

Technology Master Plan

City of Grover Beach



Approved by the City Council & Improvement Agency on

February 16, 2010

Prepared By



DIGITAL WEST

City of Grover Beach

Technology Master Plan

City Council

John P. Shoals, Mayor
William "Bill" Nicolls, Mayor Pro Tem
Karen Bright Council Member
Robert C. Mires Council Member
Debbie Peterson Council Member

City Staff

Robert Perrault, City Manager
Bruce Buckingham, Community Development Director

Consultant

Digital West Networks, Inc.
Bob Fasulkey, Senior Consultant
Fred Dyste, Program Manager

TABLE OF CONTENTS

The Vision.....	1
Background	2
The Technology	3
Defining High Technology	4
The Components of the Municipal Network	5
Point of Presence (POP).....	5
Network Operations Center.....	5
Fiber Infrastructure.....	6
Infrastructure Phasing.....	6
Operations and Management of the Municipal Network	7
Technology Master Plan Goals.....	8
Goal 1: Establish the Grover Beach Municipal Broadband Network.....	8
Goal 2: Professional Manage the Municipal Network.....	9
Goal 3: Market and Promote the Municipal Network.....	10
Goal 4: Promote Business Development	10
Goal 5: Build and Support a Technology Labor Force.....	12
Goal 6: Establish New Ordinances & Policies to Deploy the Municipal Network.....	12
Goal 7: Implement High Technology within City Facilities & Operations.....	13
Goal 8: Promote Technology Transfer & Entrepreneurship	13
Appendix A – Deployment Phasing Map	
Appendix B – Report on the Current State of Municipal Broadband Networks	
Appendix C – Public/Private Opportunities & Technical Option	

THE VISION

The City Council, in conjunction with the City's Improvement Agency, will work diligently to implement the following vision for the Grover Beach Municipal Broadband Network.

By the year 2030, the City of Grover Beach has successfully deployed a municipal fiber network that extends throughout the City. As a result, the City has developed into a major telecommunications hub in the State with direct fiber access to Asian markets. Through an innovative approach to municipal broadband and public-private partnerships, the City has attracted new and existing high tech businesses that have become the foundation of its economic base. The industrial and commercial areas are occupied with successful green technology businesses that are taking advantage of the infrastructure provided by the municipal network.

Residents of Grover Beach also enjoy one of the fastest broadband connections in the region and, as a result, home based businesses have flourished. Residents also have competitive options for telecommunication providers that package cable, internet, telephone and other services. This competition has allowed rates to remain the lowest in the region.

The creation of the municipal network has also allowed the City to establish annual revenues from the use of the municipal network by third party service providers and delivery of telecommunication services to businesses and residents. The City has partnered with private firms that operate from the City's Network Operations Center which also generates revenues for the City. These revenues have assisted the City to maintain its level of service to the community.

Finally, the successful implementation of the Grover Beach Municipal Broadband Network has been a force of economic development for the community and established the City as a place with a vibrant local economy to do business in which has enhanced the quality of life for the citizens of the City of Grover Beach.



BACKGROUND

In 2000, Pacific Crossing constructed a trans-Pacific fiber cable from Shima Japan to Grover Beach. This cable represents one of only a few trans-Pacific fiber cables that directly links the North America with Asia. The City has recognized that this potential asset could ultimately contribute to the City and regional economy. In 2008, the City Council adopted its first Economic Development Strategy and placed a renewed emphasis on economic development. One of the goals of the Strategy was to assess and determine what opportunities exist from the presence of the Pacific Crossing fiber cable.

In April 2009, the City engaged with Digital West Networks, Inc. (DWN) to prepare a Technology Master Plan (TMP) for the City of Grover Beach. The purpose of the Plan is to assess and identify technology opportunities and to make recommendations for improving technology access citywide and accomplishing economic revitalization.

In order to prepare the TMP, several tasks were necessary to provide the foundation of the Plan. The goal of these tasks was to inform the City Council on the state of municipal networks and to present various options for consideration by the Council prior to drafting the Technology Master Plan.

First, DWN prepared a report that provided information and analysis about other cities that have successfully, and unsuccessfully, implemented municipal broadband networks. This research provided insight on how other agencies established municipal networks. The second task involved a technology and municipal analysis and discussed the significance of Pacific Crossing and how it could become a major technological differentiator for Grover Beach and its potential for attracting businesses to the City. This task also reviewed applicable government codes and legislation related to municipal networks and found that more than 600 municipalities have some form of a municipal broadband development strategy. These reports are in Appendix B – Report on the Current State of Municipal Broadband Networks.

Finally, the last two tasks involved the preparation of technical options and a report on the competitive telecommunications landscape. These reports are contained in Appendix C – Public/Private Opportunities & Technical Options.

This Technology Master Plan represents the culmination of these efforts and is intended to provide guidance and a road map for development of technology infrastructure in Grover Beach. The goal of the Technology Master Plan is to enhance economic development and bring greater prosperity to the community through increased property values and head of household jobs. Eventually, implementation of the Plan will deliver a wider variety of broadband service options to business and residents in the City as funds become available.

It should be noted that during the early tasks of providing background for the project, the federal government through the American Recovery and Reinvestment Act of 2009 (ARRA), created funding opportunities for broadband infrastructure. In August 2009, the City submitted an application for a



broadband grant and loan of about \$2,000,000. Though at this time the City does not know whether the application will be approved, the TMP can be implemented with or without the grant. However, it is recognized that approval of the grant would provide a large capital investment that would be instrumental in expediting the creation of the Municipal Network.

The Technology

The technology most needed as a means to accomplish economic stimulation in a municipal area usually starts with basic broadband infrastructure. Optical fiber is the preferred medium and it should be placed in strategic streets and right of ways in the areas expected to be improved. The different configurations in which optical fiber can be deployed are not ordinarily important to the consumer, but historically the industry differentiates between four distinct configurations in order of an increasingly longer fiber loop and last mile connectivity:

- Fiber to the node or neighborhood (FTTN.)
- Fiber to the curb (FTTC) sometimes called fiber to the premise (FTTP) or "to the pole" for aerial applications.
- Fiber to the building (FTTB) which can apply to commercial and residential buildings that can have multiple users / customers or a single high usage company.
- Fiber to the home (FTTH) which actually means "into the home" to internal fiber optic outlets.

Many municipalities have extended their service to the home (FTTH) but they started out with FTTN or FTTC and progressed to the home when the economics were right. Using technology to accomplish economic stimulation can take on either or both of two forms: passive or active municipal participation. Generally, passive participation means providing loans and other economic incentives to attract businesses to come to the community or to assist existing businesses in their efforts to grow. Active participation means the City enters the business of providing ISP services to members of its business and residential community and takes an active role in promoting broadband services and helping stimulate the local economy. The goal for Grover Beach is to create a broadband network that can eventually deliver Fiber-to-the Home (FTTH) to all residents in Grover Beach within the next 20-years.

With fiber optic infrastructure in place, Grover Beach can provide low cost real estate, a good labor pool, fiber to the building, and one hop to Asia, all of which will make the City a magnet for specific industries with capital to spend on new facilities and employees. Having the City meet these criteria is important to companies storing and moving large amounts of data between North America and Asia; financial information and transaction companies (e.g., Bloomberg, Visa), social networking companies (e.g., Facebook, AOL/Bebo), content delivery providers (e.g., Google, Yahoo), and customer service organizations (e.g., Eleutian Technologies). Attracting these kinds of companies to the City will bring higher paying head of household jobs, increase property tax revenue, and attract other technology companies. It will provide an environment that will foster innovation and entrepreneurship which will in turn create more jobs and income in the community as these companies grow and succeed.



Defining High Technology

“High Technology” is a nebulous term referring to a wide range of services, products, businesses, employees, and skills that are “high tech.” For the purposes of this Plan we define high technology as a broad set of hardware and software production and service industries with substantial innovative and creative capacity. These include four specific economic markets as high technology:

- Information technology and software development and delivery services
- Hardware engineering, design, and manufacturing services
- Environmental technology
- Centralized customer service operations



COMPONENTS OF THE MUNICIPAL NETWORK

In order for the City to establish the Grover Beach Municipal Broadband Network, several components need to be constructed over a period of time. This section discusses the components necessary to achieve the goal of implementing a municipal broadband network. However, it will be necessary for the City to phase the deployment and make adjustments as it constructs the network. Implementation of the network will not be a linear process, therefore, it should be recognized that adjustments will be made as the network is deployed.

Point of Presence (POP)

In order to establish a municipal network, a “Point of Presence” (POP) or connection will be made to existing “lit” fiber. The POP becomes the “offramp” for the World Wide Web to the City. The City has several telecommunications carriers that have lit fiber in the City including Pacific Crossing, Qwest, Level 3, AT&T, and Verizon. However, only Pacific Crossing can provide a direct link to Japan, avoiding the routing of information via fiber to Los Angeles or San Francisco and back to Grover Beach. Therefore, Pacific Crossing is the preferred connection and will be the most beneficial in terms of economic development to the City.

This step will require the City to purchase equipment which converts the fiber strand and allows it to be distributed to the Municipal Network. The equipment costs vary significantly depending on the telecommunications carrier that the City connects to and where the equipment is located. The cost is estimated to range between \$100,000 and \$400,000 for the necessary equipment located in the Network Operations Center. It should also be noted that the equipment lifespan is typically about five years, therefore it is critical to plan for equipment replacement.

There is also a monthly fee for purchasing bandwidth from the telecommunications carrier. The initial monthly fee is estimated at \$5,000 to \$10,000 for 100MB for an entry level connection.

Network Operations Center

The POP will be located within the Network Operations Center (NOC). The City’s Corporate Yard has preliminarily been identified as a potential location for the NOC. However, the City should identify and evaluate if there are other publicly and privately owned properties suitable for constructing the NOC. Additionally a public-private partnership could be considered for the construction of the NOC within an existing building or as part of construction of a new building.

The size of the NOC will range from 500 to 1,500 square feet and will depend on funding and the demand for other third party service providers to be located within the NOC. Third parties that might be interested in rental space include VoIP (Voice-over-IP) phone providers, IPTV companies, alarm monitoring companies, middle mile providers, last mile providers and others that provide consumer and commercial services over the City’s municipal network. In addition, a co-location company that services business servers (e.g., Digital West) may also be accommodated within the NOC.



Fiber Infrastructure

The City must construct fiber infrastructure consisting of buried conduit in which the fiber optic line can be installed. It is this infrastructure that delivers the broadband connection to the neighborhood. Though the City's deployment will include the installation of a splice box to each property; home or business owners will be responsible for connecting to the box. The cost of connecting would depend on the distance to the building, but could range from \$1,000 to \$3,000 for a typical property.

The owner will have the option of connecting the fiber to the existing copper wiring or be responsible for installing fiber through the home, which is necessary to take full advantage of the bandwidth. The City may also want to consider adopting a fiber wiring standard so that all private installations become standardized. The wiring standard could be optional or required for all new construction.

Another method for deploying portions of the Network include wireless connections. This may be a viable option for providing broadband services to residents, businesses, and/or emergency personnel. The placement of towers in strategic locations will provide broadband services to the City and surrounding communities. Initially, this is a less expensive alternative to providing broadband services via conduit since only a small roof mounted dish is required. However, some services requiring large bandwidth may not be feasible with a wireless connection because of limited capacity in comparison to fiber.

Infrastructure Phasing

The City must prioritize the installation of the fiber infrastructure as funding becomes available. The infrastructure phasing will depend on a variable of factors including, but not limited to economic development priority, neighborhood demand, and the ability for new users and/or the City to pay for the costs associated with installation. A deployment phasing map has been developed that focuses on initial service to the City's industrial and commercial areas (reference Appendix A).

The deployment of infrastructure is reliant on funding. The estimated cost to install conduit, fiber, and splice boxes is approximately \$30 per linear foot. With approximately 50 miles of streets in the City, total infrastructure costs in today's dollars is approximately \$8,000,000.

Operations and Management of the Municipal Network

There are several components of the Municipal Network that the City needs to determine who will operate and manage. These decisions will be influenced by the capital that the City is able to provide and the desired speed for deploying the network. The components that create the Municipal Network include the Network Operations Center, the middle mile infrastructure (i.e., the conduit and fiber), and the last mile providers (the entity that provides the service and maintenance to the customer).

The goal is for the City to operate and maintain this infrastructure and provide the service. However, the City needs to consider if it wants to hire the necessary personnel to operate and manage these



tasks, or partner/contract with a firm that has the expertise to implement. The potential for public-private partnerships include, but are not limited to the following:

- Construction, Maintenance and Operation of a Colocation Facility
- Construction, Maintenance and Operation of middle mile fiber infrastructure
- Construction, Maintenance and Operation of last mile facilities

The City needs to pursue funding sources for deployment including grants, loans, bonds, and public-private partnerships. The City will also need to explore whether the Network is established as an enterprise fund or some other type of entity.

The initial deployment of the network needs to balance costs with projected revenues. The City needs to determine the demand for third party service providers such as middle mile, last mile and collocation services, prior to establishing the POP.



TECHNOLOGY MASTER PLAN GOALS

Goal TMP-1: Establish the Grover Beach Municipal Broadband Network.

Policies

TMP-1.1 Establish a connection or “Point of Presence” to the World Wide Web. The preferred connection is with Pacific Crossing based on the direct connection to Asian markets.

Implementation Measures

- Meet with the existing broadband carriers and determine the opportunities, constraints and costs for each connection (reference Appendix C, Page 4 for a more detailed discussion of the connection options).
- Negotiated with the carrier that can provide the best connection based on value to the City.

TMP-1.2 Implement a phased deployment approach that prioritizes economic development and the creation of jobs (reference Appendix C, Page 5 for a more detailed discussion of deployment options). The phasing priorities will be as follows (reference Appendix A – Deployment Phasing Map):

- Phase 1 will install conduit in the industrial area south of Farroll Road with first priority given to vacant land (e.g., Huston Street).
- Phase 2 will install conduit along the West Grand Avenue corridor.
- Phase 3 will install conduit in remaining industrial and commercial areas where job generation could occur.
- Phase 4 will install conduit to residential areas throughout the City.

Implementation Measures

- Apply for grants and other funding sources to assist with the costs for installing conduit and other infrastructure associated with the deployment of the Municipal Network.
- Install conduit as part of public and private projects which are required to construct utility or street improvements.
- Design the ultimate deployment system with multiple, self-healing fiber rings to reduce service outages to localized areas.
- Meet with middle mile carriers to discuss potential public-private partnerships for deploying the system.
- Manage and inspect the installation and acceptance process.



- Create a mapping program to document installed conduit, dark fiber and lit fiber.

TMP-1.3 Construct a Network Operations Center (NOC) to house the necessary equipment to operate the Municipal Broadband Network. The NOC will also contain additional space for lease to third party service providers.

Implementation Measures

- Identify publicly and privately owned properties for constructing the NOC. If the property is privately owned, consider a public-private partnership for constructing the NOC.
- Evaluate the short and long term demand for leasing space to third party service providers and design the NOC to accommodate future expansion. Potential third party service providers could include VoIP (Voice-over-IP) phone providers, IPTV companies, alarm monitoring companies, and others that provide consumer and commercial services over the City’s municipal network.
- Construct the NOC and allow the potential for future expansion based on projected demand.

Goal TMP-2: Professionally Manage the Municipal Network

Policies

TMP-2.1 Network Management. The City shall be responsible for insuring that all aspects of the municipal network are professionally managed including the NOC, middle mile and last mile facilities.

Implementation Measures

- Evaluate and assess options for managing the municipal network, middle mile and last mile facilities. The options could include creating a City department to operate all or a portion of the network, contracting with third party service provider, and/or forming a public-private partnership.
- If partnering or contracting with a third party service provider, consideration should be given to licensing, franchise agreement, and profit sharing.



Goal TMP-3: Market and Promote the Municipal Network

Policies

TMP-3.1 Market and Promote - The City will market and promote the Grover Beach Municipal Network to facilitate economic development in the City.

Implementation Measures

- Hire a marketing person or firm to develop and execute a marketing plan.
- Aggressively market the City’s municipal network as a place for growing businesses.
- Initiate media placements and public relations focused on high technology industries and industries that need high speed broadband services.

TMP-3.2 Conventions and Trade Shows – The City will work with hospitality and public event groups in the community to hold high technology conventions and trade shows.

Implementation Measures

- Create a strategic initiative with input from the high tech community, the City and local businesses.
- Host high profile events and technology conventions in Grover Beach.
- Establish relationships with high tech industry representatives.

Goal TMP-4: Promote Business Development

Policies

TMP-4.1 **Promote Local High Technology Development-** Promoting local startups, entrepreneurs, and small businesses will be a top priority for the City. Small firms in business services and technology are the driving forces of economic development. The City of Grover Beach will make a difference by creating a business-friendly environment for technology firms to stimulate entrepreneurship and to foster growing high technology businesses.



Implementation Measures

- Explore partnering with a non-profit such as the EVC to operate a technology incubator or shared resource business center.
- Consider using Improvement Agency funding to subsidize an incubator or business center.
- Implement and support a technology incubator or shared resource business center.
- Establish incentives that advance the development of high tech companies such as business loans/grants.
- Create a high tech directory describing businesses and available resources.
- Promote high tech employment opportunities in Grover Beach.

TMP-4.2 Make value-adding incentives available for advancing high technology companies - Small companies are often rich with ideas and enthusiasm but lack basic amenities to conduct business. This is especially true for high technology startups, where labor costs are often well above average and laboratory space is expensive, eating up dollars that are needed for capital and expense items. Technology startups have specialized needs, though while often minimal, these can make the difference between success and failure in the first few years. The City can help stimulate entrepreneurship by providing aid to startup companies in the form of:

Implementation Measures

- Consider Improvement Agency subsidies for rent and tenant improvements for technology businesses.
- Consider other funding sources for subsidizing rent and tenant improvements for technology businesses located outside the Improvement Agency.
- Prioritize subsidies based on the number of jobs, payroll, and/or revenues generated.
- Consider establishing a policy to reduce or waive Municipal Broadband Network monthly fees.
- Create technology directories describing what resources are available, where to find them, and how to apply.
- Develop value adding incentives to attract and retain small technology businesses.

TMP-4.3 Establish areas in the City for technology parks or clusters of high tech businesses.



Implementation Measures

- Work with property owners to create technology parks or technology clusters conducive to high tech companies.
- Encourage and/or create incentives for new companies in Grover Beach to lease space within the identified technology clusters.
- Work with property owners to promote and market start-up and established technology parks/clusters.

Goal TMP-5: Build and Support a Technology Labor Force

Policies

TMP-5.1 Support high technology job fairs, exhibitions, conventions and events. Attracting and developing the technology workforce will breed new entrepreneurs and business opportunities.

Implementation Measures

- Working in concert with local businesses, trade organizations, and educational institutions, the City will sponsor and support venues where employers find local talent, and where technology professionals will discover the Grover Beach.

TMP-5.2 Revitalize West Grand Avenue creating a vibrant environment for compatible technology uses with meeting places (e.g., cafes and coffee houses) conducive to technology professionals who are typically attracted to urban areas.

Implementation Measures

- Continue to promote the redevelopment of West Grand Avenue with mixed-use development and public gathering places.

Goal TMP-6: Establish new ordinances and policies to deploy the Municipal Network.

Policies

TMP-6.1 Adopt ordinances and policies requiring the installation of infrastructure to support the deployment of the Municipal Network.

Implementation Measures



- Adopt a policy requiring all Capital Improvement Projects to install shadow conduit when installing underground infrastructure, when feasible.
- Adopt development standards requiring that projects with public improvements be required to place shadow conduit.
- Amend the City’s Engineering Standards and Specifications to create new standard details for installing shadow conduit and other necessary fiber infrastructure and facilities.
- Consider adopting new building code requirements for the installation of standardize fiber wiring.

TMP-6.2 Adopt ordinances and policies that promote and support the deployment of the Municipal Network.

- Amend the Zoning Code Use Tables to allow compatible technology uses along West Grand Avenue and other commercial areas.
- Review/update franchise agreements to provide proactive development of information infrastructure and services.
- Evaluate cost recovery fees for connection to the Municipal Network.

Goal TMP-7: Implement High Technology within City Facilities and Operations

Policies

TMP-7.1 The City will lead the way for the business community by adopting the technologies made available by the Municipal Network. This will encompass communications, public safety, and city administration.

Implementation Measures

- Review the City’s use of technology and evaluate areas of improvement.
- Implement high technology practices/policies at all City facilities.
- Implement web-based collaboration with local service providers.

Goal TMP-8: Promote Technology Transfer & Entrepreneurship

Policies

TMP-8.1 The City will promote the advancement of technology in the business community and support high-tech entrepreneurship.

Implementation Measures



- Stimulate new development through support of technology transfer and entrepreneurship initiatives.
- Broker and facilitate technology student internships & involvement.
- Localize and streamline technology transfer processes.



APPENDIX B - Report on the Current State of Municipal Broadband Networks



DIGITAL WEST

Report on the Current State

Of

Municipal Broadband

For

The City of Grover Beach

Tasks 1 & 2



July 27th, 2009



Introduction – Municipal Broadband

The subject of utilizing technology, specifically fiber optic broadband, to stimulate local economy has been well discussed and attempted in several forms by many municipalities. Fiber optic equipment and installation costs dropped significantly in the late 1990's and fiber became accessible beyond the backhaul providers and major carriers and the idea of fiber to the end user started to become feasible. Since 1998 over 600 broadband networks have been developed in the United States, Varying degrees of success have been made in the cities of Santa Monica and Lompoc, CA, Ten Sleep, WY, Powell, MT, Wilson, NC, Kutztown, PA, Provo, UT and Tacoma, WA.

These cities were selected either because they represented the wide variety of approaches that have been used or have something in common with the City of Grover Beach. Most often any discussion of broadband used as a tool for economic stimulus involves a discussion about deploying fiber optics. Specifically, is the deployment of fiber optics something that the city can do cost effectively and what are the anticipated economic returns? Following is a brief discussion intended to acquaint the reader with the fundamentals of fiber optic systems and how they relate to municipal broadband overbuilds.

This report presents: a brief summary of each of these projects; provides analysis on the state of broadband and the potential for economic development in Grover Beach; reviews governmental laws, ordinances, and policies affecting the deployment of a broadband network; and provides recommendations for moving forward.

Fiber Optics

While cable and phone line Internet Service Providers (ISP) are still trying to capitalize on their most recent upgrades, demand for increased bandwidth is forcing to the surface the inadequacies of coaxial and copper lines. Bandwidth intensive applications and video-on-demand (VoD) services are becoming available with increasing frequency but they will not be available to the residents of Grover Beach unless the incumbent carriers upgrade their networks to fiber optics.

“Next-generation bandwidth is here and now! A quiet revolution in broadband is underway. Across North America, a rapidly growing number of households are connecting directly into fiber optic networks, and thereby tapping into a new generation of high-bandwidth applications and services. More than four million American households receive Internet, telephone and/or cable television services via lightning-fast fiber to the home (FTTH) connections...



Over the next few years, this transition will have an enormous impact on the way Americans live and work, as well as far reaching influence on the U.S. economy and its industrial competitiveness.”¹

The incumbent communications carriers tend to hold off upgrading network technology in peri-urban or rural areas for many years while they focus on the more profitable, more competitive, high density metropolitan and suburban communities. The Central Coast of California is considered rural and the telecommunication companies treat it as such. Upgrades tend to lag behind major markets by 5-10 years (many times never) and we tend to live with it. Since our area does not have many incumbent carriers, we tend to pay more for the same services our friends in the big city pay due to limited competition. This is a 5-10 year period in which the local community doesn't get to enjoy the economic and personal benefits of a high-speed broadband network and the services such a network can deliver to government, businesses and residents.

When incumbent carriers do upgrade they create turbulence in the local community starting with the planning department and ending with trenching in our streets and causing traffic congestion. Multiply this turbulence by the number of commercial carriers servicing your area and then spread it out over time and there is a significant impact on the community.

If a municipality decides to create a broadband utility for the community it takes control of the wiring of the community and can create a technology master plan that will not only provide existing and future services to the community but create an environment conducive to economic development in an ever changing economic and work force landscape. Many cities and towns can point directly to relocated companies for whom access to fiber broadband was a gating factor to moving into the city. Smaller communities point to saving the town money through lower cost services and providing the competition to force the incumbent service providers to upgrade services and lower prices – in many cases up to 50%.

Economic stimulus can be measured in several ways: savings to the municipality through aggregation of commercial information technology (IT) contracts and improved IT infrastructure; attracting new businesses looking for low cost - high-speed fiber; providing IT savings and opening new opportunities for existing businesses; causing incumbent service providers to compete by providing better service and offering lower prices; and income potential for the City through a profitable broadband network.

Fiber how far?

¹ From the FTTH Council's web page: <http://www.ftthcouncil.org/>



The different configurations in which fiber can be deployed are not ordinarily important to the consumer, but historically the industry differentiated between four distinct configurations in order of an increasingly longer fiber loop, without regard to electrical or other infrastructure²:

Fiber to the node or neighborhood (FTTN)

Fiber to the curb (FTTC) sometimes called FTTP for "to the pole" for aerial applications

Fiber to the building (FTTB) which can apply to commercial and residential buildings that can have multiple users / customers or a single high usage company

Fiber to the home (FTTH) which actually means "into the home" to internal fiber optic outlets.

In this report we will mostly refer FTTH as many of the municipalities have extended their service to the home but they started out with FTTN or FTTC and progressed to the home when the economics were right. Using technology to accomplish economic stimulation can take on either or both of two forms: passive or active municipal participation. Generally, passive participation means providing loans and other economic incentives to attract businesses to come to the community or to assist existing businesses in their efforts to grow. Active participation means the City enters the business of providing ISP services to members of its business and residential community and takes an active role in promoting broadband services and helping stimulate the local economy.

The technology most needed as a means to accomplish economic stimulation in a municipal area usually starts with basic broadband infrastructure. Optical Fiber is the preferred medium and it should be placed down strategic streets and right of ways in the areas expected to be improved.

An example of a community that benefited from using fiber optics for economic development is Tacoma, Washington (Pop. 193,556). Tacoma placed 700 miles of cable through all right of ways within the city at a cost of \$100 Million. They then began to offer "triple play" services including high-speed data, competing cable TV and phone service. The Tacoma Chamber of Commerce claims over 100 companies have relocated due in part to the variety of broadband options offered by the city.

Another example on a smaller scale is the Borough of Kutztown, Pennsylvania (Pop. 5,067) that started a fiber optic network as an upgrade to its city managed power utility infrastructure. As prices of fiber optic hardware started dropping the city made great strides in bringing better connectivity to its residents. The network currently operates at break even with 1,000 customers but it also funds other departments' budgets so actually Hometown Utilicom provides operating capital to the township.

According to a study completed for the FTTH Council by RVA, LLC there are 682 public and private fiber to the home deployments in North America with Verizon

² Wikipedia: <http://en.wikipedia.org/wiki/FTTH>



dominating the market with 3.3 million of the 4.4 million FTTH customers. These numbers only include FTTH and do not take into account FTTN or FTTC networks. The remaining 681 broadband networks have an average of 1,653 customers each. The largest municipal fiber project to date is Provo, Utah's iProvo network with over 10,000 subscribers and 300 business clients.

1.1 List of Benefits

Attraction to companies and home owners needing fiber to meet their needs and wanting the benefits of living in Grover Beach on the Central Coast of California - increase property values

Integrated communications and entertainment for the entire community on one strand of fiber - sufficient bandwidth for future applications that *will* require more bandwidth than is currently available from copper (phone lines) and coaxial (cable) connections.

Clear the clutter – installing a city wide broadband network and moving private commercial and retail IT services to the network will reduce the aerial cables cluttering the skyline. Aggregate SBC, AT&T, Charter, etc. cables onto one fiber network. These companies can offer more services than what their current infrastructure offers and will have to be more competitive on pricing. The city benefits by decreasing the eye sore aerial communications web and increased competition to deliver services to its residents.

Gain control over aerial and underground communication cabling and trenching. A unified approach cuts down on the financial impact of upgrades to the system; offer one stop shopping for services for the community; and reduces the impact on vehicle traffic caused by multiple companies operating on different sets of priorities, objectives and timelines.

1.2 Services that could be offered

Below is a partial list of services that can be offered by municipalities or private entities over a broadband network (which sometimes includes wireless components). Following is a list of services that can be provided over a broadband network:

Internet Service Provider (ISP) for businesses and residents – provide network access to commercial communications services like AT&T, Charter, Verizon, etc.

High resolution video services such as:

Video Conferencing and real time interactive gaming

Traditional cable and network television services

Enhanced video security and surveillance systems for public and private safety

Instant access to real-time video imagery from anywhere that the city has a camera



High-speed video and telecommunications with local, state and federal agencies in times of emergency

Voice over Internet Phone (VoIP) services

As a way for the city to decrease communication expenses and increase flexibility of its phone system

Low cost phone service to the community

Companies like Charter and AT&T offer a combination of ISP, television, and phone services

referred to as “Triple Play” to their customers. These tend to be the best priced service packages

and require high-speed broadband to achieve the best results.

1.3 Public Safety

Public safety can benefit greatly from a community broadband network. Key components are digital monitoring, exponentially larger communications channels, guest accounts for allied agencies and real-time video incident documentation. High resolution, real time, remotely controlled video for public and private surveillance only works on very high-speed networks.

A municipal fiber backbone would allow for streaming video from inside a bank to go directly (via WiMax) to a police car approaching the scene of a crime in progress. Having this available would speed up the response time to a threatening situation and provides a higher level of safety for the people inside the bank.

High resolution remote controlled webcams provide a low cost way to create a flexible surveillance system where cameras can be moved around very easily. However, the cameras need to have direct access to a high-speed wired network to be effective. During 4th of July weekend the City could place wireless webcams at major intersections along Grand Avenue and on side streets near the beach to monitor traffic flow and help direct police officers and public safety officials to reduce bottlenecks and respond to emergencies more quickly.

Real-time video information can be shared with other agencies like the Highway Patrol or the Sheriff’s department since during events like the 4th of July there is more inter-agency coordination going on than normal. A centralized surveillance system helps patrols in the field be more effective and responsive to real time needs. When the 4th of July weekend is over the cameras can be removed and placed elsewhere in the community or stored for the next event.

2 Pacific Crossing and Trans-Pacific Fiber

In 1999 Pacific Crossing established a trans-Pacific fiber optic cable landing point in Grover Beach. Along with the City of Mukilteo in the State of Washington, the cities of Shima and Hitachinaka in Japan, the City of Grover Beach is one of four landing points that create a very important redundant fiber optic loop carrying data and communications traffic between Asia and North America. The cable comes on shore at Grand Avenue and goes underground along South Fourth Avenue to Farroll Road and into Pacific Crossing’s building at 948 Huber Street. The building is data center in the Industrial Enhancement



Area (IEA) around which is a great deal of underutilized light industrial and commercial property. Inside the building is fiber optic and telecommunications equipment that takes the light wave signal and, through outhaul cables north and south of Grand Avenue, hooks up to the north-south fiber optic cables along the railroad right-of-away (ROW) that take the digital traffic south to Los Angeles and north to San Francisco. This is the super highway to the Internet and it passes right through Grover Beach without an off ramp. The building on Huber Street could provide the interchange that puts Grover Beach prominently onto the Internet’s superhighway road map.

The importance of this trans-Pacific fiber is underscored by AT&T from their statements in the Environmental Impact Report for their Montana de Oro landing:

“AT&T states that this new cable system will be a link in a global network that can provide voice, data and video services to all types of customers throughout the world (including private individuals, businesses and governmental entities). It will provide additional opportunities for commerce and information exchange, leading to closer economic and political ties among the participating countries)...”³

Based upon recent press releases, Pacific Crossing Limited is selling all of its submarine facilities to NTT Japan for \$100 million. Escrow is expected to close in September of 2009. Though the present franchise agreement doesn’t expire for 15 more years, the sale may create an excellent opportunity to establish a dialog with the new owners and possibly an early renegotiation of the franchise agreement.

2.1 The City of Mukilteo, WA (Pop. 18,019)

A facility known as Harbour Pointe located in the City of Mukilteo is the submarine cable landing station for Pacific Crossing. This is the sister facility to the one in Grover Beach. The landing stations have a dependency on each other to pick up the entirety of the Pacific Crossing’s fiber network traffic should one station fail. This makes these facilities critical to communications between North America and Asia and of *special* concern to national security.

The city of Mukilteo is in the same situation as Grover Beach – they do not have any access rights to the facility or fiber. We suggest that if Mukilteo and Grover Beach desire to approach Pacific Crossing about gaining access, they do so working in concert and increase the chance of success.

³ From AT&T’s statements in the Environmental Impact Report for their Montana de Oro landing



The city of Mukilteo is also in thinking of exploring broadband network options. In 2000 a company from Texas (WiredZone: <http://www.wiredzone.net/>) came to Mukilteo and bought a 350,000 sqf office complex and lit it up with fiber – but, unfortunately, not from Pacific Crossing. It took several years to fill the building and only when Boeing came in and leased space for 1,000 employees did the community really feel the economic impact of fiber. Boeing needed fiber to access Japan and Asia and this building met their needs. Now, other Boeing suppliers are relocating to Mukilteo as real estate prices near Seattle continue to climb. Some design companies working for Airbus require high-speed bandwidth to send large engineering files to France and are relocating to Mukilteo too.

2.2 Hitachinaka and Shima, Japan

Hitachinaka is the city at the opposite end of Pacific Crossing’s cable that is located in Grover Beach. The city was created in 1994 through the consolidation of two smaller cities and is about 60 miles North East of Tokyo. It is well connected to Tokyo via fiber optic cable.

We examined Hitachinaka to determine if they had any economic benefit as a result of the cable landing there. We found that Hitachinaka is a city that differs greatly from Grover Beach. It has nearly 200,000 residents and is highly industrialized but also has a large agricultural industry. The city is home to a deep water port which supports fishing, as well domestic and international shipping. Due to the extent of the economic maturity of Hitachinaka, we believe that little or no attention is given to the presence of the Pacific Crossing landing station.

Shima, Japan is the southern landing point for Pacific Crossing’s network in Japan. Situated on a peninsula with many bays and inlets it is a rural area heavily dependent on fishing and tourism. Shima is also home to many Shinto Temples that are popular tourist destinations for residents of



the urban areas surrounding it. The economy is not geared towards technology related businesses.

However, due to both cities' close proximity to Tokyo they could provide lower latency connections for companies on either continent. This means that a company could place its servers in Grover Beach and have far less latency to Tokyo than the same servers being placed at any other point in the U.S. This holds true for servers on the Japanese side wanting to access North America. This, of course, assumes that it is made possible for the City to gain direct access to Pacific Crossing's fiber.

3 Grover Beach and the Digital Superhighway

Grover Beach is in a very strategic location on the digital superhighway that can benefit the community greatly through economic development and establish a position for itself as the Technology Hub of Central California.

Grover Beach has a unique opportunity to create economic stimulation centered on a fiber optic and wireless network delivering low-cost/high-speed broadband throughout the City of Grover Beach and Oceano.

Many people are aware that because of the trans-pacific fiber landing coming on shore in Grover Beach we have a very important role on the backbone of the Internet. The digital super-highway runs right through Grover Beach but we do not have an off ramp. Like cities of the 1940's and 1950's, during the expansion of interstate highways, if the highway missed you or you didn't get an off ramp your city's economy didn't grow with the motorized economy.

Optical fiber cable moves bits and bytes at near the speed of light. One strand, the width of a human hair, can carry the telecommunications and digital traffic for all of San Luis Obispo County. In addition to Pacific Crossing in Grover Beach, there are multiple cable landings coming onshore in San Luis Obispo County from Japan, Hawaii, Mexico, and China. To the north, Montana de Oro and Morro Bay have other cables from the same distant locations coming onshore. In contrast, there are no cables coming onshore in any other parts of the State. There are a number of reasons that San Luis Obispo County was selected as a landing point. These include: the region is less likely to have a significant natural disaster; the cables are less likely to get damaged from ships anchors; real estate is affordable; it is strategically located midway between Los Angeles and San Francisco; and there is access to railroad rights of way (ROW) running throughout the state.



3.1 To who is broadband valuable and how could it benefit the City?

An email to a friend leaves your desktop passes through several computer devices starting with your router and ending at your friend's computer. In between are active devices called routers or gateways. Each time your email passes through an active device it is called a 'hop' - just like in air travel, you can take a direct flight or have several layovers (hops). The more hops the longer it takes to arrive. In the world of computers and telecommunications 100 millionths of a second can make a tremendous difference for many companies in terms of time and money. Thus, gaining connectivity to fiber in the Pacific Crossing building puts Grover Beach one hop from Asia, closer than anyone else in the United States.

"The specter of infinitesimal delay is why, when the Philadelphia Stock Exchange, the nation's oldest, upgraded its trading platform in 2006, it decided to locate the bulk of its trading engines 80 miles — and three milliseconds — from Philadelphia, and into NJ2[data center located in New Jersey], where, as Thomas notes, the time to communicate between servers is down to a millionth of a second. (Latency concerns are not limited to Wall Street; it is estimated that a 100-millisecond delay reduces Amazon's sales by 1 percent.)"⁴

Simply put if Grover Beach can provide low cost real estate, a good labor pool, fiber to the building, and one hop to Asia it can become a magnet for specific companies with lots of money to spend on new facilities and employees. Having the City meet these criteria is important to companies storing and moving large amounts of data between North America and Asia; financial information and transaction companies (Bloomberg, Visa), social networking (Facebook, AOL/Bebo), content delivery (Google, Yahoo), and customer service organizations (Eleutian Technologies). Attracting these kinds of companies to the City will bring higher paying head of household jobs, increase property tax revenue, and attract other companies. It will provide an environment that will foster innovation and entrepreneurship which will in turn create more jobs and income in the community as these companies grow and succeed.

⁴ http://www.nytimes.com/2009/06/14/magazine/14search-t.html?pagewanted=4&_r=2&emc=eta1



An aspect that makes this project possible is that the real estate around the Pacific Crossing's building consists mostly of parcels that are either underutilized or are vacant and ready for construction. These could, in time, be used to develop industrial parks to house these companies. Not only would these businesses be close to the landing station, they would bring high paying head of household jobs to the City. These employees would also spend money in Grover Beach on goods and services during the day. Most likely many would choose to live and work in the same community and they will by houses and become residents too.

Because of access to fiber and hydroelectric generation, The City of The Dalles in Oregon was able to attract a Google data center facility that cost \$600 million to build and provides up to 200 direct jobs in a town of 12,000 people. In another case, the town of Ten Sleep, Wyoming (Pop. 300) and several other even smaller towns of the Big Horn Basin have placed fiber out to the "middle of nowhere". Due to the community's coordinated effort to provide broadband resources, a company such as Eleutian Technologies is able to open their global headquarters in Ten Sleep. Eleutian has hired 348 teachers, which represents the entire available workforce in the Big Horn Basin, with wages at one time ranging from \$15 to \$23 per hour. More information about the Big Horn Basin and Eleutian Technologies is later in the report.

4 Case Studies - Current Municipal Broadband Projects

There are over 2,000 wired and wireless broadband initiatives in some stage of development in the United States. Below are case studies of local and national endeavors and an analysis of what has been learned from their experiences.

4.1 FTTH Council

The FTTH council is a Web-based nonprofit devoted to spreading the knowledge of fiber-optic systems' capabilities, helping towns expand their broadband networks to the home. The FTTH council said there are about 40 to 45 municipal systems in some stage of deployment that are similar to Kutztown's (see below). The FTTH Council is a great resource for information going forward.

Besides municipal systems, Verizon has taken the biggest leap (75% of the market) into the FTTH industry with more than \$20 billion proposed for FTTH systems none of which will likely ever find their way to smaller markets such as Grover Beach.



4.2 Lompoc, CA (Pop. 41,103)

Background: In 2003 the City of Lompoc issued a Request for Proposals (an RFP) for a community broadband initiative. The winner of the RFP put forward a \$23 million proposal to start with a wireless network and backfill the network with fiber to the home (FTTH) throughout the city. Lompoc has its own power utility and the broadband ISP was going to be part of the utility department. Being the power company gives Lompoc a unique advantage by having control over access to the power poles and underground utilities and being able to piggy back on current infrastructure, capital improvements, and its existing billing system.

The project did not go as planned and after spending \$3 million the city took over the project to try and salvage it. No fiber has been laid nor connected to as they could not get the backhaul they needed from Level 3 Communications. The backhaul the city was offered cost \$40,000 per month, which was not viable for the city. Reasonable access to backhaul was not researched nor negotiated prior to beginning the project. This ended the fiber portion of the network.

Currently: Rich Gracyk has been a city employee for 18-years having worked in a variety of roles related to information services (IS) functions. He was assigned to turn the project around a year and a half ago and has done an admirable job in a short time. Today the wireless broadband income covers its costs. The department is operated with 3-1/2 full time equivalent staff members (FTE's - 1 manager, 2-1/2 techs). The city's network has ~200 wireless access points servicing 1,000 subscribers.

The City of Lompoc has no intention of doing any fiber work even if they could get a reasonable deal from Level 3 Communications. With changes in the competitive landscape, i.e., once the city started down this path, the commercial service providers started to take in interest in upgrading their services in Lompoc and improved coverage, the city now finds itself serving the



lower end of the economic scale rather than appealing to a broader scope of residents and businesses than it had hoped for.

The economic impact is tremendous for low income people lacking the credit and banking history required by companies like AT&T or Comcast Cable. If a house has power meter then the residents qualify for LompocNet's services and the residents get their wireless Internet service bill on their utility account. This in and of itself is of economic benefit by making online resources available to those currently not online.

4.3 Wilson, NC (Pop. 47,380)

The City of Wilson, North Carolina, has a fiber project called Greenlight which at a cost of \$28 million provides triple play services to the businesses and 48,000 residents within the city's 23-square mile limits. There are currently 3,000 subscribers after less than a year of service.

After the successful deployment of Greenlight the entrenched telecommunication companies and service providers tried to get legislation passed at the State level that would forbid other municipalities from creating public broadband networks. The threat to the incumbent carriers' business is significant, enough for them to take considerable action. The legislation lost but the lobbyists are back with new legislation and more money to fight against municipal fiber projects. Many county and city governments in North Carolina have written letters to state legislators know they are against the bills and any attempts to stop municipal broadband networks from flourishing

"Our city council believes that broadband is an essential utility in 2008," said Wilson spokesperson Brian Bowman. "Wilson has a history of tobacco and textiles, and while they're still important, they don't carry the weight they used to. We believe that broadband is a critical tool that we'll need to continue attracting new jobs to the area."



Bowman said city officials first approached private companies—including Time Warner and local phone provider Embarq, which offers DSL in Wilson—and asked if they would be willing to build a fiber network. The private companies declined. In 2006, the city council voted unanimously to move ahead on its own.⁵

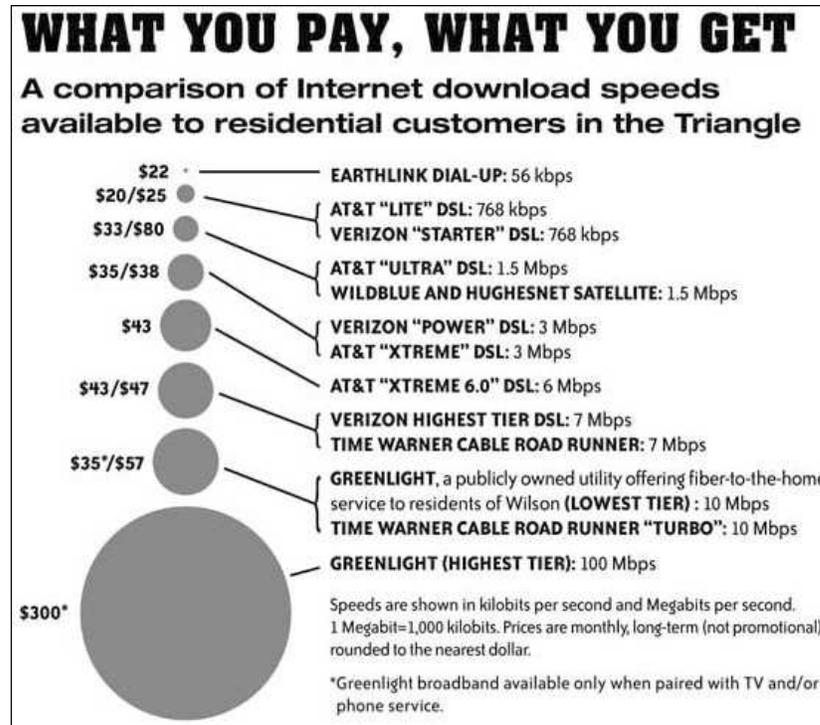


Figure 1 Comparison of Greenlight’s pricing and bandwidth to its competition

As you can see from the illustration above, Greenlight’s lowest priced service offering comes in price competitive with the incumbent carriers’ mid-level services while being bandwidth competitive with the incumbents’ highest tiered services. Greenlight offers 10 Mbps to start it goes as high as 100 Mbps for \$300 per month – an unheard of retail price for bandwidth. Keep

⁵ 18 JUN 2008 by [Fiona Morgan](#), IndyWeek.com

in mind this is symmetrical bandwidth, which means download and upload speeds are the same. This is a significant differentiator between fiber/wireless and the competition of copper/cable.

4.4 Kutztown, PA (Pop. 5,067)

“First hatched in 1996, the Hometown Utilicom network in Kutztown was designed as a ‘talking’ electric system, where if a transformer malfunctioned, it’d communicate with the main system and be easy to trace”, said Frank Caruso, Kutztown’s director of information technology.

But now, the system services more than 1,000 households with Internet and cable, Caruso said. He said the system covers the entire 1.5 square miles of the municipality and there are about 2,200 electric meters in the area, so Hometown Utilicom serves 49 percent of the people in Kutztown. By comparison, incumbent carriers consider 20% to 30% to be a good market share.

Caruso said the borough’s total investment in the project has been about \$8 million since its inception, and the services are available to everyone within the borough. Though some people elect to stay with the original service provider, they still get to enjoy up to 50% reduction in price and increased services they would otherwise not have – thanks to healthy competition from the municipal network.

The money invested in the project didn’t come from a tax hike either. It came from a taxable bond that allows private companies to purchase and use the fiber lines and transfers from the borough’s Electric Service Fund. This debt could be repaid if the Kutztown’s town council decided to do so, Caruso said.”⁶

⁶ 06 JUL 2008 by Bryan Schutt, Carroll County Times



One issue they did run into that affected their growth was instead of budgeting for the total cost of project the Kutztown council decided to budget in phases. Over time there are changes to councils, opinions, and attitudes so moving from one phase to the next took more time and effort than it should have and slowed down development of services and the network. This in turn slowed growth opportunities and additional residual income.

A 2004 feasibility study prepared for the local council reported that the system's revenues covered its costs, and its financial plan was on track. The network has lowered costs by 40% for its subscribers. The project has been so successful that in 2003, the city won the Governor's Award for Local Excellence.

Hometown Utilicom has 1,000 metered customers but Caruso says it's a misleading number that the competition likes to point at to show Kutztown's project is not successful. Hometown Utilicom offers multiple services, including third party, so one meter can have multiple services subscribed to it. Additionally one meter can service an apartment building of 30-units.

Hometown Utilicom sells 4,000 services per month and make \$63,000 - \$68,000 per month or \$800,000 per year. This just covers the costs to operate the system which takes (2) fiber certified field techs, (1) customer service representative (CSR), (1/2) IT Coordinator, and (1/2) manager to run the operation. Caruso has two other people in the city utility department at his disposal during periods of peak demand. Caruso also mentioned that they have ~50% market share, where 30 to 35% is considered good performance.

They project that in the next two years they will start putting cash back in the boroughs fund – tens of thousands per month. However, Caruso pointed out, the city administrator budgets a percentage of all unrelated city personnel and monthly expenses to the Hometown Utilicom



department. Also not factored into the profitability of his department is the cost savings from no longer paying for commercial IT services that the city now provides to itself. Prior to implementing the fiber services the city was paying \$6,000 per month for T1's and several thousands more for local and long distance phone services. Now they pay nothing for internal bandwidth usage and have significantly lowered their long distances costs. A detailed cost accounting of the department taking in all the economic benefits reveals a profitable enterprise with room to grow and contribute to the city fund.

4.4.1 Economic Development in Kutztown

Real Estate – Caruso said the city can point to one residential development of 700 units that was built just outside of city limits because the developers had fiber as a criterion and would only buy property with easy access to it. Kutztown has 2,200 power meters in its utilities district so adding 700 new homes adjacent to the town significantly increased traffic to local stores and businesses as well as increased the value of existing homes.

Business Attraction – A television post production studio relocated from California to Kutztown because they could get low cost access to high-speed bandwidth – something very critical to a company that needs to move very large files quite frequently. This brings additional jobs to the area as well as increase in hospitality services when visitors come to view or work on editing projects with the company.

Several businesses also enjoy the benefit of high-speed virtual private network (VPN) and high volume, repetitive data backup capabilities; benefits they did not have with the incumbent carriers because of lack of bandwidth or too high a price for what they needed. This is important for chain or multi-facility businesses or any business with a desire to backup off-site on a routine basis tend to face financial and technical hurdles to get the job done. Expense is increased due



to the need for extra equipment and the required business class services that go with custom broadband applications. These companies were able to set up a reliable, robust backup system for much lower costs and engineering time thanks to fiber.

Savings to the Community – Another economic impact that should not be overlooked is cost savings for the community. Providing lower cost - higher value services saves money for customers and forces incumbent service providers to upgrade services and reduce prices - in some cases by 50%. The city estimates the financial impact to be \$2 million over the last two years; money that can remain in the community rather going into the pockets of a distant corporation.

Comcast, Verizon and others were invited to participate and provide their services over the municipal fiber. They all declined and started beefing up their hardware and lowering their prices. In today's tight market they may have a different tune and be more open to cooperative competition.

4.5 Santa Monica, CA (Pop. 88,050)

Here is a summary of comments from an interview with – Jory Wolf, CIO, City of Santa Monica said, “In 1998, the city of Santa Monica created a telecommunications master plan and decided to stop paying Verizon \$4.2 million annually by creating a fiber network that would serve the city, college and schools. They currently have 50 facilities on that network and have reduced our Verizon bill from \$4.2 million to \$1.3 million.

The city pooled all of its funds from all the departments and, through our local cable franchise, we paid Adelphia - it was Adelphia at the time - \$530,000 and built the fiber network. This has allowed them to not only save money, but also has taken us to the next step with new applications that we wouldn't be able to use without robust communications.

It also provided opportunities for us to lease our fiber to businesses and co-location leases to businesses thus they have taken on a position of not just serving our internal city departments, but the community as well.



Virtualization projects have enabled them to lower the costs of our infrastructure, and improve our services and security. They now have a robust enterprise model that includes mirrored SANs using a fiber channel, VMware, virtual servers and blade enclosures and they are now following ILM [information life cycle management] and ITIL [Information Technology Infrastructure Library] for asset and desktop management.

The broadband has also enabled the other applications we've deployed. Some of which would not have been able to do accomplished without fiber. And that includes the 17 Wi-Fi hot zones we implemented throughout the city in public spaces. We've implemented 150 public video cameras for security purposes on our promenade, pier and all of our parking structures.”⁷

Eric Mueller, IT Director of Santa Monica added, “Santa Monica is feeding the video into a system developed by Indigo Vision for situational analysis”. So if there is an incident they play back to the date and time and then run that software in some manner of which he was not clear.

More importantly, he stated that both Google and Microsoft are leasing strands of dark fiber from the city. The revenues received from the lease payments has allowed them to become cash positive on their investment and given the chance to do it over they would change absolutely nothing.

4.6 Provo, UT (Pop. 105,166)

When construction finished in August 2006 Provo, Utah’s iProvo was the largest municipally owned broadband network in the United States. After 7 years of development using a three phase approach and \$40 million in borrowed capital the network now reaches every resident and business in Provo and has over 10,000 subscribers (as of December 2007). Provo is a city with a population of 105,000, has 30,000 residences, and is home to Brigham Young University.

⁷ <http://www.govtech.com/pcio/articles/371845>



However, in June 2008 the city council approved the sale of the network to one of its commercial customers for \$40.6 million. This covered the initial investment but not the estimated loss of \$14 million over 7-years of operations. However the deal does not put money back in the city's accounts, rather it offloads the debt payment burden to the private company leaving the city still at risk on the loans.

“Provo has lost millions on the iProvo venture, in large part because of the wholesale business model required by state law. Though the city owned the fiber it was not allowed to be a service provider.”

- Joe Pyrah – Daily Herald (Utah Valley) Monday, June 30, 2008

iProvo was setup as a public/private venture (wholesale model) with the city managing and maintaining the fiber network and third party private companies providing services over the network to businesses and consumers. Several issues are to blame for having to sell the network, including state laws, but the issues still come back to high expectations about revenue and subscribers and reaching milestones later than expected. The business plan anticipated having 10,000 subscribers by December 2005, not 2007, and iProvo expected 75% of their customers to sign up for the triple play services (phone, Internet, television) but in actuality only 17% of customers signed up.

“Provo’s ongoing troubles are in line with my conclusions in a policy study on iProvo published in late 2006 by Reason Foundation (reason.org/ps353.pdf). My basic findings were:

iProvo was behind on its business plan and would continue to be forced to borrow more money.

iProvo’s wholesale plan depended heavily on the performance of its retail partners.

Retail pricing for services using iProvo was not substantially different enough to prompt consumers to migrate away from incumbent service providers.



iProvo was not contributing significantly to the growth of broadband in Provo.”

- Steven Titch, “iProvo Revisited:
Another Year and Still Struggling”,
Reason Foundation, www.reason.org

The city of Provo had the means to raise \$40 million and spent 7-years deploying their network and after securing 10,000 customers was not able to make it work. This project deserves more investigation to find out what could have been done differently to achieve better results. We will continue to follow up and learn more about the situation.

4.7 Ten Sleep, Wyoming (Pop. 300)

Ten Sleep, Wyoming – population 300 - is located in the Big Horn Basin of Wyoming and has fiber optics running throughout its rural telephone services district. Ten Sleep has fiber as do most of the communities in the Big Horn Basin. When the rural telephone company started merging with other rural companies they decided it was economically viable to upgrade the ancient copper to fiber and provide the best available digital services to their traditional rural client base.

4.7.1 Business Attraction: Eleutian Technologies

Kent Holiday’s in-laws live in Ten Sleep and repeated visits by Kent had him falling in love with the area. Ken’s day job was as a telecom executive in Korea but he was ready for something new. He noticed how much money and time Koreans spend learning English and felt he could save them money and create part-time jobs in the United States for teachers. He envisioned a teacher in the United States with a home computer and high-speed connection capable of delivering high quality streaming video connecting to students in their homes in Korea – where high-speed broadband is ubiquitous. As it so happened he was able to start his new company in Ten Sleep and hire from surrounding areas thanks to the vision of the Tri County Telephone Association and their implementation of fiber.

(http://www.tctwest.net/Company_History.php).



His company, Eleutian (<http://www.eleutian.com/>) has received \$1.5 million from South Korean venture capital company Skylake Incuvest. Eleutian has partnered with CDI Holdings of South Korea, a market leader in English education, to teach conversational English to South Korean students via high-speed videoconferencing.

If the City of Grover Beach had fiber and high-speed Internet access available throughout the city then citizens of Grover Beach, including recently laid-off teachers, could find themselves working from home for Eleutian.

In a conversation with Rachel Casteel, operations manager at Eleutian, we learned that Eleutian Technologies is looking for quality teachers who will work offset hours to accommodate the time difference between here and Korea. They must also work for \$12 an hour part-time to start with and there are some fulltime jobs that start at \$25,000 per year and ½ benefits. Currently they are booking 8,000 training hours per week and have a backlog of demand. The company needs a new training center with access to a rich labor pool of teachers and retirees. There are 348 teachers currently working approximately 23 hours per week out of the Big Horn Basin in Wyoming and Provo, Utah teaching English to Koreans in Korea.

When the company began, and up to a few years ago, they were paying \$15 starting and up to \$23 per hour for part-time teachers. But they got hit with a double whammy of the declining economy and flip in the exchange rate with the Korean Yuan. This forced them to lower their pay across the board. They are currently locked into contracts and have made changes to new ones to make up for the lost revenue. While this has an impact on their financial performance and their ability to pay better they are still busy growing and providing jobs.



4.7.2 Training Center

A training center is similar in structure to a call center; 20+ cubicles with video capability, a training/conference room, and offices for up to 6 people. Shifts start in the late afternoon and end in the early morning hours to accommodate the Asian time zone. Eleutian has 8 small training centers in operation in the Big Horn Valley in Northern Wyoming and one large center in Provo, Utah – thanks to iProvo’s municipal fiber.

Teachers work for 6 – 12 months in the training center before they are allowed to work from home. The cycle may shorten as a result of improved training and hiring teachers with better technical skills. She said most of the problems they’ve had with home teachers are technology related. She said the retirees tend to have a more difficult time if they aren’t already computer savvy.

Additionally, Eleutian Technologies is buying 40 acres in the town of Ten Sleep where they currently have 18 employees and will build housing to meet demand for more employees moving from outside the area. Their five year growth projections are significant with up to 50 corporate employees managing thousands of teachers and customers.

After providing demographics information about Grover Beach and the Five Cities area, Casteel felt Eleutian could theoretically open a training center with up to 6 fulltime employees and 100 to 150 teachers. We estimated they would need 5,000 to 7,000 sqft to adequately house a training center. Furthermore, she liked the idea of being in a facility with other technology startup companies.

Casteel expressed an interest in learning more about the fiber project and find out if there is an opportunity for them to expand in Grover Beach.

4.8 Powell, MT (Pop. 5,373)

In the town of Powell, MT, even though construction of the FTTH network (PowellLink) had only recently begun, Dave Reetz, head of the Powell Valley Economic Development Alliance, said the city began seeing its potential for bringing a brighter economic future to the community. Local infrastructure is critical to many individuals and companies making relocation decisions since connectivity is often near the top of the list, along with a trained labor force that companies look for. The ability to connect to global markets from Powell attracted the attention ReSource



Inc., which develops automated retail packaging and shipping systems. The company is headquartered in Denver but decided to locate tech support for its software in Powell. The broadband capability in Powell is a key factor in ReSource’s deciding to relocate because the FTTH network is two to three times faster than the network that serves its headquarters in Denver’s Technology Center.

Powell is now also well positioned to recruit data center operations – a priority recruitment target selected and supported by the state’s economic development division, the Wyoming Business Council. Beyond economic development, Reetz also sees applications for FTTH in health care, education and access to government.

Powell is a great model for other communities exploring public-private partnerships. It proves that cities have other options to going it alone, even if their incumbent service providers are not willing to invest in critical broadband infrastructure.⁸

PowellLink is a privately funded network that will be owned by the city after 20 years. “A large part of this whole project was putting a funding model together,” he [Mayor Scott Mangold] said. “We did not want to spend any taxpayer dollars.” The \$4.9-million bond project was a joint venture between the city of Powell and the Northwest Joint Powers Board, along with private sector partners. “We didn’t use any city money,” Mangold said.

The network, reaching 95 percent of homes and businesses in the city, provides high-speed Internet, TV and telephone service. Mangold said he hopes the network will help existing

⁸ “Powell, Wyoming: Creating A New FTTH Model”, by Ernie Bray, PowellLink, August/September 2008



businesses while also being a beacon to attract outside businesses owners to Powell. That may take time.⁹

The details of this deal deserve more exploration if the City of Grover Beach decides to pursue a broadband network.

4.9 Summary

From a sampling of municipal deployments and talking directly to several individuals whose cities' profile matches Grover Beach's. Most successful deployments were treated as city utilities and built out organically letting the success of each phase dictate moving forward to the next. They also tend to be smaller communities from a few thousand to 70,000. The pronounced failures or less than adequate returns tend to be high profile large municipalities with the ability and credit to raise large amounts of money to engage highly speculative business undertakings without well defined benefits for the community.

Fiber technology and ability to deploy networks have decreased in costs and become more flexible while services delivered digitally and demand for those services has increased significantly. However, a common theme is that the incumbent carrier community is often unwilling to invest in infrastructure improvements in smaller cities because the margins are not as great as the big cities.

While there are many great stories about economic development being facilitated by municipal fiber the one area of common success is savings to the community by offering lower prices and forcing the competition to lower their rates.

⁹ Tessa Schweigert, Thursday, 22 January 2009, The Powell Tribune, <http://powelltribune.com/index.php/content/view/677/2/>



4.10 Cost/Benefit

Any community taking on a municipal broadband project of any size must define the benefits to the community and the cost it is willing to undertake to deliver the benefits. Some cities are happy having the network income cover its costs and for the city and its' residents to enjoy price savings and better services. These cities have a revenue neutral business model.

Other cities desire to deliver benefits and put money back in the city treasury. These cities actively promote economic development with fiber optics being the center piece to their strategy.

4.10.1 Revenue neutral

A fiber network connecting city facilities can save money and increase employee effectiveness by providing a high-speed broadband network and the robust services. Savings on current information technology (IT) expenses can offset the monthly expenses of managing the network and provide net savings to the city.

Many cities were able to save significant dollars providing communications services internally. The Borough of Kutztown saves up to \$10,000 per month alone on IT and communications costs. The city of Santa Monica was paying Verizon \$4.2 million per year and cut the expense to \$1.3 million thanks to having control over its communications network.

The City could put the infrastructure in place, open the fiber conduit up to third party ISP's to sell service over, and have the ISP's, property or business owners cover the cost of installation to the home or building.

4.10.2 Positive cash flow

There are two ways to achieve positive cash flow: middle mile (FTTN) or last mile provider (FTTH).

A middle mile provider follows a wholesale business model and focuses solely on managing and maintaining the broadband network to the node. The network is opened to commercial Internet service providers on a wholesale basis and they, in turn, provision the consumer. The City gives up revenue opportunity but also gives up the overhead of a retail customer service based business and the expenses and risk that go



with it. Participation and partnership with the incumbent carriers is required to achieve the greatest benefit for the community.

If the City takes the last mile, or FTTH, approach it becomes an ISP and would have to offer 'triple play' services to the community in order to compete and make money. The City is now competing with Charter, Verizon, AT&T, etal. A fiber network makes the city competitive in the broadband market and, if successful, can create positive cash flow for the city. However it also requires greater capital investment and increased monthly overhead while providing no guarantee of customers.

5 Current Conditions and Economic Development

The City has identified two areas for economic development as part of its redevelopment plan. The first area, Improvement Project Area (IPA, see green area on map below) is composed of mixed use residential/office space, retail and tourism related businesses. The second area is the Industrial Enhancement Area (IEA, see red area on map below) bordered by Farroll Road, South 13th Street, Highland Way and South 4th Street.



Figure 2 Map of the IEA and IPA, source Google Earth®

The City's stated objectives for these two areas are: "Grover Beach's industrial area south of Farroll Road should be preserved to support Grover Beach's job base. However, in the

industrial areas immediately to the north and south of Grand Avenue, a mix of uses, including commercial, residential, workforce housing and light industrial, should be allowed. Live Work units should also be allowed particularly as a buffer between the industrial uses and the surrounding residential neighborhoods.”¹⁰

Below we will address how a high-speed broadband project can help with economic development in these two areas.

5.1 Improvement Project Area (IPA)

This area is anchored by Grand Avenue and Front Streets, the beachfront hotel and convention center, and the residential area south of Grand to Farroll Road. It is a developed area of mixed use businesses and residences with some lots ready to build and some buildings needing improvement.

Beachfront hotel and convention center – as a destination location for business events and vacationers there will be a demand for high-speed connectivity for the customers and for the resort itself. The ability to conduct high quality video conferencing is a must have to attract hi-tech corporate events and technology trade organizations to the convention facility. Local organizations like Softec and The DotNet Users Group are bringing technology trade shows to the area which are growing in scale. Having a venue that caters to hi-tech group’s right next to the beach will attract more people to the beachfront area.

Grand Avenue Corridor – extending from the hotel and convention center to Oak Park Road this is Grover Beach’s main street made up of retail and commercial businesses, grocery stores, restaurants, and banks.

Brad Forde Hi-Tech Industrial Project – Brad Forde is a local developer, landlord and property manager. He owns the block of lots on Front Street from Ramona to Newport Avenue. Currently there are three modern hi-tech office buildings and 7 additional lots ready to build similar buildings. The property has shadow conduit for fiber and the buildings are set up for a fiber network along with mechanical rooms for data servers and communications equipment. Given the proximity to the beach end of Grand Avenue and the intent and design of the buildings this is an area prime for software development, design engineering and startup companies. In speaking with the owner there is a possibility of creating a shared access business facility articulated in Task 1 of this project. Mr. Forde is already doing something similar with another building he owns and shared access is a selling point.

¹⁰ <http://www.grover.org/pdf/VisionPoster11x17.pdf>



Residential Area South of Grand Avenue – This area is mostly residential and mixed use and does not have a high concentration of businesses. If this area is lit up with fiber it will be of benefit to the residents by offering higher speed services than currently available and open the opportunity to work from home for companies like Eleutian Technologies.

NOTE: “Shadow conduit” refers to conduit pipes that have been buried in trenches and do not have fiber running through them. Many times the conduit is not connected to a network, but is laid in anticipation of eventually being connected and having fiber run through it. A technology master plan would show where to place shadow conduit when roads are opened up. “Dark fiber” refers to conduit with fiber cable that is not activated or “lit up”, thus, dark fiber.

5.2 Industrial Enhancement Area (IEA)

The area around the Pacific Crossing building is made up of a variety of commercial and light industrial properties. Businesses tend to be automotive repair and maintenance services, several graphics companies, storage facilities and a host of light industrial and service based businesses.

Existing buildings – The area is a mixture of building types with the vast majority being over 20-years old. It is an area ripe for redevelopment into a technology hub for the Central Coast. Many of the buildings are not well suited for technology companies and could be torn down and built to specifications or a master plan.

Lots open for construction – Along Huston Street there are several vacant lots ready for development. Each lot is approximately 40,000 sqf and current market price is about \$13/sqf. This is advantageous when talking to larger companies who would prefer to build to specifications rather than modify or tear down.

Potential Industrial parks – Bringing fiber to the area will increase the potential for attracting businesses that have a need for low cost high-speed fiber and especially need one hop to Asia. Possible companies are social network sites targeting the Asian market, data backup and recovery companies, customer service organizations. The financial markets may also take an interest in being several milliseconds electronically “closer” to Asia.



5.3 Residential and Business Internet and Telephone Service Providers

Grover Beach and most of the Central Coast has limited choices when it comes to Internet and telephone services. While we are on the Highway 101 corridor and at the mid-point between Los Angeles and San Francisco, our population density and rural development makes the region less attractive for service providers to make the capital equipment investments required to provide the latest and greatest in technology and services. If the Central Coast does get upgraded it can lag anywhere from 5 to 10 years behind major metropolitan and suburban areas in the state.

The two predominant providers of television, telephone and Internet connectivity are AT&T and Charter Cable. Residents are able to get satellite services from DirectTV and the Dish! Network. Verizon offers Internet and wireless communications services as does AT&T's wireless division. AT&T's fiber program is marketed as U-verse and Verizon has a similar offering called FiOS. These are technically advanced entertainment video and bundled services offers which will likely never be available in this region. Charter keeps upgrading its network with fiber backbone and higher capacity coaxial to the home and at some point one would think they'd start replacing coaxial with fiber and enjoy the benefits of lower cost technology. Verizon does not offer services other than wireless in the area (<http://www.dslreports.com/gmaps/fios>).



Providers offering services in Grover Beach:

Internet: AT&T, Charter Cable, surfnet, DirectTV, Dish! Network

Telephone: AT&T, Call America, Telepacific

Television: AT&T, Charter Cable, DirectTV, Dish! Network

Cellular: AT&T, Verizon Wireless, Cingular, Phone and Wireless, Sprint/Nextel

Business ISP: AT&T, Charter Cable, Arrival Communications, Call America, Digital West, Impulse Internet

5.4 Residents, businesses and local employees

Companies who would most likely move to the area would bring or employ a work force that will hold higher education degrees and, as a result, would raise the standard of living. Having residents who seek the amenities and services found in larger, metropolitan cities will open up doors for businesses to cater to this type of person. The progression of new individuals coming to Grover Beach would push the business owners and consumers in the City to a higher economic level generating more prosperity in the community.

5.5 Business Growth and Relocation

Economic development and redevelopment seek to help existing businesses grow, help new businesses start, and attract business from outside the area to relocate or open satellite offices.

5.5.1 Eleutian Technologies

Eleutian Technologies is planning on opening a 10,000 sqf training center that will have 6 fulltime employees and from 100 to 150 part-time employees comprised partially of credentialed teachers and retirees with teaching skills. Based upon discussion with Eleutian, Grover Beach is an ideal location except it lacks fiber connectivity. This single business could bring over \$3 million per year in salaries into the local economy – money coming from Korea to Grover Beach via the trans-Pacific fiber cable.

Additionally, the proximity to a convention center would give reason for the company to hold events in Grover Beach to bring together their remote teaching staff and their clients from Asia. The company is growing rapidly despite the weak economy and has a backlog of demand that is yet to be satisfied.

5.5.2 Silicon Valley Technology Companies

San Luis Obispo is host to several satellite units of large Silicon Valley companies. Most of these business units tend to be ‘black ops’ or ‘skunk works’ projects wherein they don’t want anyone to know they are in the area or what they are working on. Each is staffed by small teams (<15) of hardware and/or software engineers. They prefer to be on the Central Coast because of the availability of engineers from Cal Poly and the quality of life it provides to their carefully selected design and development teams.



Sun Microsystems, Adobe, AOL, and iRobot have small development teams of well paid engineers in the San Luis Obispo region. The Grover Beach lifestyle is very appealing to the type of employees staffing these teams. Having a technology friendly sector near the beach could be a motivator for companies to set up new operations in the City.

5.5.3 Google, Microsoft and Electrical Power

As mentioned before, the availability of fiber and inexpensive hydroelectric generation allowed The City of The Dalles in Oregon to attract a Google data center facility that cost \$600 million¹¹ to build and provides up to 200 direct jobs worth an estimated \$9 million in annual salaries.

Access to abundant and reliable power has become a significant issue for the growing data content and social networking companies. It takes tremendous amount of computational power to keep the digital superhighway humming along. This has led to Google and Yahoo! to buy and refurbish a hydroelectric dam in Oregon and build data centers on each side of the river.

Google and Microsoft alone spend billions of dollars on new data centers every year. However there is a new trend to get away from the monolithic data centers to smaller more environmentally friendly self contained data storage built in shipping containers. All these containers need is fiber, water, power, and low cost real estate to put them on. Grover Beach's temperate climate is ideal for keeping cooling costs down. With access to high-speed fiber directly connected to the Asian markets and designated low cost power many companies would find the Industrial Enhancement Area ideal for building data storage facilities.

The City could work with PG&E towards creating a redundant power grid similar to what has been installed for electric service to Silicon Valley to further increase the value of the industrial area. PG&E has indicated that they are willing to do the studies needed to estimate costs and to develop the plan needed to execute such a project.

5.5.4 Incubator - Shared Resource Business Facility

In conjunction with a building owner the city can help foster a business park that caters to Small Office - Home Office's (SOHO) ready to move out the home and small businesses just starting up. The business park would be setup like an incubator with

11

<http://www.nytimes.com/2006/06/14/technology/14search.html?pagewanted=1&ei=5090&en=d96a72b3c5f91c47&ex=1307937600&partner=rssuserland&emc=rss>



lower than market leases and easier/shorter terms with flexibility to add and eliminate space as needed. Rather than viewing it as an incubator it may be better seen as a 'shared resource business facility' that helps entrepreneurs and small businesses transition during times of growth and contraction. This is an approach that can be undertaken regardless of fiber installation. Fiber would be icing on the cake for a company requiring large amounts of bandwidth.

The author of this report operated an informal 'incubator' within a digital production studio started in San Luis Obispo in 2000. With extra space in a 5,000 sqf warehouse that was converted into a filming studio, editing suites, workshop and office space he was able to provide low cost - low frills space for the following companies, all of which are still in business 8-years later:

The founder of the company that became Shopatron which now employs close to 100 people in SLO. (www.shopatron.com)

20/20 Design a graphics design and media firm which now has 10 + employees in SLO. (www.2020designgroup.com)

AdMinds an advertising and marketing company that reached 8 employees at its peak. (<http://www.adminds.net>)

Provided a temporary home for Ground Control when it was started. Ground Control grew to over 50 employees and is now in Atascadero with 25 employees. (www.groundcontrol.com)

Several independent web developers that needed space to work together on projects.

The underlying premise for allowing each company into the studio was cross pollination of company skill sets, clients base and market niche. Each company used the services of the others at preferred rates and, if clients were referred, a sales commission was paid to the referrer. Having this type of working relationship also allowed each company to go after projects that included other company's abilities in its scope thus opening up more opportunities for all. A shared resource business facility is an environment in which new opportunities and jobs are created.

5.5.5 High Growth Companies

Recently MindBody Online of San Luis Obispo made the news by raising \$5.6 million in investment capital, receiving the Central Coast Small Business Award for 2009, and being ranked 59th on the "Top 100 Software Companies" list put out by Inc. Magazine for 2008. MindBody has close to 100 employees and occupies 17,000 sqf of office space



in San Luis Obispo. It has close to \$250,000 per month in local payroll – that’s money from outside of the county coming in the form of salaries.

MindBody started in 2001 in a garage in San Luis Obispo and when it had 7 employees crawling over each other the company made a jump into space at the San Luis Business Center (www.sanluisbusinesscenter.com). MindBody’s growth was positively impacted by the availability of flexible office space and access to a local collocation facility with fiber and virtually unlimited bandwidth. From there the 7 employee company grew from several hundred thousands in sales to 30 employees and several millions per year in revenue. Once they outgrew the office space they had the traction and income needed to move into space built out just for their needs and to accommodate their growth.

MindBody sells software as a service (SaaS) to the global health and wellness industry with over 4,000 clients in 42 countries servicing over 6 million end users - all hosted from a server cabinet located at Digital West Networks in San Luis Obispo. Had Digital West not been in the area MindBody would have had difficulty growing their business without making risky investments in the next level of bandwidth and servers they needed to grow their business while tying up capital and burdening them with significant monthly expenses.

With fiber hooked up to a multi-tenant building, refurbished warehouse space or a business park, the City of Grover Beach can create an environment that will foster the growth of other companies like MindBody Online or Shopatron.

5.5.6 Enabling Workers

Customer service organizations

Customer service organizations require high-speed bandwidth in order to leverage the cost savings of VoIP technologies in the creation of customer service centers. Available commercial buildings with high-capacity, low-cost bandwidth and a ready pool of entry to mid level employees will attract companies needing to outsource services or relocate divisions to lower cost of living areas.

Homeworkers - Homesourcing

Remote working and home sourcing are becoming more effective ways to manage workers, work flow and business operating expenses. A remote worker cannot be successful without high-speed and reliable bandwidth to their SOHO or small office space. The trend among remote, ‘knowledge’ workers is live video feed, VoIP and Software as a Service (SaaS) applications being operating over an always-on, always-high-speed bandwidth connection. More and more of the work force no longer commute to an office and are able to be effective from home.

When you call JetBlue Airlines customer service you are speaking to one



of 400 homesource workers living in and around Salt Lake City, Utah. The service representatives tend to be stay-at-home moms, retirees, and college students. The company has very low turnover and very high productivity. JetBlue has been nationally recognized for its customer service – all out of someone’s home with a high-speed broadband connection.

6 Government Codes and Regulations

6.1 Federal Government

6.1.1 United States Department of Transportation (USDOT)

Any roadways passing through Grover Beach that are the responsibility of the Federal DOT are required to have shadow conduit placed in them for access by private service providers.

6.1.2 Department of Homeland Security (DHS)

The Pacific Crossing building is a critical piece of the communications backbone between Asia and North America and as such is part of the DHS’s National Infrastructure Protection Plan (NIPP). The NIPP is a comprehensive risk management framework that clearly defines critical infrastructure protection roles and responsibilities for all levels of government, private industry, nongovernmental agencies and tribal partners.

If the facility is designated as a Critical Infrastructure or Key Resource (CI/KR), there could be DHS funds available to provide a certain level of security in and around the facility. This requires more research as so far research has not shown Pacific Crossing’s buildings as being designated a CI/KR.

6.1.3 Pacific Crossing Facility Security

Presently security is accomplished through “under the radar” anonymity of the facilities. References to their specific locations are removed from most of the public domain but we were able to find each facility without much difficulty. We assume the buildings follow common industry standards for structural hardening, such as little or no glass exposed directly to the outside, hardened walls that are tested to a specific blast resistance, perimeter video surveillance, etc. It should also be noted that these buildings are very slightly staffed and we have to assume that there may be occasions when there may actually be nobody on site and that the video surveillance is being monitored remotely.

Consequently, “real time” reactions may be impaired and any assistance that the Police Department of Grover Beach could provide would likely be welcomed. This presents an



opportunity for the Police Department to utilize a broadband network in an effective manner and to potential leverage this relationship with Pacific Crossing.

6.1.4 HR 2428 “Broadband Deployment Act of 2009”

This act compels any new road or highway and any lane additions or shoulder work to include conduit for fiber optic cabling. This conduit is to be sufficient to allow multiple carriers to run fiber. Roadway projects receiving federal funds are required to adhere to this act. The Secretary of Transportation and Chairman of the FCC are responsible for providing guidance as to what is acceptable to meet the terms of this act.

If the City of Grover Beach decides to move forward with laying shadow conduit, then it should assign a staff member to work with other agencies doing roadwork within City limits to make sure shadow conduit is laid as per the network map. By compelling all federally funded roadwork to comply would further reduce the cost to the City to deploy a broadband network. This Act provides another tool to create municipal ordinances to further a technology master plan for the community.

(<http://thomas.loc.gov/cgi-bin/query/z?c111:H.R.2428:>)

6.2 State Level Legislation

In several states incumbent carriers’ lobbyist pushed legislation effectively trying to keep municipalities from owning fiber. The threat to their business model is significant enough for the industry to fight it through attorneys and attempted legislation

6.2.1 Public/private issues

Private companies are pushing legislation at county, state, and national levels to fight the proliferation of municipal broadband projects. They see the model as a real threat to their businesses and are taking action to stop them.

One compromise solution used in several cases is the wholesale model whereby the municipality installs, operates and maintains the network and charges wholesale access rates to third party private companies to offer retail services (Provo, UT). In some cases the municipality has setup its own ISP or television services to compete against the private companies. (Kutztown, PA)

6.2.2 North Carolina

Anti-municipal broadband network legislation pushed by telecommunication and cable operators is currently wending its way through the North Carolina legislature. The same attempts failed in 2007 but they are back in 2009 with modified bills and more money to



support their cause. The city governments continue to fight back and county governments joining in the fight as well.

House Bill 1252 and Senate Bill 1004 are identical in verbiage and intent; the bills cause the government to analyze municipal broadband networks and determine their actual impact on competition, economic growth, and determining if municipalities are on a level playing field with private enterprise. The bills themselves do not threaten municipal networks but it does get the government to do free competitive analysis for the incumbent carriers.

6.2.3 Monticello, Minnesota

A regional carrier, TDS Telecom, sued the city of Monticello for wanting to create their own broadband network. The suit slowed down the build out and allowed TDS, the carrier, to build out the very network they stated they never intended to build. Recently the Minnesota Supreme Court struck down the case and the appeal and said the city has the right to build their own network and compete against TDS. The project is funded with \$26 million in revenue bonds backed by investors, not taxpayers.

<http://arstechnica.com/tech-policy/news/2009/06/monticello-appeals-court-win.ars>

6.3 State of California

Governor Schwarzenegger has issued several Executive Orders (EO) meant to make the expansion of broadband a priority of the State and cause the State to make its resources available to commercial broadband carriers. For example, state buildings are available for wireless providers to place antennas on.

6.3.1 Executive Order 23-06 “Expanding Broadband Access and Usage in California (Revised)”

In 2006 EO 23-06 created the California Broadband Task Force which brought together public and private stakeholders to remove barriers to broadband access, identify opportunities for increased broadband adoption, and enable the creation and deployment of new advanced communication technologies.

Led by the Business, Transportation and Housing Agency (BTH) the task force came up with recommendations for the State to enable rapid growth and access to fiber or high-speed broadband.

Other key points to the Executive Order:



Encourage public/private partnerships between stakeholders
All state agencies to include conduit in infrastructure projects
Streamlined right-of-way (ROW) permitting
Wired broadband providers will be charged actual costs for State ROW usage

(<http://gov.ca.gov/index.php?/print-version/executive-order/4585/>)

6.3.2 California Broadband Task Force (CBTF)

This Task Force was created by Executive Order 23-06. It references CPUC 709, EO

The CBTF adopted three key goals:

California must ensure ubiquitous and affordable broadband infrastructure, made available through a variety of technologies to all Californians.

California must drive the creation and use of applications that produce the greatest economic, educational, and social benefits for California's economy and communities.

California must construct next-generation broadband infrastructure, positioning California as the global economic leader in a knowledge-based economy.

(<http://www.calink.ca.gov/taskforcereport/>)

6.3.3 California Public Commission Rule 20A

Grover Beach has experience with California Public Utilities Commission Rule 20A that governs undergrounding of existing utilities and the responsibilities given to the local government. Rule 20A states: The determination of "general public interest" under the following criteria is made by the local government, after holding public hearings, in consultation with the utilities.

- a. Such undergrounding will avoid or eliminate an unusual heavy concentration of overhead electric facilities;
- b. The street or road or right-of-way is extensively used by the general public and carries a heavy volume of pedestrian or vehicular traffic;
- c. The street or road or right-of-way adjoins or passes through a civic area or public recreation area or an area of unusual scenic interest to the general public; and
- d. The street or road or right-of-way is considered an arterial street or major collector as defined in the Governor's Office of Planning and Research General Plan Guidelines.

These guidelines are sufficiently vague that almost any pole and pole line can be considered as a candidate for required undergrounding. It is essential to understand that once an

undergrounding district has been declared it is very difficult for the utility companies to place new facilities on the poles or to add any new agencies to the poles. This creates an opportunity for the City to declare an undergrounding district and to then become a member of an undergrounding consortium which greatly reducing the cost of the installation.

6.3.4 California Public Utilities Commission

Public Utilities Code Section 709 “Copper Retirement Rulemaking “ –

This Section of the Code requires incumbent carriers (ILEC’s) to sell the abandoned copper infrastructure left behind after a fiber upgrade. This allows local carriers (CLEC’s) to purchase the copper and continue to provide their services to small and medium business traditionally overlooked by the incumbent carriers.

This is an additional government code to be used to Grover Beach’s advantage should it decide to build out a city wide broadband network.

<http://www.prweb.com/releases/2008/11/prweb1620254.htm>

6.4 Local Ordinances, Municipal Codes and Public Utilities

Having a host of federal and state laws and executive orders in its arsenal the City of Grover Beach should review the ordinances and agreements of communities with successful fiber deployments. The City of Dublin, OH is a model candidate.

6.4.1 Local Ordinances

A potential new ordinance could require undergrounding of new and upgraded aerial lines for communications carriers. This serves the purpose of clearing up the cluttered skyline and moving overhead cables to underground conduit. When the incumbent carriers apply to upgrade they will need a permit to trench. At that time the City can require (using federal and state law as precedence) that they put shadow conduit in for the city’s use. Alternately the carriers can sign up with the city’s network and work in partnership to get the aerial cables in the ground and connected to the home.

6.4.2 City Utility District

Most successful municipal fiber projects have been cities under 70,000 in population with an existing utilities department. Since the city has a utilities department that physically touches every resident and building in the city, it has the ability to lay a



broadband utility over its existing infrastructure and not have to start from scratch. Anytime water or sewer line trenches are opened shadow conduit should be engineered to go in when the trench is refilled.

Grover Beach’s Waste Water System program is responsible for operating, maintaining, cleaning and repairing the sanitary sewer system. This includes lift stations, mains, and a metering station. The City has joined the South San Luis Obispo County Sanitation District. The District provides treatment of all effluent. Additionally the city manages the water delivery system, metering, and billing.

Further analysis is required to determine how to effectively integrate broadband with water and waste systems and what benefits can be derived from doing so.

6.4.3 Meter Reading and Realtime Usage

Water conservation is critically necessary given the drought conditions we’ve been living under for the last 3-years and, all too frequently, over the last 20-years. The city could analyze how fiber communications and remote flow control valves on the water meters can improve management of water resources, especially in these critical times.

With such a metering system, the City water manager could literally see the flow of water through the community in real-time. Software can monitor water usage and flag a human when usage is outside of accepted parameters anywhere in the city. This would make water conservation code enforcement effective and immediate. Imagine remotely closing a flow control valve on a meter that is over using or sending an enforcement office over while an infraction is occurring. This eliminates the costly truck roll to turn off a meter saving the city time and money and saving the community its precious resource of water. It also means enforcement will be immediate and effective.

Upon further investigation it may be possible to offer meter reading service to private utility companies. Imagine having an emergency response system that closed all gas meters in the event of an earthquake or if a fire captain could shut gas off for a specific block from his PDA over the city’s wireless network.

The Gas Company and Delta Liquid Energy are two other meter related companies. Working in partnership with the State, PG&E, The Gas Company, and Delta Liquid Energy we could find additional money to apply to the deployment of a community broadband network.

6.4.4 California Energy Commission’s Public Interest Energy Research (PIER)

The California Energy Commission’s Public Interest Energy Research (PIER) Program supports public interest energy research and development that will help improve the



quality of life in California by bringing environmentally safe, affordable, and reliable energy services and products to the marketplace. The PIER Program conducts public interest research, development, and demonstration (RD&D) projects to benefit California. The PIER Program strives to conduct the most promising public interest energy research by partnering with RD&D entities, including individuals, businesses, utilities, and public or private research institutions.

6.4.5 Open Automated Demand Response Communications Specification (OpenADR)

The development of the Open Automated Demand Response Communications Specification, also known as OpenADR or Open Auto-DR, began in 2002 following the California electricity crisis. In California, the United States, and abroad, many utilities, governments, electric independent systems operators and others have been pursuing demand response to manage the growing demand for electricity and peak capacity of the electric systems. Demand response (DR) has been defined as "...action taken to reduce electricity demand in response to price, monetary incentives, or utility directives so as to maintain reliable electric service or avoid high electricity prices¹." OpenADR is one element of the Smart Grid information and communications technologies that are being developed to improve matching between electric supply and demand.

We followed up on the previous two items with Tom Jones, Regional Director of Government Affairs for PG&E, and asked two specific questions: 1) PG&E offer any kind of 'dedicated' power to high volume customers and 2) would PG&E be interested in working with the City of Grover Beach to implement automated meter reading technology.

We learned the short answer to both questions is no. Diablo Canyon's power enters the regional grid at Interstate 5 and comes back to San Luis Obispo along Highway 46. The power used in Grover Beach is a mixture of electricity from all providers on the regional grid. As for OpenADR and Demand Response (DR), Tom was very candid that Grover Beach is such a small consumer of energy and has such steady demand thanks to its climate that there is very little financial incentive to convert the system over. Their current deployment hits regions of extreme weather conditions and high density power usage first and place like Grover Beach last. Furthermore, the



meter system relies on low frequency wireless communications, not fiber. However, he said, five years hence when PG&E is ready to work on Grover Beach the technology requirements may change and access to the broadband network may be of benefit to PG&E.

That said there are many ways to work with PG&E on economic redevelopment, two of which are; (a) implementing programs like AB 811 and (b) Tom offered to create an order of magnitude estimation of power needs in the IEA if it is the City's objective to bring data and power hungry businesses to the area.

Creating an AB 811 district will be beneficial for the property owners and incoming businesses as they can get low interest loans for new construction implementing green standards and installing fixed alternative energy sources. This loan is paid back on the property tax bill and stays with the property should it be sold. The initiator of the loan will get 30% of the amount back within 60-days of completion of construction. So a low interest \$2 million loan to put solar on the roof of a new building will put \$600,000 back in the pocket of the builder in 60-days and the loan is transferable to new property owners in the event of a sale.

If the building exceeds Title 24 (c) of California's Energy Efficiency Standards for Residential and Nonresidential Buildings Code PG&E will cover a percentage of the capital cost to exceed Title 24. The more the building exceeds the code the higher percentage they will pay up to 50%. The city can also use Rule 20A (d) funds to offset capital improvement costs.

The conversation got into the specific things PG&E can do with the power grid, like locating



redundant switches or declaring an area as Zone 50. As he said they successfully meet the power demands of Silicon Valley they can do the same here where warranted.

When we get to the point of detailing the master plan, Tom encouraged us to get a hold of him to gather more information about our power needs assessment and they would provide feedback on what they can do. He will also provide us with historical data on power to the IEA area, i.e., reliability and condition. This is information a company highly reliant on power would ask for.

7 Development Strategy

There are several strategic elements to take into consideration including further research, developing a technical specification, preparing estimated costs, before completing the Grover Beach Technology Master Plan. The following information is meant to provide some background education on the structure of networks as well as provide an overview of the options that are available for deploying a municipal broadband network.

7.1 Backhaul

Laying shadow conduit and preparing for deployment of a fiber network will eventually require the city to have access to fiber for backhaul to the Internet. There are three options available to the city: negotiate a deal with Pacific Crossing; work with the County; or pay for a backhaul from a commercial carrier.

Option 1 – Pacific Crossing Direct Connect – This option can be accomplished quickly and would provide access to great amounts of trans-Pacific bandwidth that would be desirable to many companies choosing to locate in the near proximity. This option gives the City a significant differentiating resource.

Option 2 – Working with the County – Fiber could be available from the County, but the County’s charter with Level 3 does not allow commercial access to the fiber. There is current legislation, and more is being introduced, as well as directives from the Governor that are breaking down the barriers of public/private issues in order to stimulate economic growth and deployment through broadband. The tide is turning in favor of public/private municipal projects.



Option 3 – Buying backhaul from commercial carriers like Level 3, Qwest, or AT&T.

7.2 Technology

Broadband can be delivered over copper phone lines, coaxial & fiber optic cables, and satellite & terrestrial wireless. The most common method of delivery to end users is coaxial from the cable companies and copper lines from the phone company or other ISP providers. A smaller percentage of residents get their Internet and television from satellite providers.

A municipal broadband network could incorporate aerial and trenched fiber, copper, and wireless, implementing each method of delivery where economical and technically viable.

Fiber optics – This is the most reliable high-speed medium for delivering digital content and the preferred method of deployment is trenching. Fiber makes up the backbone of the network and carries the heavy load on traffic. Fiber to the Home (FTTH), fiber to the curb/premise (FTTC/FTTP) takes fiber to the customer or to their property. From the property line the customer can use most any medium depending on desired bandwidth. Fiber to the home is the ultimate goal but initially developing a solid backbone and extending services from it is the prudent approach.

- Trenching – This is the most desirable and most costly method of creating a municipal broadband network. Working in conjunction with other departments in the City and outside agencies, the City can roll out a shadow conduit network while others have the ground open. Any project that is trenching in a street designated by the City’s master technology network shall provide shadow conduit. As shadow circuits come within a reasonable proximity of lit fiber then the city can incur the cost to complete the connection and turn up fiber in the conduit.
- Aerial – Is 90% less expensive than trenching but would be contrary to any potential undergrounding ordinance passed by the City, a provision should be made for aerial cabling where needed. The city could adopt a strategy that has fiber trenched to key points in the city as a backbone. From the end points of the trenching the fiber can go aerial to reach more people for less money. As an aerial segment hits a financial return milestone it can be assessed for trenching in the street and to the homes.

•



Wireless – This is another way to deliver high-speed bandwidth to end users and, when deployed as a mesh network, allows for mobility of users and devices around the community. Wireless also allows the city to deliver services beyond city limits too. Taking advantage of the water tank on Oceanview Terrace would open up a great deal of Pismo Beach and Arroyo Grande to the city’s network and services. Wireless would be the primary method of delivery to Oceano. An antenna tower along the ridge created by Highland Way would blanket a great deal of Oceano and some of Nipomo Mesa.

Copper and coaxial – Since most residences and businesses already have copper or cable to the premise, the City can co-opt existing infrastructure for delivery of services to the end user. This would speed up the conversion of residents and vendors to the new network without incurring the expense of deploying a fiber to the home (FTTH) network from the start. Assuming the city uses the wholesale model, a deal could be worked out with Charter to provide wavelength and access to customers on the network in exchange for its cable assets in the city.

7.2.1 WATH – Wireless, Aerial, Trench, to the Home

WATH is a method of deploying broadband in the least expensive form until revenue and demand warrant upgrading to the next level. Wireless is the least expensive method of delivery but has tradeoffs in reliability and available bandwidth when compared to fiber. The advantage is that a wireless signal can cover many miles between antennas and eliminate the need for trenching or cabling. Wireless is ideal for remote locations and low population density areas.

Aerial fiber can be pulled across existing poles and towers at a much lower cost than trenching. Using aerial to reach areas without conduit and where wireless is not sufficient for the customer density. This allows the city to build out the network sooner and for less money. When trenching occurs along the path of an aerial run, the fiber will be moved to the conduit and removed from the poles. Very little trenching will be done specifically for fiber.

With an undergrounding ordinance and a master technology map in hand, anytime a road is opened conduit will be put in place and over time the City will have a contiguous fiber network throughout the streets. Finally by setting up the broadband network to provide middle-mile services third parties companies will able to make the last mile to connections the home or business.

7.3 Phased Approach

The city can implement a phased approach to rolling out its network:



Shadow conduit to the Industrial Enhancement Area (IEA)
Shadow conduit anywhere the road or right of way is opened up within city limits
Lay fiber along the County's desired path to the Court House, County Park, Sheriff's substation, and Social Services
Expand and rollout as demand and opportunity dictate

7.3.1 Shadow Conduit in the IEA

The City is planning to upgrade sewers in the IEA, which is a perfect opportunity to lay conduit and junction boxes to the curb while the streets are open. The estimated cost to do this is \$300,000 but, once the conduit is in the ground, it becomes worth up to five times in value to a communications services provider and the business the conduit will provide fiber to.

Once there are paying customers, money can be spent pulling fiber through the conduit and lighting it up.

7.3.2 Pacific Crossing (Backhaul Option 1)

Gaining access to fiber right out of the building on Huber Street would put Grover Beach on the digital superhighway roadmap as a destination for technology based businesses. Should this come to pass, the City could create a public/private partnership that would provide private funding to build out and manage a municipal fiber optic network. Central to the network will be a collocation facility accepting the fiber from Pacific Crossing and distributing wavelengths to the network. This can be managed through the public/private partnership with a company specializing in hosted data and communications services. Following the outline of the partnership created by the City of Powell in Wyoming, the public/private partnership would end in 20-years and the city would take full ownership of the network.

7.3.3 San Luis Obispo County (Backhaul Option 2)

The County has an agreement with Level 3 that provides them with access to three pairs of fiber from Paso Robles to Nipomo with junction boxes in each city along the railroad tracks. Grover Beach has one at the corner of South Fourth Street and Trouville Avenue. The County has expressed its intentions to install aerial fiber from their junction box to their facilities in Grover Beach including the Court House and Social Services. According to General Order 95, the City can prohibit any entity from further cluttering the utility poles by forcing an undergrounding of new facilities through the formation of a Rule 20A undergrounding district. Thus, if, Grover Beach elects to take this opportunity to beautify its city, they may be able to have fiber placed concurrently with the undergrounding. It should be understood that 20A undergrounding districts have



various models for which matching funds from the City may be required. If the City chooses to enforce this rule, then it may want to consider putting an ordinance in place that requires all new cabling and upgrades to be trenched with an end goal of trenching utilities in Grover Beach and cleaning up the skyline.

Assuming the county needs its Sheriff's substation in Oceano connected, the City's new network would cover the IEA, South Fourth to Grand Avenue to 12th Street, and South Fourth Street to the corner of Front Street (Oceano) and 13th Street. Assuming the City gets federal stimulus money to provide broadband to Oceano, then the fiber can be continued south from the Sheriff's substation into Oceano.

The Oceano Airport and Oceano State Park are within range of the Substation as well. We still need to explore the desire of the responsible agencies to have bandwidth at these locations. Wireless services can be offered to these locations or fiber can be run under the rail road tracks.

7.3.4 Broadband to Oceano

Two federal agencies, the FCC's National Telecommunication and Information Administration (NTIA) and the USDA's Rural Utility Service (RUS) are collectively preparing to fund in excess of \$7 Billion in grants. Additional weighting will be added to grant requests that provide service to "unserved areas." Oceano is one of the areas determined to be unserved by the California Broadband Technology Task Force. It is both technically and financially feasible to include wireless coverage for Oceano from points in Grover Beach. Should federal economic stimulus monies be granted to the City of Grover Beach based upon this weighting, consideration should be given for broadcast wireless signals from the common boundary into Oceano to fulfill the grant.

7.3.5 Acquiring Backhaul from third party providers

Alternately working in a public/private partnership with broadband carrier company could provide a way to get the flexible speed and pricing the city would need to make a profitable venture of the network.

8 Recommendations for the City of Grover Beach

From a sampling of municipal deployments and talking directly to several individuals whose cities' profile matches Grover Beach's, we find the most successful deployments were treated as city utilities and built organically - letting the success of each phase dictate moving to the next. Smaller communities from a few thousand to 70,000 tend to have greater success for several reasons. A common theme throughout these small communities is the incumbent carrier is unwilling to invest in infrastructure improvements because the margins are not as great as the big cities where population densities are higher. When municipalities offer to partner with the incumbent carriers



they are typically met with disinterest. It is practically left to smaller cities to upgrade technology infrastructure themselves.

The pronounced failures or less than adequate returns tend to be large municipalities with the ability to raise large amounts of capital to engage in a highly speculative business undertaking.

While there are many great stories about economic development being facilitated by municipal fiber the one area of common success is savings to the community by offering lower prices and forcing the competition to lower their rates by as much as 50% and increase their services. We estimate a 50% reduction in current service prices would have an economic impact on the City's residents of approximately \$2 million per year or \$815 per household with service.

The City of Grover Beach should undertake a further investigation by contacting some of the cities mentioned in this report. Each of these cities has had different motivators for undertaking a municipal overbuild. Grover Beach has an excellent opportunity to take advantage from the lessons learned by other municipalities. Additionally the City should reach out to other communities in California who are applying for Federal Funds to learn about their programs.

Other options for economic development should also be explored by the City. The most promising of these is a consideration for providing seed money to nascent companies attempting to bring new products into development. This process appears to have some dependencies on the community having proximity to a large educational institute where technical resources can be readily shared.

Fiber-to-the-home (FTTH) continues gaining momentum delivering triple-play services to customers, however it may not be the optimal solution for every broadband network deployment. Some municipalities are opting to take fiber to the curb (FTTC) or node (FTTN) as necessary and let paying customers or third party vendors pay to get it to the home. Wireless is a viable alternative when trenching or aerial fiber is prohibitive and should be done in conjunction with a fiber network so that maximum speeds of connectivity can be attained. There is no such thing as a "one size fits all" solution when deciding to build a broadband network.

We recommend that the City of Grover Beach consider developing a master plan that encompasses FTTH as the end goal but starts with FTTN or FTTB along with wireless in areas targeted for economic development. The plan should be developed in a way that does not require full implementation of the master plan to achieve success.

- Initiate conversations with the City of Mulkiteo about working together to approach Pacific Crossing
- Initiate conversations with Pacific Crossing to find out what it would take to gain access in exchange for tighter security surveillance and a public/private agreement



- Review ordinances from cities with successful broadband networks and develop new ordinances for Grover Beach
- Continue with the grant applications process for Federal Stimulus monies
- Enter in discussions with San Luis Obispo County about working together to bring fiber to City and County properties
- Develop a Technical Master Plan with a phased approach to development of a ‘middle-mile’ municipal broadband network
- Work with PG&E to determine what is required to bring any of the planned areas up to “Silicon Valley” power standards

We recommend that the City of Grover Beach continue exploring a phased approach to starting a fiber broadband network first for economic development in targeted areas and for municipal use and secondly for delivery of services to businesses and residents of the city. Fiber is the future and cities that are making the investment wisely are seeing the direct and indirect benefits for the community – for the public good.



APPENDIX C - Public/Private Opportunities & Technical Options



DIGITAL WEST

Public / Private Opportunities,
Technical Options

And

Technology Master Plan Outline

For

The City of Grover Beach

Tasks 3, 4 & 5



November 2, 2009



Background

In April 2009 the City hired Digital West Networks, Inc. (DWNl) to prepare a Technology Master Plan for the City of Grover Beach. The purpose of the Plan is to assess and identify technology opportunities and implement a plan for improving technology access citywide. In July 2009, DWNl presented the Council with a report on Tasks 1 & 2 which provided the Council with information and analysis about other cities which have successfully, and unsuccessfully, implemented municipal broadband networks. This report also discussed the significance of Pacific Crossing and how it could become a major technological differentiator for Grover Beach and its potential for attracting businesses to the City. Lastly, applicable government code and legislation related to municipal networks was reviewed and it was found that more than 600 municipalities have some form of a municipal broadband development strategy.

From this report we learned that it is economically viable and sustainable for a community to create its own municipal broadband network, in specified areas, to the benefit of the community. This is achieved through delivery of better broadband services, increased competition and lower prices while also stimulating economic development by attracting high technology companies and, with them, more head of household jobs. The Council directed DWNl to proceed with its research and report back to the Council with additional information about technology options, competitive issues and an outline of a technology master plan.

What is “High Technology”?

Many times we talk about “High Technology” which is a nebulous term referring to a wide range of possible services, products, businesses, employees, and skills that are “high tech.” For the purposes of this report, we are defining high technology as a broad set of hardware and software production and service industries with substantial innovative and creative capacity. These include four specific economic markets as high technology:

- Information technology software development and delivery services
- Hardware engineering, design, and manufacturing services
- Environmental technology
- Centralized customer service operations

ARRA Update

In July 2009, the Council authorized City staff and Digital West to move forward with the application process for Federal American Recovery and Reinvestment Act (ARRA) Broadband Grants and Loans from two agencies; the Rural Utilities Service (RUS) of the US Department of Agriculture (USDA) and the National Telecommunications and Information Administration (NTIA) of the Department of Commerce. The application (a copy is available for review in the City Manager’s office) is composed of a “Middle Mile” project which provides the infrastructure between the Internet and companies that provide



services to end users which are commonly called “Last Mile” providers. Last mile providers use these middle mile facilities to deliver services to residential and business users. Absent the participation of the City as a middle mile provider these services would not otherwise be financially feasible.

The ARRA broadband grant application was submitted in August 2009. Subsequently, the Federal government requested that the State of California review the grant applications and prepare a list of recommended projects. On October 14, 2009, the State recommended that the Grover Beach Municipal Broadband project be funded. It will likely be several more months before the City finds out if it is awarded the \$1.9 million grant and loan.

In summary, the final proposed project cost as submitted in the grant application is estimated at \$2.8 million. The City is requesting \$1.7 million in grant monies and \$271,000 in Federal loans. The remaining funding of \$902,000 would likely come from the City’s Improvement Agency (approximately \$265,000), equity contribution/investment by the City (land), debt service on the collocation building construction loan, completed work (shadow conduit installed as part of the industrial sewer trunk main project), and a commitment for private equity (Digital West, \$200,000 in capital equipment).

Overview of Tasks 3, 4 and 5

Task 3 presents the technical options which can be further developed and used as the basis of the Technology Master Plan (TMP). Task 4 reports on the competitive landscape and Task 5 is a draft outline of the TMP. The goal of these Tasks is to inform the Council on the state of municipal networks and to present various options for consideration by the Council for inclusion in the TMP. The vision of the Technology Master Plan is the eventual deployment of a city-wide broadband municipal network with fiber-to-the-homes (FTTH) and businesses over many years as funding becomes available. Implementation would be conducted in a phased manner to reduce upfront costs and minimize risk over time. The success of each phase should not be reliant on the implementation of the next phase, in this way the City mitigates a variety of long term risks such as a lack of financial resources when needed and unforeseen changes to the technology landscape.

Task 3 – Public / Private Opportunities and Technical Options

One of the main goals of the ARRA bill was to foster more public/private relationships between municipalities and private companies in the deployment of high-speed broadband across the United States. In keeping with this goal, the City’s ARRA application was developed with the potential for public/private partnerships, with private companies providing the technical and customer service expertise required for delivering commercial ISP services to the City and surrounding areas.

In Tasks 1 and 2 we discussed successful, and less than successful, deployments of municipal broadband networks around the United States. The more successful examples had one or two staff members who

were champions of the technology and had the knowledge and skills to achieve the desired results without exclusively relying on consultants.

As with the Federal Grant application, the City should consider public/private relationships to achieve the objectives of the Technology Master Plan. If the City does not want to build up the staff with proper technical and customer service credentials, then working with private companies whose core business is middle-mile and last-mile delivery of broadband services could be the most cost effective way to successfully implement and manage a municipal broadband network.

Requests for Proposals (RFPs) could be used for selecting companies to design, build, manage, and maintain the network operations center (i.e., collocation facility) and fiber/wireless backbone. Day-to-day management of the facility could be in the form of a third party vendor reporting to the City Manager. The same approach could be used for the selection of last-mile internet service providers (ISPs) to residents and businesses in the City and surrounding areas. It would be up to these companies to market and sell services – thus freeing City staff from this responsibility.

The City retains ownership and control over the network and receives income from profitable operations while day-to-day operations are managed by private companies to the benefit of the business owners and residents of Grover Beach.

Connection and Deployment Options

In order for the City to begin deploying a municipal broadband network it must determine how it will obtain access or “connect” to lit fiber. There are two components needed in order to have lit fiber, you need the physical medium, the fiber optic cable, and you need light - wavelength or ‘lit fiber’ - to move data. Connecting to existing lit fiber is how the municipal broadband network accesses the World Wide Web.

Once the City has access to lit fiber, it must decide how it will be deployed to the benefit of the community. A Technology Master Plan with the goal of providing FTTH will require a phased in approach which is discussed below in the Deployment Options.

Connection Options

The first set of options has to do with how the City connects to existing lit fiber to access the World Wide Web. Though the City is fortunate to have lit fiber running into Pacific Crossing and within the Union Pacific right of way, an “offramp” must be created to access the lit fiber. Unfortunately, this is not a simple task. The City must negotiate with the companies that have lit fiber and equipment must be installed in order to obtain access. Depending on the option and the success of the negotiations, costs for accessing lit fiber could vary from \$5,000 to \$10,000 per month for an entry level commercial connection.

Option A – Connect with Pacific Crossing

This option gives the City access to significant amounts of fiber and a direct connection to Asian markets. This relationship would also put the City on the technology roadmap with other large middle mile providers such as Level 3, AT&T, and Qwest which reduces the costs of IP transit for the City. Direct access to Pacific Crossing would also make the City’s broadband network more desirable for companies with international markets and more complex technology needs.

Successful negotiations would result in Grover Beach having a significant differentiator to set it apart from other municipal broadband networks on a global scale and would greatly enhance the City’s ability to attract new businesses to the City.

Option B – Connect with Level 3

Level 3, along with other major carriers, has a presence in the Pacific Crossing building but does not have the equipment necessary to hand-off lit fiber to the City. DWNI has been in conversations with Level 3 and the possibility exists of provisioning the facility with equipment and providing fiber to the City. It is also possible to engage in negotiations with other carriers in the building.

This option would still provide the City’s municipal network with access to high speed internet but would lack the “direct” connection to Asia that Pacific Crossing would provide. The only other area in the County that currently has access to lit fiber is the industrial area in San Luis Obispo where DWNI is located.

Option C - Connect with Level 3 and the County of San Luis Obispo

The County of San Luis Obispo has a fiber junction box or “offramp” in Grover Beach along the railroad tracks at the corner of Fourth and Trouville. This is fiber the County acquired the use of through right of way negotiations with Level 3 and is intended for public, non-commercial use. The County is in the process of running fiber from their junction box to the County Courthouse and other south county offices and has expressed a willingness to work with the City.

Therefore, the City would need to negotiate with Level 3 to allow for commercial use of the fiber in order to establish the City’s municipal network. In addition, the County would also have to approve the use of the fiber. This option would provide the same speeds as Option B.

Deployment Options

Once the City has determine the source of lit fiber, it needs to determine which areas to serve first and how future phases would be implemented based on available funding. If the City is awarded the ARRA grant, the funding would be in place to implement an extensive first phase deployment as discussed in Option A.

However, if the ARRA grant is not awarded to the City, then a reduced project would likely be implemented. The ARRA grant application proposes the installation of a fiber network covering the industrial area south of Farroll Road, the Grand Avenue Corridor, and continuing up Front Street to

Newport Avenue to create a cohesive “middle mile” deployment appropriate for use by “last mile” providers. This would provide service to 90% of the City’s industrial and commercially zoned property.

The ARRA grant application also includes the construction of a centralized data communications facility or collocation building currently proposed to be built at the City’s corporate yard. The construction of this approximately 1,500 square foot building would house computer servers of local and state wide businesses identical to the service that DWNI provides its clients in San Luis Obispo. The City would generate income from the lease income and would likely sub-contract the maintenance of the servers to a private company experienced in this type of business.

In addition, because the ARRA grant funds the installation of conduit and fiber to several areas of the City, it enables the City to consider the lease of the middle mile or backbone infrastructure to a last mile provider. The last mile provider would have the capability of installing several wireless antennas which would provide wireless cable, internet and phone service to Grover Beach and the surrounding areas. This would create another revenue generating source in addition to the leasing of the collocation building.

This option could be developed on its own and is estimated to have a positive cash-flow within 2-1/2 years based on conservative projections. While there are many variables needed to make an accurate assessment of the capital requirements, recurring expenses, and sources of revenue, it should be understood, that where appropriate, DWNI used industry accepted estimates and used expense assumptions at the high side while using the most conservative revenue assumptions.

This option does not require additional funding from the City other than the approximately \$265,000 pledged as part of the grant application. The remaining funding is leveraged using existing assets and infrastructure.

Option B – Providing Fiber in the Industrial Enhancement Area

Focusing on the objective of stimulating economic development in the Industrial Enhancement Area (IEA) south of Farroll Road, this option would install conduit and fiber in specific streets where land is available for immediate development of new industrial buildings. This option would allow the City and/or private land owners to market the properties to businesses seeking high speed broadband services.

The City would utilize recently installed shadow conduit in the industrial area. The following table shows one cost option which provides a minimum of fiber conduit in streets with the most immediate development potential.



Table 1 IEA Fiber Run - Minimum

Industrial Enhancement Area (IEA) Estimated Fiber Costs			
Street Name	Units	Incl.	Ext. Amount
Highland Way	2,000		
South 4th - Trouville to Farroll	700	x	17,500
South 4th - Farroll to Highland	2,300		
Barca Street	1,400		
Huber	1,400		
Griffin Street	1,600	x	40,000
Farroll (borders with IEA fiber)	2,800	x	70,000
Huston Street	1,400	x	35,000
South 13th Street	700		
Total Estimated Cost for shadow conduit in the IEA			\$162,500

The following table shows the full cost of placing fiber conduit throughout the IEA.

Table 2 IEA Fiber Run - Maximum

Industrial Enhancement Area (IEA) Estimated Fiber Costs			
Street Name	Units	Incl.	Ext. Amount
Highland Way	2,000	x	50,000
South 4th - Trouville to Farroll	700	x	17,500
South 4th - Farroll to Highland	2,300	x	57,500
Barca Street	1,400	x	35,000
Huber	1,400	x	35,000
Griffin Street	1,600	x	40,000
Farroll (borders with IEA fiber)	2,800	x	70,000
Huston Street	1,400	x	35,000
South 13th Street	700	x	17,500
Total Estimated Cost for shadow conduit in the IEA			\$357,500

Option C – Providing Fiber to the Grand Avenue Corridor

The majority of commercial businesses in the City are located along the Grand Avenue Corridor. As a second option or separate phase, the City could trench and install fiber along Grand Avenue providing better services to existing businesses while making underutilized real estate more attractive to small businesses needing high speed broadband.

Table 3 Grand Ave. Corridor Estimate Fiber Costs

Grand Avenue Corridor Estimated Fiber Costs			Trench
Street Name	Units	Incl.	Ext. Amount
Fourth and Trouville to Grand Avenue	2,500	x	\$62,500
Fourth and Grand to S. Oak Park Blvd.	6,500	x	\$162,500
Total Estimated Cost for Grand Avenue Corridor			\$225,000



Option D – Construct a Collocation Building

As previously discussed, a collocation building constructed at the City’s corporate yard could generate revenues from leasing space. Though this option may be financially feasible by connecting via Level 3, the best connection would be directly to Pacific Crossing. The only prerequisite for constructing this option is having lit fiber installed to the site. The City would have the option of hiring staff or contracting with private companies to maintain and operate the collocation facility.

Option E – Lease Middle Mile Infrastructure to Last Mile Providers for Wireless Services

Upon installation of a limited municipal network or middle mile infrastructure as discussed in Options B and C, the City could issue RFPs for last mile providers to provide wireless services. Depending on the extent of the infrastructure in place, services could be provided to Grover Beach and the surrounding communities. Services could include cable, telephone and internet access. The City would have the option of hiring staff or contracting with private companies to maintain and operate the wireless services.

Option F – Position the City to deploy FTTH throughout the City of Grover Beach

If and when the City deploys the above options, the next phase would be to deploy fiber to the home (FTTH) throughout the City. This would consist primarily of the residential areas throughout the City. However, the City would need to evaluate whether this option is feasible at such time the other options have been completed. Several factors could be considered before this option would occur including the success and speed of the wireless services being provided, and whether incumbent carriers have made upgrades to their infrastructure.

Task 4 – Competitive Boundaries

Creating its own broadband network can put the City in competition with existing broadband and internet service providers. In keeping with the ‘open network’ requirement of the ARRA application, the City could adopt a similar strategy and open its network to any viable service provider. This takes the City out of competition with existing companies and actually increases competition by allowing more than one service provider on the network. For small service providers who don’t own their own broadband, an open network creates a gold-rush opportunity to compete with larger service providers. The incumbent carriers should be approached to create a strategy to aggregate their traffic onto the City’s network.

However, the incumbent carriers (e.g., AT&T, Verizon, etc.) don’t have a strong track record when it comes to partnering with municipalities. In fact they may consider it a threat and have been known to instigate legal action to stop or at least halt progress on municipal projects.

As mentioned in the previous report, TDS Telecom, a regional carrier in Minnesota, sued the city of Monticello, MN for wanting to create their own broadband network. The suit slowed down the build out and allowed TDS, the carrier, to build out the very network they stated they never intended to build.



Recently the Minnesota Supreme Court struck down the case and the appeal and said the city has the right to build their own network and compete against TDS. The project is funded with \$26 million in revenue bonds backed by investors, not taxpayers. However, in this case, the suit was not about the legality of the city offering services, it was about the legality of using municipal bonds to develop a network to deliver ISP services. Unless the City of Grover Beach chooses to use bond monies to develop its' project, it eliminates the likelihood of legal action on the same grounds as TDS Telecom.

On the other hand, Charter Communications did go into partnership with the City of Riverside on a metro-fiber network in conjunction with three other companies in 2006 and AT&T is in the process of rolling out a metro Wi-Fi network as well. "The network is the perfect blend of high speed public safety communications, cost-effective secured government communications, and wireless broadband for consumers and business. Additionally the network provides a free wireless broadband service that is a stepping stone in our digital inclusion program working to give Internet access to all residences in Riverside," commented Steve Reneker, Chief Information Officer of the city of Riverside in a statement to the press.

Based on a growing body of legal precedence, the courts are deciding it is legal for municipalities to compete with incumbent carriers. Research has shown that many municipalities have approached their incumbent carriers and invited them to participate in their network projects and in some cases they declined to partner and, instead, did what they would not do before: improve service and lower prices.

Additional legislation and policy changes are removing barriers to competition with the incumbent carriers through sensible programs like placing shadow conduit in any federally funded roadway project and making the conduit available to all carriers. If a roadway project receives Federal Funds, the project must allow for the inclusion of acceptable fiber conduit that will be made available to any broadband service provider to pull fiber through.

Should the City decide to adopt an open network policy then the incumbent carriers should be approached and invited to participate in the development of the network and providing 'big city' services to their customers in Grover Beach.

Task 5 - Technology Master Plan - Draft Outline

The Vision

Grover Beach develops itself into a major telecommunications hub in California with direct access to the Asian markets. By innovation and leveraging of its local telecommunication assets, Grover Beach attracts start up, new and existing high tech businesses that become the foundation of its economic base. It is this entrepreneurial base that creates economic vitality and sustainable economic development within the community.

Defining High Technology



“High Technology” is a nebulous term referring to a wide range of services, products, businesses, employees, and skills that are “high tech.” For the purposes of this plan, we define high technology as a broad set of hardware and software production and service industries with substantial innovative and creative capacity. These include four specific economic markets as high technology:

- Information technology and software development and delivery services.
- Hardware engineering, design, and manufacturing services.
- Environmental technology.
- Centralized customer service operations.

Recommendations

- Create a municipal broadband network with a phase in approach thus minimizing risks.
- Prioritize the deployment of the municipal broadband network to industrial and commercial areas first.
- Attract, retain, support and promote high technology development in Grover Beach.
- Create a high tech business friendly environment throughout the City.
- Develop new codes, ordinances and standards to implement the Technology Master Plan.
- Lead by example by implementing advanced technologies as part of the City’s operations.
- Attract and retain a professional workforce.

Areas of Strategic Focus

Business Promotion

- Implement and support a technology incubator.
- Establish incentives that advance the development of high tech companies such as business loans/grants.
- Create a high tech directory describing businesses and available resources.
- Promote high tech employment opportunities in Grover Beach.

Business Development

- Attract and Support High Technology Business Development.
- Create a technology director position to assist in communicating with high tech businesses.
- Establish a high tech business assistance team within City Hall.

Marketing & Promotion

- Aggressively market the City's telecommunication resources as a place for high tech businesses.
- Initiate media placements and public relations focused on high technology.
- Host high profile events and technology conventions in Grover Beach.
- Establish relationships with high tech industry representatives.

Revise Policies, Codes and Ordinances

- Adopt ordinances requiring the installation of shadow conduit.
- Create new City standards for installation of high tech infrastructure.
- Review Zoning Code use tables to insure that high tech uses are allowed along West Grand Avenue.
- Review/update franchise agreements to provide proactive development of information infrastructure and services.

Implement High Technology within City Hall

- Review the City's use of technology and evaluate areas of improvement.
- Implement policies for a high tech City Hall to employ/embrace new technologies.
- Implement web-based collaboration with local service providers.

Technology Transfer & Entrepreneurship

- Stimulate new development through support of technology transfer and entrepreneurship initiatives.
- Broker and facilitate technology student internships & involvement.

- Localize and streamline technology transfer processes.

Build Professional Labor Force

- Support high technology job fairs, exhibitions, conventions and events.
- Foster development of housing opportunities for technology professionals.
- Develop a vibrant civic and cultural environment conducive to the technology professional.

Attachment A – Executive Summary from ARRA Grant Applications

Opportunities

The City of Grover Beach proposes to develop a Middle Mile fiber broadband network to provide connectivity to unserved rural areas. The proposed Grover Beach Municipal Fiber Network (GBMN) would be a public/private partnership between a consortium of local companies and the City of Grover Beach.

For the purposes of this grant the network will serve two purposes; provide broadband services to the unserved and to stimulate economic development in the City's industrial areas and main commercial corridor. Once the infrastructure is in place to meet the objectives the city and can continue to implement the city's technology master plan.

Grover Beach has a unique opportunity to create economic stimulation centered on a fiber optic and wireless network delivering low-cost/high-speed broadband throughout the City of Grover Beach and Oceano.

While cable and phone line Internet Service Providers (ISP) are still trying to capitalize on their most recent upgrades, demand for increased bandwidth is forcing to the surface the inadequacies of coaxial and copper lines. Bandwidth intensive applications and video-on-demand (VoD) services are becoming available with increasing frequency but they will not be available to the residents of Grover Beach unless the incumbent carriers upgrade their networks to fiber optics.

If a municipality decides to create a broadband utility for the community it takes control of the wiring of the community and can create a technology master plan that will not only provide existing and future services to the community but create an environment conducive to economic development in an ever changing economic and work force landscape. Many cities and towns can point directly to relocated companies for whom access to fiber broadband was a gating factor to moving into the city.

In 1999 Pacific Crossing established a trans-Pacific fiber optic cable landing point in Grover Beach. Along with the City of Mukilteo in the State of Washington, the cities of Shima and Hitachinaka in Japan, the City of Grover Beach is one of four landing points that create a very important redundant fiber optic loop carrying data and communications traffic between Asia and North America.

Service Area

The "Five –Cities" area of the Central Coastal California is a rural region made up of Grover Beach, Oceano, Arroyo Grande, Pismo Beach, and Nipomo Mesa. The aggregate population is 48,091 with 19,770 households and ~1,175 businesses.

The proposed funded service area includes Grover Beach, Oceano, Avila Beach, Sunset Palisades, and Shell Beach for a total of 10,980 residents (87% unserved) and 515 businesses.

There are 19 anchor institutions bypassed – City and County Facilities, US Coast Guard, Port San Luis Harbor Patrol, California Polytechnic Marine Institute, and Lucia Mar Unified School District. These organizations will receive IT services such as:

- a City administration VoIP system data and SCADA systems
- a City police managed surveillance system with fixed and wireless remote cameras



real-time video feeds from fire and other first responders to incidents
integrated public safety communications for both internal operations and for affiliated-
agency interoperability

Services and applications

Following is a list of services:

- Internet Service Provider (ISP) for businesses and residents – provide network access to commercial communications services like AT&T, Charter, Verizon, etc.
- Video Conferencing and real time interactive gaming
- Traditional cable and network television services
- Enhanced video security and surveillance systems for public and private safety
- High-speed video and telecommunications with local, state and federal agencies in times of emergency
- Voice over Internet Phone (VoIP) services

Public safety can benefit greatly from a community broadband network. Key components are digital monitoring, exponentially larger communications channels, guest accounts for allied agencies and real-time video incident documentation. High resolution, real time, remotely controlled video for public and private surveillance only works on very high-speed networks.

The Pacific Crossing Building and its cables running through the streets of Grover Beach are designated as part of the Department of Homeland Security's National Infrastructure Protection Plan (NIPP) and qualifies for funds for enhanced security.

Open Municipal Network

GBMN is a Middle Mile provider of fiber optic backhaul and collocation facilities. The network will be open to legitimate Internet Service Providers and digital content and entertainment providers. Each will be expected to qualify based on experience, financial stability, and other common vendor qualification criteria.

Network Architecture

For the purposes of the application, we are proposing the network begin with a 1,250 square foot network operations center (NOC) which will house all data and telecommunications equipment needed to provide full internet and communications services. The facility is of sufficient size to take full economic advantage of the capital cost of the building and network equipment.

Additionally the City will erect and manage at least three wireless antenna towers. These will provide Middle Mile and last-mile wireless services to Oceano and areas of Grover Beach not covered by the fiber network. Wireless does not have the same right of way constraints laying fiber cable does, so the City's network can expand beyond city limits.

Upon completion of Phase 1, the City will own a fully functional high- speed broadband Middle Mile network capable of delivering the most advanced digital communications services. The network includes a collocation facility and fiber optic & wireless backbone.

The first step was to place 'shadow conduit' in areas where sewer upgrade projects are taking place. Shadow conduit does not have fiber in it, but is in place for future use. Trenching for placing fiber is very costly, not to mention the inconvenience created for the community. By adopting a policy that requires all projects involving trenching in City right-of-ways are required



to place shadow conduit. By this means the City can, over time, create a wider network as segments of shadow conduit come in contact with lit fiber.

Statement of Qualifications

For the purposes of the grant application process, the City could designate Digital West Networks as the collocation management company and Surfnet as the ISP. The grant application weighs heavily on past experience of the team to successfully complete the project. The City has expertise valuable to some areas of the network deployment and operations, but lacks many of the data communications industry professionals to operate such a network. The inclusion of both companies significantly strengthens the project team and increases the chances for grant approval.

The operations of the network could be handled by one of the partner companies with a background in datacenter and fiber optic network management. The network would be based on the wholesale model in that GBMN would open the network to qualified service providers of internet, telephony and television. This would stimulate the creation of new companies in the area and allow incumbent carriers to convert their customers over to the network. This would increase competition while decreasing costs to the end user. No one is left out.

Total Costs

Enter Funding Breakdown in verbal format here.

Customers

The City has two opportunities for revenue from the network: wholesale bandwidth to service providers and collocation to service providers and other businesses. An industry rule of thumb is a collocation facility should make \$1,000 per year per square foot. In this case the revenue potential (based on rentable space) for the City's building is \$1,000,000 per year.

Analysis based on industry standard assumptions and current service pricing information from AT&T and Charter Communications, the potential revenue for both companies in Grover Beach is estimated to be between \$3.3 million and \$4.3 million per year. If the City were able to capture this traffic, with AT&T and Charter as network clients, and the wholesale rate on bandwidth was 40%, the City's revenue potential could be \$1.3 million to \$1.7 million per year. Add on top of this the additional income from Oceano and wireless customers in the Five Cities area.

Fiber-to-the-home (FTTH) continues gaining momentum delivering triple-play services to customers, however it may not be the optimal solution for every broadband network deployment. Some municipalities are opting to take fiber to the curb (FTTC) or node (FTTN) as necessary and let paying customers or third party vendors pay to get it to the home. Wireless is a viable alternative when trenching or aerial fiber is prohibitive and should be done in conjunction with a fiber network so that maximum speeds of connectivity can be attained. There is no such thing as a "one size fits all" solution when deciding to build a broadband network.

Economic Impact

Economic development and redevelopment seek to help existing businesses grow, help new businesses start, and attract business from outside the area to relocate or open satellite offices.

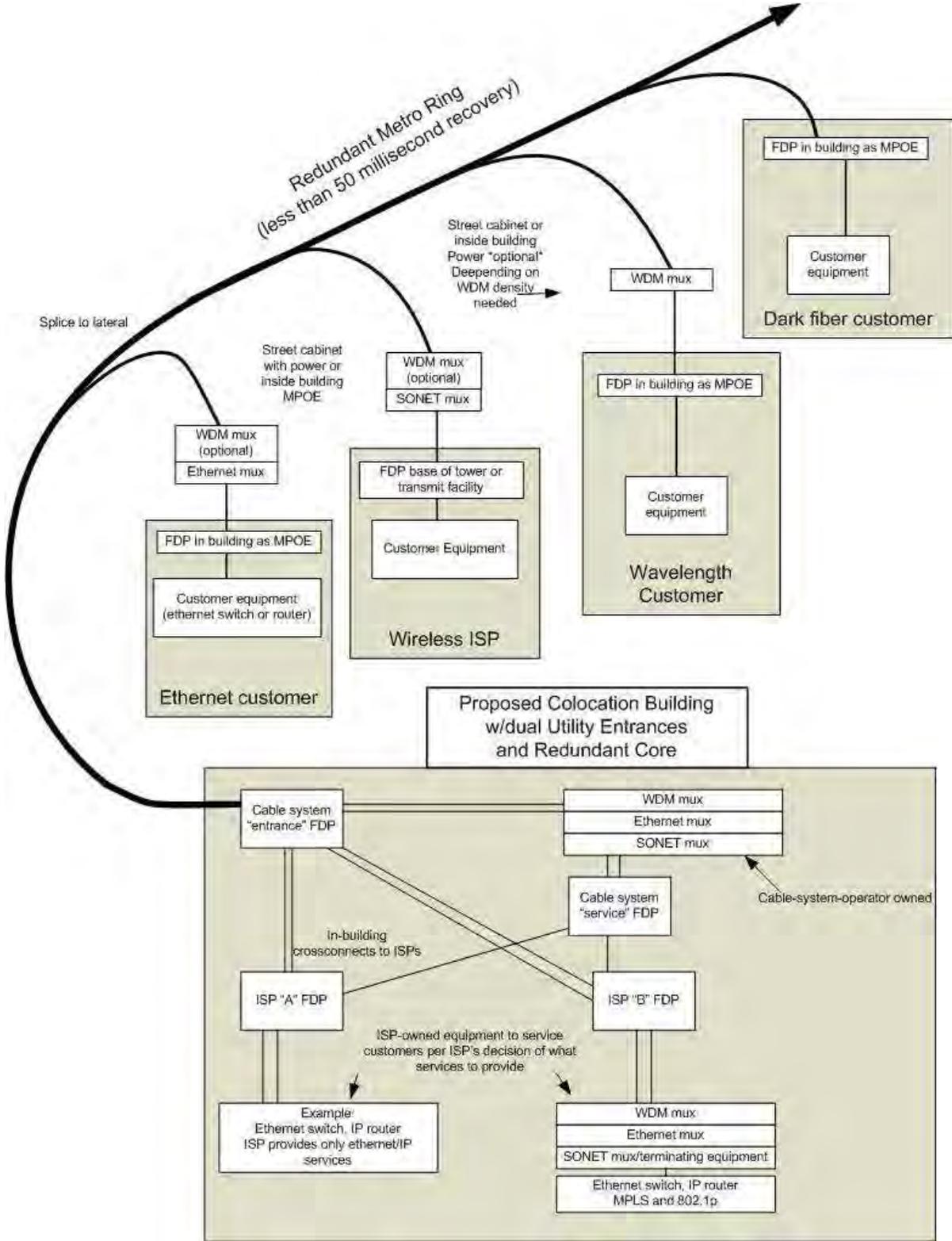
Eleutian Technologies could open a 10,000 sqf training center with 6 fulltime employees and 100 to 150 part-time employees comprised of credentialed teachers and retirees with teaching



skills. Based upon discussion with Eleutian, Grover Beach is an ideal location except it lacks fiber connectivity. This single business could bring over \$3 million per year in salaries into the local economy – money coming from Korea to Grover Beach via the trans-Pacific fiber cable.



Attachment B – Network Diagram for Option A



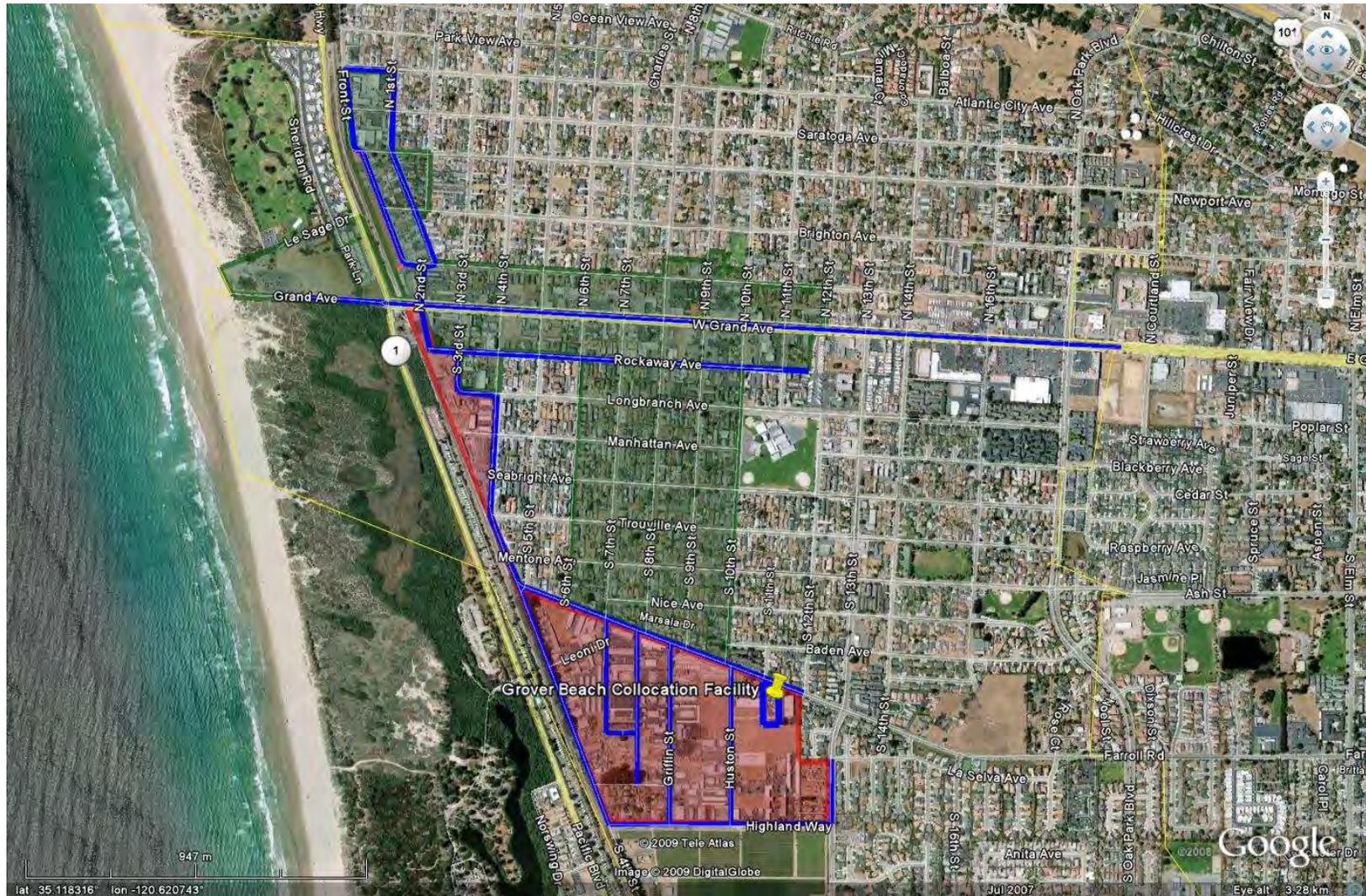


Diagram 2 – This shows the Industrial Enhancement Area (IEA) in red and the Improvement Project Area (IPA) in green. The blue lines represent the proposed fiber conduit runs for the funded portion of this project. The yellow push pin denoted the Grover Beach Municipal Network Operations Center (NOC). This map represents the City of Grover Beach.



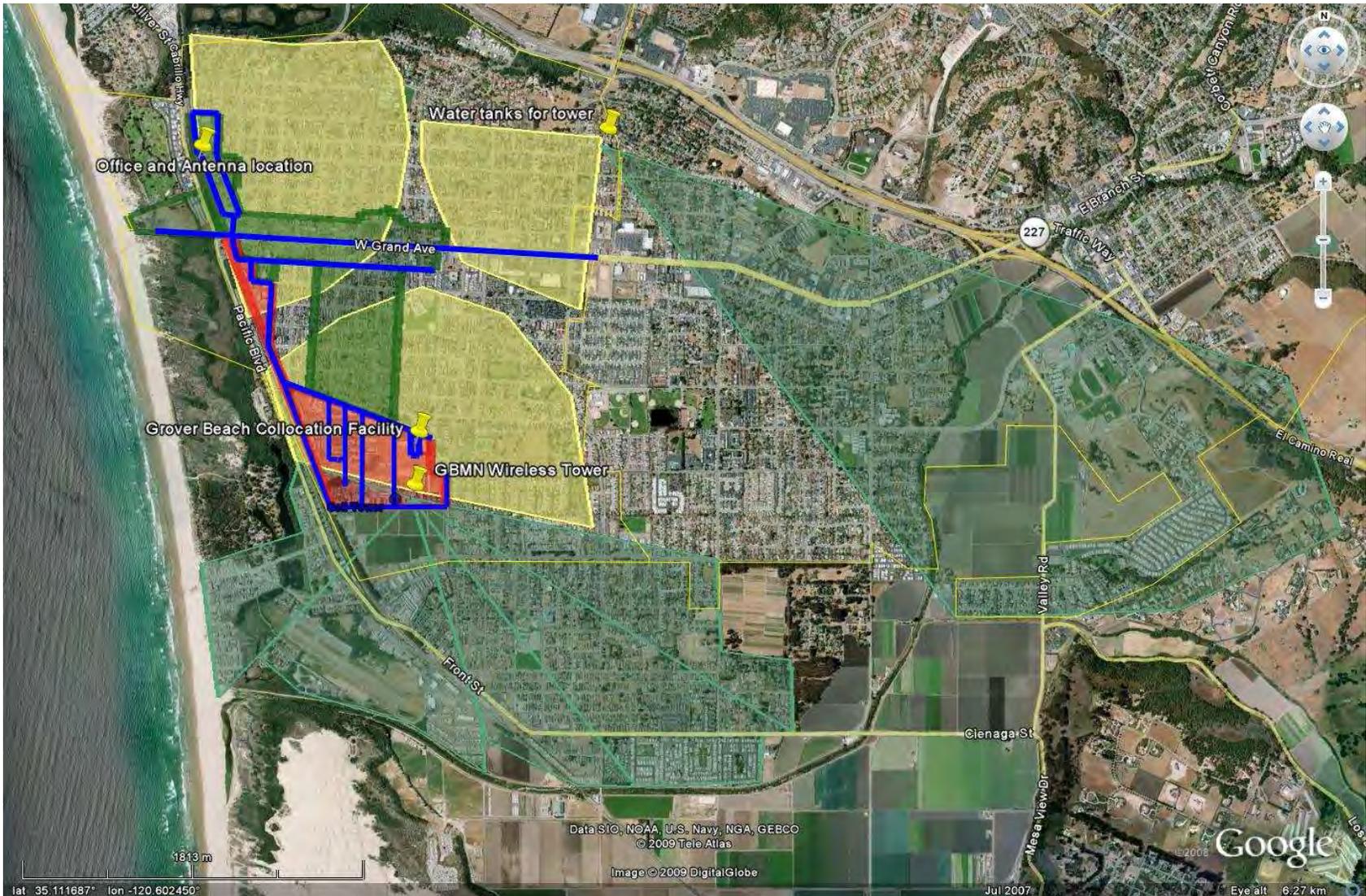


Diagram 3 – This shows an expanded view to include the wireless component of the network. Three wireless access points blanket a wide area. Areas shaded in yellow are ‘served’ areas that can receive services and the areas shaded in light green are ‘unserved’ or ‘underserved’ areas being provided service.



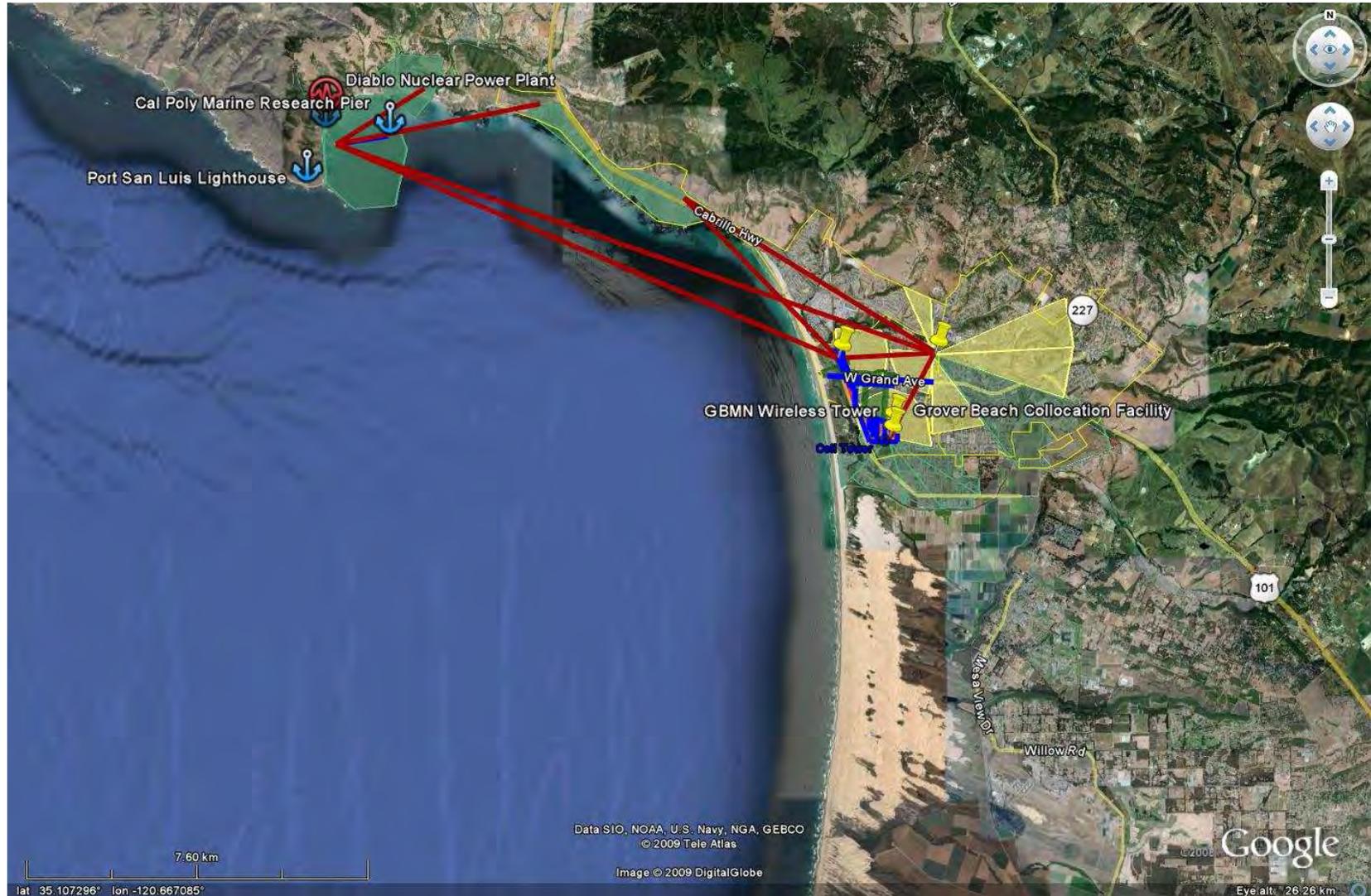


Diagram 4 – This shows the entire coverage area for the network. This is a view of Port San Luis at the top of the image to Ocean State Vehicular Recreational Area. The red lines represent high speed wireless backhauls that will provide backhaul to unserved areas of Avila Beach, Sunset Palisades, and Shell Beach.





Diagram 5 – This shows the number of businesses bypassed by the fiber and wireless network in Grover Beach. 90% of the businesses are serviceable from fiber to the node provided by the middle mile network.



Attachment C – Financial Projections

Income Statement

	Forecast Period				
	Year 1	Year 2	Year 3	Year 4	Year 5
Revenues					
Network Services Revenues:					
Local Voice Service	\$ -	\$ -	\$ -	\$ -	\$ -
Broadband Data	\$ 36,000	\$ 36,000	\$ 36,000	\$ 36,000	\$ 36,000
Video Services	\$ -	\$ -	\$ -	\$ -	\$ -
Collocation Services	\$ 130,612	\$ 273,192	\$ 399,756	\$ 513,821	\$ 540,384
Network Access Service Revenue	\$ -	\$ 77,078	\$ 349,971	\$ 718,020	\$ 1,018,817
Universal Service Fund	\$ -	\$ -	\$ -	\$ -	\$ -
Toll Service/Long Distance V	\$ -	\$ -	\$ -	\$ -	\$ -
Installation Revenues	\$ -	\$ -	\$ -	\$ -	\$ -
Other Operating Revenues	\$ -	\$ -	\$ -	\$ -	\$ -
Other Revenues	\$ -	\$ -	\$ -	\$ -	\$ -
Uncollectible Revenues	\$ -	\$ -	\$ -	\$ -	\$ -
Total Revenues	\$ 166,612	\$ 386,270	\$ 785,727	\$ 1,267,840	\$ 1,595,200
Expenses					
Backhaul	\$ 60,000	\$ 60,000	\$ 60,000	\$ 84,000	\$ 84,000
Network Maintenance/Monitoring	\$ -	\$ -	\$ -	\$ -	\$ -
Utilities	\$ 9,785	\$ 21,016	\$ 44,983	\$ 73,910	\$ 93,552
Leasing	\$ -	\$ -	\$ -	\$ -	\$ -
Sales/Marketing	\$ -	\$ -	\$ -	\$ -	\$ -
Customer Care	\$ 153,600	\$ 192,000	\$ 192,000	\$ 192,000	\$ 192,000
Billing	\$ -	\$ -	\$ -	\$ -	\$ -
Corporate G&A	\$ 98,229	\$ 108,032	\$ 112,696	\$ 123,147	\$ 126,933
Other Operating Expense					
Total	\$ 321,613	\$ 381,048	\$ 409,680	\$ 473,057	\$ 496,485
EBITDA	\$ (155,001)	\$ 5,222	\$ 376,048	\$ 794,784	\$ 1,098,716
Depreciation	\$ 240,664	\$ 240,664	\$ 240,664	\$ 240,664	\$ 240,664
Amortization					
Incomes Before Interest and Taxes	\$ (395,665)	\$ (235,442)	\$ 135,383	\$ 554,120	\$ 858,051
Interest Expense - New RUS D	\$ 10,781	\$ 10,586	\$ 10,383	\$ 10,172	\$ 9,952
Interest Expense - Existing RUS	\$ -	\$ -	\$ -	\$ -	\$ -
Interest Expense - Other	\$ 13,563	\$ 13,143	\$ 12,701	\$ 12,237	\$ 11,749
Income Before Taxes	\$ (420,010)	\$ (259,171)	\$ 112,299	\$ 531,711	\$ 836,350
Property Tax	\$ 2,750	\$ 2,750	\$ 2,750	\$ 2,750	\$ 2,750
Income Taxes	\$ -	\$ -	\$ -	\$ -	\$ -
Net Income	\$ (422,760)	\$ (261,921)	\$ 109,549	\$ 528,961	\$ 833,600
TIER (Times Interest Earned F	-16.37	-10.04	5.75	24.60	39.41



Balance Sheet

	Forecast Period				
	Year 1	Year 2	Year 3	Year 4	Year 5
Assets					
Current Assets					
Cash	\$ (303,098)	\$ (337,975)	\$ (2,028)	\$ 752,653	\$ 1,811,265
Marketable Securities	\$ -	\$ -	\$ -	\$ -	\$ -
Accounts Receivable	\$ -	\$ -	\$ -	\$ -	\$ -
Notes Receivable	\$ -	\$ -	\$ -	\$ -	\$ -
Inventory	\$ -	\$ -	\$ -	\$ -	\$ -
Prepayments	\$ -	\$ -	\$ -	\$ -	\$ -
Other Current Assets	\$ -	\$ -	\$ -	\$ -	\$ -
Total Current Assets	\$ (303,098)	\$ (337,975)	\$ (2,028)	\$ 752,653	\$ 1,811,265
Non-Current Assets					
Long-Term Investments	\$ -	\$ -	\$ -	\$ -	\$ -
Amortizable Asset (Net of Amortization)	\$ -	\$ -	\$ -	\$ -	\$ -
Plant in Service	\$ 2,869,333	\$ 2,869,333	\$ 2,869,333	\$ 2,869,333	\$ 2,869,333
Less: Accumulated Depreciation	\$ (240,664)	\$ (481,328)	\$ (721,993)	\$ (962,657)	\$ (1,203,321)
Net Plant	\$ 2,628,669	\$ 2,388,005	\$ 2,147,341	\$ 1,906,676	\$ 1,666,012
Other	\$ -	\$ -	\$ -	\$ -	\$ -
Total Non-Current Assets	\$ 2,628,669	\$ 2,388,005	\$ 2,147,341	\$ 1,906,676	\$ 1,666,012
Total Assets	\$ 2,325,571	\$ 2,050,030	\$ 2,145,313	\$ 2,659,329	\$ 3,477,277
Liabilities and Owners' Equity					
Liabilities					
Current Liabilities					
Accounts Payable	\$ -	\$ -	\$ -	\$ -	\$ -
Notes Payable	\$ -	\$ -	\$ -	\$ -	\$ -
Current Portion - Total RUS Debt	\$ -	\$ -	\$ -	\$ -	\$ -
Current Portion - Other Debt	\$ -	\$ -	\$ -	\$ -	\$ -
Other Current Liabilities	\$ -	\$ -	\$ -	\$ -	\$ -
Total Current Liabilities	\$ -				
Long-Term Liabilities					
Notes Payable - FED	\$ 266,920	\$ 261,940	\$ 256,758	\$ 251,364	\$ 245,750
Notes Payable - DEBT	\$ 266,785	\$ 258,149	\$ 249,072	\$ 239,531	\$ 229,501
Existing RUS Debt	\$ -	\$ -	\$ -	\$ -	\$ -
Proposed RUS Debt	\$ -	\$ -	\$ -	\$ -	\$ -
Existing non-RUS Debt	\$ -	\$ -	\$ -	\$ -	\$ -
Total Long-Term Liabilities	\$ 533,705	\$ 520,090	\$ 505,830	\$ 490,895	\$ 475,251
Total Liabilities	\$ 533,705	\$ 520,090	\$ 505,830	\$ 490,895	\$ 475,251
Owner's Equity					
Capital Stock	\$ -	\$ -	\$ -	\$ -	\$ -
Additional Paid-In Capital - City	\$ 319,000	\$ 319,000	\$ 319,000	\$ 319,000	\$ 319,000
Additional Paid-In Capital - DWNl	\$ 200,000	\$ 200,000	\$ 200,000	\$ 200,000	\$ 200,000
Additional Paid-In Capital - Dyste	\$ -	\$ -	\$ -	\$ -	\$ -
Patronage Capital Credits	\$ 1,695,628	\$ 1,695,628	\$ 1,695,628	\$ 1,695,628	\$ 1,695,628
Retained Earnings	\$ (422,763)	\$ (684,688)	\$ (575,146)	\$ (46,194)	\$ 787,398
Total Equity	\$ 1,791,866	\$ 1,529,940	\$ 1,639,483	\$ 2,168,435	\$ 3,002,026
Total Liabilities and Owner's Equity	\$ 2,325,571	\$ 2,050,030	\$ 2,145,313	\$ 2,659,329	\$ 3,477,277



Statement of Cash Flows

	Historical		Forecast Period				
			Year 1	Year 2	Year 3	Year 4	Year 5
Beginning Cash			\$ 319,000	\$ (303,095)	\$ (337,968)	\$ (2,014)	\$ 752,675
CASH FLOWS FROM OPERATING ACTIVITIES:							
Net Income	-	-	(422,760)	(261,921)	109,549	528,961	833,600
<i>Adjustments to Reconcile Net Income to Net Cash Provided by Operating Activities</i>							
Add: Depreciation	-	-	\$240,664	\$240,664	\$240,664	\$240,664	\$240,664
Add: Amortization	-	-	\$0	\$0	\$0	\$0	\$0
<i>Changes in Current Assets and Liabilities:</i>							
Marketable Securities	-	-	\$0	\$0	\$0	\$0	\$0
Accounts Receivable	-	-	\$0	\$0	\$0	\$0	\$0
Inventory	-	-	\$0	\$0	\$0	\$0	\$0
Prepayments	-	-	\$0	\$0	\$0	\$0	\$0
Other Current Assets	-	-	\$0	\$0	\$0	\$0	\$0
Accounts Payable	-	-	\$0	\$0	\$0	\$0	\$0
Other Current Liabilities	-	-	\$0	\$0	\$0	\$0	\$0
Net Cash Provided (Used) by Operations	\$ -	\$ -	\$ (182,095)	\$ (21,257)	\$ 350,213	\$ 769,625	\$ 1,074,264
CASH FLOWS FROM FINANCING ACTIVITIES:							
Notes Receivable	-	-	\$0	\$0	\$0	\$0	\$0
Notes Payable - FED	-	-	\$271,705	\$0	\$0	\$0	\$0
Notes Payable - Debt	-	-	\$275,000	\$0	\$0	\$0	\$0
Principal Payments - FED	-	-	(\$4,785)	(\$4,980)	(\$5,183)	(\$5,394)	(\$5,614)
Principal Payments - Debt	-	-	(\$8,215)	(\$8,635)	(\$9,077)	(\$9,542)	(\$10,030)
New Borrowing	-	-	\$0	\$0	\$0	\$0	\$0
Additional Paid-in Capital-DWNI	-	-	\$200,000	\$0	\$0	\$0	\$0
Additional Paid-in Capital-Dyste	-	-	\$0	\$0	\$0	\$0	\$0
Additions to Patronage Capital Credits	-	-	\$1,695,628	\$0	\$0	\$0	\$0
Payment of Dividends	-	-	\$0	\$0	\$0	\$0	\$0
Net Cash Provided by Financing Activities	\$ -	\$ -	\$2,429,333	(\$13,615)	\$ (14,260)	\$ (14,935)	\$ (15,643)
CASH FLOWS FROM INVESTING ACTIVITIES:							
Capital Expenditures	-	-	(\$2,869,333)	\$0	\$0	\$0	\$0
Amortizable Asset (Net of Amortization)	-	-	\$0	\$0	\$0	\$0	\$0
Long-Term Investments	-	-	\$0	\$0	\$0	\$0	\$0
Net Cash Used by Investing Activities	\$ -	\$ -	\$ (2,869,333)	\$ -	\$ -	\$ -	\$ -
Net Increase (Decrease) in Cash	\$ -	\$ -	\$ (622,095)	\$ (34,872)	\$ 335,953	\$ 754,689	\$ 1,058,621
Ending Cash	\$ -	\$ -	\$ (303,095)	\$ (337,968)	\$ (2,014)	\$ 752,675	\$ 1,811,296