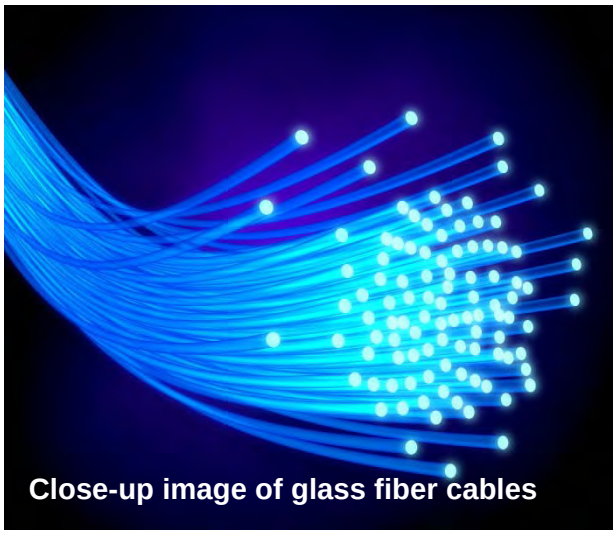
Eugene Fiber Implementation Plan

The City of Eugene and its partners are conducting engineering and financial planning to extend the municipal broadband fiber network to approximately 125 building in the downtown. This documents summarizes the status and purpose of establishing the network.

Background

The 2013 City of Eugene Broadband Strategic Plan identified the development of a downtown fiber network as a strategic goal. After completion of the Strategic Plan, City staff began working with LCOG and EWEB on a pilot project, to test the feasibility of implementation of the development of a downtown network.



Close-up image of glass fiber cables

The City of Eugene provided funds for the pilot project to connect three buildings in the downtown to the Willamette Internet eXchange (WIX) using fiber optics. Through the pilot project, two buildings have been connected: the Broadway Commerce Center and the Woolworth. The RAIN building, at 942 Olive, will be connected sometime this fiscal year. In addition, the fiber is now available in LCOG's building at 859 Willamette Street.

The pilot project determined that using underground electrical conduit is a feasible method to bring fiber to individual buildings. A key advantage is that it eliminates the need to open the streets, as the fiber is installed in tubes, known as 'microduct', that lie within the electrical conduit.

The pilot project was a success. It identified a workable method to connect commercial buildings to the WIX. Independent Internet Service Providers (ISPs) are now providing 1,000-megabit (gigabit) internet service for $99 per month to about 20 tenants in the connected buildings. The speed and price of the service is comparable to cities in the U.S. known as 'gigabit cities'.

Based on the success of the pilot project, we are now moving forward to develop a plan to construct fiber connections across downtown Eugene. The Fiber Implementation Plan includes three distinct elements:

- **Engineering Plan.** This describes the physical layout and the pathways the fiber will follow.
- **Cost Estimate.** Based on the engineering, we calculated the expected cost.
- **Funding Plan.** We are identifying the different funding sources that could be used, and their advantages and disadvantages.

Microduct-the fiber lies in the small white, 'honeycomb' tubes.

What is a Fiber Network?

A fiber network connects individual buildings to a central connection point (an 'exchange') with fiber optic cable. Fiber-optic cables are thin glass strands that transmit data using light. Fiber can transmit very large amounts of data very quickly, and is much faster than copper cables and co-axial cables, which make up the bulk of the physical connections to buildings throughout the US. Most of the 'back bone' connections, from major hub to major hub, are fiber. Fiber is the most advanced technology for delivering communications.

The Downtown Eugene network includes both physical and service components. The physical components include:

- **The fiber.** Fiber strands that lie within EWEB's existing underground conduits that connect into buildings. EWEB owns the fiber.
- **The WIX.** The Willamette Internet eXchange is local exchange located in the basement of the LCOG building at 859 Willamette Street. The individual fiber cables run into the WIX. The WIX is 'carrier neutral,' which means that any ISP can connect to it at a low cost. Incumbent service providers—Comcast and Century Link—own their own proprietary exchanges. Independent ISPs can use their facilities, but must pay a premium. The WIX has fiber connections to large, regional exchanges. LCOG owns the WIX.

An ISP connects the fiber to a rack in the WIX.

The service components include:

- **Internet Service Providers (ISPs).** The fiber connecting the buildings to the WIX is 'dark' fiber—it has no service associated with it. 'Lighting the fiber' means that an ISP has activated a connection from a customer in a building to the WIX and then to the rest of the internet. The ISPs lease fiber strands from EWEB and rack space in the WIX. Because it is a carrier-neutral facility, any ISP can lease the strands and space in the WIX. LCOG's and EWEB's lease rates cover maintenance and replacement costs; there is no mark-up for profits.
- **Back-haul connection.** There are also fiber connection from the WIX to large, regional internet exchanges in Portland and (just recently) San Jose, CA. At these regional exchange points, ISPs 'peer' (or connect) with other ISPs and major internet providers, such as Microsoft, Amazon, and Netflix. In Eugene, there is a constrained supply of access to the regional exchange points, so the connection speed is lower and cost is higher than in larger cities. The fiber planning team refers to this connection as the 'Middle Mile', as it provides the connection between major service providers and local ISPs.

The Implementation Plan

The City and its partners (LCOG, EWEB, and the Technology Association of Oregon, or TAO) are now developing a plan to construct fiber connections across downtown Eugene. We identified the service area for the downtown fiber network to correspond to the area where the utilities lies underground. The planning team identified this area because it covers much of the downtown area, and we could design the system using the technology tested in the pilot project.

The Implementation Plan covers two separate, but related, investments.

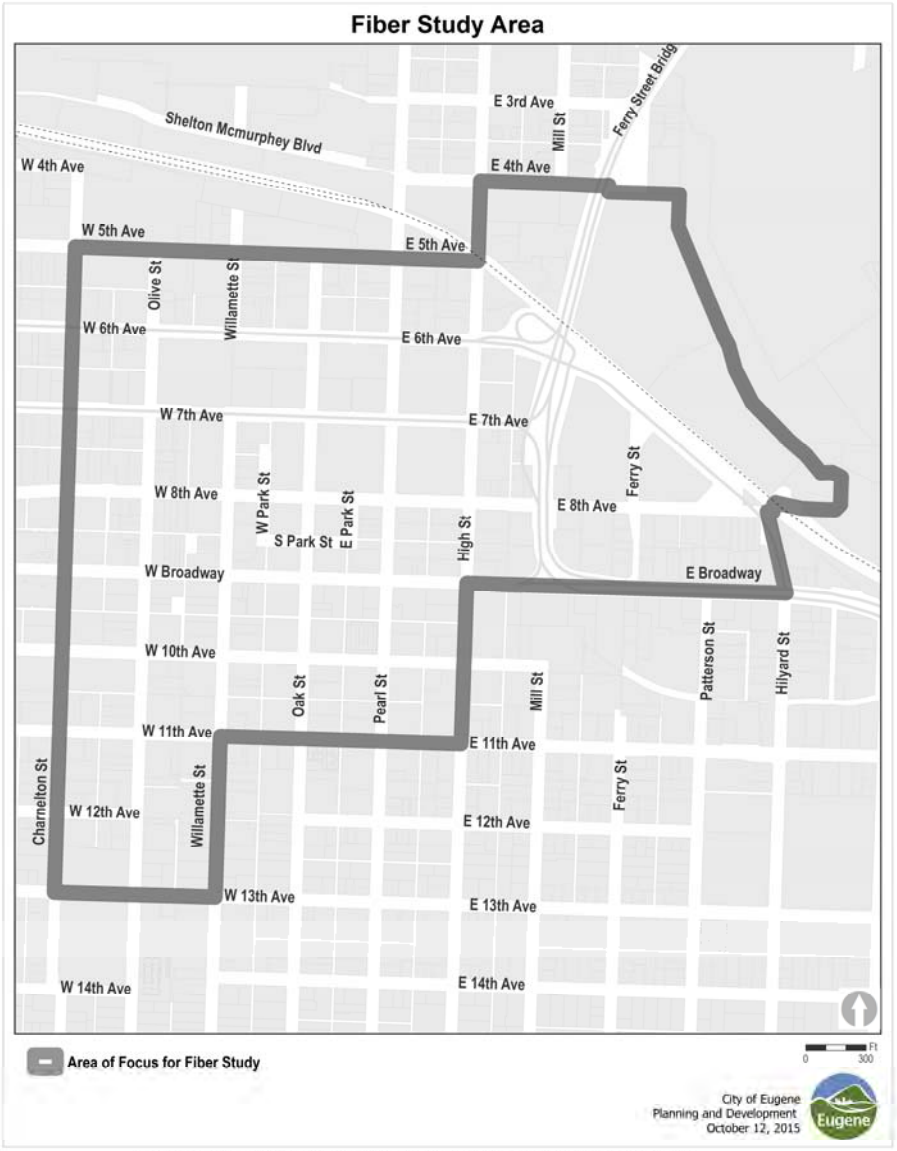
- The fiber to be installed in the electrical conduit under the City streets.
- The lease of a publicly operated Middle Mile connection to the WIX.

EWEB staff have completed the proposed engineering plan to determine the routes from the WIX to an internal patch panel inside each building. This plan has identified 120 buildings that can be connected to the network. The plan allows for additional buildings to connect to the network in the future. For example, there is capacity to allow future, new buildings to connect.

The plan also includes connection points at the physical boundaries of the service area, so that additional fiber outside the service area can splice onto this network. The planning team have worked to make this initial network flexible to accommodate future expansion.

EWEB has estimated that the cost of the full build out for the planned service area to be $2.7 million. LCOG estimates that it will cost an additional $750,000 to extend the fiber to service points inside buildings.

The engineering plan and cost estimate are preliminary. The planning team will reach out to key stakeholders (including building owners and ISPs) this winter to review the plan. The engineering plan may change, which will subsequently affect the cost estimate.



Caution:This map is based on imprecise source data, subject to change, and for general reference only.

The Implementation Plan includes the lease of a publicly operated back-haul connection—the Middle Mile. This 'Middle Mile' connection is necessary to deliver the supply needed for the downtown fiber project. The planning team is working to identify the cost of leasing our own 100-gigabit back-haul connection that could be partitioned into 10-gigabit segments and sub-leased to public agencies and ISPs.

Based on initial cost estimates, this publicly operated back-haul connection will have an initial capital cost of $350,000 and a $6,000 monthly ($72,000 annual) fee. The City, other public agencies, school districts, and ISP's would then have access to wholesale rates comparable to those that exist in the Portland and San Jose markets. The rates would be significantly lower that the retail rates available today.

While the advantages of a wholesale Middle Mile solution are clear, the actual feasibility needs to be justified before the investment is made. The City and its partners (LCOG and TAO) should prepare a careful business plan of the options. This plan would aim to secure pledges of purchases from other public agencies and local ISPs to ensure the benefits outweigh the costs.

Impacts to the Community

Customers that are in the service area will be able to purchase high-speed internet service for much less than what service providers offer today. For example, firms in the Broadway Commerce Center saw the price of monthly service decline from about $250 for 150-megabit service, to $99 for 1,000-megabit service.

The fiber network is creating a competitive landscape for telecommunications. Any ISP can lease the fiber for the same rate. No ISP receives a preferential rate. The publicly owned and operated infrastructure makes is possible for different ISPs to compete for business on a level playing field. They all have the same cost structure for the infrastructure.

The fast fiber-based connection will enhance the community's ability to attract and retain firms in the downtown. The speed and cost in our network makes our infrastructure competitive with larger markets. High-speed, low-cost telecommunications infrastructure has become essential infrastructure for many firms to thrive in the 21st century. The absence of strong network is comparable to having the railroads pass a community in the 19th century or not have an on-ramp to the interstate highway system in the 20th century.

The Middle Mile element will benefit the community beyond the core service area. The bulk lease of a back-haul connection will reduce costs for many different groups:

- **General government agencies**. LCOG, Springfield, Lane County, and Eugene would experience lower prices for their internet service. Our initial cost estimates show that, if the agency's pool resources, the net fiscal impact will be positive.
- **School Districts.** At this time, School Districts receive a federal subsidy for telecommunications. The subsidy is declining and is expected to terminate over the next few years. If the general government agencies lease the Middle Mile connection, the School Districts would benefit from the lower service cost. Each District has its own internet service agreement, but preliminary research shows the Middle Mile could result in savings from between $9,600 to $20,000 per year.
- **Private ISPs.** LCOG could lease capacity to ISPs. Today, local ISPs lease capacity from large, regional providers. Based on preliminary estimates, LCOG's lease rate would be significantly lower than existing lease rates. Local ISPs would experience reduced costs. As those ISPs compete for business in the fiber network, the reduced cost structure will allow them to offer higher speeds at lower prices than exists today.
- **Businesses on the fiber network.** The back-haul connection would provide a more direct connection to major national internet providers that have a presence in larger markets of Portland and San Jose. Eugene would then have similar access to large 'Cloud' services from companies such as Microsoft and Amazon. 'Cloud' services are becoming more and more important to businesses as they store their data in the Cloud. This back-haul connection establishes a primary connection from the WIX to these major service providers—greatly increasing the speed for customers on the fiber network.