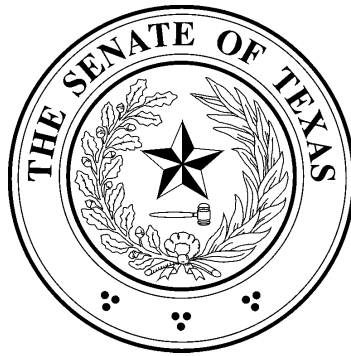# Texas Borderlands 2008

"Bridging the Digital Divide in the Texas Borderlands"
Technology

Texas Senator Eliot Shapleigh
District 29
El Paso, Texas
September 2008

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Over the last 30 years, technology advances have significantly affected the production industry and the economic environment in the United States.[1] 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.

If the Texas Border made up a "51st" state, the 43 Border counties would rank dead last in the U.S. in per capita income. Without the Border counties, Texas would rank 22nd in the nation.[2] In terms of schoolchildren in poverty and the unemployment rate, the Texas Border would rank first nationally.[3] Bridging the digital divide—the gap in access to and education in technology—is a significant factor in the Border's economic challenges. 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 Texas Border 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 spread of high-speed Internet, will continue to benefit more people and more communities. With the proliferation of Internet-based services, governments and businesses are able to reach more people and operate more efficiently and effectively.
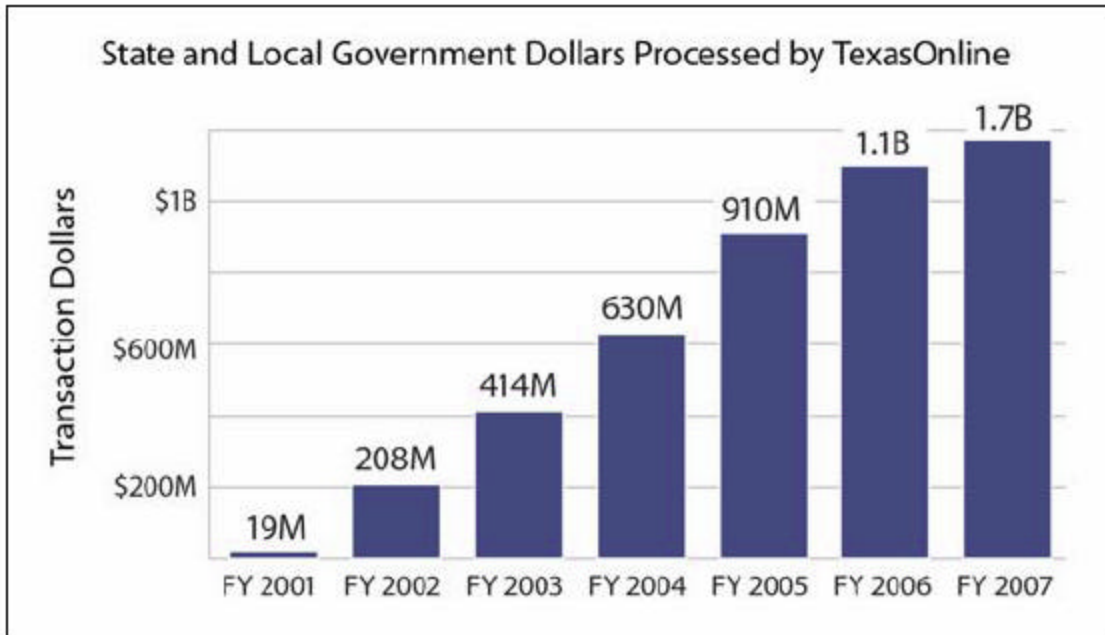
E-government

Local, state, and federal government entities recognize that through the use of technology they can offer broader and more efficient government technologies.[4] In August 2000, the State of Texas launched its official e-government site for state and local government business.[5] The site resulted from Senate Bill 974 of the 76th Legislature, which required an Internet-based system for governments to make payments and review documents.[6] The site, TexasOnline, reaches across state agencies, links municipalities, counties, courts, and universities, and is projected to generate between $12 and $14 million in revenue for the state in the 2010-11 biennium.[7]

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. In 2006, Brown University's Taubman Center for Public Policy ranked Texas number one in terms of the number of state services accessible by the

Internet.[8] At the time, TexasOnline offered more than 500 services online. Today, that number is over 800.[9]

Since its inception, TexasOnline has collected over $7 billion dollars in state and local government revenue.[10] The chart on the following page shows the incredible growth in state and local government dollars processed by TexasOnline.

State and Local Government Dollars Processed by TexasOnline

| Fiscal Year	Transaction Dollars
FY 2001	19M
FY 2002	208M
FY 2003	414M
FY 2004	630M
FY 2005	910M
FY 2006	1.1B
FY 2007	1.7B

Source: DIR[11]

When the portal was launched in August 2000, it received less than 25,000 visits monthly.[12] By June 2008, however, it received over two million visits each month.[13] The chart on the following page, *Number of Monthly Visits to TexasOnline*, illustrates this growth.

Number of Monthly Visits to TexasOnline
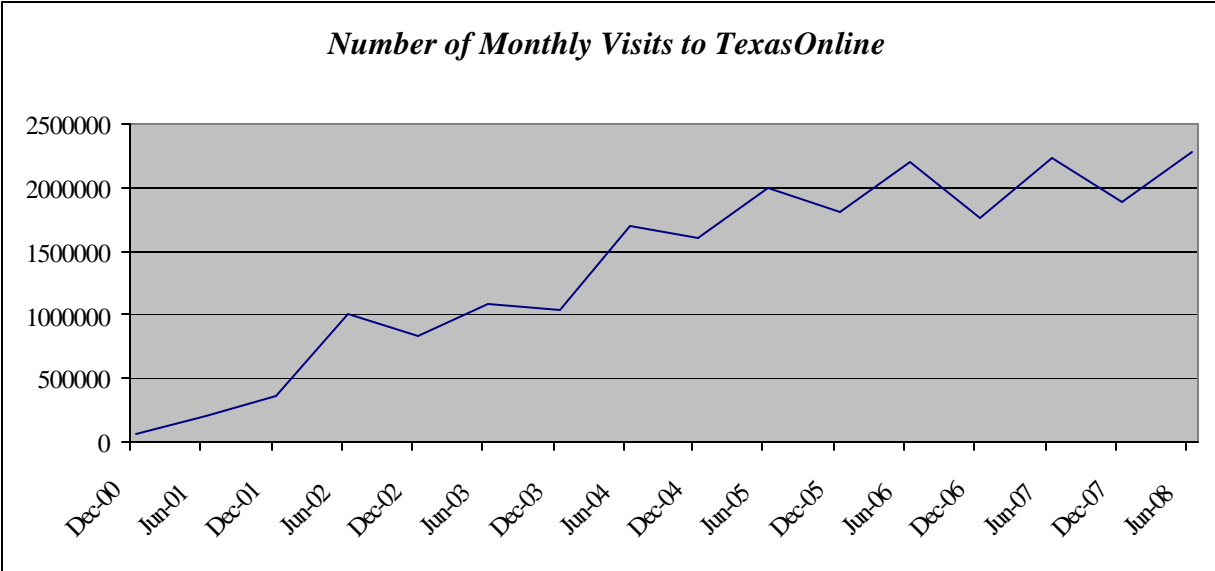
Additionally, when measuring the success of the portal, TexasOnline analyzes the number of transactions completed through the portal. Again, the growing number of transactions indicate that Texans are using the portal to complete various administrative tasks, as opposed to traveling to State agencies and conducting their business in person. The chart below, *Number of Transactions Completed Through TexasOnline*, shows that since the site's launch in December 2000, business transactions increased exponentially up to over 1.5 million in the month of June 2008.[15]

Number of Transactions Completed Through TexasOnline
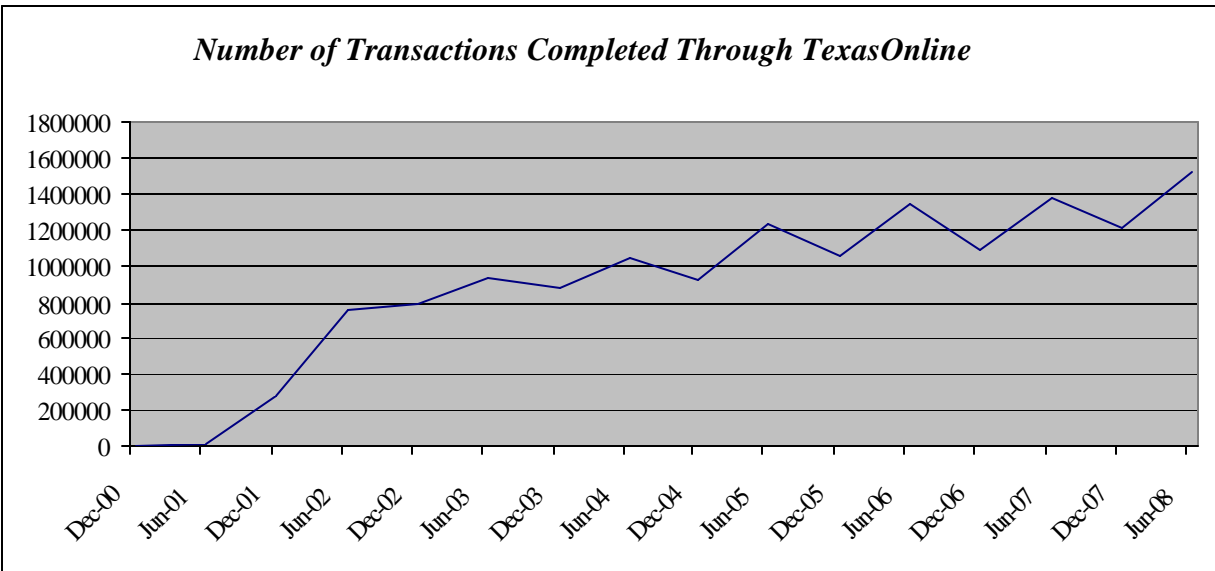
Texans that do not have access to TexasOnline must work harder and less efficiently to do business with the state. This inefficiency costs both the state and the citizen time, energy, and money. As e-government services become even more prolific and the traditional means of

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, with over a quarter of all Texans primarily speaking Spanish at home, the state must not leave those citizens behind.[17] 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 79th Legislative Session, Senate Bill 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.[18] This law took effect on September 1, 2005. As of August 2006, TexasOnline was the only state portal that provided full Spanish content.[19]

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 or other electronic systems.[20] 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 can equate to improved productivity, higher profits, and larger markets.

E-commerce has expanded rapidly over the past decade and this growth is forecasted to continue or even accelerate. In fact, e-commerce retail sales alone in the United States amounted to $33.8 billion in the first quarter of 2008, up 13.6 percent from the first quarter of 2007.[21] As the chart on the following page, *Quarterly U.S. Retail E-commerce Sales: 4th Quarter 1999 - 1st Quarter 2008*, clearly indicates, e-commerce is growing rapidly in the United States.

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)
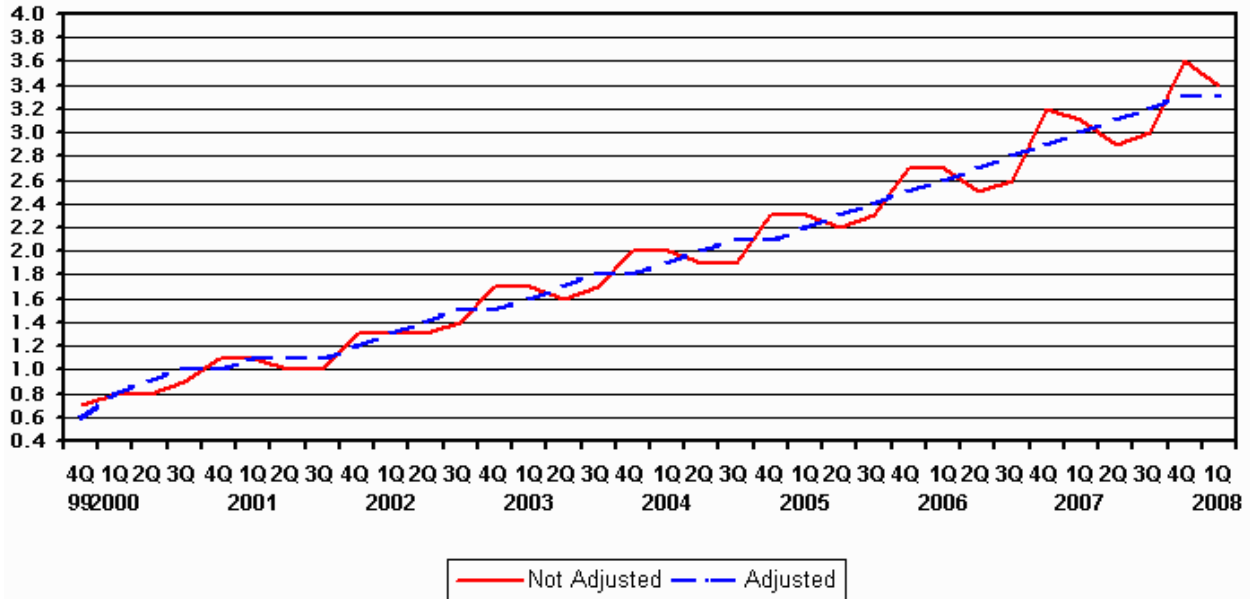
Source: U.S. Census Bureau[22]

The U.S. Census Bureau reported that in the first quarter of 2008 total e-commerce retail sales accounted for 3.3 percent of all retail sales, up from 1.9 percent in 2004.[23] While these percentages initially appear relatively insignificant, the Census Bureau notes that e-commerce grew faster than the total economic activity in all four major economic sectors measured by the department in 2006 - manufacturing, merchant wholesale trade, retail trade, and selected services.[24] The following graph, *E-commerce as Percent of Total Value: 2001-06*, illustrates the respective levels of e-commerce activity in each sector.

E-commerce as Percent of Total Value: 2001-06
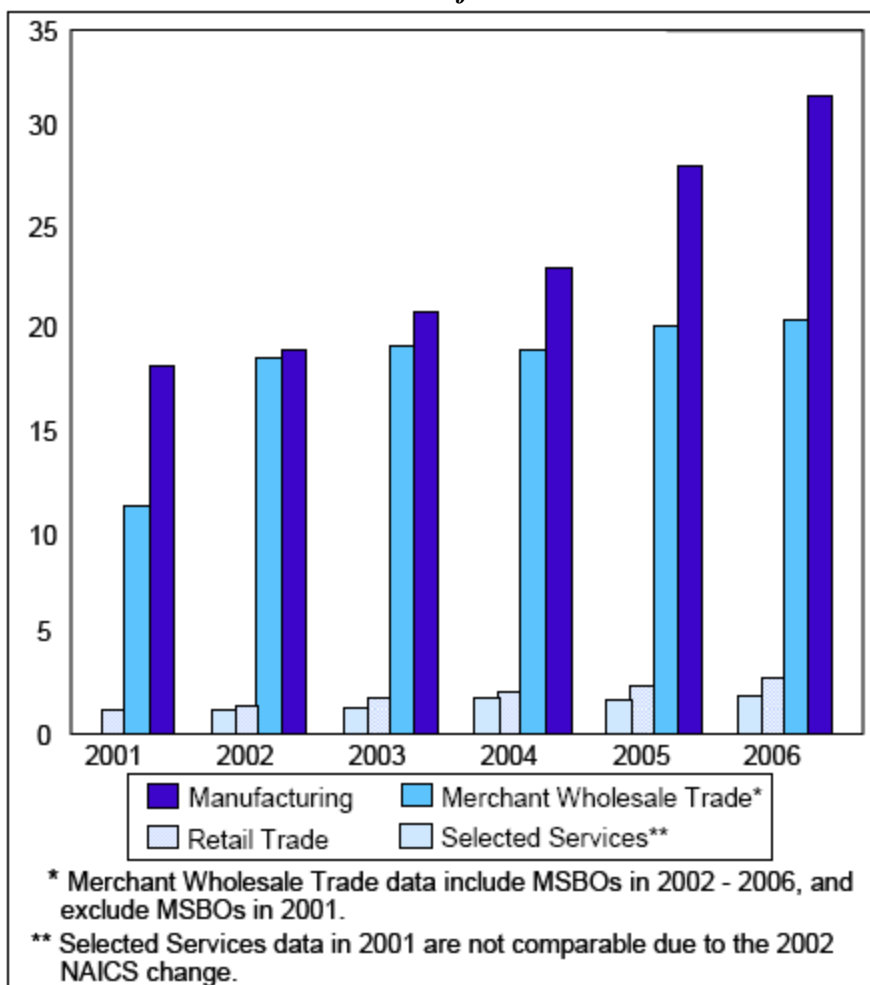
Source: U.S. Census Bureau[25]

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. As e-commerce practices grow and the boundary becomes more blurred, communities will lag economically where access to the Internet is not prolific and thus not used by consumers and businesses.

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 less of a concern, reduces the need for a prime location. Thus, a major factor in 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. However, this requires 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.[26]

To prevent the continued loss of jobs and economic generators, leaders must demonstrate to the business community that the Border region is a smart location in which to conduct business. Just several hundred miles away from the Border, Austin and the 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 increase the Border's economic stability. Local businesses and manufacturers must have access to broadband technology, effective opportunities for growth, and a growing, vibrant labor force. If manufacturers are to choose to locate, stay, and grow in the region, Border leaders must increase opportunities to use technology to expand and streamline operations. A strong and stable economy will develop.

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.

One-Stop Inspections: Moving People and Product in Minutes Not Hours

Technology can also help facilitate the movement of people, goods, and services across the U.S./Mexico border. Long waits at international border crossings affect the efficiency of commercial movement along our borders. In an attempt to shorten waiting periods, the "one stop" border concept was created. This idea combines inspection processes conducted by several federal and state agencies into one process. A "one stop" border inspection system would facilitate and expedite commercial traffic to and from the Border, improve efforts to keep the Border secure, and protect public health by decreasing pollution. Large amounts of vehicles idling during their wait to cross release a larger amount of pollution into the air.

Research shows that a one-stop system is feasible at a relatively low cost. Investing in the technology needed to combine various inspection protocols would be an important investment for Border cities like El Paso.[27] The bill creating the one stop inspection concept passed in the 76th Texas Legislature as Senate Bill 913.[28] The bill authorizes the Texas Department of Transportation to maintain and build the facilities necessary for a one stop inspection.

Combined, the El Paso ports of entry had over 28 million private vehicle crossings in 2006.[29] The construction of more adequately-staffed bridges would facilitate the flow of traffic

from Mexico coming into Texas. Additionally, secure manufacturing technology would facilitate expedited cross-border commercial traffic without the need of additional bridges. Secure manufacturing technology tracks the movement of trucks and their product from origin to destination and greatly reduces the volume of commercial traffic at the ports of entry.

Another program that assists fast, secure, smart transportation is the Fast and Secure Trade (FAST) system, which uses Radio Frequency Identification (RFID) technology. FAST lanes provide pre-clearance lanes for high-volume manufacturers and expedite U.S. Customs clearance along designated ports of entry. FAST lanes are used by low-risk travelers and allow inspection agencies to place their attention on cross-border traffic of higher or unknown risk.[30] Using similar technology, commuters have access to El Paso's designated commuter lanes.[31]

In addition, "smart cards," embedded with biometric identifiers, can be used to allow quick and reliable identification of trusted border citizens who pose no health or safety risk, allowing them to cross more quickly. Enhance driver's licenses (EDLs) are an example of a "smart card." The EDL program is modeled after Washington State's version, which improves crossing over the U.S./Canada Border. On March 23, 2007, the state of Washington established the high-security driver's license pilot program, which had been approved by U.S. Homeland Security Secretary Michael Chertoff.[32]

The Department of Homeland Security's endorsement of the EDL program comes as Border states prepare for new federal security requirements mandating a passport for U.S. citizens who enter the country at land ports. Given the impact the passport requirement has on border life, the Texas legislature passed Senate Bill 11 in 2007.[33] The bill authorizes the Department of Public Safety (DPS) to initiate a pilot program similar to the program in Washington. Under the new law, DPS may adopt rules to implement the program, and the department is authorized to enter into a memorandum of understanding with any federal agency for the purposes of facilitating the movement of people between Texas and Mexico.[34]

Currently, implementation of the Texas EDL program is opposed by Governor Rick Perry.[35] He has expressing concern that the EDL program may interfere with federal law, although the Department of Homeland Security has stated no conflict exists. Governor Perry has further stated that the State of Texas should primarily begin to work on securing the borders, then concentrate on the aspect of identification.[36] Regardless, EDLs would help secure the Border through more efficient monitoring and identification of Border travelers. The program also would afford border residents with a cost-effective alternative to purchasing a separate state drivers license and federal passport or passport card.

On a local level, El Paso County's Secure Border Trade Demonstration Project (SBTDP) utilizes the newest technologies available to increase the security and efficiency related to the movement of goods and people at the U.S.-Mexico border. Specifically, this project will equip 30 heavy-duty tractor-trailers with state-of-the-art intelligent transportation system devices to secure cargo and transmit key data into a central repository where the data will be analyzed by software agents to detect anomalies which may have comprised security of the protected cargo.[37]

At the core of the El Paso County SBTDP will be a unique software system and related network of technologies utilizing Intelligent Software Agents (ISAs). The ISAs will analyze and collaborate with each other to process vast amounts of wide ranging data which impact cargo movement. Such data is useful to truck operators and maquiladora owners and could be valuable to customs and other border officials. Utilizing an integrated hardware network that has been installed on vehicles and at predetermined load sites, the ISA software system will track cargo as it is loaded and transferred from its origin at the maquila plant, across the border, and on to its ultimate point of destination. It is important to note that the information analyzed from the actual border crossing will be only one part of the larger integrated cargo tracking effort.[38]

The El Paso County SBTDP is designed to meet the minimum needs of the maquila operators in the El Paso/Juarez region. As the largest concentration of maquila operators in the world, software and communication systems that are specifically adapted to meet the needs of local industries will help to insure their long term viability which is essential to the economic health of the region. The El Paso County SBTDP helps assure the region's continuing leadership role in the evolving international trade landscape and is the perfect test-bed for developing and applying technologies to ensure a secure maquiladora industry.[39]

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.[40]

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.[41]

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. While 1999's Senate Bill 560, also known as the Public Utilities Regulatory Act (PURU), did create a vision of a statewide Texas broadband backbone, this vision has yet to be fully achieved.[42]

Despite the vision articulated in PURU, many rural Texans and Texans living in hard-to-serve areas do not have ready access to high-speed information 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.[43]

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.[44] The graph on the following page, *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: UTEP[45]

12
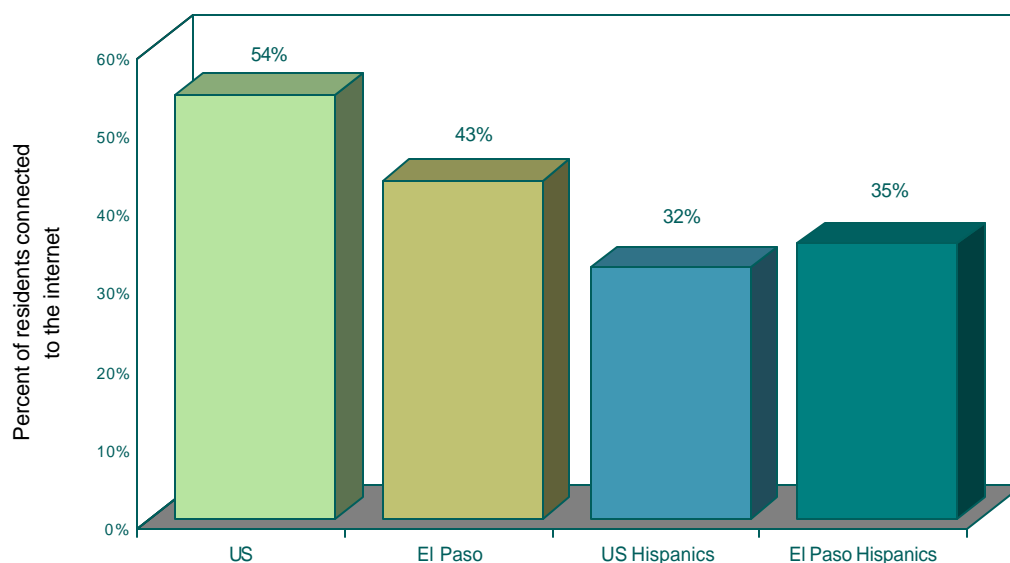
This failure in providing connectivity plagues communities throughout the Border Region, as the state is not investing the necessary funds to expand needed infrastructure to provide services to the Border. As the rest of Texas becomes increasingly more connected to the Internet with advanced services, Border communities struggle to get access to affordable dial-up services or much less advanced high-speed connections.

Disparities in Usage

The digital divide is not endemic to the Border region. According to the Pew Internet & 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.[46] These variances can be traced to, among other things, differences among the regions in income and education levels.[47] Those regions with a relatively wealthy and highly educated population are more likely to have a larger proportion of its population online.[48]

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, all factors that would indicate a low Internet penetration rate.[49] The table on the following page, *Internet Penetration by U.S. Region*, shows 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, Dallas, and Phoenix, it is clear that the Border counties counteract the high penetration levels of those cities to bring the average for the states 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 & American Life Project[50]

As discussed previously, despite the high statewide numbers, 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 Utility Commission, 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.[51] The graph on the next page, *Internet Usage by Race*, illustrates the percentages of Texans using the Internet.
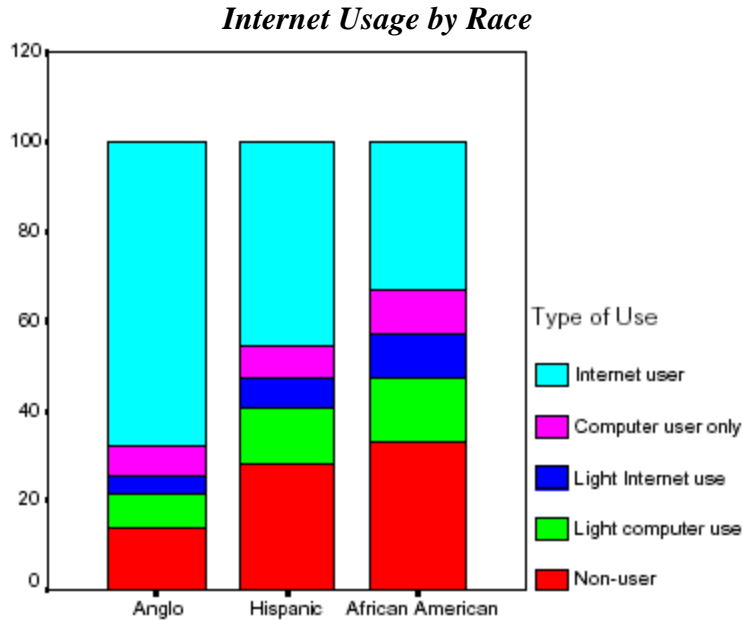
Internet Usage by Race

As income and education increase, so do computer and Internet usage.[53]   The charts 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 $40,000, however, 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.[54]

Internet Usage by Income Level
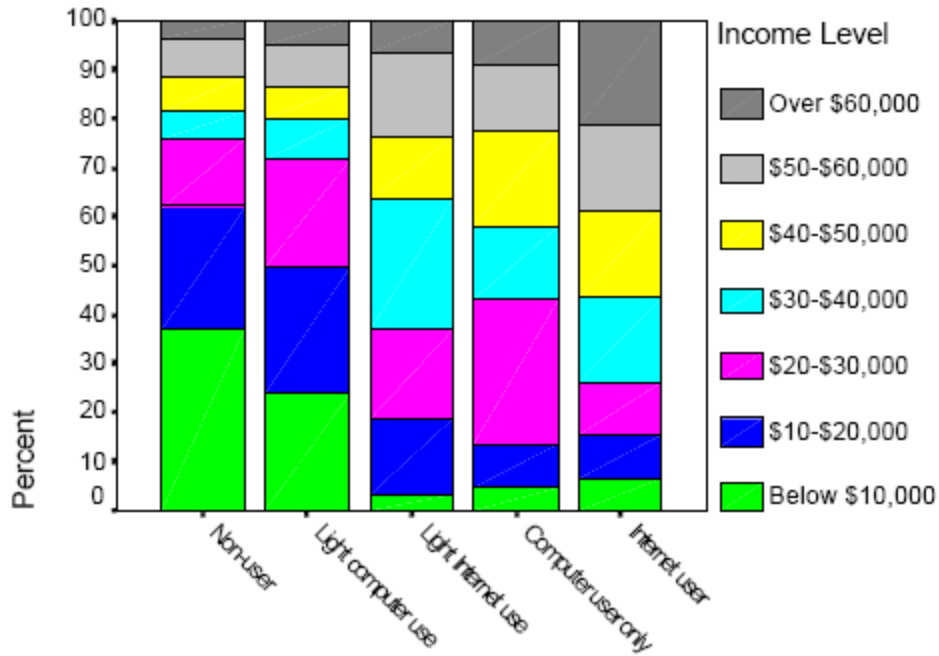
Source: PUC[55]

Internet Usage by Educational Level
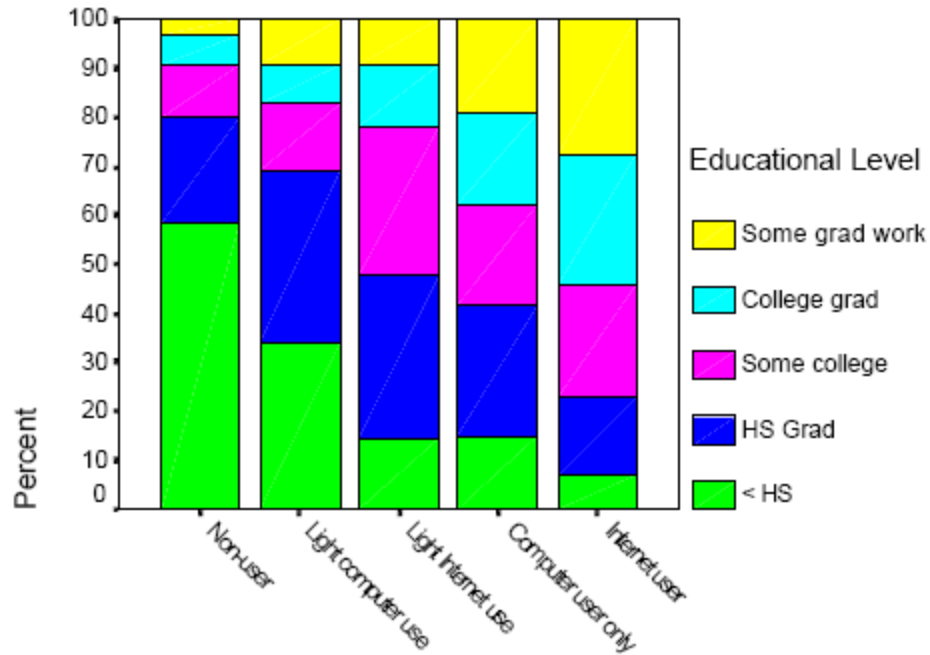
Source: PUC[56]

When deciding where to locate or whether to expand, companies and investors are sure to consider access to the Internet and advanced technologies. Thus, having access and usage levels that compete both with other parts of Texas and other states 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."[57] A critical community resource in today's economy is access to and usage of advanced services, including broadband and high-speed Internet services. The widespread use of advanced services would offer measurable economic development results for rural and Border communities.

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.

Statewide efforts

California Governor Arnold Schwarzenegger established the California Broadband Initiative on October 26, 2006 with the goals of removing barriers to broadband access and expansion and ensuring that all government agencies use the best technologies to serve the state's citizens.[58] Established by the Governor, the California Broadband Task Force issued its report on January 17, 2008.[59] The report contained seven main recommendations: build out high-speed broadband infrastructure for all Californians; develop model permitting standards and encourage collaboration among providers; increase the use and adoption of broadband and computer technology; engage and reward broadband innovation and research; create a statewide e-health network; leverage educational opportunities to increase broadband use; and continue state-level and statewide leadership. The Task Force's report stated that California's investment in broadband concentrate solely on physical infrastructure, but must instead include policies to increase the use of broadband technologies.[60] In terms of funding, the report proposed alternatives such as bond programs, grant programs, tax credits, and increased resources dedicated to broadband research and development.[61]

California also has the California Emerging Technology Fund. The Fund is a nonprofit organization established by the California Public Utilities Commission after the merger of SBC-AT&T and Verizon-MCI. Through the Fund, the companies have pledged to contribute $60 million over 5 years to advance broadband use.[62]

Another example of a state leader in its commitment to addressing the digital divide is the California Community Technology Policy Group (CCTPG). The group, with its representatives

from community-based and statewide organizations, advocates for policies that pledges to ensure that underserved communities acquire the benefits of technology.[63] CCTPG helps to document information and technology needs in underserved areas of the state through research and documentation projects.[64] CCTPG also offers legislative training materials to the public to help them navigate the legislative process and advocate for accessible and affordable access to technology.[65]

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, thus ranking first on TechNet's "State Broadband Index."[66] 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 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.[67]

Further, 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.[68] The SmartZone program organizes distinct geographical locations where technology firms, entrepreneurs, and researchers can locate in close proximity to helpful community assets.[69]

Local Efforts

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

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.[70] The organization currently has a number of projects throughout the country which aim to improve and develop community technology centers. For example, the Connections For Tomorrow program was a three-year capacity building project targeting centers working with homeless populations.[71] Providing over $2.2 million to 122 community technology centers, the program resulted in 5,192 hours of direct technical assistance.[72]

Some Texas Border communities are launching grassroots initiative to try to bridge the digital divide. In El Paso, the Orion Project is an initiative meant to address the need of providing Internet access to high quality content in a hard-to-serve community.[73] The Orion Project's vision is to " is to provide a community-wide infrastructure that transforms the models for delivering continuing and community education, and creates an advanced and flexible architecture for information access and resource sharing for the El Paso community that can be used to focus on specific community educational, health, training and economic development

needs."[74] 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.[75] Connectivity will be extended to "improve productivity through a shared, customized portal experience; easy access to information and familiar applications; improved communications; and a common delivery platform for shared applications."[76] Upper Rio Grande @ Work also recently teamed with the Orion Project and the Centro de Salud Familiar La Fe to create the Orion Computer Recycling Project. Started in January 2007, the project's goal is to transfer 5 percent of El Paso-area "orphaned" computers to qualified needy participants. Recipients will then be trained on basic computer skills.[77]

In addition, the El Paso community has the potential to leverage UTEP's participation in the National LambdaRail Project (NLR).[78] NLR is a consortium of leading U.S. research universities and private sector technology companies.[79] 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.[80] 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. UTEP is a part of the Lonestar Education And Research Network, a cooperative endeavor by 33 Texas colleges and universities to provide high-speed connectivity between the institutions and research networks across the country.[81]

El Paso also recently began an innovative program called Digital El Paso. Led by a collaboration of the City, County, El Paso Independent School District, and business partners, the program aims to "position El Paso as a leader in broadband strategy, stimulate economic development and achieve social inclusion by providing affordable wireless Internet access to all citizens."[82] The initial area of wireless Internet deployment is a 1.5 square mile area in El Paso's downtown area and Segundo Barrio.[83] The program also utilizes students at El Paso Community College to refurbish old computers, which are then donated to community centers for computer literacy training and eventual ownership by citizens.[84] Digital El Paso is thus a step toward increasing educational attainment and financial literary in the community through the use of affordable access to technology. The program hopes to ultimately stimulate economic development "as a more educated and tech-literate population begins to participate in the local economy."[85]

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.

Educational Technology

According to the U.S. Census, 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.[86] The chart on the next

page, *Educational Attainment in Texas*, shows the disparity between the Border counties and the rest of Texas.

Educational Attainment in Texas

Percent of population 25 years and over with:	Census Date	14 County Actual Border Region	32 County Sub-border (La Paz) Region	43 County South Texas Border Region	Texas	221 County Non-border Region
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: Texas Comptroller of Public Accounts[87]

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.

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. For example, the 78th Legislature established, with the passage of Senate Bill 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.[88]

Senate Bill 396: The Texas Technology Immersion Pilot Project

Technology offers significant promise for removing many barriers and increasing students' opportunity to learn. 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. In response, Senator Shapleigh filed and passed Senate Bill 396 during the 78th Texas Legislature.[89] The bill directed the Texas Education Agency (TEA) to establish the Technology Immersion Pilot (TIP). Depending on available funding, all or a portion of students at pilot schools would each receive a laptop computer for use at school and home. The bill 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.[90]

In order to implement the TIP, TEA used over $20 million in federal funds to fund the technology immersion projects in high-need middle school programs through a competitive grant

process.[91] The program began operating in the 2004-05 school year, and evaluation of the programs' results support the idea that technology immersion is a successful approach to delivering educational materials in the 21st century. Among the major findings released in a 2008 report are:

- Teachers participating in TIP grew in technology proficiency and in their use of technology for professional productivity at significantly faster rates than other teachers;
- Laptop computers and digital resources have allowed students in technology immersion schools to experience more intellectually demanding work;
- Technology immersion significantly increased students' technology proficiency and reduced the proficiency gap between economically advantaged and disadvantaged students; and
- Students who had greater access to laptops and used laptops for learning to a greater extent, especially outside of school, had significantly higher TAKS reading and mathematics scores.[92]

One-to-One Computing

Other worldwide initiatives have been developed in recent years to help address technological and educational disparities. For example, the non-profit One Laptop Per Child (OLPC) project aims to help address the lack of educational opportunities for many children in the developing world.[93] As the name of the initiative suggests, the mission is to provide a laptop—specifically a device called the XO laptop to children in impoverished regions throughout the world. OLPC's mission statement explains the goal further, stating that it "sees children in even the most remote regions of the globe being given the opportunity to tap into their own potential, to be exposed to a whole world of ideas, and to contribute to a more productive and saner world community."[94]

While the project has fallen short of its initial ambitious goals, it has still made an impact on the industry and children throughout the world.[95] Many other companies have taken OLPC's concept and developed low-cost "sub-laptops" that have been purchased throughout the Western world, thus providing an option for families that might not be able to afford a more expensive computer. Initiatives such as OLPC must be repeated on the state and local level in the U.S. to help bridge the digital divide.

Broadband Deployment In Texas

As Internet usage becomes more widespread and 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 measured by "bandwidth."[96]

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, amongst others.[97] As illustrated in the charts below, *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 - 2007)

| Technology [2]	2000 Jun	2001 Jun	2002 Jun	2003 Jun	2004 Jun	2005 Jun	2005 Dec	2006 Jun	2006 Dec	2007 Jun
ADSL	951,583	2,693,834	5,101,493	7,675,114	11,398,199	16,316,309	19,515,483	22,584,255	25,412,883	27,516,171
SDSL and Traditional Wireline	758,594	1,088,066	1,186,680	1,215,713	1,407,121	898,468	878,973	948,134	1,030,698	1,028,654
SDSL	-	-	-	-	-	411,731	368,782	337,412	344,759	319,932
Traditional Wireline	-	-	-	-	-	486,737	510,191	610,722	685,939	708,722
Cable Modem	2,284,491	5,184,141	9,172,895	13,684,225	18,592,636	24,017,442	26,558,206	29,174,494	31,981,705	34,408,553
Fiber [3]	46,635	81,248	105,991	111,386	130,928	315,651	448,257	685,823	1,035,677	1,402,652
Satellite and Wireless	65,615	194,707	220,588	309,006	421,690	965,068	3,812,655	11,872,998	23,344,106	36,560,197
Satellite	-	-	-	-	-	376,837	426,928	495,365	571,980	668,803
Fixed Wireless	-	-	-	-	-	208,695	257,431	361,113	484,277	586,141
Mobile Wireless	-	-	-	-	-	379,536	3,128,296	11,016,520	22,287,849	35,305,253
Power Line and Other	-	-	-	-	-	4,872	4,571	5,208	4,776	5,420
Total Lines	4,106,918	9,241,996	15,787,647	22,995,444	31,950,574	42,517,810	51,218,145	65,270,912	82,809,845	100,921,647

Source: Federal Communications Commission[98]

Growth of High-Speed Lines Nationwide (2000-2007)
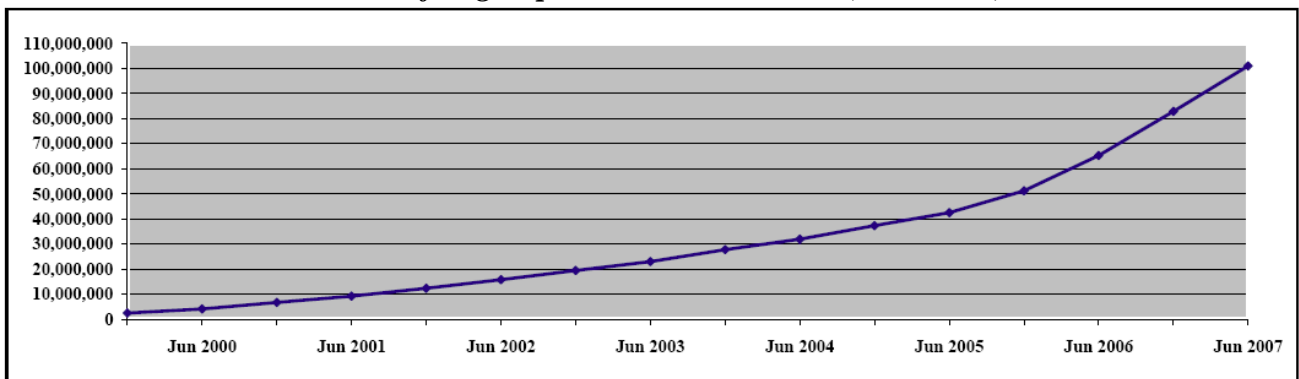
Source: Federal Communications Commission[99]

As the following chart, *Number of Broadband Subscribers in Texas (2000-2005),* shows, the number of broadband users in Texas has also increased dramatically.

***Number of Broadband Subscribers in Texas (2000-2005)***
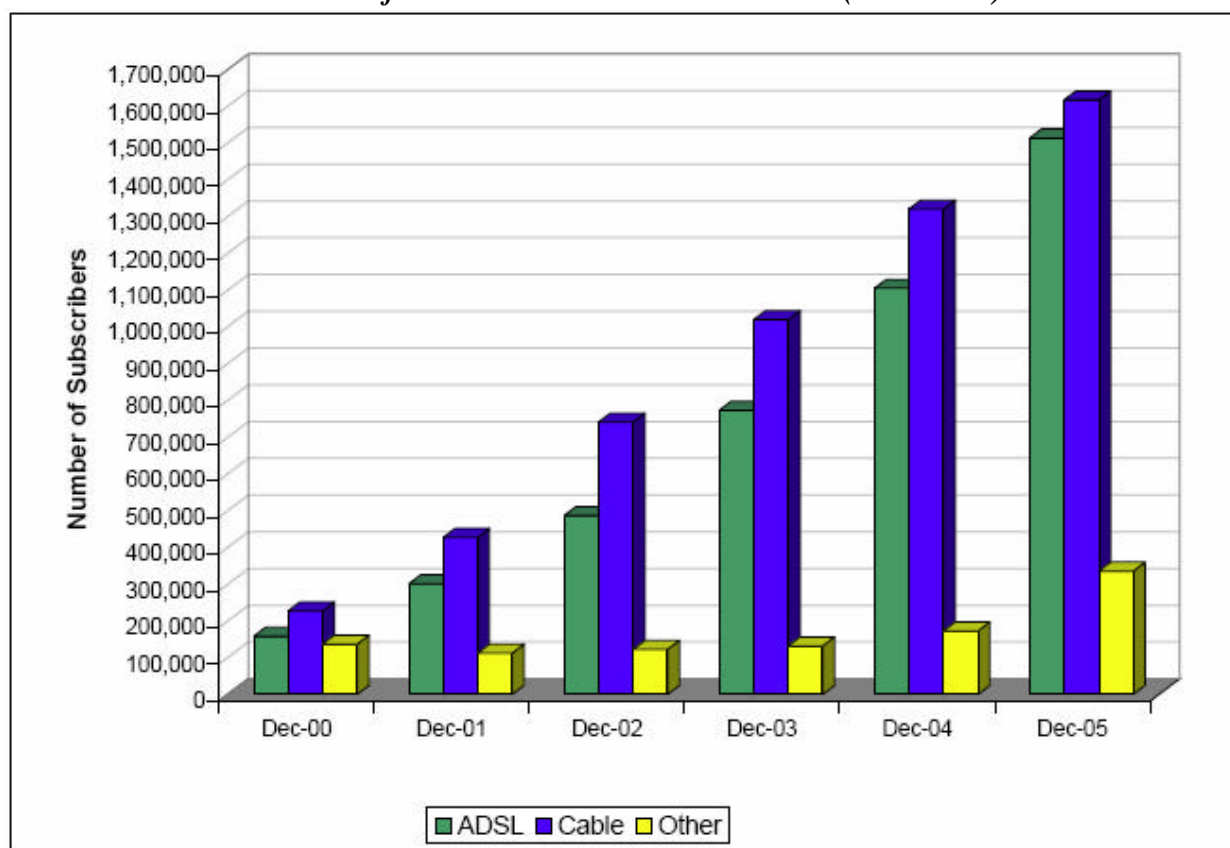
Source: PUC[100]

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.

In general, there are more broadband providers in counties with higher population densities.[101] In the Border Region, with generally lower population-density counties, broadband deployment is more limited, as shown on the map below, *Number of Broadband Providers per County as of June 2006.*

Number of Broadband Providers per County as of June 2006

■	10 to 19 (12)
■	6 to 10 (44)
■	3 to 6 (99)
☐	1 to 3 (78)
☐	0 to 0 (21)
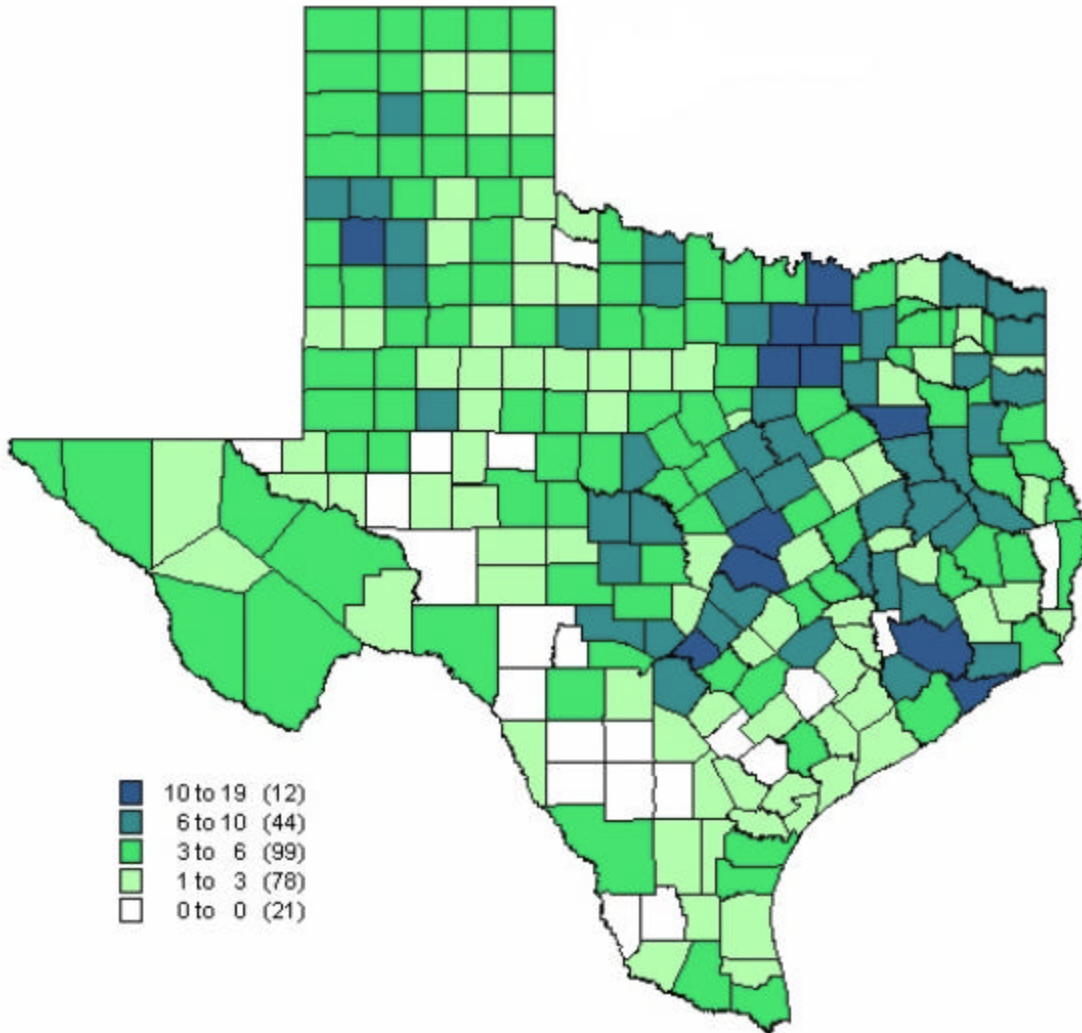
Source: PUC[102]

Barriers to Deployment

There are many high-speed deployment issues to consider that hamper the status of advanced Internet technologies in Texas.[103] 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 broadband Internet 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. and nation.[104] Utility companies claimed 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 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.

Another barrier to broadband deployment is the challenge of getting points of presence (PoP) locations along the network to or near rural communities.[105] PoPs, provide access points for Internet services, are either maintained or leased throughout service areas. A 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.[106]

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.[107] 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.[108] The Legislature then terminated the TIF tax in the 80th Legislative Session.[109] There are currently no state funds to help encourage broadband development.[110]

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 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.[111] 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.[112] 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.[113]

The Greater Austin Area Telecommunications Network is a public/private ownership model that demonstrates Texas organizations can construct, fund, and manage optical network solutions of a medium-scale.[114] This has been an important model for different aspects of statewide architecture by providing for the expansion of computer network facilities for the projects' participants.[115]

In instances where the difficulty to deploy broadband to entire communities exists, the government could allow for private access to the state's TEX-AN 2000 infrastructure.[116] TEX-AN 2000 is a project by the Texas Department of Information Resources that provides telecommunications services to state agencies and other eligible entities, such as cities, municipalities, counties, education service centers, independent school districts, and higher education.[117] 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.
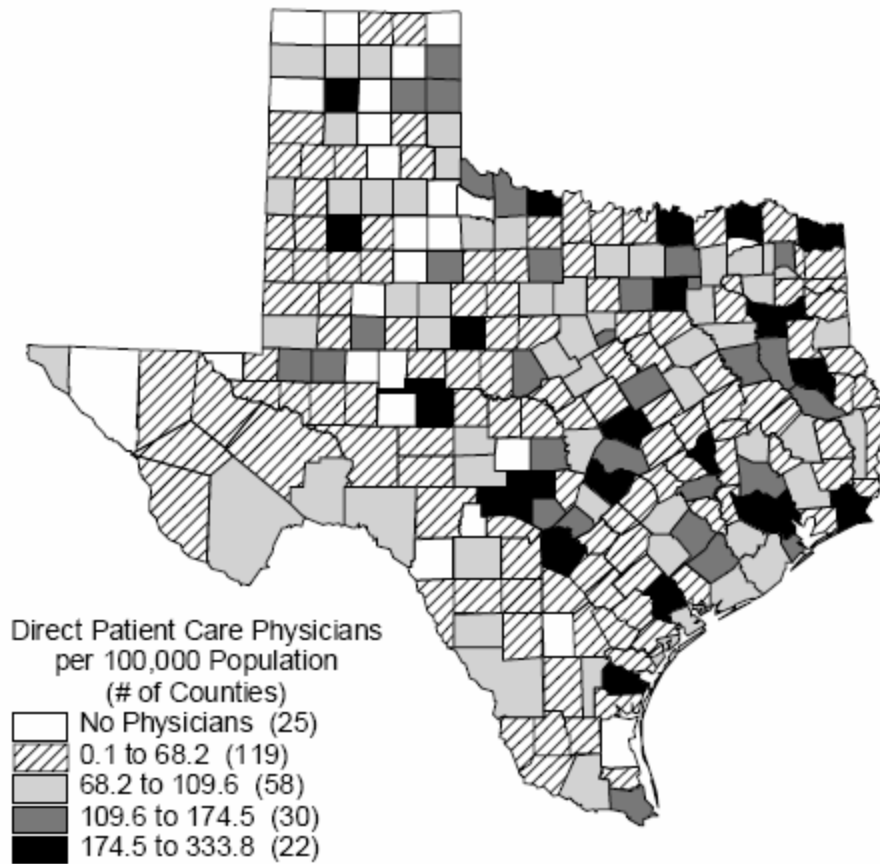
Beyond Connectivity

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 specialized workforce training facilities, 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.[118] Telemedicine uses technology to allow physicians to treat patients who are geographically too far away for face-to-face treatment.[119] Patients can be treated by remote specialists at local medical facilities or 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. Telemedicine even recently allowed Iraqi doctors to contact a network of worldwide experts to help them diagnose and treat patients.[120]

Just as telemedicine is benefiting the hard-to-serve areas of the world, it would greatly benefit the Texas Border communities that suffer from a horribly low doctor to patient ratio. As shown in the chart *Direct Patient Care Physicians per 100,000 Population, 2007*, Texas' Border counties all suffer from a lack of local physicians.

Direct Patient Care Physicians per 100,000 Population, 2007

Direct Patient Care Physicians
per 100,000 Population
(# of Counties)
No Physicians (25)
0.1 to 68.2 (119)
68.2 to 109.6 (58)
109.6 to 174.5 (30)
174.5 to 333.8 (22)

Source: Texas Department of State Health Services[121]

A shortage of doctors in the Border leads one to recognize the greater need for telemedicine than more urban, affluent communities who have greater access to healthcare. Yet, it is the more urban, 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.[122] Rural areas must have the necessary infrastructure to make use of the advantages of telemedicine.

There are examples of how telemedicine is already providing a cost effective way to provide healthcare in Texas. The Texas Department of Criminal Justice treats inmates through telemedicine services offered by the University of Texas Medical Branch and Texas Tech University Health Science Center (TTUHSC).[123] TTUHSC, for example, conducts more than 4,500 telemedicine visits a year for the 32,000 inmates housed prison units with which TTUHSC contracts. Prior to the use of telemedicine, many inmates in need of medical care were taken directly to visit a specialist or hospital, with each trip costing up to a $1,000. Telemedicine eliminated many of those trips and thus saves taxpayers thousands of dollars each year.[124] 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 becomes 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 as people must be able to use technology in order to benefit from it.

Innovative technology-based workforce training programs must 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.[125] 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.[126] 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.

Conclusion

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.[127] 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. Further, state and local leaders must integrate this agenda into policy decisions in order to meet the goal set out in 1999 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.[128]

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