage and should be accomplished prior to investing or creating partnerships. For this reason, a series of Short-Term Action Items have been identified, and are intended to provide direction and guidance as it relates to **ORGANIZING**.

Time-sensitive near-term opportunities are available to be capitalized upon now.

The capacity of incremental, opportunistic strategies such as these are only as effective as the timeframe in which they are allowed to unfold. An earlier start means more opportunity, and projects such as the water/wastewater infrastructure expansion are current, readily available means to jumpstart this action plan.

Marion County has several opportunities improve broadband in the County and to prepare the County for future broadband growth and economic opportunities. The County should take a lead role in directing, encouraging, facilitating and championing the projects/opportunities identified below. The Federal Communications Commission has large programs which are intended to fund broadband deployment. These include:

- Connect America Fund (“CAF II”) funding is provided by the FCC Universal Service Fund to service providers. However, the actual timing and location of broadband deployment by these service providers is not known to the public, including any specific plans for Marion County.
- Universal Service Fund (USF) funding for schools and health care providers, through the E-rate program and Health Care Connect program.
- The USF also includes a “Mobility Fund” designed to expand wireless broadband capacity in unserved and underserved areas.
- Leverage low income housing funding, which requires “broadband” be offered to tenants. Tax credits require a condition that low income housing offer “broadband.”



A grassroots movement to secure broadband is not a short-term, overnight effort. It does require a coordinated, consistent and motivated plan. It will take time.

Windows are often open when broadband efforts can make progress, including advances in new technologies, new grant funds becoming available, new construction projects happening, natural catastrophes highlighting the negative impacts of lack of broadband, or changes in the political environment. Smart planners should look for these windows and be ready to act when these opportunities present themselves.

Marion County should continue to have staff assigned to programs, specifically to rural and municipal broadband coordination efforts. The staff would be responsible for identifying potential communities that need broadband and then coordinating internal and external efforts to help drive everything required to get broadband for that community. These staff members should know how to navigate the political and commercial environment on behalf of the community in getting the appropriate broadband for their needs. In many instances, a Broadband Program Manager has been identified within the organization to manage aspects of this plan, executing key initiatives. This manager will sometimes reside within the IT department or may report through Public Works. Wherever this position resides, it also needs to work very closely with Economic Development.

Just as the broadband assets are long-lived, broadband should be a long-term program within Marion County and its partner's local government operations. The area, through development of this Broadband Strategic Plan, has opted to take a more holistic view of the community's needs, and through execution of this Plan, can begin to build and manage this very important infrastructure.

While several cities within Marion County are working to establish goals in their municipal planning documents to expand their fiber infrastructure, the County and others seem to take a more ad hoc approach. To support long term development, it is advised to invest incrementally, in a planned, methodical manner. Develop a 5-year, or 10-year plan, and begin to incrementally and opportunistically invest in phases, focusing on the greatest impact first, and using broadband policies such as dig-once and joint trench to build out planned routes early, and at a much-reduced cost.

Having a plan for where the network will be built will allow the County and its partners to take advantage of opportunities that arise where the right-of-way along these planned routes may be disturbed. These practices can reduce the long-term capital projections of any planned network buildout. Whereas building fiber networks in an urban environment can cost anywhere from \$50 - \$140 per foot, joint trenching or placing conduit into existing construction projects can reduce costs by over 80%.

Finally, all long-term capital programs require appropriate funding. Fiber assets have a 25-year financial life, while their useable life can exceed 50 years given the proper installation and maintenance. When funding these projects, local governments have the ability to accept a longer payback period than most incumbent, or even competitive, providers can since governments focus on the well-being, education, and welfare of



residents, rather than on creating shareholder value and increasing profits.

Fiber Expansion and Investment Initiatives are complex issues that require various levels of approvals and very tight coordination between the participating agencies and partners. Further, these initiatives require real monetary investments, further complicating the Plan. For this reason, this portion of the Roadmap and Action Plan relates to **EXECUTING** the Broadband Strategic Plan as it relates to direct investment and expansion of broadband assets throughout the County.

The County should assign staff to be responsible for driving rural broadband efforts. This person would be responsible for:

- Identifying and coordinating all rural broadband efforts and opportunities;
- Understanding, driving, and applying for grant funding opportunities;
- Educating local representatives on issues of rural broadband to develop political will;
- Ensuring public policies are in place to encourage broadband providers and ensure they have what they need to deliver broadband;
- Being a champion at all levels within the community for rural broadband and its benefits;
- Being the expert on technology solutions available for use in broadband;
- Being a liaison between the broadband providers and the community to help identify and drive solutions;
- Keeping rural broadband efforts in the public mindset; and,
- Working with government agencies to identify and map gaps in critical communications services and working to fill those gaps.

While Marion’s Broadband Strategic Plan has been forecasted over a 5- to 10-year period, the ultimate timeline will be dictated by the lead organization chosen to oversee and execute this Plan, and more so by the budgets and resources dedicated to this Program.

The Plan will focus on three general areas that have been identified by the planning team. First, the general Broadband Plan direction; second, addressing the immediate opportunity in the North Santiam Region Canyon; and third, creating an AgTech incubator taking advantage of Marion Counties assets and resources. The first area focuses on overall broadband direction and plans, irrespective of the other two specific projects. Broadband planning will focus on establishing broadband throughout the County and is not yet specific to any one location or project.

Strategic Initiative 1: NSRC “Smart Canyon”

Marion County, NSRC-area municipalities, the State of Oregon—including multiple state agencies: DEQ, DOT, Highway Patrol, Parks and Recreation, and others—Federal government agencies get much better connectivity, while enabling new economic development in the area. They simply need to work together to deploy advanced



network infrastructure in conjunction with other infrastructure projects, specifically a new sewer/wastewater system for the Canyon and water flow improvements to the dams. This is a prime opportunity that should be seized by the County. Starting with the requirements and vision for a “Smart Canyon” described in this report, Marion County should engage leading technologists to create a comprehensive system with enough detail to determine network infrastructure requirements. These requirements should be incorporated into as many area projects as possible.

A key policy decision is critical to next steps: whether the County is willing to own network assets for broadband service. Ownership of network assets means responsibility for use. If the County owns the infrastructure, knowing it does not seek to actually provide retail broadband, private partners must be engaged to deploy services. The County could essentially lease or loan network assets to the private partner, as discussed above. Alternately, the County can seek out a private partner and work with them to deploy infrastructure. Either way, the County needs a partner.

The County should focus on its requirements in the NSRC area, specifically for internal connectivity but also for broadband development (as detailed in the report). These are criteria for evaluating prospective private partners. If multiple prospects meet County criteria, and if the partner is paid for assets or services, a competitive bidding process may be necessary. It should be possible to simply establish an MOU under which the private partner agrees to something—deeply discounted connectivity or ubiquitous availability for examples—in return for County assistance and support.

Plan to apply to ReConnect, a pilot program, addressed in detail above and in Appendix B, that will provide several rounds of grant and loan funds for rural broadband development. The recipient of the funds must own the assets and ensure they are used to serve under- and unserved areas. The County must complete Action Items II.1 and II.2 to be positioned for this program. If the County wishes, it can directly apply for funding, recognizing that this will require substantial new capabilities. The County can work with private companies who meet its criteria to develop a proposal. The County’s role in the proposed work might include committing to lease facilities, demand aggregation, expedited permitting, and facilitating deployment in conjunction with other projects.

Local industry and other employers must be actively involved in this initiative for it to be truly successful. Also, network assets will need to be deployed in conjunction with other infrastructure improvements by federal, state, and local government agencies. These agencies represent customers/network users, too. The requirements and willingness to pay of all stakeholders are critically important, but so is their willingness to invest. If the public agencies follow Marion County network asset standards recommended in the report, and local employers pre-pay for services, a private partner will find it much easier and economic to serve the area. If the provider is a community-based organization like a coop, stakeholders will need to be involved on an on-going basis. Therefore, having stakeholders involved increases the long-term vitality as well as the



short-term viability of a Smart Canyon initiative

Strategic Initiative 2: County-wide “Smart Farm”

County-wide support for local, grassroots, DIY, community-based efforts around technology applications in agriculture is smart in several ways. First, it addresses a major economic development goal/opportunity, and serves the interests of the region’s key basic industries: agriculture and tech. Second, it empowers businesses and residents to literally take ownership of their network access. The County is essentially the conduit for citizens to act, in this case laying down literal conduit (and fiber). This opportunity is not as well defined or immediate as the “Smart Canyon” initiative, but could have broader geographic impact. Ideally, the two initiatives benefit each other, with lessons learned in the canyon informing the agriculture initiative, and vice-versa.

A critical element of any DIY or grassroots initiative is education. From case studies of prior such projects to technical knowledge about network facilities and gear, there is a huge amount knowledge needed to a successful initiative. The starting point may be defining what “success” is. Specifically, stakeholders must decide how much they are able and willing to directly own. How many farmers are willing to buy and install fiber cable on their property? Presuming many are, what is the best way to finance deployment? There are many examples of network cooperatives. County standards will be useful for specifying what, where, and how assets should be deployed. A design process would ideally result in network designs for all participating property owners’ sites, with clear understanding about how and where the head-end of the cable would connect. Wireless technology is essential because Smart Ag applications are literally out in the field, and the geography is more amenable to line of sight wireless connections.

As with the Smart Canyon initiative, the County should engage prospective private sector partners but with a different geographic focus, and with customers absorbing much of the upfront costs. Indeed, a DIY network for Smart Ag might simply require providers to connect at a meet point from which they could serve all or any customers with no additional investment. Thus the business criteria for a Smart Ag partner might be very different from the Smart Canyon initiative. Wireless technology is likely to be more important as a criteria, too, so the County might specifically seek out companies with wireless capabilities as prospective partners. Smart Ag may be an excellent project for ReConnect. The County will need to consider how the Smart Canyon and Smart Ag initiatives fit together for ReConnect purposes. A consistent approach and clear connection between the two may increase the County’s likelihood of getting funding for both.

Strategic Initiative 3: Support Cities Such as Silverton and Jefferson in Broadband Policies

Political will is critical to rural broadband. Political will is the ability of the



government organizations, local vocal community organizations and other prominent entities like first responders, politicians, hospitals and large businesses to speak out about their lack of services and adverse effects on the life and economy of those that live and work in these rural areas. Part of political will means being vocal and public about the lack of adequate broadband and its effect on the community.

Political will also involves government agencies taking steps to create an environment for the carriers to be able to provide broadband services. This includes:

- Having fair permitting policies and procedures;
- Making County/City sites available for co-location of assets by the carriers;
- Proper broadband planning considerations included in all construction projects by the city, county, state or federal agencies (such as dig once or joint trench);
- Organizing/facilitating/overseeing grassroots efforts of selected interested communities looking for broadband;
- Investing in broadband assets directly when a clear business case is presented; and;
- Assisting on funding by applying for available grants when opportunities are identified – see **Appendix A Broadband Infrastructure Funding Sources**

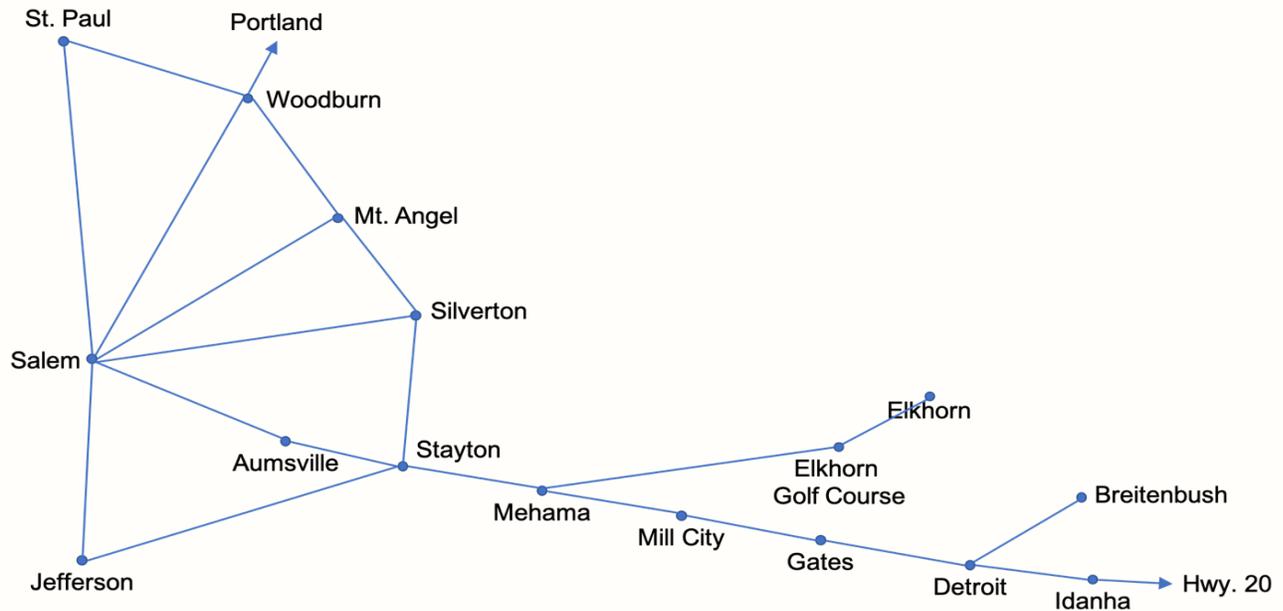
Strategic Initiative 4: Marion County Backbone Network

A long-term initiative, the primary rationale for a county-wide backbone is to improve local government operations and reduce long-term costs to taxpayers. Of course, this implies that local governments will upgrade their operations and systems to take advantage of the network. A great deal of work will need to be done toward this end, which the County might coordinate or actually do for the cities.

Secondary goals are to attract/direct private investment, support tech-enabled economic development, and possibly generate revenue by leasing network assets. In the nearer term, this initiative provides an end-point for planning efforts. The County must organize to achieve these goals by assigning responsibility for engaging stakeholders and establishing procedures, as appropriate. Portions of the backbone will be built whenever other infrastructure—road, sewer, water, etc.—work is done, which requires coordination across multiple departments, who should be involved as network users (Public Works has numerous network requirements of its own, for example) as well as construction partners.



Figure 33. A County-Wide Backbone Network



The county-wide backbone network is embedded in and supports the other two initiatives. The “Smart Canyon” initiative would build a major section of the network, and “Smart Farm” would build various, specific sections of the backbone. The overall backbone initiative would be to link them all together. Backbone network routes should be planned to pass the maximum number of city and community anchor sites and pass through “Smart Farm” areas, then prioritized based on (a) available funding and/or stakeholders’ willingness to invest, (b) other infrastructure projects that can be leveraged for broadband development, and (c) other County priorities (to win a particular industry prospect, for example).

A Marion County middle-mile fiber network would provide new fiber infrastructure assets into areas of the County that are otherwise lacking. The County’s backbone and data center interconnections are necessary tools that communities require to take on last-mile development projects. As Marion County explores the concept of broadband special districts, which are focused on facilitating the funding/structure requirements of last-mile infrastructure investments, these networks would benefit greatly from the ability to connect into major data center facilities and from the abundance of content and service providers who can be reached through these facilities.

Building a County wide middle mile network will take careful planning and a long-term perspective. These networks are not built overnight and can take years to come to fruition. Funding is always the key to these projects, so focusing on grants, opportunistic builds (joint trench) and/or by using in-kind build solutions can enhance the opportunities for success.



Lack of competition in retail providers is influenced greatly by the availability of infrastructure or lack thereof, and by the enormous cost to build infrastructure. Many competitive regional or national providers will not take the risk of using their own capital to overbuild current incumbent networks, when the outcome may be to only capture a small portion of the market. Rather, providers will often times accept federal dollars in forms of grants or loans to buildout high-cost or underserved areas – relying on tax payer subsidies. This fact further negates the argument for fair competition as it relates to tax payer funded or "government owned networks," when most providers will only build into "areas that don't make the business case" when they're using other sources of capital or "other people's money." Competing with a subsidized carrier does not always make a lot of financial sense.

The business case or justification for buildout throughout Marion County, under the "Internet is a utility" model, should necessitate local investments into furthering the access of next-generation broadband for all. With that being said, last-mile investments cannot be solely placed upon Marion County, but should have buy-in from the local communities to be served.

With the proper tools, high-speed/affordable middle-mile capacity, On-Net data center facilities, and the ecosystem of interconnected carriers, each community or neighborhood in Marion could make the local decision on if and how to fund last-mile broadband buildout and whether it will be a fiber, wireless, or hybrid approach (i.e. Silverton and Jefferson). They would even have finite control as to who their retail provider or providers would be. Further, each municipality or community can make the decision on how to fund, operate, or partner to provide end user services.

The proposed fiber backbone provides high capacity fiber-optic cables throughout the major corridors of the County. New construction proposed will deliver a robust, redundant, and reliable County backbone fiber network, which would interconnect planned County facilities traversing several of Marion's cities. Access points would be strategically placed throughout the fiber routes to allow easy interconnection with facilities, County/city/community assets, business districts, and neighborhoods.

Fiber backbones will generally consist of a minimum 288-count fiber-optic cable on major routes. This cable size would enable the ability to allocate capacity among multiple applications, including:

- County government operations
- Future smart city/connected community applications
- Community anchor connections
- Broadband applications
- Spare capacity

Secondary or lateral fiber will consist of 12 to 24-strand cable connecting individual facilities and sites. For primary County facilities, such as primary data center facilities, cables will be more appropriately sized with larger fiber counts. The network will use an



in-and-out splicing design that allows community anchors and points of interest to interconnect their locations in a “ring” topology that supports high redundancy for their communications. A range of specialized connections will be made to accommodate additional traffic signal, smart technology, and broadband applications that should be individually engineered based on the application. General specifications of the backbone are found below. Actual specifications may change based on actual engineering design; however, it is important that the County maintain compliance with these key specifications to achieve its long-term goals.

Marion County and its cities have the ability to condition development, whereby the approvals for development are contingent upon the necessary broadband infrastructure being installed as part of *initial* site development and *future visioning*.

Detailed Recommendations

Recommendation 1: Continue to Work Collaboratively with and to Encourage Providers to Expand Infrastructure to Serve Rural and Underserved Marion

Marion County and its telecommunications partners have a vested interest in furthering the buildout and delivery of next-generation broadband services to the region’s users. Unfortunately for areas like Marion County, the vast rural nature of the area makes this a challenge. And, as is evident with current rural projects, they require government funding and subsidies in order to happen.

This is precisely why governments at nearly all levels are funding rural broadband through grant and loan programs. FCC’s Connect America Fund Phase II (CAF II) and Mobility Fund Phase II, are all allocations of funding being used to further services throughout the Marion region. Marion’s current providers have applied for and been granted these dollars and have expanded/continue to expand services – but for those greatest affected, this is not soon enough. To further this problem, communications between the providers, and the local communities is not great. Upgrade plans are not public and are therefore not discussed openly. Expectations cannot be met when they are not clearly defined and communicated. The lack of transparency around these upgrades greatly contributes to the problem.

Marion County should work to ensure that its local government peers, and industry partners/providers are at the table regularly to discuss the region’s roadmap for deploying broadband. Marion should require regular quarterly updates on upgrade plans, and results for newly upgraded areas.

In addition, Marion County should push for fiber connectivity. Often providers that accept rural upgrade dollars will invest in upgrading the existing copper plant to a newer standard or upgraded specification, thereby providing minimal upgrades to the services offered. While these upgrades are welcomed, they still position the area to lag others. These incremental upgrades provided by the area providers will no doubt have to occur again, and again – until they adopt a future-proof wireline technology such as fiber.



The help encourage broadband deployment by the carriers, the County should open its assets for use with broadband deployments thus reducing some of the financial barriers these carriers may face.

There is an immediate opportunity to put this recommendation into action. The North Santiam Canyon River lacks adequate broadband. The County has the opportunity to drive broadband for the region by following the recommendations outlined in the separate NSRC Report. In short, the County needs to coordinate efforts with private providers, electric providers, and current PW projects (sewer and water) to facilitate the deployment of broadband for the area.

Recommendation 2: Consider Formation of Special Districts to Provide Structure and Fund Broadband Expansion³⁷

In many cases, rural communities can organize to support investment for next-generation broadband services. Local raising of capital by the potential subscribers or homeowners is one way to entice broadband providers to serve their areas. Homeowners associations (HOAs) are well suited for this as they are able to levy assessments for development improvements.

Unfortunately for much of rural Marion County residents, they do not live in “organized” neighborhoods, where an overarching HOA is available to manage these types of infrastructure projects, leaving most residents to fend for themselves. But special taxing districts have been used in many states and should be considered for Marion County.

Recommendation 3: Establish a Broadband Infrastructure Program (BIP)

The Strategic Plan recommends the County consider leveraging existing public assets to support expanded broadband deployment. Collectively, Marion’s local and state government offices have extensive assets which can support the efficient delivery of broadband services. Conduit, fiber, towers (water, fire or public safety communications), street light poles, and strategically located buildings can all be used to support the deployment of broadband infrastructure. This inventory of assets can be utilized through a Marion County Broadband Infrastructure Program (or BIP, later explained further in recommendation 8), whereby community assets are leased to service providers for the provision of broadband or wireless services. These assets not only expedite deployment but can be utilized to generate revenue to cover maintenance and operations costs of the network assets, and to fund network expansion.

It is recommended the County consider completing an asset inventory of all sites and facilities that are approved for an alternate use of supporting provision of commercially available broadband services. The County would also determine which assets could be used for co-location of broadband facilities. Some of these assets have already been captured and included in the GIS database provided by Magellan.

³⁷ The following analysis should not be considered to be a legal opinion. The analysis is based on a plain reading of the cited statutes and other materials.



Further, various segments of conduit and fiber exist, and are being expanded regularly in local jurisdictions such as Salem and Keizer. The County and its partners should ensure that additional fiber and conduit capacity is included within these projects and that fiber allocations are dedicated to a greater Marion County project. These expansions should be supported by joint trench/dig-once practices.

Recommendation 4: Formalize a BIP to Make Use of Broadband Related Assets

Marion County should begin to formalize a Broadband Infrastructure Program (BIP), focused on meeting telecommunications needs and demands of government agencies and community anchors, while bringing value to the greater community, and monetizing any County assets that are made available. Counties and cities across the United States are developing these types of infrastructure programs to drive new revenues to local government, and to support long-term sustainability in their communities – including in bridging the digital divide. Revenues are being generated off conduit and dark fiber assets, lit network services, and through the lease of vertical assets such as street lights and towers. The State’s Oregon FIBER Partnership is an example of such a program that can be implemented at the local level. The County should work in conjunction with local cities and governments to facilitate a program of leasing assets for the use with broadband.

Furthermore, a BIP, when equipped with adequate assets, can negate the need for additional buildout in key areas, making community assets available to providers, instead of requiring them to build their own. For many local governments, this allows for greater control and management of ROW access, including during underground construction which can severely impact major transportation corridors, and can sometimes be impacted through underground construction moratoriums.

There are several tasks required in order for Marion County to formalize this program, they include:

- Document and maintain an inventory of available assets;
- Implement a Fiber Management System (FMS);
- Develop and standardize agreements for fiber, conduit, and pole/tower leasing;
- Develop pricing policies for fiber, conduit, and pole/tower leasing;
- Publish non-discriminatory rates and terms;
- Create an enterprise fund to maintain proper budgets, cost accounting, and to track expenses and revenues of the program; and,
- Create a capital fund to cover costs of building infrastructure.

It is recommended the County be prepared to incrementally grow its program as outlined in this Broadband Strategic Plan. This progression will allow Marion to take measured steps to deploying broadband throughout the County, enabling Marion to expand its network as opportunities and community needs present themselves. This will also allow the County to support business and community anchor needs, as well as underserved/unserved residents, through the use of these community assets, and in



partnership with local service providers who require access to the County's infrastructure.

Recommendation 5: Develop RFI and Seek Strategic Partnerships in Meeting Stated Goals

Marion County is a large complex region and its Broadband Plan should be multi-faceted in its approach. To that end, the County should seek partners that can help in meeting this Plans stated goals, with an eye toward delivering next-generation broadband services throughout Marion. Over the next 10 years, the cost to deliver broadband in the most rural areas will come down in cost or will be delivered through more effective means; in the meantime, however, speeds and services should continue to be upgraded and improved.

Recommendation 6: Adopt Broadband Infrastructure and Fiber-Optic Standards

Marion County should adopt broadband infrastructure and fiber-optic standards from which it will plan, construct, and expand its network. In addition, it should incorporate these standards into all planning and expansion projects, including joint trench/dig-once requirements.

Recommendation 7: Expand Connections to Regional Data Centers and Colocation Facilities

The County's network should ideally be connected to at least one collocation facility in the greater Portland area, such as the Pittock Building downtown. By connecting the network to a regional data center, collocation facility, or Internet Point of Presence (PoP), the County would be able to interconnect with a number of broadband providers residing in the facility. This enables any organization connected to the County's fiber network to also be connected to the facility, reaching a world-class market of service and content providers. The County's fiber could be used as the last-mile network to connect community anchors to providers that reside in these locations. This creates important benefits to the County and its economic development efforts including:

- It can provide a significant reduction in Internet service costs;
- It can facilitate direct cross-connect access to several regional and national carrier networks;
- It will enable private access to cloud-based service providers; and,
- It will improve resiliency of the County's network.

As previously identified, there are several ways available to get to these PoP's, including the proposed Oregon FIBER Partnership and other current providers.

This creates an opportunity for greater regional collaboration with regional transportation partners such as Western Independent Network (WIN) or Oregon FIBER Partnership to enter the Portland area. Marion County should work to establish a relationship with these transport groups and should specifically focus on attaining routes and access into potentially interconnected data center facilities.



Further, Marion County should look for opportunities to bring data center facilities to the County. While data center projects do not normally create numerous long-term jobs, they do represent large capital investments into the community, with high paying short-term construction jobs, and constant energy consumption.

Recommendation 8: Equip Economic Development Areas with Fiber Connectivity

Economic development areas should include any areas within the County that have been identified, marketed, or developed as a key area capable of driving additional economic value within the County and the greater region. Marion County should strive to ensure proper next-generation broadband infrastructure, and leading services are readily available when companies decide to move into that area.

Taking a proactive approach to planning for telecommunications and technology in each area will ensure the necessary services are readily available from day one. As previously stated, Marion County should adopt development standards for telecommunications infrastructure, and should enforce those standards, ensuring the project is designed, and constructed with this infrastructure. Marion County should not wait for the telecom providers to lay the necessary infrastructure, as they will not typically deploy until potential customers have been identified. For Marion County, and its economic development partners, this issue can create a “chicken and egg” scenario, whereby the infrastructure is not readily available when site selectors, and companies begin their search for the optimal location. It is usually too late at this point.

The County can take several steps to ensure its existing and planned areas are properly prepared, they include:

- Adopt appropriate development standards, conditioning next-generation fiber-based telecommunications infrastructure

Marion County and its cities have the ability to condition development, whereby the approvals for development are contingent upon the necessary broadband infrastructure being installed as part of initial site development.

- Ensure Marion County’s downtown areas have the necessary capacity.

Small businesses and entrepreneurs are locating in more urban downtown areas where industry networking occurs more frequently, and where they can engage in a more collaborative setting. Maker spaces, co-working facilities and collaboration studios are becoming more of a norm, as communities begin to focus their attention on attracting talent. These facilities require high-speed connectivity and can usually take a focal point in establishing these types of professional ecosystems. Most of the larger cities within Marion County, such as Salem and Keizer, already have robust broadband, others communities such as Silverton, seem to be lacking.

- Ensure connectivity to Economic Development areas.

In addition to the last-mile connectivity within the areas, middle-mile connectivity,



connecting the site to the Internet, and major data center facilities is a necessary piece of the overall solution. Marion County should design appropriate handhole/vault configuration to enable easy interconnect as the County middle-mile network is expanded.

Recommendation 9: Identify Community Partners and Funding Sources to Expand the Network Opportunistically

Local governments that have built fiber-optic networks traditionally begin this process by connecting sites and facilities in an effort to permanently reduce the organizations' telecom spend, very much as recommended in Key Initiative 1. These initial projects are funded by reducing the operating spend for leased services, instead taking an investment approach, many times rolling the savings into a capital budget. This allows an initial network to be constructed to meet the long-term needs of the organization. At the same time, excess capacity in the existing infrastructure can be utilized to connect partnering organizations. Often these partners can access grants or other funding programs.

While the Marion County middle-mile network initially focuses on the County's connected sites, it will have a greater reach in connecting other Marion County community partners, and even regional initiatives.

Marion County's network could be expanded to facilitate additional needs, including:

- Connect public safety facilities and communications tower infrastructure which can provide:
 - Redundancy and diversity, focus on remote areas of Marion that have no cell service, and no capacity for high-bandwidth programs.
 - Need for fiber-based assets to serve with microwave for redundancy and/or diversity. Need more sites to increase coverage. Move from T1's to fiber-based solutions.
 - Fairgrounds/Veteran's buildings - Disaster Relief Center. Need to make sure they have adequate cell and broadband services.
- Serve schools and other educational organizations, including faith-based and private schools
- Identify public housing facilities and funding
- Identify Utility providers and districts
 - Sewer and Water - Use the facilities and planned upgrades for assistance in buildout of broadband. They are looking to upgrade solutions. Further, utility providers and districts should participate in County dig-once efforts.
- Traffic signaling and traffic improvements
 - Many cities are looking to upgrade their traffic signaling infrastructure from twisted pair to fiber. Some state funds are available.
- Explore benefits of cooperation with other regional partners:
 - PGE, Pacific Power, CPI and others
 - Oregon FIBER Partnership



- All carriers in the region

A detailed funding analysis is provided in Appendix A: Broadband Infrastructure Funding Sources.

Recommendation 10: Develop Last-Mile Investment Framework and Facilitate Deployment of Next Generation Broadband Service

A Marion County middle-mile fiber network would provide new fiber infrastructure assets into areas of the County that are otherwise lacking. The County's backbone and data center interconnections are necessary tools that communities require to take on last-mile development projects. As Marion County explores the concept of broadband special districts, which are focused on facilitating the funding/structure requirements of last-mile infrastructure investments, these networks would benefit greatly from the ability to connect into major data center facilities and from the abundance of content and service providers who can be reached through these facilities.

While the County's network would not penetrate into residential neighborhoods, it can be used as an interconnect, or "jumping off" point, providing the necessary capacity to residential areas along the route. The County backbone has been specified to ensure high-count fiber cables which would support fiber-to-the-home distribution networks within reach of the network's fiber routes.

Lack of competition in retail providers is influenced greatly by the availability of infrastructure or lack thereof, and by the enormous cost to build infrastructure. Many competitive regional or national providers will not take the risk of using their own capital to overbuild current incumbent networks, when the outcome may be to only capture a small portion of the market. Rather, providers will often times accept federal dollars in forms of grants or loans to buildout high-cost or underserved areas – relying on tax payer subsidies. This fact further negates the argument for fair competition as it relates to tax payer funded or "government owned networks," when most providers will only build into "areas that don't make the business case" when they're using other sources of capital or "other people's money." Competing with a subsidized carrier does not always make a lot of financial sense.

The business case or justification for buildout throughout Marion County, under the "Internet is a utility" model, should necessitate local investments into furthering the access of next-generation broadband for all. With that being said, last-mile investments cannot be solely placed upon Marion County, but should have buy-in from the local communities to be served.

With the proper tools, high-speed/affordable middle-mile capacity, On-Net data center facilities, and the ecosystem of interconnected carriers, each community or neighborhood in Marion could make the local decision on if and how to fund last-mile broadband buildout and whether it will be a fiber, wireless, or hybrid approach (i.e. Silverton and Jefferson). They would even have finite control as to who their retail provider or providers would be. Further, each municipality or community can make the



decision on how to fund, operate, or partner to provide end user services.

Municipalities and local communities have many options when selecting a business model targeted at incentivizing further broadband investment. These business models range in options for ownership, governance, and operations, all of which can vary greatly depending on funding/investment options. When selecting a business model, an organization should understand its operating and technical capabilities, and its willingness to add personnel if the determined model is labor intensive. While this roadmap is not meant to select any last-mile deployment option for Marion communities, it is meant to provide each community with the required network assets and deployment frameworks which it can then use to make the best local decision on how to drive their last-mile investment.

Recommendation 11: Implement Smart Community Technologies and Innovation Districts

Smart communities are the future and sensors will be deployed to provide real-time analytics around vehicle/pedestrian counts, environmental (air quality, temperature, humidity), and public safety concerns. The data created from these activities will be used to adjust/modify local government work plans and performance, to notify the public, and to provide open data versions of the datasets which could spur additional, complementary business efforts. Santa Monica, CA was able to use its real-time parking systems and data to spur a startup focused on routing vehicles to open parking spaces. This technology is now integrated into BMW, Mercedes and Audi vehicles.

For Marion County, there is opportunity to support and incubate local technologies that impact agriculture, as described herein, and other Marion industries. Sometimes all that is needed to spur innovation is to connect home-based entrepreneurs, inventors, researchers and software development professionals, and coordinate them around a common problem. Innovation Districts can facilitate this kind of economic development activity, creating local solutions to industries which are currently in the midst of major positive transformations through automation.

“The trend is to nurture living, breathing communities rather than sterile, remote compounds of research silos.”

-Pete Engardio, “Research Parks for the Knowledge Economy.”
Bloomberg Businessweek

The County and its partners should look for key areas that could be fruitful grounds for an innovation designation. According to the Brookings Institute “a new complementary urban model is now emerging, giving rise to what we and others are calling ‘innovation districts.’” These districts, by our definition, are geographic areas where leading-edge anchor institutions and companies cluster and connect with start-ups, business incubators, and accelerators. They are also physically compact, transit-accessible,

technically-wired and offer mixed-use housing, office, and retail.”



Further,

“Innovation districts are the manifestation of mega-trends altering the location preference of people and firms and, in the process, reconceiving the very link between economy shaping, place and social networking. Our most creative institutions, firms and workers crave proximity so that ideas and knowledge can be transferred more quickly and seamlessly. Our “open innovation” economy rewards collaboration, transforming how buildings and entire districts are designed and spatially arrayed. Our diverse population demands more and better choices of where to live, work and play, fueling demand for more walkable neighborhoods where housing, jobs and amenities intermix.”³⁸

Marion County has a strong agriculture community and as such, Marion County should look to develop an AgTech, Smart Ag Innovation District and paradigm. See the AgTech section for additional insights.

As this recommendation is focused on urban cities, the County would serve a supporting role, rather than lead.

Marion County should:

- Use its public network assets as a platform for innovation;
- Support and incubate technologies such as ag tech, precision farming, etc.; and,
- Define and identify prime urban locations, including supporting industries
 - Downtowns, specific parks and areas, redevelopment areas.
- Showcase technology, through strategic partnerships where possible.

The Recommendations listed above depend on organizational and technology governance capabilities. They provide a basis for collaboration and partnerships. While these recommendations are geared toward the greater Marion County Broadband Plan, each municipality has a role to play in ensuring their communities are served, and that they have a seat at the table when it comes to the greater broadband discussion. Several cities are already involved in actively planning for broadband infrastructure. Others simply don’t have the resources, or haven’t yet identified the need. Greater collaboration and more regional leadership can help to drive these improvements into every corner of the County.

Table 12 below is meant to outline each recommendation documented within this Strategic Plan and should provide guidance to each local government entity as to their role in this Plan.

³⁸ <https://www.brookings.edu/essay/rise-of-innovation-districts/>



Table 12: Recommendations by Local Government Jurisdiction

Recommendation	County	Salem	Keiser	Gervais	Woodburn	Stayton	St. Paul	Detroit	Mt. Angel	Silverton
Advisory Board	L	S	S	S	S	S	S	S	S	S
Governance	L	S	S	S	S	S	S	S	S	S
Policy	L	C	C	C	C	C	C	C	C	C
Provider Collaboration	L	C	C	C	C	C	C	C	C	C
Special Districts	L	S	S	S	S	S	S	S	S	S
Validate Assets	L			C	C		C			
Formalize BIP	L	C	C	C	C	C	C			C
RFI P3s	L	C	C	C	C	C	C	C	C	C

In this context the Lead (L) organization leads the efforts and overall planning for this Plan. Support (S) organizations provide oversight and participate in the planning efforts, while Coordinated (C) organizations have a complementary role in executing specific actions. For instance, while we recommend Marion County consider taking a lead role in all of these activities, we recommend that each local government organization adopt and implement Broadband Friendly Public Policy in a coordinated fashion with the County. While we could recommend each organization lends its support to the County in taking the lead on the Advisory Board and overall program/project governance, we recommend that all act in a coordinated fashion in Validating Assets and developing coordinating Broadband Infrastructure Programs to build, and make assets available to market.



Conclusions and Next Steps

Marion County, due to its rural nature, suffers a broadband gap primarily related to a funding gap. Like other rural areas throughout the United States, it is dependent on competitive service providers willing to buildout rural fiber routes and communities based upon grant and subsidized loan programs. In short, the funding to wire rural Marion is coming from taxpayers and other related state and/or federal programs.

Marion County should focus on building public infrastructure, ensuring long-term ownership is maintained by those paying for the infrastructure. Long-term ownership, decision making authority over the infrastructure, how it's used, and the benefit derived from it should be controlled by those funding the efforts. This is a central theme to this Marion County Broadband Strategic Plan, and our action items, and recommendations support this vision.

Marion County should consider organizing itself in order to accomplish the goals and initiatives documented in this Plan. Additionally, Marion County should build consensus amongst the community and potential partners to move broadband forward throughout the region.

Marion's Broadband Strategic Plan's Roadmap and Action Plan include the following recommendations and prioritizations:

Initiative 1: NSRC "Smart Canyon"

Initiative 2: "Smart Farm" Agricultural Corridor

Initiative 3: Support Cities in Developing Comprehensive Broadband Policies

Initiative 4: Support Development of County Fiber-Optic Backbone and Middle-Mile Network

Recommendation 1: Continue to Work Collaboratively with and to Encourage Providers to Expand Infrastructure to Serve Rural and Underserved Marion

Recommendation 2: Consider Formation of Special Districts to Provide Structure and Fund Broadband Expansion³⁹

Recommendation 3: Establish a Broadband Infrastructure Program (BIP)

Recommendation 4: Formalize a BIP to Make Use of Broadband Related Assets

Recommendation 5: Develop RFI and Seek Strategic Partnerships in Meeting Stated Goals

Recommendation 6: Adopt Broadband Infrastructure and Fiber-Optic Standards

Recommendation 7: Expand Connections to Regional Data Centers and Colocation Facilities

³⁹ The following analysis should not be considered to be a legal opinion. The analysis is based on a plain reading of the cited statutes and other materials.



Recommendation 8: Equip Economic Development Areas with Fiber Connectivity

Recommendation 9: Identify Community Partners and Funding Sources to Expand the Network Opportunistically

Recommendation 10: Develop Last-Mile Investment Framework and Facilitate Deployment of Next Generation Broadband Service

Recommendation 11: Implement Smart Community Technologies and Innovation Districts

Marion's Broadband Strategic Plan's Immediate Action Plan includes:

Action 1: Establish a Broadband Task Force

Action 2: Assign or acquire staff to facilitate broadband strategic plan

Action 3: Make broadband fiber deployment a county-wide strategy

Action 4: Formalize Broadband Friendly Policies and Standards

These Actions are short-term in nature and should be accomplished within the first 12-18 months of this Plan's adoption. The next steps Magellan Advisors is recommending for Marion County to follow over the next 10 years are intended to be incremental. By setting a 10-year timeline, the incremental steps are feasible and realistic for Marion County to pursue, allowing adequate time to ease into the Broadband Strategic Plan's recommended model. Initializing the Broadband Strategic Plan model should be viewed similarly to the original creation of other county departments in the past, in the sense that public demand for better telecommunications is gradually increasing; and, Marion County should consider the opportunities in the Broadband Strategic Plan to effectively meet the public demand in the next 10-year horizon and onward. Marion County will continue to update the Broadband Strategic Plan over time as new data becomes available and projects are completed.



Appendix A: Funding

With the conclusion of the grant and loan awards established by the American Recovery and Reinvestment Act of 2009 (P.L. 111-5), two primary sources of ongoing federal funding for broadband infrastructure remain:

- The Rural Utilities Service (RUS) Telecommunications Program of the U.S. Department of Agriculture for Broadband Network infrastructure and the RUS Electric Program for Electric Smart Grid Networks, and
- The Universal Service Fund (USF) program under the Federal Communications Commission (FCC).

In addition to regular fiscal year appropriations to USDA-RUS, the Farm Bill appropriates and structures funding for broadband infrastructure and broadband-enabled services for rural areas. The Farm Bill must be reauthorized by Congress approximately every five years,

Other sources of funding may include Congressional appropriations to the U.S. Department of Commerce for Public Works and Economic Adjustment grants to areas impacted by unexpected events, including extreme weather events, military base closings, and closure or downsizing of major employer facilities. The Department of Housing and Urban Development (HUD) may allocate funding from appropriations for support in disaster affected areas to infrastructure resiliency projects to bury electric and communications lines.

Other funding for broadband infrastructure and services may be appropriated to the Institute for Science and Museum Services, the Department of Transportation, the Defense Department, the Department of Military Construction and Veterans Affairs, the Department of Health and Human Services and other federal agencies.

DECEMBER 2018 UPDATE ON FEDERAL APPROPRIATIONS

Fiscal Year 2019 Regular Appropriations

Five of the FY2019 regular appropriations bills have been enacted as of 12/16/2018:

- Department of Defense Appropriations Act, 2019;
- Energy and Water Development and Related Agencies Appropriations Act, 2019;
- Departments of Labor, Health and Human Services, and Education, and Related Agencies Appropriations Act, 2019;
- Legislative Branch Appropriations Act, 2019; and
- Military Construction, Veterans Affairs, and Related Agencies Appropriations Act, 2019.

Appropriations for rural water and wastewater systems grants and loans may be leveraged with grant funding from USDA-RUS to co-locate underground conduit and fiber-optic cable with the water systems financed.

Defense funding includes \$20 million for infrastructure modernization in areas outside of military bases.

Subsidy requests from the Rural Healthcare program of the Department of Health and Human Services have exceeded funding levels in recent years, creating challenges for private sector providers to feasibly offer broadband services for rural healthcare.

Regular Appropriations Bills Not Yet Enacted as of 12/16/2018



(Continuing Resolutions in place through 12/21/2018)

- Agriculture
- Commerce
- Justice
- Science
- Financial Services & General Government
- Homeland Security
- Interior
- Environment
- State
- Foreign Operations
- Transportation
- Housing and Urban Development (HUD)

Congress must continue to extend Continuing Resolutions for these agencies in order to avoid expiration of funding, which would result in a shutdown of non-essential functions and furloughs of non-essential personnel.

Farm Bill Reauthorization

The Farm Bill must be reauthorized by Congress every five years. Funding for the Farm Bill lapsed when Congress allowed the Bill to expire in 2018 without a Continuing Resolution. The Farm Bill reauthorization was passed by the Senate on December 11 and by the House on December 12. Differences between the Senate and House bill versions are being resolved, and the President is expected to sign the Farm Bill reauthorization, known as the 2018 Agriculture Improvement Act, into law next week.

Title VI of the Act appropriates funding for Rural Development, of which the Rural Utilities Services is a part. Key provisions of Title VI are as follows:

- **Sec. 6101. Combating substance use disorder in rural America.** This section creates a 20 percent set-aside of financial assistance and prioritizes telemedicine projects aimed at addressing the opioid crisis.
- **Sec. 6102. Distance learning and telemedicine.** The Farm Bill increases annual authorizations for the Distance Learning and Telemedicine Program from \$75 million to \$82 million a year.
- **Sec. 6201. Access to broadband telecommunications services in rural areas.** This section expands the federal resources for broadband investments to include grants (in addition to the loan and loan guarantee programs already available).
- **Sec. 6202. Expansion of middle mile infrastructure into rural areas.** This section allows counties to use USDA broadband loans and grants for middle-mile projects prohibited under current law.
- **Sec. 6214. Rural broadband integration working group.** This section creates a federal advisory committee that is required to work with state, local, tribal and territorial governments, telecommunications companies, utilities, trade associations, philanthropic entities, policy experts and other interested parties to identify, assess and determine possible actions relating to barriers and opportunities for broadband deployment in rural areas.



- **Sec. 6301. Exclusion of Certain Populations from Definition of Rural Area.** This section would allow counties with regional jails to exclude incarcerated individuals from population caps for funding eligibility under USDA Rural Development programs.
- **Sec. 6306. Council on Rural Community Innovation and Economic Development.** Much like the previous administration’s White House Rural Council, this section creates a federal interagency council to coordinate the development of policy recommendations, maximize the impact of federal investment on rural communities, promote economic prosperity and quality of life in rural communities and use innovation to resolve local and regional challenges faced by rural communities.
- **Sec. 6401. Strategic economic and community development.** This section of the package expands the Strategic Economic and Community Development program to allow the U.S. Secretary of Agriculture to prioritize funding for projects that support the implementation of a strategic community development plan that encompasses two or more jurisdictions
- **Sec. 6424. Rural innovation stronger economy grant program.** This section creates a new Rural Innovation Stronger Economy (RISE) grant program, which would help counties strengthen local economies through job accelerator partnerships with the private sector and institutions of higher education.
- **Sec. 6507. Cybersecurity and grid security improvements.** This section of the package authorizes the Secretary of Agriculture to make loans or loan guarantees available to communities for cybersecurity and grid security improvements.

It is important to note that the Farm Bill authorizes funding for allowable purposes and determines general requirements, but the specific requirements applicable to each funding opportunity will be announced at the time the Notice of Funding Availability is released by the authorizing agency. The initial rules for E-Connectivity funding appropriated in FY 2018 were recently announced by RUS, but detailed rules are still being developed and are expected to be released in the near future.

The Funding section of this report is a work in progress until final rules are released for the E-Connectivity funding opportunity and other new opportunities, including the Rise program, and regulatory appropriations bills have been enacted for the twelve federal agencies still operating under a Continuing Resolution.

Continuing Resolutions for FY 2018 Appropriations Funding

Continuing resolutions under the Consolidated Appropriations Act, 2018 (P.L. 115-141) appropriated \$5 million to subsidize a broadband loan level of \$29.851 million; \$30 million to the Community Connect broadband grant program; \$29 million for the Distance Learning and Telemedicine grant program; and \$0.863 million in loan subsidies for a total loan level of \$690 million for the Telecommunications Infrastructure Loan and Loan Guarantee Program.

P.L. 115-141 also appropriated \$600 million to RUS to conduct a new broadband loan and grant E-Connectivity pilot program known as the ReConnect program. Initial program rules follow, with final rules expected to be released in the near future.

- Ninety percent of the households served by any project funded through this program must be unserved or underserved with 10 Mbps broadband downstream and 1 Mbps upstream
- Any entity receiving funds from the program is prohibited from overbuilding an existing RUS borrower.



- No more than 4% of funds received through the program can be used towards administrative costs.

FY 2018 Appropriations for the U.S. Department of Commerce

P.L. 115-141 appropriated \$7.5 million to the National Telecommunications and Information Administration to update the national broadband availability map in coordination with the FCC. In addition, the Act contains provisions to facilitate deployment of broadband infrastructure on federal property, as well as making more spectrum available for wireless broadband.

Connect America Fund

The FCC’s USF High Cost Fund is undergoing a major transition to the Connect America Fund (CAF), which is targeted to the deployment, adoption, and utilization of both fixed and mobile broadband.

Since 2015, the CAF program has provided over \$19 billion in funding to the ten largest telephone carriers in the U.S., including Frontier Communications and CenturyLink, and over 700 rural local telephone companies throughout the U.S., to provide a minimum of 10 Mbps downstream and 1 Mbps upstream broadband service and telephone service to unserved rural areas. The culmination of the CAF program’s multi-year funding program was a “reverse auction” held on July 24, 2018 to award \$1.98 billion in subsidies to any qualified providers, including cable and internet service providers, offering to provide the minimum service level at the lowest cost to remaining unserved areas.

A list of companies applying for FCC qualification to participate in the auction was published prior to the auction opening.

In Oregon, CenturyLink, Wave Broadband, Peoples Telephone, Stayton Telephone Cooperative, and PEAK Internet did not apply for qualification. Frontier Telecommunications did apply and was approved by the FCC to bid. Frontier’s application was for the entire U.S.

The results of the CAF Reverse Auction may be found at the following link:

<https://www.fcc.gov/reports-research/maps/caf2-auction903-results>

The FCC’s CAF program is described in more detail in a later section of this report.

Other Federal Funding Sources:

Private Sector Tax Incentives:

- New Markets Tax Credits
- State-Designated Opportunity Zones

Bills Supporting Broadband Infrastructure Introduced in 115th Congress

As this Congress has considered options for accelerating broadband infrastructure deployment, a key issue has been how to provide federal assistance for unserved and underserved areas where the private sector is not providing acceptable service levels, while at the same time minimizing the impact of government intervention on competition and private sector investment.

156 bills supporting broadband infrastructure deployment or incorporating provisions for broadband service for specific purposes were introduced in the 115th Congress from 2017 to 2018 to date, but only 20 of the bills gained traction. Four appropriations bills were passed by the House and Senate and signed into law. The Farm Bill reauthorization was passed by the House and the Senate but is still in reconciliation to resolve differences in the House and Senate versions before the bill is sent to the White House for signature. The remaining 15 bills



were passed by the House or the Senate, but not both. Of the 15 bills, those with recent action may still advance and be passed into law, but the remaining bills have either died in committee or been superceded by other bills.

With increasing bipartisan support from members of Congress from rural states for broadband infrastructure funding and public policies to remove barriers, the two underlying reasons why there are still unserved areas in the U.S. today are: 1) internal rate of return thresholds for private sector investments; and 2) politics. Funding and policy support for broadband deployment in hard to serve rural areas may increase in 2019.

Federal Funding Sources

United States Department of Agriculture (USDA)

Rural Development

USDA Rural Development is committed to improving the economy and quality of life in Rural America. Rural Development has a multi-billion-dollar loan portfolio and administers billions in loans, loan guarantees, and grants through its programs. Rural Development helps rural individuals, communities and businesses obtain needed financial and technical assistance to address diverse and unique needs through specific programs.

Rural Development programs support such essential public facilities and services as water and wastewater disposal systems, housing, health clinics, emergency service facilities, electric service and telephone/broadband communications service. Rural Development promotes economic development by supporting loans to businesses through banks, credit unions and community-managed lending pools. It offers technical assistance and information to help agricultural producers and cooperatives get started and improve the effectiveness of their operations. In addition, Rural Development provides technical assistance to help communities undertake empowerment programs.

Rural Utilities Service

USDA's Rural Utilities Service (RUS) administers programs that provide much-needed infrastructure or infrastructure improvements to rural communities. These include water and waste treatment, electric power, and telecommunications and broadband services. All of these services play a critical role in helping to expand economic opportunities and improve the quality of life for rural residents.

Utilities programs connect rural residents to the global economy by:

1. Increasing access to broadband and 21st century telecommunications services;
2. Funding sustainable renewable energy development and conservation;
3. Financing reliable and affordable electric systems;
4. Working to integrate electric smart grid technologies;
5. Developing reliable and affordable rural water and wastewater systems.

These investments support the nation's long-term prosperity by ensuring that rural communities have the infrastructure to compete in the global economy.

Programs Administered by the Rural Utilities Service (RUS)

1. Rural Broadband Access Loan and Loan Guarantee Program

This program was created under the 2002 Farm Bill and subsequent reauthorizations. The



program provides funding for projects that offer Broadband Service at or beyond a specific Broadband Lending Speed defined by RUS. Through this program, rural consumers can benefit from the same quality and range of broadband services that are available in urban and suburban communities.

Definition of Broadband: Definitions affecting eligibility are required to be revised by RUS from time to time and published in the Federal Register.

As of May 1, 2018 RUS defined “Broadband Service” for both mobile and fixed service as a minimum data transmission rate of 25 megabits/second (Mbps) downstream from the Internet to the consumer’s premise, and 3 Mbps upstream from the premise to the Internet (25 Mbps / 3 Mbps).

This data transmission rate defines the presence of Existing Broadband Service, which determines whether an area is eligible for funding. It also defines the “Broadband Lending Speed” as the minimum data transmission rate that applicants for funding must propose to offer for both mobile and fixed service to the customer.

Use of Funds: Financing may be used to fund the costs of construction, improvement and acquisition of broadband facilities; the cost of leasing facilities; the acquisition of existing systems or another company; and the refinancing of existing telecommunications loans.

Eligible Entities: To be eligible for a broadband loan, an applicant may be either a non-profit or for-profit organization, and must take one of the following forms:

- Corporation;
- Limited liability company (LLC);
- Cooperative or mutual organization;
- A state or local unit of government; or
- Indian tribe or tribal organization.

Individuals and Partnerships are not Eligible

Eligible Areas: Proposed service areas to be funded must be completely contained within a rural area or composed of multiple rural areas, defined as any area, as confirmed by the latest decennial census of the Bureau of the Census, which is not located within:

- (i) A city, town, or incorporated area that has a population of greater than 20,000 inhabitants; or
- (ii) An urbanized area contiguous and adjacent to a city or town that has a population of greater than 50,000 inhabitants. For purposes of the definition of rural area, an urbanized area means a densely populated territory as defined in the latest decennial census of the U.S. Census Bureau.

In addition to population size and location relative to an urbanized area, the following conditions also determine eligibility:

- At least 15 percent of the households in the proposed service area must have no access to Broadband Service.
- No part of the proposed service area may have three or more “incumbent service providers”



- No part of the proposed service area may overlap with the service areas of current RUS borrowers or the service areas of grantees funded by RUS for broadband service.
- Communities where RUS has previously provided funding for construction of broadband infrastructure may not be eligible.

The General Field Representative (GFR) for the RUS Telecommunications Program in the state should be contacted prior to an application for funding to determine the presence of previous RUS loan- or grant-funded broadband infrastructure in the proposed serving area.

Contact information for the RUS State GFR(s) may be found by clicking on the map at the following link:

<https://www.rd.usda.gov/contact-us/telecom-gfr>

Funding Availability:

Over \$100 million is available nationwide for this program.

Minimum Loan Amount: \$100,000

Maximum Loan Amount: \$10 million

Eligible applications that propose to serve the highest % of unserved households will receive funding offers first.

Funding Type:

- Direct Cost of Money Loans
- Loan Term limited to the expected composite economic life of the assets to be financed plus 3 years (generally 20 years)
- Fixed Interest Rate equal to U.S. Treasury Yield Curve rates for instruments with comparable maturities (commonly referred to as “Constant Maturity Treasury” rates or “CMTs”).

The 30-year Treasury Constant Maturity Rate was 3.14% on December 14, 2018.

- Items of Special Emphasis:
 - Calculation of Additional Cash Requirement
 - Equity Requirement
 - Market Survey
 - Methodology and Assumptions included with Financial Information
 - Audited Financial Statements vs. Unaudited Financial Statements plus Tax Returns

Additional Information:

Code of Federal Regulations: [7 CFR 1738](#)

Website:

<https://www.rd.usda.gov/programs-services/farm-bill-broadband-loans-loan-guarantees>.

2. Community Connect Broadband Grants Program

The Community Connect Program is a highly competitive grant program providing funding for projects that offer Broadband Service to rural and economically-challenged communities at or beyond the Broadband Grant Speed, which is defined by RUS in the latest publication of the Federal Register. These projects must also provide for two years of free Broadband Service to



critical community facilities, such as government buildings, fire stations and libraries. Successful grantees must also provide a community center that offers two years of free Internet access to the public.

Definition of Broadband:

- A) ***Minimum Broadband Service.*** RUS uses this measurement to determine whether a proposed funded service area is served or unserved. Until otherwise revised in the Federal Register, the minimum data transmission rate that qualifies as Minimum Broadband Service is ten (10) megabits per second (Mbps) downstream and one (1) Mbps upstream (written as “10 Mbps / 1 Mbps”) for both fixed and mobile broadband service. RUS will determine that Broadband Service does not exist for areas with no broadband access or where access is less than 10 Mbps / 1 Mbps.
- B) ***Minimum Broadband Grant Speed.*** The minimum bandwidth that an applicant must propose to deliver to every customer in the proposed funded service area. Until otherwise revised in the Federal Register, the minimum data transmission rate that qualifies as Minimum Broadband Grant Speed is 25 Mbps / 3 Mbps for both fixed and mobile service to the customer.

Use of Funds: Construction, acquisition, or leasing of facilities, spectrum, land or buildings used to deploy broadband service for:

- All residential and business customers located within the Proposed Funded Service Area (PFSA).
- All participating critical community facilities (such as public schools, fire stations, and public libraries).
- The cost of providing broadband service free of charge to the critical community facilities for 2 years.
- Up to 10% of the grant may be used for the improvement, expansion, construction, or acquisition of a community center that provides online access to the public, provided that the community center is open and accessible to area residents before, during, and after normal working hours and on Saturday or Sunday.
- All equipment purchased with grant and/or matching funds must be new or nondepreciated.

Eligible Entities:

Applicants must be organized as an incorporated organization, an Indian tribe or tribal organization, a state or local unit of government, or other legal entity, including cooperatives, private corporations or limited liability companies organized on a for profit or not-for profit basis.

Eligible Areas:

- Funds must be used in rural areas that are not located within an urbanized area or a place that has a population of greater than 20,000 inhabitants.
- All the households in the applicant’s proposed funded service area must have no access to existing broadband service at the Minimum Broadband Service speed of 10 Mbps / 1 Mbps.
- Grantees must provide matching funds in cash that are equal to at least 15 percent of the requested grant amount.



Funding Availability:

\$30 million was authorized to this Program under the Consolidated Appropriations Act of 2018. The 2018 Farm Bill Reauthorization increased funding to \$50 million per fiscal year through 2023.

Annual Application Window: Funding Window in 2018 announced in March

Funding window closed May 14, 2018

Minimum Loan Amount: \$100,000

Maximum Loan Amount: \$3 million

Matching funds of at least 15% from non-federal sources are required and can be used for operating costs.

Application Scoring:

- Documentation in support of the need for services
- Benefits derived from the proposed services
- Characteristics of the Proposed Funded Service Area (PFSA)
- Local community involvement in project planning and implementation
- Level of experience of the management team

In ranking applications the Agency will consider the following criteria based on a scale of 100 possible points:

(a) An analysis of the challenges of the following criteria, laid out on a community-wide basis, and how the Project proposes to address these issues (up to 50 points):

- (1) The economic characteristics;
- (2) Educational challenges;
- (3) Health care needs; and
- (4) Public safety issues;

(b) The extent of the Project's planning, development, and support by local residents, institutions, and Critical Community Facilities. Documentation must include evidence of community-wide involvement, as exemplified by community meetings, public forums, and surveys. In addition, applicants should provide evidence of local residents' participation in the Project planning and development (up to 40 points).

(c) The level of experience and past success of operating broadband systems for the management team. (up to 10 points)

(d) In making a final selection among applications with comparable rankings and geographic distribution, the Administrator of RUS may take into consideration the characteristics of the PFSA. Only information provided in the application will be considered. Applicants should therefore specifically address each of the following criteria to differentiate their applications:

- (1) Persistent poverty counties that will be served within the PFSA;
- (2) Out-migration Communities that will be served within the PFSA;
- (3) The rurality of the PFSA;
- (4) The speed of service provided by the project;



- (5) Substantially underserved trust areas to be served within the PFSA;
- (6) Community members with disabilities to be served within the PFSA;
- (7) Any other additional factors that may be outlined in the NOFA.

- Other Requirements:

- Buildings constructed with grant funds must be located on property owned by the awardee
- Leasing expenses will only be covered through the advance of funds period included in the award documents
- Borrowers must have legal authority to provide, construct, operate and maintain the proposed facilities or services
- Partnerships with other federal, state, local, private, and nonprofit entities are encouraged

Additional Information:

Code of Federal Regulations: 7 CFR Part 1739

Website: <https://www.rd.usda.gov/programs-services/community-connect-grants>

3. Telecommunications Infrastructure Loan Program

This program provides funding for projects that offer new and improved telephone and broadband service in rural areas. Program financing may be used to fund the costs of construction, improvement, expansion and acquisition of systems or facilities; the acquisition of existing systems or another company; and the refinancing of loans from other lenders.

Use of Funds: Telecommunications service in rural areas. A beneficiary must be a resident of rural areas and others who may also receive telephone service as a result of service provided to a rural area.

Eligible Entities: Most entities that provide or propose to provide telecommunications service in qualified rural areas including:

- State and local governmental entities
- Federally Recognized Tribes
- Non-profits, including Cooperatives, and limited dividend or mutual associations
- For-profit businesses (must be a corporation or limited liability company)

RUS gives preference to those borrowers (including initial loan applicants) already providing telephone service in rural areas, and to cooperative, nonprofit, limited dividend, or mutual associations.

Eligible Areas:

- Rural areas and towns with a population of 5,000 or less
- Areas without telecommunications facilities or areas where the applicant is the recognized telecommunications provider are eligible
- Contact the local USDA Rural Development office to determine whether a proposed service area qualifies



Funding Availability:

Total funding of \$690 million nationwide is available for this program.

Applications are accepted year-round and are not competitive.

Minimum Loan Amount: \$50,000

Funding Types:

- Cost-of-Money Loans are direct loans from USDA Rural Utilities Service
- Loan Guarantees of up to 80% allow private lenders, including the Federal Financing Bank (FFB), to extend credit to qualified borrowers in rural areas
- Hardship Loans may be used, at the sole discretion of USDA Rural Utilities Service, to assist applicants in meeting financial feasibility requirements for applications to serve underserved areas

Loan Terms:

- Cost-of-money loans: Fixed rate at current U.S. Treasury rates depending on loan maturity at time of each advance. Interest Rate equal to U.S. Treasury Yield Curve rates for instruments with comparable maturities (commonly referred to as “Constant Maturity Treasury” rates or “CMTs”)
- Loan Guarantees: Fixed rate primarily from the Federal Financing Bank (FFB). Interest rates (Treasury rate plus 1/8%) vary depending on call options and the interim maturity rate selected at each advance, which may be as short as 90 days, with auto-rollover. Current rates available online, scroll down to “Treasury Constant Maturities” add 0.125% for FFB rate
- Hardship loans: fixed interest rate of 5% for up to 20 years and requires special qualifications

Other Requirements:

- Borrowers must have legal authority to provide, construct, operate and maintain the proposed facilities or services
- All facilities financed with the aid of federal dollars must be used for a public purpose
- May not duplicate similar services available in the same area
- Partnerships with other federal, state, local, private and non-profit entities are encouraged

Additional Information:

Code of Federal Regulations: 7 CFR Part 1735

Website: <https://www.rd.usda.gov/programs-services/telecommunications-infrastructure-loans-loan-guarantees>

4. Electric Program Smart Grid Loan Program

The RUS Electric Program has a \$5.0 billion annual loan budget for financing electrical infrastructure in rural areas, including Smart Grid networks. The Electric Program makes loans to borrowers for fully integrated “Smart Grid” purposes, including fiber-optic network infrastructure from electrical generation facilities directly to the meters of electric service customers. Smart Grid capabilities can improve reliability, promote energy efficiency, enhance grid security, advance safety, provide security, reduce pollution and restrain consumer electricity costs. It is the policy of RUS to promote smart grid deployment among all electric utilities



serving rural consumers.

It is also the policy of RUS to promote the deployment of broadband services in rural areas. The RUS Electric Program and the RUS Telecommunications Program will work together to find innovative ways to facilitate joint efforts between Electric Program and Telecommunications Program borrowers to provide Smart Grid and broadband capabilities in shared service areas.

In areas where the electric utility may also provide broadband service to electric customers, the RUS Electric Program and Telecommunications Program will work together to provide financing for eligible components for both purposes in one concurrent loan.

In areas where the electric utility may not provide retail broadband service to electric customers, a public partnership with a nonprofit provider (e.g. cooperative) or a private sector provider should be considered.

***Uses of Funds:* All facilities receiving federal financing must be used for a public purpose.**

Funds may be used to finance:

- Maintenance
- Upgrades
- Expansion
- Replacement of distribution, sub-transmission and headquarters (service, warehouse) facilities
- Energy efficiency
- Renewable energy systems
- Fiber-optic Smart Grid Fiber-to-the-Meter (FTTM) Communications Networks

Electric Program borrowers seek to enhance the use of fiber-optic networks for Smart Grid deployments to offer their customers additional services such as high-speed consumer broadband service.

Smart grid and broadband services are separate and distinct loan purposes, even though the network components are the same.

RUS will ensure that statutory boundaries between programs are respected, and unnecessary duplication of federal funding avoided, in cases where a converged fiber infrastructure can be used for multiple purposes.

While the Electric Program can fully fund Smart Grid infrastructure, it cannot solely finance the delivery of consumer broadband services. If an Electric borrower (or applicant) were to seek Electric Program funding solely for the purpose of providing broadband services (with no Smart Grid elements); the application would be rejected by the Electric Program because the application seeks to use Electric Program funds to finance an ineligible purpose. In that case, the borrower would be referred to the Telecommunications Program for further consultation.

Similarly, in cases where Electric Program borrowers seek to provide consumer broadband services in addition to Smart Grid capabilities, the borrower cannot use Electric Program funding for the enhancements to the Smart Grid infrastructure necessary only to deliver consumer broadband services. The borrower can self-fund, or use non-Electric Program financing, including RUS Telecommunications Program financing, for the enhancements necessary to provide consumer broadband services but not necessary for Smart Grid capabilities.

Broadband network elements ineligible for Smart Grid funding include customer premise inside



wiring, and gateways, routers and set-top boxes located inside the customer premise.

Elements of network infrastructure from generation facilities to electric customer meters are eligible expenditures.

Constraints on Electric Program Smart Grid funding may be necessary for fiber to the meter (premises) Smart Grid projects that propose broadband services in areas where there are existing RUS Telecommunications borrowers providing the services.

Electric Program and Telecommunications Program borrowers are strongly encouraged to collaborate and cooperate in efforts to deliver Smart Grid and high-speed broadband services to rural consumers within the territories served by both borrowers.

Electric utilities not prohibited from providing consumer broadband service by state law or corporate charter may provide broadband services to electric customers over Smart Grid network infrastructure funded by the Electric Program. In states with laws restricting electric utilities from providing retail broadband services, a nonprofit (e.g. cooperative) or private-sector broadband provider partnership should be considered.

Eligible Entities:

- Most retail distribution or power supply providers serving qualified rural areas, including:
- States, Territories, Local Governments and Government Agencies
- People's Utility Districts, Communications Union Districts, Public Service Districts
- Federally Recognized Indian Tribes
- Nonprofits, including cooperatives and limited dividend or mutual associations
- For-profit businesses (must be a corporation or limited liability company)
- Partnerships with other federal, state, local, private and non-profit entities are encouraged

Borrowers must provide or propose to provide:

- The retail electric service needs of rural areas, or
- The power supply needs of distribution borrowers under the terms of power supply arrangements satisfactory to RUS.

Eligible Area:

The law requires consideration of several factors to determine whether an area qualifies as rural for the purposes of this program.

A Rural Determination must be performed by RUS for a potential New Borrower or a Returning Borrower.

- Identifies all areas within a service territory of a borrower or applicant that are rural in comparison to areas that are not rural (i.e., urban).
- Electric facilities to be financed must provide service to Rural Electrification Act Beneficiaries (person, business, or other entity located in a rural area).
- Rural Determination is not an issue for Existing Borrowers (exclusive of certain Acquisitions, Mergers and Consolidations)

Interested electric utilities who are first-time borrowers should contact one of the area Electric Program General Field Representatives (GFRs) to request a Rural Determination from RUS.



Contacts for Electric Program State GFRs may be found at the following link:
<https://www.rd.usda.gov/contact-us/electric-gfr>

Funding Availability:

- \$5.5 billion in FY 2018
- Funding expected to remain level for FY 2019
- Maximum Loan Amount: No stated maximum
 - \$68+ million loan reported in 2017

Types of Funding:

- Direct Cost of Money Loans
- Loan Guarantees up to 100% allow the Federal Financing Bank (FFB) to extend credit to qualified borrowers in rural areas. 100% of the construction work plan can be financed
- Hardship Loans may be used, at the sole discretion of the Rural Utilities Service, to assist applicants in rural areas that are either economically distressed or recovering from an unavoidable event, such as a natural disaster

Loan Terms:

Repayment may not exceed the useful life of the facility being financed, with a maximum repayment schedule of 35 years. Power supply borrowers are also limited by the terms of their wholesale power contracts

- Loan Guarantees and Treasury Rate Loans: interest rates are fixed at the time of each advance based on rates established daily by the United States Treasury plus 1/8 of 1%

The 30-Year CMT Rate on December 14, 2018 was 3.14%

Hardship Loans: interest rates are fixed at a rate of 5% for up to 35 years

Borrowers must have legal authority to provide, construct, operate and maintain the proposed facilities or services

Loan Security:

- Unsubordinated Security Interest in assets of utility as a going concern
- For public utilities owned by local governments, states, territories and public power districts, RUS will accept a pledge of revenues.

Loan Application Process:

The Loan application process is paperwork intensive. Loan application preparation, review and approval by RUS can take from 12 months to 18 months for a new borrower.

Rural Determination by RUS is the first step.

Key Loan Application Documentation:

- Load Forecast
- Construction Work Plan (CWP)
- Environmental Assessment and Maps
- Report of Impacts on Historic Preservation
 - State Historic Preservation Office Notification and Clearance



- Notifications to Tribes
 - Long Range Financial Forecast (LRFF) (10-year Period)
 - Useful Life Certification
- At least 90% of loan funds for facilities with useful life of 33 years or more
 - Schedule of Facilities and/or Useful Life Worksheet
- Reimbursement Schedule for Distribution Facilities
- Attorney Opinion Letter
- Board Resolution requesting Rural Electric Infrastructure Loan or Loan Guarantee

Complete list of required documentation at 7 CFR §1710.501

Additional Information:

Code of Federal Regulations: 7 CFR Part 1710

Website: <https://www.rd.usda.gov/programs-services/all-programs/electric-programs>

5. Leveraging the Water & Waste Disposal Loan & Grant Program

Purpose:

This program provides funding for clean and reliable drinking water systems, sanitary sewage disposal, sanitary solid waste disposal, and storm water drainage to households and businesses in eligible rural areas.

The program helps very small, financially distressed rural communities extend and improve water and waste treatment facilities that serve local households and businesses. Good practices can save tax dollars, improve the natural environment, and help manufacturers and businesses to locate or expand operations.

RUS Water and Wastewater disposal loans and grants may be leveraged to co-locate broadband conduits during trenching. Approximately 80% of the cost of underground network deployment is in the trench. RUS Broadband programs may provide grants for materials and labor to co-locate the conduits during construction.

Eligible Applicants:

- Most state and local governmental entities
- Private nonprofits
- Federally-recognized tribes
- Eligible Areas:
 - Rural areas and towns with populations of 10,000 or less
 - Tribal lands in rural areas
 - Colonias

Type of Funding:

Long-term, low-interest loans

If funds are available, a grant may be combined with a loan if necessary to keep user costs reasonable.

Uses of Funds:



Funds may be used to finance the acquisition, construction or improvement of:

- Drinking water sourcing, treatment, storage and distribution
- Sewer collection, transmission, treatment and disposal
- Solid waste collection, disposal and closure
- Storm water collection, transmission and disposal
- In some cases, funding may also be available for related activities such as:
 - Legal and engineering fees
 - Land acquisition, water and land rights, permits and equipment
 - Start-up operations and maintenance
 - Interest incurred during construction
 - Purchase of facilities to improve service or prevent loss of service
 - Other costs determined to be necessary for completion of the project

See 7 CFR Part 1780.7 and 1780.9 for a complete list of related activities

Funding, Loan Term and Rate:

- Funding announced each year.
- 40-year payback period, based on the useful life of the facilities financed
- Fixed interest rates, based on the need for the project and the median household income of the area to be served

Interest Rates:

Interest rates for 3rd Quarter FY 2018, effective July1, 2018 to September 30, 2018

Poverty: 2.375%
 Intermediate: 3.125%
 Market: 3.875% USDA Rural Development Water and Waste Disposal Loan and Grant

Program Governance:

- Basic Program – 7 CFR, Part 1780
- Loan Servicing – 7 CFR, Part 1782
- Section 306 of the Consolidated Farm and Rural Development Act

Additional Requirements:

- Borrowers must have the legal authority to construct, operate and maintain the proposed services or facilities.
- All facilities receiving federal financing must be used for a public purpose.
- Partnerships with other federal, state, local, private and nonprofit entities that offer financial assistance are encouraged.
- Projects must be financially sustainable.

Contacts:

RUS State Director

A list of RUS State Directors may be found at the following link:



<https://www.rd.usda.gov/about-rd/leadership/state-directors>

6. ReConnect Program (Broadband Loan and Grant E-Connectivity Pilot Program)

P.L. 115-141 appropriated \$600 million to RUS to “conduct a new broadband loan and grant pilot program.” The details of the pilot program are still being worked out by RUS, but the authorization calls for “expedited” delivery of the new program. Conditions mandated by the bill will include:

- Ninety percent of the households served by any project funded through this program must be unserved or underserved with 10 Mbps broadband downstream and 1 Mbps upstream
- Any entity receiving funds from the program is prohibited from overbuilding an existing RUS borrower
- No more than 4% of funds received through the program can be used towards administrative costs.

Program rules published to date are described in a later section of this Funding report.

Federal Communications Commission

The Federal Communications Commission (FCC) is an independent U.S. government agency. The FCC was established by the Communications Act of 1934 and is charged with regulating interstate and international communications by radio, television, wire, satellite and cable. The FCC's jurisdiction covers the 50 states, the District of Columbia, and U.S. possessions.

The Commission staff is organized by function. There are seven operating Bureaus and ten Staff Offices. The Bureaus' responsibilities include: processing applications for licenses and other filings; analyzing complaints; conducting investigations; developing and implementing regulatory programs; and taking part in hearings. Even though the Bureaus and Offices have their individual functions, they regularly join forces and share expertise in addressing Commission issues. Through these offices, funding is specifically designed to meet the needs of each applicant.

1. Universal Service Fund

In accordance with the Telecommunications Act of 1996, the FCC established the following four programs within the Universal Service Fund, of which the Connect America Fund, Schools and Libraries and Rural Health Care Programs are focused on expanding accessible, affordable, high-speed broadband service:

- Connect America Fund (formally known as High-Cost Support) for rural areas
- Lifeline (for low-income consumers), including initiatives to expand phone service for residents of Tribal lands
- Schools and Libraries (E-rate)
- Rural Health Care (appropriations funding levels for this program have been insufficient to compensate service providers offering RHC services)

Connect America Fund

On July 24, 2018, the FCC auctioned subsidies totaling \$198 million annually for 10 years for a total of approximately \$1.98 billion to service providers committing to offer voice and broadband in unserved census block groups identified by the FCC.

Formerly known as the Universal Service High Cost Program, the Connect America Fund (CAF) reduces the cost of extending and operating fixed and mobile broadband infrastructure to serve



consumers and small businesses in rural, “high-cost” areas where long distances between communities, low population and low household density increase the costs of infrastructure deployment and operation.

The goal of Universal Service is to promote the availability of quality services at just, reasonable and affordable rates for all consumers, including those in low income, rural, insular, and high cost areas, at rates that are reasonably comparable to those charged in urban areas.

Eligibility: Wireline and wireless telephone companies seeking to participate in any of the High Cost Program support components must be designated an “eligible telecommunications carrier” (“ETC”) and meeting ongoing requirements by the applicable state or, in cases in which the state does not have jurisdiction over a particular type of provider, the Federal Communications Commission.

The FCC provides information about the process to become an eligible telecommunications carrier. Based on currently proposed rules, bidders will have up to 180 days after award to complete the certification process.

Use of Funds:

CAF subsidies are offered to telecommunications companies throughout the U.S. to upgrade and expand their networks as required to provision broadband service at a minimum speed of 10 Mbps downstream from the Internet to the consumer’s premise and 1 Mbps upstream from the premise to the Internet. Telecommunications companies accepting CAF subsidies receive the subsidies over a period of six or ten years.

If accepted, these subsidies replace subsidies the companies may have previously received to provide telephone service in High Cost areas and replace them with subsidies obligating them to upgrade their networks to provide broadband service at various speed tiers in their serving areas.

Funding Awarded to Date:

In August 2015, ten of the Nation’s largest telephone companies (the “Price Cap Carriers”) accepted over \$1.5 billion in annual support, for a total of approximately \$9 billion in subsidies over a six-year period, to provide broadband to nearly 7.3 million consumers in 45 states and the Commonwealth of the Northern Mariana Islands

- AT&T, CenturyLink, FairPoint, Frontier, Windstream, and other price cap providers accepted subsidies over a six-year period in exchange for a commitment to upgrade and maintain voice and broadband networks capable of 10 Mbps download/1 Mbps upload speed in their traditional telephone serving areas. Of these locations, over 2 million households did not have access to broadband at speeds of 3 Mbps download /768 kilobits per second (kbps) upload at that time. 40% of the build-out was required to be completed by the end of 2017 and 100% by 2020.
- Verizon was offered \$144 million annually or a total of approximately \$864 million for states in its serving area, but did not accept funding for any of the states that would remain in its serving area assuming its then pending sale of lines in California and Texas to Frontier. According to a letter to the FCC, Verizon essentially accepted funding totaling \$48.5 million on behalf of Frontier on the condition that the deal went through.

In August 2016, the FCC released the final version of the Alternative Connect America Cost



Model (A-CAM), which determined the amount of “model-based” support to be received by carriers agreeing to serve “high-cost” census blocks.

The FCC offered nearly 700 small, rural local telephone companies throughout the U.S. over \$10 billion in model-based support over 10 years to upgrade their broadband networks and provide broadband at various speed tiers in the high-cost locations eligible for support.

This phase of the Connect America Fund targeted over 821,000 home and business locations in areas served by the rural companies that did not have 10 Mbps download/1 Mbps upload broadband service available. For companies accepting the FCC’s offer, the new model-based support for broadband-grade service would replace subsidies the companies previously received to provide voice-grade service. The telephone companies had until November 1, 2016, to decide whether to accept or reject the offer.

A total of 207 carriers are now authorized to receive model-based FCC support for broadband in high-cost areas. The total amount of model-based support to be issued over a 10-year period is \$5.283 billion.

Census Blocks declined by the Price Cap Carriers:

In August 2016, the FCC published a preliminary list of high-cost census blocks that the Price Cap carriers had declined to serve. For these areas and other unserved areas across the U.S., the Commission stated that it would hold the **Connect America Phase II Reverse Auction**, through which eligible service providers would compete to receive support of up to \$1.98 billion over a 10-year support term to offer voice and broadband service to fixed locations.

Alaska, New York, Puerto Rico and the Virgin Islands were not eligible to compete in the Reverse Auction.

- **CAF Mobility Fund Phase II and Tribal Mobility Fund Phase II Auction:** On Feb. 23, 2017, the Commission adopted the framework for the Mobility Fund Phase II and Tribal Mobility Fund Phase II auction, to allocate up to \$4.53 billion over a 10-year support term to advance the deployment and maintenance of 4G LTE in certain rural areas.
- 2018 Phase II Reverse Auction:
 1. In June 2017, the FCC published a list and map of high-cost census blocks to be excluded from the FCC Phase II Reverse Auction because support for these census blocks had been claimed by the Price Cap carriers who accepted statewide annual support. The Price Cap carriers must serve at least 95% of the census blocks. The FCC requested the Price Cap carriers to confirm the census blocks they intend to serve in a response to the FCC no later than July 7, 2017. Census blocks that will not be served by the Price Cap Carriers will be added to the list of eligible census blocks for the Connect America Fund Phase II Reverse Auction.
 2. Maps of areas claimed by the Price Cap carriers to receive high-cost funding support are available on the FCC’s website under Maps and Publications.
 - On August 4, 2017, the Federal Communications Commission initiated the pre-



auction process for the Connect America Fund Phase II auction (“Phase II auction”) or “Auction 903”. The FCC Public Notice proposed pre-auction and bidding procedures and processes and requested public comments.

3. Auction 903 held on July 24, 2018, awarded up to \$198 million annually for 10 years for a total of approximately \$1.98 billion to service providers committing to offer voice and broadband services to fixed locations in unserved high-cost areas.

4. Auction 903 was the first auction to award ongoing high-cost universal service support through competitive bidding in a multiple-round, reverse auction. The Commission’s stated intention was “to maximize the value the American people receive for the universal service dollars we spend, balancing higher-quality services with cost efficiencies”.

5. The auction was designed to select bids from providers that would deploy high-speed broadband and voice services in unserved communities for lower relative levels of support.

6. The Commission expected that Auction 903 would attract parties that had never participated in a Commission auction.

The results of the CAF Reverse Auction may be found at the following link:

<https://www.fcc.gov/reports-research/maps/caf2-auction903-results>

Additional Information:

Website:

<https://www.fcc.gov/general/universal-service-high-cost-areas-connect-america-fund>

Universal Service Schools and Libraries Program

This program is also known as the “E-Rate” program and is administered by the Universal Service Administrative Company (USAC) under the direction of the Federal Communications Commission. When E-Rate was established in 1996, only 14 percent of the nation’s K-12 classrooms had access to the Internet. Today, virtually all schools and libraries have Internet access. The FCC began updating E-rate in 2010 and in July 2014, released the E-rate Modernization Order expanding Wi-Fi networks in schools and libraries across America while ensuring support continues to be available for broadband connectivity to schools and libraries.

With new reforms adopted in 2014 aimed at providing tools and competitive options for purchasing fiber broadband connectivity, more schools and libraries are connected to high-speed broadband each year.

Use of Funds: The E-rate Program provides discounts of up to 90 percent for broadband connectivity to and within elementary and secondary schools (public and private) and public libraries in rural and non-rural areas. Funding is provided through an annual application process with schools, libraries and consortia of schools and libraries applying for funding. A discount increase of up to 10 percentage points is available for schools and libraries in rural areas depending on the poverty level.

Schools may request funding for wireless or wireline broadband services, as well as for unbundled services including leased fiber, as follows:

- Dark Fiber Leasing
- Lit Fiber Leasing



- Dark and Lit Fiber Leasing
- Self-provisioned Services and Services provided over Third-party Networks
- Transport Only
- Internet Access Only

Schools and libraries have the flexibility to lease dark and provision their own broadband services, allowing for opportunities to share fiber-optic cable with fiber owners in the area.

Eligibility:

To be eligible,

- A. Schools must provide elementary or secondary education as determined under state law.
- B. Schools may be public or private institutional day or residential schools, or public charter schools.
- C. Schools must operate as non-profit businesses.
- D. Schools may not have an endowment exceeding \$50 million.
- E. Libraries must be eligible for assistance from a state library administrative agency.
- F. Libraries must have budgets completely separate from any schools (including, but not limited to, elementary and secondary schools, colleges and universities).
- G. Libraries may not operate as for-profit businesses.

Availability of Funding: Applications to receive funding are accepted on an annual basis. In 2015, the FCC voted to raise the E-rate's annual spending cap from \$2.4 billion to \$3.9 billion. In the last two funding years, the E-rate Program has funded \$5.6 billion in funding requests for connectivity to and within schools and libraries, including \$2.1 billion in support for the equipment needed to deploy Wi-Fi to students and library patrons in all 50 states.

Additional Information:

Websites:

FCC E-rate:

<https://www.fcc.gov/general/universal-service-program-schools-and-libraries-e-rate>

USAC:

<http://www.universalservice.org/sl/about/getting-started/default.aspx>

**United States Department of Commerce
Economic Development Administration**

Public Works and Economic Adjustment Grants

EDA's Public Works program helps distressed communities revitalize, expand, and upgrade their physical infrastructure. This program enables communities to attract new industry; encourage business expansion; diversify local economies; and generate or retain long-term, private-sector jobs and investment through the acquisition or development of land and infrastructure improvements needed for the successful establishment or expansion of industrial or commercial enterprises.

EDA Public Works program investments help facilitate the transition of communities from being distressed to becoming competitive by developing key public infrastructure, such as technology-



based facilities that utilize distance learning networks, smart rooms, and smart buildings; multitenant manufacturing and other facilities; business and industrial parks with fiber optic cable; and telecommunications and development facilities.

In addition, EDA invests in traditional public works projects, including water and sewer systems improvements, industrial parks, business incubator facilities, expansion of port and harbor facilities, skill-training facilities, and brownfields redevelopment.

Selection Criteria:

- The project's demonstrated alignment with at least one of EDA's current investment priorities as published on EDA's website at www.eda.gov
- The project's potential to increase the capacity of the community or region to promote job creation and private investment in the regional economy
- The likelihood that the project will achieve its projected outcomes
- Ability of the applicant to successfully implement the proposed project, including the applicant's financial and management capacity and the applicant's capacity to secure the support of key public and private sector stakeholders

Regular Appropriations for FY 2019 for the Department of Commerce has not yet been passed into law.

In FY 2018 Supplemental Funding for Disaster Relief was approved making \$587 million available to eligible grantees in communities impacted by natural disasters, which could be used to rebuild infrastructure or fund infrastructure resiliency projects.

Other Funding and Support in Farm Bill Reauthorization:

Appendix C to this report contains relevant provisions of the Farm Bill that provide for support for planning, technical assistance and infrastructure funding for broadband, for loan and grant funding, and for the "RISE Program" for development of regional jobs accelerators focused on connecting specified industry clusters to new market opportunities.



Appendix B: Municipal Broadband Business Models

As municipalities across the nation begin to make adjustments for next-generation broadband services in support of the future of their communities, a variety of approaches have come into play. The benefits of broadband services have been shown to positively impact communities both economically and socially including increasing economic competitiveness, workforce deployment, educational capabilities, municipal operations, and Smart City applications.

City and county governments have an array of options to choose from when selecting the right broadband business model to effectively meet the specific needs of their communities. Knowledge of the competitive market factors in the locality, needs of residents, businesses and internal stakeholders, and organizational and operational capabilities of local government should be carefully considered. The following section will discuss many of the available options in detail, as well as providing examples of cities who have found success in the adoption of each model.

Public Policy Only

The municipality utilizes its public policy tools to influence how broadband services are likely to develop in its community. Public policies are shaped to streamline the processes of designing, constructing, and managing broadband infrastructure in a local government's jurisdiction. Focus areas include right-of-way access, permitting processes and costs, construction practices and placement methods, and franchises and utility fee assessments. Examples of policies and standards include: joint trenching and dig once policies, utility relocations, and funding mechanisms for design, labor, and materials. This option is not considered a true business model per se, but does impact the local broadband environment and is therefore included as one municipal broadband option.

Public Policy Only Example: Santa Cruz County, California

In 2013, the board of supervisors approved an overhaul of broadband infrastructure plans and regulations. Specific areas of focus include permitting fee reductions and a proposed dig once ordinance that would make it easier to install fiber-optic cables during other work on area roads or utilities lanes.

Zach Friend, Santa Cruz County Supervisor, said, "Many regions throughout the country face a situation similar to ours: deemed too rural for real capital investment by the Internet Service Providers but urban enough that this lack of investment really puts us at an economic and community disadvantage. To have these policies recognized at a national level shows their applicability and value throughout the country."

The initiatives were crafted into a comprehensive set of policies:

- A dig once process that requires notification and an opportunity for broadband companies to join in whenever a street is open.
- Development of master lease agreements (MLAs) to simplify access to county facilities.
- Including conduit as part of public works projects, new developments, and land divisions.

The key challenges to policy development and implementation relate to internal departments working together and communicating the shortcomings in current practices and policies. With a better understanding of interdependent responsibilities, policies can be improved. In addition,



changes often come with an associated cost, so the municipality will need to establish a fund to financially assist the early adoption of certain policies.

Public Services Provider

Public services providers utilize fiber and broadband resources to interconnect multiple public organizations with fiber or wireless connectivity. These organizations are generally limited to the community anchors within their jurisdiction, including local governments, school districts, higher educational institutions, public safety organizations, utilities, and healthcare providers. The majority of these anchors require substantial connectivity and often, the local government's network can provide higher capacity at lower costs than these organizations are able to obtain in the commercial market.

Public Services Provider Example: Seminole County, Florida

Seminole County owns and operates a 450-mile fiber-optic network that was installed over the past 20 years primarily to serve the needs of transportation. The county's Traffic Engineering Group initially developed the network by connecting traffic signals to fiber in the early 1990s to provide enhanced communications and better reliability. What was originally conceived to be a network used exclusively for transportation became a resource that connected public organizations across the county.

To date, the county's Traffic Engineering Department has connected 26 fire stations, 58 county buildings, 44 schools, 4 Seminole State College campuses, 41 city buildings, and 17 water treatment plants. In addition, the department maintains over 375 traffic signals, 148 school flashers at 73 locations, 46 beacons and flashers, and 29 variable message signs. The fiber network consists of different types of cables and strand counts: single mode, multi-mode, and hybrid. This results in approximately 1,246 active strand pair miles of fiber.

Seminole County's network has saved the public organizations millions of dollars and has enabled the county and its cities to:

- Share resources between the county, cities, schools and community colleges;
- Aggregate demand for public procurements to attain volume purchasing power;
- Provide inter-jurisdictional public safety communications between the county and cities;
- Reduce public organizations' spend on communications services on a countywide basis; and,
- Future-proof the communications needs of all organizations connected to the network.

Significant challenges were identified in certain portions of the County's network, resulting from the commingling of fiber assets with the Florida Department of Transportation (FDOT). The restricted use of the FDOT's assets limited the County's opportunities to utilize this fiber in commercial transactions. However, the County was still able to utilize these assets for its own purposes as well as other public organizations connected to the network.

Open-Access Provider

Local governments that adopt open-access generally own substantial fiber-optic networks in their communities. Open-access allows these local governments to "light" the fiber and equip the network with the electronics necessary to establish a "transport service" or "circuit" to service providers interconnecting with the local network.



The concept of open-access enables competition among service providers across a network that is owned by the local government. The municipality remains neutral and non-discriminatory with providers who deliver services over the network. Service providers lease access to the network based on the amount of bandwidth required by the end customer and establishes a standard rate structure and terms of service. They generally charge wholesale rates to retail broadband providers to use their networks. They publish rates to competitive service providers, charging a monthly recurring fee based on bandwidth of the service utilized or a flat fixed fee per month. Services offered may include Internet, telephone, data connectivity (transport), and dark fiber.

Open-Access Provider Example: The City of Palm Coast, Florida

In 2006, the Palm Coast City Council approved a five-year fiber-optic deployment project funded at \$500,000 annually for a total investment of \$2.5 million. The network was developed to support growing municipal technology needs across all public organizations including city, county, public safety, and education. The city utilized a phased approach to build its network using cost-reducing opportunities to invest in new fiber-optic infrastructure. As each phase was constructed, the city connected its own facilities and coordinated with other public organizations to connect them, incrementally reducing costs for all organizations connected to the broadband network. Through deployment of this network, the city has realized a savings of nearly \$2 million since 2007 and projects further annual operating savings of \$350,000. The network provides valuable new capabilities that enhance its mission of serving the residents and businesses of the community, while generating over \$500,000 annually in new outside revenue from use of the network.

In a market where local fiber was scarce and unaffordable for all but the largest businesses, Palm Coast FiberNet now provides cost-effective fiber access for as little as \$50 per month for a 10Mbps connection. Service providers utilize the network to deliver internet and business communications services for significantly lower costs than were previously available. FiberNet has reduced the costs of business internet services across the city by 30%. The city has enabled new competition and introduced a competitively priced fiber product into the wholesale market within Palm Coast.

Palm Coast struggles with decisions of whether to build out to customers in line with city's overall goals of supporting local economic development whether that be opting to not build the connections; proceeding with these connections; or declining to build where these connections are infeasible. Under most conditions, the city has been successful at building out these connections; however, this has been a recurring issue facing FiberNet and several other municipally owned networks.

Infrastructure Provider

Cities that provide conduit and dark fiber services to local organizations are generally considered infrastructure providers. They lease these assets to community organizations, businesses, and broadband providers. These organizations use municipal fiber to connect to one another and to data centers to reach the internet, cloud services, and other content networks. Many municipal providers who have deployed these services began by building their own fiber networks to serve purely municipal functions. As their networks grew, they realized



that these networks could provide access to local organizations needing fiber connectivity.

Dark fiber is the core product of most infrastructure providers and is generally utilized by businesses, community anchor organizations, and in a few cases residents. Commonly, dark fiber strands are leased using a simple mileage-based price calculation to the end user. However, customers may require new construction to reach their facilities, resulting in construction costs to be incurred by the municipality and which will be charged back to customers to allow the municipality to recoup its investment.

Infrastructure Provider Example: The City of Santa Monica, California

In 2002, Santa Monica renewed its franchise with the local cable provider; it also included a lease of fiber-optic network capacity to connect various schools and community college sites. The city paid construction costs of \$530,000 and shared the ongoing costs with the schools and community colleges saving a combined \$400,000 in annual telecommunications costs which grew to \$500,000 over several years. The savings were used as seed capital for the development of the city's own fiber-optic network.

Today, 126 businesses are connected to CityNet and approximately five are added monthly. The network covers approximately eight square miles and soon will be delivering up to 100Gbps of symmetrical broadband access. Prices for services are negotiated for each business customer individually.

Santa Monica's CityNet fiber network was able to achieve the following goals for the community:

- Lower costs of internet access for the city and schools;
- Establish free Wi-Fi in 35 public hot zones as well as distribute 375 computers in kiosks and libraries in town for free access;
- Nurture existing businesses, attract new businesses, support startups, VCs, and incubators; and
- Create an environment for other incumbents to invest in city infrastructure. The city has no plans to provide residential service.

As demand for high-speed internet services grew over the past five years, small and medium businesses desired an affordable internet solution that was enabled by a single provider. The struggle Santa Monica faced was maintaining lean operations and a "hands off" approach while still serving a range of business customers. Retail was a new business model that Santa Monica had not encountered yet which required a "change in thinking" to have true impact in the local market. The decision was made to offer direct internet services as part of its portfolio of services.

Municipal Retail Provider – Business Only

A common goal for municipalities that deploy broadband networks is to support local economic development needs. Local governments equip their business and industrial districts with fiber infrastructure through which they can provide cost effective, high-speed internet, and other services to local customers.

Municipal business providers offer competitively priced internet and communication services that are generally very competitive in the small and medium business market against other provider offerings. They compete on both price and quality, generally focused on the following value proposition, all at a lower monthly cost:



- Higher bandwidth, scalable to Gigabit speeds
- Symmetrical service, the same upload and download speeds
- Higher quality fiber connections with less downtime and a stronger service level agreement
- Responsive local customer service

Municipal Retail Provider Example: The City of Hudson, Ohio

Similar to other communities that have recently decided to invest in municipal networks, Hudson's focus is only on internet access and voice. The gigabit network will be deployed incrementally by Hudson Public Power focusing on downtown and areas of high demand. Through the reinvestment of service fees from customers, the city plans to grow the network as a self-sustaining venture.

Hudson's municipal network is marketed under the name Velocity Broadband and the city is one of the first cities in the Midwest to offer gigabit connectivity. Hudson is actively signing on business customers while the network is being deployed. The city has no definite plans to serve residents but once business services are in place, they will consider a residential service offering.

Municipal Retail Provider – Residential

Municipalities that provide end user services to residential and business customers are considered retail service providers. Most commonly, local governments offer triple-play services consisting of phone, television, and internet services. As a retail provider, the organization is responsible for a significant number of operational functions, including management of retail services, network operations, billing, provisioning, network construction, and general management.

Perhaps the most important decision when evaluating a retail business case is whether the municipality should provide linear television services. Television is the “glue” that holds the triple-play service bundle together, and without television, many networks fail to achieve strong market share above 30%.

Costs vary among municipal retail providers. Therefore, it becomes difficult to set benchmarks consistently as each provider has a cost structure that differs from its peers. We do not advise that a city rely on the performance of other municipal providers to forecast its own expected performance.

Municipal Retail Provider – Residential Example: The City of Morristown, Tennessee

At the time of Morristown's initial deployment in 2004, fiber-to-the-home was not a common practice. However, once the city realized that fiber was a way to secure the network investment for the future, it was an easy decision. Nearly a decade later the upgrade to gigabit capability did not have to touch the fiber network – the electronics were simply changed on either end.

Morristown Utility System (MUS) FiberNet started signing up customers in 2006, and by 2008 had a take rate of 33%, with take rates in 2015 over 44% of homes passed, and a greater percentage of businesses. Out of the four broadband service providers present in Morristown,



80% of residents have availability to choose from at least two of those providers⁴⁰ and 100% of Morristown households have access to broadband internet.

FiberNet's strong financial performance resulted in:

- Cash flow positive two years after launch
- Net income positive after five years
- Revenues of \$8.6 and \$8.9 million in 2013 and 2014, respectively
- Businesses and residents saving \$3.4 million annually
- \$840,000 in savings from a smart meter program
- \$20,000 in savings due MUS's dedicated network specialists.

MUS FiberNet's impact on economic development:

Oddello Industries, a contract furniture manufacturer that relies on FiberNet for its communications, announced a \$4 million expansion resulting in 228 new jobs.

Molecular Pathology Laboratory Network (MPLN), a global leader in personalized laboratory medicine located its primary backup facility in Morristown.

While many benefits that outweigh the challenges, MUS admits that broadband and telecommunications is tough for a small community, due primarily to the economies of scale. The challenge for Morristown leaders was to gain the political will to be successful, battle the telecom lobby and the Tennessee legislature, and make good business decisions with vendors. MUS leadership acknowledges that it takes determination to make this model successful.

Public-Private Partnerships

Public-private partnerships (P3s) are an emerging business model that provides an innovative solution to an ongoing municipal broadband issue: How does a local government invest in municipal broadband without operating a broadband network?

Generally, P3s bring a local government and one or more private organizations into a partnership to plan, fund, build, and maintain a broadband network within the municipality's jurisdiction. In many cases, P3s are still in development as there are few cases of networks today permanently using this model.

The key to P3s is to find the right alignment between the public and private partner. Each organization must align on aspects of the P3 to make it successful, including:

- Who has rights to access the network and is the P3 exclusive or non-exclusive?
- What are the public and private partners' goals and how are they incentivized?
- What roles and responsibilities does the public and private partner have in the P3?
- What assets are financed through the public and private partner?
- What revenue model is used by the public and private partner to recoup their investment?
- What requirements must the private partner meet, in terms of service availability, speed, price, locations, and timeframes?

⁴⁰ <http://www.musfiber.net>



- How will the partners determine future buildouts and who pays for them?

Public-Private Partnership Example: Ontario, Rancho Cucamonga, and Vallejo, CA

The cities of Ontario, Rancho Cucamonga, and Vallejo, California have all contracted with Inyo Networks in P3 agreements for Inyo to function as the network operator and retail provider of business and residential fiber services. The cities will receive a percentage of gross revenues generated from the network assets, and in turn will be responsible for all capital costs associated with fiber expansion, as well as operations and maintenance of all conduit and fiber assets.

Under this agreement, Inyo will own all end-user customers and will be responsible for providing an excellent customer experience. Inyo provides a full suite of IP-enabled services including cable TV, phone and high-speed internet services. In Rancho Cucamonga, a 1 Gbps residential service starts at \$69 per month, and a 1 Gbps business service at \$250 per month.

Other Community Benchmarks and Lessons Learned

Riverside County, CA – RIVCOConnect

RIVCOConnect is a Riverside County, CA initiative, supported by the County Board of Supervisors and Executive Office and led by Riverside County Information Technology, that seeks to invite the private sector, either incumbent vendors or business entities new to the county, to work in a cooperative fashion and create partnerships to deliver broadband services countywide at speeds of 1 Gbps and above.

The main objective of RIVCOConnect is to encourage development and reduce restrictions on private entities to entice fiber network builds throughout the county. The strategies RIVCO is utilizing center around:

- Open Data Portals;
- Streamlining and reduction of costs regarding applications, permits, inspections, etc.;
- Seeking grants to minimize costs;
- Creating opportunities for providers to secure revenues after build-outs; and,
- Encouraging innovations that create demand.

Monroe County, NY

Over the course of the previous two decades, Monroe County spent millions of dollars installing fiber and conduit as part of sewer maintenance projects and an emergency communications systems project. As a result, the County has over 350 miles of fiber throughout the area with approximately 18% of the fiber strands being utilized to date. The network was constructed to initially connect county facilities with no plans by the County to compete with private providers. Furthermore, Monroe County provides network access to the City of Rochester, and other municipalities throughout the County.

Monroe County is now exploring opportunities to connect its network into regional data centers, and New York State education and research networks.



Columbia County, GA

The C³BU network currently offers 20 Gigabits bandwidth and is scalable to several hundred Gigabits. The Dense Wave Division Multiplex (DWDM) platform is Metro Ethernet Forum (MEF) 2.0 certified to provide true carrier-class performance to their customers. The C³BU Software Defined Network (SDN) also provides carrier-class packet optical transport services to other service providers.

C³BU directly serves Community Anchor Institutions (CAI) which consist of government, education, public safety, and non-profit facilities. C³BU currently partners with multiple providers for commercial and residential services. C³BU serves over 180 facilities through the network (excluding residential customers), and five service providers collocated in the point of presence facility.

C³BU seeks to use their technology investments to achieve the following goals:

- Stimulate demand for broadband, economic growth, and job creation by expanding the availability of affordable broadband Internet access for all people, businesses and community organizations.
- Promote the use of broadband to improve the quality and availability of health care, education and government services.
- Enable Intelligent Traffic System (ITS) to increase traffic management efficiency, thus reducing carbon emission impact.
- Support Supervisory Control and Data Acquisition (SCADA) migration from radio-based transport to Ethernet.
- Provide bandwidth to next generation applications such as Software As A Service (SAAS), public safety cameras, E-Health records, disaster recovery, automatic utility meter readings and distance learning.
- Provide public safety agency radio interoperability facilitated by new tower construction.
- Develop the C³BU into a hub access point for the region.⁴¹

City of Newport and Newport Utilities, TN

Newport Utilities is located in rural Cocke County, TN and provides electric, water, and waste water services to the residents in Newport, TN. This rural area is underserved and unserved in many areas of NU's footprint.

In December of 2015, Newport Utilities (NU) conducted a feasibility study regarding creation of a broadband network – overwhelming the response was positive from residents and businesses. By September of 2016, NU embarked on developing a formal implementation plan. In December of 2016, the NU Board unanimously approved the Phase 1 Business Plan.

The fiber network will be completed in a phased approach, with Phase 1 connecting 7,000 residential customers and nearly 1,200 businesses. Phase 1 is expected to take 12 to 18 months, with Phase 2 beginning shortly after. Early in March 2018, NU connected its first pilot

⁴¹ <http://www.columbiacountyga.gov/government/departments-a-c/broadband-utility/about-broadband>



customer, who was very excited to have gigabit connectivity to the home in Coker County.⁴²

Oregon Municipal Broadband

Determining the right business model is an imperative consideration in the success of a municipal broadband project. Selecting appropriate business models should be based on a number of factors, including a local government's stage of broadband development, local environment, funding capacity, organizational capabilities and desired benefits to the community. Marion County should examine all available options to understand which business model(s) fit best within the current environment using a context of risk and reward, in terms of financial and community benefits. Based on the information gathered over the course of this study, Magellan has made recommendations regarding the business model best suited to Marion County in the Business and Financial Models section of this report.

⁴² <http://www.newportutilities.com/fiber/index.shtml>



Appendix C: Broadband Basics

As Marion County plans for its broadband future, current trends, outlooks, and best practices should be considered. This background information is imperative in the examination of options available and will be instrumental in determining how decisions made today will have effects in the years to come.

Overview of Broadband Technologies

The term “broadband” refers to high-speed internet services that provide users access to online content including websites, television shows, videoconferencing, cloud services, or voice conversations. These applications can be accessed and shared through a variety of technologies including personal computers, smartphones, tablets, and other connected devices. Although demands for this high-speed data are rapidly increasing, the Federal Communications Commission (FCC) defines broadband speeds as at least 25 Mbps downstream and 3 Mbps upstream. Cable, DSL, fiber, and wireless are the prime broadband delivery systems used to meet these demands by connecting users to the internet.

Fiber-optic cables (or just “fiber”) are strands of glass the diameter of a human hair that carry waves of light. Unlike other connections that carry electrons across copper wire, fiber supports fast, reliable connections by using photons across glass, giving it the capacity to carry nearly unlimited amounts of data across long distances at spectacularly fast speeds. Because of this speed and reliability, fiber is considered the gold standard for supporting broadband across the full spectrum of devices and applications. Its usability and resiliency has brought fiber to the forefront of broadband, making it a highly desired asset for all entities, public and private, that own or control it. The availability of a reliable, cost-effective fiber connection creates opportunities for the communities it serves.

Generally, broadband is one of many services offered by telecommunications companies on multiple tiers of performance and cost. These services are divided into business and consumer users and are then offered at a subscription fee. The variety of services and technologies are increasing—exemplified by the explosion in smartphone apps—but the networks themselves are converging, so that any device operated by any user can potentially connect with vast amounts of information either inside or outside of the same network.

Broadband is deployed throughout communities as wired cables or wireless technologies that carry digital signals to and from users. The content comes into the local community from around the world via global, national and regional networks. The local infrastructure is built, connected and operated by internet and telecommunications companies that own the physical wires to each household. This started with telephone companies, which deployed twisted-pair copper telephone lines. The second wire came from television companies in the form of coaxial cable. Later satellite and wireless phone companies provided video and voice, with more flexibility to mobile and remote devices using radio waves. Beginning in the mid-1990s these companies repurposed their infrastructures to connect to the internet and carry digital content.

Infrastructure built on the older technologies described above is aging and results in slower, less reliable access to content. Capacity limits of this infrastructure of the infrastructure limit service providers’ ability to reliably provide high speeds, and in turn, the amount of data consumers can



use is also limited. Fiber provides the robust infrastructure that connect telephone, cable and internet infrastructure between communities and around the world. It was originally used by telecommunications for their core infrastructure, to connect their major switching centers, and was only available to their biggest corporate and institutional customers.

Today, fiber-optic networks serve homes and businesses throughout the world providing telephone and television as well as internet access services. The next section describes internet access technologies in more detail.

Dial-Up Access

Though not defined as a broadband technology due to speed and bandwidth limitations, dial-up access still exists. Dial-up internet access uses the public switched telephone network (PSTN) to establish an analog connection from a computer to an internet service provider (ISP). The computer connects via a modem by dialing a telephone number on a conventional telephone line and translating digital data into an analog signal.

Digital Subscriber Line (DSL)

DSL is a wireline technology uses high frequencies, which are not used by analog voice calls, to transmit digital data over traditional copper telephone lines faster than modems. DSL-based broadband provides transmission speeds ranging from several thousand bits per second (Kbps) to millions of bits per second (Mbps), generally ranging from 1.5 Kbps to 10 Mbps. DSL operates over the phone line—in parallel with voice traffic so calls are not affected—which plugs directly into a computer or router at the customer's site. The other end of the phone line connects to a DSL line card in the telephone company's central office or remote cabinet. Each user's data is multiplexed with their neighbors' over high-capacity fiber, transported to internet interconnection points, then routed over internet backbones to their online destinations.

There are different types of DSL:

- Asymmetrical Digital Subscriber Line (ADSL/ADSL2/ADSL2+) provides faster speed in the downstream direction than the upstream direction. This is fine for most customers who receive a lot of data but do not send much.
- Symmetrical Digital Subscriber Line (SDSL) – SDSL has the same speeds as ADSL and is used typically by businesses that generate online content or for services such as video conferencing, which need significant bandwidth both to and from the internet.
- Very-high-bit-rate Digital Subscriber Line (VDSL) – is a new generation of technology that provides up to 52/16 Mbps. It is more sensitive to line quality and requires a more expensive line card.

The availability and speed of DSL service depends on the distance from the customer to the closest telephone facility known as a central office. Telephone lines were optimized for voice communications and conditioned to eliminate high frequency noise. Consequently, some telephone lines cannot handle DSL, and others must be modified to support the service. Multiple DSL lines can be bonded to provide higher speeds, but the cost multiplies, too.

Digital Carrier Systems

Most commonly known as T-1s, this is the digital telephone standard in the US and has been the mainstay of corporate telecom for years. This service uses a four-wire interface to deliver 1.5 Mbps, which can be subdivided into 24 channels when bonded together. While not falling within today's federal definition of broadband, this is the way many companies get internet



access and connect their various facilities. T-1s are almost universally available from local service providers, although they may charge for mileage and other things that make the service rather expensive. The digital services hierarchy extends to multi-megabit services and fits with the even higher bandwidth optical carrier services.

Cable Modem

Cable operators provide broadband to subscribers using the same coaxial cable that has historically delivered content to televisions through a cable modem across the same “tree and branch” network used to distribute channelized broadcast television. Technically termed DOCSIS (Data Over Cable Service Interface Specification), cable broadband literally allocates channels for carrying data to and from customers instead of television. Most cable modems are external devices that have two connections: one to the cable wall outlet via coaxial cable that goes out to the internet, the other to a computer or router via Ethernet cable.

On the cable network, where the coaxial physically ends, a DOCSIS interface strips out the data and routes them all to their destinations via fiber optic cable. DOCSIS uses a “multiple access” approach to network in which every user’s data is intermingled with others on the wire from the house to the router. Transmission speeds vary depending on the type of cable modem, cable network, and traffic load.

In response to growing consumer demand for bandwidth, DSL and cable network operators upgrade outdated or underperforming equipment following their revenue models and capital budget limitations to attempt to make the infrastructure faster and more reliable. However, several fundamental issues exist that pose long-term challenges to meeting the growing bandwidth demand through copper infrastructure:

- Broadband signals degrade significantly over copper as distances increase.
- Broadband signals over copper are susceptible to electrical interference and signal degradation, particularly as they age.
- The amount of bandwidth available on portions of broadband networks is often shared among multiple users, which can result in an uneven distribution of speed to users, and slower speeds to all as facilities become congested.

Fiber-Optics

Fiber-optic network technology converts electrical signals carrying data into light and sends the light through transparent glass fibers about the diameter of a human hair. Fiber transmits data at speeds far exceeding copper, typically by hundreds of megabits per second. With fiber-optic broadband networks, speeds in the billions of bits per second range are possible. The fiber-optic network today operates at nearly 300 Terabits per second, which is so fast that a single fiber could carry all the traffic on the internet.

More commonly, fiber-optic networks provide between 100 Mbps and 10 Gbps to users. Fiber-optic networks can be designed to be highly reliable as well as fast. Fiber-optics are used extensively by major corporations and institutions and are beginning to be at the core of every telecom company’s network. There are numerous standards for fiber optic networks. The two most common for broadband applications are Active Ethernet (AE) and Gigabit Passive Optical Network (GPON).

The actual speeds the customer experiences will vary depending on a variety of factors, such as how the network is structured, the hardware attached to the fiber-optics, and how the service



provider configures the service. The same fiber that provides broadband internet can also simultaneously deliver voice (VoIP) and video services, including video on demand. Fiber operates synchronously, meaning the service is just as fast to download as to upload, which is increasingly important for households and businesses.

Dark fiber is a fiber-optic strand with no hardware attached to generate laser light signals across the fibers. From the business perspective, dark fibers are facilities—real estate—that are leased to customers. As with any real estate, the value of dark fiber depends on location, location, location: its end points and route. Dark fiber customers are large enterprises, including ISPs, that need to interconnect local area networks or “last mile” access network infrastructure.

The fiber must be “lit” to carry data between network nodes and provide network services. That equipment must be powered and connected to other network infrastructure and must be housed in a building or cabinet. And, of course, all this infrastructure must be secured and maintained. Dark fiber lessors and lessees need to be thorough, clear, and in agreement about who is responsible for each portion of the infrastructure.

- **Fiber to the Node (FTTN)** brings high-capacity fiber-optic cables to communities and then connects to existing DSL and coaxial equipment. This is not an “all fiber” approach. Rather than bringing fiber-optic cables to every home or business, the fiber is connected to the existing copper network to increase its capacity. The copper-based “last mile” network that connects homes and businesses to the local nodes is still a bottleneck and results in subscribers not accessing the true speeds of fiber-optic connections.
- **Fiber to the Premise (FTTP)** provides internet access by running fiber-optic cable directly from an ISP to a customer’s home or business. This approach is “all fiber” all the way to the customer. Fiber facilitates much faster speeds than copper wire, generally needs to be serviced less, and is “future proof” because technology can increase the bandwidth of fiber-optic cables. AE and GPON are both FTTP technologies.

Figure 1B illustrates the relative difference between common internet connection methods, comparing access technologies from basic dial-up service through DSL, cable, and fiber. Whereas traditional broadband technologies have an upper limit of 300 Mbps, next-generation broadband that utilizes fiber-optic connections surpasses these limitations and can provide data throughputs of 1 Gbps and greater.

Figure 1B. Physical Bandwidth Capacity Comparisons

Dial-Up – 56Kbps

- Legacy Technology
- Shared Technology

ADSL – 10Mbps

- First Generation of DSL
- Shared Technology

ADSL2 – 24Mbps

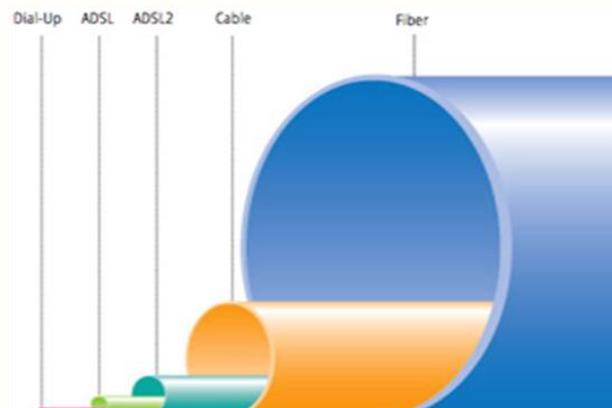
- Second Generation DSL
- Shared Technology

Cable – 150Mbps

- Data Over Cable (DOCSIS 3.0)
- Shared Technology

Next Generation Fiber – 1Gbps

- Passive Optical, Active Ethernet
- Shared and Dedicated Technology





Wireless

Wireless broadband can operate as mobile, hotspot, or fixed. Wireless can also be used as “backhaul” to connect remote locations or sparsely populated areas, where DSL or cable service would not be economically feasible, via long-range directional antenna. Fixed wireless services allow consumers to access the internet from a fixed point while stationary, and often require an external antenna with direct line-of-sight between the wireless transmitter and receiver. Speeds are generally comparable to DSL and cable modem. These services have been offered using both licensed spectrum and unlicensed devices.

Hotspot wireless uses the Wi-Fi standard to provide connectivity for digital devices in an area via physical access points and a router, which interconnects wireless devices to the internet. Hotspots typically operate at 54 Mbps, but the actual bandwidth depends on the quality of the wireless signal and speed of backhaul to the internet. Wi-Fi is a multiple access technology, so bandwidth is shared with other users. While users can move around in the hotspot, they can’t drive away: Wi-Fi does not provide a mobile connection. Wi-Fi is fast and robust, if limited in distance and susceptible to interference because it operates in open, unlicensed spectrum. Wi-Fi hotspots are common at hotels, restaurants, and public buildings for public access. It is used in many homes and businesses for private access. Many WISPs use Wi-Fi, and it is increasingly available from traditional telecoms (AT&T and Comcast have many branded hotspots). Wi-Fi complements cellular data via mobile wireless (users often use it to avoid cellular data caps and slow speeds), and is used in conjunction with wired broadband services—most hotspots connect to the internet via broadband.

Wireless cellular data services, which borders on broadband speeds, are widely available from mobile phone companies. Typically referred to as either 3G or 4G (G for “generation”), mobile connections operate within cells that hand off signals from antenna to antenna as the device moves. 4G can move data at 12/5 Mbps, but speeds in the Kbps range are more common. Cellular data connections are most commonly used with smartphones, or with computers via cellular network interface card. Many smartphones can act as Wi-Fi hotspots or tether to computers via Bluetooth.

The next generation of wireless networks, 5G, are being designed and developed, with forecasted commercial availability in 2020 and an increased maturity of the network in approximately 2035. 5G networks operate multiple frequencies (i.e., 5-GHz, 60-GHz, 0.47-0.71 GHz) and will utilize millimeter wavelengths. 5G networks will operate on the IEEE 802.11ac, 802.11ad, and 802.11af standards, also known as Gigabit Wi-Fi and are expected to provide download/upload speeds up to 1 Gbps, which depends on the number of connections. The networks are designed to provide increased efficiencies while decreasing latency, and are designed for improving the performance of connected devices that define the IoT. In particular, network architectures with an emphasis on massive multiple input multiple output technologies (MIMO) and device-to-device (D2D) communications. For example, autonomous vehicles, healthcare technologies (such as blood glucose monitoring), ultra-high-definition video, virtual reality with many more network designs architectures and other applications. With 5G networks being heterogeneous, it must include macrocells, microcells, small cells and relays.

Satellite

Satellite internet uses licensed radio spectrum to send data from and to anywhere on Earth. The signals go on a 46,000-mile roundtrip from earth-bound devices through the atmosphere via the



satellite and back to earth to another computing device. These radio signals have limited capacity and thus the connections tend to be slow. Because of the distance the signal must travel, satellite transmissions are susceptible to weather. Satellite should be considered a last resort for all but the most rural and remote areas. Areas with a high adoption of satellite generally indicates a need for better service. Today, the federal government finds that no satellite broadband service meets the 25/3 Mbps threshold of broadband.

Modern 21st Century Networks

Modern 21st century networks are comprised of a combination of technologies, not just one. Fiber is used in nearly all modern networks as it carries the most “data” and bandwidth when compared to other access technologies. Fiber is used not only for last mile access, but also as a middle-mile technology that carries data from cell towers, Wi-Fi hotspots, and other networks. Fiber is the backbone of the internet.

Wireless also plays a role in a modern network. Wireless access takes many forms including cellular, fixed wireless, Wi-Fi, Bluetooth, Zigbee, ZWave, and many others. Wireless offers a mobile or untethered experience that fiber cannot. However, the trade-off is less bandwidth when compared to fiber, but still may be appropriate for the desired mobile applications.

Wireless networks will nearly always need fiber for backhaul. So, having a robust fiber network is the anchor to any modern broadband network design. The combination of these network access technologies is what provides the foundation for the Internet-of-Things (IoT) that is discussed over, especially in respect to Smart City applications and technology.

Technology Concerns in Marion County

When limited funds are available to meet an ever-increasing demand, it becomes difficult to meet the needs of all parties involved, which is the case with federal and state broadband subsidies. Roughly six billion in federal dollars per year is set aside for rural broadband support. Much of this is earmarked for new construction, but a lot is also set aside for ongoing maintenance and operations for existing customers. This money tends to go directly to service providers. The big debate centers on how to get broadband available to the largest number of subscribers for the money available.

All broadband networks are made up of “last mile” and “middle mile” segments. Last mile refers to the physical network elements that run from a telephone company’s central office and out to the consumers’ home or business. The middle mile portion of the network is what connects all these last mile networks to the internet. The physical last mile medium can be either copper twisted pair wires, fiber-optic cables, coaxial cable, wireless or even satellite. Middle mile can also be any of these, but in most cases today it is trending towards fiber-optic based solutions, when costs permit.

Technology plays an important role in determining this cost versus the service availability solution. Most homes, as a result of a century of building telephone services to each and every home (just like electricity to every home), do have physical cables available that could carry broadband, depending on the current definition of broadband. This copper-based DSL technology, as described in the Broadband Basics section of this Plan, runs on the same twisted pair wires that used by traditional voice service. DSL shares the same physical medium as voice service. In the early days of DSL, all carriers used it to provide broadband, and it was more than adequate to provide the speeds required at the time.



However, DSL, suffers in comparison to other mediums like fiber in that the signal weakens the further users are from the “central office.” Weakened signals have a significant effect on broadband speeds. For instance, with today’s DSL, if a user is less than 3,000 feet from the central office, they could potentially get 40 Mbps broadband service. However, if they are 15,000 feet or greater, they may not get any broadband. Hence, the rural broadband problem. Rural homes are generally far apart and a long way from a telephone central office, so even though voice service is available, broadband may not be as the home is too far away. DSL technology has improved over time, but it is not keeping up with current broadband expectations.

Because the FCC has designated 10Mbps/1Mbps as the required broadband speeds for some areas, while other areas it has designated 25Mbps/3Mbps as the level of service for funding, several issues have arisen. First, DSL is a dying technology that is not keeping up with broadband trends required for many of the devices and applications consumers and businesses want to use. Many suburban areas can get 1 Gbps (1,000 Mbps) broadband via their fiber or coax cables. This availability is increasing the digital divide between urban, suburban and rural areas. The FCC has decided on these numbers because DSL can often support those speeds. If the FCC were to increase their requirements, then DSL would not be able to support it and new, more expensive infrastructure would have to be deployed, the cost of which is not currently funded. As such, those in rural communities, even with DSL service, struggle to get adequate broadband enjoyed by urban and suburban communities.

Other technologies have also tried to provide last mile broadband in rural areas. Fixed wireless solutions and satellite-based technologies are available in many rural markets. Satellite solutions have many inherent problems when compared to fixed based solutions. For instance, current geostationary satellite solutions, while available everywhere and provide 15-25 Mbps of broadband, suffer from latency issues and make them unusable for most video or real-time applications. In addition, satellite companies, in order to manage their limited bandwidth, often put caps on the amount of data end users are allowed each month, creating frustration amongst users who are constantly worried about being penalized for going over that allotment. Many view satellite services as a service of last resort only viable when nothing else is. Affordable satellite service is often not available for small/medium businesses and does not meet their broadband demands.

There are new satellite technologies on the horizon, referred to as Low Earth Orbit (LEO) satellites that may provide better services than traditional geostationary options available today. Geostationary satellites are large satellites located in fixed positions 23,000 miles from earth in space. They are “stationary” in that they remain in the same fixed location and follow the earth’s rotation. This 23,000-mile one-way (46,000) round trip causes some latency issues mentioned above. These physics cannot be overcome, so not much can be done to improve the latency issues for this technology. Signals are already traveling near the speed of light, so speeding the signals is not an option. Because these satellites are so high, they can cover a lot of geographic territory with a single satellite.

LEO satellites on the other hand, have planned orbits of around 1,200 miles from earth theoretically eliminating the latency issue inherent with their geostationary brothers. These LEO satellites will not be in fixed positions but will travel around the earth in coordination with other like satellites, part of a constellation of satellites. Some have likened these satellites to mobile cell sites in space. Many large companies have plans to mass-produce small, cost effective



satellites that will ultimately provide a collective ecosystem of broadband. Some of these designs call for solutions of up to 4,000 satellites to cover the globe.

The initial target audience for LEO based satellites may be rural communities and developing countries, as well as support of the upcoming 5G services being planned by the large cellular providers. Costs, availability and business models are still being developed by the potential providers. As of late 2018, no companies have deployed any satellites, but many have immediate plans to do so. OneWeb for instance, has publicly stated the plan to launch their first set of ten to twenty satellites between Dec 2018 and Feb 2019. Testing and commissioning the system will follow immediately with end user pricing being available soon thereafter. Initial indications point to service pricing and speeds equivalent to current geostationary solutions including caps on data. However, there are indications that some solutions will offer services of up to 500Mbps for businesses and anchor institutions.

It is possible that LEO based satellites will be an affordable broadband solution for rural Marion County. There are still a lot of unknowns with the technology, the business models and pricing, and service offerings. Most LEO providers have indicated they could start offering limited service in late 2019 with upgrades and expansion soon thereafter. We foresee that LEO satellites will play a role in providing some broadband to the hardest to reach areas, and will be part of an ecosystem of technologies that will support 5G broadband paradigms (i.e. Smart Agriculture).

Fixed wireless is also an alternative offered in many rural markets. Wireless providers, usually local companies, erect towers on top of vertical assets or on hilltops and then provide a line-of-site based broadband service to end users with a receiving antenna mounted on their home or business. These services can offer anywhere between 1 Mbps to 1 Gbps depending on the provider and their individual network capabilities.

There are some fixed wireless providers located in Marion County that have established themselves to fill the broadband access void created by the larger carriers, which don't see a business model in these rural communities. These wireless ISPs face a lot of challenges with their business model, including RF interference due to terrain, lack of appropriate spectrum, access to tower sites, equipment upgrades and costs, and their ability to respond to changes in user expectations over time. All fixed wireless traffic will eventually have to be carried to the internet via fiber based middle mile networks. Many tower sites or potential tower sites in Marion County do not have fiber-based infrastructure available, as many are in remote sites that are too expensive to connect to fiber. Although a few anchor institutions in Marion County currently rely on fixed wireless for their broadband and internet access, the preference is for fiber when available.



Fixed wireless has a place in the most rural communities given it can be the only fairly cost-effective solution available. There are new technologies (5G) coming available soon that will address at least some of the challenges of fixed wireless. Verizon and AT&T have announced plans to use 5G as a fixed wireless technology in rural markets to help deliver broadband, although no large carriers serving Marion County have announced any plans to offer last mile 5G broadband to date. Even with this new technology, however, fixed wireless providers will still be challenged with RF interference, terrain, lack of tower sites and lack of backhaul from those sites. 5G will not be a fix-all for rural broadband, but could help a few select communities, even within Marion County.



Importantly, technology selection is only part of the equation for enhancing broadband in rural markets. Finding technology that is applicable in Marion County's rural areas is important; however, it is only a part of the equation. There are several other components that should be considered in order to enhance rural broadband access.

Wireless Broadband

Wireless technology can be used to deliver broadband, especially in places that are traditionally hard to reach using wired infrastructure. Wireless networks have been built to deliver broadband and communications services in both rural hard-to-reach locations, as well as in urban and suburban areas. Wireless networks can oftentimes be the least expensive to deploy, especially in hard to reach places where “traditional” wired solutions are cost prohibitive.

When *cellular service* and *wireless service* may sound synonymous, there are some nuanced differences. Traditionally, cellular service was targeted for a mobile/nomadic environment where a cell tower delivers voice and data services using handsets and smartphones. As the user moves out of range of one cell site, the technology passes the user off to the next cell site, so the end user does not lose connection. This is what gives the user mobility.

Traditional wireless broadband has not been considered cellular in nature as it does not support mobility but is designed to be more akin to wireless DSL type service instead. A tower is constructed and those within range of the tower can receive broadband at their fixed locations.

Wireless broadband can carry wireless last mile (DSL type service) and is also used for middle mile or backhaul service as well. This use of backhaul is called *microwave backhaul* and generally requires two antennas on two different tower sites being able to “see” each other, referred to as line-of-sight service. In fact, many cellular providers use wireless microwave services to carry their aggregated traffic from one tower location to another instead of relying on fiber or other fixed infrastructure, especially in tower locations that are remote and hard to reach.

In the past, cellular service has not been appropriate as a true broadband solution given the best effort nature of delivery, slower data speeds, monthly data allowances and the fact that it is a shared medium, meaning that speeds and performance may vary depending on how many users are connected to the same tower at the same time. However, with new advances in cellular technologies, the line between cellular service and wireless broadband expectations are blurring. Many cellular companies are now delivering “broadband” speeds over their cellular networks and using network infrastructure to deliver both wireless broadband and cellular



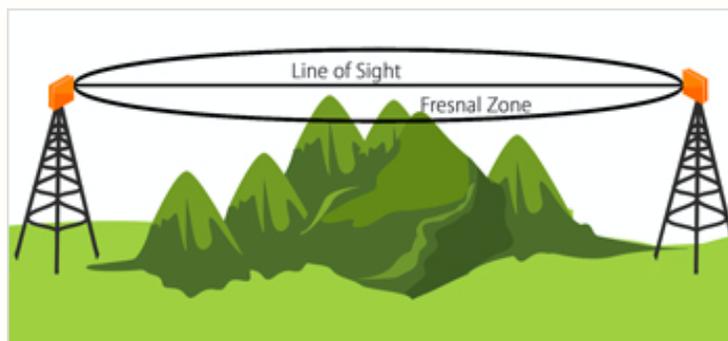
service. Both AT&T and Verizon, for instance, which are traditional cellular providers, have announced plans to use 5G (next generation cellular service) to provide fixed wireless broadband services to those in hard-to-reach areas and including rural communities where traditional fixed line services may be cost prohibitive. This new technology (5G) was designed to overcome some of the traditional limitations of using cellular service as a means of providing true broadband to end users. It increases speed, latency and overall performance when compared to traditional cellular service.

Companies use wireless instead of wired (copper, cable or fiber) technologies for the last mile solution due to economics. Given a choice, carriers will always choose fiber over any wireless broadband solutions. However, the cost of deploying fixed wired solutions into hard-to-reach locations can be very expensive on a cost-per-home basis. Rural communities are a classic example of potentially expensive locations to build to, given the small number of homes per square mile. Carriers determine cost on a per subscriber basis and if a lot of infrastructure must be installed or built and only a few homes help to pay for that infrastructure, then carriers do not see a business case and will look or wait for alternatives. This is why many rural parts of the US and the world lack of adequate broadband and is the issue facing areas like Detroit, Idanah and others in Marion County.

Wireless broadband, in some instances, can help address the cost equation for delivering broadband to many, especially in rural locations, where fiber or copper-based solutions are too expensive. At a high level, carriers can construct a tower and then anyone within “range” of that tower could get broadband services, bypassing the need to install fiber or copper-based solutions. However, wireless solutions are not without their challenges either.

Delivering broadband via wireless may seem very simple and on paper, it is. To deliver a wireless solution, providers need to consider a few things:

- Available and appropriate spectrum – not all spectrum is created equal
- Tower locations and siting
- Terrain
- Backhaul options
- Bandwidth requirements



Wireless (and cellular) signals travel through the air via wireless spectrum. This spectrum is not an infinite resource: there is only so much available. While technology continues to improve the amount of bandwidth delivered over a set amount of spectrum, spectrum is still limited and, in the US, the FCC manages its use by establishing rules about who can use it and how it may be used. There is spectrum set aside for radio (FM/AM), TV broadcast, military communications, airlines, satellites, emergency use, ship-to-shore communications, research, cellular



communications, and many others. Blocks of spectrum are lumped into two buckets: licensed and unlicensed spectrum (there are more, but outside the scope of this report).

Unlicensed spectrum can be used by anyone who agrees to “play nice” within that spectrum. Wi-Fi is an example of *unlicensed spectrum* that the FCC has made available for anyone to use certain rules are followed. Carriers will not traditionally deploy their services in unlicensed spectrum because they would have a difficult time providing guaranteed quality of service to their end users. From time to time, the FCC makes spectrum available via an auction to the highest bidder, which becomes *licensed spectrum*. The largest cellular providers have paid billions for the spectrum that they have exclusive rights to use. This exclusive use allows them to control the user experience, which is a competitive differentiator between them and their competitors. The reason the spectrum can be so expensive is that spectrum is due to factors of supply and demand.

Not all spectrum is created equal. When designing a wireless or cellular network, engineers start with the network requirements (what the network needs to deliver in terms of performance) and then work to design a network to meet those requirements. Choice of spectrum is one of their first considerations. Appropriate spectrum is not always available to them, which may change the network design and costs. Spectrum behaves differently depending on where it is in the spectrum range. Spectrum in the lower ranges (400MHz-900MHz, for example) is effective at penetrating through walls, foliage, and buildings, but on a per hertz basis, it does not carry much bandwidth when compared to something higher in the spectrum range. The higher the spectrum range, the more bandwidth it can carry. However, the higher spectrum ranges used in cellular and wireless networks do not penetrate walls, buildings or foliage very well even though they can carry more bandwidth.

Network engineers then have to balance their network marketing requirements with the spectrum they have available and at their disposal. Getting high bandwidth broadband and the ability to penetrate walls and terrain is a balancing act. Spectrum in the lower ranges offer better non-line-of-sight solutions, whereas the higher spectrum ranges need a line-of-sight solution. Line-of-sight requires the transmitting antenna to be able to “see” the receiving antenna with limited trees and buildings in the way to be effective.

Terrain, then, plays an important role in the network design. Spectrum does not travel over mountains or hills very well, nor does certain spectrum do very well in penetrating through trees, bushes, water or distance. The farther away the transmitter and the receiver are from each other, the less bandwidth the user will get. Many wireless designs will struggle to be appropriate in Marion County given the terrain, foliage and distances between potential sites, especially in the Santiam Canyon. This generally means the network will require more sites, closer together, or higher on hilltops, which can put them above the clutter.

Sites are important too. An engineer designing a new wireless network also must consider where tower sites can be located. Sites are not always available in ideal locations, and network engineers must design based on what is available. Sites also need a means of backhaul, whether via fiber or microwave, to another site, where it then transitions to a wireline fiber network. Fiber can be costly to install to remote locations. Electrical power, security and access are also considerations when locating appropriate tower sites.

If fixed wireless is a viable solution for addressing the broadband needs, the County can help mitigate some of the challenge's carriers might face in deployment by making County assets,



such as land, site locations, power and existing shelters available to these carriers. The County should develop a list of assets and guidelines on the use of those assets, and then make them available for use by the private sector as an incentive for broadband deployment.

Wireless Networks will be an important part of any Smart Ag development ecosystem as the equipment and stock of Ag is not connected to a fixed line (tractors are mobile out in the field,), so wireless networks and the fiber backhaul to each wireless site, needs to be part of the planning process.



Appendix D: Broadband & Public Policy

As governments at all levels prepare for the future demands of the public, commercial entities, and internal operations, public policy related to the internet, wireless technologies, and related infrastructure has become increasingly vital in meeting the needs of communities. Policies have emerged at the federal, state, and local levels in an effort to streamline new processes and anticipate the changing landscape of broadband technologies. At all levels, the importance of government involvement in the future of broadband cannot be overstated. Efficient, timely, and cost-effective solutions are imperative to ensuring the success of deploying these technologies to meet the demands of all communities, large and small.

National Broadband Public Policies

In reaction to growing consumer demand for bandwidth, network operators have continued to upgrade equipment and networks within capital budget limitations to make these lines faster and more reliable, however several fundamental issues exist that pose long-term challenges to meeting the growing bandwidth demand through copper infrastructure:

- Broadband signals degrade significantly as distances increase.
- Broadband signals are susceptible to electrical interference and signal degradation, particularly as they age.
- Service Providers generally share bandwidth among pools of users that result in an uneven distribution of speed to users, and speed degrades to all as these facilities become congested.
- Service Providers understand that fiber-optic broadband delivers the only long-term solution to the ever-growing bandwidth needs of homes, businesses, and community anchors and that the actual speeds associated with fiber-optic connectivity are always dependent on the services provisioned by the provider who operates the system.

In sum, broadband is deployed throughout communities as wired and wireless infrastructure that carries digital signals between end users and the content they want to access. The content comes in many forms and from many locations across the world in the networks that connect the local community to the Internet backbone. Websites, television, streaming video, videoconferencing, cloud services, and even telephone service are just a few types of content that are delivered across local broadband networks.

Every minute of every day, subscribers are consuming real time video and streaming applications at work, at home – and in between. More than ever, planners, regulators and consumers alike need to understand the roles of Accessibility, Bandwidth, and Continuity.

Wireline Regulation and Policy

Broadband facilities and services essentially have been not regulated at the federal (Federal Communications Commission) or state levels. The FCC in its application of federal law had generally treated broadband Internet access services as unregulated services and subjected them to fewer regulations than cable TV or telecommunications services. The FCC briefly went back-and-forth on this issue with the imposition of its “Net Neutrality” order in February 2015, in which the FCC changed from classifying Internet access (and other services) as Title I



“Information Services”, and reclassified those services to be regulated as “Title II” services.⁴³ The intent was to allow regulatory scrutiny focused mainly to ensure greater transparency, reasonable network management practices, authority to review interconnection practices, and to ban three practices: blocking access to legal content; throttling on the basis of content; or paid prioritization. However, this decision has been reversed by the current FCC, and re-imposition of “Net Neutrality” requirements is not likely in the foreseeable future.

The FCC has opened a proceeding to address barriers to investment in and deployment of wireline broadband infrastructure. The FCC has issued an Order⁴⁴ to address some issues in that docket, and sought comment on other issues (e.g., notice requirements for discontinuance or grandfathering of services) to “continue reducing barriers to broadband deployment.”

Wireless Regulation and Policy

Wireless providers are looking forward to the deployment of “5G,” which is distinguished from the present “4G” based wireless service by use of low power transmitters with coverage radius of approximately 400 feet – 5G thus requires close spacing of antennas and more of them. This has obvious implications for city authorities with applications for location of antennas by service providers before city and municipal authorities. These providers – Verizon, AT&T, Sprint and T-Mobile – are making a concerted push for new rules and legislation before state, local and federal authorities with jurisdiction and responsibilities for siting of wireless facilities. As stated by the FCC,

The wireless industry is currently deploying and planning for additional construction of a large number of small cells, and the number of these facilities is expected to grow rapidly over the next decade. S&P Global Market Intelligence estimates that between 100,000 and 150,000 small cells will be constructed by the end of 2018, and that small cell deployments are expected to reach 455,000 by 2020 and nearly 800,000 by 2026. AT&T has reported that the substantial majority of its infrastructure deployments over the next five years will be small cell sites. In addition, Verizon is deploying small cells in several urban areas, including New York, Chicago, Atlanta, and San Francisco. Sprint announced last year a goal of deploying 70,000 small cells within two years.⁴⁵

The placement of wireless facilities is governed by an interrelated legal framework including shared jurisdiction of state and federal authorities. The Federal Communications Commission has preempted the authority of state and local jurisdictions in other cases and may be poised to take preemptive steps again regarding siting of wireless facilities, in two current proceedings. The FCC states the “dilemma” – as well as its perspective regarding jurisdiction – as follows:

We recognize, as did Congress in enacting Sections 253 and 332 of the Communications Act, that localities play an important role in preserving local interests such as aesthetics and safety.

43 Report and Order on Remand, Declaratory Ruling, and Order; *In the Matter of Protecting and Promoting the Open Internet*; GN Docket No. 14-28; FCC 15-24; Adopted February 26, 2015 and Released March 12, 2015. [The “Net Neutrality Order”]

44 *Accelerating Wireline Broadband Deployment by Removing Barriers to Infrastructure Investment*, WC Docket No. 17-84, Report and Order, Declaratory Ruling, and Further Notice of Proposed Rulemaking, FCC 17-154 (rel. Nov. 29, 2017)

45 *Streamlining Deployment of Small Cell Infrastructure by Improving Wireless Facilities Siting Policies*; *Mobilitie, LLC Petition for Declaratory Ruling*, WT Docket No. 16-421, Public Notice, 31 FCC Rcd 13360, December 22, 2016, at page 3-4 (citations omitted). (“Improving Wireless Facilities Siting Policies Public Notice”).



At the same time, the Commission has a statutory mandate to facilitate the deployment of network facilities needed to deliver more robust wireless services to consumers throughout the United States. It is our responsibility to ensure that this deployment of network facilities does not become subject to delay caused by unnecessarily time-consuming and costly siting review processes that may be in conflict with the Communications Act.⁴⁶

The emergence of 5G technology is causing significant current rulemaking and legislative activity in both the federal and state jurisdictions.

Federal Communications Commission (FCC)

The FCC has implemented “Shot Clock” requirements that place a maximum time for local authorities to review applications to place wireless facilities. Current FCC shot clock requirements arise in two contexts. First the 60-day clock for “Wireless Facility Modifications”⁴⁷ arises from § 6409(a) of the Spectrum Act.⁴⁸ The Spectrum Act applies to applications which do not “substantially change” an existing tower or base station, and thus are eligible requests to modify existing towers or base stations which do not substantially change the physical dimensions. Eligible requests include collocation of new transmission equipment, removal of transmission equipment or replacement of transmission equipment. All terms are defined in the rule, including “substantial change.” The time-period for review is “within 60 days of the date on which an applicant submits a request seeking approval.” The 60-day clock may be tolled only by mutual agreement, or when the agency determines the application is incomplete. Clear and specific written notice is required within 30 days. Requests for approval gain “deemed granted” status if the request is not acted on within the 60-day timeframe, and the applicant notifies the local authority in writing.

The second context for “shot clock” requirements is under § 332(7) of the Communications Act⁴⁹, regarding “Preservation of local zoning authority.” In its Declaratory Ruling⁵⁰ in 2009 the FCC set “presumptively reasonable period of time” deadlines of 90 days for collocation applications, and 150 days for all other applications, including new siting applications. An application is defined as a request for collocation “if it does not involve a ‘substantial increase in the size of the tower’ as defined in the Nationwide Programmatic Agreement for the Collocation of Wireless Antennas.”⁵¹ Applications are not “deemed granted” if the local authority fails to act on a completed application within the shot clock time period for review, instead the provider must pursue any relief in court.

The statutory provisions of the Communications Act and the Spectrum Act overlap to a certain extent, but the FCC up to now has specifically preserved the distinct standards above under the two provisions.

46 *Id.*, at page 2.

47 47 CFR § 1.40001.

48 See Middle Class Tax Relief and Job Creation Act of 2012, Pub. L. No. 112-96, 126 Stat. 156, § 6409(a) (2012) (Spectrum Act), *codified at* 47 U.S.C. § 1455(a).

49 47 U.S.C. § 332(7).

50 Petition for Declaratory Ruling to Clarify Provisions of Section 332(c)(7) to Ensure Timely Siting Review, Declaratory Ruling, Federal Communications Commission, 24 FCC Rcd 13994 (2009), at paragraph 45.

51 *Id.*, at paragraph 46.



State Wireless Policy

Along with pushing for reexamination of FCC rules, the wireless providers – Verizon, AT&T, Sprint and T-Mobile – have embarked on a nationwide push for state legislation to limit what local authorities can do regarding placement of “small wireless facilities.” The state legislative push is strategic on the part of the wireless providers looking forward to the deployment of “5G,” given the vastly increased number of antennas that will be required. The state legislative framework advanced by the wireless providers generally truncates timelines, limits review, limits payments, and removes this subject from home rule authority. Such legislation has passed in some states (approximately 14, e.g., Florida) and has been introduced but not passed.



Exhibit A: 2018 Farm Bill Reauthorization

Provisions related to Broadband Infrastructure and Services.

A detailed description of relevant Farm Bill provisions affecting broadband infrastructure funding, reporting of funded projects, and interagency cooperation follows.

It is important to note that the Farm Bill authorizes funding for allowable purposes and determines general requirements, but the specific requirements applicable to each funding opportunity will be announced at the time the Notice of Funding Availability is released by the authorizing agency. The rules for the E-Connectivity funding opportunity recently announced are still being developed but are expected to be released in the near future.

The Funding section of this report is a work in progress until the E-Connectivity rules are released and regulatory appropriations bills have enacted for the twelve federal agencies still operating under a Continuing Resolution.

2018 Farm Bill Reauthorization

Provisions Applicable to Broadband Funding and Reporting

THE AGRICULTURE IMPROVEMENT ACT OF 2018

TITLE VI—Rural Development

Subtitle A—Improving Health Outcomes in Rural America

SEC. 6101. Combating substance use disorder in rural America; prioritizations.

Set asides and prioritization for programs that prevent and treat substance abuse in rural areas:

- Distance Learning and Telemedicine: 20% set aside
- Community Facilities: Priority given to projects for facilities to provide prevention, treatment, and or recovery services, and that employ staff that have expertise and training in how to identify and treat individuals with substance use disorders.
- Rural Health and Safety Education Programs: Priority given to applicants using grants for substance use disorder education and treatment and prevention.

SEC. 6102. Distance learning and telemedicine.

Increases appropriations from \$75 million per year to \$82 million.

Subtitle B—Connecting Rural Americans to High Speed Broadband

SEC. 6201. Access to broadband telecommunications services in rural areas.

Provides for grants in addition to loans and loan guarantees.

- Highest priority to be given to applications to unserved rural communities:
 - With no residential broadband service of at least 10 Mbps downstream and 1 Mbps upstream capacity



- Providing maximum level of broadband service to greatest proportion of rural households in proposed funded service area (“PFSA”) identified
- Equal consideration given to all eligible entities, including those not previously receiving grants, loans, or loan guarantees for that purpose
- Priority given to applications requesting less grant funding than loan funding

Additional priorities, after giving effect to priorities listed above:

- Projects in rural communities with less than 10,000 permanent residents
- Communities experiencing that are experiencing outmigration and have adopted a strategic community investment plan (under section 379H(d) of the Farm Bill) that includes considerations for improving and expanding broadband service;
- Communities with a high percentage of low-income families or persons (as defined in section 501(b) of the Housing Act of 1949 (42 U.S.C. 1471(b));
- Communities that are isolated from other significant population centers; or
- Projects that provide rapid and expanded deployment of fixed and mobile broadband on cropland and rangeland within a service territory for use in various applications of precision agriculture; and
- Projects developed with the participation of, and receiving a substantial portion of funding for the project from, 2 or more stakeholders, including:
 - State, local, and tribal governments;
 - nonprofit institutions;
 - community anchor institutions, such as—
 - public libraries;
 - elementary schools and secondary schools (as defined in section 8101 of the Elementary and Secondary Education Act of 1965 (20 U.S.C. 7801));
 - institutions of higher education; and
 - health care facilities;
 - private entities;
 - philanthropic organizations; and
 - cooperatives.

Grants available for Development Costs, defined as:

- construction, including labor and materials;
- project applications; and
- other development activities, as determined by the Secretary.

Grant amount shall not exceed:

- 75% of total project cost for an area with a density of fewer than 7 people per square mile;
- 50% for an area with a density of 7 or more and fewer than 12 people per square mile; and
- 25% for an area with a density of 12 or more and 20 or fewer people per square mile.

The Secretary may make modifications of the density thresholds to ensure that funds are best utilized to provide broadband service in communities that are the most rural in character.

Project must be carried out in a PFSA:



- Where not less than 90% of households are unserved; and
- Where there is no other concurrent broadband grant administered by the USDA Rural Utilities Service (“RUS”)

Determination of population density must:

- Utilize publicly available data; and
- Include only those areas in which the applicant is able to meet the service requirements

Broadband Buildout Requirements:

- The term ‘broadband buildout requirement’ means the level of internet service an applicant receiving assistance must agree, at the time the application is finalized, to provide for the duration of any project-related agreement between the applicant and the Department.
- Applicant must demonstrate ability to furnish or improve service to meet broadband buildout requirements in the PFSA (currently 25 Mbps downstream and 3 Mbps upstream at minimum).
- The Secretary shall establish such requirements to reasonably ensure:
 - the repayment of all loans and loan guarantees; and
 - the financed network is technically capable of providing broadband service for the lifetime of any project-related agreement
- If an applicant shows that it would be cost prohibitive to meet the broadband buildout requirements established under this paragraph for the entirety of a PFSA due to the unique characteristics of the proposed serving area, the Secretary and the applicant may agree to utilize substitute standards for any unserved portion of the project. Any substitute service standards should continue to consider the best technology available to meet the needs of the residents in the unserved area.

SUPPORT FOR TECHNICAL ASSISTANCE AND TRAINING:

Not less than 3% and not more than 5% of amount appropriated for a fiscal year shall be used for technical assistance and training for eligible entities applying for assistance for a project:

- to prepare reports and surveys necessary to request grants, loans, and loan guarantees for broadband deployment;
- to improve management, including financial management, relating to the proposed broadband deployment;
- to prepare applications for grants, loans, and loan guarantees; or
- to assist with other areas of need identified by the Secretary.

PAYMENT ASSISTANCE FOR CERTAIN LOAN AND GRANT RECIPIENTS:

When providing a grant, the Secretary, at the Secretary’s sole discretion, may provide:

- a subsidized loan at a reduced interest rate determined by the Secretary to be appropriate to meet the objectives of the program; or
- a payment assistance loan



- Will require no interest and principal payments while the borrower is:
 - in material compliance with the loan agreement; and
 - meeting the milestones and objectives of the project
- Will require nominal periodic payments as the Secretary determines to be appropriate.
- Before entering into the payment assistance agreement, the applicant and the Secretary shall agree to milestones and objectives of the project
- The Secretary and the applicant may jointly agree to amend the milestones and objectives
- When deciding to utilize payment assistance authority, the Secretary shall consider whether or not the payment assistance will—
 - improve the compliance of the grantee with any commitments made through the grant agreement;
 - promote the completion of the broadband project;
 - protect taxpayer resources; and
 - support the integrity of the broadband programs administered by the Secretary.
- the Secretary may not make a payment assistance loan to an entity receiving a grant that is also the recipient of a loan associated with the grant.

SEC. 6202. Expansion of middle mile infrastructure into rural areas

- Purpose: to encourage the expansion and extension of middle mile broadband infrastructure to connect underserved rural areas to the backbone of the Internet.
- “Middle mile infrastructure” means any broadband infrastructure that does not connect directly to end-user locations (including anchor institutions) and may include interoffice transport, backhaul, Internet connectivity, data centers, or special access transport to rural areas.
- Grants, loans, and loan guarantees to eligible applicants may provide funds for the construction, improvement, or acquisition of middle mile infrastructure to serve rural areas
- \$10,000,000 authorized for each fiscal year from 2018 through 2023.
- Grants may not exceed 20% of the total project cost;
- To be eligible to obtain assistance, the applicant must:
 - Submit an application at such time, in such manner, and containing such information as required;
 - Agree to complete build-out of the middle mile infrastructure described in the application by not later than 5 years after the initial date on which proceeds from the assistance provided under this section are made available; and
 - Submit a plan to ensure the viability of the project by—
 - connecting, assisting with connecting, or enabling the connection of retail broadband systems that serve rural areas within the PFSA to the middle mile infrastructure project in an affordable and economically competitive manner;
 - leasing or selling sufficient capacity prior to project approval; and
 - complying with any other requirements imposed by the Secretary.
- Entities that receive assistance to construct, improve, or acquire middle mile infrastructure under this section shall be eligible to apply for additional funds to provide for retail



broadband service to end users.

- The proceeds of assistance may be used to carry out a project in a PFSA only if, as of the date the application for assistance is submitted, there is not adequate middle mile infrastructure available to support broadband service for eligible rural communities that would be provided access to the middle mile infrastructure.
- A project is eligible for assistance if at the time of the application—
 - At least 75% of the interconnection points serve eligible rural areas; and
 - The proposed middle mile network will be capable of supporting retail broadband service meeting the maximum broadband buildout requirement within the PFSA.
- Grants may only be provided to serve rural areas where population density or geographic characteristics make it infeasible to construct middle mile broadband systems without grant assistance.
- All loans and loan guarantees will be subject to terms, conditions, and adequacy of security requirements as imposed by the Secretary. If the middle mile infrastructure would not provide adequate security due to long-term leasing arrangements, the Secretary shall require substitute security in such form and substance as acceptable to the Secretary.

SEC. 6203. Modifications to the Rural Gigabit Program.

The Program is renamed “Innovative Broadband Advancement”;

A grant, loan, or both may be provided to an eligible entity for the purpose of demonstrating innovative broadband technologies or methods of broadband deployment that significantly decrease the cost of broadband deployment, and provide substantially faster broadband speeds than are available, in a rural area.

Eligibility

- Projects designed to decrease the cost of broadband deployment, and substantially increase broadband speed to not less than the broadband buildout requirements
- Applications must be submitted at such time, in such manner, and containing such other information as required
- Applications must demonstrate that the entity is able to carry out the project; and
- Applicants agree to complete the project build-out within 5 years after the date the assistance is first provided for the project.
- Priority given to projects that:
 - involve partnerships between or among multiple entities;
 - provide broadband service to the greatest number of rural entities at or above the broadband requirements; and
 - could be replicated in other rural areas

SEC. 6204. Community Connect Grant Program

The Program is amended as follows:

- **FUNDING AVAILABILITY:** \$50,000,000 for each fiscal year from 2019 through 2023
- **ELIGIBLE BROADBAND SERVICE:** The term ‘eligible broadband service’ means broadband service that has the capability to transmit data at a speed specified by the



Secretary, which may not be less than the applicable minimum download and upload speeds established by the Federal Communications Commission in defining the term 'advanced telecommunications capability' for purposes of section 706 of the Telecommunications Act of 1996 (47 U.S.C. 1302).

- **ELIGIBLE SERVICE AREA:** The term 'eligible service area' means an area in which broadband service capacity is less than—
 - (A) a 10-Mbps downstream transmission capacity; and
 - (B) a 1-Mbps upstream transmission capacity.
- **ELIGIBLE ENTITY—** a legally organized entity that is:
 - (I) an incorporated organization;
 - (II) an Indian Tribe or Tribal organization;
 - (III) a State
 - (IV) a unit of local government; or
 - (V) any other legal entity, including a cooperative, a private corporation, or a limited liability company, that is organized on a for-profit or a not-for-profit basis; and has the legal capacity and authority to enter into a contract, to comply with applicable Federal laws, and to own and operate broadband facilities
- **EXCLUSIONS:** The term 'eligible entity' does not include—
 - (i) an individual; or
 - (ii) a partnership.
- **ELIGIBLE PROJECTS:**
 - (1) Within the PFSA, provides eligible broadband service to:
 - (A) each essential community facility; and
 - (B) any required facilities necessary to offer that eligible broadband service to each residential and business customer within such proposed eligible service area; and
 - (2) for not less than 2 years—
 - (3) furnishes free eligible broadband service to a community center
 - (4) provides not fewer than 2 computer access points for that free eligible broadband service; and
 - (5) covers the cost of bandwidth to provide free eligible broadband service to each essential community facility that requests broadband services within the PFSA
- **ELIGIBLE USES OF GRANT FUNDS:**
 - (A) Construction, acquisition, or leasing of facilities (including spectrum), land, or buildings to deploy eligible broadband service; and
 - (B) Improvement, expansion, construction, or acquisition of a community center within the proposed eligible service area described in the application submitted by the eligible entity.



- INELIGIBLE USES:

(A) Duplication of any existing eligible broadband service provided by another entity in the eligible service area; or

(B) Operating expenses, except to provide free broadband service or spectrum as required

- REQUIREMENTS:

(A) Free Access for Community Centers not greater than the lesser of—

(A) 10 percent; and

(B) \$150,000.

(B) Matching funds – cash contribution in an amount not less than 15 percent of the amount of the grant, and

- shall be used solely for the project for which the eligible entity receives a grant; and

- shall not include any Federal funds, unless a Federal statute specifically provides that those Federal funds may be considered to be from a non-Federal source.

Applications must include documentation sufficient to demonstrate the availability of matching funds

SEC. 6205. Outdated broadband systems

In general, the Secretary shall consider any portion of a service territory that is subject to an outstanding grant agreement between the Secretary and a broadband provider to be unserved for the purposes of all broadband assistance programs under this Act, if the broadband service in that portion of a service territory is less than 10 Mbps downstream transmission capacity or less than 1 Mbps upstream transmission capacity.

Exception. —The Secretary shall not consider a portion of a service territory to be unserved if the broadband service provider has constructed or begun to construct broadband facilities that meet the minimum acceptable level of service established in that portion of the service territory.

The amendment made by this section shall not take effect until October 1, 2020.

SEC. 6206. Default and deobligation; deferral.

In addition to other authority under applicable law, the Secretary shall establish written procedures for all broadband programs so that, to the maximum extent practicable, the programs are administered to—

(1) recover funds from loan and grant defaults;

(2) deobligate any awards, less allowable costs that demonstrate an insufficient level of performance (including metrics determined by the Secretary) or fraudulent spending, to the extent funds with respect to the award are available in the account relating to the program established by this title;

(3) award those funds, on a competitive basis, to new or existing applicants consistent with this title; and



(4) minimize overlap among the programs.

Deferral period:

In determining the terms and conditions of assistance, the Secretary may establish a deferral period of not shorter than the buildout period established for the project involved in order to support the financial feasibility and long-term sustainability of the project.

SEC. 6207. Public notice, assessments, and reporting requirements

The Rural Electrification Act of 1936 (7 U.S.C. 901 et seq.) is amended by adding at the end the following new title:

“TITLE VII—General and administrative provisions

“SEC. 701. Public notice, assessments, and reporting requirements.

“(a) Notice requirements. —The Secretary shall promptly make available to the public, a fully searchable database on the website of the Rural Utilities Service that contains information on all retail broadband projects provided assistance or for which assistance is sought that are administered by the Secretary, including, at a minimum—

“(1) notice of each application for assistance describing the application, including—

“(A) the identity of the applicant;

“(B) a description of each application, including—

“(i) a map of the proposed service area of the applicant; and

“(ii) the amount and type of support requested by each applicant;

“(C) the status of each application; and

“(D) the estimated number and proportion of service points in the proposed service territory without fixed broadband service, whether terrestrial or wireless;

“(2) notice of each entity receiving assistance administered by the Secretary, including—

“(A) the name of the entity;

“(B) the type of assistance being received;

“(C) the purpose for which the entity is receiving the assistance; and

“(D) each annual report submitted under subsection (c) (redacted to protect any proprietary information in the report); and

“(3) such other information as is sufficient to allow the public to understand assistance provided.

“(b) Service area assessment. —

“(1) IN GENERAL. —The Secretary shall, with respect to a retail broadband application for assistance, which is outside an area in which the applicant receives Federal universal service support—

“(A) after giving notice required by subsection (a)(1), afford service providers not less than 45 days to voluntarily submit information required by the Secretary onto the agency’s online



mapping tool with respect to areas that are coterminous with the proposed service area of the application (or any parts thereof), such that the Secretary may assess whether the application submitted meets the eligibility requirements under this title; and

“(B) if no broadband service provider submits information under paragraph (1), consider the number of providers in the proposed service area to be established by using any other data regarding the availability of broadband service that the Secretary may collect or obtain through reasonable efforts.

“(2) ASSESSMENT OF UNSERVED COMMUNITIES. —In the case of an application given the highest priority under section 601(c)(2)(A)(i), the Secretary shall confirm that each unserved rural community identified in the application is eligible for funding by—

“(A) conferring with, and obtaining data from, the Chair of the Federal Communications Commission and the Administrator of the National Telecommunications and Information Administration with respect to the service level in the service area proposed in the application;

“(B) reviewing any other source that is relevant to service data validation, as determined by the Secretary; and

“(C) performing site-specific testing to verify the unavailability of any retail broadband service.

“(3) FOIA EXEMPTION. —For purposes of section 552 of title 5, United States Code, information received by the Secretary pursuant to paragraph (1)(A) of this subsection shall be exempt from disclosure pursuant to subsection (b)(2)(B) of such section 552.

“(c) Reporting broadband improvements to USDA. —

“(1) IN GENERAL. —The Secretary shall require any entity receiving assistance for a project which provides retail broadband service to submit an annual report for 3 years after completion of the project, in a format specified by the Secretary, that describes—

“(A) the use by the entity of the assistance, including new equipment and capacity enhancements that support high-speed broadband access for educational institutions, health care providers, and public safety service providers (including the estimated number of end users who are currently using or forecasted to use the new or upgraded infrastructure); and

“(B) the progress towards fulfilling the objectives for which the assistance was granted, including—

“(i) the number of service points that will receive new broadband service, existing network service improvements, and facility upgrades resulting from the Federal assistance;

“(ii) the speed of broadband service;

“(iii) the average price of the most subscribed tier of broadband service in a proposed service area;

“(iv) new subscribers generated from the project; and

“(v) any metrics the Secretary determines to be appropriate.

“(2) ADDITIONAL REPORTING. —

“(A) BROADBAND BUILDOUT DATA. —As a condition of receiving assistance under section 601, a recipient of assistance shall provide to the Secretary complete, reliable, and precise geolocation information that indicates the location of new broadband service that is being



provided or upgraded within the service territory supported by the grant, loan, or loan guarantee not later than 30 days after the earlier of—

“(i) the date of completion of any project milestone established by the Secretary; or

“(ii) the date of completion of the project.

“(B) REPORTING FOR MIDDLE MILE PROJECTS. —The Secretary shall require any entity receiving assistance under section 602 to submit a semiannual report for 5 years after completion of the project, in a format specified by the Secretary, that describes—

“(i) the use by the entity of the assistance to construct, improve, or acquire middle mile infrastructure;

“(ii) the progress towards meeting the end-user connection plan submitted under section 602(d)(1)(A)(iii); and

“(iii) any additional metrics the Secretary determines to be appropriate.

“(C) ADDITIONAL REPORTING. —The Secretary may require any additional reporting and information by any recipient of any broadband assistance under this act so as to ensure compliance with this section.

“(d) Annual report on broadband projects and service to Congress. —Each year, the Secretary shall submit to the Congress a report that describes the extent of participation in the broadband assistance programs administered by the Secretary for the preceding fiscal year, including a description of—

“(1) the number of applications received and accepted, including any special loan terms or conditions for which the Secretary provided additional assistance to unserved areas;

“(2) (A) the communities proposed to be served in each application submitted for the fiscal year; and

“(B) the communities served by projects funded by broadband assistance programs;

“(3) the period of time required to approve each loan application under broadband programs;

“(4) any outreach activities carried out by the Secretary to encourage entities in rural areas without broadband service to submit applications under this Act;

“(5) the method by which the Secretary determines that a service enables a subscriber to originate and receive high-quality voice, data, graphics, and video for purposes of providing broadband service under this Act;

“(6) each broadband service, including the type and speed of broadband service, for which assistance was sought, and each broadband service for which assistance was provided, under this Act; and

“(7) the overall progress towards fulfilling the goal of improving the quality of rural life by expanding rural broadband access, as demonstrated by metrics, including—

“(A) the number of residences and businesses receiving new broadband services;

“(B) network improvements, including facility upgrades and equipment purchases;

“(C) average broadband speeds and prices on a local and statewide basis;



“(D) any changes in broadband adoption rates; and

“(E) any specific activities that increased high speed broadband access for educational institutions, health care providers, and public safety service providers.

“(e) Limitations on reservation of funds. —Not less than 3 but not more than 5 percent of program level amounts available pursuant to amounts appropriated to carry out title VI shall be set aside to be used for—

“(1) conducting oversight under such title;

“(2) implementing accountability measures and related activities authorized under such title; and

“(3) carrying out this section.”.

SEC. 6208. Environmental reviews.

Title VII of the Rural Electrification Act of 1936, as added by section 6207 of this Act, is amended by adding at the end the following:

“SEC. 702. Environmental reviews.

“The Secretary may obligate, but not disperse, funds under this Act before the completion of otherwise required environmental, historical, or other types of reviews if the Secretary determines that a subsequent site-specific review shall be adequate and easily accomplished for the location of towers, poles, or other broadband facilities in the service area of the borrower without compromising the project or the required reviews.”.

SEC. 6209. Use of loan proceeds to refinance loans for deployment of broadband service.

Title VII of the Rural Electrification Act of 1936, as added by section 6207 and amended by section 6208 of this Act, is amended by adding at the end the following:

“SEC. 703. Use of loan proceeds to refinance loans for deployment of broadband service.

“Notwithstanding any other provision of this Act, the proceeds of any loan made or guaranteed by the Secretary under this Act may be used by the recipient of the loan for the purpose of refinancing an outstanding obligation of the recipient on another telecommunications loan made under this Act, or on any other loan if that loan would have been for an eligible telecommunications purpose under this Act.”.

SEC. 6210. Smart utility authority for broadband.

(a) Section 331 (referring to the Farmers Home Administration Act and other Acts authorizing agricultural credit) of the Consolidated Farm and Rural Development Act (7 U.S.C. 1981) (s amended by adding at the end the following:

“(e) (1) Except as provided in paragraph (2), the Secretary may allow a recipient of a grant, loan, or loan guarantee provided by the Office of Rural Development under this title to use not more than 10 percent of the amount so provided—

“(A) for any activity for which assistance may be provided under section 601 of the Rural Electrification Act of 1936; or

“(B) to construct other broadband infrastructure.



“(2) Paragraph (1) of this subsection shall not apply to a recipient who is seeking to provide retail broadband service in any area where retail broadband service is available at the minimum broadband speeds, as defined under section 601(e) of the Rural Electrification Act of 1936.

“(3) The Secretary shall not provide funding under paragraph (1) if the funding would result in competitive harm to any grant, loan, or loan guarantee provided under the Rural Electrification Act of 1936.”.

(b) Title I of the Rural Electrification Act of 1936 (7 U.S.C. 901–918a) is amended by inserting after section 7 the following:

“SEC. 8. Limitations on use of assistance.

“(a) Subject to subsections (b) and (c) of this section, the Secretary may allow a recipient of a grant, loan, or loan guarantee under this title to set aside not more than 10 percent of the amount so received to provide retail broadband service.

“(b) A recipient who sets aside funds under subsection (a) of this section may use the funds only in an area that is not being provided with the minimum acceptable level of broadband service established under section 601(e), unless the recipient meets the requirements of section 601(d).

“(c) Nothing in this section shall be construed to limit the ability of any borrower to finance or deploy services authorized under this Act.

“(d) The Secretary shall not provide funding under subsection (a) if the funding would result in competitive harm to any grant, loan, or loan guarantee referred to in subsection (a).”.

SEC. 6211. Refinancing of telephone loans.

Section 201 of the Rural Electrification Act of 1936 (7 U.S.C. 922) is amended, in the fifth sentence, by striking “furnishing telephone service in rural areas:” and all that follows through “40 per centum of any loan made under this title.” and inserting “furnishing telephone service in rural areas, including indebtedness of recipients on another telecommunications loan made under this Act.”.

SEC. 6212. Federal broadband program coordination.

(a) Consultation between USDA and NTIA. —The Secretary shall consult with the Assistant Secretary to assist in the verification of eligibility of the broadband loan and grant programs of the Department of Agriculture. In providing assistance under the preceding sentence, the Assistant Secretary shall make available the broadband assessment and mapping capabilities of the National Telecommunications and Information Administration.

(b) Consultation between USDA and FCC. —

(1) BY USDA. —The Secretary shall consult with the Commission before providing broadband assistance for a project to serve an area with respect to which another entity is receiving Connect America Fund or Mobility Fund support under the Federal universal service support mechanisms established under section 254 of the Communications Act of 1934 (47 U.S.C. 254).

(2) BY FCC. —The Commission shall consult with the Secretary before offering or providing Connect America Fund or Mobility Fund support under the Federal universal service support mechanisms established under section 254 of the Communications Act of 1934 (47 U.S.C. 254) to serve an area with respect to which another entity has received broadband assistance under a loan or grant program of the Department of Agriculture.



(c) Report to Congress.—Not later than 1 year after the date of the enactment of this Act, the Secretary, the Commission, and the Assistant Secretary shall submit to the Committee on Agriculture and the Committee on Energy and Commerce of the House of Representatives and the Committee on Agriculture, Nutrition, and Forestry and the Committee on Commerce, Science, and Transportation of the Senate a report on how best to coordinate federally supported broadband programs and activities in order to achieve the following objectives:

(1) Promote high-quality broadband service that meets the long-term needs of rural residents and businesses, by evaluating the broadband service needs in rural areas for each decade through 2050.

(2) Support the long-term viability, sustainability, and utility of federally supported rural broadband infrastructure, by analyzing the technical capabilities of the technologies currently available and reasonably expected to be available by 2035 to meet the broadband service needs of rural residents identified under paragraph (1), including by analyzing the following:

(A) The real-world performance of such technologies, including data rates, latency, data usage restrictions, and other aspects of service quality, as defined by the Commission.

(B) The suitability of each such technology for residential, agricultural, educational, healthcare, commercial, and industrial purposes in rural areas.

(C) The cost to deploy and support such technologies in several rural geographies.

(D) The costs associated with online platforms, specifically the resulting constraints on rural network bandwidth.

(3) Identify and quantify the availability of broadband service and ongoing broadband deployment in rural areas, including ways to do the following:

(A) Harmonize broadband notification and reporting requirements and develop common verification procedures across all federally supported broadband programs.

(B) Consolidate and utilize the existing broadband service data.

(C) Collect and share data on those projects in rural areas where Federal programs are currently supporting broadband deployment, including areas with respect to which an entity is receiving—

(i) support under a broadband assistance program of the Department of Agriculture; or

(ii) Connect America Fund or Mobility Fund support under the Federal universal service support mechanisms established under section 254 of the Communications Act of 1934 (47 U.S.C. 254).

(D) Leverage support technologies and services from online platforms for providers of broadband service in rural areas.

(d) Definitions. —In this section:

(1) ASSISTANT SECRETARY. —The term “Assistant Secretary” means the Assistant Secretary of Commerce for Communications and Information.

(2) COMMISSION. —The term “Commission” means the Federal Communications Commission.

(3) RURAL AREA. —The term “rural area” has the meaning given the term in section 601(b)(3) of the Rural Electrification Act of 1936.



SEC. 6213. Transition rule.

For the period beginning on the date of the enactment of this Act and ending on the date that is one year after such date of enactment, with respect to the implementation of the rural broadband access program under section 601 of the Rural Electrification Act of 1936 (7 U.S.C. 950bb) and the Community Connect Grant Program under section 604 of such Act, as added by section 6204 of this Act, the Secretary shall use the regulations in existence as of the day before the date of enactment of this Act that are applicable to the program involved, until the Secretary issues a final rule implementing the provisions of, and amendments made by, this title that apply to that program.

SEC. 6214. Rural broadband integration working group.

(a) In general. —

(1) ESTABLISHMENT. —There is established the Rural Broadband Integration Working Group (referred to in this subsection as the “Working Group”).

(2) MEMBERSHIP. —The membership of the Working Group shall be composed of the heads, or their designees, of—

(A) the Department of Agriculture, acting through the Administrator of the Rural Utilities Service;

(B) the Department of Commerce, acting through the Assistant Secretary for Communications and Information;

(C) the Department of Defense;

(D) the Department of State;

(E) the Department of the Interior;

(F) the Department of Labor;

(G) the Department of Health and Human Services;

(H) the Department of Homeland Security;

(I) the Department of Housing and Urban Development;

(J) the Department of Justice;

(K) the Department of Transportation;

(L) the Department of the Treasury;

(M) the Department of Energy;

(N) the Department of Education;

(O) the Department of Veterans Affairs;

(P) the Environmental Protection Agency;

(Q) the General Services Administration;

(R) the Small Business Administration;



- (S) the Institute of Museum and Library Services;
 - (T) the National Science Foundation;
 - (U) the Council on Environmental Quality;
 - (V) the Office of Science and Technology Policy;
 - (W) the Office of Management and Budget;
 - (X) the Council of Economic Advisers;
 - (Y) the Domestic Policy Council;
 - (Z) the National Economic Council; and
 - (AA) such other Federal agencies or entities as are determined appropriate by the co-chairs.
- (3) CO-CHAIRS. —The following individuals, or their designees, shall serve as co-chairs of the Working Group:
- (A) The Administrator of the Rural Utilities Service.
 - (B) The Assistant Secretary for Communications and Information.
 - (C) The Director of the National Economic Council.
 - (D) The Director of the Office of Science and Technology Policy.
- (4) CONSULTATION; COORDINATION. —The Working Group shall consult, as appropriate, with other relevant agencies, including the Federal Communications Commission. The Working Group shall coordinate with existing Federal working groups and committees involved with broadband.
- (5) MEMBERSHIP CHANGES. —The Director of the National Economic Council and the Director of the Office of Science and Technology Policy shall review, on a periodic basis, the membership of the Working Group to ensure that the Working Group—
- (A) includes necessary Federal Government entities; and
 - (B) is an effective mechanism for coordinating among agencies on the policy described in subsection (b).
- (b) Functions of working group. —
- (1) CONSULTATION. —The Working Group shall consult with State, local, Tribal, and territorial governments, telecommunications companies, utilities, trade associations, philanthropic entities, policy experts, and other interested parties to identify, assess, and determine possible actions relating to barriers and opportunities for broadband deployment in rural areas.
- (2) POINT OF CONTACT. —Not later than 15 days after the date of enactment of this Act, each member of the Working Group shall—
- (A) designate a representative to serve as the main point of contact for matters relating to the Working Group; and
 - (B) notify the co-chairs of the Working Group of that designee.
- (3) SURVEY. —Not later than 60 days after the date of enactment of this Act, based on information provided by the members of the Working Group, the Working Group shall publish a



comprehensive survey of—

(A) Federal programs, including the allocated funding amounts, that currently support or could reasonably be modified to support broadband deployment and adoption; and

(B) all Federal agency-specific policies and rules with the direct or indirect effect of facilitating or regulating investment in, or deployment of, wired and wireless broadband networks.

(4) LIST OF ACTIONS. —Not later than 120 days after the date of enactment of this Act, the members of the Working Group shall submit to the Working Group an initial list of actions that each of the agencies could take to identify and address regulatory barriers to, incentivize investment in, promote best practices within, align funding decisions with respect to, and otherwise support, wired broadband deployment and adoption.

(5) REPORT. —Not later than 150 days after the date of enactment of this Act, the Working Group shall submit to the President an agreed-to and prioritized list of recommendations of the Working Group on actions that Federal agencies can take to support broadband deployment and adoption, including—

(A) a list of priority actions and rulemakings; and

(B) timelines to complete the priority actions and rulemakings.

subtitle C—Miscellaneous

SEC. 6301. Exclusion of certain populations from definition of rural area.

(a) In general. —Section 343(a)(13) of the Consolidated Farm and Rural Development Act (7 U.S.C. 1991(a)(13)) is amended—

(1) in subparagraph (A), by striking “(G)” and inserting “(I)”; and

(2) by adding at the end, the following:

“(H) EXCLUSION OF INCARCERATED POPULATIONS. —Populations of individuals incarcerated on a long-term or regional basis shall not be included in determining whether an area is ‘rural’ or a ‘rural area’.

“(I) LIMITED EXCLUSION OF MILITARY BASE POPULATIONS. —The first 1,500 individuals who reside in housing located on a military base shall not be included in determining whether an area is ‘rural’ or a ‘rural area’.”.

(b) Broadband. —Section 601(b)(3) of the Rural Electrification Act of 1936 (7 U.S.C. 950bb(b)(3)) is amended by adding at the end the following:

“(C) EXCLUSION OF CERTAIN POPULATIONS. —Such term does not include any population described in subparagraph (H) or (I) of section 343(a)(13) of the Consolidated Farm and Rural Development Act (7 U.S.C. 1991(a)(13)).”.

(c) Distance learning and telemedicine loans and grants. —Section 2332 of the Food Agriculture, Conservation, and Trade Act of 1990 (7 U.S.C. 950aaa–1) is amended by adding at the end the following:

“(4) RURAL AREA. —The term ‘rural area’ has the meaning given the term in section 601(b)(3) of the Rural Electrification Act of 1936.”.



SEC. 6302. Establishment of technical assistance program.

(a) Definition. —In this section, the term 'tribally designated housing entity' has the meaning given the term in section 4 of the Native American Housing Assistance and Self-Determination Act of 1996 (25 U.S.C. 4103).

(b) In general. —The Secretary shall, in coordination with the Office of Tribal Relations established under section 309 of the Department of Agriculture Reorganization Act of 1994 (7 U.S.C. 6921), provide technical assistance to improve access by Tribal entities to rural development programs funded by the Department of Agriculture through available cooperative agreement authorities of the Secretary.

(c) Technical assistance. —Technical assistance provided under subsection (b) shall address the unique challenge of Tribal governments, Tribal producers, Tribal businesses, Tribal business entities, and tribally designated housing entities in accessing Department of Agriculture-supported rural infrastructure, rural cooperative development, rural business and industry, rural housing, and other rural development activities.

SEC. 6305. DEFINITION OF RURAL AREA FOR PURPOSES OF THE HOUSING ACT OF 1949.

The second sentence of section 520 of the Housing Act of 1949 (42 U.S.C. 1490) is amended—

- (1) by striking “or 2010 decennial census” and inserting “2010, or 2020 decennial census”;
- (2) by striking “December 31, 2010,” and inserting “December 31, 2020,” ; and
- (3) by striking “year 2020” and inserting “year 2030”.

SEC. 6306. Council on Rural Community Innovation and Economic Development.

(a) Purpose.—The purpose of this section is to enhance the efforts of the Federal Government to address the needs of rural areas in the United States by—

- (1) establishing a council to better coordinate Federal programs directed to rural communities;
- (2) maximizing the impact of Federal investment to promote economic prosperity and quality of life in rural communities in the United States; and
- (3) using innovation to resolve local and regional challenges faced by rural communities.

(b) Establishment.—

(1) There is established a Council on Rural Community Innovation and Economic Development (referred to in this section as the “Council”).

(2) The Council shall be the successor to the Interagency Task Force on Agriculture and Rural Prosperity established by Executive Order 13790.

(c) Membership.—

(1) IN GENERAL.—The membership of the Council shall be composed of the heads of the following executive branch departments, agencies, and offices:

- (A) The Department of Agriculture.
- (B) The Department of the Treasury.



- (C) The Department of Defense.
 - (D) The Department of Justice.
 - (E) The Department of the Interior.
 - (F) The Department of Commerce.
 - (G) The Department of Labor.
 - (H) The Department of Health and Human Services.
 - (I) The Department of Housing and Urban Development.
 - (J) The Department of Transportation.
 - (K) The Department of Energy.
 - (L) The Department of Education.
 - (M) The Department of Veterans Affairs.
 - (N) The Department of Homeland Security.
 - (O) The Environmental Protection Agency.
 - (P) The Federal Communications Commission.
 - (Q) The Office of Management and Budget.
 - (R) The Office of Science and Technology Policy.
 - (S) The Office of National Drug Control Policy.
 - (T) The Council of Economic Advisers.
 - (U) The Domestic Policy Council.
 - (V) The National Economic Council.
 - (W) The Small Business Administration.
 - (X) The Council on Environmental Quality.
 - (Y) The White House Office of Public Engagement.
 - (Z) The White House Office of Cabinet Affairs.
 - (AA) Such other executive branch departments, agencies, and offices as the President or the Secretary may, from time to time, designate.
- (2) CHAIR.—The Secretary shall serve as the Chair of the Council.
- (3) DESIGNEES.—A member of the Council may designate, to perform the Council functions of the member, a senior-level official who is—
- (A) part of the department, agency, or office of the member; and
 - (B) a full-time officer or employee of the Federal Government.
- (4) ADMINISTRATION.—The Council shall coordinate policy development through the rural development mission area.
- (d) Funding.—The Secretary shall provide funding and administrative support for the Council to



the extent permitted by law and within existing appropriations.

(e) Mission and function of the council.—The Council shall work across executive departments, agencies, and offices to coordinate development of policy recommendations—

- (1) to maximize the impact of Federal investment on rural communities;
- (2) to promote economic prosperity and quality of life in rural communities; and
- (3) to use innovation to resolve local and regional challenges faced by rural communities.

(f) Duties.—The Council shall—

(1) make recommendations to the President, acting through the Director of the Domestic Policy Council and the Director of the National Economic Council, on streamlining and leveraging Federal investments in rural areas, where appropriate, to increase the impact of Federal dollars and create economic opportunities to improve the quality of life in rural areas in the United States;

(2) coordinate and increase the effectiveness of Federal engagement with rural stakeholders, including agricultural organizations, small businesses, education and training institutions, health-care providers, telecommunications services providers, electric service providers, transportation providers, research and land grant institutions, law enforcement, State, local, and tribal governments, and nongovernmental organizations regarding the needs of rural areas in the United States;

(3) coordinate Federal efforts directed toward the growth and development of rural geographic regions that encompass both metropolitan and nonmetropolitan areas;

(4) identify and facilitate rural economic opportunities associated with energy development, outdoor recreation, and other conservation related activities; and

(5) identify common economic and social challenges faced by rural communities that could be served through—

(A) better coordination of existing Federal and non-Federal resources; and

(B) innovative solutions utilizing governmental and nongovernmental resources.

(g) Executive departments and agencies.—

(1) IN GENERAL.—The heads of executive departments and agencies shall assist and provide information to the Council, consistent with applicable law, as may be necessary to carry out the functions of the Council.

(2) EXPENSES.—Each executive department or agency shall be responsible for paying any expenses of the executive department or agency for participating in the Council.

(h) Council working groups.—

(1) IN GENERAL.—The Council may establish, in addition to the working groups established under paragraph (3), such other working groups as necessary.

(2) MEMBERSHIP.—The Secretary shall include as members of each working group such Council members, other heads of Federal agencies (or their designees as defined in (d)(3)), and non-Federal partners as determined appropriate to the subject matter.

(3) REQUIRED WORKING GROUPS.—The working groups specified in this paragraph are



each of the following:

(A) THE RURAL SMART COMMUNITIES WORKING GROUP.—

(i) ESTABLISHMENT.—The Council shall establish a Rural Smart Communities Working Group.

(ii) DUTIES.—The Rural Smart Communities Working Group shall—

(I) not later than 1 year after the establishment of such Working Group, submit to Congress a report describing efforts of rural areas to integrate smart technology into their communities to solve challenges relating to governance, economic development, quality of life, or other relevant rural issues, as determined by the Secretary; and

(II) create, publish, and maintain a resource guide designed to assist States and other rural communities in developing and implementing rural smart community programs.

(iii) SMART COMMUNITY DEFINED.—For the purposes of this subparagraph, the term “smart community” means a community that has the ability to integrate multiple technological solutions, in a secure fashion, to manage a community’s assets, including local government information systems, schools, libraries, transportation systems, hospitals, power plants, law enforcement, and other community services with the goal of promoting quality of life through the use of technology in ways that improve the efficiency of services and meet residents’ needs.

(B) JOBS ACCELERATOR WORKING GROUP.—

(i) ESTABLISHMENT.—The Council shall establish a Jobs Accelerator Working Group.

(ii) GOALS.—The Jobs Accelerator Working Group shall support rural jobs accelerators (as defined in section 379I(a)(4) of the Consolidated Farm and Rural Development Act)—

(I) to improve the ability of rural communities to create high-wage jobs, accelerate the formation of new businesses with high-growth potential, and strengthen regional economies, including by helping to build capacity in the applicable region to achieve those goals; and

(II) to help rural communities identify and maximize local assets and connect to regional opportunities, networks, and industry clusters that demonstrate high growth potential.

(iii) DUTIES.—The Jobs Accelerator Working Group shall—

(I) provide the public with available information and technical assistance on Federal resources relevant to a project and region;

(II) establish a Federal support team comprised of staff from participating agencies in the working group that shall provide coordinated and dedicated support services to rural jobs accelerators; and

(III) provide opportunities for rural jobs accelerators to share best practices and further collaborate with one another.

subtitle D—Additional Amendments to the Consolidated Farm and Rural Development Act

SEC. 6401. Strategic economic and community development.

Section 379H of the Consolidated Farm and Rural Development Act (7 U.S.C. 2008v) is amended to read as follows:

“SEC. 379H. Strategic economic and community development.



“(a) In general.—In the case of any program under this title or administered by the Secretary, acting through the rural development mission area, as determined by the Secretary (referred to in this section as a ‘covered program’), the Secretary shall give priority to an application for a project that, as determined and approved by the Secretary—

“(1) meets the applicable eligibility requirements of this title or the other applicable authorizing law;

“(2) will be carried out in a rural area; and

“(3) supports the implementation of a strategic community investment plan described in subsection (d) on a multisectoral and multijurisdictional basis, to include considerations for improving and expanding broadband services as needed.

“(b) Reserve.—

“(1) IN GENERAL.—Subject to paragraph (2), the Secretary shall reserve not more than 15 percent of the funds made available for a fiscal year for covered programs for projects that support the implementation of a strategic community investment plan described in subsection (d) on a multisectoral and multijurisdictional basis.

“(2) PERIOD.—Any funds reserved under paragraph (1) shall only be reserved for the 1-year period beginning on the date on which the funds were first made available, as determined by the Secretary.

“(c) Approved applications.—

“(1) IN GENERAL.—Subject to paragraph (2), any applicant who submitted an application under a covered program that was approved before the date of enactment of this section may amend the application to qualify for the funds reserved under subsection (b).

“(2) RURAL UTILITIES.—Any applicant who submitted an application under paragraph (2), (14), or (24) of section 306(a), or section 306A or 310B(b), that was approved by the Secretary before the date of enactment of this section shall be eligible for the funds reserved under subsection (b)—

“(A) on the same basis as an application submitted under this section; and

“(B) until September 30, 2019.

“(d) Strategic community investment plans.—

“(1) IN GENERAL.—The Secretary shall provide assistance to rural communities in developing strategic community investment plans.

“(2) PLANS.—A strategic community investment plan described in paragraph (1) shall include—

“(A) a variety of activities designed to facilitate the vision of a rural community for the future, including considerations for improving and expanding broadband services as needed;

“(B) participation by multiple stakeholders, including local and regional partners;

“(C) leverage of applicable regional resources;

“(D) investment from strategic partners, such as—

“(i) private organizations;



“(ii) cooperatives;

“(iii) other government entities;

“(iv) Indian Tribes; and

“(v) philanthropic organizations;

“(E) clear objectives with the ability to establish measurable performance metrics;

“(F) action steps for implementation; and

“(G) any other elements necessary to ensure that the plan results in a comprehensive and strategic approach to rural economic development, as determined by the Secretary.

“(3) COORDINATION.—The Secretary shall coordinate with Indian Tribes and local, State, regional, and Federal partners to develop strategic community investment plans under this subsection.

“(4) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to carry out this subsection \$5,000,000 for each of fiscal years 2019 through 2023, to remain available until expended.”.

SEC. 6411. Rural business development grants.

Section 310B(c)(4)(A) of the Consolidated Farm and Rural Development Act (7 U.S.C. 1932(c)(4)(A)) is amended by striking “2018” and inserting “2023”.

SEC. 6412. Rural cooperative development grants.

(a) In general.—Section 310B(e) of the Consolidated Farm and Rural Development Act (7 U.S.C. 1932(e)) is amended—

(1) in paragraph (10), by inserting “(including research and analysis based on data from the latest available Economic Census conducted by the Bureau of the Census)” after “conduct research”; and

(2) in paragraph (13), by striking “2018” and inserting “2023”.

(b) Technical correction.—Section 310B(e)(11)(B)(i) of such Act (7 U.S.C. 1932(e)(11)(B)(i)) is amended by striking “(12)” and inserting “(13)”.

SEC. 6419. Rural Business-Cooperative Service programs technical assistance and training.

The Consolidated Farm and Rural Development Act is amended by inserting after section 367, as added by section 5306 of this Act, the following:

“SEC. 368. Rural Business-Cooperative Service programs technical assistance and training.

“(a) In general. —The Secretary may make grants to public bodies, private nonprofit corporations, economic development authorities, institutions of higher education, federally recognized Indian Tribes, and rural cooperatives for the purpose of providing or obtaining technical assistance and training to support funding applications for programs carried out by the Secretary, acting through the Administrator of the Rural Business-Cooperative Service.

“(b) Purposes. —A grant under subsection (a) may be used—



“(1) to assist communities in identifying and planning for business and economic development needs;

“(2) to identify public and private resources to finance business and small and emerging business needs;

“(3) to prepare reports and surveys necessary to request financial assistance for businesses in rural communities; and

“(4) to prepare applications for financial assistance.

“(c) Selection priority. —In selecting recipients of grants under this section, the Secretary shall give priority to grants serving persistent poverty counties and high poverty communities, as determined by the Secretary.

“(d) Funding. —

“(1) IN GENERAL. —There is authorized to be appropriated to carry out this section \$5,000,000 for each of fiscal years 2019 through 2023, to remain available until expended.

“(2) AVAILABILITY. —Any amounts authorized to be appropriated under paragraph (1) for any fiscal year that are not appropriated for that fiscal year may be appropriated for the immediately succeeding fiscal year.”.

Sec. 6424. Rural innovation stronger economy grants program.

Subtitle D of the Consolidated Farm and Rural Development Act (7 U.S.C. 1981 et seq.) is amended by adding at the end the following:

“SEC. 379I. Rural innovation stronger economy grant program.

“(a) Definitions. —In this section:

“(1) ELIGIBLE ENTITY. —The term ‘eligible entity’ means a rural jobs accelerator partnership established after the date of enactment of this section that—

“(A) organizes key community and regional stakeholders into a working group that—

“(i) focuses on the shared goals and needs of the industry clusters that are objectively identified as existing, emerging, or declining;

“(ii) represents a region defined by the partnership in accordance with subparagraph (B);

“(iii) includes 1 or more representatives of—

“(I) an institution of higher education (as defined in section 101 of the Higher Education Act of 1965 (20 U.S.C. 1001));

“(II) a private entity; or

“(III) a government entity; and

“(iv) has, as a lead applicant—

“(I) a District Organization (as defined in section 300.3 of title 13, Code of Federal Regulations (or a successor regulation));

“(II) an Indian tribe (as defined in section 4 of the Indian Self-Determination and Education



Assistance Act (25 U.S.C. 5304)), or a consortium of Indian tribes;

“(III) a State or a political subdivision of a State, including a special purpose unit of a State or local government engaged in economic development activities, or a consortium of political subdivisions;

“(IV) an institution of higher education (as defined in section 101 of the Higher Education Act of 1965 (20 U.S.C. 1001)) or a consortium of institutions of higher education; or

“(V) a public or private nonprofit organization; and

“(B) subject to approval by the Secretary, may—

“(i) serve a region that is—

“(I) a single jurisdiction; or

“(II) if the region is a rural area, multijurisdictional; and

“(ii) define the region that the partnership represents, if the region—

“(I) is large enough to contain critical elements of the industry cluster prioritized by the partnership;

“(II) is small enough to enable close collaboration among members of the partnership;

“(III) includes a majority of communities that are located in—

“(aa) a nonmetropolitan area that qualifies as a low-income community (as defined in section 45D(e) of the Internal Revenue Code of 1986); and

“(bb) an area that has access to or has a plan to achieve broadband service (within the meaning of title VI of the Rural Electrification Act of 1936 (7 U.S.C. 950bb et seq.)); and

“(IV) (aa) has a population of 50,000 or fewer inhabitants; or

“(bb) for a region with a population of more than 50,000 inhabitants, is the subject of a positive determination by the Secretary with respect to a rural-in-character petition, including such a petition submitted concurrently with the application of the partnership for a grant under this section.

“(2) **INDUSTRY CLUSTER.** —The term ‘industry cluster’ means a broadly defined network of interconnected firms and supporting institutions in related industries that accelerate innovation, business formation, and job creation by taking advantage of assets and strengths of a region in the business environment.

“(3) **HIGH-WAGE JOB.** —The term ‘high-wage job’ means a job that provides a wage that is greater than the median wage for the applicable region, as determined by the Secretary.

“(4) **JOBS ACCELERATOR.** —The term ‘jobs accelerator’ means a jobs accelerator center or program located in or serving a low-income rural community that may provide co-working space, in-demand skills training, entrepreneurship support, and any other services described in subsection (d)(1)(B).

“(5) **SMALL AND DISADVANTAGED BUSINESS.** —The term ‘small and disadvantaged businesses have the meaning given the term ‘small business concern owned and controlled by socially and economically disadvantaged individuals’ in section 8(d)(3)(C) of the Small Business Act (15 U.S.C. 637(d)(3)(C)).



“(b) Establishment. —

“(1) IN GENERAL. —The Secretary shall establish a grant program under which the Secretary shall award grants, on a competitive basis, to eligible entities to establish jobs accelerators, including related programming, that—

“(A) improve the ability of distressed rural communities to create high-wage jobs, accelerate the formation of new businesses with high-growth potential, and strengthen regional economies, including by helping to build capacity in the applicable region to achieve those goals; and

“(B) help rural communities identify and maximize local assets and connect to regional opportunities, networks, and industry clusters that demonstrate high growth potential.

“(2) COST-SHARING. —

“(A) IN GENERAL. —The Federal share of the cost of any activity carried out using a grant made under paragraph (1) shall be not greater than 80 percent.

“(B) IN-KIND CONTRIBUTIONS. —The Non-Federal share of the total cost of any activity carried out using a grant made under paragraph (1) may be in the form of donations or in-kind contributions of goods or services fairly valued.

“(3) SELECTION CRITERIA. —In selecting eligible entities to receive grants under paragraph (1), the Secretary shall consider—

“(A) the commitment of participating core stakeholders in the jobs accelerator partnership, including a demonstration that—

“(i) investment organizations, including venture development organizations, venture capital firms, revolving loan funders, angel investment groups, community lenders, community development financial institutions, rural business investment companies, small business investment companies (as defined in section 103 of the Small Business Investment Act of 1958 (15 U.S.C. 662)), philanthropic organizations, and other institutions focused on expanding access to capital, are committed partners in the jobs accelerator partnership and willing to potentially invest in projects emerging from the jobs accelerator; and

“(ii) institutions of higher education, applied research institutions, workforce development entities, and community-based organizations are willing to partner with the jobs accelerator to provide workers with skills relevant to the industry cluster needs of the region, with an emphasis on the use of on-the-job training, registered apprenticeships, customized training, classroom occupational training, or incumbent worker training;

“(B) the ability of the eligible entity to provide the non-Federal share as required under paragraph (2);

“(C) the identification of a targeted industry cluster;

“(D) the ability of the partnership to link rural communities to markets, networks, industry clusters, and other regional opportunities and assets;

“(E) other grants or loans of the Secretary and other Federal agencies that the jobs accelerator would be able to leverage; and

“(F) prospects for the proposed center and related programming to have sustainability beyond the full maximum length of assistance under this subsection, including the maximum number of



renewals.

“(4) GRANT TERM AND RENEWALS. —

“(A) TERM. —The initial term of a grant under paragraph (1) shall be 4 years.

“(B) RENEWAL. —The Secretary may extend the term of a grant under paragraph (1) for an additional period of not longer than 2 years if the Secretary is satisfied, using the evaluation under subsection (e)(2), that the grant recipient has successfully established a jobs accelerator and related programming.

“(5) GEOGRAPHIC DISTRIBUTION. —To the maximum extent practicable, the Secretary shall provide grants under paragraph (1) for jobs accelerators and related programming in not fewer than 25 States at any time.

“(c) Grant amount. —A grant awarded under subsection (b) may be in an amount equal to—

“(1) not less than \$500,000; and

“(2) not more than \$2,000,000.

“(d) Use of funds. —

“(1) IN GENERAL. —Subject to paragraph (2), funds from a grant awarded under subsection (b) may be used—

“(A) to construct, purchase, or equip a building to serve as an innovation center;

“(B) to support programs to be carried out at, or in direct partnership with, the jobs accelerator that support the objectives of the jobs accelerator, including—

“(i) linking rural communities and entrepreneurs to markets, networks, industry clusters, and other regional opportunities to support high-wage job creation, new business formation, business expansion, and economic growth;

“(ii) integrating small businesses into a supply chain;

“(iii) creating or expanding commercialization activities for new business formation;

“(iv) identifying and building assets in rural communities that are crucial to supporting regional economies;

“(v) facilitating the repatriation of high-wage jobs to the United States;

“(vi) supporting the deployment of innovative processes, technologies, and products;

“(vii) enhancing the capacity of small businesses in regional industry clusters, including small and disadvantaged businesses;

“(viii) increasing United States exports and business interaction with international buyers and suppliers;

“(ix) developing the skills and expertise of local workforces, entrepreneurs, and institutional partners to meet the needs of employers and prepare workers for high-wage jobs in the identified industry clusters, including the upskilling of incumbent workers;

“(x) ensuring rural communities have the capacity and ability to carry out projects relating to housing, community facilities, infrastructure, or community and economic development to support regional industry cluster growth; or



“(xi) any other activities that the Secretary may determine to be appropriate.

“(2) REQUIREMENT. —

“(A) IN GENERAL. —Subject to subparagraph (B), not more than 10 percent of a grant awarded under subsection (b) shall be used for indirect costs associated with administering the grant.

“(B) INCREASE. —The Secretary may increase the percentage described in subparagraph (A) on a case-by-case basis.

“(e) Annual activity report and evaluation. —Not later than 1 year after receiving a grant under this section, and annually thereafter for the duration of the grant, an eligible entity shall—

“(1) report to the Secretary on the activities funded with the grant; and

“(2) (A) evaluate the progress that the eligible entity has made toward the strategic objectives identified in the application for the grant; and

“(B) measure that progress using performance measures during the project period, which may include—

“(i) high-wage jobs created;

“(ii) high-wage jobs retained;

“(iii) private investment leveraged;

“(iv) businesses improved;

“(v) new business formations;

“(vi) new products or services commercialized;

“(vii) improvement of the value of existing products or services under development;

“(viii) regional collaboration, as measured by such metrics as—

“(I) the number of organizations actively engaged in the industry cluster;

“(II) the number of symposia held by the industry cluster, including organizations that are not located in the immediate region defined by the partnership; and

“(III) the number of further cooperative agreements;

“(ix) the number of education and training activities relating to innovation;

“(x) the number of jobs relocated from outside of the United States to the region;

“(xi) the amount and number of new equity investments in industry cluster firms;

“(xii) the amount and number of new loans to industry cluster firms;

“(xiii) the dollar increase in exports resulting from the project activities;

“(xiv) the percentage of employees for which training was provided;

“(xv) improvement in sales of participating businesses;

“(xvi) improvement in wages paid at participating businesses;

“(xvii) improvement in income of participating workers; or

“(xviii) any other measure the Secretary determines to be appropriate.



“(f) Authorization of appropriations. —There is authorized to be appropriated to carry out this section \$10,000,000 for each of fiscal years 2019 through 2023.”.

SEC. 6504. Extension of the rural economic development loan and grant program.

Title III of 7 U.S.C. 931–940h is amended by inserting after section 313A the following:

“SEC. 313B. Rural development loans and grants.

“(a) In general. —The Secretary shall provide grants or zero interest loans to borrowers under this Act for the purpose of promoting rural economic development and job creation projects, including funding for project feasibility studies, start-up costs, incubator projects, and other reasonable expenses for the purpose of fostering rural development.

“(b) Repayments. —In the case of zero interest loans, the Secretary shall establish such reasonable repayment terms as will encourage borrower participation.

“(c) Proceeds. —All proceeds from the repayment of such loans made under this section shall be returned to the subaccount that the Secretary shall maintain in accordance with sections 313(b)(2) and 313B(f).

“(d) Number of grants. —Loans and grants required under this section shall be made to the full extent of the amounts made available under subsection (e).

“(e) Funding. —

“(1) DISCRETIONARY FUNDING. —In addition to other funds that are available to carry out this section, there is authorized to be appropriated not more than \$10,000,000 for each of fiscal years 2019 through 2023 to carry out this section, to remain available until expended.

“(2) MANDATORY FUNDING. —Of the funds of the Commodity Credit Corporation, the Secretary shall credit to the subaccount to use for the cost of grants and loans under this section \$5,000,000 for each of fiscal years 2022 and 2023, to remain available until expended.

“(3) OTHER FUNDS. —In addition to the funds described in paragraphs (1) and (2), the Secretary shall use, without fiscal year limitation, to provide grants and loans under this section—

“(A) the interest differential sums credited to the subaccount described in subsection (c); and

“(B) subject to section 313A(e)(2), the fees described in subsection (c)(4) of such section.

SEC. 6507. Cybersecurity and grid security improvements.

Title III of the Rural Electrification Act of 1936 (7 U.S.C. 931 et seq.) is amended by adding at the end the following:

“SEC. 319. Cybersecurity and grid security improvements.

“(a) Definition of cybersecurity and grid security improvements. —In this section, the term ‘cybersecurity and grid security improvements’ means investment in the development, expansion, and modernization of rural utility infrastructure that addresses known cybersecurity and grid security risks.

“(b) Loans and loan guarantees. —The Secretary may make or guarantee loans under this title and title I for cybersecurity and grid security improvements.”.



Exhibit B: USDA-RUS Reconnect Program Key Considerations

WEBSITE: <https://reconnect.usda.gov>

HOUSEKEEPING:

- Applicants must have a DUNS number and current federal SAM registration to apply.
- It can take 2-3 weeks to obtain a SAM registration number.

ELIGIBLE PURPOSES:

- The construction or improvement of facilities, including buildings and land, required to provide broadband service.
- Pre-application expenses (not to exceed 5% of the total award).
- Costs must be incurred after the publication date of the Federal Opportunity Announcement and be properly documented.
- For 100% loans only
 - The acquisition of an existing system that does not currently provide sufficient access to broadband (limited to 40% of the total loan amount).
- Terrestrial-based facilities for satellite broadband service.

(Note from SM: RUS presenter made conflicting statement that satellite service is not considered to be broadband)
- Costs must be reasonable, allocable, and necessary.
- Applications that propose to use any portion of the award or matching funds for any ineligible cost may be rejected.

APPLICATION WINDOW:

If the government shutdown does not interfere, application windows are expected to open in mid-March and close on the following dates:

Round 1	\$200 Million Fund	100% grant funding	Closes April 29
Round 2	\$200 Million Fund	50% Loan and 50% Grant funding	Closes May 29
Round 3	\$200 Million Fund	100% Loan funding	Closes June 28

INITIAL ELIGIBILITY DETERMINATION OF PROPOSED FUNDED SERVICE AREA (PFSA):

1. PRSA must be a **Rural Area**, defined as not located in a city, town, or incorporated area that has a population of greater than 20,000 inhabitants or an urbanized area contiguous and adjacent to a city or town that has a population of greater than 50,000 inhabitants.
2. **Fixed Terrestrial Broadband Service Unavailable** to 90% of Households in PFSA, at minimum, and to 100% of Households for applications for 100% grant funding. For eligibility, Broadband Service defined as 10 Mbps downstream and 1 Mbps upstream. For multiple PFSAs, each PFSA will be evaluated on a stand-alone basis.

Prior Funded Service Areas:

3. For census blocks for which a service provider received a **CAF II Auction 903 award**, only that provider may apply for ReConnect funds and only for loan funding,



4. For census blocks for which there is already an **existing RUS Telecommunications or Broadband loan borrower providing 10/1 Mbps service**, RUS will not award loans or grants. Borrowers receiving loans before the beginning of FY 2000 are not considered. Only RUS broadband borrowers that received funding but are not currently delivering 10/1 Mbps service in the PFSA are eligible to apply for funding for PFSA these service areas, if they have not defaulted on and have materially complied with their prior broadband loan requirements.
5. Service areas that received a **100% grant under the RUS BIP Program** are eligible if the BIP grantee is not already delivering at least 10 Mbps downstream and 1 Mbps upstream broadband service. However, if the applicant is the same BIP grantee, then the applicant may only request a 100% loan.
6. Service areas that received grants under the **RUS Community Connect Grant Program** are eligible if they do not have sufficient broadband access, except for those grants still under construction.
7. Areas that have received **State funding to deploy broadband** at 10/1 Mbps are ineligible. Applicants must provide a map of the PFSA to the appropriate State government office, and the **State government office must certify** whether funds have or have not been allotted for the area.

FUNDING LIMITS:

100% Grant Funding	\$25 million maximum grant	25% match required, up to \$6,250,000. Matching funds to be expended first
50% Grant/50% Loan	\$25 million maximum grant \$25 million maximum loan	Fixed Interest Rate in 3%-4% range Maturity = Economic Life of Assets (Generally 20 to 26 years)
100% Loan Funding	\$50 million maximum loan	2% Fixed Interest Rate Maturity = Economic Life of Assets

DEGREE OF COMPETITION:

100% Grants	Highly Competitive
50% Grant/50% Loan	Competitive
100% Loans	Not Competitive, funded on first in, first awarded basis until fund is expended

KEY CONSIDERATIONS FOR APPLICANTS:

1. RUS wants to see strong partnerships with **community engagement and support**.
2. **Last mile service** will be required. Financials should project retail service revenues.
3. A collaboration of a network owner and operator may be acceptable only if there are **binding commitments to guarantee last mile service** provision



4. **Stat-ups with no operating history will not be funded.** An existing utility may create a new wholly-owned subsidiary and present historical financial statements and audited statements of the parent.
5. **Substantially Underserved Trust Area Provisions (SUTA) will apply.**
6. **Applicants may only apply in one funding category.**
7. Applicants seeking grants and grant/loan combination awards must submit a scoring sheet (attached separately). **Applications with the highest number of points will receive awards.**

Overlapping Service Areas. RUS will not fund more than one project in a given PFSA. If RUS receives applications that contain overlapping service areas, these procedures will be followed:

1. Determine the overlap to be so insignificant that no agency action is necessary;
2. Request one or more applications be revised to eliminate overlapping territory;
3. Choose one application over another given the amount of assistance requested, the number of awards already chosen in the area or State, or the need for the project in the specific area due to other factors; or
4. Simply choose the project that scores higher or in the judgement of the agency is more financially feasible

FINANCIAL REQUIREMENTS:

Only projects that USDA determines to be financially feasible and sustainable will be eligible

1. Applicant must submit historical financial statements and audited statements for prior two years.
2. Project must demonstrate positive ending cash balance as reflected on the cash flow statement for each year of the forecast period.
3. Must demonstrate positive cash flow from operations in year five of the forecast period.
4. Must also meet at least two of the following requirements in year five of the forecast period: a minimum Times Interest Earned Ratio (TIER) requirement of 1.20, a minimum Debt Service Coverage Ratio (DSCR) requirement of 1.20 and a minimum Current Ratio of 1.20.

RUS RATIO ANALYSIS:

TIER= (Net Income + Fixed Charges)/Fixed Charges Telecom Debt Service

Current Ratio = Current Assets/Current Liabilities

Debt Service Coverage Ratio (DSCR) = (Net Income + Fixed Charges + Depreciation + Amortization) / Annual Debt Service Payments

If an applicant:

1. Has no existing debt,
2. Is not applying for loans from the ReConnect program or proposing to borrow funds from any other funding sources during the forecast period, and
3. is applying only for grant funds,



Then only the Current Ratio will be applied and not the TIER or DSCR.
In this case, applicants must meet the minimum Current Ratio requirement of 1.20.

PRE-AWARD NOTIFICATION AND MANAGEMENT ANALYSIS PROFILE (MAP)

RUS will notify awardees of a preliminary award decision. RUS will schedule a Site Visit to assess the Awardee’s strengths and weaknesses and ability to fulfill the requirements of the award. . Funds will not be advanced until the MAP is completed and issues discovered have been satisfactorily addressed.

RUS Answers to Questions Submitted to Date:

NOTE THAT RUS IS NOT ACCEPTING OR RESPONDING TO QUESTIONS DURING THE GOVERNMENT SHUTDOWN.

Eligibility Speed: Mobile wireless and satellite service will not meet the 10/1mbps threshold for an underserved area (SM Note: This is a conflicting statement with Eligible Uses of Funding published by RUS).

For the environmental section of application, will have to provide extensive Environmental Review (ER) as part of the application.

Borrowers with existing loans – existing loans are not impacted, but may apply for funding to overbuild existing system.

Can local govt own system and have a third party operator. You must be willing to own and operate a network, but can have an open access network, build out and own, and then allow other providers to come on and provide retail service, but must have firm commitments from service providers to provide retail service.

Start-ups, not allowed because of requirement for 2 yrs of audited statements, but start-up subsidiaries utilities can provide 2 years audits of parent company, and parent company will have to guarantee the debt.

Funding cannot be used for refinancing

Project must be fully deployed within 5 years.

Reconnect allows applicants to submit multiple PFSA’s, each one must be a contiguous area.

How will Tribal land be determined for scoring points? RUS mapping area will identify tribal lands. If area encompasses 50% or more tribal area, then scoring points will be awarded.

Operating expenses eligible – No. Professional expenses allowable after date if FOA.

SUTA = does apply. Projects that are serving SUTA areas can request additional consideration. Regulation applies as to how to apply and how points will be awarded.

Funding announcement, first one Dec. 14.

Fixed Wireless allowable if it meets the technology criteria, can submit fiber + fixed wireless

Applicants must own and operate the broadband system funded. State University would be eligible to apply, but probably would not be interested to own and operate the network, but could be an anchor tenant.



RECONNECT SCORING CRITERIA

Applicable to 100% grant and 50% loan/50% grant applications
(100% loan applications not competitive)

Scoring Sheet will be required with application to allow USDA to analyze nine separate special evaluation criteria.

- Total of 150 points possible

Categories:

1. **Rurality of Proposed Funded Service Area (25 points).**

Points awarded for serving the least dense rural areas measured by the population of the proposed funded service area per square mile.

Population Density:

6 or less	25 points
Greater than 6	0 points

Formula:

Total Population of Proposed Funded Service Area / Total Square Miles of Proposed Funded Service Area.

If multiple service areas are proposed, the density calculation will be made on the combined areas as if they were a single area.

2. **Farms Served (20 points).**

One point for each farm that pre-subscribes for broadband service
Maximum of 20 points.

Applicants proposing to serve farms and ranches must have the executive head of the farm or ranch sign the pre-subscription form, available under Forms & Resources, and must submit the pre-subscription forms as part of the application. Points will not be awarded if pre-subscription forms are not included as part of the application to support the number of farms pre-subscribing for service.

3. **Performance of the Offered Service (20 points).**

For projects proposing a network capable of 100 megabits per second (Mbps) symmetrical,



20 points will be awarded.

A certification from a licensed Professional Engineer must certify that the proposed system can deliver these speeds to every premise in the proposed funded service area. The certification form, available under Forms & Resources must be signed by a Professional Engineer.

4. **Businesses (15 points).**

One point for each business that pre-subscribes for broadband service
Maximum of 15 point

Applicants must have the owner of the business sign the pre-subscription form, available under Forms & Resources, and submit the pre-subscription forms as part of the application. Points will not be awarded if pre-subscription forms are not included as part of the application to support the number of businesses pre-subscribing for service.

5. **Healthcare Centers (15 points).**

One point For every healthcare center served
Maximum of 15 points.

Healthcare centers, such as hospitals, clinics, and pharmacies, will be counted using the GIS layer provided in the RUS Mapping Tool.

6. **Educational Facilities (15 points).**

One point will be awarded up for educational facilities , such as public and private schools, libraries, and technical colleges

Maximum of 15 points

Education facilities will be counted using the GIS layer provided in the RUS Mapping Tool.

7. **Critical Community Facilities (15 points).**

One point will be awarded for each critical community facility
Maximum of 15 points.

Critical community facilities will be counted using the GIS layer provided in the RUS Mapping Tool.



8. Tribal Lands (5 points).

Five points for applications where, at a minimum, 50 percent (%) of the geographical area of the proposed funded service area(s) is to provide service on tribal.

Tribal lands will be analyzed using the GIS layer maintained by the U.S. Census. Tribal land areas will be tabulated using the GIS layer provided in the RUS Mapping Tool.

9. State Broadband Activity (20 points).

10 points for projects that are in a State that has a broadband plan that has been updated within the previous five years of the date of publication of this Funding Opportunity Announcement (FOA)

Additional 5 points for projects located in states that allow any utilities service provider to deliver broadband service.

Additional 5 points will be awarded for projects located in states that commit to expediting right-of-way environmental permitting.

Applicants will be required to submit evidence from the appropriate State official that a broadband plan has been implemented and updated, that there are no restrictions on utilities providing broadband service, and that procedures are in place for expediting right-of-way and environmental requirements. If service is proposed in multiple states, then evidence must be submitted from each state to receive the appropriate points.



Exhibit C: Fiber Specifications

The proposed fiber backbone provides high capacity fiber-optic cables throughout the major corridors of the County. New construction proposed will deliver a robust, redundant, and reliable County backbone fiber network, which would interconnect planned County facilities traversing several of Marion’s cities. Access points would be strategically placed throughout the fiber routes to allow easy interconnection with facilities, County/city/community assets, business districts, and neighborhoods.

Fiber backbones will generally consist of a minimum 288-count fiber-optic cable on major routes. This cable size would enable the ability to allocate capacity among multiple applications, including:

- County government operations
- Future smart city/connected community applications
- Community anchor connections
- Broadband applications
- Spare capacity

Secondary or lateral fiber will consist of 12 to 24-strand cable connecting individual facilities and sites. For primary County facilities, such as primary data center facilities, cables will be more appropriately sized with larger fiber counts. The network will use an in-and-out splicing design that allows community anchors and points of interest to interconnect their locations in a “ring” topology that supports high redundancy for their communications. A range of specialized connections will be made to accommodate additional traffic signal, smart technology, and broadband applications that should be individually engineered based on the application. General specifications of the backbone are found below. Actual specifications may change based on actual engineering design; however, it is important that the County maintain compliance with these key specifications to achieve its long-term goals.

Fiber Specifications

-
- Backbone cable size – 288-count fiber (minimum)
 - Lateral cable size – 12-count to 24-count fiber generally, 1 to 2-count fiber for business or component connections
 - Singlemode, loose-tube non-armored cable
 - Jacketed central member
 - Outer polyethylene jacket
 - Sequential markings in meters
 - All dielectric
 - Gel-free/dry buffer tubes
 - 12 fibers per buffer tube



- Color coded buffer tubes based on ANSI/TIA/EIA-598-B Standard Colors Conduit Specifications
- 36" minimum acceptable depth
- (2) 1.5" outer conduit

Handhole Specifications

Each route (Backbone/Lateral) will require a unique design and exact box placement will depend on a variety of factors to be determined in the final engineering analysis. Boxes along the backbone are generally placed every 500 feet or at major intersections to allow for pulling in the fiber and splicing to adjacent buildings and infrastructure. Conduit sweeps into handholes should enter in flush with the cut-out mouse holes aligned parallel to the bottom of the box and come in perpendicular to the wall of the box. Conduits shall not enter at any angle other than near parallel. Sweeps from the mainline to the conduit would be accomplished using radii recommended by the manufacturer. Handholes will be sized based on the size of cable(s) transiting the structures, the total number of cables, and the specific applications required by the County.