Chapter 7: Broad Band in the Borderlands
Bridging the Digital Divide

Over the last 30 years, United States economic trends have been marked by the growth in knowledge-based fields. Technology advances have significantly affected the production industry and the economic environment in general. Communities that have prepared for this growth of technology have fared well economically. Regions where technology advancement has not been a priority have fallen behind. The Texas Border Region must make digital literacy a priority in order to succeed.

The Border Region suffers greatly on most socioeconomic indicators. If it made up a "51st" state, the 23 Border counties, excluding San Diego, would rank 1st among the states in unemployment; 27th in the percentage of adults with a four-year college degree; and 51st in per capita income.[1] In 22 of the 24 border counties, the unemployment rate is double the national average and their labor force participation rates are less than 58 percent compared to 65 percent nationwide. [2]

The digital divide -- the gap in access to and education in technology -- is a significant factor in the Region's economic struggles. Communities, like those on the Border, that do not yet have the infrastructure and training to support a technology-based economy, are failing to maintain self-sufficient and prosperous economic environments. Without access to and training in technology, the labor force in the Border Region will continue to struggle to accrue stability and wealth. Moreover, children of the Border, who are not developing the skills to work in a knowledge-based technology economy, will fall behind.

Information Revolution

The Internet and access to technology has changed our lives and our communities significantly over the past decade. Ready and fast access to information has transformed the way that students learn, people communicate, and businesses operate. More than ever, access to information allows the opportunity for people with various backgrounds and levels of education to compete academically, economically, and socially. The information revolution, spurred by the spreading use of high-speed Internet, will benefit more people and more communities than ever imagined. With the proliferation of Internet-based services, governments and businesses are able to reach more people and operate more efficiently and effectively.

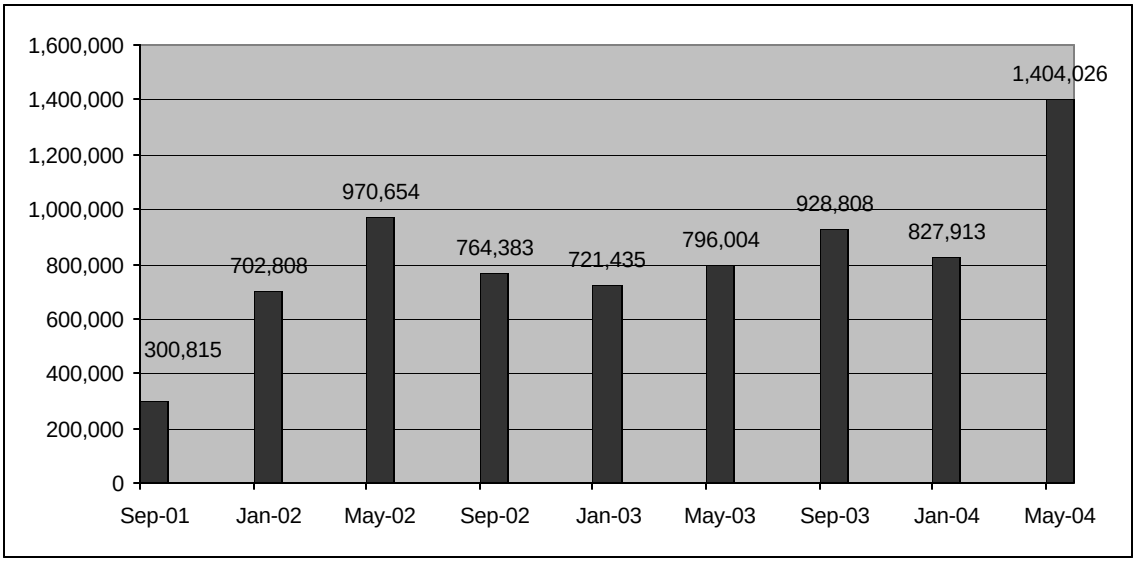
E-government

Local, State, and Federal government entities recognize that through the use of technology they can offer broader and more efficient government technologies. In August 2000, the State of Texas launched its official e-government site for state and local government business. The site, TexasOnline, reaches across state agencies, links municipalities, counties, courts, and universities, and has generated over $20 million in fees associated with government

transactions.[3] For Texans, TexasOnline provides a single port into communicating with State agencies and State officials. Moreover, Texans can complete many necessary tasks online that otherwise would cost them time and money in traveling to a government agency; for example, Texans with Internet access to TexasOnline can renew a driver's license, pay business sales taxes, and obtain oil and gas drilling permits.

Since its inception, TexasOnline has presented over 300 citizen and business services online, received over 35 million visits, and processed over 25 million transactions and over $1 billion dollars in collections.[4] When the portal was launched in September 2000, it received approximately 40,000 visits monthly.[5] A visit is defined as a customer coming to TexasOnline to find information or a service.[6] By May 2002, it received roughly 900,000 visits monthly—with a high of more than one million visits in April 2002.[7] The chart below, *Number of Monthly Visits*, illustrates this growth.

Number of Monthly Visits, September 2001 - May 2004



Source: Texas Department of Information Resources (DIR), June 2004.

Additionally, when measuring the success of the portal, the Texas Online Authority analyzes the number of transactions completed through the portal. Again, the growing number of transactions indicate that Texans are using the portal to complete various administrative tasks, as opposed to traveling to State agencies and conducting their business in person. The chart on the next page, *Number of Transactions Completed Through TexasOnline*, shows that between September 2001 and May 2004, business transactions increased exponentially, from just over 1 million in the month of January 2004.[8]

Number of Transactions Completed Through TexasOnline

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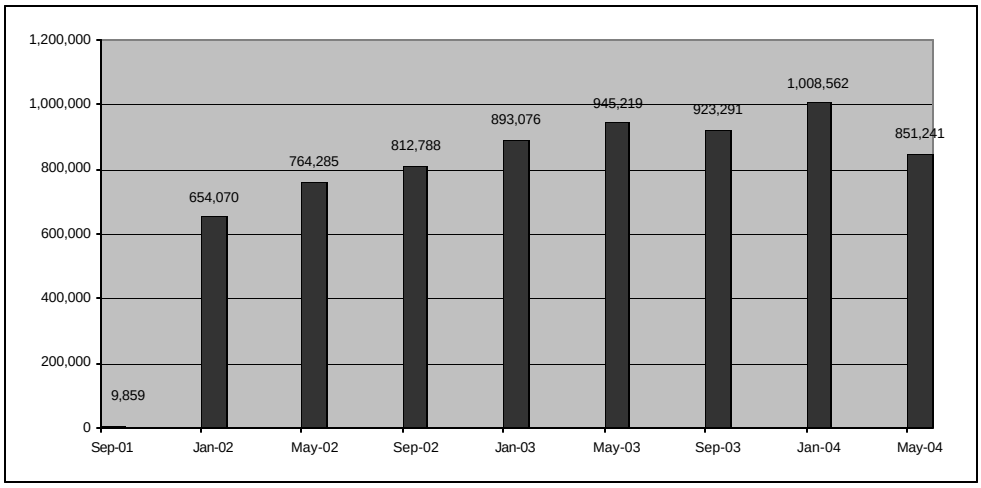
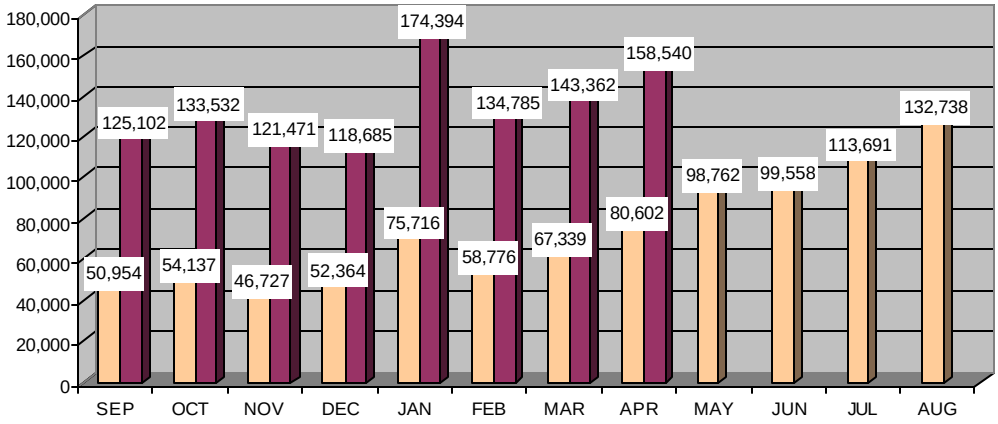


Source: DIR, June 2004.

More recent statistics indicate that TexasOnline is increasingly becoming the primary portal for information regarding State agencies and the initial point of communication for transactions with the State. The below graph, *TexasOnline Transactions*, juxtaposes the number of visits for the months of 2003 and the first months of 2004. As the graph shows, transactions are almost doubling per year.

TexasOnline Transactions



Source: Department of Information Resources, TexasOnline Division. *Monthly Financial Report*, June, 2004.

Texans that do not have access to TexasOnline must work harder and less efficiently to do business with the State. This inefficiency costs both the State and the citizen time, energy, and money. As e-government services become even more prolific and the traditional means of providing government services are phased out, those without ready access to and training in Internet applications will find that communicating with State government will become increasingly more difficult.

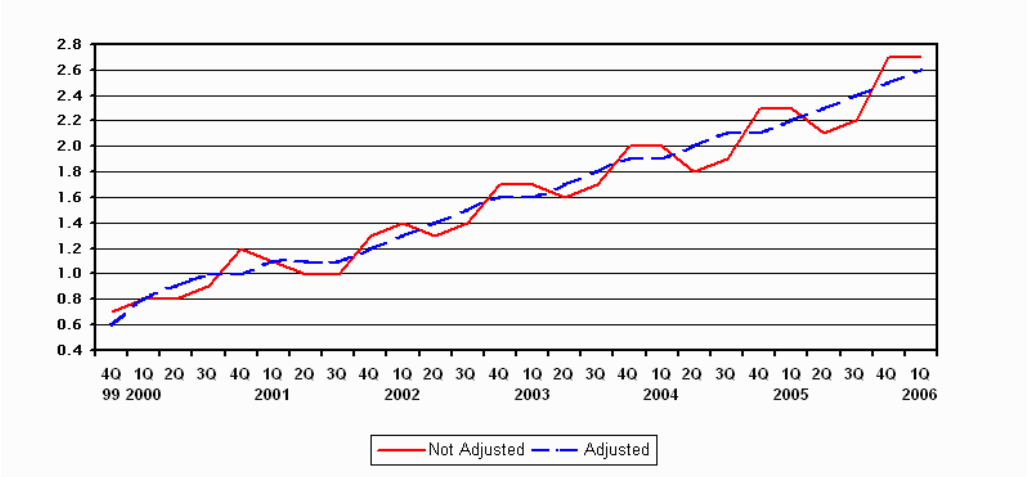
Further, nearly a third of all Texans speak Spanish and 10 percent of all Texans do not speak English. The significant number of Spanish speaking citizens in Texas has caused an increased demand in equal access to state resources. Further, Texas residents are increasingly becoming more dependent on the Internet to address their needs. TexasOnline is making great strides to serve the public's needs in cost effective ways. During the last regular legislative session, S.B. 213 by Senator Shapleigh required that all state agencies follow federal guidelines requiring that state agencies that have direct and constant contact with Spanish-speaking constituents make vital information and their forms available in Spanish. This new law took effect on September 1, 2005. These modifications to the nation's biggest internet portal have beard fruit. TexasOnline was recently selected as the top state portal in the country in Brown University's annual study on electronic government.

E-commerce

An important aspect of high-speed Internet access is the promotion of e-commerce. E-Commerce, or Electronic Commerce, is a general term for any type of business or commercial transaction that involves the transfer of information across the Internet. This covers a range of different types of businesses, from consumer-based retail sites like Amazon.com, through auction sites like eBay, to business exchanges trading goods or services between corporations. The incorporation of technology and the improved communications equates to improved productivity, higher profits, and larger markets.

E-commerce has expanded rapidly over the past five years and this growth is forecasted to continue or even accelerate. In fact, online retail sales alone in the United States amounted to $45.6 billion in 2002, up 26.9 percent from 2001.[9] As the chart below, *Estimated Quarterly U.S. Retail E-commerce Sales: 4th Quarter 1999 - 1st Quarter 2004*, clearly indicates e-commerce is growing rapidly in the United States.

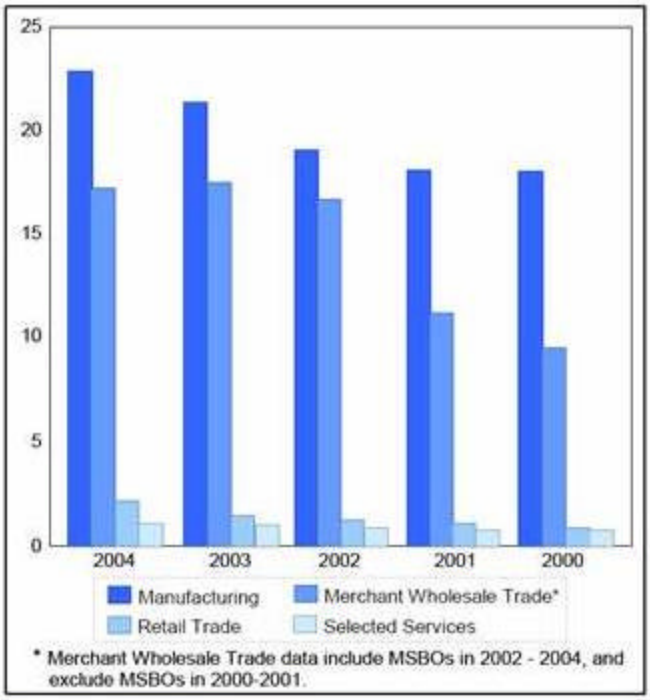
Estimated Quarterly U.S. Retail E-commerce Sales
as a Percent of Total Quarterly Retail Sales:
4th Quarter 1999–1st Quarter 2006
(Billions of Dollars by Quarter)



Source: U.S. Census Bureau. *U.S. Department of Commerce News*. May 18, 2006.

The Census Bureau of the Department of Commerce reports that in 2006 total e-retail sales in the U.S. accounted for 2.7 percent of all retail sales, up from 1.1 percent in 2001.[10] While these percentages initially appear relatively insignificant, the Department of Commerce notes that e-commerce grew faster than the total economic activity in three of the four major economic sectors measured by the department in 2004 -- manufacturing, merchant wholesale trade, retail trade and selected services.[11] The following graph, *E-commerce as Percent of Total Value: 2000-2004*, illustrates the respective levels of e-commerce activity in each sector.

E-commerce as Percent of Total Value: 2000-2004



Source: United States Department of Commerce, Census Bureau, *E-Stats: Measuring the Electronic Economy*

As more businesses move parts of their operation onto the Internet, it is likely that, in the future, the boundaries between "conventional" and "electronic" commerce will become increasingly blurred. Businesses and consumers that do not have ready access to the Internet cannot reap the benefits afforded by e-commerce practices. And, as e-commerce practices grow and the boundary becomes more blurred, communities where access to the Internet is not prolific, is not used by consumers and businesses, will lag economically and will fall behind at an exponential rate.

Finally, for economically struggling communities, e-commerce should create a sense of promise. This tool can increase the attraction of rural communities to different investors who may be wary of relocating to an area that is not seen as an economic hub. The increased use of e-commerce, where geographic boundaries are not a concern, reduces the need for a prime location. Thus, a major factor in corporation or business relocation will increasingly be the quality of telecommunications infrastructure present in the area. For Border communities,

strategically located in trade corridors, the use of e-commerce could develop a prosperous manufacturing and wholesale market economy, if there was reliable and ready access to high-speed Internet services.

Because of reduced wages and lower regulatory standards, companies are increasingly moving manufacturing and knowledge-based businesses overseas. Where the U.S.-Mexico border once epitomized a flourishing manufacturing region by providing producers a large pool of skilled laborers willing and able to work for reduced wages, outsourcing to China and India is slowly chipping away at the foundation of the region's economy.

To prevent the continued loss of jobs and economic generators, leaders must demonstrate to the business community that the border region is a smarter location in which to conduct business. One asset that must be developed that leads to a Smart Manufacturing Zone is the relative ease of accessing advanced technological services. Just several hundred miles away from the border, Austin and Silicon Valley are leading the technological revolution; developing more advanced services and applications, and cementing the economic stability of their regions. Stretching access to these advancing capabilities to the border and beyond will allow this region to, in turn; cement its own economic stability. The current strengths of the border, coupled with the added strengths of advanced technology, will create the Smart Manufacturing Zone of tomorrow.

The Internet and access to technology has changed our lives and our communities significantly over the past decade. Ready and fast access to information has transformed the way that students learn, people communicate, and businesses operate. More than ever, access to information allows the opportunity for people with various backgrounds and levels of education to compete academically, economically, and socially. The information revolution, spurred by the spreading use of high-speed Internet, will benefit more people and more communities than ever imagined. With the proliferation of Internet-based services, governments and businesses are able to reach more people and operate more efficiently and effectively.

Local businesses and manufacturers must have access to broadband technology, effective opportunities for growth, and a growing, vibrant labor force. They must increase opportunities to use technology to expand and streamline operations to operate efficiently and manufacturers will choose to locate, stay, and grow in the region. A strong and stable economy will develop.

Creating smart supply lines is integral in creating a *Smart Manufacturing Zone*. Industry leaders will be drawn to an area where operating costs are low; by shortening supply lines, we can reduce operating costs for industry and manufacture in a safe zone free from external threats. Clusters of industries will be drawn together, and with a strong industry cluster, a manufacturer will be less enticed to move its operations overseas.

"Smart Border Plan" and Related Technology - a Means to Facilitate the Free Movement of People

Each day, thousands of Mexican citizens use their Border Crossing Cards (BCCs) to cross the border in order to shop and engage in other legitimate business in the U.S. By suddenly

making their entry into the U.S. much more difficult deals a blow to border towns and the state economy at the worst possible time. Homeland security issues must be considered in tandem with economic security to ensure the continued safety and health of the border and the entire nation.

Homeland security and improved trade processes are not mutually exclusive and can be accomplished simultaneously. To accomplish both, existing or new pre-screening programs can be considered to allow the federal and state government's law branch to have advance knowledge of the people, freight, and vehicles crossing our borders. To be able to identify, in advance, the overwhelming majority of the individuals who cross the border as law abiding and low-risk crossers, innovative technology with precise filtering devices can be used so that law enforcement personnel can focus on high-risk movement. Improving the capacity of border inspection agencies to validate legitimate cross-border pedestrians should be the basis for implementing new models of risk management.

The high volume of persons and vehicles crossing the border may make the implementation of new technology appear daunting. However, it is not as difficult a task as it might appear. Aggregate border crossing numbers are somewhat misleading since so many of the vehicles, drivers, and pedestrians are local, frequent travelers. For example, of the 4.2 million recorded commercial vehicle southwest border crossings in 2000, the crossings were made by only 80,000 trucks.[12] If even one-half of these trucks, or 40,000 were found eligible for low-risk crossing, it is conceivable that federal and state workloads would decline significantly representing ongoing annual saving after an initial investment.

To address these issues and expedite the use of new technologies at border ports-of-entry, the following priorities for implementing a U.S.-Mexico "Smart Border Plan" should be addressed

- Develop immediately common biometric identifiers in documentation such as permanent resident cards, NEXUS, and other travel documents to ensure greater security. Use innovative technology to develop and deploy a commuter or secure identity card for permanent residents that includes a biometric identifier to allow for the timely determination of legitimate crossers.

- Support pilot programs to experiment with prototypes for low risk travelers, such as Dedicated Commuter Lanes (DCLs), and frequent traveler cards for U.S. citizens. The concept of "Frequent Traveler Cards" is an example of ways that technology at ports-of-entry can be used to expedite the inspection process. Biometrics can be embedded in the card, such as a digitized photograph, handprints, or facial or retina recognition that will verify the individual's identity

- Promote and encourage manufacturers and the trade community to enroll in the U. S. Customs' pre-clearance programs—the Border Release Advance Screening & Selectivity (BRASS), the Business Anti-Smuggling Coalition (BASC), and the Carrier Initiative Program (CIP), by encouraging dedicated trade lanes with expedited crossing for those who participate in these programs.

- Realignment of the federal border inspection agencies within the Department of Homeland Security Agency.

- Support the acquisition and use of non-intrusive technologies by border inspection agencies, such as Pulse Fast Neutron Analysis (PFNA) inspection

E-commerce and e-government are only two ways that the Internet has transformed the United States and global economies to a more knowledge-based environment. With the increased use of technology applications in education, the way our children learn is being transformed. With the increased use of technology based communication systems, e-mail, instant messaging, video-conferencing and web-based telephone services, business and social interactions between people are transforming. For people living in areas that do not have ready access to this technology, these transformations are merely tall tales. For Texas' Border residents, students and businesses, the technology revolution is not yet a reality.

The Digital Divide on the Border

The term "Digital Divide" has become common shorthand to describe perceived and real gaps among geographic regions and population groups in access to, and utilization of, advanced technologies and the Internet. Such gaps are often most pronounced in rural and low income communities, as compared with urban and suburban locales.

The Border Region experiences these gaps in availability and usage and suffers because of the digital divide. There are many areas within the Region where advanced infrastructure, such as broadband Internet access, have been slow to develop. Also, the costs of developing a high-speed network are prohibitively expensive for many Border communities; and, areas along the Border have not benefited extensively from national funding sources that have disproportionately been directed to other regions of the country. Even if communities could develop or lure the commercial market to develop the infrastructure, many low-income people living in the area and many small businesses could not afford the monthly fees associated with high-speed Internet access.[13]

Disparities in Access

In providing access to technology, Texas is behind the curve. The State lacks a unified, comprehensive approach to providing advanced, high-speed networking across the entire state. Other states, Canadian provinces, and entire countries have designed, funded and are increasingly deploying networks that work to develop a system that supports education, health care, research, and public information access. While H.B. 2128 (1995), also known as the *Public Utilities Regulatory Act*, did create a vision of a statewide Texas Broadband Backbone, this vision has yet to be achieved.

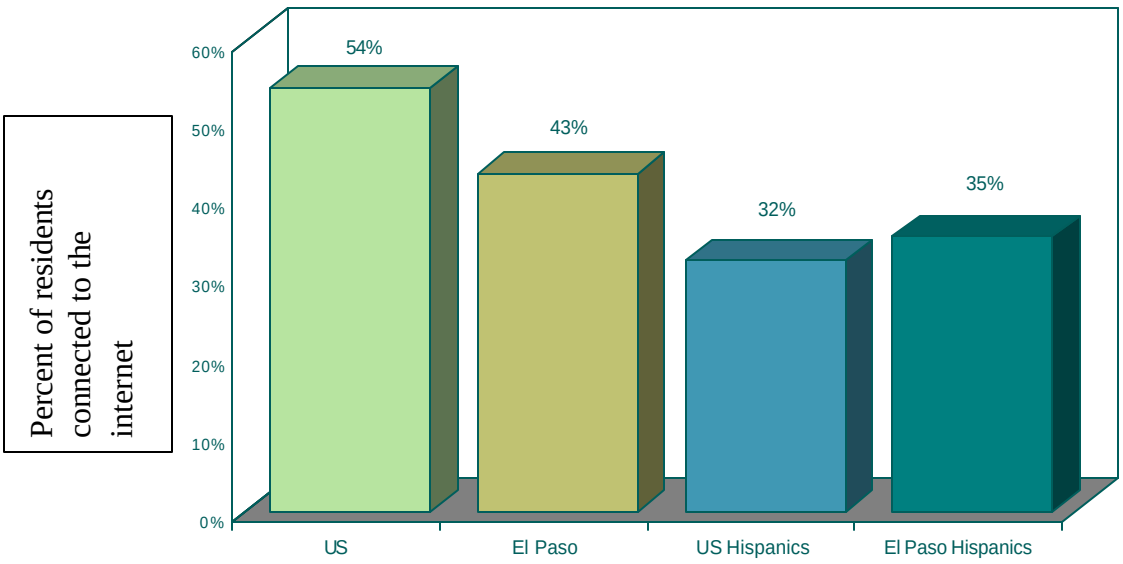
It is the policy of this state to ensure that customers in all regions of this state, including low-income customers and customers in rural and high cost areas, have access to telecommunications and information services … that are reasonably comparable to those services provided in urban areas and that are available at prices that are reasonable comparable to prices charged for similar services in urban areas.
Public Utilities Regulatory Act (PURU) H.B. 2128 (1995)

Despite the vision articulated in PURU, many rural Texans and Texans living in hard to serve areas do not have ready access to comparable telecommunication services.

The first step to bridging the digital divide involves providing access to the Internet. Without connectivity, residents have no chance to develop familiarity with technology and are unable to apply their skills in future work opportunities. Communities on the Border do not have the access available to other communities around the state and the country.

For example, in El Paso, one of the larger, more urban areas on the Border, connectivity to the Internet lags behind other parts of the country. The graph below, *Internet Connectivity*, shows that El Paso's connectivity falls below the national level of Internet access. Moreover, the disparity between the national average, and the average for the Hispanic population reiterates the concern that the digital divide greatly affects minorities and the primary Border population.

Internet Connectivity



Source: University of Texas El Paso Institute for Policy and Economic Development (IPED), *Survey of Technology Use in El Paso County* (Technical Report 2003-6), 2003.

This failure in providing connectivity plagues communities throughout the Border Region. Nationwide in 2001, 65.6 percent of households owned computers, compared to 57.6 percent of households in El Paso. Moreover, across the nation, 54 percent of homes had Internet access in 2002, compared to 42.9 percent for El Paso.[14] The State is not investing the necessary funds to expand needed infrastructure to provide services to the Border. As the rest of Texas becomes increasingly more connected to the Internet with advanced services, Border communities struggle to get access to affordable dial-up services or much less advanced high-speed connections.

Disparities in Usage

One reason cited by commercial Internet providers as the cause of low accessibility rates on the border is the lack of Internet usage by those communities.[15] However, this argument fails to consider the specific factors that underlie low usage in the first place. In other words, the problem is not that people on the Border are not using the Internet as much as people in Austin and Dallas, but people on the Border do not have the same opportunity for access as the people of Austin and Dallas. Usage cannot lead accessibility; there must be access to have usage.

As stated earlier, the Border region lags behind the nation in Internet usage. But the problem is not endemic to the Border region. The digital divide is more widespread. According to the *PEW Internet and American Life Project*, while the South lags behind much of the country, high Internet penetration can be found along both the Atlantic and Pacific coasts, as well as in the Rocky Mountain States.[16] These variances can be traced to, among other things, differences among the regions in income and education levels.[17] Those regions with a relatively wealthy and highly educated population are more likely to have a larger proportion of its population online.[18]

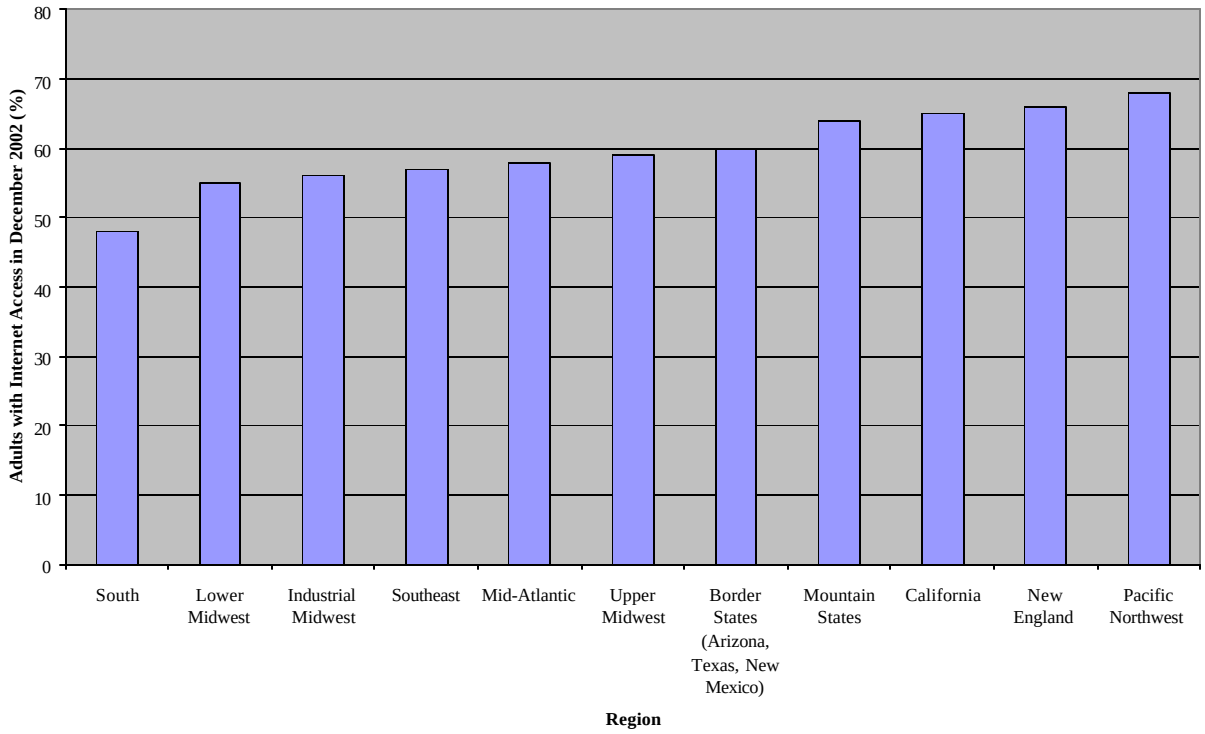
The Texas Border Region has the nation's lowest per-capita income, the highest percentage of adults without a high school diploma, and the highest poverty and unemployment rates in the country,[19] all factors that would indicate a low Internet penetration rate. The table and chart below, *Internet Penetration by U.S. Region*, show that the Border States, in general, rank relatively well in penetration, with 60 percent of adults having access to the Internet. But, when one considers the high penetration rates in urban areas like Austin and Dallas, it is clear that the Border Region counteracts the high penetration levels of those cities to bring the average for the state down.

Internet Penetration by U.S. Region

Region	Percent of Adults with Access
South	48
Lower Midwest	55
Industrial Midwest	56
Southeast	57
Mid-Atlantic	58
Upper Midwest	59
Border States (Arizona, Texas, New Mexico)	**60**
Mountain States	64
California	65
New England	66
Pacific Northwest	68

Source: PEW Internet and American Life Project, *Internet Use by Region in the United States, Regional variations in Internet use mirror differences in educational and income levels* (2003).

Internet Penetration by U.S. Region

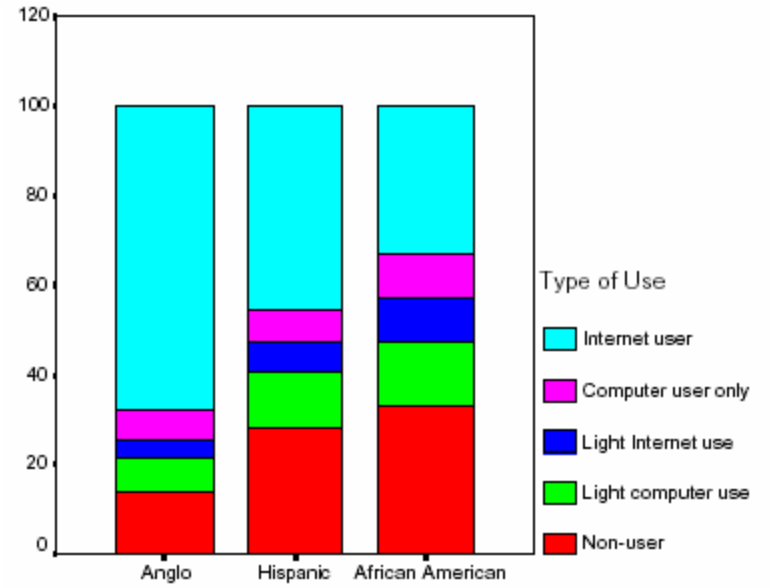


Source: PEW Internet and American Life Project, *Internet Use by Region in the United States, Regional variations in Internet use mirror differences in educational and income levels* (2003).

As of 2001, a large majority of Texans, 67 percent, used a computer and 60 percent used the Internet.[20] Today, 2.7 million Texas residents and 252,00 Texas businesses use high-speed Internet connections.[21]

However, there is great disparity in who is actually using the Internet. The differences in the ethnic composition of computer and Internet users in Texas are shown in the below chart. According to the Public Utilities Commission (PUC), nearly 68 percent of the Anglo community regularly uses the Internet, compared to 45.2 percent of Hispanics and 32.8 percent of African Americans. The pattern reverses for those who use neither a computer nor the Internet: 32.8 percent of the African Americans, 28 percent of the Hispanics, and 14.2 percent of the Anglos.[22] The graph on the next page, *Internet Usage by Race,* illustrates the percentages of Texans using the Internet.

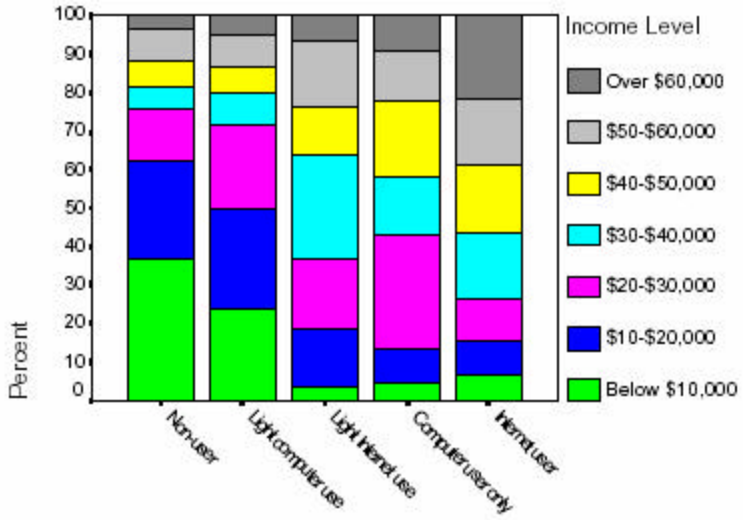
Internet Usage by Race



Source: Public Utilities Commission of Texas, *Report to the 77th Legislature on Advanced Services in Rural and High Cost Areas.*

As income and education increase, so do computer and Internet usage.[23] The chart below, *Internet Usage by Income Level*, indicates that people making less than $10,000 represents the largest cluster of people who use neither computers nor the Internet. At incomes over $30-$40,000, Internet usage is very common; the results for high and lower levels of education follow a similar pattern, with more highly educated people using the Internet more commonly than those that are less well educated. Moreover, most Internet users have had some education beyond high school, while the non-users are disproportionately composed of people who did not complete high school.[24]

Internet Usage by Income Level



Source: Public Utilities Commission of Texas, *Report to the 77th Legislature on Advanced Services in Rural and High Cost Areas.*

As companies and investors are sure to consider access to advanced technology, having access and usage levels that compete with other parts of Texas and with other states around the country is very important for the Border Region. Economic development in today's economy is necessarily founded in technology. The traditional way that state and local governments had recruited new businesses was through various incentives, including reduced taxes, wage subsidies, reduced rent, and other such monetary incentives. However, these traditional means of recruiting businesses must also incorporate a new approach.

A common element of most successful economic development efforts is "strong local leadership committed to mobilizing the community's resources and obtaining the facilities it needs."[25] A critical community resource in today's economy is access to advanced services; advanced services being broadband and high-speed Internet services such as DSL and cable. Access to advanced services would offer measurable economic development results for rural and Border communities. Other states recognize the need to promote advanced services to promote the economy and Texas needs to embrace this philosophy as well.

Successful efforts to bridge the divide

Texas' Border Region is not the only area hindered by the digital divide. There are other rural areas and hard-to-serve areas of the country that do not have ready access to high-speed technology services. To address this divide, many states and local communities are finding innovative ways of investing in their communities to bridge the digital divide. Some of these efforts are focused on connecting communities by subsidizing Internet services, or setting up community computer labs. Other efforts are more focused on getting schools connected.

State-wide efforts

An example of a state leader in its commitment to addressing the digital divide is California, through its *California Community Technology Policy Group*. The group has representatives from community-based and statewide-wide organizations. Together these member organizations advocate a policy that pledges to ensure that underserved communities acquire the benefits of technology. The Group has made numerous efforts in meeting this goal, including providing training to local leaders on what they can do to help their communities become more connected, and working closely with the State Legislature to pursue a policy agenda that promotes a resolution giving 50 percent in discounts for telecommunication services to schools, hospitals, and community based organizations working to bring technology to communities.[26]

Another state, Michigan, has recognized the economic advantage and need to have high-speed Internet services available throughout the state. It has expanded high-speed Internet services to every community – ranking first on The Technology Network's *State Broadband Index*.[27] Seeing the need to increase demand for and operation of broadband services along with the need for more private investment in high-speed Internet infrastructure, Michigan created the Michigan Broadband Development Authority (MBDA). The MBDA addresses these needs by offering organizations low-cost financing for the purchasing of hardware and/or software that improves or increases the use of broadband service. They also offer low-cost loans to telecommunications companies willing to invest in efforts of increasing broadband access.[28]

Moreover, Michigan has created the *SmartZone* program – a collaborative effort between universities, industry, research organizations, government, and other community institutions, that stimulates the growth of technology-based businesses by creating recognized clusters of new and emerging businesses. The *SmartZone* program organizes distinct geographical locations where technology firms, entrepreneurs, and researchers can locate in close proximity to helpful community assets. Finally, recognizing the value of small businesses, Michigan has developed Small Business and Technology Development Centers that provide consultation and training to small business owners and entrepreneurs. Michigan, a state once known as a manufacturing center, has recognized the implications that long-term investments in education, infrastructure, and technology have on developing a thriving business climate, and resultantly has begun to make policy changes that invest in the future.

Local-level Efforts

Initiatives to bridge the digital divide are also occurring at a more local level. There are numerous local governments and non-profits that are at work to bring technology access, training and services to their communities, in an effort to move the community its residents forward educationally, economically and socially.

Cleveland has started the Adelphia-Cleveland City Council *Neighborhood Technology Fund* to ensure that the community has ready Internet access. The cable operator of Cleveland has agreed to provide free cable modems and Internet services to computer centers in 21 city council wards. Primary and secondary schools, city facilities, public libraries, and computer

centers receive discounts on cable modems and Internet service. A $3 million fund has been established for community programs working to bridge the digital divide in underserved and hard to reach households.

The *Community Technology Centers' Network* in Washington, D.C., a nation-wide organization that works with local communities, provides support to centers trying to connect communities to technology. The organization currently has a number of projects through out the country, including the Leadership Development Institutes program. With support from AT&T and America Connects Consortium (ACC), Community Technology Centers' Network is conducting leadership workshops called Leadership Development Institutes (LDI) across America. These institutes are two days sessions that address key leadership issues in community technology centers. Some of the issues covered include staff development, effective programming and evaluation, strategic technology planning and fundraising.

The Orion Project--Working Off a Broadband Highway

Some Texas Border communities are launching grassroots initiative to try to bridge the digital divide. In El Paso, the *Orion Project* is an emerging initiative meant to address the need of providing Internet access to high quality content in a hard to serve community.[29] The *Orion Project* provides a high-speed Internet backbone (the Orion Ring) to support a community portal to serve as the platform for K-Grey education. The Orion portal will be a familiar and seamless access point for students of all ages, parents and the community. The core leadership of El Paso Community College, El Paso Independent School District, and The University of Texas at El Paso envisions educational content, as well as access to healthcare information, and library resources. Connectivity will be extended to include all area K-12 schools, higher education, the city, county, non-profit healthcare entities, and libraries. In addition, there is the potential to leverage UTEPs participation in the National LambdaRail Project (NLR).[30]

NLR is a consortium of leading U.S. research universities and private sector technology companies.[31] NLR's mission is to deploy a new and unique national networking infrastructure to foster the concurrent advancement of networking research and next generation network-based applications in science, engineering, and medicine.[32] This innovative research and development project could have a significant impact on economic development as UTEP begins to use the NLR link to collaborate on applied research projects focused on the unique challenges of the border, such as healthcare issues and the interoperability of the myriad of agencies monitoring border security.

Efforts to bridge the digital divide in the Border Region, either at the state level, regional level, or local level must be undertaken in order to ensure that this area does not continue to struggle educationally and economically.

Broadband Deployment In Texas

As Internet usage becomes more widespread and as new uses and applications emerge, the demand for higher speed Internet access is exploding. High-speed Internet access is generally referred to as "broadband" access. Broadband Internet is a new generation of high-

speed transmission services, which allows users to access the Internet and Internet-related services at significantly higher speeds than traditional dial-up modems. Broadband is thus not a system or a technology, but rather refers to speed or capacity (bandwidth).[33]

Modes of broadband include digital subscriber line (DSL) service provided by phone companies over telephone lines; high-speed access via cable typically provided by cable television providers; and satellite and wireless service.[34] As illustrated in the tables on the next page, *Number of Broadband Users Nationwide (2000 - 2005)* and *Growth of Broadband Users Nationwide (2000 - 2005)*, the number of broadband users nationwide has steadily increased since 2000.

Number of Broadband Users Nationwide (2000 - 2005)

High-Speed Lines [1]

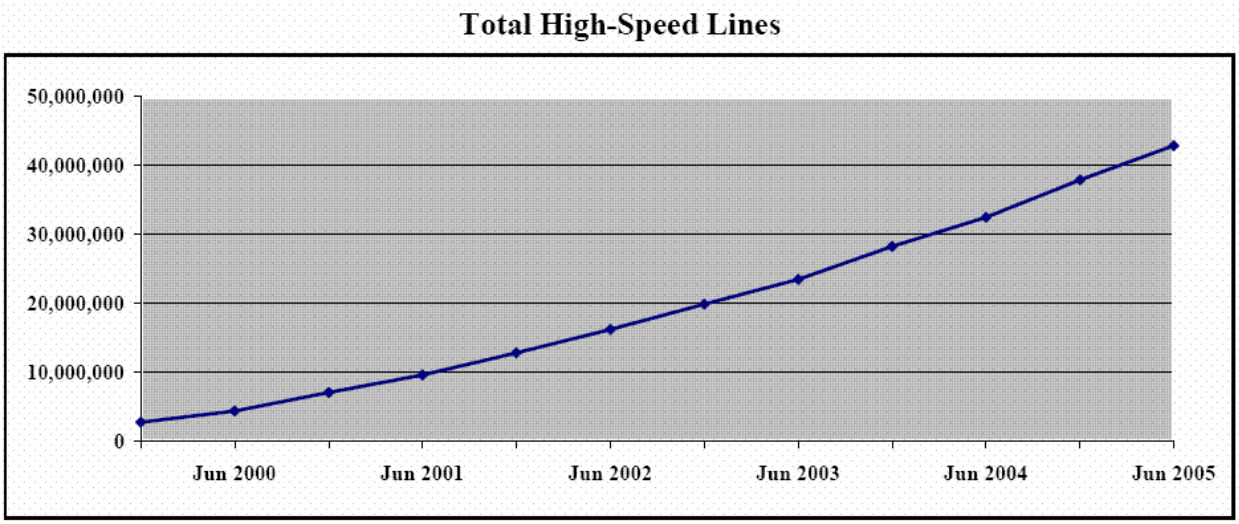
(Over 200 kbps in at least one direction)

Technology [2]	2000	2001	2002	2003	2004		2005
	Jun	Jun	Jun	Jun	Jun	Dec	Jun
ADSL	951,583	2,693,834	5,101,493	7,675,114	11,398,199	13,817,280	16,182,076
SDSL and Traditional Wireline	758,594	1,088,066	1,186,680	1,215,713	1,407,121	1,468,566	905,648
SDSL	-	-	-	-	-	-	423,716
Traditional Wireline	-	-	-	-	-	-	481,932
Cable Modem	2,284,491	5,184,141	9,172,895	13,684,225	18,592,636	21,357,400	23,938,908
Fiber [3]	307,151	455,593	520,884	575,613	638,812	697,779	864,831
Satellite and Wireless	65,615	194,707	220,588	309,006	421,690	549,621	970,133
Satellite	-	-	-	-	-	-	377,291
Fixed Wireless	-	-	-	-	-	-	213,306
Mobile Wireless	-	-	-	-	-	-	379,536
Power Line and Other	-	-	-	-	-	-	4,872
Total Lines	4,367,434	9,616,341	16,202,540	23,459,671	32,458,458	37,890,646	42,866,469

A 250 line per state mandatory reporting threshold applied to data through December 2004.
See additional notes following Chart 9.

Source: Federal Communications Commission, Industry Analysis and Technology Division Wireline Competition Bureau, *High-Speed Services for Internet Access: Status as of June 30, 2005* (April 2006).

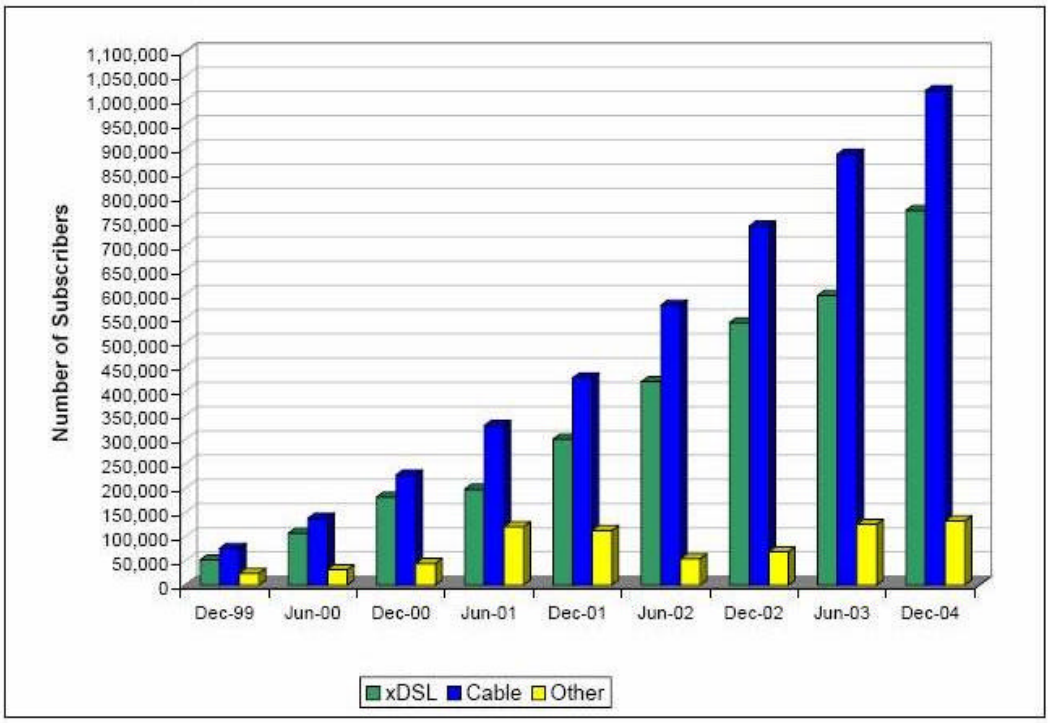
Growth of Broadband Users Nationwide (2000 - 2005)



Source: Federal Communications Commission, Industry Analysis and Technology Division Wireline Competition Bureau, *High-Speed Services for Internet Access: Status as of June 30, 2005* (April 2006).

As the following chart, *Number of Broadband Subscribers in Texas (1999 - 2004),* shows, the number of broadband users in Texas has also increased.

Number of Broadband Subscribers in Texas (1999 - 2004)

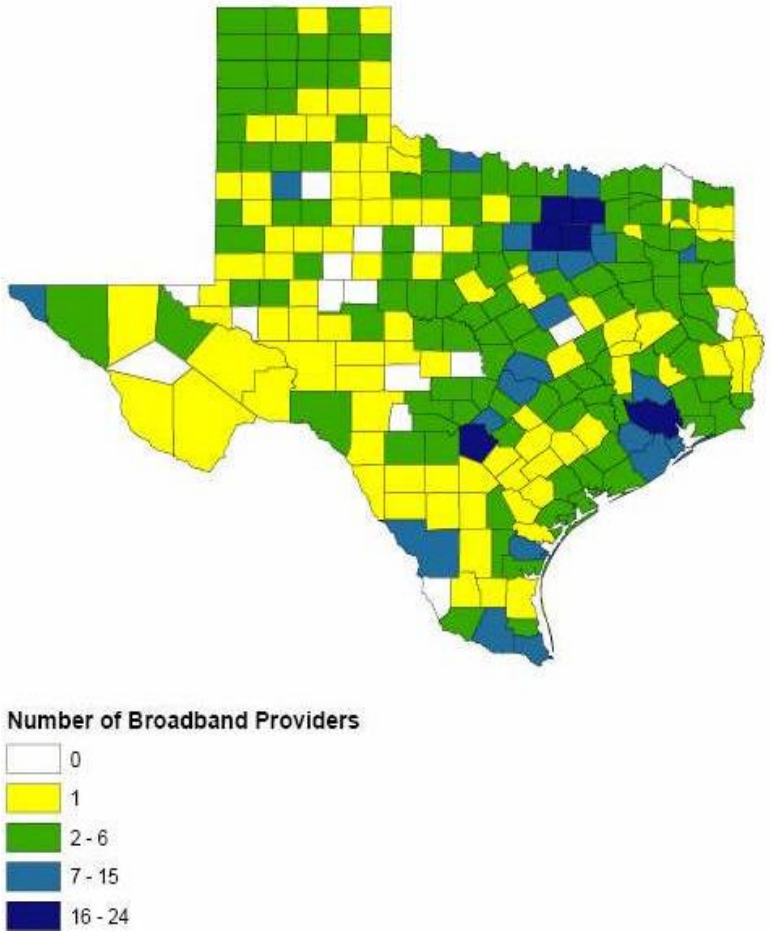


Source: Public Utilities Commission of Texas, *Report to the 79th Texas Legislature: Scope of Competition in Telecommunications Markets of Texas* (January 2005).

With broadband Internet access, Texans can create and access new Internet content, communicate through video links, and create interactive multimedia learning environments. High-speed Internet access will also become critical to Texas' continued economic development and quality of life. Although competition is rapidly driving the adoption of broadband technology by users, market forces alone are unlikely to address the high speed needs of all rural and hard to reach communities, like those in the Border Region. These communities have demonstrated a strong desire for broadband and view it as an essential component to economic development, but have had little success in enticing market competitors to invest in the essential infrastructure for developing a useful broadband network.

As reflected in the maps below, in general, there are more broadband providers in counties with higher population densities.[35] In the Border Region, with generally lower population-density counties, broadband deployment is relatively limited, as shown on the maps below, *Number of Broadband Providers per County as of June 2004.*

Number of Broadband Providers per County as of June 2004



Source: Texas PUC 2005 Scope of Competition Data Responses

Barriers to Deployment

There are many high-speed deployment issues to consider that hamper the status of advanced Internet technologies in Texas. Market forces play a large role in the deployment of broadband to the U.S./Mexico Border Region. One of the issues that companies face for deployment is the population density in relation to the cost. It is less cost effective for high-speed Internet providers to deploy services where the populations are sparse instead of concentrated. This price difference may lead to DSL/cable not being plausible in some areas, where wireless or satellite would be more reasonable.

However, this same argument was made in the 1930s when utility companies refused to provide electrical power to inhabitants of the Hill Country and other rural areas of the State. They said that it would cost too much money to build power lines to those areas and then they would have to charge these residents high rates that they [the residents] could not possibly afford. However, once the power lines were constructed, the residents who inhabited these areas became more productive due to the electricity they had received and were able to pay the monthly rates. There is no reason to believe that history will not repeat itself concerning the productivity of the Border Region if high-speed and broadband technology infrastructure is developed in the area.

Currently, IT services could be made available by local telephone service companies to every single area of Texas, but the investments, at this time, are much higher than the returns for this deployment method. The current Texas deployment model is determined by the economic advantages for serving major urban areas and high bandwidth users, instead of working to connect all communities and citizens.

Another barrier to broadband deployment is the challenge of getting Points of Presence (PoP) locations along the network to or near rural communities. PoPs, provide access points for Internet services, are either maintained or leased throughout service areas. A PoP (pronounced "pop") is likely to contain modems, digital leased lines, and multi-protocol routers. The access to PoP challenge not only consists of bringing PoP locations to a town, but knowing where the cable exists and who owns it. In Texas, this problem stems from the fact that there is no centralized map or database of Texas with this information. There are currently a few organizations such as the *Texas Lone Star Network* (TLSN), which offers "middle mile" transport solutions to areas in rural Texas, but no centralized organization to help with that "last mile" connection.

The key issue concerning advanced service connectivity for many communities is the high service costs associated with distance sensitive pricing because of existing tariffs. However, even if the issue of high tariffs is solved, congestion on existing fiber optics may hinder deployment. While cable networks exist as inefficient, expensive high speed Internet paths, fixed wireless, *Multipoint Microwave Distribution System* (MMDS), and satellite technologies could prove to be less expensive alternatives.

Texas' Deployment Efforts: A Step Backward?

In order to encourage broadband deployment, numerous State and local solutions have been proposed. For deployment to rural areas, pro-competition and pro-investment public policy has been encouraged with local level solutions seen as the most effective approach. Specific policy alternatives to encourage deployment include expanded data collection activities, demand aggregation, anchor tenancy, and community networks. Additionally, broadband deployment has been encouraged through the proposed use of economic development funds for rural telecommunications infrastructure investment, including the allocation of community development block grants. A third manner in which broadband deployment could be made more feasible is for local governments to provide tax incentives to providers in exchange for advanced services deployment.

One of the most important programs for increased connectivity for rural and under-served Texans across the state was the Texas *Telecommunications Infrastructure Fund* (TIF). The TIF Program was established in 1995 to promote the deployment of equipment and telecommunications infrastructure for distance learning, information sharing programs of libraries, and telemedicine services.[36] The TIF initiative helped Texas to strategically deploy superior telecommunications infrastructure to rural communities by inspiring scaleable and universal connectivity for public libraries, institutions of higher education, public schools, and non-profit healthcare facilities. One of the principal goals of TIF was to make available high-speed Internet, at a minimum of 1 gigabit per second connection, to each Texas household, school, university, medical facility and library by the year 2010. In its first five years, TIF awarded 36 grants to small Texas communities which collaborate to obtain telecommunications resources and access. TIF awards included:

- more than $21 million to enhance current or establish new healthcare services through the purchase of telecommunications equipment;

- more than $20 million to establish local area networks connected to the Internet and to purchase telemedicine equipment to provide clinical services for direct patient care;

- more than $9 million to enhance patient care by improving distance learning facilities; and

- more than $3 million to enhance local health departments' ability to enhance and/or provide public access to medical information and services.

The goals of the Texas Infrastructure Fund not only impacted the state positively, but helped to influence different aspects in various community services and further economic development.

In order for Texas to be a leader in the global society, the state must step up, maintain, and improve programs such as the TIF. Nevertheless, the TIF program was terminated by Governor Perry and closed out by the Texas Workforce Commission on August 31, 2005.[37]

Public/private sector deployment initiatives also have been enacted in Texas, although these too have recently stalled in some instances.

The first of these was *Project Pronto.* This project, launched in 1999, was an initiative of the Southwestern Bell Corporation (SBC) and was aimed at serving more broadband customers in its 13-state service area, including Texas. The principal goal of this project was to push fiber deep into residential neighborhoods and quadruple DSL deployment.[38] However, in 2001, the telecom industry began to retreat from broadband expansion, focusing instead on selling services to customers whose neighborhoods were already equipped for it.[39] SBC, in the same year, announced it was halting *Project Pronto*, blaming the decision on an industry downturn and unfavorable regulations requiring it to share its networks with rivals at a discount.[40]

Other incumbent local exchange carriers (ILECs) such as Sprint, Valor -- and smaller carriers such as independent phone companies and co-ops -- have started their own projects promoting advanced telecom services. The *Greater Austin Area Telecommunications Network* (GAATN) is also a public/private ownership model that demonstrates Texas organizations can construct, fund, and manage optical network solutions of a medium-scale.[41] This has been an important model for different aspects of statewide architecture.

In instances where the difficulty to deploy broadband to entire communities exists, the government could allow for private access to the TEX-AN 2000 infrastructure.[42] TEX-AN 2000 is a project by the Telecommunications Services Division (TSD) of the Texas Department of Information Resources (DIR), where TSD provides telecommunications services to state agencies and other eligible entities, such as cities, municipalities, counties, education service centers, independent school districts, and higher education.[43] This proposal is most feasible when other deployment efforts for expanding broadband are unsuccessful, such as demand aggregation or anchor tenancy in communities of 5,000 or fewer, and when a private entity commits to bear a portion of the cost.

Another possible manner in which to provide advanced services to rural communities is to allow rural municipal governments to build their own telecommunications infrastructure. Even though this is possible, a law prohibiting local governments and municipal authorities is currently in place. A more focused and efficient manner in which to address this issue is to place accountability into one agency, therefore it would enhance statewide telecommunications strategic planning.

After initial connectivity is established, Texas must work to encourage broad advanced services deployment. Different allowances have been made in Texas policy order to help move forward high-speed Internet use.

- One example of Texas policy is a program that allows distance learning and information sharing programs to receive reduced rates from ILECs.

- A second is the development of a Rural Development Task Force; this task force works on issues such as economics, business and industry growth, water quality and availability,

access to technology, transportation, and overall community development. Task force members explore and deal with access to telecommunications services in the State.

- A third Texas policy that encourages broadband is the Finance and Agribusiness Development Division of the Texas Department of Agriculture. This division is devoted to the issue of economic development by increasing rural and agribusiness opportunities. These programs help to develop rural communities wanting to enhance their telecommunications infrastructures.

- Another Texas policy is Senate Bill 560, which states that any telecommunications company that supplies advanced services within inner-city service areas of Texas must also make services available to rural areas with comparable prices and terms within fifteen months of serving the initial community.

New Creative Solutions

- 100 Laptops
- Laptops & Wireless as part of Mortgage Loan
- Broadband in Philly
- Downtown EP Wireless for one mile (interview Joyce Wilson).

Beyond Connectivity

Connection to the Internet is not the final goal, but only the first step in a strategic process of utilizing advanced technologies to serve communities. There are various applications that would serve Border residents and businesses by providing access to information and services not otherwise accessible. Most notably, Border residents, living miles away from urban areas with advanced medical expertise and miles away from specialized workforce training facilities, with access to high-speed broadband technologies, could utilize telemedicine and workforce training applications to gain access to these otherwise hard to access services.

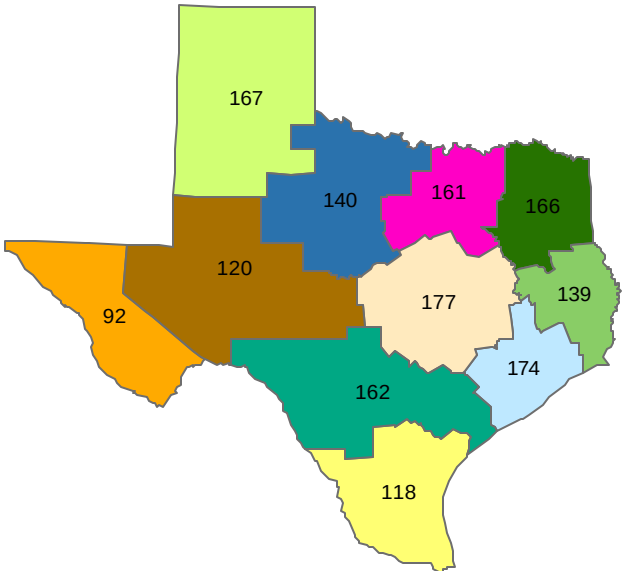
Telemedicine

Telemedicine is a form of medicine that will be of great use to communities who are ready to accommodate the technology.[44] Telemedicine uses technology to allow physicians to treat patients who are geographically too far away for face to face treatment.[45] Patients can be treated by remote specialists at local medical facilities, or can have virtual home visits through Internet technology.

Moreover, where doctors are advised to ask patients about their home life, telemedicine allows physicians to treat illnesses in their personal, social, and family context. Health Partners in Minnesota and Kaiser Permanente in Northern California used telemedicine to connect patients in rural areas; and, based on a survey of 200 patients, there are projections that home visits through telemedicine provided a business savings of 30 percent.[46]

Just as telemedicine is benefiting the hard to serve residents of rural California, it would greatly benefit the Texas Border communities that suffer from a horribly low doctor to patient ratio. As shown in the chart *Physicians per 100,000 Population in Texas Regions in 2001*, next page, Texas has fewer physicians at 160 per 100,000 people than the national average of 221. Further, Texas has fewer physicians than the ten most populous states, which average 199 physicians per 100,000 people.

Physicians per 100,000 Population in Texas Regions, 2001



Source: Texas State Data Center, Texas Department of Health, & Texas State Board of Medical Examiners; Bureau of Health Professions (2001).

A lack of doctors in the Region leads one to recognize the greater need for telemedicine than more urban, more affluent communities who have adequate access to healthcare. Yet, it is the more urban, more affluent communities that have access to the technology necessary to utilize telemedicine.

Telemedicine requires a high-speed Internet connection because it is crucial that the images being sent to physicians are sharp. Rural areas must have the necessary infrastructure to make use of the advantages of telemedicine. The American Telemedicine Association believes that, in time, broader bandwidth technology will meet the required demand of medical facilities, but currently, many facilities utilize dedicated high-speed connections, such as T1's.

There are examples of how telemedicine is already providing a cost effective way to provide healthcare in Texas. The Texas Department of Justice treats 130,000 inmates through the University of Texas Medical Branch on Galveston Island[47] and Texas Tech Health Science Center in Lubbock.[48] Before the use of telemedicine, inmates had to travel an average distance of between 200 to 300 miles for care one way or as much as 850 miles to get to and from the necessary medical expertise. If the State of Texas can serve the needs of the inmates, we must demand that the needs of our Border residents are served as well.

Workforce Development/Training

As businesses become more dependent on technology and the Internet to increase productivity it will become more important to train workers on how to use advanced technology. Providing infrastructure and technology to rural and low income communities is only the beginning. People must be able to use technology in order to benefit from it. Efforts, like the ones described earlier, to bring computer training to communities is a vital part of bridging the digital divide.

Innovative technology-based workforce training programs should be developed and implemented to meet the Border's unique needs. One example of such a program is El Paso's *Frontier of the Americas* (FOA) technology training program, a collaboration between the SBC Foundation, the El Paso Area Library Consortium (EPAL) and People Skills, Inc.[49] The Frontier of the Americas Program's main goal is to bridge the digital divide along the Texas-Mexico Border Region of El Paso by creating laptop lending libraries configured with Internet access and online training for disadvantaged communities.[50] By improving computer literacy in the El Paso region, the gap between the "information rich," those with higher-than-average incomes and levels of education, and the "information poor," those who are younger and have lower incomes and education levels living in rural areas or central cities, can be significantly reduced.

Another program improving workforce development, *e-learning*, has become a popular, established method of delivering training and allows the employer to serve thousands of employees in hundreds of locations with fewer resources than traditional classroom training. Additionally, the training can be better focused to specific situations and relevant timings, increasing retention rates. Although still in its infancy, it is predicted that *e-learning* will be the fourth-most used Internet application by 2005, exceeded only by Web infrastructure, e-mail, and search applications.[51]

Frontier of the Americas: basic computer class certificate recipients at the Ysleta Library branch (July 12, 2005).

Again, however, if the Border Region does not obtain greater accessibility, *e-learning* will not be an available resource for Border businesses and residents.

After Connectivity

The Internet is changing the way businesses are run. It is becoming an everyday part of the workplace, meaning businesses will move where the infrastructure available for high-speed Internet, bringing jobs where the technology is available. Communities who are not connected will lose their ability to lure businesses to the area.

Technology and high-speed Internet will continue to become more advanced. The type of broadband necessary for HDTV is on the horizon. Furthermore, Internet access will be available in far more than computers. We are already seeing the Internet being accessible in cell phones and pagers. Currently, Electrolux, a company known for making vacuum cleaners has developed the ScreenFridge, a refrigerator with Internet capability. The refrigerator will allow family members to communicate with each other through video messaging while allowing for communication to the outside world with e-mail. The refrigerator provides information on how to manage and prepare food. This is just one example of how technology is being integrated into everyday life, proving that if the digital divide is not bridged, the gap between those who are connected and those who are not will only grow.

Educational Technology

According to the Texas Comptroller, as many as 43 percent of people aged 25 or older living in the 14 counties adjacent to the Border do not have high school diplomas.[52] The chart on the next page, *Educational Attainment in Texas*, shows the disparity between the Border counties and the rest of Texas.[53]

Educational Attainment in Texas

	Most Recent Year	14 County Actual Border Region	32 County Sub-border (La Paz) Region	43 County South Texas Border Region	Texas	221 County Non-border Region
Percent of population 25 years and over with:						
Some college education, but no degree	2000	17.6%	17.5%	20.7%	22.4%	22.7%
Bachelors degree	2000	9.3%	9.1%	11.2%	15.6%	16.6%
Postgraduate degree	2000	5%	4.9%	6.3%	7.6%	7.9%
Associate degree	2000	4.1%	4%	4.9%	5.2%	5.3%
No high school diploma	2000	43.2%	43.2%	33.6%	24.3%	22.2%

Source: *The Border: Snapshot*. Texas Comptroller of Public Accounts.

For today's students, learning and developing advanced technology related skills is no longer an elective, but a necessity. Every aspect of higher education and the workforce requires that our youth understand and are adept at technology. Whether a college student must know how to perform Internet based research and use a word processor for term papers or a young employee must know how to use email to communicate with a supervisor, tomorrow's high school graduates must leave Texas schools with a functioning use of computers and related technology. A Harris poll found that 74 percent of American adults are now accessing the

Internet,[54] and, as Internet penetration rises, those without the basic skills to get on-line will be left behind, both economically and socially.

Leaders in Texas, recognizing the important role that technology plays in the education process have begun, albeit slowly, to develop programs to assist students and educators. A one-on-one wireless laptop environment increases attendance, class participation, and achievement rates; decreases dropout rates; and stimulates students' quest for knowledge. Given this overwhelming promise, the 78th Legislature established, with the passage of S.B. 396, a Technology Immersion Pilot Program, in which as many as five school districts will participate with all or a portion of students at pilot schools receiving laptop computers to use full time.[55]

Senate Bill 396: The Texas Technology Immersion Pilot Project

Currently Texas' school children are not all moving successfully through the preschool-through-16 education pipeline towards guaranteed admission to an institution of higher learning.[56] The state cannot continue its current methods of delivering an education to its increasingly diverse population and expect to produce high numbers of college-ready students. Algebra pass rates, high school dropout rates, and the percent of Texans entering institutions of higher education all support this claim.[57]

Technology offers significant promise for removing many barriers and increasing students' opportunity to learn, as evidenced by recent breakthroughs in neuroscience and brain plasticity research.[58] The old model of having computer labs is not cost effective, takes up valuable space, and is generally not focused on teaching the critical technical and analytical skills required in the 21st century work environment. A 1:1 wireless laptop environment has proved to have a meaningful impact on students' success in the following ways: attendance increases, class participation and achievement increases, drop-out rate decreases, and the use of technology stimulates students' inherent thirst for knowledge.[59]

In the 78th Texas Legislature, Senator Shapleigh filed S.B. 396, which directed the Texas Education Agency (TEA) to establish a Technology Immersion Pilot (TIP) Project. Depending on available funding, all or a portion of students at pilot schools would each receive a laptop computer. S.B. 396 further provided for the establishment of teams in participating districts to oversee the pilot program, and for an evaluation of the program at its end.

In order to implement S.B. 396, the TEA applied for a grant from the United States Department of Education called the Evaluating State Educational Technology Programs Grant.[60] In October 2003, the project was funded with $12 million from the federal Title II grant.[61] Shortly thereafter, TEA chose 13 schools to participate in the pilot program, including Hillcrest Middle School from Ysleta ISD.[62] Under S.B. 396, these schools had computers in the hands of students by the start of the 2004 school year.[63]

But more work is needed to make technology effective in the classroom. Putting computers in the classroom must be accompanied by a concerted state effort to provide training and technical support to students, educators and parents. That is why S.B. 699, passed in the 78th Regular Session, established an education portal for Texas

An education portal directs parents, teachers, and students to resources that will stimulate learning and make the education process more effective. S.B. 699 directed the TEA, with assistance from the Department of Information Resources and the Texas Higher Education Coordinating Board, to establish and maintain an education Internet portal for use by school districts, teachers, parents, and students. The goal of the education portal is to eliminate impediments that prevent school-aged children in Texas from successfully progressing through the pre-school through grade 16 education pipeline. The portal provides a single point of access for educational resources, especially interactive tools that are aimed at alleviating inequities in access to education.

Another prolific use of technology in education is the growth of distance learning applications. Distance learning is the separation of teacher and learner by space and/or time. It changes the learning relationship from the common, centralized school model to a more decentralized flexible model. The most popular methods of distance learning are computer-based communication technologies such as e-mail, bulletin board systems (BBS), and the Internet. Also, distance learning can be conducted by telephone based audio-conferencing and video conferencing with either one or two way video.

Distance learning courses can be most useful in the small rural school districts or in the underserved urban school districts. There are secondary schools in these districts that allow students to take courses via distance learning in order to meet graduation requirements which their own districts cannot offer. Normally, students of high talent and ability are selected to participate in distance learning classes because of the self-motivation and independence that is required from the students. Distance learning, which can offer a great deal to students who live too far away from a school, require advanced service access, of which there is very little of in the Border Region. Thus, the great benefits that distance learning applications could provide to Border students, are not widely accessible as of yet.

There are innovations of distance learning programs occurring in the Texas Border Region. One model example of a successful distance learning program is the El Paso Independent School District (EPISD) program. This program, which broadcasts educational programming through the local cable station, has been successfully educating hard to serve students for almost ten years. The EPISD Distance Learning Television Studio plays approximately 17 hours of educational programs per week on cable Channel 14 in the El Paso area. The various programs include: computer training programs, science and math programs, and shows that feature student discussions that are designed to promote positive behavior. This award winning educational project was started in 1995, has an annual budget of about $160,000, and has proven to be quite successful; a recent Time Warner study showed that 56 percent of all EPISD students have watched the programs on the channel. Programs such as the EPISD Distance Learning Television Studio use technology to provide learning opportunities to otherwise hard to serve students. Technology provides an avenue to education.

To end the cycle of poverty in the Texas Border Region and help communities prosper, it is imperative that advanced technologies become accessible for the government entities, businesses, residents and students living there. Texas' border has consistently suffered from low

incomes, low educational attainment, and high poverty; while the Internet alone is not the answer to solving these issues, joining the rest of the State in the information revolution will be a great boon for creating a more stable and prosperous economy and environment. It is imperative that the State work with technology providers to strategically provide services to the Border. The PUC, in a report to the 78th Legislature, laid out several broad goals for expanding services to hard to serve communities, like those on the Border.

- Establish a Statewide goal for widespread Broadband deployment.
- Explore New Deployment Models, such as Demand Aggregation and Anchor.
- Provide Education and Training to Increase Computer.
- Provide Economic and Tax Incentives to Spur Deployment of Broadband Infrastructure.

It is imperative that State and Local leaders integrate this agenda into policy decisions in order to meet the goal set out in 1995 of ensuring that customers in all regions of this state, including low-income customers and customers in rural and high cost areas, have access to telecommunications and information services (PURU).

[1] University of Texas-El Paso Institute for Policy and Economic Development (IPED), *At the Cross Roads: US/Mexico Border Counties in Transition* (Technical Report 2006-1, March 2006), available online at http://digitalcommons.utep.edu/iped_techrep/27/. Last visited July 24, 2006.

[2] *Id.*

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[4] Texas Online Authority, *TexasOnline 2004 Status Report: Progress and Efficiencies Gained* (September 1, 2004), available at http://www.dir.state.tx.us/pubs/txo/2004status/index.htm Last visited July 24, 2006.

[5] *Id.*

[6] *Id.*

[7] *Id.*

[8] *Id.*

[9] U.S. Census Bureau, *Quarterly Retail E-Commerce Sales 1st Quarter 2006* (May 18, 2006), available at http://www.census.gov/mrts/www/data/html/06Q1.html. Last visited July 24, 2006.

[10] *Id.*

[11] United States Department of Commerce, Census Bureau, *E-Stats: Measuring the Electronic Economy* (May 25, 2006), available at http://www.census.gov/eos/www/papers/2004/2004reportfinal.pdf. Last visited July 24, 2006.

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[15] University of Texas El Paso Institute for Policy and Economic Development, *Technology report*, 2003

[16] PEW Internet and American Life Project, *Internet Use by Region in the United States, Regional variations in Internet use mirror differences in educational and income levels*, available at http://www.pewinternet.org/pdfs/PIP_Regional_Report_Aug_2003.pdf. Last visited June 7, 2004.

[17] IPED Technical Report 2003-9, *supra* note 13, at 1.

[18] *Id.*

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[22] *PUC Report to the 77th Texas Legislature*, *supra* note 19, at 25.

[23] IPED Technical Report 2003-9, s*upra* note 13.

[24] *PUC Report to the 77th Legislature*, *supra* note 19.

[25] Parker, Edwin P. and Heather E. Hudson, *Electronic Byways: State Policies for Rural Development Through Telecommunications* (1995).

[26] California Community Technology Policy Group. "California Community Technology Policy Group (CCTPG)." (June 1, 2004), available at http://www.cctpg.org/about.htm. Last visited July 30, 2006.

[27] TechNet, *The State Broadband Index: An Assessment of State Policies Impacting Broadband Deployment and Demand* (2003), available at http://mi.gov/documents/State_Broadband_Index_71282_7.pdf. Last visited July 25, 2006.

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[32] *Id.*

[33] Lone Star Broadband, available at http://www.lonestarbroadband.org/background/definition.htm. Last visited June 3, 2004.

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[35] *Id.*

[36] Public Utilities Commission of Texas, *Report to the 78th Texas Legislature: Scope of Competition in Telecommunications Markets of Texas*, 74 (January 2005), available at http://www.puc.state.tx.us/telecomm/reports/scope/2003/2003scope_tele.pdf. Last visited July 25, 2006.

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[39] *Id.*

[40] *SBC wants feds to lift restrictions for DSL; High-speed data service rivals say telecom giant trying to shut them out*, Sanford Nowlin, San Antonio Express-News (April 21, 2002).

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[42] *TEX-AN 2000: A Network and a Family of Contracts*, available at http://www.dir.state.tx.us/tex-an/. Last visited July 26, 2006.

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