LEAGUE OF OREGON CITIES

OREGON MUNICIPAL BROADBAND

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Introduction

Recognition of telecommunications infrastructure as a vital service in Oregon began in 1991 when the Task Force on Telecommunications was established. In 2010, this priority was reemphasized with the creation of the Oregon Broadband Advisory Council, whose goal is to develop and implement statewide broadband initiatives.

In today's digital age, high-speed broadband services are crucial to economic development, job creation, education, health care, civic engagement, government transparency and responsiveness, as well as public safety and emergency preparedness. If broadband services are not available or are insufficient, businesses may pass over a city when assessing potential locations for new offices and facilities. Even if a city expects enhanced broadband services in the next few years, businesses cannot afford to wait and may choose to make investments elsewhere.

Beyond the business sector, the general public is growing more accustomed to having Internet access everywhere they go. Not only do people want access to traditional local government services such as libraries and parks, but they also want to check their email while they use these city services.

The main purpose of a city is to provide essential services to a community. Due to insufficient services provided by private utilities, some cities have classified broadband as "essential" and have chosen to add broadband to the list of their city services. Even among those that have chosen to enter the realm of telecommunications, the roles and models used vary greatly. Some cities have implemented a city utility, others have entered into partnerships with other governmental entities and private providers, and some provide services only to other governmental entities. Some cities have chosen to provide services directly to the customer, while others lease network space to private service providers.

In addition to these variations in implementation, the type of broadband access varies as well; some cities have chosen to construct "wired" fiber-optic networks, while others provide free wireless broadband services to key areas around the city, including city hall, parks and downtown business areas.

About this Report

There are many options available to cities that want to provide broadband services, and the purpose of this report is to provide general information to those cities. The report will discuss the link between broadband expansion and economic development, while posing several policy and legal issues cities should consider before deciding to provide these types of services. To assist readers with technical terms, there is a glossary on page 44.

This report also provides a general overview for the various models based on the actions and experiences of other Oregon cities that have chosen to provide broadband services. Additional information on any of the case study cities can be obtained by contacting the League of Oregon Cities.

Broadband & Economic Development

The Link Between Broadband & Economic Development

Although most agree that broadband is playing an ever increasing role in the global economy, several studies have attempted to assess whether the expansion of broadband services truly is an effective economic development tool.

Broadband and the U.S. Economy

- 62% of American workers rely on the Internet to perform their jobs.
- The U.S. Bureau of Labor Statistics forecasts that jobs depending on broadband and information and communication technologies will increase by 25% from 2008 to 2018.
- One third of the per capita GDP growth can be attributed to telecommunications infrastructure investments.
- Information and communications technology contributed 59% of growth in labor productivity from 1995 to 2000 and 33% from 2000 to 2005.

Source: Portland Broadband Strategic Planning Briefing Book (2010–Sect. 2; p. 2)

The city of Portland's "Broadband Strategic Planning Briefing Book" (2010) notes that "broadband is becoming a prerequisite to economic opportunity for individuals, small businesses and communities. Those without broadband and the skills to use broadband-enabled technologies are becoming more isolated from the modern American economy" (Section 2, page 2). Because of this reality, Portland is developing a comprehensive Broadband Strategic Plan to keep pace with future telecommunications and economic trends.

The Briefing Book examines many surveys and studies linking broadband and economic development. One objective of the Portland Broadband Strategic Plan is to "positively impact the policies, actions and directions of other Oregon communities and of the state as a whole" (Section 1, page 2). The Briefing Book helps fulfill this objective by providing other cities with information and resources on broadband, especially regarding economic development. Any city interested in expanding the provision of broadband services in their community should review the Portland Broadband Strategic Plan documents (see Resources section, page 42).

The Portland Briefing Book references a study conducted by the Public Policy Insitute of California (PPIC), "Does Broadband Boost Local Economic Development" (Kolko, 2010). The study found a very strong, positive relationship between the expansion of broadband and job growth, noting that the relationship is stronger for certain industries such as utilities, finance, insurance, scientific/technical, and other professional services. The study further noted that job growth after broadband expansion is not as strong in jobs that rely on local demand, such as retail stores or entertainment services. In fact, these types of businesses could be negatively affected by better connecting local consumers to the global market.

According to the PPIC study, the positive relationship is stronger in areas of lower population density, the theory being that the introduction and/or expansion of broadband connects these areas to a larger market. However, even areas of high population density do experience job growth after broadband services are expanded.

One interesting point made by the PPIC study was that even though broadband is linked to job growth, the study did not find a connection between broadband expansion and higher local employment rates or wages (Kolko, 2010). Some of the new jobs may not filled by current city residents, especially if the new industry requires a highly skilled workforce in a specific field.

Several of the cities in the Oregon municipal broadband case studies, however, have experienced broader economic benefits than what is presented in the PPIC study. For example, the city of Sandy expanded its municipal broadband services, SandyNet, to a nearby resort, which in turn was able to host larger business conferences. The resort then created more jobs to accommodate their business growth, and these jobs were filled mostly by Sandy area residents. The attendees at these conferences also became tourist patrons at local restaurants and businesses (see case study, page 24).

Another example can be found in The Dalles with the completion of QLife, an intergovernmental fiber network. The enhanced services provided by QLife attracted Google's attention, and the company chose to locate a new facility within the city. Due to the technical scope of the work needed at the facility, some jobs were filled from out-of-city recruitments. However, other jobs were filled by current city residents. In addition to job growth, the location of a highly visible business puts The Dalles on the map as a desirable place to locate. Even though some of the new jobs were not filled by local residents, the city benefits from the indirect economic impacts related to the new jobs, residents and income (see case study, page 32).

Local broadband projects have had positive impacts on cities throughout the nation. In 2009, The National Association of Telecommunications Officers and Advisors (NATOA) put together a briefing for the Federal Communications Commission (FCC) which highlighted several examples. Among these examples was Bristol, Virginia, which found its local economy drastically changing as the tobacco, textiles, coal mining and agriculture industries were in decline. The city decided to rebuild its economy on a foundation of advanced telecommunications infrastructure and services. In 2001, the city began building a fiber-to-the-home network, and by 2009 this system served more than 65 percent of city residents and businesses. This broadband network has begun attracting new employers, including two businesses which will bring in approximately 1,500 jobs that pay twice the average local wage. More information on Bristol, Virginia, as well as other examples from the NATOA briefing can be found in the Resources section on page 42.

Recent evidence shows there is a link between broadband and economic development. However, the issue of whether a city should become directly involved in the provision of broadband services is complicated by several factors, including the current local economy, skills of the workforce, and the city's economic goals (e.g. create new jobs for current residents). Regardless, broadband is crucial to national, state and local economies.

Broadband Services in the U.S.

> *"America's record in expanding broadband communication is so poor that it should be viewed as an outrage by every consumer and business person in the country. Too few of us have broadband connections, and those who do pay too much for service that is too slow. It's hurting our economy, and things are only going to get worse if we don't do something about it."*
>
> *Michael J. Copps, Federal Communications Commission Member (2006)*

As the global economy changes, it appears that broadband will play an increasing role in future economic markets. Despite this clear trend, the United States is lagging behind many countries in terms of broadband adoption and availability, which could have devastating impacts on the nation's recovering economy. In 2010, the United States was ranked 15th worldwide in terms of broadband penetration, whereas 10 years ago the U.S. ranked number one (Meinrath & Losey, 2010).

According to a study conducted by Pew Internet (Smith, 2010), after years of double-digit growth in broadband adoption, the U.S. saw a growth rate of only 3 percent from 2009 to 2010. As part of the solution, the American Recovery and Reinvestment Act (ARRA) designated $7.2 billion to broadband expansion projects, as well as nationwide mapping of broadband availability. The Oregon Broadband Advisory Council (2010) reports that $52 million was awarded to Oregon-based broadband projects. Of that $52 million, Oregon local government projects received the following: the city of Sandy received a grant/loan award of $749,085; Clackamas County received a grant of $7.8 million; Crook County received a grant of $3.9 million; and the Lane Council of Governments was awarded a grant of $8.3 million (see page 23 for more information).

Download Speeds
(Hours: Minutes: Seconds)

Internet Speed	Movie File (1,000 MB)	Music File (5 MB)
1 Mbps	2:13:20	0:00:40
4 Mbps	0:33:20	0:00:10
25 Mbps	0:05:20	0:00:01
100 Mbps	0:01:20	< 0:00:01

As mandated by the ARRA, the Federal Communications Commission published its National Broadband Plan in 2010. The core principle of the plan is that "broadband is a foundation for economic job growth, job creation, global competitiveness and a better way of life" (page xi). A goal of this plan is to have universal broadband available to all U.S. households by 2020, with a minimum download speed of 4 megabits per second (Mpbs) and upload speeds of 1 Mbps. Furthermore, the FCC wants 75 percent of the population to have affordable access to download speeds of 100 Mbps, and 50 Mbps upload speeds. Even with the achievement of these goals, the U.S. may still lag behind – many countries had already met these standards by 2010, including Taiwan, Denmark and the U.K. (Meinrath & Losey, 2010).

Broadband adoption rates show part of the competitive issue facing the U.S. economy, but the cost and service levels within the U.S. show a dreary outlook. Compared to other countries, U.S. citizens pay more for broadband services, but receive substantially lower speeds. The FCC found that the high cost of services is one barrier preventing or discouraging some U.S. households from subscribing to broadband services (Meinrath & Losey, 2010). A competitive market can help lower the cost of services, but for communities that are still struggling to find one provider, additional private provider competition may never materialize. According to the FCC's National Broadband Plan (2010), areas that include 75 percent of the nation's population

are likely to have only one service provider that can provide top-speed Internet services. This paints a dire picture for the smaller, rural areas around the country, and in Oregon.

Broadband Services in Oregon

In 2009, the U.S. Department of Commerce reported that Oregon was ranked 8th nationally for broadband reach, with 70.1 percent of homes utilizing high-speed Internet access. A 2010 survey conducted by the Opinion Research Corporation shows even higher statistics for Oregon: 88 percent of Oregon adults use the Internet, 85 percent have Internet access at home, and 82 percent have broadband access.

Using a different broadband indicator, established by the Information Technology and Innovation Foundation (ITIF, 2010), Oregon was ranked 21st nationally. The indicator in ITIF's report, 2010 State New Economy Index, evaluates the availability of broadband services in the 50 states as well as the cost of services. A high score means affordable broadband services are widely available throughout the state.

The ITIF report found that states with a higher population density tended to have a higher broadband score. The lower population density around much of the state of Oregon may explain the lower ranking, meaning many Oregonians do not have affordable broadband available in their communities.

Private providers tend to offer more services to areas with a higher population density, higher household income, and flatter terrain (Kelko, 2010). This leaves some areas around the country and around the State of Oregon "underserved" in terms of broadband availability. In some cases, the underserved must decide what role cities should play in the expansion of local broadband services.

The Role of Cities in Broadband Services

In the 2010 National Broadband Plan, the FCC stated that 96 percent of households are served by two or fewer providers. In Oregon, there are still a handful of cities that have no broadband options and many that have insufficient services from one provider. The goal of universal availability by 2020 may be too far off for some cities. For many of the Oregon cities providing broadband, the local providers' estimated date for providing services, or the inability to provide a date at all, prompted the discussion of whether these cities should provide broadband services.

> *Government's role is to let the market meet whatever needs it can, work with the market (public/private partnerships) when appropriate, and fill the void when the private sector offers inadequate solutions.*
>
> *Sonja Reece, Councilmember of Normal, Illinois & Chair of the National League of Cities Information Technology & Communications Steering Committee (2007)*

FCC Broadband Tiers
(2008)

Tier	*Rate*
1	200 Kbps up to 768 Kbps
2	768 Kbps to 1.5 Mbps
3	1.5 Mbps to 3.0 Mbps
4	3.0 Mbps to 6.0 Mbps
5	6.0 Mbps to 10.0 Mbps
6	10.0 Mbps to 25.0 Mbps
7	25.0 Mbps to 100.0 Mbps
8	100.0 Mbps and beyond

Source: Federal Communications Commission: Order 08-89

Furthermore, the 2020 goal of universal 4 Mbps services will bring many areas to today's current standard of "high-speed," which is currently tier 4 in the FCC's categorization of broadband services. Today's standards may be insufficient to accommodate the demands of a mobile, online constituency in 2020. The public wants more access and faster speeds. For example, Tigard launched its free limited Wi-Fi service due to the demand from local citizens (see case study, page 36).

In 2005, a study found that 616 of the 2,007 municipal electric utilities in the United States were providing some sort of communications services (Ford, 2005). Many municipal electric utilities looked to telecommunications as a way to stay competitive after deregulation.

In Oregon, there are at least eight cities providing for-fee broadband services through a city utility or an intergovernmental partnership. Two of these cities also operate electric utilities. The main reason these cities chose to enter the telecom businesses was to facilitate economic development and to fill a gap in broadband services. In 2001, dial-up Internet was the only broadband option for Sandy residents. The SandyNet broadband utility filled a void, helped recruit several businesses, and prompted the introduction of additional services from local providers (see case study, page 24).

Private broadband providers are companies that need to make a profit. Therefore, decisions on how and when broadband services are introduced or expanded are made based on the bottom line. If a city is not densely populated, or if a city has difficult terrain, it will be more expensive for local providers to deploy services, thereby cutting into the profit margin.

The mission of cities, counties and other non-profits is to serve the needs of the local community, not shareholders. As stated in a 2011 report by Chris Mitchell of the New Rules Project, the United States is facing a broadband service monopoly, and municipal and community networks provide a way to increase competition and enhance services in local communities.

Municipal broadband services can create competition and help increase broadband services while lowering the costs. Ashland citizens have two choices for broadband: municipally-owned Ashland Fiber Network, and privately-owned Charter Communications. Based on a survey of sales flyers and promotional materials collected for cable television services offered in Ashland, Talent, Phoenix and Medford between 2000 and 2006, Ashland customers (either Ashland Fiber Network or Charter) saved at least $10 per month compared to customers in the other cities. With a cable TV penetration rate in Ashland of approximately 67 percent, this translated into a minimum annual savings of $714,000 for customers in Ashland during that time due to the presence of competition.

The cities in Oregon providing broadband services have thus far been successful in the development, implementation and management of their broadband networks. Oregon municipal broadband utilities are financially stable, and broadband service competition within the cities has increased. The recent economic crisis has put a damper on job growth, but most of these cities

are hopeful that as the economy strengthens, so will their local economies, due in part to the availability of broadband services.

However, the role of a city in local broadband does not need to be as extensive as building a citywide broadband network. Several cities in Oregon have chosen to take on another role, such as forming a public/private partnership or creating a free Wi-Fi network for local residents and businesses. These endeavors can also enrich the community and business life of a city.

Policy Considerations

There are many policy issues to consider before a city begins providing broadband services. These are not decisions that should be made quickly, and both technical and legal consultation should be involved in the process.

Below are a few key questions to help begin the conversation regarding city broadband services. See Appendix A (page 41) for a visual flow chart which will help cities walk through some of these questions and make a more informed decision regarding their city's role in broadband services.

The Need for Broadband Services

What is the need for broadband services in a city?

Need does not necessarily mean lack of service. In today's digital economy, a city needs fast, affordable broadband services to compete in business recruitment and retention.

If there are already affordable services provided within a city, a new city broadband utility or partnership will be coming into the market late, and the investment may not pay out as well. However, a city could still consider providing free Wi-Fi in parts of the city as a service to citizens, and to help promote certain areas of town (e.g. parks, city hall and downtown businesses).

If there is a serious unmet need for broadband services and the city council agrees that broadband is an essential service, cities could consider the option of providing broadband services to the community as either a city utility, or in partnership with another city, governmental entity or a private provider.

If a city is unsure of the level of local broadband services, the Oregon Public Utility Commission developed an interactive map of broadband availability around the state. In addition, the National Telecommunications and Information Administration (NTIA) developed a national interactive map of broadband availability that includes Oregon. Using these maps, city officials can view the number of providers offering services by address, city, county or other selected areas. Cities can also search coverage areas, search by broadband technology, and run speed tests on local current Internet connections. For more information on these map websites, see the Resources section on page 42.

To evaluate the affordability of services, the Citizens' Utility Board of Oregon has developed a database showing landline phone, mobile phone and Internet rates by zip code. For more information on this website, see the Resources section on page 42.

In order to help assess whether the current services are affordable and fast, a city should hire a consultant to conduct a feasibility study and market analysis. Several of the Oregon cities with broadband networks conducted these types of studies before building their broadband networks.

Encouraging Private Broadband Services

Are there ways a city can encourage the introduction or expansion of private broadband services?

If there is a need for broadband services but the city council is reluctant or there is no interest in building a network or providing services, cities could consider options to attract providers to the city, thereby providing initial services or encouraging competition to enhance services and reduce prices.

State Programs

Many cities have used enterprise zones as an economic development tool. Some of these enterprise zones are given an additional status of "e-commerce zone," which provides additional incentives to further encourage development in electronic commerce. This incentive cannot be used directly for private broadband network expansion – as in the laying of infrastructure. A local telecom provider could use the e-commerce zone status for purchasing equipment and other hardware needed to provide broadband services. Furthermore, a city could use the program as a tool to recruit more e-commerce businesses that will utilize the current provided broadband services, as well as create a need and demand for increased broadband service levels.

E-commerce zones give a qualifying business a credit against their state income or corporate excise tax liability. The credit equals 25 percent of the qualifying business's capital cost in a given tax year for electronic commerce investments within the designated area. This e-commerce tax credit is in addition to the standard enterprise zone exemption from local property taxes. For more information on e-commerce zones, see the Resources section on page 42.

Strategic Planning

The city of Portland is developing a broadband strategic plan (see Resources section, page 42). One major goal of this project is to assess the role the city can play in the development of broadband over the next 10 years. According to Portland's Broadband Briefing Book (2010), the strategic plan will include the adoption of city policies and initiatives which help support broadband expansion for Portland businesses. This plan also includes incentives Portland can offer that encourage the enhancement and expansion of broadband services.

Another key feature of Portland's broadband strategic plan is to aggregate the need of the local residents and businesses. The city plans to contact key institutions, such as schools, colleges and health care facilities, to get a pulse on the need for services. The city can use this information to talk with private providers and illustrate there is a ready-made demand for services.

Other City "Recruitment" Efforts

Other cities have successfully "recruited" private providers. Within the last 10 years, the city of Bandon formed an exploratory committee and issued an RFP for a private partner to work with the city to provide broadband services. The owner of ComSpan, a local telephone company in Roseburg, also owned a business in Bandon and chose to bring broadband services there.

Around the same time, the local telephone company began providing DSL in Bandon. ComSpan then became an independent provider with no formal partnership or investment from the city. The city treated ComSpan the same as the local telephone and cable companies in terms of franchising. However, the city provided incentives to ComSpan by expediting the permit process, leasing space to ComSpan for offices and equipment, and switching the city over to ComSpan's telephone and Internet services. Even though there is no formal partnership, ComSpan and Bandon have found other ways to support each other.

Similarly, within the last 10 years the city of Forest Grove developed a limited-area, free Wi-Fi network. The network was very affordable to deploy and maintain, so the city began discussing expansion. Just the discussion was enough of a nudge to the local phone and cable providers to enhance their services and lower their prices. Recently, the city found itself needing to upgrade the equipment in order to keep providing Wi-Fi services. Since there were more high-speed internet options available within the city, it decided to discontinue the Wi-Fi service.

Community Attitudes & Usage

Will the community support a municipal broadband network and will the services be used?

Having an identified need for broadband and resources available to provide the services are not necessarily enough reason to initiate a city broadband network. Cities must also consider whether or not the community is in support of this endeavor and whether the community will use the services.

A survey conducted by Pew Internet (Smith, 2010) found that 26 percent of Americans felt that the federal government should not be involved in the expansion of broadband services, and 27 percent felt this should not be a major priority of the federal government. Even though the survey referred to "federal" government, many people view "government" in a collective sense, and these opinions may apply to all levels of government. The Pew report often referred to government in a general sense.

It is also important to consider demographic factors such as age and income and their effect on the use of Internet services. The U.S. Department of Commerce (2010) found that 81 percent of Americans between the ages of 18 to 24 use the Internet at home, while only 46 percent of Americans over the age of 55 use the Internet at home. If a city is considering building a broadband network and the population demographic falls predominantly within the over-55 age group, a city may want to consider a technology education plan to help citizens better utilize the city's broadband investment.

According to the same survey, income was another major factor in Internet use at home. The usage rates start at 29 percent for households with incomes less than $15,000, and progressively

move upwards to almost 89 percent for households with incomes greater than $150,000. If a city can provide affordable services, however, municipal broadband may increase usage among lower-income populations, allowing them the access they desperately need.

Prior to developing municipal broadband networks, several cities in Oregon conducted community surveys. These surveys allowed the cities to determine the needs of the community and gauge the public perception towards a municipal broadband utility. When the public is engaged in the process early and often, they may develop a sense of ownership of the project and may be more supportive of the utility.

Broadband Service Structure

How will the broadband services be structured?

For cities, there are many options for providing broadband services. The examples listed below are only a few of the options available. There may be other service structures that more closely meet the needs and goals of a particular city. Because telecommunications is a constantly changing field, ingenuity and creative thinking can be useful tools.

Free City Service

One broadband service option available to cities is to provide free broadband services, such as a limited-area and/or limited-use Wi-Fi network. For cities that provide free Wi-Fi services, there is no need for an independent city utility. The Wi-Fi network just becomes a provided service under another department, such as Information Technology (IT), or is a contracted service. There may be opportunities for cities to partner with a private provider. More information on cities providing this type of service is detailed on page 23.

City Utility

In a city utility network structure, a city will likely own all or part of the broadband network, and the utility manages this network and any services provided. The utility would have a separate enterprise fund and would be a separate department or division within the city.

With a city utility structure, a city is able to make all decisions regarding the broadband network, including the expansion of the network and the service levels and prices. However, the city is also the sole bearer of the cost of the project and any debt that is incurred. More information on cities providing this type of service is detailed on page 23.

Partnerships

A partnership structure requires a city and at least one additional entity to jointly share resources to build a broadband network. From the case studies in this report, two types of partnerships emerge:

1. Intergovernmental Network: A city partners with other governmental entities to create a broadband network. All specifics regarding the network/utility, including financing and structure, are decided and agreed upon with an intergovernmental agreement. More information on cities providing this type of service is detailed on page 23.

2. Public/Private Partnership: A city enters into a partnership with a private provider. The roles and obligations of each party are agreed upon in contract. More information on cities providing this type of service is detailed on page 23.

A partnership is an excellent way to make a telecom project more cost effective by creating a larger market for services as well as a greater pool for sharing resources (staff, equipment, etc.). However, it may create financial ties between a city and its broadband partner. In these types of projects, it is common to accrue some debt.

In the case of public/private partnerships, there are loans available to cities that are not available to the private provider, so some debt may be solely in a city's name. If the partnership dissolves after the debt is incurred, a city may be placed in a dire financial position, especially if the utility is not operational yet and no revenue is being generated.

In the case of an intergovernmental utility, all governmental entities will likely be financially responsible for the utility and its debt/expenses. Intergovernmental partnerships can also be difficult with two or more community identities trying to move forward with one comprehensive plan. If a city decides to enter into a partnership, make sure there is a clear commitment and understanding of the partnership responsibilities, and preferably a previous history of cooperative ventures.

Type of Broadband Network

What type of broadband network should a city deploy?

Service needs and available funding will likely determine the type of network a city chooses to deploy. The first decision is whether a city wants to develop a wired broadband network, a wireless broadband network, or both.

Broadband technology is changing rapidly and the market is competitive. If a city is considering a for-fee broadband utility, a technical consultant can help facilitate good decisions that will better protect a city's long-term investment in a broadband project.

Wired Network

Most private sector providers are moving toward fiber-optic networks for broadband service provision. The term "fiber-to-the-premises" describes the expansion of fiber-optic cable directly to homes and other buildings. Building a fiber-optic network can be costly, especially if a city builds the network all at once. However, a faster build-out means the network is up and running more quickly, allowing a faster return on investment through generated revenue.

According to an Oregon Public Utility Commission report (PUC, 2007), more than half of the broadband connections in Oregon are cable-modem connections provided by local cable company coaxial networks. However, a coaxial cable network may not be the best option for cities currently considering the construction of a new broadband network. Coaxial cables have a high data transmission capacity, but transmit over a shorter distance than fiber-optic cables and can be very costly to install.

Digital subscriber line (DSL) networks are more affordable to deploy than other wired networks. DSL transmits data over local telephone copper wires. In Oregon, approximately one-third of high-speed connections are DSL (PUC, 2007). DSL speeds tend to be slower than fiber networks and in some cases even commercial wireless services (see page 12 for more information on wireless broadband). Since telecommunications is an ever-evolving arena, even DSL and copper lines are undergoing technological change and innovation, and eventually the older copper networks could be revamped to accommodate today's high-speed demands. However, the recent trend in wired broadband seems to be a move toward fiber-optic networks. For example, the city of Sandy's utility, SandyNet, began as a DSL network, but the city is expanding using wireless and fiber-optic networks and eventually plans to phase out the DSL services (see case study, page 24).

If a city decides to build a fiber-optic network, but feels no urgency and does not want to accrue much debt, a network can be developed in stages. Some cities have begun to utilize "joint trenching," where fiber conduits are installed when streets and sidewalks are excavated for water, sewer or street projects. The actual fiber-optic cable can be easily blown, pulled or pushed through installed conduits at a later time.

The city of Sandy recently installed fiber-optic cable in a new water line trench. The city has also used abandoned water lines as conduit for fiber-optic cables. Joint trenching is also an excellent practice even if a network is needed for sole use by the city (e.g. to connect facilities, enhance public safety communication, etc.). Examples of efficient joint-trenching practices are available on the Oregon Utility Notification Center's website (see Resources section, page 42).

In accordance with city development codes or specifications, cities such as Sherwood, require city-owned conduits to be trenched along with other infrastructure in a new development. Therefore, the equipment pieces needed for a broadband network are installed for future use by the city.

Portland's franchise agreements require telecommunications companies to install city-owned conduit while installing the providers' own conduit in the right-of-way. Over time, using this conduit and additional city resources, Portland was able to build a fiber network, IRNE (Integrated Regional Network Enterprise). This network connects many of the city's facilities and is interconnected to Comcast's Institutional Network, which reaches more than 270 regional public facilities throughout Multnomah County, including: the cities of Fairview, Gresham, Portland, Troutdale and Wood Village; Multnomah County; Tri-Met; Metro; schools; and libraries. The IRNE is not being used to provide commercial services.

Wireless Network

Wi-Fi wireless networks represent one of the more affordable options for providing broadband services. Wireless technologies are evolving and the speeds are increasing. A Wi-Fi network is not truly "wireless," however. A typical Wi-Fi network consists of several access points that are

connected to a wireline backbone network. The number of access points needed to cover a city with Wi-Fi access depends on the size of the city and the topographical layout. With this type of network, the speeds can be slower depending the distance between the wireless access points and the fiber/cable connection.

When creating a for-fee wireless broadband utility, cities should conduct a site analysis. It is important to assess the best locations for wireless access points; confirm the wired infrastructure is available to support these access points; and verify the locations will provide competitive high-speed services throughout the city. Even if there is currently little or no competition for service within a city, there may be in the future. Taking the time to develop a utility that provides comparable services to the private providers may help the long-term viability of a utility.

If a city would like to provide free broadband to certain areas, Wi-Fi appears to be the best choice. The equipment is very affordable, and maintenance costs are manageable. The services are free, therefore the efficiency of the wired infrastructure and the placement of the wireless access points is not as crucial. For the city of Tigard, it cost $2,500 to establish a free, limited-area Wi-Fi network, and the ongoing expenses are minimal. Part of what made this project affordable was the strategic placement of access points at city facilities (e.g. city hall) or those of interested parties. By agreement, the city of Tigard mounts a wireless access point on the chamber of commerce building, which then provides free Wi-Fi to all users within the downtown business area (see case study, page 36).

WiMAX is a wireless technology that was released more than 10 years ago, but is currently increasing in popularity. WiMAX provides for a larger coverage area with fewer antennas and is being used to build nationwide 4G networks. WiMAX is even being offered by the wireless provider, CLEAR, in several locations in the Willamette Valley (Portland, Salem, Eugene). In some cases, WiMAX broadband speeds are faster than fiber-optic network services, however the full transmission capacity over a fiber-optic transmission is much greater than wireless. Because the cost of WiMAX equipment is still fairly high, WiMAX may not be a viable option for most cities.

WiMAX Antenna

Another 4G wireless standard that was recently released is Long Term Evolution (LTE). As with all "next generation" telecommunications technology, it boasts faster speeds than the previous generation. LTE is being deployed in Oregon by mobile wireless service providers such as AT&T Wireless and Verizon Wireless.

It is important to consider the advancement in technologies when making decisions regarding city broadband networks. If a city is considering a for-fee service, the utility may need to compete with WiMAX and LTE in the near future. As reported by the Oregon Broadband Advisory Council (2010), CLEAR is charging $25 for its mobile WiMAX wireless services. In comparison, the cost of cable modem services ranges from $27 to $80 per month.

Although watching and waiting may be costly when it comes to economic development, these newer technologies may also be beneficial to cities when the equipment costs decrease and WiMAX and LTE become a more affordable option for the provision of broadband services.

Type of Broadband Provider

What type of broadband provider should a city become?

Once the type of broadband network is selected, cities must determine the type of provider it will be and what services will be provided. Will broadband services be provided free to the public or to paying customers? This decision will affect the answers to subsequent questions based on whether a city needs to generate money to support a for-fee service, or if the city is providing a general service to residents, such as parks and libraries.

Broadband is a general term for high-speed telecommunications networks. Once a building or area is connected to a broadband network, there are other services that can be provided. Within the realm of broadband, there are many players and therefore many roles cities can play as a broadband provider.

Middle Mile Provider (For-Fee Service)

If a city owns and manages a broadband network, it can be a middle mile provider, building the network and leasing network facilities to other entities that provide services directly to the end user (customers).* The intergovernmental broadband network QLife (The Dalles) is an example of a middle mile provider (see case study, page 32).

The "middle mile" choice protects a city from the fiercest part of competition, which is the direct service to the customer. It also helps keep costs down since the city does not need to provide customer service to individual users, only technical support to those leasing space from the network.

Last Mile Provider (For-Fee Service)

In addition, a few Oregon cities are last mile providers, whereby a city utility provides services directly to its customers.* Ashland Fiber Network and MINET (Monmouth-Independence Network) both provide "triple-play" services (voice, video and data) to their local residents (see MINET case study, page 30).

Sandy, which has both DSL and wireless networks, is an Internet service provider, but does not offer voice or video (see case study, page 24). Cascade Locks started a cable utility in 1970 due to a lack of available services, and now also provides data but no voice services.

A utility can choose to be a middle mile provider, last mile provider, or some combination of the two. Sherwood Broadband operates primarily as a middle mile provider. However, in some cases it does lease fiber directly to large businesses. Conversely, Ashland Fiber Network functions mostly as a last mile provider, with a small share of its business related to middle mile network services.

** Note: "Middle mile" and "last mile" provider can have different meanings within the telecom industry.*

It is recommended that cities consult their attorney while considering the type of provider a city will become. There are many legal requirements within the telecommunications business, which may differ depending on the type of provider. For more discussion of the potential legal issues regarding municipal broadband, refer to page 21.

Available Infrastructure

What infrastructure assets does a city already own that can be used to support a broadband network?

One effective cost-saving strategy for cities is to inventory assets that are already available, such as street lights, utility poles, buildings, conduits, etc. City-owned assets are easier and more affordable to access, however arrangements can be made to utilize other public and private sector infrastructure.

City Wired Network

Does a city have any broadband networks connecting its facilities? If so, is the network sufficient enough to provide broadband services at today's fast speeds, or are there ways to affordably upgrade the network? Ashland expanded a 12-mile fiber loop in order to build the complete Ashland Fiber Network. A wired city network could also be used to support a limited-area Wi-Fi network.

Portland's franchise agreements require telecommunications companies to install city-owned conduit while installing the providers' own conduit in the right-of-way. Over time, using this conduit and additional city resources, Portland was able to build a fiber network, IRNE (Integrated Regional Network Enterprise). This network connects many of the city's facilities and is interconnected to Comcast's Institutional Network, which reaches more than 270 regional public facilities throughout Multnomah County, including the following: the cities of Fairview, Gresham, Portland, Troutdale and Wood Village; Multnomah County; Tri-Met; Metro; schools; and libraries. The IRNE is not being used to provide commercial services.

Other Governmental Networks

Do any other governmental entities have their own network? If so, can such a network be utilized in the provision of the city's broadband services in *exchange* for free or discounted services?

Through an intergovernmental agreement, the Lebanon Community School District joined Lebanon's public/private partnership wireless network. The city combined its fiber and wireless infrastructure with the school district's fiber network. This provided the city with more fiber bandwidth for wireless services, and the school district is able to provide wireless services to all school facilities (see case study, page 34).

Private Network

Are there businesses or hospitals in town which have private wired networks connecting facilities? If so, can these private networks be utilized in exchange for free or discounted services?

Though the negotiations can be difficult, some cities have successfully negotiated agreements to lease bandwidth from local phone and cable company networks. If private infrastructure is vital to the delivery of broadband services, cities should consult with private providers before investing in a broadband project.

Long Haul Carriers

Are there "long-haul carrier" telecommunications providers that have fiber-optic cable running through a city, but do not provide services to the city? If so, can bandwidth be leased from the carrier's network? Because a long-haul carrier has infrastructure that is not used to provide local services and therefore is not generating revenue, this could be a mutually-beneficial arrangement for both parties. In some cases, the carrier may actually be paying a city franchise fee for the use of the right-of-way. More information on right-of-way franchises is available in the League of Oregon Cities' Telecommunications Tool Kit (see Resources section, page 42).

Street Lights and Utility Poles

Do cities own street lights or other utility poles that can be used to mount wireless access points across the city? Sandy owns most of the city street lights, which offers many site options for wireless access points (see case study, page 24).

City of Sandy

Some cities have successfully negotiated arrangements to mount wireless access points on private electric utility poles. Again, negotiations with private utilities can be difficult, so cities should talk with the local electric provider to see if an arrangement is feasible before moving forward with a broadband project.

Buildings and Towers

Are there city facilities, water towers or other facilities near the targeted area that could be used to install wireless access points? If a city is providing complimentary services, it may be best to minimize the up-front and ongoing costs. Cities could also use the building or tower of another entity under an agreement that is beneficial to both parties.

As mentioned earlier, the city of Tigard mounted wireless access points on city hall and parks facilities. The city also mounted an access point on the chamber of commerce building, which provides free Wi-Fi to all users within the downtown business area (see case study, page 36).

Other City Resources

As a city moves forward with a broadband project, it is important to consider all resources available to the city and assess how these resources can be used to support a new broadband service. For example, is there IT equipment that can be used to support or back up the

City of Ashland

broadband service equipment? Can electric utility bucket trucks be used to repair wireless access points? Creativity and ingenuity are crucial to the successful provision of public services.

Funding Options

How will a city pay for a municipal broadband network?

The financial resources needed to develop a broadband network depend on the size and type of network. The cities that built smaller networks did so with little or no debt, and ongoing costs are minimal. The city of Tigard spent $2,500 for the equipment needed to start up its free, limited area Wi-Fi network, and the ongoing cost is only about $145 per month (see case study, page 36).

The cities that have deployed fiber-optic loops and/or fiber-to-the-premise networks were able to fund these projects using various revenue sources. For more details on the costs for this type of project, see the case studies on page 23.

Loans and Other Debt

Many of the cities providing broadband services incurred debt in order to fund the project. Even if the utility does accrue debt, effective financial planning and an efficient business model can make the debt manageable. However, debt may also bring public scrutiny upon a newly-formed broadband utility.

MINET (an intergovernmental utility between the cities of Monmouth and Independence) obtained several smaller loans at the beginning of the project and then additional loans as funding was needed for expansion. However, in hindsight a better financial option would have been to acquire one larger loan and return any unused funds. Fortunately, the two cities were able to refinance MINET's debt with a full faith and credit bond. Currently MINET is facing an annual shortfall of about $600,000, but revenues are increasing; MINET projects it will be in the black within two years (see case study, page 30).

Grant Funding

Several cities have also used grants to help fund their broadband projects. The Oregon Business Development Department (OBDD) website contains information regarding state and federal grant funding for broadband projects. Even though grant funding through OBDD has not increased in recent years, some projects may be eligible for funding through the Special Public Works Fund.

Federal broadband grants were awarded through the American Recovery and Reinvestment Act. As reported by the Oregon Broadband Advisory Council (2010), more than $52 million was extended to Oregon-based broadband projects. See page 24 for more information on the city of Sandy and the other Oregon local government broadband projects that received ARRA funding. More federal funding is expected since broadband expansion is a federal priority.

General Fund Support

For most municipal broadband utilities, general fund revenues are not used to support broadband services. Instead, cities rely on subscriber revenue. In order to quell some public concern over the financing of a public broadband utility, the city of The Dalles and Wasco County promised there would be no ongoing general fund support (see case study, page 32).

Some municipal broadband projects did receive initial funding from the city general fund, and a few received general fund loans for smaller expansion projects. For example, Sherwood Broadband has received two general fund transfers, but the utility will repay these loans along with any other debt.

The discussion on financing should extend beyond the initial cost of building a network. Long-range financial planning is essential in order to ensure the viability of a municipal broadband service.

Maintenance & Operations

How will a city maintain and manage its broadband service?

Providing broadband services is more than just building the infrastructure or purchasing equipment. Cities must plan for the resources needed to maintain and manage broadband networks and services. This also applies to cities only providing a limited area Wi-Fi service.

For the broadband cities in Oregon, administrative options for maintenance and operations include the use of in-house staff and volunteers, contracted services, or a combination of the two.

City of Ashland

City Staff & Volunteers

If a city would like to handle maintenance and operations in-house, the level of service provided may dictate how much staff time is needed. Some of the municipal broadband networks have city staff assigned to the utility. Sherwood Broadband has two primary staff and two support staff. All these employees have other duties in the city's information technology department, but part of their work responsibility includes the maintenance of the Sherwood Broadband network. Time spent on Sherwood Broadband by these four staff members is equivalent to a half-time employee.

If cities are only providing a free Wi-Fi service, it is best if there is already staff available who have the time and skill to maintain the equipment. It is not cost-effective to hire new staff to maintain a free service. A city could also consider a contract for the provision of Wi-Fi services to the public (see Contract Services/Equipment section below).

Another cost-saving option is to use volunteers. A councilor in Yachats who was helping the city install a weather station at the treatment plant also suggested the city use this new infrastructure to provide free Wi-Fi services downtown. The councilor is now in charge of

network maintenance, which requires minimal time. There may be other volunteer partnership opportunities such as students in need of work experience or business owners hoping to reach out to the community.

It is important to note that current staff may have expertise in one area needed for the provision of broadband services, but not in another. For example, the information technology department can manage the servers and other IT equipment, but may not be able to handle the electrical work needed to repair a wireless access point.

Contract Services/Equipment

Several cities utilize contract services as a cost-effective method of providing broadband services. QLife is an intergovernmental utility that has no direct QLife employees. All of the work is contracted out, including the management of the utility by The Dalles' city manager (see case study, page 32).

Coos Bay chose to contract with a local telecom company for the provision of free Wi-Fi services to several locations around the city, including the downtown area and the library. The monthly cost of the service contract is affordable, although the city did have to purchase the needed start-up equipment (see case study, page 37).

City of Sandy

The city of Sandy has two general information technology staff members who provide network support to SandyNet. However, for the Wi-Fi services, the city leases its Wi-Fi equipment and is not responsible for equipment maintenance or repair. At the end of the lease the city can either purchase the equipment or upgrade to new equipment under a new lease (see case study, page 24).

As previously mentioned, Sherwood has four staff members supporting Sherwood Broadband which is the equivalent of a half-time employee. In addition, the city has a contract with an on-call network contractor who can respond to outages or other network issues that arise when city staff are not available (see case study, page 26).

Staying Competitive

If a city builds a state-of-the-art network now, can the city stay competitive in the future?

Competition requires multiple providers to offer more services at a lower price. If a city chooses to provide broadband services, its services must compete with other providers, including mega-corporations of the telecommunications industry.

Telecommunications is a rapidly changing industry, where private providers have the benefit of being "for-profit." When major upgrades are needed to stay competitive, private providers have more financial resources available and have access to newer technologies such as LTE. Private providers can target service areas they know are profitable, whereas the role of a city is not to make a profit, but to provide essential services to the community in the most cost-effective

manner. Creating more broadband service competition can be a community benefit, but if a city cannot continue to compete with private sector services or prices, it may be difficult for the broadband utility to thrive.

The city of Cascade Locks has been running a cable utility since 1970. As satellite TV began to penetrate the market, the city began losing cable customers. The city made some upgrades to the network and then introduced its data service, which has helped customer retention. At that time, the city's broadband network was the premier service in town. Currently, some of the private providers have surpassed the city's service levels and the city is not in the financial position to make additional upgrades.

Furthermore, while city broadband services are subject to laws affecting private telecom and cable providers, cities are subject to additional laws as a governmental entity. This could put cities at a competitive disadvantage. For example, the voters in Cascade Locks approved a charter amendment requiring voter approval for city fee increases. The city's cable and data service rates are included in this requirement. As cable programming prices increase, the city is not able to increase its cable rates without voter approval and now loses more than $2 per HBO account. Fortunately, Cascade Locks' utility is well established, has no debt, and is not facing a fiercely competitive market. Even though the city is seeing a decline in revenues, the broadband service it provides is more affordable than most other providers and therefore is seen as a valued service to many citizens.

Political Opposition

Cities moving forward with a municipal broadband network could face political opposition from private providers. The goal of the opposition is to prevent and/or abolish city broadband utilities, and its efforts range from the threat of counter action to actual legislative and legal efforts. The Community Broadband Networks website provides information on state preemptions as well as opposition to specific municipal broadband networks (see Resources section, page 42).

Local Preemption

Oregon State Capitol

At the federal level, telecommunications industry lobbyists and politicians have made efforts to pass legislation that would prohibit local government authority to provide broadband services. While these efforts have not been successful, several states have passed preemptions on local government broadband services.

Currently in Oregon there are no state preemptions on municipal broadband services. However, there have been unsuccessful legislative efforts to prohibit or limit local government authority. Authorities in telecommunications law and politics warn local governments that similar attempts could be made in the future. Cities that are considering a municipal broadband service, or that currently have one, should closely monitor both federal and state legislative efforts.

Local Opposition

In 2001, The Dalles and its broadband partners experienced political opposition as the QLife network proposal developed. Originally, the partnership was going to include the city, county, the port and the local People's Utility District (PUD). As the partnership progressed, the local telecom provider launched a campaign against the proposed broadband network and a lawsuit was filed against the PUD. Eventually the port and the PUD bowed out of the partnership; however, the city and the county moved forward. In response to the negative campaign launched against the proposed broadband network, the city and county changed the model and promised no ongoing public subsidies would be paid to the network.

As reported on the Community Broadband Networks website, other cities around the country have faced similar opposition to their municipal broadband networks. Recently, two cities in Minnesota, Silver Bay and Two Harbors, received letters from the local telecom provider stating that the company disagreed with a claim made in the city intergovernmental agreement. The company asserted that the agreement claimed the municipal broadband network was necessary because there were no other broadband providers in the area. The letter noted that this false claim was a legal liability to the revenue bonds and other funding the cities had received. In actuality, the telecom provider had not read the final revision of the agreement, and furthermore any claim that there were no other providers was not a condition of the funding sources. However, misinformation can be politically damaging when working with a constituency that may be cautious about a public broadband network.

Legal Authority, Restrictions & Requirements

If a city chooses to pursue a municipal broadband network, several legal issues must be considered. Due to the unique nature of telecommunications, the following information is not a complete list of legal issues and cities should consult their attorney when pursuing a municipal broadband project.

Authority & Local Restrictions

Oregon is a home rule state, giving cities broad authority to act according to the language in their charters, unless federal or state law preempts local authority. Currently there are no laws restricting the ability of cities to provide broadband services in Oregon. However, there have been efforts at both the state and federal levels to restrict this authority.

Most Oregon cities have adopted home rule charters with "broad" powers that would allow the city to provide broadband services as long as there is no specific restriction in the charter. To confirm a city's authority to provide broadband, a city must first have its charter reviewed by legal counsel.

In addition to city charters, there may be other local restrictions affecting the ability of cities to create broadband networks. Therefore, it is important for cities to take inventory of any additional local restrictions such as pole attachment agreements, franchise agreements, bond

restrictions, ordinances, resolutions and/or contracts. These restrictions could be implicit or explicit, and these documents should be reviewed by legal counsel.

Charters, ordinances and other legal documents could also limit how cities operate and manage their broadband services. For example, if a city's charter contains a voter approval provision for any utility rate increase, a city should analyze the impact of this type of charter provision on the broadband services that the city may provide.

Despite the fact that most Oregon cities retain authority to provide municipal broadband services, there are, of course, other legal issues that a city should keep in mind when considering a municipal broadband network.

The Communications Assistance for Law Enforcement Act

The Communications Assistance for Law Enforcement Act (CALEA) requires telecommunications carriers and equipment manufacturers to modify and design equipment, facilities and services to ensure that built-in surveillance capabilities allow law enforcement and federal agencies to monitor all telephone, Internet (including emails) and VoIP traffic in real-time.

CALEA became effective in 1995, thus new commercial systems that a city might purchase should be CALEA compliant. A city providing broadband services will need to make sure that it complies with any other CALEA requirements. A city could contract with a third party that provides data to law enforcement agencies in the required format.

The Federal Communications Commission (FCC) has interpreted CALEA to include broadband providers not offering voice services. Thus, an Internet-only provider would be subject to CALEA. The CALEA requirements may shape the decisions a city makes in regards to broadband services, so for more information on CALEA see the Resources section on page 42.

Risk Management

The different business models demonstrated in this report may subject cities to a broad range of liabilities (see page 10 for more information on the different types of service models). Therefore, it is appropriate to consider not only the cost benefits of the different service models, but also the potential risks. Furthermore, grant or loan funding could also result in various financial and legal requirements which a city is then obligated to fulfill.

Another risk management consideration could be related to the type of services that a city provides. For example, if a city provides free Wi-Fi, it may want to adopt terms of use and privacy policies. These policies should establish that a city is not responsible for issues related to lost data or interrupted service. Additionally, city policies should establish that free Wi-Fi may only be used for legal, personal activities and are not for resale to another party. These types of policies can prevent claims against cities or be used to defend cities should such claims arise. However, such a policy could have free speech implications, so legal consultation is recommended.

Oregon Municipal Broadband – Case Studies

In today's digital society, high-speed broadband services are vital to local economic development and are in high demand with the general public and business community. The main purpose of a city is to provide essential services to a community. Due to insufficient services provided by private utilities, some cities have classified broadband as "essential" and have chosen to add broadband to the list of city services.

The following section examines several Oregon cities that provide broadband services. These case studies highlight the various roles and business models discussed in this report. They focus on cities that have led the way in municipal broadband; however, cities must still consider all of the policy and legal questions and determine what role they should play in the provision of broadband services.

This report only provides a general overview for the following Oregon municipal broadband networks and services. Additional information on any of the case study cities can be obtained by contacting the League of Oregon Cities.

City Utilities

- City of Sandy: city-owned broadband network (DSL, Wi-Fi, and fiber) (page 24)
- City of Sherwood: city-owned fiber-optic broadband network (page 26)
- City of Cottage Grove: city-owned fiber-optic network; public/private partnership for free and for-fee wireless services (page 28)

Intergovernmental Partnerships

- Cities of Monmouth & Independence: partnership for a fiber-optic broadband network (page 30)
- City of The Dalles: partnership for a fiber-optic broadband network (page 32)

Public/Private Partnerships

- City of Lebanon & Peak Internet: Partnership for free and for-fee wireless services (page 34)
- See Also: city of Cottage Grove (under city utilities - page 28)

Free City Wi-Fi Services

- City of Tigard: city provides free Wi-Fi at certain city facilities and parks (page 36)
- City of Coos Bay: city contracts with private provider for free Wi-Fi at certain locations (page 37)
- Other City Wi-Fi Networks (page 37)

Other Broadband Projects

- Other Local Government Networks (page 38)

City of Sandy

City Broadband Services

Network Type: DSL, Wireless & Fiber Networks

Service Type: Internet Service Provider

City Role: City Broadband Utility

Coverage: Citywide

Start Date: 2003

Needs Assessment & Planning

In 2001, the only Internet option for the city of Sandy was dial-up, even though the need and desire for faster services existed.

The city decided to take the initiative in solving its broadband issues by hiring a consultant to analyze the options for a city broadband utility. The consultant recommended a digital subscriber line (DSL) network as a simple, cost-effective method to deploy high-speed Internet services. Despite the fact that DSL has historically been a slower service than cable modem Internet, the belief was that these speeds would be a substantial improvement over dial-up Internet, and sufficient for local residents and small/home-based businesses. As plans moved forward, the public perception of a municipal broadband utility was very positive.

Implementation & Administration

Later in 2001, the city council approved an ordinance establishing SandyNet, a municipal broadband utility which operates under its own enterprise fund. Despite having the option to provide voice, video and data, Sandy chose to only provide data services to its customers.

The city council also created a SandyNet Advisory Board to assist the city on decisions regarding broadband services. This board is appointed by the council and consists of members of the public, including some local business owners.

It only cost the city $150,000 to activate the major parts of the city with DSL services. Although the technology is fairly simple, the city found it difficult to coordinate with the local phone company regarding the city's use of the private network. The company was legally bound to respond, but there were no requirements on compliance deadlines.

At that time, DSL was an effective and affordable method for bringing high-speed Internet services to the city of Sandy. The utility's business model is to expand the network when a demand is demonstrated and there is subscriber revenue available to fund the expansion. This successful business model resulted in SandyNet being debt free within six years, and the utility continues to be financially stable. There are no ongoing general fund contributions to the SandyNet enterprise fund.

Even though DSL was the initial service provided by SandyNet, most of the network's recent expansions have been made using Wi-Fi technology. Wi-Fi is affordable to deploy and can provide faster speeds than other wired broadband services, including DSL. Currently, the city's Wi-Fi download speeds are approximately 10 megabits per second (Mbps), which is comparable to cable Internet speeds.

The topographic layout of Sandy makes it difficult to deploy Wi-Fi citywide, so DSL is still available through SandyNet. The city hopes that in the next few years Wi-Fi technology will advance, allowing Wi-Fi coverage for all areas and a full phase out of the DSL service.

SandyNet has laid fiber within the main business core and is currently studying the feasibility of expanding a fiber network to new subdivisions.

In order to provide the "middle mile" connection to the Internet, the city leases space on the local cable provider's fiber network. In the future, this connection will be provided through a federally-funded county fiber-ring (See Clackamas County case study on page 38).

The city leases the Wi-Fi equipment. At the end of the lease the city either owns the equipment or can acquire the latest devices through a new lease. Under the lease, the city is not responsible for the maintenance, repair or replacement of the equipment. The city has found this to be a cost-effective approach to equipment management. Most of the Wi-Fi access points are mounted on city-owned street lights, with a few located on roof tops and towers.

For utility operations, there are no staff members exclusively designated to SandyNet. Two staff members provide support to SandyNet, but they also serve as the city's general information technology (IT) department.

Results & Benefits

In the last few years, cable modem Internet was introduced to Sandy residents, however many customers are still satisfied with the Wi-Fi and DSL services provided by the city. SandyNet's rates are $19.95 per month for residential services of 10 Mbps download speeds, and $175 per month for commercial fiber services with speeds up to 80 Mbps. There are approximately 600 SandyNet customers, equal to 20 percent of the local market.

SandyNet has been a successful economic development tool for the city. Its services support a local business which writes technical manuals for corporate aircraft. This business needs to upload and download large documents, and the city's fiber-optic services have met this need.

Furthermore, the city expanded its network outside of the city and up to the Resort at the Mountain. This expansion allowed the resort to recruit more high-tech conferences. The success of the resort means more jobs for Sandy-area residents and more tourists visiting Sandy stores and restaurants.

The city initially created SandyNet to bring higher speed Internet services to residents and businesses, however the city has also found many cost-effective uses for government business. The city uses the Wi-Fi network for police department e-ticketing, security cameras at city parks, and "smart" water meter reading. With the SandyNet fiber connecting all city facilities, the city was able to switch to VoIP telephone services, saving approximately $1,500 per month.

Since SandyNet began, the city council has been faced with many decisions about the future direction of the utility. The city always uses these opportunities to evaluate the utility and the services it provides. The city of Sandy received a $750,000 United States Department of Agriculture (USDA) stimulus grant to expand wireless Internet to the rural areas surrounding the city. To this day, the public perception of SandyNet is still very positive, and the community is supportive of the city's efforts to expand its Wi-Fi and fiber network.

City of Sherwood

City Broadband Services

Network Type: City-Owned Fiber Network (Limited Area Wireless Network)

Service Type: Middle/Last Mile Provider (Wi-Fi Services)

City Role: City Broadband Utility

Coverage: City of Sherwood & Neighboring City

Start Date: 2005

Needs Assessment & Planning

In 2000, Sherwood was experiencing rapid growth, mostly through residential development. The only broadband service provided was the phone company's DSL service, which at the time met the need of most residential users, but was not ideal for business recruitment. By 2001, the city of Sherwood decided it needed to develop a fiber-optic broadband network in order to facilitate more business growth. After extensive discussion and the completion of feasibility studies, the city council, acting as the urban renewal agency board, approved a resolution authorizing $300,000 to create the city utility Sherwood Broadband.

Implementation & Administration

Of the initial $300,000 expenditure, $250,000 was used to connect Sherwood to a large fiber network in downtown Portland. The remaining $50,000 was spent on capital equipment.

In 2004, Sherwood began laying fiber all around the city. Since the primary focus of the project was business development, the city started construction in the downtown area, and this portion of the project was funded by the urban renewal district. The city then continued the expansion, bringing fiber-to-the-premise citywide. In 2005, the city decided to expand the network outside of city boundaries into the neighboring city of Newberg. This decision to expand the network paid off, and several of the utility's biggest customers are currently located in Newberg.

Sherwood Broadband is generally a "middle mile" provider, meaning the utility owns and manages the network but leases network space to other vendors, who in turn provide services directly to the customer. A few larger companies lease fiber for their own use.

In order to fund the construction and expansion of the Sherwood Broadband Network, the city accrued approximately $1.25 million in debt. Sherwood Broadband is revenue positive, and the city has a plan to repay this financial obligation. To help keep operational costs down and eliminate the need for additional debt, the current business plan is for no further expansions of the network outside of the city, to expand only with new development, and to maintain the existing network. However, the city can deviate from this business model with city council approval.

For operations and administration, the city of Sherwood has four employees in the information technology department whose job descriptions include assistance to Sherwood Broadband. The staff time spent maintaining Sherwood Broadband equates to approximately one half-time employee. In the case of outages, which only occur a few times a year, if at all, one of the city staff responds to the incident. If city staff is not available, an on-call network contractor responds. If there are no outages or major network repairs needed, ongoing maintenance of the broadband utility is approximately $50,000 to $60,000 per year.

Around the same time Sherwood Broadband launched its network, the local cable company decided to deploy their broadband service. Because the city is not providing services directly to the customer, there is no direct competition between the city and the cable company. However, there is now one more service option for local businesses and residents.

Results & Benefits

Just when the broadband utility had hit full momentum, the current economic recession set in and at least one prospective business that was considering locating to Sherwood put their expansion plans on hold. However, the city is still confident that as the economy recovers, Sherwood Broadband will play a vital role in the city's economic development efforts.

Having a city-owned broadband network has also allowed Sherwood to provide other benefits to the community. For instance, all the school facilities are now connected to Sherwood Broadband. The school district covered a small portion of the expenses needed to connect all the schools, and there is now an improved communication network between school facilities.

In addition, Sherwood's broadband network allows the city to provide free Wi-Fi services at 10 locations around the city. Because the city owns the wired network and does not need to lease network space from a private provider, the cost to provide these free Wi-Fi services is minimal. The Wi-Fi hotspots are located in areas such as downtown (on city facilities such as city hall), the YMCA, senior center, a major park, the public works facility, and the police department. The city is hoping to eventually provide free Wi-Fi at all the city parks.

Negative public feedback was minimal when the utility was first being discussed. The public is still satisfied with the benefits Sherwood Broadband has provided to the community, including more competition, leading to a better choice of services at a more affordable price. Sherwood Broadband is considered an essential service to the community, just like any other service or infrastructure. With the utility in a sound financial position and the adoption of a conservative business plan, Sherwood Broadband should continue to be successful, and the community will continue to see the rewards.

City of Cottage Grove

City Broadband Services

Network Type: Fiber Network; Wireless Network

Service Type: Fiber services to key institutions; Public Wi-Fi services.

City Role: City manages the fiber-optic network; Partnership with an ISP to provide free and subscription Wi-Fi services.

Coverage: 1 fiber loop and 80% Wi-Fi coverage in Cottage Grove; 1 fiber loop in Creswell.

Start Date: 2008

Needs Assessment & Planning

In 2005, there was no cable Internet service and limited DSL services within the city of Cottage Grove, which left the schools and other key stakeholders with few options for a vital service.

The Cottage Grove City Council set a goal to connect local schools to a high-speed fiber network. Since the private providers had no interest in offering this service, the city considered a municipal broadband network.

Implementation & Administration

The city leased two strands of fiber-optic cable from the Regional Fiber Consortium, an ORS 190 organization which includes cities, counties and other public entities. The city's fiber backbone starts in Eugene, runs through Creswell and ends in Cottage Grove. To connect schools, city hall, and other government agencies, the city built a complete fiber loop and a second fiber line (partial loop) in Cottage Grove. The city also built a fiber line (partial loop) in nearby Creswell, which connects key institutions such as schools and city hall.

The cost to construct this broadband network was approximately $2.5 million. The South Lane School District and the Lane Education Service District made a combined contribution of $300,000. At that time, the ruling in *Qwest Corp. v. City of Portland* was being appealed and the city was saving its Qwest franchise fees and settlement payments in case a subsequent ruling required the city to return the funds. When the decision was finalized, the city had roughly $700,000 to help fund the broadband project. Additional funds were secured through a bank loan. To prevent future debt, the city plans to expand the network and related services only when the funds are available.

As the fiber-optic network was launched, it became clear to the city that there was a need and demand for residential broadband services. However, the newly-built fiber-optic loop did not bring fiber-to-the-premise, so the city decided to utilize Wi-Fi as an affordable means to cover the city with faster services.

The city entered into a $500,000 lease/purchase agreement for more than 100 radios, and has placed most of them in locations that cover 80 percent of the city. In partnership with the local Internet service provider OIP Earthclick, the city is providing free and subscription Wi-Fi services. The city purchases the equipment while OIP handles the maintenance and customer service. The city has several Wi-Fi service tiers, starting with 10 hours of free Internet at 128 Kilobits per second (Kbps) upload and download speeds. The top service tier is $50 for unlimited time and unlimited speed (over 7 Mbps). Currently the city has 800 subscribers, including 250 paying customers.

Results & Benefits

Through this broadband project, the city of Cottage Grove met its goal of connecting all area schools to high-speed broadband services. Before the South Lane School District (SLSD) was connected to the city's fiber network, the district was using a 10 Mbps network connection to conduct business with the Lane Education Service District (ESD) in Eugene. With the city's network, SLSD is currently utilizing a 1 gigabit per second (1,000 Mbps) connection to the ESD. The nine schools within SLSD are connected through a 1.5 Mbps, district use-only network. Six of the school facilities are even benefiting from 1 Gbps connection speeds between schools. The schools are also able to have direct phone access to each classroom, a significant benefit to classroom safety. The affordability and efficient connectivity of the city's fiber network has provided a needed benefit to the local school district.

Schools and residents in the city of Creswell are also benefiting from the fiber network built by Cottage Grove. The school facilities in Creswell, including the district office, middle school and high school, are also connected to Lane ESD with faster speeds. Furthermore, the city of Cottage Grove was able to lease dark fiber and rack space to the local incumbent telecommunications provider in Creswell. This arrangement will hopefully bring more opportunities for faster, affordable telecommunications services to Creswell citywide.

The city plans to install a third broadband fiber loop in Cottage Grove which would pass by several major businesses, as well as extend the network out to the hospital and wastewater treatment facility. One local business, which primarily conducts sales by phone and the Internet, is very interested in this third loop which would connect two of the business's local facilities.

The demand for Wi-Fi services also illustrates a need for residential broadband services. Though the city's Wi-Fi services cover most of the city, many of the residents that are not currently in the city's coverage area are eager to see the city expand this service.

As funds become available, the city is hoping to expand the fiber-optic network and Wi-Fi services. However, the city also hopes that other Internet service providers will lease space off of the fiber network, thereby creating more service options for local residents and providing revenue sources for the city broadband network.

Cities of Monmouth and Independence

City Broadband Services

Network Type: Intergovernmental Fiber Network

Service Type: "Triple-Play" voice, video & data

City Role: Intergovernmental Partners

Coverage: Citywide (both cities)

Start Date: 2006

Needs Assessment & Planning

In 1999, the cities of Monmouth and Independence asked their local cable company when high-speed Internet would be introduced to the cities. The cities were told services would be available no sooner than 2020. With the new millennium approaching, both cities realized that to be economically viable, high-speed Internet services were desperately needed.

Accordingly, the two cities conducted a feasibility study regarding an intergovernmental broadband network. This study also included a public survey, which showed that the citizens of Monmouth and Independence were receptive to the idea of a municipal broadband utility. Furthermore, a major client was eager to receive better telecommunications services, Western Oregon University. These and other factors illustrated to the two city councils that a municipal broadband utility was a viable and necessary project.

Implementation & Administration

In 2002, MINET (Monmouth-Independence Network) was created and in 2004 the two cities approved an ORS 190 intergovernmental agreement, establishing that MINET would be governed by a six-member board of directors, including the city manager, a councilor and a citizen from each city. MINET is now a licensed Competitive Local Exchange Carrier (CLEC) under the Oregon Public Utilities Commission (PUC) and can operate statewide. However, the network is currently operating only within the Monmouth/Independence city limits.

The first phase of the project was to build the primary fiber loops in Monmouth and Independence. Phase two, full fiber-to-the premise in both cities, was completed in 2006. MINET began providing broadband services to customers later that year.

The cost for phase one (primary loops within both cities), was approximately $1.45 million. From 2005 to 2008, MINET took out an additional loan of $27 million for the fiber-to-the-premise expansion.

MINET obtained several smaller loans at the beginning of the project and then additional loans as funding was needed for expansion. However, in hindsight a better financial option would have been to acquire one larger loan and return any unused funds. Fortunately, the two cities were able to refinance $17 million of MINET's debt with a full faith and credit bond. Currently MINET is facing an annual shortfall of about $600,000, but with each passing year the utility sees increasing revenues. MINET projects it will be in the black within two years. Since MINET has already brought fiber-to-the-premise throughout both cities, the only network expansion that is expected is for new development, which is considerably less expensive to install than in developed areas.

MINET spends little revenue on marketing, though it actively promotes services through advertisements on the MINET video service, the local newspaper and city utility billing flyers. Occasionally the utility does embark on a door-to-door campaign. Despite the nominal revenue spent on marketing, the utility's subscriber revenue has been growing at a healthy pace over the last three years. MINET holds a 46 percent penetration rate in the local market, and expects it to rise to 60 percent by 2014.

The utility's Internet services run from download speeds of 5 megabits per second (Mbps) to 100 Mbps. The basic Internet package price to a residential user is $30 per month and offers 5 Mbps download and 1.5 Mbps uploads speeds. MINET monitors network traffic and service speeds to ensure that customers receive the advertised speeds. In comparison, Qwest's DSL services run $40 a month for up to 7 Mbps download and 768 kilobits per second (Kbps) upload, though services could be slower depending on location and customer traffic.

MINET's basic "triple-play" package (voice, video and data) costs $94 per month and includes the basic Internet package, 100 video channels, and basic telephone services (e.g. local and long-distance calls).

Results & Benefits

The goals of the MINET utility are:
1) To provide affordable, state-of-the-art broadband services;
2) To be an economic development partner and help recruit businesses by offering creative, customized service solutions; and
3) To be financially stable, with debt service and operation costs being paid exclusively from subscriber revenue.

Among the major successes for MINET has been the utility's ability to provide excellent service with a small staff due to a network of highly automated systems for network management and billing. MINET works diligently to ensure that they provide cutting-edge services at competitive speeds and prices.

MINET has also been successful as a partner with businesses. Western Oregon University has been very pleased with the cost and level of services it receives through MINET. This service has also made Monmouth and Independence an attractive location for telecommuters. MINET also showed its ingenuity in business service solutions by creating a state-of-the-art, redundant broadband service package for the new Independence City Hall that is both highly efficient and cost effective for the city.

Finally, the utility is on the right track for financial stability. With subscriber revenue climbing at a healthy pace, the utility projects to be in the black within two years. MINET does not envision any regular general fund contributions from either city.

As an intergovernmental utility, MINET is an important public service to the community. It provides support to the local PEG channel and gives free advertising space to local businesses within the utility's billing notices. It also helps local businesses create TV advertisements, which run on the MINET video service. The utility has exceeded the expectations of the two cities and will continue to be a vital service provided by the partnership of Monmouth and Independence.

City of The Dalles

City Broadband Services

Network Type: Fiber Network

Service Type: Middle Mile Provider

City Role: Intergovernmental Partner with Wasco County

Coverage: 17-mile loop around most of the city

Start Date: 2004

Needs Assessment & Planning

In 2001, The Dalles was in need of affordable high-speed broadband services. The local provider told the city it would be 5 to 10 years before broadband services would be available within city limits. During this time, a business that was considering locating to The Dalles decided to locate in another city because of the affordability and speed of available broadband services.

Meanwhile, local schools and the community college were also in need of more broadband service options. The Dalles needed urban broadband services at urban prices, and they needed it right away. In an effort to meet these needs, a partnership was formed between the city of The Dalles, Wasco County, the port of The Dalles and the local People's Utility District (PUD). The goal was to create a broadband network to provide affordable, high-speed broadband services to local agencies (such as schools, colleges and the regional hospital) and to recruit businesses.

As the partnership progressed, a local telecom provider launched a campaign against the proposed broadband network. After a lawsuit was filed against the PUD, the port and the PUD bowed out of the partnership. However, the city and the county moved forward, changing the model in response to the negative campaign. In the new model, phases of the project were built only after subscriber revenue could cover the monthly cost of any loan payments incurred. This allowed the city and county to promise that no ongoing public subsidies would be paid to the network. The new model alleviated enough public concern that in 2002 the city and county were able to begin building the fiber-optic broadband network. The final construction phase ended in 2003, and the end result was the QLife Network, a 17-mile fiber loop intergovernmental broadband utility.

Implementation & Administration

The QLife Broadband Network was officially created by an intergovernmental agreement between the city of The Dalles and Wasco County. The utility is governed by a board of directors appointed by the city and county. The utility is managed and supported by the city through a contractual agreement. In fact, the QLife network is a 100 percent contract entity that has no direct QLife employees. In addition to a contract with the city, there are two contracts with Internet providers for network management. There are also contracts for an attorney, engineer services, and plant management and maintenance. Contract GIS services are provided by the county.

QLife is a middle mile provider that leases space on the fiber network to other vendors who offer commercial broadband services directly to the customer. The only "end-users" who use the network directly are local government agencies (city, county, schools and community college).

Approximately 50 percent of the initial funding for the QLife Network consisted of federal and state grants, while 50 percent came from loans with a one-time public subsidy of $10,000. The

total cost for the 17-mile fiber loop was $1.8 million. QLife expects this debt to be paid off by June 2018. As promised, there have been no public subsidies from either the city or the county.

A major success of QLife has been the utility's revenue model. The utility does not expand services unless there is revenue to cover expenses – both for construction and ongoing maintenance. The utility does not build out to a new area unless a need or interest is demonstrated. QLife also works to complement existing services from private providers rather than compete with them.

QLife earns about $500,000 per year. Approximately $180,000 is applied towards system operations, $190,000 is used to retire the accumulated debt, and the remaining revenue is used at the board's discretion for reserves, contingencies or projects identified as best for the network or the community.

QLife did face a potential financial setback when a private partner went bankrupt and left the city with an $800,000 loan. Fortunately, the company reorganized and agreed to a payment arrangement with QLife. Both entities use a portion of their revenue to pay off the loan. The company's revenue comes from the services they provide using the QLife network, and QLife uses the revenue from the company's lease. Had this provider been unwilling to cooperate, Qlife would have faced a huge setback in its financial debt repayment plan.

Results & Benefits

QLife has been a tremendous economic development tool. In 2005, a shovel-ready site, affordable electricity and the QLife Network services helped attract Google, which located a new facility in The Dalles and created 150 new local jobs within one year.

In addition, QLife has experienced some unexpected revenues. There is a QLife facility in city hall which houses the QLife Network equipment and servers. Other providers lease space from this rack to house their equipment, and the resulting revenue makes up one third of QLife's annual total.

The local cable provider eventually introduced its broadband service to the area, but QLife has allowed other providers to enter the market, thereby increasing the level of service and decreasing the cost through competition. As a middle mile provider, QLife does not actively advertise for users of the network. QLife provides services over the fiber-optic network to seven local government organizations (including all schools and the community college), the State of Oregon, the regional medical center and affiliated medical offices, seven telecom and Internet service providers, and a Google Data Center.

QLife and Google plan to partner to provide free Wi-Fi access downtown by the summer of 2011. All of these efforts are added benefits to the local community and the public perception of QLife is very positive. Currently, QLife is exceeding the goals and expectations that were originally envisioned and local government agencies are all receiving excellent services at affordable prices.

City of Lebanon

City Broadband Services

Network Type: Wireless Network

Service Type: Free/Subscription Wi-Fi Services

City Role: Partnership with ISP

Coverage: City-wide

Start Date: 2005

Needs Assessment & Planning

In 2004, Lebanon was looking to bring high-speed wireless to its police patrol cars and public works vehicles. Available cellular phone service consisted of voice, but no data/Internet service for "smart" phones.

As the city began looking to improve its wireless network, it coordinated with other Wi-Fi network owners to ensure all networks would be compatible. From these discussions, a partnership began between the city of Lebanon and Peak Internet. The city proposed to create a wireless network with a capacity far beyond what it needed for its patrol and public works vehicles. With no affordable high-speed Internet options in the city, Lebanon and Peak decided to provide Wi-Fi to the public – both free and extended subscription services. Not only would this be an excellent service for residents, but a vital service for businesses and economic development. Even though no similar partnership existed, the city decided to move forward with the project.

Implementation & Administration

The contract between the city and Peak directed that the city purchase the start-up equipment and that both parties install the equipment. The city was not interested in starting a utility and dealing with the issues that are unique to Internet services (customer support, federal regulations, etc.). As an Internet provider, Peak was already equipped to handle the management of an Internet utility and was therefore designated as the manager of the wireless network. The city replaces any equipment that fails on the main network, and Peak is responsible for the repair of failed equipment on a customer's premise.

The Lebanon City Council approved $100,000 for the start-up equipment, including 80 wireless access points to cover the entire city, and the Wi-Fi network launched in 2005. Anyone can use the wireless services free of charge for up to 10 hours per month. If residents or businesses want more time, a subscription from Peak can be purchased with the base rate of $19.95 per month. This is an affordable option compared to $50-60 being charged by the local phone and cable company companies for broadband services.

The city did not incur any debt with this project. The total contribution to date has been approximately $135,000. The city receives a "kick-back" of 6 percent for any subscription that Peak acquires. The ongoing expenses run about $5,000 per year, including a fee for the electric utility pole attachments and a maintenance fee with the equipment provider.

Through an intergovernmental agreement, the Lebanon Community School District joined Lebanon's public/private network, combining the city's fiber and wireless infrastructure with the school district's fiber network. This provided the city with more fiber bandwidth for wireless services, and the school district is able to provide wireless services to all school facilities.

Results & Benefits

Among its other uses for the wireless network, the city connected its water treatment plant to the network, which brought wireless broadband services to an unserved, remote area. This also enhanced communication between the water treatment plant and other city facilities. The wireless network has also saved the city money by reducing the need for commercial telecom services.

The public perception of the city/Peak service was very positive when it was first proposed, and it is still considered a beneficial service. Not only did it help facilitate competition in the local broadband market, thereby bringing down the cost of wired high-speed Internet access, it also has been used to help recruit businesses to the city. In the last few years, Western University of Health Sciences built a new campus in Lebanon. Although the wireless network was not the only reason the university decided to locate to Lebanon, it was a positive factor in the decision.

Over the last five years, the local phone company has brought down their prices for DSL, and in some areas of the city the speeds are faster than the Peak wireless services. The city has noticed a decline in the number of Peak subscriptions; however, the free access is still popular. Even though subscriptions are declining, and therefore so are the city's "kick-backs," the city still feels this is a valuable service to residents and is worth the small ongoing cost.

City of Tigard

City Broadband Services

Network Type: Wireless Network

Service Type: Free Wi-Fi Services

City Role: City provides services through wireless access points

Coverage: Parks, Downtown, City Hall

Start Date: 2008

Needs Assessment & Planning

The city of Tigard's Wi-Fi network provides free services to targeted areas within the city, including parks, the downtown area and city hall.

The idea of a free Wi-Fi network was first discussed by city staff in response to an increasing demand by local citizens. The goal was to provide a free service without the need for additional staff. Meraki, a new technology utilized by the city, allowed for the creation of a mesh network without the reconfiguration of any existing city Wi-Fi networks. Because of the small price tag, city staff made the decision to launch a free Wi-Fi network.

Implementation & Administration

The initial pilot project, which cost less than $500, allowed the city to test the equipment. The city was pleased with the service provided and the low maintenance needs of the devices. The city then decided to expand services to other targeted areas. The total cost of implementing the Wi-Fi network was less than $2,500. The city used funding allocated for unanticipated projects, leaving no debt associated with this project.

The affordability of this project is due in part to the strategic placement of access points on city facilities such as city hall and the facilities of interested parties. Under an agreement with the chamber of commerce, the city mounted a wireless access point on the chamber's building, which then provides free Wi-Fi to all users within the downtown business area.

Three Wi-Fi connections cover several key locations around the city. Internet speeds vary depending on how far away users are from the primary device. The city uses its information technology (IT) staff to respond to any network problems, but the ongoing maintenance since installation has been minimal – an average of $145 per month.

Results & Benefits

The wireless devices used by the city of Tigard are very flexible, which has provided some additional benefits to the city. For example, Internet access was needed at the Tigard Balloon Festival, and within hours the city was able to temporarily redirect Wi-Fi to the festival location.

Another city benefit is the availability of the Wi-Fi network to serve as a back-up for the city's emergency operations center. The city can also promote itself by directing the free Wi-Fi users to the city's website from the log-in page.

Internet speeds vary depending on how far away users are from the primary device. Despite this issue, city staff believe this free Wi-Fi service is a successful project, and public utilization rates seem to reflect this opinion.

City of Coos Bay

In 2008, the city of Coos Bay began offering free Wi-Fi to the library and downtown area. Rather than directly providing the services, the city contracts with ORCA, a competitive local exchange carrier (CLEC), which then provides the wireless services. The free Wi-Fi is part of a larger contract for services provided to the city, though the city purchased the start-up equipment.

City Broadband Services

Network Type: Limited Area Wireless Network

Service Type: Free Wi-Fi Services

City Role: City pays a local CLEC to provide services by contract

Coverage: Downtown & Library

Start Date: 2008

The city pays $940 per month for ORCA to provide Wi-Fi to city hall and several city facilities including fire stations, parks and city shops. These services are not free to the public; use of the Wi-Fi at these sites must be approved by the city.

The city also pays $130 per month for free public Wi-Fi in the downtown area and $103 for services to the library. Public use is limited to one hour per day. The downtown area includes some of the major tourist sites, including the visitors' center and the art museum.

Because it is paying ORCA to provide the service, the city is not responsible for customer service or maintenance of the network. This arrangement has proven to be very cost-effective to the city and has been a valued service to the community.

Other City Wi-Fi Networks

As the demand for broadband services on-the-go increases, more cities are providing free Wi-Fi services at key locations. In addition to the free Wi-Fi services provided by municipal broadband utilities, there are other cities that are using the ease and affordability of Wi-Fi to provide free services. Other cities may be providing Wi-Fi, but are not listed in this report.

One of the most popular locations to provide free Wi-Fi is in the downtown business corridor. This city service also helps support local businesses. Astoria and Yachats provide free services downtown, and Eugene has a hot-spot in the downtown blocks that include its Saturday Market.

Other popular Wi-Fi "hot-spots" are recreation areas. Astoria provides Wi-Fi at its aquatic center. Eugene has Wi-Fi at three swimming pools, seven community centers and at the Hult Center for the Performing Arts. Salem provides Wi-Fi to its Senior Center and Center 50+. Oregon City recently began providing Wi-Fi at the city community center and swimming pool.

To help facilitate learning, some cities, including Astoria, Corvallis, Eugene, Hillsboro, Oregon City, Salem and Springfield, have created wireless networks at library facilities.

Several cities have Wi-Fi at city administrative buildings, such as city hall, and have made this service free to citizens as an added benefit. If a city is buying and maintaining equipment for a city network, it takes minimal resources to extend that service to members of the public who are using city facilities. Eugene, Hillsboro, Oregon City, Salem and Springfield provide Wi-Fi at city hall or a civic center. Eugene also has free services at its planning department.

Though many cities do not have airports, these facilities can also be a valued location for free city Wi-Fi services. Redmond and Eugene have Wi-Fi at their commercial airports, providing a useful service to business travelers.

Cities can use Wi-Fi networks to help increase communication between "mobile" departments such as police, fire and public works. Eugene has staff-only Wi-Fi for 911, fire and emergency medical services (EMS), but free access is available in the police and fire training classrooms.

Other Local Government Broadband Networks

Clackamas County

Clackamas County, in partnership with Clackamas Education Service District and SandyNet, is building approximately 185 miles of backbone and last mile fiber-optic cables throughout the county. This project is funded in part by a $7.8 million grant from the Broadband Technology Opportunities Program (BTOP), which is part of the 2009 American Recovery and Reinvestment Act (ARRA). The fiber network will be available to any entity on a nondiscriminatory basis. The county will not provide any broadband services, nor will it compete with local service providers. This extensive network will be available for local communication providers to enhance their networks, and it will be used to enhance broadband services to community anchor sites such as schools, libraries, health care and public safety.

Crook County

According to the National U.S. Department of Commerce's website, Crook County received a $3.9 million grant from the 2009 American Recovery and Reinvestment Act. Along with the state's highest unemployment rate, Crook County has limited broadband services. The county partnered with other public, private and non-profit organizations to establish a 65-station computer learning center, to be located in the city of Prineville. The Crook County Computer and Education Center will give county residents the access to education, training and broadband services, which is vital to an area that is in economic distress. The center will deploy a mobile lab which will help bring broadband access to the more remote areas within the county.

Lane Council of Governments

In 2010, the Lane Council of Governments (LCOG) received $8.3 million in American Recovery and Reinvestment Act funding, which was matched by $2.7 million in local contributions. The planned project will bring broadband services to more than 100 critical institutions in portions of Douglas, Klamath and Lane counties. LCOG will be installing more than 100 miles of fiber to connect these institutions to existing fiber networks. Approximately 70 percent of the critical institutions to be connected will be local government facilities including schools, city halls, libraries, fire stations and police buildings. Some state offices, including the state police, will be connected as well. The total miles of fiber installed and the number of institutions that will be connected has not been finalized. For more information on this project, see the Resources section on page 42.

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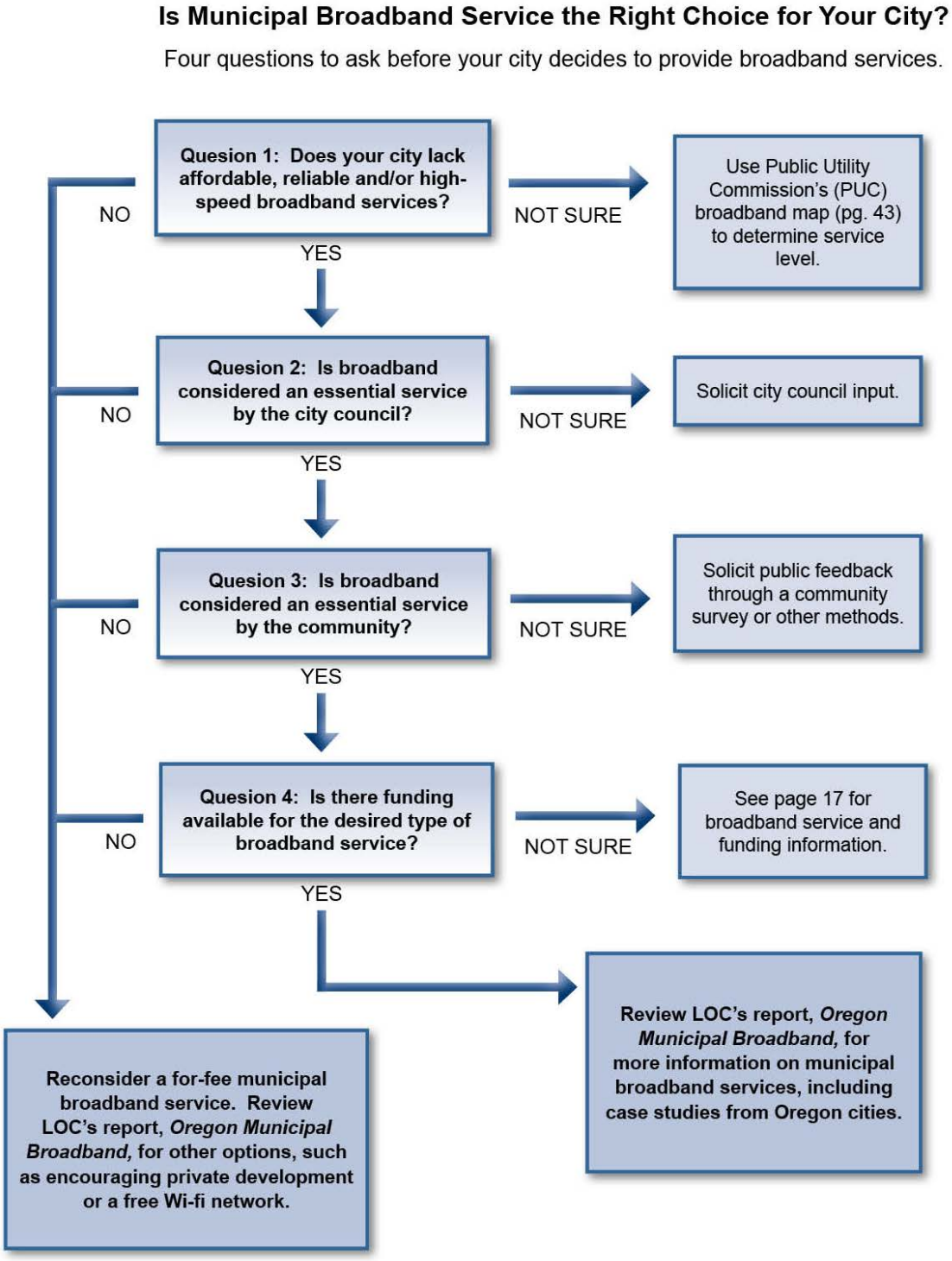
Appendix A

Broadband Flow Chart



Appendix B

Additional Resources

Referenced in the report

(See also References, page 39)

Municipal Broadband Networks

- Oregon Municipal Broadband Information – resources from Oregon cities (e.g. master plans; enabling ordinances; agreements; policies)
  http://www.orcities.org (select A-Z Index – "T" for Telecommunications)

- National Association of Telecommunications Officers and Advisors (NATOA) – Examples of local broadband initiatives; broadband and economic opportunity (comments to FCC)
  http://www.natoa.org/documents/NATOA%20et%20al%20Comments%20-%20NBP%20Public%20Notice%20%2318.pdf

- Community Broadband Networks
  http://www.muninetworks.org/

- "Mediacom Falsely Accuses Lake County Communities of False Statements"
  http://www.muninetworks.org/content/mediacom-falsely-accuses-lake-county-communities-false-statements

- MuniWireless.com – Information and resources on municipal wireless projects worldwide
  http://www.muniwireless.com/

- Lane Council of Governments – Broadband Network
  www.connectingoregon.org

- "From the Digital Divide to Digital Excellence: Global Best Practices to Aid Development of Municipal and Community Wireless Networks in the United States" – New America Foundation
  http://mediapolicy.newamerica.net/publications/policy/from_the_digital_divide_to_digital_excellence

Broadband and Economic Development

- Portland Broadband Strategic Plan (preliminary documents) – City of Portland
  http://www.portlandonline.com/cable/index.cfm?c=54013

- E-Commerce Zones – Oregon Business Development Department
  http://www.oregon4biz.com/The-Oregon-Advantage/Incentives/Enterprise-Zones/ecommerce-zone/

Broadband Funding

- Special Public Works Fund (Government Projects) – Oregon Business Development Department
  http://www.orinfrastructure.org/Learn-About-Infrastructure-Programs/Interested-in-a-Community-Development-Project/Special-Public-Works-Fund/

Broadband Services - Cost and Availability

- Oregon Broadband Map – Oregon Public Utility Commission
  www.broadband.oregon.gov

- National Broadband Map – National Telecommunications and Information Administration (NTIA)
- http://broadbandmap.gov/

- Landline/Mobile/Internet Providers Database – CUB Connects
  http://cubconnects.org/

Broadband Strategic Planning

- National Broadband Plan – Federal Communications Commission
  http://www.broadband.gov/download-plan/

- Portland Broadband Strategic Plan (preliminary documents) – City of Portland
  http://www.portlandonline.com/cable/index.cfm?c=54013

Telecommunications and Right-of-Way

- Telecommunications Tool-Kit – League of Oregon Cities
  (A-Z Index – "T" for Telecommunications. Available to download for LOC members)
  http://www.orcities.org

- Oregon Utilities Notification Center – Joint Trenching Examples
  http://www.digsafelyoregon.com/joint-trench-examples.asp

Legal Resources

- Community Assistance for Law Enforcement Act (CALEA) – Federal Communications Commission (FCC)
  http://www.fcc.gov/calea/

Appendix C

Glossary

NOTE: NOT ALL TERMS LISTED WERE USED IN THE REPORT. THESE DEFINITIONS MAY BE USEFUL IF A CITY CONDUCTS MORE RESEARCH ON TELECOMMUNICATIONS AND BROADBAND.

Broadband Services & Users

Broadband: High-speed Internet connections that allow users to connect to websites and download content at a faster speed. Broadband can also be a wireless service carrying voice, video and data channels simultaneously. The Federal Communications Commission (FCC) defines broadband as advanced communications systems capable of providing high-speed transmission of services such as data, voice and video over the Internet and other networks. Transmission is provided by a wide range of technologies, including digital subscriber line (DSL) and fiber-optic cable, coaxial cable, wireless technology and satellite. Broadband platforms allow the convergence of voice, video and data services onto a single network.

Cable Services: Defined in the Federal Telecom Act as (A) the one-way transmission to subscribers of (i) video programming or (ii) other programming service; and (B) subscriber interaction, if any, which is required for the selection or use of such video programming or other programming service.

End User: An individual, association, business, government agency or other entity that subscribes to a broadband service and does not resell it to another provider.

Voice over Internet Protocol (VoIP): Wireless or wireline technology that allows the use of a broadband Internet connection to make voice telephone calls. A special adapter is used to send a voice call in a digital form using the Internet rather than the traditional voice stream. A wireless example is Clearwire; a wireline example is Comcast Digital Voice.

Broadband Technology

Broadband over Power Line (BPL): BPL systems use existing electrical power lines as a transmission medium to provide high-speed communications capabilities by coupling radio frequency (RF) energy onto the power line, then distributing it to a home. BPW systems operate on an unlicensed basis under Part 15 of the FCC's rules. Because power lines reach virtually every community in the country, BPL has the potential to play an important role in providing broadband services to American homes and consumers. There are two types of BPL systems: In-House BPL, which uses the electrical outlets available within a building to transfer information between computers and other home electronic appliances; and access BPL systems, which carry high-speed communication signals outdoors over the medium voltage (MV) lines, from a point where there is a connection to the Internet (backhaul point), to neighborhoods where they are distributed to homes via the low voltage (LV) power lines or Wi-Fi links.

Coaxial Cable (Cable): An electric cable composed of an insulated central conducting wire wrapped in another conducting wire. This type of network is mostly used by cable TV providers.

Digital Subscriber Line (DSL): A generic name for a family of digital lines that are provided by CLECs and local telephone companies to their local subscribers. Such services, known by

different names, propose to give the subscriber up to 8 million bits per second one way downstream to the customer, and somewhat fewer bits per second upstream to the phone company. DSL lines typically operate on one pair of wires like a normal analog phone line. (Newton's Telcom Dictionary, 25th Edition)

Fiber-Optic Cable (Fiber): Thin filaments of glass through which light beams are transmitted over long distances, carrying enormous amounts of data. This network is being used by Verizon and other companies offering "fiber-to-the-premise."

Satellite: A microwave receiver, repeater and regenerator of voice, video and data transmissions. The satellite is in orbit above the earth.

Wireless Technology: Any system of transmitting and receiving data without wires. Examples include:

Long Term Evolution (LTE): Provides for a larger coverage area with fewer antennas and is being used to build nationwide 4G networks. LTE is being deployed in Oregon by mobile wireless service providers such as AT&T Wireless and Verizon Wireless.

Wi-Fi: A term coined by the Wireless Ethernet Compatibility Alliance which designates wireless products that are interoperable even if they are from different manufactures. The use of these products creates a wireless broadband network that can be utilized by any user.

WiMAX: Provides for a larger coverage area with fewer antennas, however it uses a different standard than LTE. WiMAX is being used to build nationwide 4G networks and is currently being offered in the Willamette Valley by the wireless provider, CLEAR.

Wireless Mesh Network: A wireless network configured so that each wireless node is interconnected to every other node within the network, thereby creating the "mesh."

Wireless Access Point: A device that connects wireless communication devices (e.g. computers and laptops) to form a wireless network, such as Wi-Fi.

Broadband Providers

Cable Providers: Companies with right-of-way franchises to provide cable services. Many of these companies now provide voice and data services. Examples include Comcast and Charter.

Competitive Local Exchange Carriers (CLECs): Providers of local phone services that have Public Utility Commission certificates for operation. Some own a facility located in the public right-of-way and some may compensate to a facility-based carrier for use of that facility for resale purposes.

Incumbent Local Exchange Carriers (ILECs): Traditional phone companies that provide exchange access service (dial tone service). Some of these providers offer cable and data services.

Internet Service Providers (ISPs): A vendor providing Internet access to corporate and individual customers.

Long Distance/Long Haul Carriers: Service providers that do not offer local service, but "transmit" through public right-of-way via facilities. They may own, lease or pay compensation to a facility-based carrier. Examples include AT& T, MCI and Sprint.

Last Mile Providers*: Provides broadband services, such as voice, video and data, directly to the end user. The provider may own their own broadband network, or lease space off another network, such as a middle mile provider.

Middle Mile Providers*: Connects last mile providers to a broadband backbone.

Resellers: Companies that may or may not own telecommunications facilities but pay compensation to a facility-based provider for use of systems to deliver wholesale or retail services to an end user.

Wireless Service Providers: Companies that provide telecommunications services primarily through wireless technologies. These include Verizon Wireless, Sprint, AT& T, Nextel and T-Mobile, and wireless resellers such as Virgin Mobile, TelePlus and Consumer Cellular that pay compensation to a wireless provider for use of their facilities. Some wireless companies provide broadband services as direct connections to the Internet.

Other Technical Terms

Bit: The basic unit of measurement for information data and digital communication. Bits per second is a measurement of data transmission speed.

Kilobit: 1,000 bits

Megabit: 1 million bits

Gigabit: 1 billion bits

Redundancy: Having at least one back-up system in place in case of a network failure on the main broadband network.

** Note: "Middle mile" and "last mile" provider can have different meanings within the telecom industry.*

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