



## **A White Paper**

# **Economics of Broadband Access for Underserved Consumers and Businesses**

**May 2007**

## Background

The Public Technology Institute is a national, member-supported organization based in Washington, DC. As the only technology organization created *by and for* cities and counties, PTI works with a core network of leading local government officials—the PTI membership—to identify opportunities for technology research, share best practices, offer consultancies and pilot demonstrations, promote technology development initiatives, and develop enhanced educational programming. Officials from PTI member governments participate in councils and forums that address specific technology areas. Through our corporate partner program with leading technology companies, and partnerships with federal agencies and other governmental organizations, PTI shares the results of these activities and the expertise of its members with the broader audience of the more than 30,000 cities and counties across the United States.

PTI issues occasional white papers on what its local members believe to be critical issues of importance requiring further thought and research. And broadband generally has been a very important topic of late. This is true even more so for rural governments and regional economic development agencies.

In August, 2006 PTI was asked to assist certain U.S. Senators in creating the nation's first Rural Broadband Act. In early November as a direct result of PTI staff work, S.3999 was introduced. While the underlying intentions of the Senate bill were clearly political (introduced prior to the November elections), there was never any doubt about the substance and significance of the proposed Act. It appears certain that the new Congress will re-visit the issue and will enjoy better prospects for passage.

## Why Broadband is Necessary

Broadband continues to be identified as one of the greatest requirements necessary for our nation to remain competitive in order to sustain all levels of economic growth. While broadband penetration has risen the fastest in government and business, rural America remains seriously underserved.

According to the U.S. Census Bureau, 61.7% of the population is considered "rural." This equates to approximately 10-15 million homes and over 3.4 million small businesses. The Government Accountability Office (GAO) reports that only 17% of rural households subscribe to broadband services.

According to the ITU, the U.S. continues to lag behind the rest of the industrialized nations and ranks about 16<sup>th</sup> in overall broadband penetration. Worse, this indicator continues to go down as other nations move up in rank. This alone proves worrisome to policy makers at all levels of government concerned with economic development and growth. And according to the Pew Internet Study, rural broadband penetration in America is worse than the national average.

Today's technology requires greater and greater reliance on the Internet as the central information vertex for functions no longer supported by human intervention—and especially no longer supported by dial-up connectivity.

Today's local governments operate "virtual" city halls open 24/7. Permits, licenses, tax bills and general information can be obtained in just a few keystrokes. Local schools systems now place student course outlines, homework assignments, required readings and assignments, grades and teacher comments on line. The Federal Communications Commission (FCC) serves as the administrative regulatory body overseeing the Universal Service Fund (USF). This fund subsidizes broadband expenses for schools and libraries. The FCC has consistently recognized the need for greater broadband access—especially in underserved areas such as found in rural America.

Businesses can no longer operate and compete without on-line services and marketing. And while the technology improves dramatically with each passing day, there are a significant number of Americans living in rural and other underserved areas that remain at a huge social and economic disadvantage.

According to the Public Technology Institute (PTI), based on informal interviews with a cross section of corporate CEOs of various size businesses, found that those planning to remain in a location or contemplating moving to a new location, consider reliable broadband connectivity and availability more critical to their decision than an educated workforce. It is for this reason—plus the fact that citizens in rural America are openly complaining and demanding access to broadband options—that rural broadband is gaining so much attention of late.

When economists and politicians decry the "digital divide" or "knowledge divide," they are usually referring to an inner city population, but rural America also fits into this dilemma and includes a geographic divide.

Rural businesses are realizing that to be successful and competitive in today's marketplace, they too must be able to obtain and promptly respond to orders online, conduct research, purchase inventory, access electronic documents from suppliers, and receive large e-mail attachments with ease. They need to be open 24/7 and be able to send and receive information efficiently and quickly. And for this to occur, business owners need reliable broadband access. Without it many experts believe that those without broadband access will be left at a competitive disadvantage and run the risk of becoming disenfranchised from their customers and the marketplace.

## **BROADBAND APPLICATIONS**

**B**roadband is no longer a technology in search of applications. Instead, innovative applications are growing by leaps and bounds and the only limitations to their use are access, bandwidth and reliable connectivity.

Aside from merely staying in touch via e-mail and downloading music and video, there are other key applications that are especially important to rural America. These include telework, telemedicine, distance learning, as well as many critical business applications.

Health experts have argued the benefits for geographic diversity of our population especially should a health emergency take place or other homeland security issue. Even the Department of Homeland Security has recognized the need for geographic dispersion of our population and security-related field offices. When one looks at all the exciting new applications in health, telemedicine, safety and distance learning, small business stands out as the leading economic driver.

Access to these critical applications allows businesses and citizens to remain in rural areas, providing enhanced employment opportunities and improved educational, medical and government services. It also reduces the need to drive and so fits well into most local government efforts to reduce energy dependence and energy emissions.

With rural broadband access, local leaders can provide exciting alternatives for creating community spirit. Churches, libraries, community centers can all be linked together and include members—even in their homes.

Small businesses are the critical link in fostering economic growth and survival in rural America. And they can remain in place and not be forced to relocate into more densely populated areas with the associated higher costs of real estate and labor. With high-speed Internet small businesses can stay open 24/7 just like their competition in more crowded areas. It has been said that having broadband access in rural America is like having the “great equalizer!”

Having the means to sustain a robust rural economy provides benefits to the elderly, as well as mainstream workers who wish to remain competitive both personally and professionally in a relatively cost-effective environment.

It should also be said that this is more than an issue of competing with like businesses in non-rural areas. It comes down to survival of a business that has no choice to move. For example prime rural businesses include agriculture, wineries, construction sites, remote storage facilities, lodging, resorts, and farms to name a few categories.

### **Why is Rural America Still Waiting? What Technologies are Available?**

**M**any communities were told that they would be next and it was just a matter of time and waiting. But the waiting persists, while the need for broadband continues to grow along with the frustration.

Clearly telecom businesses go where they can get the biggest ‘bang for the buck’. Broadband technologies are expensive and rural areas simply lack the population density for major companies to invest in infrastructure. They say it is too costly on a per customer basis. There are abundant choices offered by the leading technology companies to urban and suburban population centers when compared to those offered to rural America.

Generally there are two major categories of broadband access—wired and wireless options—that can deliver varying forms of reliable and robust broadband services. Wired includes DSL, cable, and fiber to the premise.

Wireless includes WiFi, WIMAX, cellular/PCS, and satellite. Each has its own characteristics. Given the challenges regarding population density and topography found in rural America some of these options may prove to be less attractive to system operators compared to what is offered in urban and suburban localities.

What follows are brief descriptions of available technologies as applied to a rural environment.

## **WIRED OPTIONS**

### **DSL**

**D**igital Subscriber Line, or DSL, is offered by most landline phone companies. Service plans and pricing vary, but there are two limitations. The first is that this technology requires that the end point be relatively close to a central office and second, it is a shared usage system. The later point means that when more people are using it, speeds decrease accordingly. To the first point, most rural areas are too far from the necessary switching operations, and thus these areas are unlikely to find many DSL offerings. Most companies offer DSL service as a package (bundle) often requiring the maintaining of an analog landline whether needed or not. Yet increasingly many customers prefer to use their cell phones as their main phone line, which they carry around wherever they go, rather than paying for a fixed phone line.

### **CABLE**

**C**able usually offers greater upload and download speeds and comes with a higher price to match. But cable requires well, cable—and it is not always available in rural America. Here, too, even when it is available, it often requires a customer to pay for a TV programming package making the monthly bills very expensive. But like other wired services cable is simply not an option in many rural areas.

## FIBER

**F**ew will argue the merits of fiber to the home or business—the problem is simple economics. Fiber offers the most robust broadband speeds available anywhere—but it is also the most expensive. Fiber, like cable and DSL lines, has to be strung across miles of poles or buried beneath the ground at great expense.

In summation, rural America because of its lack of population density and topography lacks the economic incentives to make these applications universally deployed.

## WIRELESS OPTIONS

### Cellular/PCS

**T**he five major wireless providers are currently building out high speed wireless networks called third generation or 3G. With the proper device and network one can receive emails and in some cases view small video clips. These same companies are offering laptop computers wireless cards to take advantage of the larger screen. While the mobile environment is very important it does not replace the need for fixed broadband connectivity

While coverage areas will remain an issue for some time as 3G networks are being built out in urban centers first, there are some trade-offs too. Businesses and homes still need fixed connectivity for the heavy bandwidth applications that are required. Wireless networks, even 3G still lack the bandwidth to support most always-on line business applications.

Further, cellular/PCS coverage, even if available, often has trouble getting its signals into a home or office.

### WiFi

**W**iFi as a technology was originally designed for small areas (usually not exceeding three hundred feet per base station) such as a in-home network, a coffee shop hot-spot, etc. The coverage on unlicensed spectrum in which it operates is not always reliable, but certainly comes in handy when you are near the right place at there right time. Often forgotten however, is the need for the WiFi system's backhaul or gateway to and from the Internet. People often do not realize that such connectivity can be fixed or carried by satellite.

Most of the newer applications that are being developed today will be requiring greater and greater amounts of bandwidth—something that WiFi can not reliably supply. Here, too, WiFi signals have great difficulty entering a home or business.

In urban areas it is estimated that at least 40+ transmitters at an average cost of \$100,000 per square mile. In a rural setting while far fewer base stations would be needed, the cost when applied to the sparse population makes this technology cost prohibitive and the system would require a band-rich and expensive backhaul.

## **WIMAX**

**W**IMAX is similar to WiFi except that it promises to offer connectivity over many miles not the 300 feet maximum per base station. WIMAX also offers the promise to provide more bandwidth as well, but again this technology will take years to build out and will still have issues with topography. And because this technology is mainly aimed at the outdoors and requires a fixed outdoor antenna for home use—and it is considered a shared network architecture, it will most likely not replace the urgent need for a reliable high-bandwidth broadband solution as that offered by satellite.

## **SATELLITE BROADBAND**

**S**atellite communications has been rural America's best choice for entertainment options for years and initially offered as a one-way medium bringing in distant TV stations and special networks like HBO to the rural home where cable was not economically practical. Years ago some companies developed hybrid systems that allowed consumers to download from a satellite and upload from a phone line. But customers met this technology with mixed results—often complaining about reliability and unacceptable quality of services.

Today we see dramatic growth of two-way, fully interactive satellite broadband offerings. Large businesses such as Wal-Mart have been using satellite broadband for many years and could not do without it. Today small rural businesses are increasingly recognizing the cost benefits of satellite broadband.

There continues to be technological breakthroughs that increase speed and bandwidth, reliability, and quality of service at extremely high levels. It clearly is the best wireless technology that actually brings the signal into the home or office and is not dependent on towers or repeaters or signals trying to penetrate building structures. In terms of economics, there is no requirement for local infrastructure build-out—simply the user's CPE.

One of the greatest challenges is to make consumers and businesses aware of the advantages of satellite broadband. To illustrate the point, Hughes Network Systems (Hughes) commissioned a sample survey of 250 small businesses across the nation to gauge their knowledge of the broadband options available to them. The survey discovered that two in five (43 percent) small businesses surveyed did not know that broadband access was available to them.

Rural businesses utilizing satellite broadband can enjoy the same advantages as their urban and suburban counterparts in that it can provide the means to:

- create point-of-sale registers
- placing & managing orders for goods and services
- ability to have “just-in-time” deliveries of special parts
- ability to check inventory from various locations
- manage payroll and other accounting functions
- real-time credit/debit card verifications
- on-line training and educational opportunities
- increased employee retention through telecommuting
- disaster recovery and secured off-site data backup
- offering outsourced services at lower prices

The above list is but a few business functions that are possible with broadband services. And when offered in a rural environment, the local economies will prosper through job retention and creation, and a more solid tax base.

## CONCLUSION

**A**fter weighing all the pluses and minuses of available broadband options for rural America, we conclude that two-way, always-on satellite broadband bridges the digital divide or knowledge divide for consumers and small businesses better than most other broadband technologies.

The fact that it is available right now and everywhere makes this technology particularly compelling for rural America and its citizens and in particular businesses. Economics plays a major role in broadband penetration in terms of infrastructure—who builds where and when. Satellite covers large geographic areas and pricing is not based on distance so there are no last mile problems. Therefore it is very cost effective when compared to other technologies – assuming there are any other real options in a given area.

Local governments, particularly in rural areas, have been at the forefront in striving to ensure that their communities are not left behind in broadband deployment. It has not been easy as there is no central place for governments to turn to for more information, demonstration projects, pilot projects, grants and economic development assistance information. The proposed National Rural Broadband Development Act S.3999 is a start that can answer many of the needs expressed above.

In the last few years, broadband availability has been a driving force for new wealth creation and its distribution nationwide. It places greater responsibility on local governments to provide broadband access to the businesses and households to ensure their own fiscal survival as non-availability of broadband

accelerates wealth migration towards broadband-centric regions, unhindered by local and political boundaries.

Local governments and regional economic development agencies can and should do more to promote satellite broadband and help fill the many identified needs for rural economic development. For example local governments can themselves lead by example by utilizing this kind of system. And local governments can utilize satellite broadband technology to create local wireless “hot spots” in their communities.

Satellite broadband is an excellent rural technology solution. Based on PTI’s research we conclude the following:

1. There remains a need to better promote the advantages of two-way satellite broadband service—that it is available now and everywhere in the United States where there is exposure to the southern hemisphere, this would include:
  - a. Satellite broadband provides comparable high-speed, high-quality, broadband service that matches or exceeds that of other technologies;
  - b. Satellite broadband is scalable, reliable, cost-effective and distance-insensitive;
2. Local governments can and should play a leadership role in promoting, adopting and showcasing satellite broadband applications—especially for small business;
3. Congress should move forward with its proposed Rural Broadband Act to serve as a central depository of information and best practices for rural broadband deployments.

Finally, based on what we know today, and after assessing the needs of rural America—no rural broadband development program should be considered without including the cost/benefits of two-way satellite broadband services that are available everywhere and are available now.