iProvo: A Telecommunications Success Story

By Lewis K. Billings, Mayor of Provo

Throughout history, new technology has been at first criticized and outcast. In 1977, Ken Olsen, President and Founder of Digital Equipment Corp., said to his employees, "There is no reason anyone would want a computer in their home" (Many, 2005)." Many Provo City employees can tell you the story of how a previous Mayor lambasted fax machines and said they would never be of any use. The area of telecommunications is always a prime target for this disparaging. It seems people often do not understand the communications needs of the future. Whether this criticism comes from fear of competition or just not understanding the technology, innovators still often find themselves having to rigorously defend their work. In Provo City with the creation of iProvo, I have found myself in this position.

iProvo is the largest municipally-owned Fiber-to-the-Subscriber™ (FTTS) network in the United States. The fiber optics infrastructure passes by each home and business in Provo. Bandwidth on this ultra-high capacity network is leased to private companies who provide retail telecommunications services, such as telephone, internet, and television. In addition, it allows many services not possible with other current technology, such as fully interactive distance learning, full-motion videoconferencing, uploading and downloading of immense graphics files, video gaming, telemedicine applications, business-to-business connections, telecommuting and numerous school, local community and neighborhood applications. iProvo is designed to be part of a public/private partnership where the essential infrastructure is owned by the public, but the services are provided by private sector companies.

From the standpoint of bandwidth alone, nothing can compare to fiber. In fact, the only thing limiting fiber's capacity is scientists' ability to break the spectrum of light into finer detail. In addition, fiber will not become obsolete. The glass fibers that carry pulses of light have virtually infinite capacity: a single strand of fiber transmitting multiple frequencies of light could conceivably carry all the phone traffic for the entire planet. With new technologies being developed, the capacity is almost unimaginable.

I strongly believe fiber-to-the home and office is the only technology that will meet future needs. This network as deployed today operates at gigabits per second. It truly allows the network to become the computer, making access to internet applications as fast as to one's own computer hard drive. This network will enable products that we have yet to conceive of, but that are certain to become necessities for living well and working well in the decades ahead.

An example of this is telemedicine. During the testing of the iProvo system we had a doctor who was able to transfer full body scans very quickly via the fiber-to-the hospital facilities from a satellite office. This is just one example of the many opportunities that exist in the medical field for iProvo to support. The need to quickly transfer complex files to medical personnel and hospitals throughout the country could translate, literally, into saving lives. iProvo connectivity opens the possibility for our residents to have access to any doctor or medical specialist in the world in a timely and meaningful way.

One of the daily newspapers in Utah editorialized against iProvo, saying high tech projects like iProvo should be left "to the dreamers" (*Deseret Morning News*, 2003, P. 12). I admit it. I am a big dreamer. But I believe that big dreamers built this country. Big dreamers built our communities. Big dreamers sent men to the moon. With iProvo, we are dreamers, but we are also doers – very practical doers. My goal is to position Provo for the future. We have three choices. We can follow and die; stay even and survive; or we can lead and prosper. I want Provo to prosper, and iProvo is how to do that. We are building the infrastructure of the future, and in the process we are facilitating commerce and enabling whole new ways of living and doing business.

Local governments have always been facilitators and partners with private businesses and free enterprise and have the role of providing infrastructure that is too difficult or too expensive for a private firm to provide alone. Municipalities enable robust competition in the private sector by providing basic services like police and fire protection, and by installing and maintaining essential infrastructure like roads, bridges, and water systems. Today, basic telecommunications infrastructure is crucial to a community's success.

Former FCC Chairman Michael Copps said, ". . . broadband networks are indeed the roads, the canals, the railroads and the interstate highways of the Information Age. All of these were built with the public and private sectors working together to provide Americans with the infrastructure we needed in order to prosper" (Copps, 2003).

An example of how this public-private partnership should work is an airport. Would it make economic sense for each airline to own its own airport? Obviously not. Airlines cannot justify building their own airports, and cities do not try

to operate airlines. Cities provide the infrastructure of the airport itself, and each airline pays its share through operating fees. Airlines share costly public infrastructure, offering services over it and competing on price, customer service, destination availability, etc. This is exactly how iProvo works. We developed the infrastructure, making fiber connections available to every home and business. But private contractors provide the services to the consumer and compete for each customer's business.

Many telecommunications experts believe this model is the best way to provide advanced telecommunications services to homes and businesses:

> "There is a wide class of municipalities for which a municipal broadband network is not only viable but is essential if the deployment of broadband is ever to be achieved. By developing an open-access broadband infrastructure, the Town can unbundle the network and provide wholesale network access . . . This assures a level playing field and creates a competitive environment which in turn will likely manifest itself in low prices, high quality of service, and a diversity of broadband products and services to customers. The service providers need scale and efficiency in local distribution and they cannot each deploy such distribution. A municipal network is . . . the very most efficient and economically viable alternative to get service providers to homes and local businesses" (McGarty, 2002).

Without local ownership and control these rich telecommunication services would not have been made available to all residents and businesses in Provo. It is local government's core mission to build infrastructure for everyone and for the long term. Building a high speed communications infrastructure is a logical next step for community growth and quality of life.

Why iProvo is Needed

When I first ran for Mayor, one of my platform planks was that I would seek to use technology to benefit our residents and businesses. After the election I set out to do this. Working with City employees, it became clear that the City needed a fiber optic network to control traffic lights and traffic cameras, to connect City facilities, to enhance public safety capabilities, to accomplish electrical distribution system SCADA (Supervisory Control and Data Acquisition) monitoring and control, and to provide other municipal services.

At the time, five private sector companies had franchise agreements to provide fiber connectivity in Provo, but none could or would provide what the City needed. Telecom companies have said it is too expensive to run fiber to every home and business. Their return on investment would not be quick enough. Because the private sector was not going to provide what the City needed, we began to work to meet our own needs. As we built a backbone and began to develop and deploy internal applications, businesses and residents began to express similar needs for connectivity.

Let me assure you that I am a champion of the private sector. I am from the private sector. My background is business. I feel strongly that government should not do what the private sector can and will do. But no single telecommunications company could justify such an investment. Cities, however, are suited to install this infrastructure because their capacity is so great it can be shared among many competing firms and the investment repaid over a longer repayment period than a private company could justify.

There is an old saying that we always overestimate the impact of technology in the short run but underestimate it in the long run. The spectacular implosion of the dot-com balloon a few years ago did nothing to invalidate the underlying technologies that have continued to develop unabated. Today, many internet businesses are making profits and doing extremely well, and any business or government entity without a robust internet strategy is in serious trouble. Ultra-broadband capabilities in every home and business accelerate the transformation of whole industries. Every web site becomes a potential full-motion video broadcast channel, and every computer becomes a potential receiver of millions of these broadcast web sites.

A 2006 U.S. Department of Commerce study concluded that economic growth and jobs are going disproportionately to communities with strong communications access deployment (US Department of Commerce, 2006). The communities that can offer dependable, reasonably-priced, high-speed connections are preferred, other things being equal, over communities that cannot.

Commissioner Copps agrees. "In the 21st century, having access to advanced communications and information will be every bit as important as access to basic telephone services was in the 20th century. I believe that providing meaningful access to advanced telecommunications for all our citizens may well spell the difference between continued stagnation and economic revitalization" (Copps, 2001).

Consider an example I will refer to as a "Tale of Two Cities." Cedar Falls and Waterloo are adjacent cities in Iowa, literally across the street from each other. They have similar tax structures, educational levels and economic bases. Yet, in the last decade, Cedar Falls has seen great growth in business relocations, construction and tax base, while Waterloo's economic growth has been stagnant. What made the difference? Most observers attribute it to a giant step Cedar Falls took in 1996 when it made fiber-optic connections available to every home and business in the city. Following that, annual new construction in Cedar Falls tripled from $32 million in 1996 to $101 million in 2002. Waterloo remained flat, hitting an 8-year low in 2002 at $53 million. In documenting this, Doris J. Kelly concluded,

> "There may be no single thing more important in a community's efforts to achieve economic well-being than to grasp the role that telecommunications plays in creating meaningful jobs, enhanced education and world-class healthcare. Now, more than ever, the direct link is evident between advanced communications and productivity and economic development" (Black & Veatch, 2004).

The advanced technology companies clustered in the Provo/Orem area are second to none. Many up-and-coming high-tech companies are quickly carving a niche for themselves here. The 40-mile strip between Salt Lake City and Provo was described in *The Economist* as "the world's second-biggest swath of software and computer-engineering firms after California's Silicon Valley" (1994). iProvo supports and attracts these companies. This year, Provo was ranked number two in best places for business and careers by *Forbes Magazine*, the highest ranking Provo has ever received in the numerous times it has been ranked (Badenhausen, 2007). Provo is seeking a diversified economic base, and iProvo is an attractive draw for all types and sizes of industry and business. *Additionally, Inc*. magazine ranked Provo number seven in the hottest midsize cities for entrepreneurship for 2007, up from number nine in 2006 (Shires, 2007). iProvo fiber services make it possible for a start-up company to have the same telecommunications resources as a large established company. One of the truly exciting things about iProvo's ultra-speed technology is that it spawns entrepreneurial activity, resulting in even more services and applications.

Fiber-optic access provides a higher quality of life to residents also. Reasonably-priced access to a high-capacity network provides residents new potentially life-changing possibilities. Advanced services and visual communications that were unreliable or of poor quality when operated on a traditional network are suddenly not only possible but also practical on a high-capacity active fiber network. Provo citizens and businesses want to compete in the global marketplace. We want to attract businesses and residents who are on the leading edge of advanced technology. We do not want to become second-class citizens of the on-line world, languishing at the bottom of the digital divide.

U.S. Need for Broadband

The United States has traditionally led the world in technology and innovation. Through most of the 1990's, the U.S. led the world in high-speed connectivity (Kushnick, 2006). Yet the United States has dropped to 15th place in broadband deployment (Organization for Economic Co-operation and Development, 2007). With 58.1 million broadband subscribers compared to 116.5 million U.S. households, only one-half of the U.S. population is using broadband. And only .3 percent of those subscribers are to fiber. This is only roughly 174,000 subscribers to fiber-to-the premise networks, compared to 7.9 million in Japan. Though the large rural areas in the United States can make fiber deployment difficult, when compared to the metropolitan-like area of Japan, it does not explain why large metropolitan areas in the United States do not have fiber-to-the-premise access.

Access to broadband and better broadband like fiber is increasingly important. A 2004 study concluded that average households will need 57-72 Mbps of bandwidth by 2009 - much more than can be offered by basic broadband of DSL and cable (Baller & Lide, 2006). And businesses will need much more than that. Only fiber-to-the-premise has the ability to offer that bandwidth to all consumers on a network.

The Brookings Institution estimates America's broadband decline could lead to a loss of $1 trillion in economic productivity over the next decade, as well as more than 1.2 million jobs that could be created by better broadband (Reinan, 2006).

Current Types of Telecommunications Service

The term broadband is so widely used that it can only be understood in context of the speed, data transfer capacity, and security the technology offers to the user. These attributes are also the parameters that define the user applications the broadband service can support. Older broadband technology, especially those using the existing copper wires in some form, are often hampered by the ability to send information from the user's computer to the Internet. In addition, environmental impacts can harm or damage the transmission of many of these older technologies. Fiber-to-the-premise broadband offers a broadband solution that overcomes the shortfalls of DSL, cable modem, wireless, satellite, and broadband over power line systems. These slower broadband systems can be good interim solutions given the limitations of the speed and data transfer capacity that each can offer to a user, but they are not at all sufficient in the long term view of what is happening with technology and data.

When referring to internet connectivity, the Federal Communications Commission (FCC) many years ago defined an access speed in excess of 250 Kbps as broadband. However, this traditional FCC-defined broadband speed is very slow by today's standards, especially considering current applications like online gaming, file sharing, streaming video or voice over Internet protocol phones (especially for upload speeds). Upload speeds for most of today's broadband users are as critical as download speeds. The FCC-defined broadband speeds are hardly adequate to transfer typical video content, such as pictures and movies, or even large files, such as programs and slide shows, especially when looking at the projected future needs of users. Following is a more in-depth description and comparison of the types of broadband.

Digital Subscriber Loop

DSL describes the most common method for sending data over a phone line in residential applications, although it can be used for businesses. While it technically would qualify as broadband by the FCC definition above, it is the slowest broadband technology commonly used for internet access. Although claims of speeds as high as 8 Mbps are sometimes made, typical connections operate at 1-2 Mbps downloading and 250 Kbps uploading. Even these speeds are not guaranteed. This technology uses the traditional copper wires and is limited by the capacity of this old technology. Copper wires use electrical signals which are prone to interference by other devices.

Coax / Coaxial
Coax or Coaxial is used to describe the type of wire used by most of today's cable systems to reach the home or business. It is metallic, usually copper, with a center conductor and an outside wire mesh or metal foil shield.

Fiber Optic Cable
This cable is made of a very thin strand of glass with a protective cover. It can carry light signals generated by a laser for several miles.

Hybrid Fiber Coax System
This type of system, commonly called HFC, is used by many cable companies today. It includes fiber-optic cable from the office of the cable company to the neighborhood of the subscribers and coaxial cable from that point to the home or business. Several hundred subscribers typically share a single fiber with the optical signals converted, split, and amplified once they reach the coax. This type of system can operate at a few Mbps for downloading and a few hundred Kbps for uploading. However, this capacity is shared by all the subscribers sharing the fiber from the hub to the head end facility. The more users on the system, the slower the speeds that each subscriber experiences since there is a shared use of a single fiber access point. The use of amplifiers is another point of weakness in the system delivery and a cause for outages.

Cable Modem
Cable modem is a type of modem that provides access to a data signal sent over the cable television infrastructure. Bandwidth of cable modem service typically ranges from 3 Mbps to 6 Mbps for downloading. The uploading bandwidth on residential cable modem service is most often 384 Kbps. However, many cable internet providers are reluctant to offer cable modem access without tying it to a cable television subscription, adding to the cost for the consumer.

Wireless
This type of system uses radio waves to communicate between users. These systems are well suited for mobile or portable applications and operate up to tens of Mbps. The drawback to these types of systems is finding radio frequencies that are available for use. The most common form of wireless system for data today is specified as 802.11 and commonly called Wi-Fi. Certain frequencies have been dedicated for Wi-Fi use, and these frequencies are shared by all Wi-Fi enabled devices today. These frequencies are often quite crowded, and when they are, the capacity is shared by all users. Wi-Fi capabilities are typically from 5 to 50 Mbps, shared by all users. If the frequencies get too crowded, the devices can cause interference with each other, and then no data can be transferred. Wireless data connections are actually quite tenuous. Climatic conditions such as rain, snow, and wind can cause connection problems. Line of sight between antennas is required for good wireless connections but not always possible. Since these devices are not regulated, this can sometimes be a problem. Security of a wireless network is considered to be inadequate by most network managers. While this may improve with enhanced encryption schemes, wireless connections will never match the security that is possible with a fiber connection.

Satellite
This means of data communication is reasonably good for downloading data. Unfortunately, uploading data can be quite difficult. Early systems uploaded data using a dial-up telephone line. The best application for satellite seems to be satellite television broadcasting. Weather and interference to the satellite inhibits transmission of these systems.

Broadband over Power Lines (BPL)
The electric power lines can be used to transmit data along with the electric power. However, because the electric distribution system was not designed to carry high speed data, BPL suffers from some serious problems. When used to carry high frequency data, it radiates electromagnetic signals that interfere with radio signals used by aircraft and amateur radio operators. These signals are blocked by transformers, so special adaptations must be made to route the signals around transformers. Similar to wireless technology, it also has inherent security issues.

Fiber-to-the-Premise
This type of broadband system (iProvo is an example) uses fiber transmission from the network operations center all the way to the individual home or business. These systems operate at typical transmission speeds of 100 Mbps to 1 Gbps for each subscriber whether downloading or uploading data. A properly designed network allows many subscribers to share backbone fiber without slowing down the experience. Fiber-optics has many advantages over the traditional copper wire technology that has been used over the past hundred years as it can carry light signals generated by a laser for several miles. Fiber-optics are thin pieces of glass that are made of extremely pure optical glass that is thinner, less expensive and can coexist with electrical wires without any interference. Fiber-optics provide less signal degradation than copper wires because of the use of light to transfer data and are ideally suited for digital signals which are important for computer networks. While the electronic equipment on each end of the fiber would need to be upgraded at regular intervals, fiber technology can be used far into the future due to its ability to continue to expand capacity by dividing the light by color. The virtually unlimited capacity that fiber optics offer to current and future applications ensures that a community needs only one fiber system built to meet its broadband service needs. Ownership of rights-of-way and access to the use of electrical conduits can also greatly reduce the costs of construction of a fiber system.

OSI MODEL (OPEN SYSTEMS INTERCONNECTION BASIC REFERENCE MODEL)
OSI Model describes how information is exchanged between different information systems over networks. It consists of seven layers, each with its own rules and procedures.

INTERNET PROTOCOL (IP)
IP is a network protocol at layer 3 of the OSI model. IP is the protocol used to determine the path and logical addressing of devices and can pass information between networks. The IP protocol by itself does not guarantee that the data will arrive at the receiving end without errors. A higher level protocol is required for that, such as TCP, Transmission Control Protocol, at layer 4. Together, the TCP/IP protocols are used to make sure data is transmitted error free over the Internet.

IP VIDEO
IP Video describes the process of sending video content over a packet switched network using the Internet Protocol. This differs from analog video which is used for broadcasting video over the air or over older cable systems, and from digital video, which is used by cable and satellite systems and which requires a receiver, usually called a set-top box or cable box. These boxes convert the digital video back into a signal that a TV can use. IP Video also requires a receiving set-top box.

BIT
A bit is the smallest unit of information that digital computers use. It can have only two values, 0 or 1. Inside computers, these two values are often represented as a switch that is either on or off.

BYTE
A byte is 8 bits. It can represent 256 different combinations of 8 bits set to 0 or 1. It can therefore represent 256 different values.

MEGA, GIGA
Mega and giga are prefixes and stand for million and billion respectively. A megabit is a million bits, and a gigabyte is a billion bytes.

FEDERAL LEGISLATION ON BROADBAND
The Telecommunications Act of 1996 was the first major reform of United States telecommunications law in 62 years. It significantly amended the 1934 Communications Act and, on a more limited basis, the 1984 Cable Act. The Act contains seven titles that cover issues from regulation of telecommunications carriers to indecent programming on cable television.

One of the major thrusts of the Act was to advance competition in all areas of communications services. The Act abolished rules that previously prevented telephone companies from entering the cable television arena and cable companies from offering telephone service. The Act also relaxed or removed barriers to consolidation, merger and acquisition, and integration of services. Section 706 of the Act charges the FCC with "encouraging the deployment on a reasonable and timely basis of advanced telecommunications capability to all Americans" by "regulatory forbearance, measures that promote competition . . . or other regulating methods that remove barriers to infrastructure investment" (Telecommunications Act of 1996).

In 2002, the FCC ruled cable modem service as an "information service" keeping it free from the regulations traditionally imposed on incumbent telecommunications providers, including the requirement that their networks be available to other providers. The ruling was upheld by the Supreme Court in *National Cable & Telecommunications Association v. Brand X Internet Services*. Subsequent to the Supreme Court's decision, the FCC ruled in August of 2005 that DSL would also receive regulatory treatment as an "information service" in an effort to "place all broadband internet access providers on a level playing field" (Martin, 2005).

In 2004, against the backdrop of state legislatures erecting barriers to municipal entry into telecommunications, the Supreme Court issued an opinion in the case of *Nixon v. Missouri Municipal League*. The issue before the Court was whether the language in Section 253 of the Act pre-empting state or local legislation that prohibits the ability of "any entity" from providing telecommunications services included municipal entities. The Court ruled Congress did not intend "any entity" to include municipalities. The effect of this opinion is that states are allowed to limit—or flat out prohibit—municipalities from providing telecommunications services (*Nixon v. Missouri*, 2005).

HISTORY OF IPROVO AND STATE LEGISLATIVE ISSUES
The population of Provo is approximately 115,000. It is located high in the Rocky Mountains, bordered by Utah Lake on one side and mountains rising as high as 14,000 feet on the other. Robert Redford's Sundance Ski resort is located in Provo Canyon 20 minutes away. Provo is the county seat and home of Brigham Young University, one of the largest private universities in the country with some 30,000 students. Provo is the birthplace and/or home of many important businesses such as WordPerfect, Novell, Nu Skin, Morinda, and Steven R. Covey.

Provo is the largest public power city in the state. Provo City Power has existed since 1940. Its beginning was very controversial, just like our broadband project is today, but it has been very popular with our citizens for over 65 years. Provo City Power has been steady and responsive, providing reliable customer service and stable rates.

When current companies were unable to provide the services Provo needed, the city issued an RFP for an opinion on the viability of a municipal telecommunications system in Provo. Uptown Services was hired to provide this report. The

Uptown Services report indicated that the city could be successful if it built and operated its own telecommunications network. The report was reviewed by Peregrine Communications, who agreed with the conclusions.

On June 5, 2000, I appointed a Telecommunications Ad Hoc Committee, made up of elected officials, business representatives, representatives from the University, and residents to review the report and make recommendations on Provo developing its own telecommunications infrastructure. After reviewing the opportunities and risks involved in the construction and operation of a telecommunications network, the committee, by unanimous vote, recommended that the city proceed based upon the guiding principles as outlined in the report. By ordinance, we then created a Telecommunications Utility as a subsidiary of the Energy Department.

The Telecommunications Utility designed and constructed a fiber-optic backbone connecting the electrical substations. The location of these substations, spread as they were throughout Provo, placed fiber-optic lines in close proximity to many additional desired connection sites. Knowing the possibility existed that the city might desire to use the fiber for future uses, additional fibers were added to the design. The construction labor cost of hanging a 12 count fiber is no different than the cost of hanging a 288 count fiber. Provo now had a fiber rich backbone covering much of the city.

This fiber was used to connect city buildings for data and telephone communications. Connections were made between City Hall and the Energy Department, Engineering, etc. In addition, a number of remote fire stations were placed on the city network for the first time as the fiber backbone was in all parts of the city.

At that point we began to seriously investigate and explore the feasibility of a fiber-to-the-premises community broadband network. We went through a long and deliberative process, including thorough study by a special task force of community leaders, numerous public hearings, city council debate and scrutiny, and a great deal of staff work.

When it became apparent that we, as a city, were getting serious about building this network, the two largest incumbent telecommunications providers began a campaign against iProvo. One company hired a public relations firm and a telemarketing company to make calls to citizens. They took out full page advertisements in local newspapers and ultimately hired people to picket City Hall.

It was a bruising fight, but the efforts of the large incumbents actually backfired. One meeting at City Hall was filled with people who were concerned because of the calls they had received from the telemarketers. But as these residents listened to what iProvo actually was, they became angry at the telemarketers and incumbent company because our proposal had been so grossly misrepresented. I heard many times how the proposed iProvo was completely different from what they had been told through phone calls and advertisements.

From there, it moved to a state legislative fight. The incumbent companies had made many contributions to state legislative races over the years, and it greatly helped their cause. At first, we were shut out of closed meetings in which proposed legislation affecting us was discussed.

Eventually, the sponsor of the legislation was convinced to meet with us, and numerous significant compromises were made in his legislation. The legislation, as initially proposed, would have prevented us from proceeding with our project. The legislation that was passed allowed us to proceed under a wholesale, open network model, rather than actually offering retail services, which is actually a model I am very happy with.

iProvo was challenged at the Utah State Legislature again the following year, but again we were able to prevail. The opposition was working with a philosophy of "If you can't convince, then simply confuse." I was told DSL was expanding in Provo, and I should just be patient. Or that there was plenty of fiber in Provo already, so we did not need more. We were put in the position of constantly explaining the facts about fiber, which were being greatly misconstrued by the opposition.

In 2002, we designed, constructed and operated a fiber-to-the-home neighborhood demonstration project to test and prove the technology. A 300-home trial was built in primarily single-family homes in the Grandview neighborhood with a small number of multi-dwelling units in student housing areas added. While we had some problems with our telephone switch provider, the technology worked, and the services offered were very popular. With a successful test completed, Provo City bonded for the full network build-out.

CURRENT STATUS OF iPROVO

iProvo has been fully funded and built out to every home and business in Provo, and services are currently offered by two providers. iProvo is also currently looking to add service providers to give even more options to our residents. It is the only network in Provo providing broadband access to every home and business in Provo, including those of the two largest incumbent competitors. Public ownership has been the only way to ensure universal access to broadband in Provo. The capital outlay of the network was $40 million, including the fiber build-out and the network equipment. The project was financed by a sales tax revenue bond. A municipally-owned fiber-to-the-premises project is a relatively new concept, and a telecommunications revenue bond would have been cost prohibitive. The sales tax revenue bond allowed us to receive a very favorable bond rating and interest rate. The iProvo network currently has nearly 10,000 subscribers and projects 40-60 new subscribers each week over the next year.

CONCLUSION

Government exists to provide those services necessary for basic security, economic success, and quality of life that the private sector either cannot or will not provide. Thus, an obvious role of government is to provide vital infrastructure and public safety services. We come together as a society to jointly accomplish these purposes. Providing these services under the direction of duly elected leaders is what city government is all about.

I firmly believe ultra-broadband telecommunications infrastructure is as critical to the economic vitality and quality of life of Provo residents and businesses as other forms of basic infrastructure. None of us will be successful in the future without access to the electronic highway with enough capacity for the amazing and life-altering applications that are here today and the many others rapidly being developed. This infrastructure is vastly more important than some other common and widely accepted municipal services, such as golf courses and recreation centers.

iProvo provides a basic fiber-optic public telecommunications network on which private firms can vigorously compete and offer advanced phone services, high-definition television, ultra-broadband Internet access, telemedicine, video conferencing, telecommuting, and so forth. The system allows for school channels, neighborhood channels, and new applications we cannot even fathom today. Rather than unfairly competing with the private sector, this arrangement actually ensures and encourages competition and attracts more private firms to offer services to city residents and businesses. The incumbent telecommunications firms have also been invited to use the network.

In weighing the proper role of government, I firmly believe that providing this basic public infrastructure is just what government ought to be doing.

REFERENCES

Badenhausen, K. (2007, April 5). Special report: Best places for businesses and careers. *Forbes Magazine*. Retrieved May 12, 2007 from http://www.forbes.com/lists/2007/1/07bestplaces_Best-Places-For-Business-And-Careers_land.html

Baller J. & Lide, C. (2006, October). America needs a fiber-based national broadband policy now, if not sooner. Retrieved April 26, 2007 from *http://baller.com/pdfs/Baller-Lide_AmericaNeedsNatlBBPlanNow_10-06.pdf*

Black & Veatch. (2004). A study of the economic and community benefits of Cedar Falls, Iowa's municipal telecommunications network.

Copps, M.J. (2001, October 26). National Summit on Broadband Deployment, Washington, D.C.

Copps, M.J. (2001, November 14). National Association of State Utility Consumer Advocates, Philadelphia, Pennsylvania.

Deseret Morning News. (2003, December 7). Leave UTOPIA to the dreamers. Retrieved May 11, 2007 from http://deseretnews.com/dn/view/0,1249,565036524,00.html

Economist, The. (1994, April 23). Technology in Utah: Software valley. Pp. 97-98.

Kushnick, B. (2006, March 14). Where's that broadband fiber-optic access. *Nieman Watchdog*. Retrieved May 11, 2007 from *http://www.niemanwatchdog.org/index.cfm?fuseaction=Ask_this.view&askthisid=186*

Many, K. (2005, July 5). Tech titans wish we wouldn't quote them on this baloney. USA Today. Retrieved May 11, 2007 from *http://www.usatoday.com/money/industries/technology/maney/2005-07-05-famous-quotes_x.htm*

Martin, K.J. (2005, August 5). Commission policy statement. Retrieved May 13, 2007 from *http://www.lasarletter.net/docs/2005/martin_netneutrality.pdf*

McGarty, T.P. (2002). Municipal broadband networks: A revised paradigm of ownership. *MIT Internet and Telephony Consortium Group*.

Organization for Economic Co-operation and Development (2007). OECD broadband statistics to December 2006. Retrieved April 26, 2007 from *http://www.oecd.org/document/7/0,2340,en_2649_34223_38446855_1_1_1_1,00.html*

Reinan, J. (2006, February 22). Broadband gap looms as net loss for the US. Minneapolis Star Tribune. Retrieved April 26, 2007 from *http://www.startribune.com/535/v-rint/story/257956.html*

Shires, M.A. (2007). Boomtowns '07: Top 20 midsize cities. Inc. Magazine. Retrieved May 12, 2007 from *http://www.inc.com/magazine/20070501/features-boomtowns-07-midsize.html*

Telecommunications Act. (1996). United States Congress.

U.S. Department of Commerce (2006). Measuring broadband's economic impact. Washington, D.C.

FINAL WORD

"We either advance or we decline. Power comes from looking forward with faith and courage - of expecting and demanding better things."

—*ROBERT H. HINCKLEY*