

***CITY OF TUMWATER
MASTER TELECOMMUNICATIONS PLAN
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SECTION I

EXECUTIVE SUMMARY

Project Description, Scope of Work, Goals and Objectives

Zoomy Communications (ZoomyCo) was hired by the City of Tumwater to provide a comprehensive, unified Master Telecommunications Plan.

Goals and Objectives

The City of Tumwater, in conducting this plan, had three primary goals for the project:

1. **Identify existing telecommunications facilities and conduit.** Members of City Council desired to coordinate construction activities and minimize traffic congestion and road closures due to telecommunications construction. With an inventory of existing telecommunications and conduit infrastructure, the City will be able to better coordinate construction activities, utilizing existing telecommunications conduit and facilities whenever possible. The City will also realize the benefit of being able to utilize the excess conduit as a negotiation tool with entities in exchange for fiber strands.
2. **Evaluate economic development opportunities.** The question was asked, “Where does it make sense from an economic development standpoint to deploy more telecommunications infrastructure?” The City desired, at a minimum, to deploy wireless hotspots in areas within the community that could create an economic development impact. The City also owns excess conduit throughout the City and existing conduit may be used to bring optical fiber to key stakeholders within the community.
3. **Energize the City’s partnerships with key stakeholders in town to create a unified telecommunications plan.** The City wanted to play a leading role in leveraging and energizing community efforts in deploying a unified, non-duplicative, telecommunications plan. This involved meeting with key stakeholders in the community, assessing their broadband and connectivity needs, and creating a unified plan to meet the needs of many key, community stakeholders.

In addition to these primary goals, the City also saw opportunities for the following benefits that a Master Telecommunications Plan could provide:

- Improved connectivity for schools, key businesses and government offices
- New possible residual income sources for the City
- Traffic telemetry for traffic mitigation
- Homeland security for the City’s water systems

Project Description, Scope of Work and Methodology

In this report, ZoomyCo will provide a description of Tumwater’s current system in terms of location, capacity, potential and gaps in the system.

In order to facilitate creation of the existing infrastructure and gap analysis within the City of Tumwater, ZoomyCo conducted a two-week site survey that involved the following activities:

- Review of zoning maps along with land use, master and transportation plans and current construction activity.
- Our engineers determined right of way issues, located other utilities, and identified other telecom providers that may utilize existing and future-placed

telecommunications facilities. ZoomyCo identified which services, if any, are currently being provided for the community.

- Assessed City and private conduit and fiber optic cable available in the community.
- Reviewed right-of-way restrictions for utilities, railroads and highways.
- Identified key businesses, government agencies, schools, residences (potential “anchor tenants”). Interviewed existing key stakeholders regarding their access and broadband needs.
- Identified other revenue generating or cost-cutting opportunities.

This report provides the background detail necessary for ZoomyCo to develop a **Telecommunications Inventory** and a **Preliminary Conceptual Design for further expansion of the network**. AutoCAD drawings of the various locations needing connectivity and the primary backbone network routes throughout the community are provided as an additional deliverable of this project.

Also in this report, ZoomyCo will provide an overview of the telecommunications industry, technology options, and what other municipalities are doing in terms of community broadband initiatives. The report will provide an understanding of the business models, the economic impacts of the network, and how implementation costs and ongoing maintenance charges of the network may be funded. This report will also illuminate the opportunities and risks for the City of Tumwater in expanding its fiber optic/Wi-Fi network.

This report will include a detailed financial analysis of projected capital costs, projected financial statements, cash flow analysis and assessment of potential partnership opportunities for the City of Tumwater in deploying fiber optic and/or Wi-Fi connections.

Finally, ZoomyCo has identified potential **Funding Opportunities**. Grants, strategic public/private partnership opportunities, and other capital sources are all carefully scrutinized within this report to provide the best funding options for the City of Tumwater.

Interviews and Findings with Key Stakeholders

ZoomyCo met with the following key stakeholders within the community:

1. ***City of Tumwater Staff***. ZoomyCo met with several individuals representing Public Works, Development Services, Personnel, Finance, and Information Services.
2. ***Thurston Community Television***, ZoomyCo met with Deborah Vinsel, Executive Director
3. ***Tumwater School District***, ZoomyCo met with and had several discussions with school district representatives, Bob Kuehl and Dan Reich.
4. ***State of Washington Department of Transportation***, ZoomyCo met with and had several discussions with Todd Turner and Dennis Defries
5. ***Puget Sound Energy***, ZoomyCo discussed pole attachment possibilities and existing infrastructure with Puget Sound Energy representatives, Pete Addison and Al Hernandez.

6. **Port of Olympia**, ZoomyCo discussed infrastructure options and connectivity needs with Heber Kennedy. His main concern is providing telecommunications redundancy for his tenants. ZoomyCo discussed what fiber and carriers existed in his area that would provide his need for redundancy.
7. **Bonneville Power Authority**, ZoomyCo conducted a conference call with Christine Kimbal and Tim Murray of the Bonneville Power Authority. The Bonneville Power Authority (BPA) operates in a tri-state region, providing electric power on a wholesale basis to power companies. ZoomyCo researched what existing fiber is in place within the City of Tumwater. BPA does not have fiber facilities within the City of Tumwater; however it does have an extensive long-haul fiber network if the City would need connectivity with other Cities and networks within the State of Washington.

The most significant and strategic findings were from the Department of Transportation, the City of Tumwater and the School District. All three entities have common goals of desiring connectivity and have a willingness to work together to assist each entity in meeting these common goals.

The Tumwater School District is interested in connecting all of their schools with a fiber ring with the goal of eliminating or consolidating current monthly charges for Internet and telecommunications services. They are also evaluating using a unified Voice over IP phone system, further reducing monthly access fees, long distance charges, and consolidation of telecommunications equipment needs. The School District has obtained a \$6 Million bond for technology needs and a small portion of this bond is yet available for technology use.

The City of Tumwater's Public Works Department has two primary initiatives that require broadband connectivity. The first initiative involves reducing traffic congestion due to extensive growth in three major corridors:

- North – South Highway 99
- Henderson – Tumwater Boulevard – I5
- Yelm Highway – Cleveland – Capitol Boulevard

There are twenty-three signal controlled intersections along these corridors. One way of reducing traffic congestion would be to create a real-time traffic operation center managing traffic flow and real time message postings. In order to do this, traffic lights could be connected to a centralized location.

The second initiative for the City of Tumwater is planning for compliance with Homeland Security measures regarding the water supply system. According to Dave Barclift, the plan for compliance needs to be submitted by the 1st quarter of 2006. Within the Tumwater Water and Sewer District are two water treatment plants and four water treatment reservoirs. There are currently 44 telemetry circuits connecting these facilities. Currently these locations are connected via government radio frequencies. The Homeland Security measures call for surveillance systems to be installed and more reliable connections to be in place. These locations could be served by fiber optic network facilities to meet the requirements from Homeland Security.

The Department of Transportation has a new building under construction located on Tumwater Boulevard. The DOT is interested in utilizing the City of Tumwater's existing conduit along Capitol Boulevard to bring fiber facilities to this building. ZoomyCo suggests having the DOT install and provide dark fiber in exchange for utilizing the City's conduit. This would allow the City of Tumwater and the School District to more easily extend a potential fiber network to the schools and would provide additional fibers for potential traffic control operations. The additional fibers could also serve as a backbone for further expansion of the fiber network or a backbone network for offering wireless services to the community. The additional fiber placed by the DOT would be

at no additional charge to the City of Tumwater and the saving benefits to the schools and to the City for use of additional fibers would be significant.

The Port of Olympia is interested in telecommunications redundancy for the industrial park. ZoomyCo discussed existing fiber and service providers near the area with Heber Kennedy. Mr. Kennedy explained that a company was interested in leasing space in the industrial park for a call center, and one of the requirements was telecommunications redundancy and diversity. Because of a lack of knowledge, the company moved elsewhere. ZoomyCo discussed other possible carriers in the area, in addition to Qwest. AT&T has a fiber optic cable along highway 99, and can be used for redundancy. Also, the City of Tumwater owns spare conduit near the industrial park and the Department of Transportation will also be installing additional fiber optic cable following a separate route near the Port of Olympia. We discussed the possibility of working together with the schools, the Department of Transportation and with the City of Tumwater.

Additionally, ZoomyCo contacted the following service providers within the community to access existing telecommunication infrastructure and possible mutual dark fiber leases:

1. Comcast, Stan Finley, Area Franchise Manager Northwest Division
2. ATG, Brandon Firkins
3. Qwest, Chris Johnson, Senior Design Engineer
4. Century Tel, Ross Skinner
5. US Wirefree, John Mayse

Conceptual Network Design

Current Infrastructure. The City owns a substantial amount of conduit within the City limits. Excess conduit is valuable for telecommunications initiatives as it serves as a means of connecting various locations within the City through an optical fiber network. Without excess conduit, the City and any potential telecommunications or communication service providers, need to either use electric pole attachments for deploying more fiber, or tear up the road for underground fiber placement, or consider offering wireless solutions for communication connectivity.

ZoomyCo also met with several entities to determine what existing infrastructure is in place owned by service providers, the power company, Bonneville Power, and the Department of Transportation. The service providers, Qwest, Century Telephone and Comcast were very reluctant to share information regarding their existing infrastructures. They all explained that this information is proprietary, and that ZoomyCo and the City of Tumwater do not have a right to access such information.

An AutoCAD map of the City's existing conduit system is shown in Appendix E.

Recommended Policies Going Forward, Telecommunications Permits. As the City of Tumwater desires to limit traffic disruption due to telecommunications construction activities, ZoomyCo recommends initiating a Telecommunications Permitting Process, whereby anyone or any company who desires to place telecommunications conduit, fiber optic facilities, wireless hotspots or towers, must fill out a permit for approval with the City.

The permitting process serves two essential functions. First, it provides a streamlined process for coordinating telecommunications construction activities, and secondly, it allows the City to document any new, proposed telecommunications infrastructure. It is recommended that the City update its own mapping program, documenting location and type of utilities placed in public right-of-way. The City might also consider a policy where if any new construction for telecommunications infrastructure is to take place, the proposing service provider must install

excess fiber facilities that will be given to the City for future use. This is a bold policy, but has been successfully implemented in other areas of the country.

Samples of Telecommunications Permit Applications can be found in Appendix D. There are several very useful Web Sites that discuss policies, permitting processes, right-of-way management, as well as compensation and pricing/cost recovery for the City's time and expense in managing this process. The American Public Works Association has a comprehensive list of studies and recommendations for implementing right-of-way, conduit and dark fiber leases.

Their Web Site is:

<http://www.apwa.net/ResourceCenter/index.asp?Section=row&SectionName=Right+of+Way+Management>

Other Recommended Policies, Road Improvement Plans. ZoomyCo also recommends for all road improvement projects, road extensions, and new road construction, that a policy is put in place to install conduit for future City use. This conduit should be placed along the road right-of-way, and at all intersections, the conduit should be extended to the other side of the street. The conduit should be a minimum of 2-inches in diameter. This conduit policy will minimize future road and traffic disruption due to telecommunications construction.

Network Design Concepts. ZoomyCo has created a network design that will accommodate the City of Tumwater's, and key shareholders' existing needs within the City. We have incorporated the Department of Transportation's fiber design into this plan. We have also provided a conceptual design for the school district, utilizing the Department of Transportation's optical fiber network and City-owned conduit. We have also provided a conceptual design incorporating the City's desire for better traffic telemetry. As we do not currently know where the water and sewer treatment plants are locations, these locations have not been incorporated into the plan.

The fiber optic network will also serve as a backbone network for potential wireless hotspots, and a potential backbone for wireless services for community constituents. We have also created the backbone fiber network with a view for further Fiber-to-the-Premise network expansion, and a platform for eventually providing Fiber-to-the-Home and/or Fiber-to-the-Business if the City chooses to pursue a complete network infrastructure for all City constituents.

Conclusions and Recommendations

The City of Tumwater has a number of options to pursue in terms of meeting its goals and objectives for this project. ZoomyCo is proposing a phased plan for the City of Tumwater's Master Telecommunications Plan. The four phases are:

Phase 1, Wireless Hotspots. Wireless hotspots are easy and inexpensive to implement. They also represent a significant potential revenue stream for the City of Tumwater. ZoomyCo recommends implementing a wireless hotspot within the Town Center and possibly implementing another hotspot within the newly developed Wal-Mart business park. Other applications for wireless hotspot implementation might be cafes, coffee shops, green space or parks, within the schools or libraries, within recreation centers or other City buildings. A detailed breakdown of the costs and potential revenue streams for wireless hotspot implementation is found in Section 4 of this report.

Phase 2. Fiber Backbone Network, Aggregation of Needs. The City of Tumwater, the school district and the Department of Transportation have common needs in implementing a fiber backbone network or a Fiber-to-the-Premise network. If the three entities can work together to

implement the network, there is significant savings that can be realized for all three entities. Additionally, the fiber backbone network may be used for implementing a wireless network for the community constituents, as well as a beginning phase for eventually implementing Fiber-to-the-Home. ZoomyCo has designed a fiber optic backbone network that will accommodate the three entities' initial needs, as well as provide a path for the City of Tumwater to implement additional infrastructure options.

ZoomyCo's initial network design for the City of Tumwater is a conservative design. If there is an opportunity to obtain additional fibers from the Department of Transportation, ZoomyCo recommends that the City of Tumwater needs to take advantage of that. Placing additional fiber through existing conduit or an "open trench" does not represent a significant incremental cost to either the City or the Department of Transportation. Our recommendation for the City of Tumwater is to place as much fiber as possible, whenever the Department of Transportation is utilizing the City's conduit system.

Phase 3. Implement a Wireless Network for Community Constituents. US Wirefree has indicated a preliminary interest in offering additional wireless services throughout the community of Tumwater. The City of Tumwater could facilitate further expansion of wireless connectivity by negotiating a joint arrangement with US Wirefree. This arrangement could be implemented in a number of ways. A detailed discussion of potential business models to consider is provided in Section 2 of this report. Further financial considerations for the various business models are provided in Section 5, Financial Options and Next Steps.

Phase 4. Ultimately, Fiber-to-the-Home. Many cities across the country are implementing fiber directly into homes and businesses. This is not a new idea, and it is not solely occurring within the United States. In fact, the U.S. has slipped to 12th place in the developed world in fiber implementation. Japan and Korea have implemented Fiber-to-the-Home in over 85% of their households, offering bandwidth speeds in excess of 10 Mbps to 1000 Mbps, which is 100 to 1000 times faster than DSL and cable modem technology, for prices less than what U.S. citizens are paying – less than \$30 per month.

Ultimately, ZoomyCo believes the U.S. cities that implement Fiber-to-the-Home will realize benefits that the Koreans and Japanese are already seeing. In investing in Fiber-to-the-Home, the Koreans are experiencing a thriving business and economic economy, and lower costs of doing business.

There are many financing options and grants available for implementation of Fiber-to-the-Home. ZoomyCo recommends, as the fourth phase of the Master Telecommunications Plan, to seek out financing and grant options available to the City of Tumwater. ZoomyCo can assist the City of Tumwater in applying for these grants.

The timing of these phases is based upon how urgent and critical the City of Tumwater's officials believe infrastructure investment is to the City's needs.

There are a number of follow-up steps that can and should be pursued for further investigation of the potential business models. They are:

1. Meet with the DOT, finalize a mutual conduit use, and fiber placement agreement.
2. Meet with the School District, provide cost estimates and plan for joint use of the extended fiber network, and mutual coordination and placement of the extended fiber network.
3. Discuss a wholesale agreement with US Wirefree and other potential providers, having them utilize the fiber network for expansion of their wireless network.

4. Set up hotspots in the Town Center and newly developed Business Park. Hotspot usage could be provided on a retail or wholesale basis to the community.
5. Apply for Grants to extend fiber to other locations and potentially, offer Fiber-to-the-Home and/or Business to the community.

SECTION 2

INDUSTRY OVERVIEW AND INTRODUCTION

The Ever-Changing Telecommunications Industry

The Telecommunications Act of 1996 (“The Act”) was the first major telecommunications legislation since the Cable Act of 1934. The 1996 Act was designed to “promote competition and reduce regulation in order to secure lower prices and higher quality services for American telecommunications consumers and encourage the rapid deployment of new telecommunications technologies.”

The drafters of this Act understood that the lack of deployment of advanced services in small rural communities would become a significant problem. The writers of the Act were correct in this assumption. As the incumbent telephone and cable TV companies began developing their advanced networks, it became apparent that the deployment of advanced networks in rural America was not a priority. The incumbent cable TV and telephone companies began building out their infrastructure in densely populated metropolitan areas where they had the greatest opportunity to achieve a large return on investment. This is understandable. However, a vast “digital divide” has been created as a result of incumbent providers focusing their network improvement on densely populated areas, leaving rural communities behind in the deployment of advanced telecommunications systems.

There have been other factors that have slowed the deployment of advanced telecommunication networks. The recent economic downturn and the shakeout in the telecommunications industry in 2001 have halted or slowed the pace of private-sector deployment of advanced telecommunications services in many areas. After a string of corporate telecommunication bankruptcies, numerous competitive telecommunications companies have either cut back on their plans to compete with incumbent telecommunications companies, and or have gone out of business altogether.

Competitive cable TV “overbuilders” have had the same misfortune. Rather than building sophisticated new communications networks that would enable them to compete simultaneously with providers of voice, video, data and other advanced communications services, the slowed economic environment has usurped the ability to capitalize these networks. Even the major incumbent providers of cable and telecommunications services have retreated from their bold claims to extend their services aggressively outside their traditional markets.

As a result of the private sector not deploying these advanced networks, adversely affected local governments have increasingly begun to explore the possibility of building their own broadband networks.

Several municipalities have been operating communications infrastructures for many years. At present, over 800 municipalities throughout the U.S. are either actively constructing broadband telecommunications infrastructures or are engaged in the planning stages. Municipalities are motivated by the failure of existing service providers to offer adequate service at reasonable prices along with the lack of reinvestment in infrastructures and new technology.

Many community leaders feel that it is imperative to the economic growth and stability of their communities to have access to a technically advanced broadband telecommunications infrastructure. Therefore, many municipalities are electing to construct and operate their own infrastructure to meet the needs of their communities.

Why Should a Public Entity Deploy Broadband? Broadband and Electricity Parallels¹

For rural communities, being left behind by the private sector is nothing new. During the first few decades of the electric power industry, privately-owned electric power companies literally left rural America in the dark while electrifying more densely-populated and lucrative urban markets.

Today, the same patterns are repeating themselves in the telecommunications industry. This time, however, many larger cities have joined rural communities in being at risk of falling behind urban population centers in obtaining the full benefits of the Information Age. These benefits include the ability to attract and hold on to businesses, the ability to retain local youth to the community, the ability to create attractive educational and employment opportunities, and the ability to offer the many other technology-based advantages that collectively make for a higher quality of life.

At the turn of the last century, residents in thousands of rural communities that were shunned by the private electric power companies formed their own electric utilities, in recognition that electrification was critical to their economic development and survival. The great majority of these communities thrived while others failed, and the public power systems they created still exist today, providing their customer-owners superior service at substantially lower prices than their counterparts in the private sector.

As they did in the electric power industry, local governments can play a critical role in ensuring that our Nation's telecommunications goals are met, particularly in rural areas. A local government that is dissatisfied with the pace, nature or quality of private-sector deployment of broadband services in its community will have a number of options to further deploy local telecommunications and communications infrastructure.

Communities that already operate their own electric utilities have several advantages that may contribute to the success of a broadband project. To remain competitive in the increasingly competitive electric power industry in the years ahead, public power utilities will need highly sophisticated communications infrastructure and facilities. Such infrastructure and facilities can readily support the provision of video, voice, data and other advanced telecommunications services, either by the utilities themselves or by other providers of such services. Furthermore, public power utilities also have decades of experience in operating complex technologies, serving customers of all kinds, managing billing and collection systems, and providing technical support. They have access to essential poles, conduits and rights of way. Public power utilities also have a century-long tradition of universal service.

With assets such as these, public power utilities have successfully provided broadband communications since the late 1980s, when the public power utility of Glasgow, Kentucky, upgraded its communications infrastructure for internal purposes and discovered that it could use its new facilities to offer better and cheaper cable television service than the incumbent provider. Currently, more than eighty public power utilities are offering broadband services in over thirty-three states, and many more are considering doing so. These utilities range from small systems serving less than 1000 customers to the \$100 million, state-of-the-art fiber network planned for Memphis, Tennessee, which will furnish wholesale high-speed communications services on an "open access" basis to telecommunications and data providers and resellers, which will in turn offer cable TV, video on-demand, high-speed data connections, telephone services and other advanced communications services throughout the city.

¹ This section was taken directly from Jim Baller's Address to the Fiber-to-the-Home Council Conference, October 5, 2004. http://www.baller.com/pdfs/baller_keynote_10-5-04.pdf

While helpful, ***operating an electric utility is not a prerequisite to a local government's ability*** to foster the rapid deployment of broadband communications in its community. For example, Chicago's CivicNet project promises to bring prompt and affordable fiber connectivity, not just to the City government's 1600 sites, but also to thousands of other organizations, including businesses, schools, libraries, hospitals, community centers, churches and even individuals. By aggregating the \$25 million in annual telecommunications expenditures of the City's agencies and holding out the promise of substantial user fees paid by the others using the system, the City has given itself sufficient clout to attract private-sector partners who will build and operate the CivicNet system in accordance with the City's goals and specifications.

The City of Lynchburg, Virginia, furnishes a smaller-scaled but equally creative example. In 1997, the City began to construct a 42-mile fiber optic network to interconnect its municipal buildings and school facilities. The City essentially paid for the network within 18 months, as measured by the costs that the City would have had to pay to obtain equivalent services from the incumbent telephone company. When local businesses and residents urged the City to make its system available to the public, the incumbent telephone and cable companies of Virginia pushed a law through the state legislature that not only barred Virginia's localities from offering telecommunications services themselves, but that also precluded localities from leasing their telecommunications infrastructure and facilities to potential competitors of the incumbents.

In response, the City of Lynchburg embarked on a nationwide search for a strategic partner that would purchase the City's network and operate it in a manner that advanced the City's goals. The City eventually sold the system for \$1 to CFW Communications, a century-old telephone company in central Virginia which had reinvented itself as an aggressive telecommunications provider. In return, the City obtained a 30-year irrevocable right to use the fibers that it was currently using, 8 dedicated fibers on all newly-constructed routes, the lowest rates for telecommunications services in Virginia for a period of 10 years, a commitment by CFW to extend high-speed services to 95 percent of the City's addresses in defined stages within four years, and numerous other significant benefits.

Even in sparsely-populated areas in which fiber-based networks may be infeasible, local governments have stepped forward to bring themselves into the 21st Century. Examples include Washington County, Ohio, Greenup, Illinois, and the Missouri Basin localities of Keokuk, Iowa, and Sioux Falls, South Dakota, which are all working to implement fixed wireless solutions. Numerous other satellite and terrestrial possibilities are also under development.

Benefits of Community Broadband Initiatives, the Vision of Advanced Broadband Networks

There are many rewards of deploying a community broadband initiative. This section provides a vision of the number of benefits that an advanced broadband network can provide to the City of Tumwater.

Many communities are deploying fiber facilities to their local public entities. These local public entities include the schools and libraries and institution of higher education, city, county and federal government offices, and the medical facilities within the community. In many cases these entities are the largest employers of the community and are also the largest telecommunication users within the community. In providing services to the entities, local businesses which are usually located within the same vicinities also benefit from advanced telecommunications services and can most often, also be accommodated.

Coordinated Effort and Aggregated Demand. The City of Tumwater will benefit from a fully developed, scaleable and coordinated city-wide telecommunications infrastructure to provide the citizens access to government services, educational opportunities and information resources they need to keep the City's economy competitive, locally and abroad.

Without a coordinated telecommunications plan, state agencies, schools, libraries and institutions of higher education will continue to purchase telecommunications services in a piecemeal fashion. This often duplicates service in a community, or even the same building. Acquiring services in this manner slows development efforts by not providing sufficient incentive for the private sector to fund and build-out the needed infrastructure.

This *Master Telecommunications Plan* is the mechanism that will prepare your City for the new millennium. Its goal is to fully develop a city-wide telecommunications network, based on demand aggregation. The benefit is to unify and concentrate efforts to ensure that maximum value is achieved in the shortest time. Using key city stakeholders' combined buying power will reduce costs of deploying additional technology infrastructure within the City, as well as encourage private sector investment in the area of telecommunications.

Bridge the Digital Divide. Citizens, businesses and governmental entities will all benefit from the upgraded facilities necessary to meet the objectives of this plan. Rural areas, such as the City of Tumwater, that are currently "at or near" capacity will benefit from additional bandwidth and the advanced services made available. A more favorable environment for economic development can be achieved, allowing the City of Tumwater to compete on the basis of technology as well as quality of life.

More Economic Development Benefits. Broadband services are becoming more important to the success of small and large businesses. For many, broadband is no longer an optional service; it is a standard for doing business. The network will provide businesses with the communication link they require to remain competitive with large metropolitan areas. **Please refer to Appendix E, Cedar Falls, Iowa Economic and Community Benefits Study.**

Educational Benefits. Educational opportunities can be expanded through distance learning, computer-based training and increased technology literacy. Professionals, life-long learners and non-traditional students can fulfill their educational needs through programs and courses offered electronically by our nation's colleges, universities and school districts as well as the emerging new consortia of educational providers.

Students and teachers in classrooms in the City of Tumwater will be able to share instructional materials and access remote information resources. Teachers will be able to collaborate amongst other teachers from different schools and school districts. Access to our world's largest and best endowed public and academic libraries, and the unlimited resources on the World Wide Web (WWW), will provide valuable opportunities to enhance the quality of education within the City. Access to broadband services will enable access to advanced placement classes for high school students who are not physically close to a higher education institution.

E-government Applications. State agencies, schools, libraries and institutions of higher education can pursue new and innovative network applications to improve the delivery of services and information to the citizens of the City. An advanced broadband network will provide the high-speed Internet connections that make "e-government" possible. This process will allow citizens to fill out forms and obtain licenses and permits over the Internet instead of the traditional, time-consuming methods such as standing in line.

Traffic telemetry, homeland security measures, and other e-government applications can be achieved through deployment of advanced telecommunication networks.

Other e-government applications include:

- Facilitate the handling of jail and prison inmates for arraignment, health care examination and continuing education.
- Replace long travel time for municipal and county regional and statewide meetings through video conferencing.
- Provide faster data links between local and state government.

Medical Benefits. Although the City of Tumwater does not currently have large medical establishments, there are significant medical benefits to broadband networks. Rural physicians and their patients can consult with specialists at hospitals or medical research centers throughout the country. Rural health care providers at all levels will benefit from reduced isolation from educational resources, increased opportunity for professional consultation, and online reference resources. Broadband networks support continuing medical education, support telehealth applications such as public awareness and disease control, and support telemedicine applications such as remote diagnoses, X-ray evaluation and treatment options.

Benefits for Telecommunications Providers. Telecommunications providers will benefit from dealing with fewer, larger clients and the potential for more rapid diffusion of advanced technologies in the newly aggregated local markets

Regulatory Considerations and New Challenges, Risk Mitigation

Local governments that enter the communications field are likely to face challenges that are somewhat different from those faced by their predecessors.

First, shortly after the Telecommunications Act became law, a number of states enacted explicit state barriers to municipal entry. While some of these laws were working their way through the courts, several other states enacted laws that were ostensibly intended to balance the interests of public and private providers of cable and telecommunications services. While Section 253(a) of the Telecommunications Act prohibits both explicit and effective barriers to entry, proving that a non-explicit state law is an "effective" barrier to entry may in some cases be difficult to prove. Doing so will require a showing that the measure "inhibits or limits the ability of any competitor or potential competitor to compete in a fair and balanced legal and regulatory environment." Where such a showing is not possible, public entities will have to comply with the state laws or persuade the state legislatures to change them.

Second, incumbent cable and telecommunications providers have undergone a metamorphosis over the last few years that have left several of them larger and better able to cross-subsidize anti-competitive behavior. In several recent cases, incumbents have engaged in clearly predatory behavior, as if taunting affected competitors and federal agencies to try to stop them. When considering entry into broadband services market, public entities must therefore be prepared for the possibility that the incumbents will not only respond aggressively, but perhaps even unlawfully. Cities have been most successful in pursuing broadband objectives by "flying under the radar" as long as possible. ***In Appendix A, ZoomyCo has provided a report from the American Public Power Association, "Community Broadband, Separating Fact from Fiction." This is an excellent report that provides useful information to refute common tactics and unfounded charges brought by the incumbents against Cities who implement broadband services.***

Finally, in the current "hands-off" deregulatory environment, new public entrants into the broadband communications market must be prepared to rely on themselves. It is unclear at this point whether, or to what extent, the Federal Communications Commission, or other branches of the federal government, will forcefully intercede to prevent anticompetitive practices. While these agencies may ultimately decide that strong pro-competitive intervention is necessary if deployment of broadband services continues to lag, that is not something on which public entities can rely in formulating their business and economic decisions.

Regulation within the State of Washington

ZoomyCo conducted a preliminary regulatory review in terms of the City of Tumwater's capabilities to offer telecommunications or cable TV services, based upon the State of Washington's regulatory environment. In short, cities that have "home rule" powers (that is,

charter counties, first class cities, and cities operating under the Optional Municipal Code) have the authority to provide telecommunications services to their residents. Since the City of Tumwater operates under the Optional Municipal Code, it can offer retail telecommunications services to its constituents. The City of Tumwater does not currently have any regulatory constraints for offering services to the community.

For more detailed information on the regulatory environment within the State of Washington, please refer to Appendix B.

Business Models to Consider

Even if the City of Tumwater does decide to invest in local access infrastructure, this does not mean that the municipality needs to provide end-to-end retail services. There are a variety of business models available to a municipality to offer such services. These include:

1. ***Retail service model.*** Under this model, the municipality offers retail services to consumers over infrastructure that it owns and operates. The municipality becomes a voice communications provider, cable TV operator, and Internet Services Provider.

The primary strengths of the retail service model:

- Owned and controlled by municipality in all aspects
- Highest potential revenue return

Weaknesses of the retail service model:

- Highest capital investment and risk
- Own the customer and, therefore, own billing and customer service responsibilities
- Responsible for maintenance of infrastructure
- Potential regulatory issues (need to become a registered CLEC and franchised cable provider)

With wireless services, there are additional community entities that could participate in owning and operating such services, including a local educational institution or a local business entity. With this model, Tumwater could lease conduit, fiber facilities or wireless sites and/or hotspots to another entity that would then offer retail services to the community.

2. ***Wholesale service model:*** With this model, the municipality owns and operates a network which provides a wholesale access platform for retail Internet Service Providers and other communication service providers to use. The “wholesale” service might be limited to dark fiber, or include advanced transport services. Under the constraint of state law which requires open access, a number of utilities in the State of Washington are deploying open access or wholesale service infrastructures (e.g., Grant County, WA, Mason County PUD).

Service providers use the municipally-owned infrastructure and lease it, paying a compensated access fee or wholesale fee for lease of the network. The service providers provide services, billing and customer service to customers. The municipality maintains and operates the network, billing the service providers for compensated access fees. This strategy allows the municipality to recover its investment costs in the network, and it allows the service providers to offer more robust services to the community.

There are two types of wholesale or compensated access strategies. These types of compensated access strategies are either an open-access or an exclusive-access. In an open-access network, the network is available to support multiple service providers. An open-access strategy fosters a competitive environment amongst the service providers, as the network is open to many service providers to use. The competitive environment creates competitive pricing, better customer services, and more products and services to the community. An open-access strategy has higher operational expenses, as many providers need to be managed, and typically,

a lower residual income is available to the network owner. An open-access strategy, therefore, has a longer return on investment schedule, than an exclusive access strategy.

The alternative to an open-access network is one in which a limited or exclusive number of service providers use the network. In this scenario, the municipality will most likely receive higher residual income, as the exclusive service provider will pay a larger residual for exclusive provider status. The municipality or network owner may also provide marketing privileges to the exclusive provider of the community. As homes are sold, contact information is given to the exclusive provider to market its services to the end user. Or, perhaps the provider is allowed to present telecommunications and cable TV packages to the end user during the closing of the home, business or lot. Also, in an exclusive-access strategy, operational expenses are lower, as fewer service providers need to be managed.

Strengths of the wholesale model:

- Infrastructure owned and controlled by the municipality
- The municipality bills the service provider only for access to the network; service providers handle customer service and billing.
- Fewer regulatory issues

Weaknesses of the wholesale model:

- High capital investment (a little less than retail model by having service providers pay for equipment in the Network Operating Center or headend location pertaining to their respective services.)
- Coordination of multiple service providers co-located in the same Network Operations Center and provisioning services over the same infrastructure.

Municipality-Owned Infrastructure, Combination of Wholesale and Retail Services. In this model, the municipality owns the infrastructure and offers one or two services to the community on a retail-basis and offers services also through a compensated or wholesale basis. For example, the municipality may want to offer Internet Services on a retail basis, and voice and video services on a wholesale basis.

3. ***Franchisee model:*** Under this model, the municipality contracts with a private firm to build and operate the facilities. This is similar to the traditional model of municipally-franchised cable television service, but wireless alters the range of players that might be considered and the architectures/services that might be offered. The service provider pays a franchise fee to the municipality, based upon a percentage of gross revenue. In turn, the municipality may extend telecommunications and/or public rights-of-way, roof rights, property rights, etc. for placement of telecommunications conduit and/or wireless sites. This model is similar to the wholesale or compensated access model; however, the municipality might not own the network infrastructure; but rather provide conduit, property rights, etc.

4. ***Real estate or Leasing model:*** With this model, the municipality provides access to conduit or public rights-of-way. In the wired-world, this includes access for stringing or burying cables; while in the wireless world, it includes locations for siting antennas. In this model, the municipality partners with private providers to deliver end-to-end services to consumers. Again, this model is similar to the franchisee model; compensation is based upon a leased fee, perhaps based upon lease of space square footage, or conduit footage, etc.

5. ***Coordination model:*** Here the municipality can provide a nexus for demand aggregation (e.g., buyer groups) or for coordinating efforts of community networking, but maintain a distance from the services being offered to the community.

6. **Combination:** The municipality may elect to provide a combination of many of these models.

Based upon conversations with City employees, it appears the City of Tumwater is most interested in establishing a network that the City owns, and offering a combination of wholesale, franchise, real estate and coordination models, but is not currently interested in offering retail services to the community.

What Other Public Entities are Doing

The development of fiber optic telecommunications systems and wireless systems has become a common practice of communities in the Pacific Northwest.

Some communities plan to provide only wholesale broadband capacity and connection to their customers with other businesses offering Internet, data, voice and video services over the network. Others are competing with their local telecommunications and cable TV services providers and offering retail telecommunications services directly to their customers.

Tacoma has made a significant investment to build its telecommunications infrastructure. The project, called the "CLICK! Network," is being constructed by the municipal electric utility, Tacoma Power, and is providing high-speed data services, Internet access, cable television services, high-speed data transport, and music applications. According to the CLICK! Network web site, Tacoma Power is offering cable TV and music applications on a retail basis to businesses and residences, and data communications and Internet services in partnership with several local Internet Service Providers.

Tacoma Power is also leasing the network to other telecommunications companies. Participating companies include: Optic Fusion, Electric Lightwave, Rainier Connect, Advanced Telecom Group and Integra Telecom. Tacoma has been awarded "the #1 Wired Community in America" and continues to expand its network throughout the Tacoma region.

The **Grant County PUD** has developed a SONET-based fiber optic telecommunications network, called the Zipp Network, which currently passes 6,000 homes and businesses. The network estimates to pass another 6,000 homes and businesses in 2004, a third of the PUD's 36,000 homes and businesses. When complete, the Zipp Network will include 47,000 miles of fiber optic cable at an investment of \$120 million. The Zipp Network is offering voice, data and cable TV services under a wholesale service platform.

Mason County PUD #3 is following the Grant Count PUD model and installing a FTTH network and providing wholesale services to its services area.

The **Franklin PUD** has deployed a wireless broadband network using its extensive fiber optic network as a backbone. The PUD will offer wholesale capacity to third party ISPs which will provide service to end users.

Neighboring utility **Benton PUD** has been offering similar service in Kennewick. Benton County has a 40-mile (64 km) square mile hotzone. The Benton PUD supplies power for the county leases dark fiber from Bonneville Power Administration, which built a 2,400 mile fiber network for sub-station monitoring. Benton PUD built the infrastructure and allows multiple Internet Service Providers to provide services.

The Franklin and Benton utility companies recently have banded together to create a large roaming network whereby a subscriber of one city network can have wireless access in another city.

Southeastern Washington State has wireless service that covers 3700 square miles (9583 sq km), thanks to the Columbia Rural Electric Association, a non-profit electric cooperative. Three counties - **Walla Walla, Columbia and Umatilla**, now have wireless DSL access. The area has a population of about 60,000, according to Tom Husted, chief executive officer of Columbia Rural Electric Association (REA) and its Columbia Energy LLC subsidiary, in Dayton, Washington, which is building the network. One Eighty Networks Inc., in Spokane, Washington, is the Internet service provider (ISP).

SECTION 3

TECHNICAL OVERVIEW

Technology Options, Pros and Cons

The term 'broadband' has been dulled in recent years to mean any 'always-on' service exceeding 200 kbps. Unfortunately, 200 kbps is not a big improvement over 56K dial up speeds.

The primary technology options that are available today are:

1. **Copper – Cable Modem, Hybrid Fiber Coax, Cable Modem Networks.**
2. **Wireless. Fixed Wireless and Wireless Hot Spots.**
3. **Broadband over Power Lines.**
4. **Fiber Optic Backbone and Fiber to the Premise, and Ultimately, Fiber to the Home and/or Business**

When designing a network, these major considerations must be considered:

- **Applications and desired services that will be supported.** Will the network support voice communications, data services and cable TV services? The applications and services supported impact the bandwidth that is required to support these services.
- **Cost.** What are the capital cost considerations for implementation of network facilities, equipment, and end-user equipment? What are the operational cost considerations?
- **Security.** Is the technology secure? How safe is the data that is transmitted over this technology medium?
- **Speed and Bandwidth Capabilities.** What can the technology deliver in terms of performance and speed?
- **Future-proof, Upgradeability, Scalability.** How can the technology be upgraded? What is the risk of obsolescence? Is the technology scalable?

A brief description of the advantages and disadvantages of each of the technologies are explored below:

Copper. Most incumbent telecommunications networks are based on copper facilities. DSL-type services, cable modem, dial-up services are all supported on copper facilities. First of all, the idea of implementing a technologically-advanced network would not be relevant with a copper plant infrastructure. DSL and cable modem services can currently support speeds of 256k – 3 Mbps. The speed of the connection with cable modem service is dependent upon the number of users on the network. As cable modem technology is a shared network transport; as more users are on the network; speed is diminished. DSL speed is influenced by the distance of the customer from the carrier's DSLAM. Both DSL and cable modem service have asymmetrical transport rates, meaning, the amount of bandwidth available for download speed is greater than the upload speed.

Hybrid Fiber Coax (HFC) architectures, which many of the cable modem network use, have cost advantages today, as did a party line service during the telephone system's initial rollout. But the shared and inherently asymmetric nature of HFC is unsuitable for commercial customers and will likely end up as such for the residential sector. HFC is not future proof. It is a shared medium that is challenged to deliver more than 10 Mbps service.

The City of Tumwater's competitive advantage of offering a network that meets today's and the future needs would not be available with implementing a copper plant. Today's copper networks are maxed-out, and cannot support the existing needs of high-speed data communication networks, let alone, the future capacity needs of tomorrow's applications.

Secondly, copper cannot support video services, enhanced Internet services, or video-on-demand services. Copper cannot support Voice-over-IP services well.

Lastly, if the ever-increasing need for more bandwidth continues, the City of Tumwater may need to replace the copper plant infrastructure in the future. This would require reopening trenches, new construction costs and additional capital needs to meet the future needs of telecommunication users.

Wireless. Wireless services have an advantage over other technologies as it is inexpensive, quick and easy to deploy wireless services. Termination equipment for line-of-site wireless services cost approximately \$400 - \$600 per location for the transceiver, antennas and hub site. A wireless hotspot, which will allow wireless access to the Internet, can be deployed inexpensively and quickly within the Town Center and other business park applications.

One downside of wireless is that it will only effectively support data communications services, and falls short of being able to support voice and cable TV, or video services effectively.

The maximum theoretical speed with wireless services is 11 Mbps. The maximum theoretical speed does not take into consideration interference issues and multiple users. Actual speeds supported by wireless services are 256 Kbps – 1 Mbps. There is no speed guarantee with wireless as it requires line of site to a wireless tower for connectivity and the bandwidth diminishes as more users are on the network.

From a reliability standpoint, wireless services are impacted by weather conditions, distance and line of site issues. Security is a concern with wireless networks, as it is easy to tap into a wireless network and data is therefore, not secure with wireless. Encryption is just beginning to be supported with wireless; however, encryption consumes bandwidth, a limited resource with wireless. If the wireless network is to be upgraded in the future, each wireless transceiver and receiver that would be placed at each location must be replaced.

In ZoomyCo's opinion, wireless is a complimentary technology to fiber. Because wireless technology can quickly and economically provide connectivity, it may be considered as a short-term solution to fill a gap. Wireless services can compliment fiber networks, also as wireless serves the mobile and portable needs of users. Wireless also works well within a home or business. However, because of the line of site, distance limitations, security issues and reliability concerns, wireless is not an excellent solution for local access infrastructure, or a long-term solution.

Broadband over Powerlines. **Broadband over Powerlines** (BPL) is high-speed Internet service delivered via electric power lines. It's called Power Line Communications, or PLC, in some places. The primary benefits touted by of BPL proponents is that in sparsely populated areas, BPL could *theoretically* make high-speed Internet access available in locations that do not currently have cable or DSL broadband access. Theoretically. In densely populated areas, it would provide consumers with a third option for high-speed Internet access, in addition to cable Internet service and the phone company's high-speed DSL (digital subscriber line) service.

Electric wires are designed to carry electricity, not data. Electric wires cannot efficiently carry data very far, and a utility installing BPL would have to invest in a network of fiber-optic cables and amplifiers to bring the Internet signals to a distribution point for the "last mile" to subscribers' homes. In addition, in order to effectively implement BPL, utilities would have to manually bypass

every transformer along the electric lines, since data signals cannot pass through transformers.

In 2004, there have been several test areas, covering smaller neighborhood deployments, as well as large-scale deployments. The primary issues of BPL technology from the test areas is interference with existing radio frequencies – all users of the shortwave and low-VHF parts of the radio spectrum could be affected. With radio wave interference, the BPL service does not work, and neither does the radio.

Power lines, unlike cable TV lines, are not shielded. This means that any signal sent down those lines at radio frequencies will "leak" from the power lines. That means they also receive radio signals. Any nearby signals would be sent straight to a customer's computer.

The biggest problem is that these BPL systems use frequencies between 2 MHz and 80 MHz. This includes the shortwave bands, between 3 and 30 MHz, which are the only frequencies in the whole radio spectrum on which worldwide communications are possible without using satellites or other relays.

Users of these frequencies include not only ham operators but aircraft pilots, the military, ship-to-shore, international broadcasters and others. At the high end of the range, you have many emergency service agencies and the lower TV channels (2-4). While many of these services operate away from residential areas where BPL may be installed, even low-power radio signals in this frequency range may often travel hundreds or even thousands of miles.

Some of the radio uses/users affected by BPL on 2-80 MHz are:

- TV channels 2, 3, 4 (56-80 MHz)
- Kids' walkie-talkies (27 & 49 MHz)
- Older cordless phones (49 MHz)
- Some wireless baby monitors (49 MHz)
- Radio-controlled cars, boats, planes (27, 49, 72 MHz)
- CB (Citizens Band) radio (27 MHz)
- International shortwave broadcasters (various frequencies, 2-25 MHz)
- Amateur (ham) radio (various frequencies, 3-54 MHz)
- Military (various frequencies, 2-80 MHz)
- Police/Fire/EMS (30-50 MHz)
- Federal law enforcement (various frequencies, 2-80 MHz)
- Federal Emergency Management Agency / Dept of Homeland Security (various frequencies, 2-80 MHz)
- Airlines / Air Traffic Control (2-22 MHz)

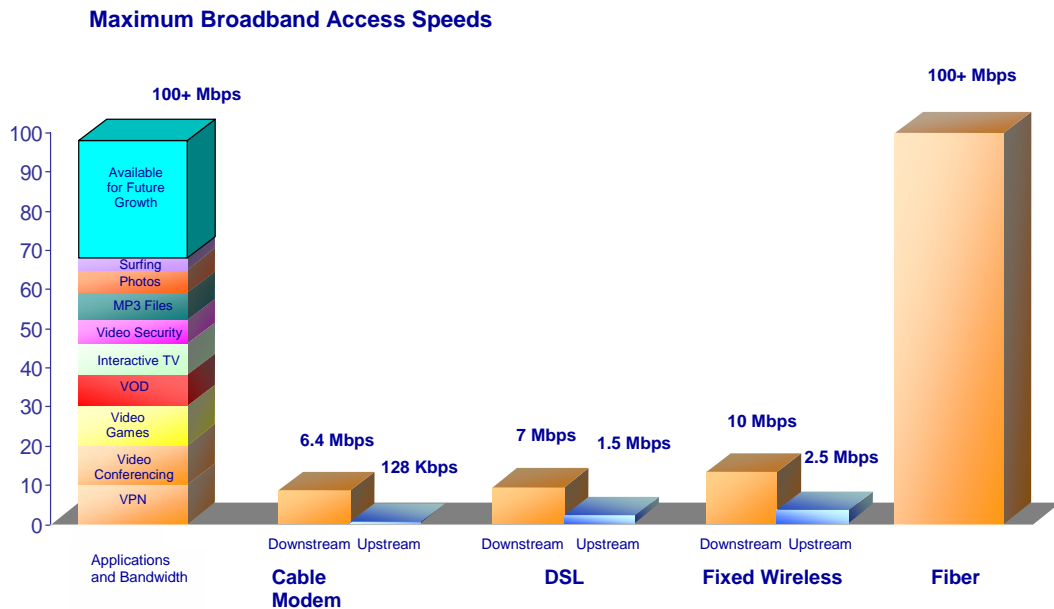
BPL is not a licensed service, meaning that neither the sponsoring utility nor the individual user would need a license from the Federal Communications Commission, or FCC. Other users of the same frequencies, such as broadcasters, police and fire departments, and ham operators, must have FCC licenses. The law is very clear that if an unlicensed service causes interference to a licensed service, then the unlicensed service must resolve it or shut down. Likewise, an unlicensed service must tolerate any interference it receives from a licensed service. Technically speaking, the utility would bear full responsibility for resolving the interference problem by taking any necessary steps, up to and including shutting down the service in a given area.

Optical Fiber. ZoomyCo strongly believes that fiber optic technology offers far greater benefit than any other technology available today.

Fiber optic technology is simply the best transport medium available in the industry. Only fiber will allow sustained data communication rates of 10/100Mbps. Optical equipment is capable of 1000Mbps or Gigabit speeds. This provides speeds that are several orders of magnitude faster than wireless, Broadband over Power Lines, DSL, cable modem and Hybrid Fiber Coax networks. As the number of subscribers increases on a cable modem network, bandwidth available to each subscriber decreases. Fiber speeds are not affected by number of subscribers or distance limitations.

Optical fiber is not new. Fiber has been implemented throughout **all** telecommunications and cable TV networks for the past thirty years. It is a technology that is stable, risk-free, and is easy to manage.

One fiber network will support voice, video or cable TV services and data communications. Wireless, cable modem and DSL networks stops short at supporting voice and data services only, with speeds topping out at 1.5Mbps. Fiber can also support innovative, new applications, including high definition TV, cable TV services, & Video-on-Demand, IP video, VoIP telephony, "smart appliances", alarm systems, automated meter reading, video conferencing and video telephones, community networking and intranets.



Fiber will support all technologies available today and any unforeseen needs in the future. Investment in fiber will serve the next 100 years at a minimum. Existing wireless, DSL and cable modem networks will be obsolete within five years, and do not currently support the existing needs of today. Copper networks will need to be replaced as they fall short in meeting current demands for speed and more bandwidth.

Fiber has unlimited and countless upgrade possibilities. The electronics on the end points of the fiber may be switched out to support new applications in the future. The fiber in the ground will not need to be replaced. Consequently, as copper networks need to be upgraded, the entire network, including reopening trenches must be redone to upgrade a copper network.

The technology deployed for the FTTP network can easily integrate with existing telecommunications and cable TV service providers. The technology is standards-based, non-proprietary, and can interface with existing service providers without the providers needing to change any existing technologies or equipment.

From a cost-standpoint, optical fiber is at par with copper in terms of per foot costs. The electronics for fiber optic networks in the local distribution are still expensive; however costs for electronics are coming down and will continue to decrease over time.

Optical fiber is very secure because taps can easily be detected.

Fiber-to-the-Home or Premise. Again, fiber optic technology is not new. Deploying fiber directly into a home or business – referred to as Fiber-to-the-Home (FTTH) or Fiber-to-the-Premise (FTTP) is a young but rapidly growing market, with the potential to transform how we live, work and play. This transformation has been led by distinct market segments worldwide, market segments that each have its own unique advantages for deploying FTTH and unique business needs to be successful.

More than 217 communities in the U.S. have deployed fiber directly to a home, or have implemented a FTTP network. These communities include large municipalities, such as Provo Utah; Jackson Tennessee; Bristol Virginia; Dayton Georgia; as well as numerous real estate developments. Deploying FTTP, especially within a Greenfield real estate development, is becoming the standard for utility infrastructure.

SECTION 4

PHASES OF IMPLEMENTATION, ESTIMATED CAPITAL COST CONSIDERATIONS

Phase 1: Wireless Hotspots - WiFi

WiFi is an acronym for “Wireless Fidelity”. In the case of the City of Tumwater, WiFi can be used at fixed locations, wireless hotspots, for users to have access to the Internet. WiFi users can use wireless for email, Web browsing, and printing to local network printers. Users should **not** use wireless for streaming audio/video, very large downloads or viewing extremely graphic-intensive Web sites.

Even though wireless networks look attractive for use everywhere, wired networks – fiber optic networks -- still give the best performance and speed. In general, a wireless connection works just like a wired Ethernet connection. Wireless access may be up to 11 megabits per second. This bandwidth, however, is shared among all users connected via wireless in a given area. This means that network speeds may be noticeably slower when many people are using wireless, and generally will not be as fast as wired Ethernet. For permanent network connections, a wired network is the best solution.

WiFi uses an 802.11 standard and comes in a number of flavors: 802.11b, 802.11a, and 802.11g. The 802.11 standard defines two modes: infrastructure mode and ad hoc mode. In infrastructure mode, the wireless network consists of at least one access point connected to the wired network infrastructure and a set of wireless end stations. This configuration is called a Basic Service Set (BSS). An Extended Service Set (ESS) is a set of two or more BSSs forming a single subnetwork. Since most corporate WLANs require access to the wired LAN for services (file servers, printers, Internet links) they will operate in infrastructure mode.

Ad hoc mode (also called peer-to-peer mode or an Independent Basic Service Set, or IBSS) is simply a set of 802.11 wireless stations that communicate directly with one another without using an access point or any connection to a wired network. This mode is useful for quickly and easily setting up a wireless network anywhere that a wireless infrastructure does not exist or is not required for services, such as a hotel room, convention center, or airport, or coffee shop. ZoomyCo has provided the methodology and pricing for setting up an ad hoc wireless station.

Getting WiFi Set-up

ZoomyCo recommends placing a wireless hotspot within the City’s Town Center, at a City-owned building within the vicinity. Another wireless hotspot may be considered at the newly-development Wal-Mart business park.

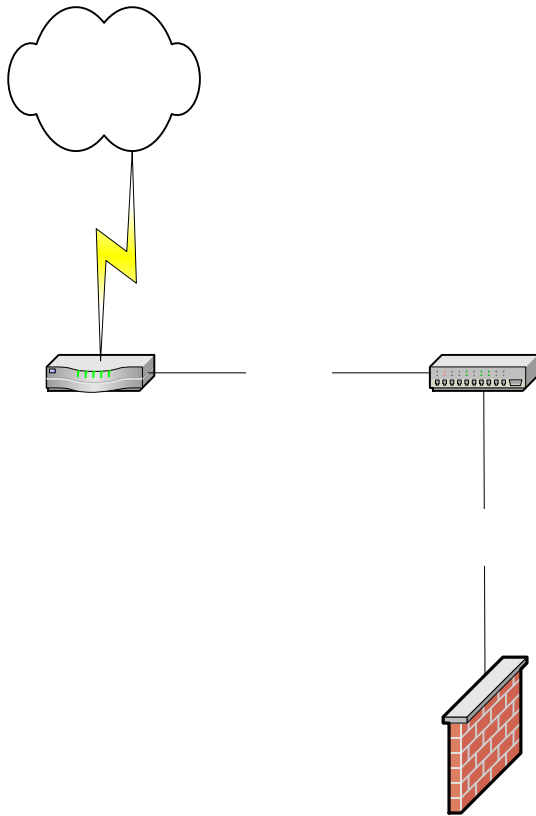
Internet access needs to be ordered and provided to the hotspot location. Once the hotspot equipment is in place, there are numerous WiFi companies that would be able to provide authentication, scratch cards, and general program administration services. A few of the companies that support Wi-Fi hotspots:

- Hotspotz Network
- The Cloud
- Boingo Wireless
- Wayport
- T-Mobile

Each of these companies provides scratch cards or Point-of-Sale applications that will be given to customers wanting short-term Internet access. Each of the companies also provides monthly service options for customers that would like to subscribe to a monthly subscription. Each of the companies also offers revenue sharing on all of the usage on the wireless network.

Equipment Needed

The equipment needed to set-up a wireless hotspot and the preliminary, associated costs are:



Equipment List for each hotspot: Please note: the pricing shown below is preliminary and an estimate only:

1	Cisco 2621 Router	\$3,000	\$3,000
1	Cisco T1-WIC (CSU/DSU for T1)	\$1,000	\$1,000
1	24 Port 10/100 Switch	\$500	\$500
1	Chatsworth Rack	\$400	\$400
1	APC 1400 UPS	\$1200	\$1200
1	Engenius NL-2611 CB3 + Deluxe Radio	\$200	\$200
1	24 dbi Parabolic Grid Antenna	\$100	\$100
1	Passive injector for power	\$30	\$30
50	Category 5 wiring	\$0.31	\$15.50
	Total		\$6,445.50
	Installation, setup and configuration		\$2,500.00
	Grand Total		\$8,945.50

Shipping and handling charges are not included in the pricing estimate above.

ZoomyCo can install and manage your wireless hotspots, in addition to providing Internet access services.

Phase 2: Fiber to the Public Entity, Traffic Telemetry, Aggregation of Needs

The City of Tumwater, the school district and the Department of Transportation have common needs in implementing a fiber backbone network or a Fiber-to-the-Premise network. If the three entities can work together to implement the network, there is significant savings that can be realized for all three entities.

ZoomyCo has created a network design that will accommodate the City of Tumwater's, and key shareholders' existing needs within the City. We have incorporated the Department of Transportation's fiber design into this plan. We have also provided a conceptual design for the school district, utilizing the Department of Transportation's optical fiber network and City-owned conduit. We have also provided a conceptual design incorporating the City's desire for better traffic telemetry. As we do not currently know where the water and sewer treatment plants are located, these locations have not been incorporated into the plan.

The Tumwater School District is interested in connecting all of their schools with a fiber ring with the goal of eliminating or consolidating current monthly charges for Internet and telecommunications services. They are also evaluating using a unified Voice over IP phone system, further reducing monthly access fees, long distance charges, and consolidation of telecommunications equipment needs. The School District has obtained a \$6 Million bond for technology needs and a small portion of this bond is yet available for technology use.

The City of Tumwater's Public Works Department has two primary initiatives that require broadband connectivity. The first initiative involves reducing traffic congestion due to extensive growth in three major corridors:

- North – South Highway 99
- Henderson – Tumwater Boulevard – I5
- Yelm Highway – Cleveland – Capitol Boulevard

There are twenty-three signal controlled intersections along these corridors. One way of reducing traffic congestion would be to create a real-time traffic operation center managing traffic flow and real time message postings. In order to do this, traffic lights could be connected to a centralized location.

The second initiative for the City of Tumwater is planning for compliance with Homeland Security measures regarding the water supply system. According to Dave Barclift, the plan for compliance needs to be submitted by the 1st quarter of 2006. Within the Tumwater Water and Sewer District are two water treatment plants and four water treatment reservoirs. There are currently 44 telemetry circuits connecting these facilities. Currently these locations are connected via government radio frequencies. The Homeland Security measures call for surveillance systems to be installed and more reliable connections to be in place. These locations could be served by fiber optic network facilities to meet the requirements from Homeland Security.

The Department of Transportation has a new building under construction located on Tumwater Boulevard. The DOT is interested in utilizing the City of Tumwater's existing conduit along Capitol Boulevard to bring fiber facilities to this building. ZoomyCo suggests having the DOT install and provide dark fiber in exchange for utilizing the City's conduit. This would allow the City of Tumwater and the School District to more easily extend a potential fiber network to the schools and would provide additional fibers for potential traffic control operations. The additional fibers could also serve as a backbone for further expansion of the fiber network or a backbone network for offering wireless services to the community. The additional fiber placed by the DOT would be at no additional charge to the City of Tumwater and the saving benefits to the schools and to the City for use of additional fibers would be significant.

Assumptions for the Conceptual Network Design

To accommodate the City of Tumwater's existing needs, as well as provide a migration path for further fiber expansion, the following assumptions were used:

- The Network Operations Center would be located in the Town Center in an existing or new city owned building.
- The city was then divided into distribution areas consisting of approximately 1200 to 1500 homes.
- Within each of these distribution areas would be a hub-site location where fiber would be extended to different premises.
- A minimum of two feeder fibers would be extended to each hub-site location.

By utilizing this conceptual design, and by placing distribution hub-site locations throughout the City, the fibers placed under this plan could accommodate either an active or passive optical network in the future, if the City decided to eventually implement Fiber-to-the-Home or any further Fiber-to-the-Premise network expansion. By placing one **additional** sheath in the existing conduit structure that is owned by the City, the City would still have one existing vacant innerduct for future expansion.

The Department of Transportation requires a 48-count fiber cable along Capitol Boulevard. ZoomyCo recommends requesting the DOT to put in a 96-count fiber cable to accommodate the school district and the City of Tumwater's needs.

The incremental cost of installing a 96-count fiber versus a 48-count fiber cable is: **\$30,440.**
 The incremental cost of installing a 144-count fiber versus a 48-count fiber cable is: **\$70,012.**
 The cost difference of installing a 144-count fiber versus a 96-count fiber cable is: **\$39,572.**

The Department of Transportation should be able to cost justify the incremental expense for the City, as the City of Tumwater is providing the conduit to the Department of Transportation at no charge. Normally, the City of Tumwater would charge a \$2 per linear foot lease fee for the conduit per month. The savings to the Department of Transportation for having the conduit at no charge is \$2 per linear foot x 16,000 feet = \$32,000 per month in savings.

Acting alone

Acting alone, if the **Department of Transportation** installed conduit along Capitol Boulevard, the costs would be:

WDOT				
Quantity	Item	Cost	Subtotal	
16000 ft	Directional Bore and 1 1/4" Conduit	\$ 8.60	\$ 137,600.00	
16000 ft	48 Fiber Cable	\$ 1.80	\$ 28,800.00	
10	4' Round Manholes	\$ 1,905.00	\$ 19,050.00	
27 days	Traffic Control	\$ 600.00	\$ 16,200.00	
44880 ft	48 Fiber Cable- Aerial	\$ 1.80	\$ 80,784.00	
44880 ft	1/4 " Wire Strand	\$ 0.91	\$ 40,840.80	
180	Make Ready Poles	\$ 27.50	\$ 4,950.00	
	Misc. Material		\$ 34,570.00	
Total:			\$ 362,794.80	

The cost for the **City of Tumwater** to place fiber through the existing conduit is:

City of Tumwater				
Quantity	Item	Cost	Subtotal	
13200 ft	24 Fiber Cable	\$ 1.60	\$ 21,120.00	
4800 ft	12 Fiber Cable	\$ 1.40	\$ 6,720.00	
39150 ft	6 Fiber Cable- Aerial	\$ 1.30	\$ 50,895.00	
39150 ft	1/4 " Wire Strand	\$ 0.91	\$ 35,626.50	
157	Make Ready Poles	\$ 27.50	\$ 4,317.50	
Yearly Costs	Annual Pole Rental Fee and Maintenance Costs	\$11.80/ Pole	\$ 1,852.60 + Maintenance Costs	
Total:			\$ 118,679.00 + Additional Yearly Costs	

We made the assumption that the **School District** would place their facilities on power poles, with a minimum of two fibers to each school. The cost is as follows:

School District			
Quantity	Item	Cost	Subtotal
127800 ft	1/4 " Wire Strand	\$ 0.91	\$ 116,298.00
109000 ft	6 Fiber Cable	\$ 1.30	\$ 141,700.00
4800 ft	12 Fiber Cable	\$ 1.40	\$ 6,720.00
14000 ft	24 Fiber Cable	\$ 1.60	\$ 22,400.00
512	Make Ready Poles	\$ 27.50	\$ 14,080.00
Yearly Costs	Annual Pole Rental Fee and Maintenance Costs	\$11.80/ Pole	\$ 6,041.60 + Maintenance Costs
			\$ 301,198.00
Total:			+ Additional Yearly Costs

Aggregation of Needs

Acting together, the fiber cable placed by the **Department of Transportation** would need to be increased from a 48 count fiber cable to a 96 fiber count fiber cable or a 144 fiber count cable.

The following costs will be accrued installing a 96 fiber count cable:

WDOT- 96 Fiber Cable			
Quantity	Item	Cost	Subtotal
16000 ft	96 Fiber Cable	\$ 2.30	\$ 36,800.00
44880 ft	96 Fiber Cable- Aerial	\$ 2.30	\$ 103,224.00
44880 ft	1/4 " Wire Strand	\$ 0.91	\$ 40,840.80
180	Make Ready Poles	\$ 27.50	\$ 4,950.00
Total -96 Fiber:			\$ 185,814.80
Total- 48 Fiber:			\$ 155,374.80
Additional Cost:			\$ 30,440.00

The following costs will be accrued installing a 144 fiber count cable:

WDOT- 144 Fiber Cable			
Quantity	Item	Cost	Subtotal
16000 ft	144 Fiber Cable	\$ 2.95	\$ 47,200.00
44880 ft	144 Fiber Cable- Aerial	\$ 2.95	\$ 132,396.00
44880 ft	1/4 " Wire Strand	\$ 0.91	\$ 40,840.80
180	Make Ready Poles	\$ 27.50	\$ 4,950.00
Total- 144 Fiber:			\$ 225,386.80
Total- 48 Fiber:			\$ 155,374.80
Additional Cost:			\$ 70,012.00

Total- 144 Fiber:			\$ 225,386.80
Total- 96 Fiber:			\$ 185,814.80
Additional Cost for 144 Fiber vs. 96 Fiber:			\$ 39,572.00

Acting together, the **City of Tumwater** would experience the following cost savings:

City of Tumwater			
Quantity	Item	Cost	Subtotal
13200 ft	24 Fiber Cable	\$ 1.60	\$ 21,120.00
4800 ft	12 Fiber Cable	\$ 1.40	\$ 6,720.00
9800 ft	6 Fiber Cable- Aerial	\$ 1.30	\$ 12,740.00
9800 ft	1/4 " Wire Strand	\$ 0.91	\$ 8,918.00
40	Make Ready Poles	\$ 27.50	\$ 1,100.00
Yearly Costs	Annual Pole Rental Fee and Maintenance Costs	\$ 11.80/ Pole	\$ 472.00 + Maintenance Costs
Total:			\$ 50,598.00 + Additional Yearly Costs
Savings:			\$ (68,061.00)

By utilizing the city-owned conduit, the **School District** will experience a cost savings of:

School District			
Quantity	Item	Cost	Subtotal
78800 ft	1/4" Wire Strand	\$ 0.91	\$ 71,708.00
74600 ft	6 Fiber Cable	\$ 1.30	\$ 96,980.00
4800 ft	12 Fiber Cable	\$ 1.40	\$ 6,720.00
316	Make Ready Poles	\$ 27.50	\$ 8,690.00
Yearly Costs	Annual Pole Rental Fee and Maintenance Costs	\$11.80/Pole	\$ 3,728.00 + Maintenance Costs
Total:			\$ 184,098.00 + Additional Yearly Costs
Savings:			\$ (117,100.00)

Shipping and handling charges are not included in the pricing estimate above.

Phase 3: Community Constituents, Broadband Services

The fiber optic network could also serve as a backbone network for potential wireless hotspots, and a potential backbone for wireless services for community constituents.

Additionally, the fiber backbone network may be used for implementing a wireless network for the community constituents, as well as a beginning phase for eventually implementing Fiber-to-the-Home. ZoomyCo has designed a fiber optic backbone network that will accommodate the three entities initial needs, as well as provide a path for the City of Tumwater to implement additional infrastructure options.

Other cities have deployed a wholesale approach with wireless service providers in extending wireless services to the community constituents. Cities build out a fiber backbone network that is owned and maintained by the City, and lease it to potential wireless providers. The Cities recover costs of fiber network implementation by charging a compensation access fee (ranges from \$20 - \$55 per month per subscriber).

ZoomyCo recommends meeting with potential services providers in the area to explore possibilities of implementing a wireless network for community users.

Phase 4: Ultimately, Fiber-to-the-Home and/or Fiber-to-the-Business

We have also created the backbone fiber network with a view for further Fiber-to-the-Premise network expansion, and a platform for eventually providing Fiber-to-the-Home and/or Fiber-to-the-Business if the City chooses to pursue a complete network infrastructure for all City constituents. No capital or operational cost projections are included in this report.

In order to provide financing for the Fiber-to-the-Home and/or Fiber-to-the-Business, ZoomyCo recommends applying for grants and financial assistance. Details on grant programs are provided in Section 5.

SECTION 5

FINANCIAL OPTIONS AND REVENUE SOURCES

Financing Options

There are a number of options available to Cities, schools and communities to fund infrastructure and telecommunication initiatives. The primary funding options available are:

1. **E-Rate Program for Schools.** The Universal Service Program is administered by the Schools and Libraries Division (SLD) of the [Universal Service Administrative Company \(USAC\)](#). This not-for-profit corporation was appointed by the [Federal Communications Commission \(FCC\)](#) to ensure that the benefits of telecommunications services reach students and communities across the country. The E-rate - or, more precisely, the Schools and Libraries Universal Service Support Mechanism - provides discounts to assist most schools and libraries in the United States to obtain affordable telecommunications and Internet access. This program has approved \$24.2 million in new funding for projects and services for 2005.
2. Packaging the project to become eligible for financing through **Leasing, Certificates of Participation, Installment Loans, Bonds**
3. **Grants.** There are numerous grants available for schools, municipalities, and medical establishments for deployment of advanced broadband networks.

Below is a number of grant opportunities for the City of Tumwater to pursue. Again, ZoomyCo can assist the City of Tumwater in applying for these grants.

The Rural Utilities Service (RUS) has several funding and financing programs available – especially for rural or small town telecommunication networks. RUS continues to provide many programs for financing rural America's telecommunications infrastructure. The "traditional" infrastructure loan program, consisting of **hardship, cost of money, Rural Telephone Bank, and guaranteed loans**, provides financing of broadband and other advanced services. Since 1995, every telephone line constructed with RUS financing has been capable of providing broadband service using digital subscriber loop (DSL) technology. The **Distance Learning and Telemedicine** program continues its charge to wire our schools and improve health care delivery in rural America.

<http://www.usda.gov/rus/telecom/index.htm>

RUS has been given the challenge to administer several new and developing programs for improving the quality of life in rural America. The **Broadband Program**, a loan program designed specifically to increase the rate of deployment of technology to small towns in rural areas has enabled RUS to step beyond its traditional definition of rural (towns of 5,000 or less), and fund borrowers serving communities of up to 20,000 inhabitants. Another program, the **Weather Radio Grant Program**, provides funding for weather radio transmitters in rural areas. This has provided early warning systems in rural areas that are saving lives.

The dedicated borrowers of the RUS telecommunications program have been hard at work for over 50 years, providing solutions to problems associated with serving rural America. Progress is

being made and there are successes being achieved everyday. Rural carriers are providing more access and a higher deployment rate of access every day. The deployment of advanced service by rural carriers is truly impressive. RUS hopes to help those carriers continue that trend through its **financing programs**.

Another national grant program is the National Telecommunications and Information Administration (NTIA) Technology Opportunities Program:

<http://www.ntia.doc.gov/top/grants/grants.htm>

The Department of Commerce's Technology Opportunities Program (TOP) promotes the widespread availability and use of digital network technologies in the public and non-profit sectors. As part of the Department's National Telecommunications and Information Administration (NTIA), TOP gives grants for model projects demonstrating innovative uses of network technologies. TOP evaluates and actively shares the lessons learned from these projects to ensure the benefits are broadly distributed across the country.

TOP makes matching grants to state, local and tribal governments, health care providers, schools, libraries, police departments, and community-based non-profit organizations. TOP projects demonstrate how digital networks support lifelong learning for all Americans, help public safety officials protect the public, assist in the delivery of health care and public health services, and foster communication, resource-sharing, and economic development within rural and urban communities. To date, TOP has awarded 610 grants, in all 50 states, Puerto Rico, the District of Columbia, and the U.S. Virgin Islands, totaling \$233.5 million and leveraging \$313.7 million in local matching funds. TOP projects are demonstrations of how digital network technologies can be used to extend and improve the delivery of valuable services and opportunities to all Americans. By serving as models that can be replicated in similar communities across the country, TOP projects extend their benefits far beyond the communities in which they take place, and provide economic and social benefits to the nation as a whole.

In addition, TOP continuously disseminates the results and insights learned from the projects it supports by providing technical assistance, creating publications, newsletters and online resources, and hosting conferences.

See also *TOP's News from the Field* for news and information about TOP grantees.

See also NTIA Press Releases for additional information and updates on NTIA and TOP activities.

There are a number of grants available to schools:

<http://www.adec.edu/fed-pgms.html> The American Distance Education Consortium has several grant sources listed on their web site. They are:

Federal Programs & Grants

- **Agricultural Telecommunications Program**
- **Advanced Technology Program (ATP):**
 - ATP Home Page
 - Listing of Conferences and Public Meetings
- **AmeriCorps**
 - Grant Applications and Guidelines

- **Association Liaison Office for University Cooperation in Development**
 - ALO oversees and administers a cooperative agreement between USAID and the six associations:
 - The American Association of Community Colleges (AACC)*
 - The American Association of State Colleges and Universities (AASCU)*
 - The American Council on Education (ACE)*
 - The Association of American Universities (AAU)*
 - The National Association of Independent Colleges and Universities (NAICU)*
 - The National Association of State Universities and Land-Grant Colleges (NASULGC).*
 - [ALO Home Page](#)
- **Fellowships:**
 - [Recent Recipients of ACLS Fellowships and Grants](#)
- **Foundations:**
 - [AOL Foundation](#)
 - [Indian Land Tenure Foundation](#) (Currently accepting proposals for [Legal Extern/Indian Law Attorney Programs](#))
 - [The Markle Foundation](#)
 - [The National Science Foundation](#)
 - [The Rockefeller Foundation](#)
 - [W.K. Kellogg Foundation](#)
- **Fund for the Improvement of Postsecondary Education (FIPSE)**
 - [FIPSE Home](#)
- **Initiative for Future Agriculture and Food Systems (IFAFS)**
 - [IFAFS 2001 Awards](#)
- **Learning Anytime Anywhere Partnerships (LAAP):**
 - [LAAP Home Page](#)
 - [FY2001 Awards](#)
- **National Library of Medicine (NLM)**
 - [NLM Internet connection grants](#)
 - [Telecommunications Funding Resources](#)
 - [National Telemedicine Initiative](#)
- **National Science Foundation:**
 - [Course, Curriculum, and Laboratory Improvement \(CCLI\)](#)
 - [The Faculty Early Career Development \(CAREER\) Program](#)
 - [Math and Science Partnership Program \(MSP\)](#)
 - [Presidential Early Career Awards for Scientists and Engineers \(PECASE\)](#)
 - [Overview of NSF Grants and Awards](#)
- **Pew Foundation**
 - [Pew Grant Program in Course Redesign](#)
- **Public Telecommunications Facilities Program (PTFP):**
 - [NTIA's PTFP Home Page](#) [2001 PTFP Awards](#)
- **USDA:**
 - [Agricultural Telecommunications Program](#)

- [Assistive Technology Program for Farmers with Disabilities: State and Regional AgrAbility Projects](#)
- CYFERnet - Children, Youth and Families Education and Research Network
 - [Renewal CYFERnet Projects](#)
 - [New Communities Project \(NCP\)](#)
 - [State Strengthening \(STST\) Projects](#)
- Distance Learning and Telemedicine
 - [Program Overview](#)
 - [2001 Awards](#)
- [Higher Education Challenge Grants Program \(HEC\)](#)
- [Higher Education Multicultural Scholars Programs](#)
- [Higher Education Programs](#)
- Rural Utilities Service
 - [Community Connect Broadband Grant Program](#)
- [Secondary and Two Year Postsecondary Agriculture Education Challenge Grants Program](#)

- **U.S. Department of Education**
 - [Distance Education Demonstration Program](#)
 - [Department of Education Grants Information](#)
 - [Department of Education Grant Awards Database](#)
 - [e-GRANTS - Department of Education portal site for electronic grants](#)

- **Web Sites:**
 - [Application of Geospatial and Precision Technologies Program](#)
 - [Bureau of Educational and Cultural Affairs](#)
 - [Catalog of Federal Domestic Assistance](#)
 - [Community Food Products Competitive Grants Program](#)
 - [Community of Science](#)
 - [Department of Commerce Federal Grants Page](#)
 - [Department of Labor - Grant and Contract Information](#)
 - [Environmental Education Grant Program](#) [EPA Grant-Writing Tutorial](#)
 - [Federal Commons Portal](#)
 - [2002 Federal Register](#)
 - [FedStats](#)
 - [FinanceNet - Federal Gateway for Grants Resources](#)
 - [Inter-Agency Electronic Grants Committee \(IAEGC\)](#)
 - [Internet Prospector](#) [National Endowment for the Humanities - Grants and Applications](#)
 - [NIS College and University Partnerships Program](#)
 - [Nonprofit Gateway: Grants & Financial Support](#)
 - [Notices of Funding Availability](#)
 - [Polaris Grants Central](#)
 - [Technology Grant News](#)
 - [Telecommunications Development Fund \(TDF\)](#)
 - [U.S. Small Business Administration Federal Grant Resources](#)

U.S. State & Local Government - Competitive Grants

Other grants available to Cities:

“Digital Government Grant Application Process Featured”

"For cities and social service providers, or any organization that interfaces with government, the Digital Government website <http://www.diggov.org>, is a place to network with others working on digital government and learn about the National Science Foundation's 'Digital Government' grant process. This year, an anticipated \$8 million will be given for 10-20 awards for "Digital Government" academic/government collaborations to contribute to government strategic planning for information technologies and services. Topics may include technology for law and order; digital democracy and outreach; use of large datasets in government; electronic rulemaking, networks; archiving of digital materials, and e-government for crisis management and emergency response. Contact: Lawrence E. Brandt, (703) 292-8980, e-Mail: lbrandt@nsf.gov."

3COM Urban Challenge Technology Grants

\$100,000 to Towns or Cities Committed to Using Technology to Improve Residents' Lives

Availability: Annually

<http://www.3com.com/urbanchallenge>

First Responder

High Tech Emergency Response Equipment

<http://www.FirstResponder.org/>

Microsoft Corporation

Unlimited Potential (UP) Funding for Community-based Technology & Learning Centers

<http://www.microsoft.org/>

What Revenue Sources are Possible for the City of Tumwater?

The question is always raised, "What revenue sources are possible for the City of Tumwater with a fiber optic backbone network?" There are several avenues for potential revenue for the City of Tumwater to pursue.

Wireless Hotspot Revenue Potential. Each of the wireless hotspot management companies has a revenue sharing program available to hotspot owners. Their revenue sharing programs range from 25-50% revenue share of the network usage.

The City of Tumwater could also elect to manage the wireless hotspot themselves and offer retail rates to users. Retail rates for wireless hotspot usage are \$11 - \$20 per Internet session or Internet usage per day. Retail rates are at times billed in 15-minute increments – an example, \$5 per 15 minutes.

Wholesale Wireless Backbone Services. A full-blown P&L Statement can be created based upon the City's main objectives for wholesale wireless services. Considerations for the P&L Statements are:

- Take rates. How many users will use the network? What percentage of the total population will utilize the City's network?
- Negotiated Compensated Access Agreements. If the City were to pursue a wholesale strategy, it is recommended to negotiate compensated access agreements with the

carriers. Typical wholesale rates range from \$20 - \$40 per subscriber for data services and/or up to 40% of the retail revenue generated from the network.

Other Services to be offered. Does the City want to offer data only services? Conduit leases? Voice and cable TV services? Right-of-way only services? How ambitious would the City of Tumwater like to be? These questions need to be answered prior to conducting a detailed financial analysis.

If the City of Tumwater is interested in utilizing its fiber optic network to offer voice, data and cable TV services, typical retail rates for these three services range from \$90 – \$150 per month per subscriber.

If the City is interested in becoming an Internet Service Provider, the City would be able to charge \$17 - \$30 per home subscriber per month for Internet Services and \$30 - \$2,000 per business per month for business subscribers, depending upon bandwidth needs of the business. Again, the City is not restrained from offering retail services from a regulatory standpoint.

The City currently leases its conduit for \$2 per linear foot. The City could continue to lease conduit as a means of obtaining additional revenue.

The City does not currently charge for management of rights-of-way. The City could charge a monthly fee for management of rights-of-way to the utility companies located within the City's right-of-way. Again, the American Public Power Association has detailed white papers on best practices for rights-of-way management and associated fees.

The City could charge wireless carriers for roof-rights, traffic light site placement, or wireless site fees for placement of wireless antennas and receivers on City-owned property on a monthly basis. The City could also charge carriers to utilize its fiber network on a per foot dark-fiber lease basis. Dark fiber leases range from \$1.00 - \$3.00 per foot for dark fiber, depending upon the number of strands of fiber that are leased.

Conclusions

With the Master Telecommunications Plan documenting existing conduit and telecommunications facilities, and with the recommendation of combining efforts with the schools, the Department of Transportation and the City's conduit, the City is well positioned to pursue any and/or all of the strategies listed within this plan. The City of Tumwater has taken a leading role in coordinating efforts of various entities within the City to improve telecommunications infrastructure. These strategies give the City many options to pursue and various business models to consider for implementation and for obtaining revenue from the City of Tumwater's fiber infrastructure. This plan provides a means of obtaining additional fiber infrastructure at very little, if not any, capital costs to the City of Tumwater.

At this point, ZoomyCo recommends following the next steps outlined in this plan. ZoomyCo also recommends further discussion within the City of Tumwater regarding its desire to enter into any other business areas either on a wholesale or retail basis. ZoomyCo will certainly facilitate these efforts within the City of Tumwater and will provide templates for financial analysis to the City of Tumwater, based upon its goals and desires for further analysis.