Fiber Optic Networks: Connect Communities

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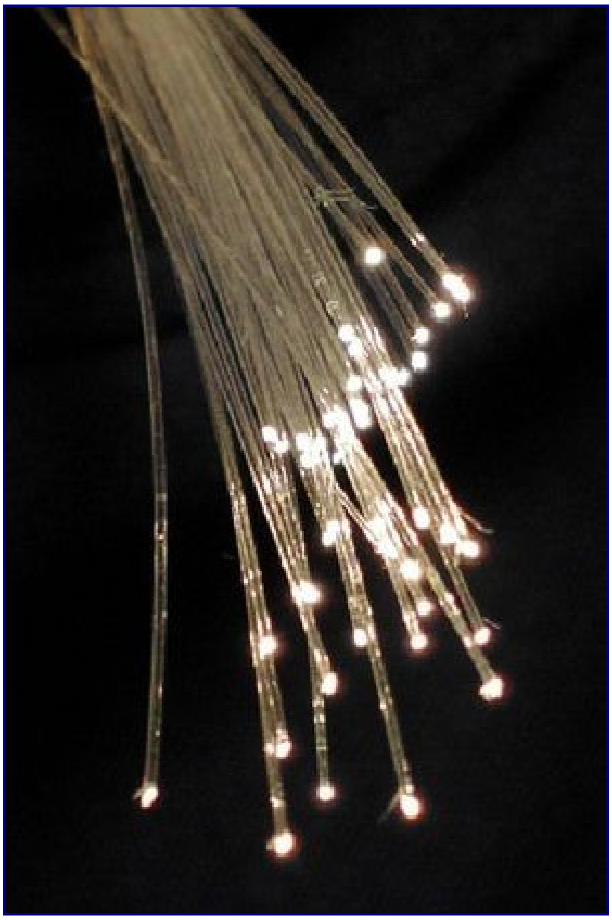

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Fiber optic technology advanced at an astonishing rate in the second half of the twentieth century. The discovery of fiber optics in 1966 was indeed a major landmark for which Charles Kao won a share of the Nobel Prize in physics in 2009. Working at the Old Standard Telecommunications Laboratories in the United Kingdome, Kao coauthored a paper with G. A. Hockham in 1966 on the subject of the theory and practice of the use of optical fiber for communications applications. In this paper, for the first time, they described how to transmit light over long distances using ultrapure optical glass fibers which enabled such transmissions to reach 62 miles. As a result of this discovery, the first ultrapure fiber was produced in 1970.

Related innovations, and improvements continued in the rest of the century from the development of fiberscope, light-emitting diodes (LED) and lasers to the emergence of dense wavelength-division multiplexing (DWDM) and the applications for optical fiber. Consequently, fiber optic technologies pervade a variety of industries around the world. For instance, delivering high-definition broadcast (HDTV) at resolutions of 1080p has become possible through the deployment of fiber-to-the-curb (FTTC/FTTH) networks which allows video on demand to become a reality and satellites transporting L-Band signals over fiber do not need to be demodulated which also suffer less attenuation.

The most common definition for fiber optic networks states that it is based on the principle that light in a glass medium can carry more information over longer distances than electrical signals can carry in a copper or coaxial medium or radio frequencies through a wireless medium. Furthermore, the purity of today's glass fiber, combined with improved system electronics, enables fiber to transmit digitized light signals hundreds of kilometers without amplification. With few transmission losses, low interference, and high bandwidth potential, optical fiber is an almost ideal transmission medium.

Needless to say that smart telecommunication companies around the world are taking advantage of the fiber optic networks to provide voice, video, and high capacity broadband data services to their customers and these networks will allow them to continue to provide the capacity and speed necessary to deliver advanced broadband applications today and into the future.

Everybody has accepted the fact that the Internet has become the new marketplace and countries around the world are recognizing that the capacity to deliver electronic services is not only crucial to their economy but it is also critical to their health care, security, education, and workforce. It was acknowledged by the US government when they included $7.2 billion in the economic stimulus package of $787, for broadband deployment in underserved communities, the telecommunications industry is expected to help stimulate new jobs, enhance high-speed Internet services and make technology more accessible in rural areas.

The Organization for Economic Cooperation and Development (OECD) Council on Broadband Development also recognizes the growing importance of broadband and its principles have been instrumental in fostering broadband development. The development and use of broadband has flourished in most countries since the Recommendation made by the Council. It's interesting to note that since December 2004, broadband subscribers in the OECD have increased by 187%, reaching 221 million in June 2007. Broadband is available to the majority of inhabitants even within the largest OECD countries. A number of countries have reached 100% coverage with at least one wired broadband technology and up to 60% with coverage by two. Wireless Internet connections at broadband speeds are also increasingly available and are particularly important in under served areas.

The major finding of the report that was produced by Connected Nation Inc. on the subject of the Economic Impacts of Stimulating Broadband Nationally, clearly stipulates that adopting a national policy to stimulate the deployment of broadband in under served areas of the U.S. could have dramatic and far-reaching economic impacts. For instance, just a seven percentage point increase in broadband adoption could result in:

- $92 billion through 2.4 million jobs created or saved annually;
- $662 million saved per year in reduced health care costs;
- $6.4 billion per year in mileage saving from unnecessary driving;
- $18 million in carbon credits associated with 3.2 billion fewer lbs of CO2 emissions per year in the United States;
- $35.2 billion in value from 3.8 billion more hours saved per year from accessing broadband at home; and
- $134 billion per year in total direct economic impact of accelerating broadband across the United States.

A study by George Ford and Thomas Koutsky of the Phoenix Center for Advanced Legal and Economic Public Policy Studies evaluated whether broadband investments by municipalities have an effect on economic growth. They compared Lake County, a small county in central Florida, with other Florida counties. The finding of this study was published under the title of "Broadband Economic Development: A Municipal Case Study from Florida". Here are the major points of the study:

- In 2001, Lake County (A small, central Florida county of nearly 250,000 residents and 953 square miles) began generally offering private businesses and municipal institutions access to one of Florida's most extensive, municipally-owned broadband networks, with fiber optic connections to hospitals, doctor offices, private businesses, and 44 schools;
- The Lake County municipal system was constructed by private companies, the system leases capacity to private network providers, and customers use the system to supplement services from other providers;
- Their economic model showed that Lake County has experienced approximately 100% greater growth in economic activity - a doubling - relative to comparable Florida counties since making its municipal broadband network generally available to businesses and municipal institutions in the county;
- Their findings provide support for the position that municipal broadband infrastructure may better serve the overall community than simply relying solely on private telecommunications firms; and
- These findings were consistent with other analyses that postulate that broadband infrastructure can be a significant contributor to economic growth and their results suggested that efforts to restrict

municipal broadband investment could deny communities an important tool in promoting economic development.

Public Technology Institute, a national and member-supported organization, based in Washington, D.C., endorsed and helped distribute "The Municipal and Utility Guidebook to Bringing Broadband Fiber Optics to Your Community" which is coauthored by David Chaffee and Mitchell Shapiro. The purpose of this publication was to set examples and share success stories with local government officials and utility companies. The report is the result of extensive analysis of four cities where fiber optic networks were deployed to deliver broadband services and the following highlights represent the conclusion for each city:

BRISTOL, VIRGINA:

- First Muni-Fiber System to offer triple-play;
- Year service launched: 2003;
- Premises passed: Approximately 13,000;
- Penetration of premises passed: 63 percent;
- Generating net income since 3Q07;
- Incumbents are Charter and Embarq;
- Has expanded beyond core service area through partnerships; and
- Created business unit to help other communities deploy and operate municipal networks.

BURLIGTON, VERMONT:

- Burlington is Vermont's largest city with a population of roughly 38,000;
- Year residential service launched: 2006;
- Premises passed: Approximately 18,300;
- Penetration of premises passed: approximately 21 percent overall and 43 percent in initial launch area, which has had service available since February 2006;
- Expected to generate net income by 2009;
- Financed via capital lease;
- Incumbents are Comcast (formerly Adelphia) and Fairpoint (formerly Verizon); and
- Former project director Tim Nulty is now spearheading multi-town Muni-Fiber project planning to serve 23 small Vermont towns.

JACKSON, TENNESSEE:

- At launch, offered retail video and wholesale voice and Internet;
- Transitioning to full-retail model;
- Year residential service launched: 2004;
- Premises passed: Approximately 35,000;
- Penetration of premises passed: 44 percent;
- Expects to generate net income by year 7 of operations;
- Nearly $8 mil. in consumer savings over 4 years from lower rates in Jackson;
- Incumbents are Charter and AT&T; and
- JEA's experience highlights importance of retail service model and problems with wholesale-only model.

REEDSBURG, WISCONSIN:

- Year residential service launched: 2003;
- Premises passed: Approximately 4,400;
- Penetration of premises passed: 61 percent+;
- Relatively high capital cost due to underground construction;
- Expected to generate net income in 2008;
- Initial financing was interest-only "Bond Anticipation Note" from local bank; refinancing in 2008;
- Incumbents are Charter and Verizon; and
- Provides local schools with 100 Mbps links for less than $500/mo., compared to the $650-$750/mo. they were previously paying for just 1.5 Mbps connections.

The report clearly illustrates that each city has been successful in accomplishing their objectives. It also demonstrates that investments in municipal fiber can pay for themselves and cities can start generating revenue within three to seven years depending upon the size of the city and the magnitude of their investments.

The reality is that while there are numerous towns and cities that are revolutionizing the world of telecommunications by building community-owned and community-controlled fiber optic networks to connect their members to each other and to the rest of the world via high-capacity fiber optics, there are hundreds of thousands of towns and cities around the world who are still struggling to make decisions about fiber optic networks. It is not easy to make decisions when it comes to deploying fiber optic networks for the communities.

In addition to justifying financial expenditures and finding right business partners for their projects, the city officials also have to worry about how those fiber optic networks are going to be built in their cities. These officials are acutely aware of the fact that the implementation of fiber optic networks in their cities requires to cut trenches into and under city streets in order to install conduit, splice vaults, and building entrance facilities. These activities cause pollution, ccommuters get frustrated by traffic delays, and downtown shops along the affected streets lose business when customers stay away to avoid the traffic congestion. What is worse is that the repair of the streets after excavation rarely left the streets in acceptable condition. These forces the city officials to issue moratoriums on new open cut excavations involved in the last mile work. The last mile is being the section of a network that connects an end-user building to the city-area network that surrounds a city.

The city officials must know that they have an option to build their fiber optic networks without worrying too much about their streets and traffic jams. The idea of leasing space inside of existing sewers by telecommunication companies is becoming popular around the world according to which owners of existing sewers get to generate a new revenue stream and telecommunication companies could install their optical cables in their sewers at an attractive cost. Typically, every building, every facility, every business, and every house in a city is connected to a common sewer system. This common sewer system is already in place and has existing routes beneath the city streets. Perhaps most importantly, the robotic technology to install fiber optic cables carefully and successfully in sewers is available in North America.

Paradoxically, North America is way behind Europe, Korea and parts of South Asia, Eastern Europe and some other countries when it comes to utilizing and delivering true high speed broadband services. Fiber optic networks offer strategic opportunities for North America to catch up to the rest of the world by connecting their communities, using robots to install fiber cables inside live storm and sanitary sewer pipes. The robots can install fiber in sewer pipes as small as 8 inches at 30 to 60 percent less cost in comparison with trenching cost and two to six times faster. This as a consequence will help improve the quality of life, increase productivity, conserve energy, reduce pollution, create new jobs, enhance real estate value, and redistribute wealth in North America.