

ODOT BROADBAND STRATEGY & IMPLEMENTATION PLAN

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INTRODUCTION

In November 2021, the Oregon Department of Transportation (ODOT) and the Oregon Transportation Commission (OTC) published the 2021-2023 Strategic Action Plan¹, which describes the priorities, goals, and outcomes for ODOT. The Strategic Action Plan has three priorities, each with specific goals. One of the three priorities is a Modern Transportation System, which aims to **“Build, maintain and operate a modern, multimodal transportation system to serve all Oregonians, address climate change, and help Oregon communities and economies thrive.”**

The Modern Transportation System priority includes an action to **develop and implement an integrated broadband strategy** in 2022. It recognizes that broadband technology is a key infrastructure building block for a modern transportation system. The broadband strategy aims to prepare ODOT for future transportation needs, and this plan describes the goals, strategies, and actions needed for ODOT’s integrated broadband strategy.

WHY BROADBAND IS IMPORTANT FOR TRANSPORTATION

Some experts now refer to broadband as another transportation mode due to the potential for broadband solutions related to telework, telehealth, education, and other applications to replace trips. In addition to the community benefit of having broadband, ODOT uses intelligent transportation technologies to achieve the agency’s multimodal safety, operations, and reliability goals.

Advancements in technology provide new solutions for fixing the significant problems facing our transportation system, such as the negative effects of climate change and a growing population. ODOT needs to apply new technologies to address these challenges, and broadband is the required infrastructure to enable transformative transportation technologies.

Numerous state Departments of Transportation (DOTs) recognize the need for broadband. Other states have partnered with the private sector to implement broadband infrastructure as a cost-effective approach to rapidly expand their infrastructure while supporting community goals to deliver high-speed broadband to underserved communities. Other states, such as Utah, Oklahoma, and Virginia DOTs, have been implementing broadband infrastructure for over two decades and now have thousands of miles of fiber optic cable. They recognize that they can’t afford to build all of the broadband infrastructure on their own, with taxpayer money, so they partner with the private sector to share the cost of construction and trade for access to the right-of-way. In some cases, such as Colorado DOT, public-private partnerships allowed them to acquire more than \$80 million worth of services and assets (almost 500 miles of fiber optic cable) without state capital expenditure.

1 Oregon Transportation Commission and The Oregon Department of Transportation ODOT Strategic Action Plan, January 2022, <https://www.oregon.gov/odot/SAPDocs/Strategic-Action-Plan.pdf>

THE FOLLOWING LIST PROVIDES A BRIEF (NON-COMPREHENSIVE) OVERVIEW OF ODOT'S IDENTIFIED NEEDS AT THIS TIME:



With the growing use of central software or cloud applications like electronic timecards, virtual employee trainings, and personnel information, ODOT needs broadband services at all ODOT staffed locations. ODOT has many rural maintenance stations that have no or minimal network services.



While network services are available at some of ODOT's rural office locations, the services are costly.



Intelligent Transportation Systems applications depend upon network services and benefit from access to broadband services along state highways.



Future connected vehicle applications will depend on broadband backhaul for vehicle-to-infrastructure communication points.



There is a growing understanding of the value of broadband access for Oregon citizens in reducing trips by teleworking.

FIGURE 1: ODOT'S IDENTIFIED BROADBAND NEEDS

ODOT'S REASONS FOR BROADBAND

ODOT needs broadband communications to fulfill its mission and achieve the strategic action plan goal to modernize the transportation system.

ODOT'S MISSION: WE PROVIDE A SAFE AND RELIABLE MULTIMODAL TRANSPORTATION SYSTEM THAT CONNECTS PEOPLE AND HELPS OREGON'S COMMUNITIES AND ECONOMY THRIVE.

ODOT has three primary reasons for needing broadband infrastructure.

- To support the future connected transportation environment.
- Provide high-speed broadband to all ODOT facilities.
- Support the community goals for high-speed broadband to unserved and underserved communities.

1. TO SUPPORT THE FUTURE CONNECTED TRANSPORTATION ENVIRONMENT.

Advances in technology provide new options for managing and operating the transportation system. These technologies enable ODOT to carry out its mission to provide a safe and reliable multimodal transportation system. Most of these technologies require high-speed broadband communications to serve ODOT's transportation operations needs, improve incident and emergency response capability, and connect ODOT facilities.

- Supports OTP Goals 1, 2, and 5 (*see page 7*)
- Supports OTC Goal of a Modern Transportation System and Strategy 8. Implement Transformative Technologies

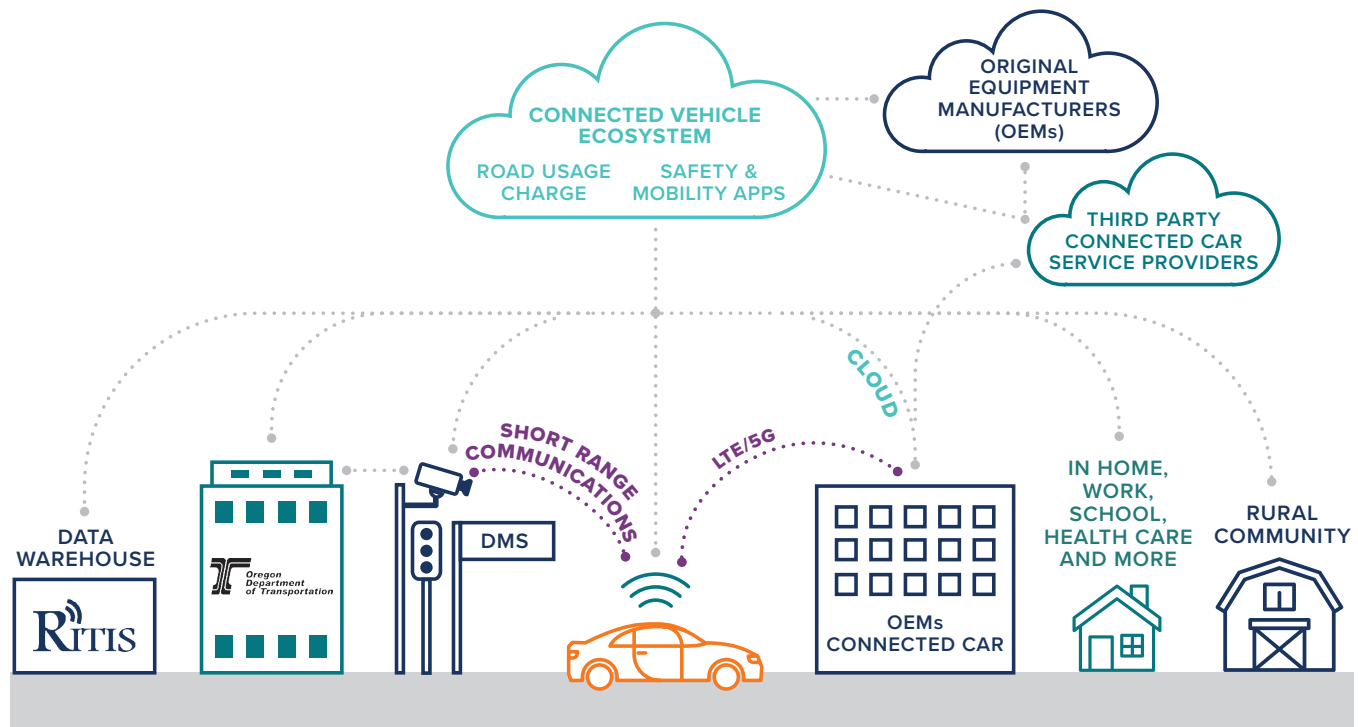


FIGURE 2: CONNECTED VEHICLE ECOSYSTEM

2. PROVIDE HIGH-SPEED BROADBAND TO ALL ODOT FACILITIES.

In addition to serving the needs of a modern transportation system, the same broadband infrastructure addresses the needs of a modern workforce. Along with increasing remote work options and video conferencing, ODOT's workforce needs access to high-speed broadband in all parts of the state to support access to digital resources and systems to proactively manage and operate the transportation system. Currently, many facilities across the state have low bandwidth (≤ 20 MB), as shown in the Figure 3.

- Supports OTP Goals 2 and 5 (see page 7)
- Supports OTC Goal of a Modern Transportation System and Strategy 8. Implement Transformative Technologies

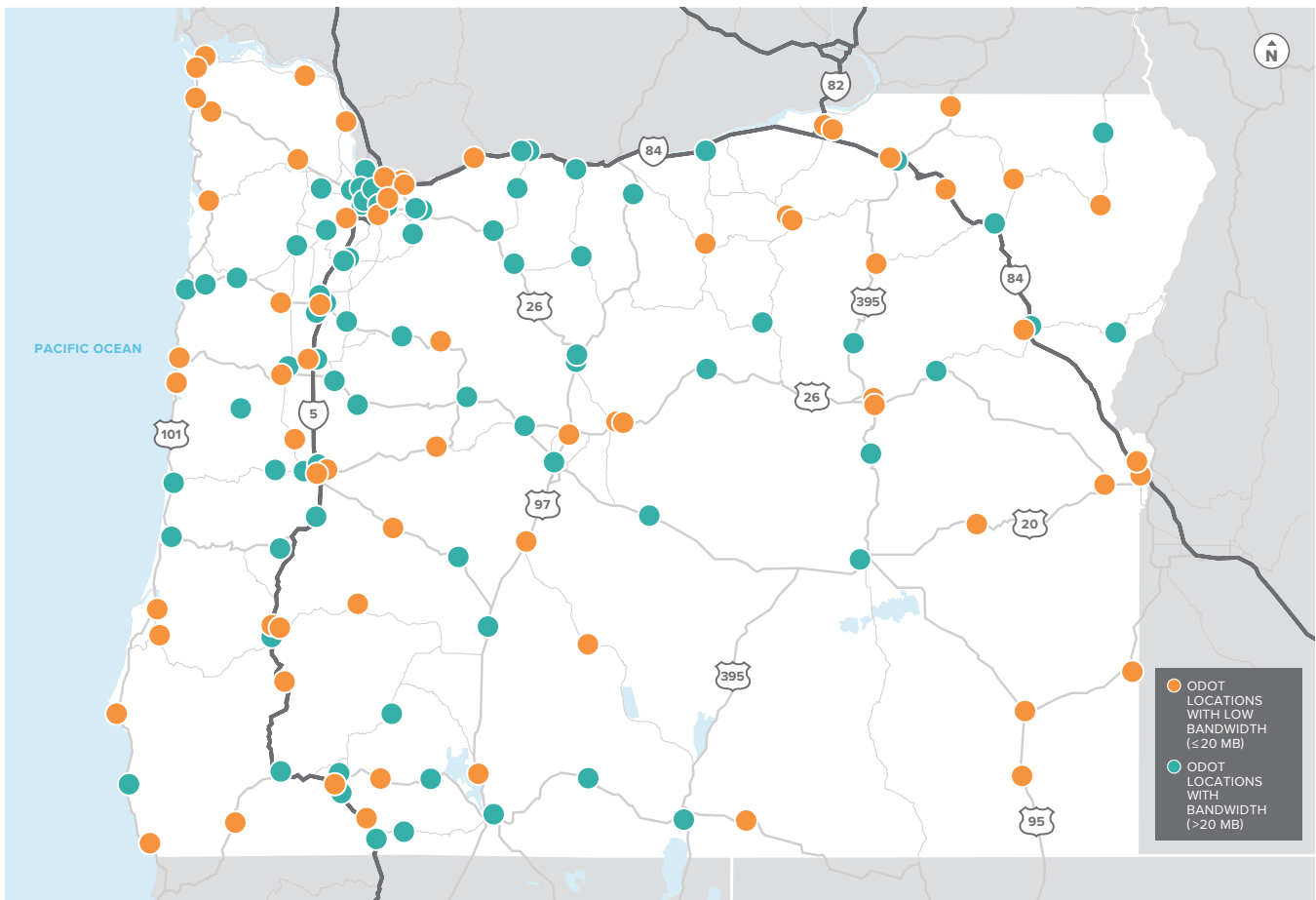


FIGURE 3: ODOT LOCATIONS UNDERSERVED BY BROADBAND (≤ 20 MBPS)

3. SUPPORT THE COMMUNITY GOALS FOR HIGH-SPEED BROADBAND TO UNSERVED AND UNDERSERVED COMMUNITIES.

As the COVID-19 pandemic has shown, access to the internet is no longer a luxury but a necessity. The Oregon Broadband Office strategic plan clearly shows large parts of Oregon are underserved. ODOT’s highways provide natural paths for broadband infrastructure connecting cities and all parts of the state. As ODOT seeks to build out broadband infrastructure to meet its transportation management and operations needs, it can partner with other public and private partners to share the infrastructure costs using methods such as public-private partnerships.

Interestingly, broadband availability in communities also helps meet the state’s reliability and safety goals by reducing trips that can be replaced with online capabilities such as telehealth, telework, and online education.

- Supports OTP Goal 1 (see page 7)
- Supports OTC Goal of Equity

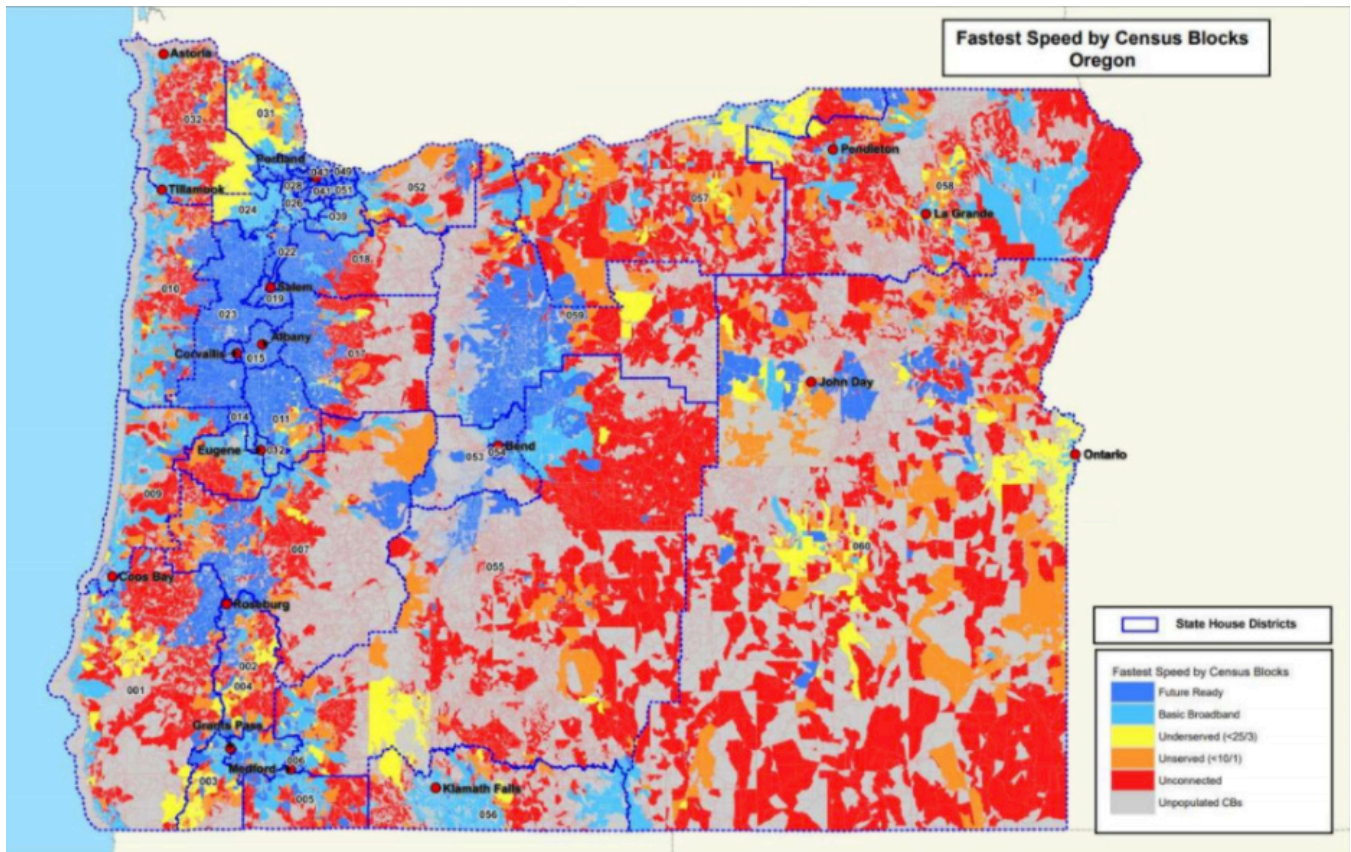


FIGURE 4: BROADBAND SPEED BY CENSUS BLOCK

Source: Oregon Broadband Office Strategic Plan

ALIGNMENT WITH OREGON'S GOALS

In addition to being a priority action in the Strategic Action Plan, ODOT's needs for broadband infrastructure align with Oregon's Transportation Goals.

OREGON TRANSPORTATION PLAN GOALS² SUPPORTED BY ODOT'S BROADBAND INITIATIVES

- **Goal 1 – Mobility and Accessibility**
To enhance Oregon's quality of life and economic vitality by providing a balanced, efficient, cost-effective and integrated multimodal transportation system that ensures appropriate access to all areas of the state, the nation and the world, with connectivity among modes and places.
- **Goal 2 – Management of the System**
To improve the efficiency of the transportation system by optimizing the existing transportation infrastructure capacity with improved operations and management.
- **Goal 5 – Safety and Security**
To plan, build, operate and maintain the transportation system so that it is safe and secure.

Many other modal plans point to a need for technology to achieve their goals. These plans include, but are not limited to, the ODOT Freight Plan, the ODOT Transportation Demand Management, and the Transportation Safety Action Plan. Intelligent Transportation Systems (ITS) infrastructure relies on broadband to aid delivering the services of these plans to manage congestion, improve safety, and inform travelers.

ODOT'S ROLE IN BROADBAND IMPLEMENTATION

Traditionally, ODOT installs broadband infrastructure for its use on ODOT transportation projects. In many urban areas such as the Portland Metropolitan Area, Eugene-Springfield, Deschutes County, and Medford, ODOT partners with other public transportation agencies to share the construction cost of the broadband infrastructure and also share individual fiber strands. These partnerships with other public agencies have saved millions of taxpayer dollars by eliminating the need for multiple agencies to build in the same location.

ODOT must continue to seek opportunities to partner with other public agencies to build, operate, and maintain broadband infrastructure. **What is new within this broadband strategy and implementation plan is the desire to partner with the private sector to share construction costs.** Why build all the infrastructure ODOT needs with taxpayer dollars when there is a win-win for ODOT and the private sector to share costs? Other states have proven it is possible to share the broadband infrastructure costs with the private sector. **ODOT's new broadband strategy and implementation plan sets in motion the actions needed to streamline ODOT processes, build relationships, define the public-private partnership arrangements, and define the broadband infrastructure construction specifications.**

2 https://www.oregon.gov/odot/Planning/Documents/OTP_Volume_I.pdf

DEFINITION OF BROADBAND

Broadband refers to high-speed communications, typically 100Mbps upload and 100Mbps download. High-speed communications are most often delivered using fiber optic cable. If installed underground, it requires a significant investment in underground conduits, vaults, and associated infrastructure to accommodate the fiber optic cable.

Other options exist to provide broadband, such as emerging cellular options and other wireless technologies such as satellites. However, fiber optic cable is the most reliable, consistent, and future-proof medium and should be used the majority of the time for delivering broadband services in Oregon. An added benefit of fiber is that higher network speeds can be achieved by upgrading the end electronics with no modifications to the physical cable or underground infrastructure.

ODOT BROADBAND OPPORTUNITIES

Installing ODOT-owned conduit and vaults is most cost-effective when done within existing construction projects. For example, installing conduits while a contractor is already digging in the area is far less expensive than returning to install conduits after completing the roadway or bridge construction.



However, historically the conduit and communications infrastructure are not included in the significant transportation construction projects.

The conduit and vaults needed for broadband infrastructure must be considered a core part of modernizing the transportation infrastructure in today's environment. In addition, there are clear connections to the broader statewide goals for connecting disadvantaged and underserved communities to high-speed broadband communications. ODOT's highway system provides ideal routes for completing the broadband connections across all of Oregon and enabling broadband in parts of the state where it is difficult for any single entity, public or private, to make a case for the overall investment. It becomes feasible for all involved through partnerships and sharing the cost to install the infrastructure with other public and private partners.

ODOT can play a vital role in enhancing Oregon's broadband connections. Installing conduits and fiber in new construction projects modernizes the transportation system while supporting broader community goals to connect unserved and underserved communities and reduce the digital divide.

EXAMPLE OF ODOT CONSTRUCTION PROJECT OPPORTUNITIES

Oregon has many needs for broadband across the state. According to many telecommunications providers, Oregon has adequate broadband infrastructure along the I-5 corridor in the Willamette Valley; however, there is a significant need along the Oregon coast, the coast range, and all areas east of the Cascades.

ODOT can help close the gaps by installing broadband with planned transportation construction projects. Two representative examples illustrating the opportunity for broadband in transportation projects are provided below. While broadband infrastructure was not included in these projects, the point is to highlight examples of opportunities to watch for in the coming years.



EXAMPLE #1: COLUMBIA RIVER GORGE

The Columbia River Gorge is a challenging place for construction for good reasons. It's a scenic byway, and there are significant environmental and scenic restrictions to protect and preserve the beauty and natural landscape. There is also a considerable need for broadband infrastructure connecting western Oregon to eastern Oregon. For ODOT, there is a need for broadband communications from points west of the Cascades to eastern Oregon to support a connected transportation future and provide high speed broadband to ODOT facilities across the State.

Recently, a telecommunications provider needing to install fiber from the Portland metropolitan area to east of the Cascades spent years permitting and installing broadband communications on US26 and OR35 around Mt. Hood because construction through the Gorge was not allowed. However, suppose ODOT could coordinate with the private sector to allow the installation of broadband conduits while ODOT is constructing the Historic Columbia River Highway State Trail. This would allow the private sector to help deliver broadband to hard to reach parts of the state, ODOT could get access to the infrastructure for intelligent transportation infrastructure, and it reduces the construction cost and impact that could result from multiple telecommunication providers building separate paths over Mt. Hood.



EXAMPLE #2: NEWBERG-DUNDEE BYPASS

Another significant broadband need in Oregon is conduit and fiber from the Oregon coast to the Willamette Valley. Many undersea cables land at the Oregon coast, which need to connect to the I-5 corridor and further east. Several years ago, ODOT installed intelligent transportation systems along the Newberg- Dundee bypass without fiber optic communications, conduit, or vaults to connect cameras and field devices to the Traffic Management Center.

With this new broadband strategy, HB 2411 (2021), and a broadband coordinator, ODOT can seek joint construction opportunities with the private sector. In this case, another partner may need broadband in the area and could construct the infrastructure while the ground is open to build the bypass. The result is a win-win-win. The private sector gets construction at a reduced cost because the ground is already open, ODOT gets access to fiber for communications to intelligent transportation infrastructure, and the public gets increased access to high-speed broadband communications.

BEST PRACTICES FROM OTHER STATE DOTs

Many other state DOTs are already implementing broadband strategies, allowing ODOT to learn from their practices. Over 30 states have some form of a broadband program, with Oklahoma, Utah, and Virginia having the most resource-shared fiber and over 20 years of experience each. Arizona and Colorado have recently started their broadband programs and provide some lessons learned on key near term activities.

RESOURCE AND BROADBAND SHARING

Like ODOT, most State DOTs provide utilities free access to highway right-of-way (ROW) through utility permits. However, other States, especially Colorado, Oklahoma, Utah, and Virginia, have the ability to require an exchange of fiber, services, or cash to allow broadband or internet providers onto the Interstate ROW. This allows states to leverage the value of the Interstate ROW to expand their fiber network and reduce the build costs. States will trade empty conduit along certain sections and help facilitate environmental reviews in exchange for additional dark fiber or conduit. A combination of long-term memorandum of understandings or unsolicited public-private partnerships (P3) agreements are used to execute the arrangements. Colorado and Oklahoma DOTs have been most aggressive using the unsolicited P3 approach and Arizona, Utah, and Virginia use the Memorandum of Understanding (MOU) approach.

Each agreement defines the term, typically 20-25 years, maintenance responsibility and who pays for any relocations. Maintenance responsibility and relocation costs are typically put on the private broadband provider. Utah, Oklahoma, and Virginia have found that State DOTs need to be ready for private sector investments by having policies, procedures, and templates prepared to streamline the process. A dig-one policy or approach is suggested by all states. A dig-once policy is just as it sounds, allowing additional conduit to be installed for broadband communication, either for public or private use, if the ground is excavated in the ROW. Arizona DOT installs seven-microduct conduits that have 2,016 fiber strands, Utah DOT installs eight-conduit duct banks on Interstates and 16-conduit duct banks under railroads, and Virginia DOT requests one empty conduit. This allows states to have infrastructure to exchange or trade.

Finally, Arizona DOT, Virginia DOT, and ODOT publish route maps of broadband infrastructure online for private partners and public access. Other states will provide this information to private broadband partners upon request or as needed. This allows gaps to be highlighted. When gaps are identified, private partners can propose to build conduit in those areas, knowing the need for ODOT and the communities in the area.

BUILDING RELATIONSHIPS AND PARTNERSHIPS

Successful states rely on a broadband coordinator to build relationships with telecommunications companies and act as the primary point of contact with the agency. These relationships are important because ODOT hasn't traditionally coordinated with the telecommunications companies to share open trench dig opportunities or to look for opportunities to coordinate joint construction needs. Most DOTs that have implemented successful broadband programs rely on agreements and partnerships with the private sector to expand the broadband infrastructure.

In addition to the telecommunications companies, the broadband coordinator must also build relationships with the Oregon Broadband Office, other public sector partners, and non-profit organizations such as Link Oregon. These relationships are necessary to align needs and deliver the most cost-effective expansion of broadband infrastructure across Oregon.

ESTABLISHING METRICS

Establishing metrics shows a willingness to be transparent and aggressive when implementing the broadband plan. Utah DOT and Arizona DOT both have metrics that demonstrate the targets they are looking toward. With Utah DOT, it is 800 miles of fiber by 2025. Arizona DOT has benchmarks, as well as lists who in the government is accountable for the metric.

FUNDING

State DOTs have used a variety of funding sources to expand their broadband infrastructure and administer the program, and most use more than one funding source. Examples include:

- DOT budgets for Intelligent Transportation System infrastructure
- Include the broadband infrastructure in all significant transportation infrastructure projects
- Grant funds, including recently CARES Act funds
- Public-private partnerships
- Trades with the private and public sector partners

The funds primarily go to the design and construction of the broadband infrastructure and support other program management activities.

- Mapping existing broadband infrastructure
- Staff time for a range of activities, including broadband program coordination, specification and construction standards development, process design for coordination with the private sector, relationship management, notifying the private sector of dig opportunities, tracking and monitoring the program metrics, etc.
- Consultant support for program administration and other planning and design activities

One aspect of Utah DOT's successful broadband program is access to DOT-owned conduits and vaults available to trade. Utah DOT has installed hundreds of miles of DOT-owned infrastructure with additional spare conduits that they share with the private sector to trade for conduits and fiber in other parts of the state. While other options exist for partnering with the private sector, installing DOT-owned conduits and vaults increased the value of what Utah DOT brings to the partnerships.

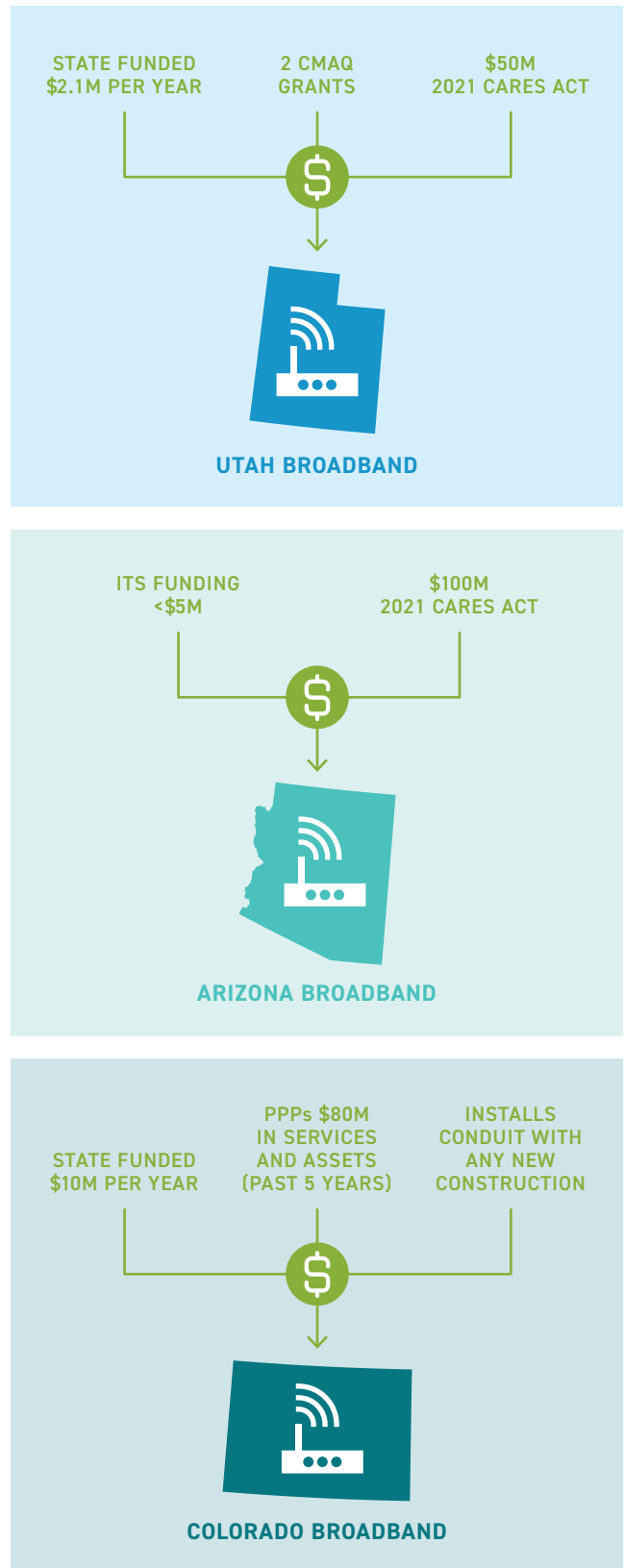


FIGURE 5: UTAH DOT, ARIZONA DOT, AND COLORADO DOT FUNDING SOURCES

OTHER OREGON BROADBAND INITIATIVES

There are many active public and private broadband initiatives within Oregon. The following list provides a thorough representation of the broadband initiatives across Oregon, but is not meant to be comprehensive.

- **Oregon 2020 Broadband Office Strategic Plan** – created to advocate, develop, promote, and support expanding broadband across the state. This initiative included the creation of a website, broadband.oregon.gov, and an online published Oregon Broadband Map
- **Oregon Statewide Broadband Assessment and Best Practices Study** – presents findings and insights regarding the current state of broadband in Oregon, drawing from multiple independent data sources
- **Link Oregon** – the federally tax-exempt 501(c)(3) Oregon non-profit organization that is a consortium of the State of Oregon, through its Enterprise Information Services, and Oregon’s four largest research universities: Oregon State University (OSU), Oregon Health and Sciences University (OHSU), Portland State University, and the University of Oregon that provides high-speed, resilient, middle-mile, fiber broadband connectivity to Oregon’s public and non-profit sectors
- **Department of Administrative Services’ Oregon Enterprise Information Services (DAS-EIS) Network Modernization** – in partnership with Link Oregon, DAS-EIS is in the process of modernizing the state’s network to enhance connectivity, improve network speeds, and improve resilience
- **Oregon Broadband Opportunities Notification** – ODOT will identify potential projects in the Statewide Transportation Improvement Program (STIP) and notify the private sector of an open trench opportunity for the installation of broadband conduit
- **Oregon Researchers** – Oregon Hazards Lab at the University of Oregon is working on several projects that require remote sensors and cameras across Oregon, and therefore, require communications networks to connect to the remote digital devices
- **Oregon Broadband Middle Mile Infrastructure Planning Group Report and Recommendations** – focused on attaining digital equity including access to affordable high-speed broadband throughout Oregon. The Oregon Broadband Middle Mile Infrastructure Planning Group prepared a report with actionable recommendations to “assure robust broadband services to all Oregonians”, and “attain broadband availability in currently underserved communities”
- **Other Existing Public Agency Networks** – public agencies that have developed and are developing communications networks and systems in their communities
 - » Portland Metropolitan Area
 - » Vancouver Area Smart Trek (VAST)
 - » Clackamas County
 - » Eugene-Springfield Public Agency Network
 - » Rogue Valley Metropolitan Area – City of Medford, City of Ashland and ODOT
 - » Deschutes County – City of Bend and City of Redmond

2

ODOT'S BROADBAND NEEDS

WHY ODOT NEEDS BROADBAND

A key part of expanding broadband for ODOT requires understanding the overlap between ODOT needs, community needs, and private broadband provider needs.

Table 1 lists the major needs and key factors to meet the needs for ODOT broadband services identified through the discussion with ODOT representatives and the expected benefits from these services.

TABLE 1: ODOT BROADBAND NEEDS AND THE EXPECTED BENEFITS AND KEY FACTORS

BROADBAND NEEDS	EXPECTED BENEFITS	KEY FACTORS
<p>Broadband services needed at all ODOT staffed locations with sufficient bandwidth and affordable price.</p> <p>The growing use of central software and cloud-based applications, event and weather monitoring, and emergency response requires reliable broadband services at all ODOT facilities including rural maintenance stations, rest areas, airports, and tolling equipment/facilities.</p> <p>Network service at some ODOT offices/facilities are very slow but expensive. For example, some leased network services cost more than \$2,000/month for 3MB bandwidth. ODOT spends approximately \$1.5M annually on leased network services.</p>	<ul style="list-style-type: none"> • Improve productivity of ODOT employees • Improve ODOT employee and public safety • Help ODOT better serve the public • Reduce ODOT network service expenditure 	<ul style="list-style-type: none"> • Identify gaps between areas requiring services and existing coverage • Having redundant service to improve resiliency and reliability, especially during natural disasters or other emergency situations
<p>Broadband services needed to cover mountain passes that don't have full cell coverage.</p> <p>The network coverage gaps along mountain passes make it hard to monitor road conditions and convey information such as weather conditions to travelers.</p>	<ul style="list-style-type: none"> • Improve safety • Better incident and traffic management on mountain passes 	<ul style="list-style-type: none"> • Many mountain passes pass through rural areas which can be a good opportunity to extend broadband services to rural communities

TABLE 1: ODOT BROADBAND NEEDS AND THE EXPECTED BENEFITS AND KEY FACTORS, *CONTINUED*

BROADBAND NEEDS	EXPECTED BENEFITS	KEY FACTORS
<p>Broadband services needed to support Transportation Systems Management and Operations (TSMO), traffic signals, and Intelligent Transportation Systems (ITS).</p> <p>Communications among Traffic Management Centers (TMCs), Traffic Signals, and ITS devices, remote monitoring and diagnosing of traffic signals/ITS devices, and traffic conditions all require quality network services.</p> <p>The number of connected transportation devices and quantity of data is expected to continue to increase rapidly.</p>	<ul style="list-style-type: none"> • Reduce the number of field trips of ODOT staff • Improve ODOT staff working efficiency • Improve traffic signal/ITS system reliability • Better manage and operate the transportation system and reduce congestion • Better incident and event management to improve public safety 	<ul style="list-style-type: none"> • ODOT has a need for more frequent fiber drops, which doesn't directly align with the telecommunications company's need for long-haul fiber with very few drops • Incorporate fiber and conduit construction as part of the project planning process to reduce design, construction, and retrofitting cost • Build redundant physical paths to ensure a resilient network
<p>Broadband services needed to enable the deployment of connected and autonomous vehicles (CAVs).</p> <p>Future CAV applications will depend on broadband for vehicle-to-vehicle (V2V), vehicle-to-infrastructure (V2I), vehicle-to-cloud (V2C), and other communication points.</p>	<ul style="list-style-type: none"> • Improve safety • Reduce congestion and create more efficient transportation systems • Reduce traffic's negative environmental impacts 	<ul style="list-style-type: none"> • Get the buy-in from leadership, stakeholders, and the public on the importance of developing future-proof infrastructure systems
<p>Broadband services needed to support Commerce and Compliance Division's operations.</p> <p>Commerce and Compliance Division has needs for broadband services to upgrade their existing Weigh-in-Motion (WIM) sites and adding virtual WIM sites. Some of the current WIM sites have bandwidth as low as 1.5 Mb. Virtual WIM sites require a minimum of 20Mb bandwidth.</p> <p>Commerce and Compliance Division plans to add more sites in the Portland, Springfield areas and port of entry locations into the state which all require broadband services.</p>	<ul style="list-style-type: none"> • Improve work efficiency of ODOT Commerce and Compliance Division • Preserve ODOT infrastructure by reducing overweight vehicles • Support vehicle size, weight, and other types of enforcement • Support traffic surveillance and/or data collection 	<ul style="list-style-type: none"> • Technology supported virtual WIM sites offer significant benefits and flexibility compared to the traditional WIM, but they require sufficient and reliable bandwidth to transfer data, transmit images and communicate with different entities, especially if they are set up at various locations across the state to increase coverage.
<p>Broadband services needed to support maintenance land mobile radio (LMR) backhaul.</p> <p>Similar to networking needs, ODOT needs dedicated backhaul communications for Statewide Maintenance Radio System to be used during emergencies, winter weather, forest fires, earthquakes, and landslides.</p>	<ul style="list-style-type: none"> • Improve communications between field maintenance crews during emergency response • Improve ability to share data along with voice information 	<ul style="list-style-type: none"> • Reduce costs for leased communications backhaul • Fill in gaps in availability of leased communications services • Improve resiliency of agency systems

TABLE 1: ODOT BROADBAND NEEDS AND THE EXPECTED BENEFITS AND KEY FACTORS, *CONTINUED*

BROADBAND NEEDS	EXPECTED BENEFITS	KEY FACTORS
<p>Broadband services needed to support teleworking.</p> <p>It is likely a large amount of ODOT’s workforce will continue to work remotely after the COVID-19 pandemic. In general, more employers encourage teleworking. Remote work, telehealth, and online education all rely on reliable and high-quality network services.</p>	<ul style="list-style-type: none"> • Reduce travel demand and traffic congestion • Reduce negative environmental impacts from traffic • Improve productivity by reducing commute time • Defer/Delay capacity expansion investments to preserve existing transportation system 	<ul style="list-style-type: none"> • Seek opportunities with organizations such as Link Oregon to expand the network coverage
<p>Broadband services needed to boost and sustain economic growth.</p> <p>Businesses, e-commerce, and efficient goods movement all benefit from broadband services and are vital to the state economy. High-speed internet promotes businesses’ adoption of innovative technologies.</p>	<ul style="list-style-type: none"> • Improve the competitiveness of Oregon businesses • Attract new businesses • Improve freight efficiency and reduce costs 	<ul style="list-style-type: none"> • Leverage other broadband initiatives currently happening in Oregon to benefit transportation and state economy
<p>Broadband services needed to promote social equity.</p> <p>Balancing between well-served and unserved/underserved areas to make sure people of all demographic backgrounds have equal access to online education, business, employment, and health systems, especially people who can’t afford owning a vehicle or using transit services.</p>	<ul style="list-style-type: none"> • Help traditionally underserved/underserved areas gain access to services and opportunities that are critical to the well-being of those communities 	<ul style="list-style-type: none"> • Policy and funding supports are the keys to bring broadband services to limited access communities • Trading infrastructure, resource sharing, and other methods will leverage demand for urban broadband to invest in rural broadband

3

BROADBAND IMPLEMENTATION SCENARIOS

ODOT BROADBAND IMPLEMENTATION SCENARIOS

Eight scenarios were chosen to provide focus to the broadband program strategies and action items. The scenarios are the different ways for ODOT to implement and expand broadband infrastructure. The scenarios are not mutually exclusive and multiple could be used simultaneously.

1 ▶ Accommodate Broadband Providers in ODOT Statewide Transportation Improvement Program (STIP) Projects.

Scenario 1 is focused on results of HB 2411 to accommodate broadband providers in the ODOT STIP projects. This is a form of a dig-once approach, so ODOT can maximize the opportunity cost and lower the construction cost to installing conduit during certain transportation projects (e.g. highway widening and not pavement resurfacing).

2 ▶ Solicit public-private partnerships to help fund ODOT initiated fiber projects.

Scenario 2 is focused on leveraging private sector investments to expand ODOT's fiber optic network either by sharing the build cost in a location or expanding ODOT's fiber network in exchange for access to existing ODOT spare conduit or dark fiber.

3 ▶ Accommodate unsolicited private proposals for broadband partnerships.

Scenario 3 aims to accommodate unsolicited proposals for expanding ODOT's fiber network by working with the ODOT Oregon Innovative Partnership Program (OIPP) Office.

4 ▶ Pursue public sector partnerships for fiber installation and sharing.

Scenario 4 is similar to Scenario 2, except focused on public sector entities (such as cities and counties) to leverage those investments by either sharing the build costs in a location or expanding ODOT's fiber network in exchange for access to existing ODOT spare conduit or dark fiber.

5 ▶ Pursue grant opportunities in partnership with other public and/or private partners.

Scenario 5 is focused on pursuing the growing set of state and federal grants to expand broadband. Each grant sponsor will have individual requirements and award criteria. Identification of upcoming opportunities, selecting teaming partners, developing a winning approach, and obtaining political support are key components to winning grants.



6 ▶ **Support and partner with Oregon Tribes on federal broadband grant proposals.**

Scenario 6 is similar to Scenario 5, yet focused specifically on supporting and partnering with Oregon Tribes to pursue and win federal broadband grants to expand both ODOT broadband and commercial broadband services within Tribal communities. Developing effective relationships are an important component to Scenario 6.

7 ▶ **Trade/barter existing ODOT broadband infrastructure for fiber construction or fiber on other routes.**

Scenario 7 is similar to Scenario 2 to exchange fiber conduit/routes with the private sector to help expand the ODOT network, but focused on leveraging existing ODOT broadband infrastructure.

8 ▶ **Install conduit and fiber in ODOT-led transportation projects.**

Scenario 8 continues to expand ODOT's fiber optic network using transportation funds and existing traditional procurement methods with no private sector support. ODOT has built the nearly 300 miles of fiber optic network using this approach.

ODOT HAS NEEDS FOR BROADBAND COMMUNICATIONS IN ALL AREAS OF THE STATE, BUT CAN'T AFFORD TO BUILD ALL THE INFRASTRUCTURE ON ITS OWN. THEREFORE, ODOT MAY USE ONE OR MORE OF THE EIGHT DIFFERENT SCENARIOS TO EXPAND ITS BROADBAND INFRASTRUCTURE. THE SCENARIOS ARE NOT MUTUALLY EXCLUSIVE AND MULTIPLE COULD BE USED SIMULTANEOUSLY.

4

VISION, GOALS, STRATEGIES, AND ACTIONS

ODOT'S BROADBAND VISION

The overall vision for ODOT broadband services is to:

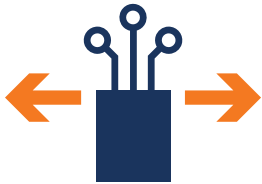
PROVIDE AFFORDABLE AND RELIABLE BROADBAND SERVICES TO SUPPORT ODOT'S OPERATION, CONNECT PEOPLE, AND HELP OREGON'S COMMUNITIES AND ECONOMY THRIVE.

This vision is well aligned with ODOT's mission statement and is supported by the specific goals described in the next section.



ODOT'S BROADBAND GOALS

The following five goals define what is needed to support the overall vision of the ODOT broadband program. These goals are the important results the ODOT broadband program will be working to accomplish. These goals are not listed in a particular order and have an equal level of importance.



GOAL 1:
EXPAND THE FIBER OPTIC NETWORK TO SUPPORT THE TRANSPORTATION SYSTEM.



GOAL 2:
PROVIDE SUFFICIENT, AFFORDABLE, AND RELIABLE NETWORK SERVICES TO ODOT OFFICES, MAINTENANCE STATIONS AND OTHER ODOT FACILITIES.



GOAL 3:
ENABLE NEXT-GENERATION TRANSPORTATION SYSTEMS SUPPORTING CONNECTED AND AUTONOMOUS VEHICLES, CONNECTED INFRASTRUCTURE, AND INTEGRATED DATA EXCHANGE.



GOAL 4:
SUPPORT THE STATEWIDE OBJECTIVE TO EXPAND BROADBAND TO RURAL OREGON AND REDUCE THE DIGITAL DIVIDE.



GOAL 5:
ESTABLISH POLICIES AND PROGRAMS TO REDUCE BARRIERS AND PROMOTE THE ADOPTION OF BROADBAND.

ODOT BROADBAND STRATEGIES AND ACTIONS

TABLE 2: ODOT BROADBAND STRATEGIES AND THE GOALS THAT THEY HELP ACHIEVE





STRATEGY	GOAL 1	GOAL 2	GOAL 3	GOAL 4	GOAL 5	PRIORITY ACTION ITEMS
1. Establish the enabling policies and Oregon Administrative Rules (OARs)		–	–	–		<ul style="list-style-type: none"> • 1.1 Develop the Oregon Administrative Rules required to implement HB 2411 to notify broadband providers of open trench opportunities on ODOT State Transportation Improvement Program (STIP) Projects (supports Scenarios 1, 2, 7 and 8) • 1.2 Identify steps needed to leverage public and private investment to install communications infrastructure for transportation use in the Interstate right-of-way to reduce expansion costs (supports Scenarios 2, 4, and 7) • 1.3 Investigate the feasibility of a Dig-Once policy and develop if needed (supports Scenario 1) • 1.4 Pursue opportunities to include support for broadband in the policies being developed as part of the Oregon Transportation Plan Update
2. Develop and streamline ODOT's processes to implement broadband expansion		–		–	–	<ul style="list-style-type: none"> • 2.1 Develop efficient procedures for determining fair value of proposed public private partnership projects or exchanges (supports Scenarios 2, 3, 4, 6 and 7) • 2.2 Develop contract templates or other legal documents for trades, including terms and conditions, for ongoing ownership and maintenance of the infrastructure and utility accommodation (supports Scenarios 2, 3, 4, 6, 7 and 8) • 2.3 Collaborate with the FHWA Oregon Division Office on efficient and effective processes to support transportation related broadband projects (supports Scenario 1, 6 and 8)

TABLE 2: ODOT BROADBAND STRATEGIES AND THE GOALS THAT THEY HELP ACHIEVE, *CONTINUED*






STRATEGY	GOAL 1	GOAL 2	GOAL 3	GOAL 4	GOAL 5	PRIORITY ACTION ITEMS
<p>3. Establish a broadband program/team/resources to implement ODOT’s broadband efforts and coordinate with other initiatives</p>			<p>–</p>	<p>–</p>		<ul style="list-style-type: none"> • 3.1 Facilitate the execution of the ODOT broadband implementation plan, and update the priorities as actions are completed • 3.2 Involve all necessary Divisions to understand comprehensive Agency need • 3.3 Establish a program governance structure to guide implementation of the Broadband strategy including defining roles and responsibilities for the broadband program within ODOT (supports all Scenarios) • 3.4 Define likely program scenarios to guide program direction and expand broadband at reduced costs (<i>see pages 25-26 for further definition</i>) • 3.5 Act as liaison between ODOT broadband effort and other initiatives within the State by organizing and/or attending joint meetings and activities (supports Scenarios 1, 4, 5, 6 and 8) • 3.6 Develop metrics to measure and report program benefits and progress • 3.7 Manage, track, and coordinate the maintenance and operations of the ODOT owned broadband infrastructure to ensure ODOT facilities / functions’ broadband needs are met • 3.8 Develop a communications strategy to educate and inform key internal and external stakeholders about ODOT’s broadband program. • 3.9 Review and strengthen procedures for gathering, updating, and maintaining fiber inventory in ODOT’s broadband infrastructure asset management system. • 3.10 Ensure all business processes developed under Strategy 2 are documented, have appropriate internal stakeholder reviews, and are maintained and shared with appropriate internal and external stakeholders.
<p>4. Identify and secure sustainable funding for ODOT fiber implementation</p>			<p>–</p>	<p>–</p>	<p>–</p>	<ul style="list-style-type: none"> • 4.1 Identify a funding program to allow the ODOT Broadband team to add funding and pursue partnerships for fiber installation in ODOT projects that lack funding for the communications infrastructure to help complete implementation of the Communications Master Plan (all Scenarios) • 4.2 Identify opportunities to partner with other entities on broadband grant opportunities (supports Scenarios 5 and 6) • 4.3 Explore, apply for, and track funding opportunities to support the ODOT broadband efforts (supports Scenarios 5 and 6)

TABLE 2: ODOT BROADBAND STRATEGIES AND THE GOALS THAT THEY HELP ACHIEVE, *CONTINUED*










STRATEGY	GOAL 1	GOAL 2	GOAL 3	GOAL 4	GOAL 5	PRIORITY ACTION ITEMS
5. Create an ODOT statewide communications master plan. Document existing broadband infrastructure, clearly define ODOT needs, identify gaps, and plan redundancy into the network					–	<ul style="list-style-type: none"> • 5.1 Map ODOT existing infrastructure into a comprehensive and single source map to show all existing fiber and network available within the state. (supports Scenarios 3, 4 and 8) • 5.2 Identify and prioritize communications network gaps taking into consideration existing and future needs of connecting all ODOT owned and leased facilities, devices and roadside infrastructure. (supports Scenarios 2, 3, 4, 6, 7 and 8) • 5.3 Identify maintenance and governance needs, including asset management procedures • 5.4 Develop procedures identifying broadband project opportunities and criteria for prioritizing projects to pursue with the limited resources available. (supports Scenarios 4 and 8)
6. Establish partnerships with both public and private stakeholders and coordinate broadband expansion efforts		–		–		<p>PUBLIC PARTNERS:</p> <ul style="list-style-type: none"> • 6.1 Seek membership on the Oregon Broadband Interagency Task force to actively engage in conversations with other members and communicate the value of ODOT expanding communications systems at reduced costs (supports Scenario 4 and 5) • 6.2 Establish regular communication with the Oregon Broadband Office, Link Oregon, Department of Administrative Services, state agencies, regional broadband multi-agency coordination groups (e.g. Metro/TransPort, Lane Council of Governments/Public Agency Network (PAN)), local governments, and other broadband stakeholders to seek and identify understand broadband needs/plans and identify opportunities for shared construction or trades that benefit both ODOT and the broader statewide objective to reduce the digital divide (supports Scenarios 4, 5 and 8) <p>PUBLIC/PRIVATE:</p> <ul style="list-style-type: none"> • 6.3 Outreach to telecommunications companies for collaboration opportunities through industry organizations such as the Oregon Telecommunications Association and Oregon Cable Telecommunications Association (supports Scenarios 2, 4, 6, and 7) • 6.4 Create and execute a P3 workshop with Oregon broadband providers (supports Scenario 3) <p>NATIONAL COORDINATION:</p> <ul style="list-style-type: none"> • 6.5 Coordinate peer-to-peer exchanges with other state DOTs (supports Scenario 2) • 6.6 Participate in a regional and national broadband working group such as AASHTO if/when a broadband committee becomes active

TABLE 2: ODOT BROADBAND STRATEGIES AND THE GOALS THAT THEY HELP ACHIEVE, *CONTINUED*

STRATEGY	GOAL 1	GOAL 2	GOAL 3	GOAL 4	GOAL 5	PRIORITY ACTION ITEMS
7. Update communications infrastructure policy, design standards, and construction specifications	–	–	–			<ul style="list-style-type: none"> • 7.1 Establish a policy to install communications infrastructure in appropriate ODOT Transportation Projects (supports Scenarios 1 and 8) • 7.2 Investigate lower cost construction methods for potential use • 7.3 Update design guidelines, standards, and construction specifications (supports all Scenarios) • 7.4 Investigate the access requirements/rules for working within Interstate right-of-way (supports Scenarios 2, 3, 4, and 7) • 7.5 Design ODOT broadband infrastructure, including the number and size of conduits, innerducts, and fiber optic cables based on the agency’s expected needs over the next 20 years • 7.6 Train construction inspectors, bridge engineers, bridge inspectors, and Resident Engineers around the state about the design guidelines and installation of conduit, vaults, and fiber optic cable including testing and installation (supports Scenarios 1, 3, and 8)

5

NEAR TERM ACTION PRIORITIES

The overall broadband strategy and implementation plan defines a multi-year and multi-dimensional effort across the agency. Embarking on a journey to implement 36 Action Items can be challenging, given staffing and funding constraints. To help ODOT get the broadband program launched, provide some early momentum, and maximize return on the investment in both the short- and long-term, the plan defines near term action priorities. Some action items are dependent on others to be completed, such as knowing the framework for trades before developing contract terms and conditions. Some action items serve multiple implementation scenarios, such as identifying a funding program. The following action items define the near term priorities to stand up the broadband program and achieve the OTC priority to Modernize the Transportation System.

NEAR TERM ACTIONS

ESTABLISH CRITICAL POLICIES AND PROCEDURES

1.1 Develop the Oregon Administrative rules required to implement HB 2411 – ODOT is required to implement HB 2411 and must develop the policies and procedures to notify broadband providers of open trench opportunities and the determine which transportation projects are excellent candidates for open trench opportunities (e.g. highway widening versus maintenance resurfacing).

2.1 Develop efficient procedures for determining fair value of proposed P3's and exchanges – Before anyone approaches ODOT to provide or exchange fiber, ODOT needs to determine how to value the right-of-way to ensure it is receiving fair value. There are many different approaches from other states' and AASHTO, but ODOT needs to reach an internal consensus on what works for Oregon.

2.2 Develop contract templates or other legal documents for trades, including terms and conditions – Before anyone approaches ODOT to provide or exchange fiber, ODOT need to outline the contract template and decide on critical terms and conditions such as contract length, ownership and maintenance responsibility, who pays for relocating fiber optic conduit, risk, insurance, and liability.

5.3 Identify maintenance and governance needs, including asset management procedures – ODOT needs to define who is responsible for maintenance through trades, how to maintain and track any fiber or conduit obtained through exchanges, and ensure any fiber/conduit is properly maintained over time.

7.3 Update design guidelines, standards, and construction specifications to accommodate the broadband needs of the agency in the future – Before anyone approaches ODOT to provide or change fiber, ODOT needs to define design guidelines and standards and any construction methods.

7.4 Investigate the access requirements/rules for working within the Interstate ROW – ODOT will need to determine the rules for where conduits, splice vaults, and pullboxes can be placed along the intersection and how to a broadband provider can safely access equipment without impacting safety or operations.

STREAMLINE ODOT PROCESSES

2.3 Collaborate with the FHWA Oregon Division Office on efficient and effective processes to support transportation related broadband projects

– ODOT needs to ensure FHWA supports expanding the fiber optic network using the 8 scenarios identified in the Implementation Plan. The partnership agreement will spell out the issues that need to be addressed when exchanging fiber on the Interstate and National Highway System roadways.

STAND UP BROADBAND PROGRAM

3.3 Establish a program governance structure –

ODOT needs to define organizational roles and responsibilities of ITS, Statewide Project Delivery, Construction Section and others involved in the broadband program, establish the staff responsible to execute the broadband program, and provide resources to execute the program.

3.6 Develop metrics to measure and report program benefits and progress – ODOT will need to establish the metrics to manage the program and know whether it is providing the expected outcomes and benefits.

3.8 Develop a communications strategy to educate and inform key internal and external stakeholders about ODOT's broadband program – A critical component of any new program is to help all stakeholders understand why the program is needed, the benefits, and the changes ODOT is making to support the program. Using internal and external communication tools will be an important component to the communications strategy.

6.2 Establish regular communication with the Oregon Broadband Office, Link Oregon, DAS, state agencies, regional multi-agency groups, local governments, and other stakeholders –

A critical near term item is for ODOT to establish regular communication with other public sector stakeholders to coordinate build opportunities and work together on any grant/funding opportunities.

IDENTIFY AND SECURE FUNDING

4.1 Identify a funding program – ODOT will need funding to run the program, expand its own fiber optic network, and provide funding to support private sector investments. **This is probably the most important action item.** The level of investment provided will strongly influence how quick broadband expands in Oregon.

4.2 Identify opportunities to partner with other entities on broadband grant opportunities – An important element to winning grant opportunities is discussing a project with partners in advance of the grant opportunity and not waiting until the grant is advertised. It will take time to form the partnership and establish a project scope worth pursuing.

4.3 Explore, apply for, and track funding opportunities – ODOT will need to utilize various alternative funding opportunities to expand the broadband quicker and ODOT should begin looking for these upcoming opportunities and track them.