San Joaquin Valley Regional Broadband Consortium

PRIMER

California Partnership for the
San Joaquin Valley

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Executive Summary

The San Joaquin Valley Regional Broadband Consortium (SJVRBC) is an initiative of the California Partnership for the San Joaquin Valley (Partnership) and is being administered by the Office of Community and Economic Development at Fresno State (OCED). The SJVRBC is comprised of key stakeholders committed to furthering regional deployment, accessibility, and adoption of broadband services in the eight-county region of the San Joaquin Valley, California.

The SJVRBC received funding from the California Public Utilities Commission (CPUC) to bring broadband infrastructure to unserved and underserved communities in the region, through the network of consortium members who were strategically chosen on the basis of prior experience with delivering networked telecommunications, digital literacy programming, and broadband advocacy.

The SJVRBC is comprised of members of the public and private sectors, including government, telecommunications providers and industry associations, economic development corporations and business development centers, local educational agencies and institutions of higher education; health delivery organizations, community-based and nonprofit organizations; and accessibility advocates.

It is the mission of the SJVRBC to enhance the region's quality of life and economic vitality by facilitating the deployment, accessibility, and utilization of broadband and information technology throughout the San Joaquin Valley, integrating it into 21st Century infrastructure. This goal will be achieved by successfully executing deliverables within the give major activity areas:

- Expedite the provision of broadband access in all areas of the San Joaquin Valley
- Promote accessibility and adoption of broadband in targeted underserved communities and populations
- Expand and replicate successful model programs to increase broadband access and bridge the digital divide.
- Accelerate deployment of broadband infrastructure through telemedicine and telehealth technology
- Work with neighboring regional consortia to ensure the development of a cohesive infrastructure. This document is intended to serve as a tool to inform Valley residents, elected officials, public and private sector stakeholders and staff on the wide range of benefits of broadband and how the region is working together to bring these benefits to fruition in the San Joaquin Valley.

THE NEED FOR BROADBAND IN THE SAN JOAQUIN VALLEY

Broadband infrastructure has countless benefits to a community, particularly in fields like distance learning, telehealth, telework, economic development and quality of life. Obtaining broadband access in the 21st century has been likened to obtaining access to railroad

infrastructure in the 19th century in terms of driving economic development. With this in mind, assuring access to broadband is critical to maintaining vibrant communities in the San Joaquin Valley.

Typically, broadband is more readily available in urban areas and is lacking in more rural areas. This may be a contributing factor as to why the San Joaquin Valley has lower broadband adoption rates than more urban parts of the state. As indicated below, when compared to other regions in the state, the San Joaquin Valley lags in broadband penetration and adoption:

San Joaquin Valley lags when it comes to Broadband Penetration and Adoption

	SJV	California
Penetration Rate	58.71%	74.50%
Adoption Rate	54.95%	72.40%
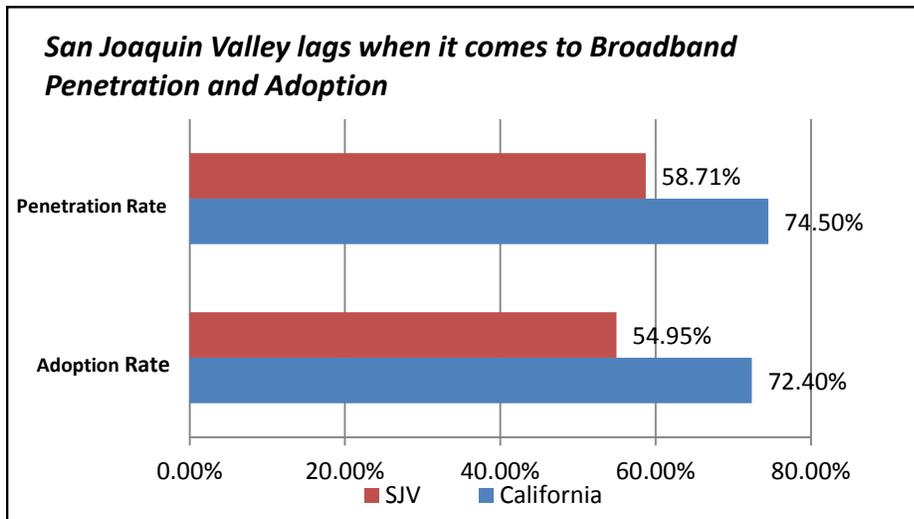
ROLE OF LOCAL LEADERSHIP IN BROADBAND ACCESS

Leadership is key to closing the digital divide in the San Joaquin Valley and throughout California. As California has emerged in recent years as a national leader in promoting the deployment and adoption of broadband, it is now pivotal that local and regional officials embrace a larger leadership role to accelerate the deployment and adoption of broadband in their communities.

A local or regional government may decide to initiate a leadership role with the adoption of a resolution or it may adopt a stand-alone policy to promote broadband deployment and adoption. The adoption of a resolution or policy may be followed by the promulgation of an implementing ordinance. A local jurisdiction also may decide to incorporate broadband policy into other foundational governing and planning documents, such as the General Plan, Specific Plans, Sustainable Communities Strategies, or Emergency Response Plans. The effectiveness of policy can be enhanced by ensuring that all foundational governing documents are aligned to the jurisdiction's priorities and consistent with one another.

A local example of how leaders can drive the development of broadband access in their community is the city of Shafter's development of the Shafter Fiber Network. Showing true

innovation and leadership, the City of Shafter is one of only five cities in California with municipally-owned broadband infrastructure (along with San Bruno, Santa Monica, Loma Linda, and Burbank). As a strategic location for transportation and logistics firms, the city found itself at risk of being passed over by private sector firms looking to locate industrial and distribution facilities in the San Joaquin Valley due to their lack of fiber-based broadband access. Recognizing the critical role of broadband as a driver of economic development, the city decided to make itself more competitive by investing in the development of four miles of fiber to create the Shafter Fiber Network. Initiated in 2006, the Shafter Fiber Network was constructed to connect its municipal facilities, including city hall, police department, courthouse, correctional facility, and the local school district---all with general fund monies. Based on the city's calculations, the project paid for itself within 6 ½ years.

Later this year (2012), Shafter intends to release a request for proposals for the construction of an 18 mile fiber loop to complete its Phase II backbone infrastructure. This project will also be funded by its general fund. The city owns the fiber network and will invite private sector ISPs to deliver telecommunication services across the network to customers.

The City of Shafter's efforts serve as a key example of how smaller cities and communities in the Valley can empower themselves and drive increased economic activity through broadband. The SJVRBC commends the city's efforts and looks forward to the Shafter Fiber Network's continued success!

Background

Our ability to connect through high-speed internet access – referred to generically as "broadband"- is improving our lives in many ways: helping us share information and images, research and apply for jobs, stay in touch with loved ones, and access entertainment and news. Broadband saves consumers time and money, increases productivity in the economy, and reduces impacts on the environment. Broadband is essential 21st Century infrastructure in a digital world and global economy. It is vital to the economic prosperity of every community, the quality of life for all residents, and a "green" strategy to shrink our carbon footprint.

However, the significant digital divide exists in California can be seen through substantial differences among population groups and regions in the use of broadband. For example, only 49% lower-income households (under $40,000 annually), 50% of Latino families, and 55% people with disabilities have a broadband connection at home compared to 70% of all adults statewide and 94% of all higher-income households ($80,000 or more annually). Many rural and remote communities have no access at all and there are great variations

among regions, with 55% of San Joaquin Valley residents having a home broadband connection versus 70% in the Bay Area. This gap among regions and socio-economic segments of the population is referred to as the digital divide.[1]

Overall, progress is being made as evidenced by the increased attention and investment broadband has received by the federal government and the State of California in recent years. In 2006, Governor Arnold Schwarzenegger signed Executive Order S-21-06 (amended November 28, 2006 as S-23-06), entitled *Twenty-First Century Government: Expanding Broadband Access and Usage in California* which created the California Broadband Task Force (CBTF) with a focus to "remove barriers to broadband access, identify opportunities for increased broadband adoption, and enable the creation and deployment of new advanced communication technologies." The governor also requested that the CBTF "pay particular attention to how broadband can be used to substantially benefit educational institutions, healthcare institutions, community-based organizations, and governmental institutions."

Composed of public and private stakeholders with the expertise to advise policymakers on a framework for California's broadband policy, the task force issued a final report in January 2008, which offered a comprehensive assessment of the state of broadband in California. With this new data available, the California Emerging Technology Fund (CETF) declared the ambitious goal to reach 98% of all residences with broadband, and to achieve 80% adoption statewide by 2015 in order to remain globally competitive. It was understood that local and regional leadership would be critical in achieving this goal.

Recognizing that both public and private sectors are essential to closing the digital divide and fostering access to and use of innovative communications technologies, the California State Legislature passed Senate Bill 1040. Governor Schwarzenegger signed the bill into law on September 25, 2010 as an urgency measure which caused it to go into effect immediately. SB 1040 expanded the California Advances Services Fund (CASF) administered by the California Public Utilities Commission (CPUC), allocating $125 million to create two new programs: (1) a revolving loan fund for capital infrastructure, and (2) the Rural and Urban Regional Broadband Consortia Account, which provides grant funds to eligible consortia to cover the cost of deployment activities other than the capital costs of facilities. The legislation also authorized an additional $125 million to be collected as a surcharge over five years to award to broadband projects. Through SB 1040, funding was made available to support the development of regional broadband consortia, including the SJVRBC.

On December 1, 2011, the SJVRBC received funding approval from the California Public Utilities Commission to bring broadband infrastructure to unserved and underserved communities in the eight counties of the San Joaquin Valley: the western portion of Kern and the counties of Tulare, Kings, Fresno, Madera, Merced, Stanislaus and San Joaquin.
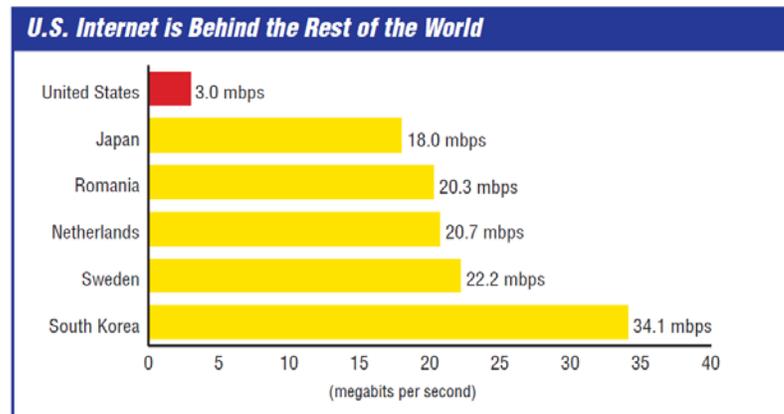
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[1] CETF *Getting Connected for Economic Prosperity and Quality of Life: A Resource Guide for Local and Regional Government Leaders*

The Current State of Broadband Access and Adoption

Generally speaking, both the United States and the San Joaquin Valley are lagging in terms of broadband access and adoption. As detailed in the graphics below, the United States' rates of adoption and access are lower than other countries. Moreover, the San Joaquin Valley has some of the lowest rates in California, underscoring the importance of the SJVRBC's objective to increase broadband accessibility in our region.

Broadband Nationwide

- Nearly 100 million Americans do not have broadband at home
- More than 15 million Americans do not have access to broadband at all
- 70% of urban and suburban households subscribe to broadband, but only 50% of rural households across the country do
- 87% of Americans who earn more than $75,000 a year have broadband access, but only 45% of households that earn less than $30,000 a year subscribe
- Among non-subscribers, one-fifth report that broadband access or a computer is too expensive, and another one-fifth say they do not know how to use the technology[2]
- The United States is ranked 15th behind other industrialized countries in high speed Internet adoption and 25th in Internet speeds
- Half of all U.S. residents' internet connections are slower than the Federal Communication Commission's minimum broadband speed standard; only 1% of U.S. internet connections meet the FCC's broadband speed goal for the year 2015[3]

U.S. Internet is Behind the Rest of the World

Country	Speed
United States	3.0 mbps
Japan	18.0 mbps
Romania	20.3 mbps
Netherlands	20.7 mbps
Sweden	22.2 mbps
South Korea	34.1 mbps

(megabits per second)

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[2] www.pewinternet.org/~/media//Files/Reports/2010/Home%20broadband%202010.pdf
[3] http://download.broadband.gov/plan/national-broadband-plan.pdf
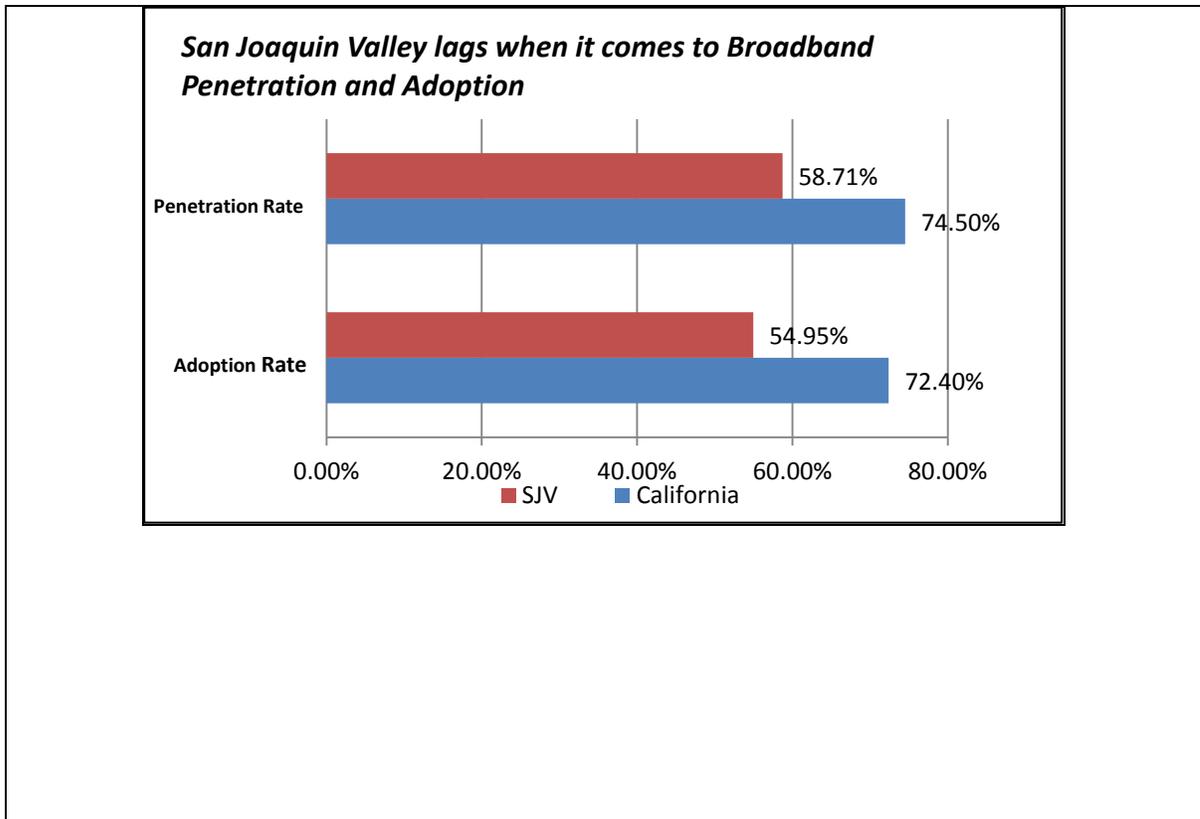
Broadband in California

- California is ranked 13th in the nation in Internet speeds
- 46% of California households have Internet speeds that are below the minimum national standard[4]
- 1.4 million Californians (mostly rural) lack broadband access at any speed
- Less than half of Californians have adopted broadband at home
- Broadband infrastructure is deployed unevenly throughout the state, from state-of-the-art to nonexistent

Most California Residents Have Slow Speed
% of California Residents in Each Speed Tier

Speed Tier	%
More than 25 Mbps	5%
10-25 Mbps	28%
4-10 Mbps	21%
FCC Minimum Broadband Speed	
4 Mbps or less	46%

(megabits per second)
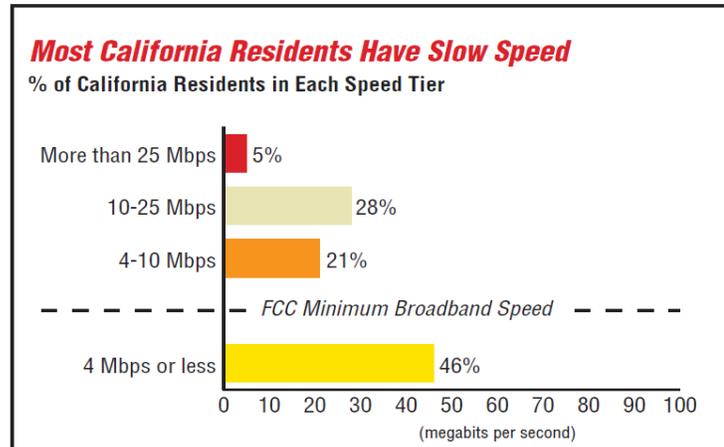
Broadband in the San Joaquin Valley

- Broadband is more widely available in higher-income and higher-density areas
- Relatively low population density, topographical barriers, and greater geographical distances make broadband service more difficult to obtain in some rural areas
- The San Joaquin Valley (54.95%) trails behind the rest of California (72.4%) in adoption rates
- 31% of rural households subscribed to broadband at home, while 52% of urban and 49% of suburban households had adopted broadband
- Rural areas lack either broadband providers or a variety in the choice of broadband providers, as compared to their urban and suburban counterparts
- The southern San Joaquin Valley (Kings, Tulare, and Kern counties) has the lowest access rates when compared to the whole region
- Both low income and unemployed persons are less likely to use broadband at home than their more affluent and employed peers.
- 49% of the households and 15% of the communities do not have broadband.
- Only 20% of the users have more than a 10Mb/s connection.
- Broadband costs to the user are most often distance-sensitive.

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[4] http://cwa.3cdn.net/299ed94e144d5adeb1_mlblqoxe9.pdf

San Joaquin Valley lags when it comes to Broadband Penetration and Adoption

Penetration Rate — SJV 58.71%, California 74.50%
Adoption Rate — SJV 54.95%, California 72.40%

(Legend: SJV, California)

Broadband – The Basics

What is Broadband?

Broadband is a generic term that refers to high-speed access to the Internet that allows users to access the Internet and Internet-related services at significantly higher speeds than those available through a "dial-up" connection. Transmission is digital, meaning that text, images, and sound are all transmitted as "bits" of data. The transmission technologies that make broadband possible move these bits much more quickly than traditional telephone or wireless connections, including traditional dial-up Internet access connections. Broadband is described in terms of rate of transmission of data, with sufficient speeds to support applications relevant to the end user. Broadband speeds vary significantly depending on the particular type and level of service ordered. They may range from as low as 200 kbps (4 times faster than dial-up), or 200,000 bits per second, to six megabits per second (Mbps), or 6,000,000 bits per second. Some recent offerings even include 50 to 100 Mbps. Broadband services for residential consumers typically provide faster downstream speeds (from the Internet to your computer) than upstream speeds (from your computer to the Internet).

How Does Broadband Work?

Broadband allows users to access information via the Internet using one of several high-speed transmission technologies. Transmission is digital, meaning that text, images, and sound are all transmitted as "bits" of data. The transmission technologies that make broadband possible move these bits much more quickly than traditional telephone or wireless connections, including traditional dial-up Internet access connections.

Common Broadband Connections

Broadband is a term that is used to describe multiple types of Internet connections. According to the California Public Utilities Commission, "broadband refers to the wdith of frequency bands used to transmit data or voice communications over the Internet." Below are several different types of Internet connections that are classified as broadband:

- Digital Subscriber Line (DSL)
- Cable Modem
- Fiber -optic cable (Fiber)
- Wireless
- Satellite
- Broadband over Powerlines (BPL)

Digital Subscriber Line (DSL)

DSL is a wireline transmission technology that transmits data faster than dial-up via traditional copper telephone lines already installed to homes and businesses. DSL-based broadband provides transmission speeds ranging from several hundred Kbps to millions of bits per second. The availability and speed of DSL service may depend on the distance from homes or businesses to the closest telephone company facility. The following are types of DSL transmission technologies:

- Asymmetrical Digital Subscriber Line (ADSL) – used primarily by residential customers, such as Internet surfers, who receive a lot of data but do not send much. ADSL typically provides faster speed in the downstream direction than the upstream direction. ADSL allows faster downstream data transmission over the same line used to provide voice service, without disrupting regular telephone calls on that line.
- Symmetrical Digital Subscriber Line (SDSL) – used typically by businesses for services such as video conferencing. Downstream and upstream traffic speeds are equal. Faster forms of SDSL, typically available to businesses, include High-data-rate Digital Subscriber Line (HDSL) and Very High-data-rate Digital Subscriber Line (VDSL).

Cable Modem

Cable modem service enables cable operators to provide broadband using the same coaxial cables that deliver pictures and sound to televisions.
Most cable modems are external devices that have two connections, one to the cable wall outlet and the other to a computer. They provide transmission speeds of 1.5 Mbps or more. Using a cable modem does not preclude the user from still watching television, in contrast to dial-up Internet and phone usage. Transmission speeds

vary depending on the type of cable modem, cable network, and traffic load. Speeds are comparable to typical residential DSL.

Fiber-Optic Cable (Fiber)

Fiber optic technology converts to light electrical signals carrying data and sends the light through transparent glass fibers about the diameter of a human hair. Fiber transmits data at speeds far exceeding current DSL or cable modem speeds, typically by tens or even hundreds of Mbps. The actual speed, however, will vary depending upon a variety of factors, such as how close to the computer the service provider brings the fiber and how the service provider configures the service, including the amount of bandwidth used. The same fiber that provides broadband can also simultaneously deliver voice (VoIP) and video services, including video-on-demand. Some network operators (mostly telephone companies) are offering fiber-based broadband in limited areas, expanding their fiber networks, and beginning to provide bundled voice, Internet access and video services.

Wireless

Wireless broadband can be mobile or fixed. Wireless fidelity (WiFi) is a fixed, short range technology that is often used in conjunction with DSL or cable modem service to connect devices within a home or business to the Internet.

WiFi connects a home or business to the Internet using a radio link between the customer's location and the service provider's facility. This fixed wireless broadband service is becoming more and more widely available at airports, city parks, bookstores, and other public locations called "hotspots."

Fixed wireless technologies using longer range directional equipment can provide broadband service in remote or sparsely populated areas where other types of broadband would be too costly to provide. Speeds are generally comparable to DSL and cable modem service speeds. An external antenna is usually required. With newer services now being deployed (WiMax), a small antenna located inside a home near a window is usually adequate, and higher speeds are possible. Mobile wireless broadband services, such as 3G, are also becoming available from mobile telephone service providers. These services generally require a special card with a built in antenna that plugs into a user's laptop computer. Generally, they provide lower speeds, in the range of several hundred kbps.

Satellite

Just as satellites orbiting the earth provide necessary links for telephone and television service, they can also provide links for broadband services. Satellite broadband is another form of wireless broadband and is particularly useful for serving remote or sparsely populated areas.

Downstream and upstream speeds for satellite broadband depend on several factors, including the provider and service package purchased, the consumer's line of sight to the orbiting satellite, and the weather. Satellite service can be disrupted in extreme weather conditions. Typically, a consumer can expect to receive

(download) at a speed of about 1 Mbps and send (upload) at a speed of about 200 kbps. These speeds may be slower than DSL and cable modem, but the download speed is still much faster than the download speed with dial-up Internet access. Obtaining satellite broadband can be more costly and involved than obtaining DSL or cable modem. A user must have:

- a two or three foot dish or base station – the most costly item;
- a satellite Internet modem; and
- a clear line of sight to the provider's satellite.

Broadband over Powerline (BPL)

BPL delivers broadband over the existing low and medium voltage electric power distribution network. BPL speeds are comparable to DSL and cable modem speeds. BPL can be provided to homes using existing electrical connections and outlets. BPL is an emerging technology, currently available in very limited areas. It has significant potential because power lines are installed virtually everywhere, alleviating the need to build new broadband facilities to every customer.

What Are Middle Mile and Last Mile Infrastructure?

Middle mile and last mile infrastructure are terms used to describe how far broadband infrastructure extends in a community, with the end goal being "last mile" infrastructure. Typically, middle mile infrastructure denotes a connection to a "hot spot," or a WiFi-enabled anchor institution. Anchor institutions are typically public buildings such as a hospital, library, school or other government building. Middle mile infrastructure enables communities to promote telemedicine opportunities, distance learning, electronic recordkeeping, and promote streamlined e-services in government agencies.

Once middle mile infrastructure is established, last mile infrastructure can be developed. Last mile infrastructure means a community's broadband infrastructure connects residents and businesses to the Internet. As indicated in this document, last mile infrastructure facilitates increased economic development opportunities and enriches communities. The graphic below helps illustrate the distinction between middle mile and last mile infrastructure in greater detail:

Figure 1. Recovery Act Investments in the Middle Mile Will Connect Key Institutions and Enable Service to Homes and Businesses
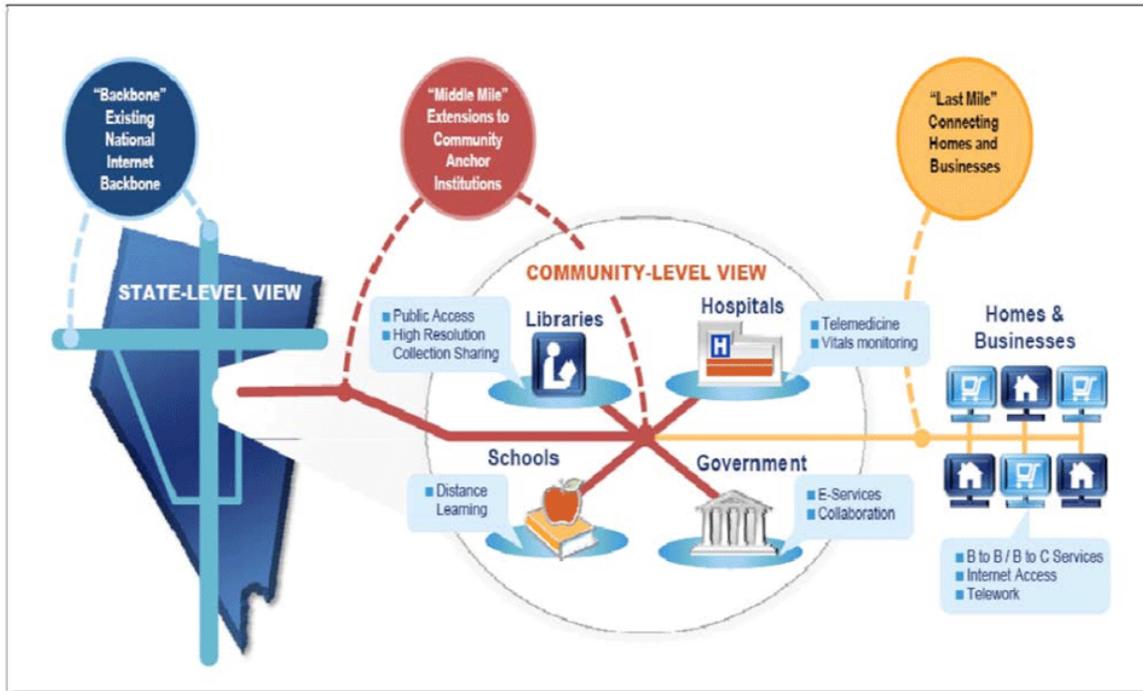
Source: National Telecommunications and Information Administration, U.S. Department of Commerce.

Challenges to Broadband Deployment in the San Joaquin Valley

One objective of the San Joaquin Valley Regional Broadband Consortium is to develop strategies for making broadband available to all San Joaquin Valley residents. To do this, the consortium is working with stakeholders from a variety of sectors to assess barriers to broadband deployment in the San Joaquin Valley. While research is still currently underway, some of the barriers to adoption that have been identified at this point in time are as follows:

Cost of the Device and Connectivity (major obstacle)
Different types of Broadband technologies (DSL, Cable, Wireless and Fiber Optic) are capable of serving the predominately rural communities of the San Joaquin Valley. All have costs associated with the types of deployment balanced against situations encountered in the field. In addition, products and services to be delivered will factor into the type of technology deployed. In rural applications, the costs of "wireline" technology generally outweigh expected returns on the investments unless such infrastructure already exists in suitable locations and quantity/quality. Construction costs often exceed $60,000 per mile and may not include "last mile" construction from the main line to the residential/commercial user or environmental studies. Wireless technology is the best case scenario for Broadband deployment in rural areas, although it does have pros and cons dependent on frequency and licensing variables.

Digital Literacy, Including a Lack of Trust, or Concerns about Privacy and Safety Online

Digital literacy is a term used to describe one's familiarity with the Internet. While there are countless applications for the Internet in today's society, digital literacy is critical for individuals to be equipped with the resources necessary to identify spam, phishing schemes, computer viruses and other malware. One of the barriers to broadband adoption is inadequate training in digital literacy paired with a fear of privacy and safety from Internet scams. With this in mind, digital literacy training is critical to promote broadband adoption throughout the valley.

Relevance: the value consumers perceive from broadband

Individuals often choose not to subscribe to broadband because they may not see the value of the service or understand what content and applications are available online. Other times Broadband non-adopters may not see the relevance of the Internet to their lives, nor see a need to subscribe. This is particularly true in rural areas, where access is a problem.

Infrastructure in Rural Areas

In areas without middle mile or last mile broadband access, it is impossible for residents and businesses to wirelessly connect to the Internet. Because of the proportion of rural communities in the San Joaquin Valley, in many instances, infrastructure in rural areas directly correlates with lower broadband adoption rates than the rest of the state.

Benefits of Broadband Access in the San Joaquin Valley

Expanded access to high-speed Internet combined with a digitally literate population generates major economic growth and rapid job creation. High speed connections accelerate business development by providing new opportunities for innovation, expansion and e-commerce. Connected communities create wealth and opportunity by attracting businesses that want to locate in areas with a strong broadband presence. Broadband access can help communities retain their citizens with advanced degrees, helping to avoid the so-called "brain drain" (the relocation of young, upwardly mobile individuals to other parts of the state). Additionally, digitally literate members of the community benefit greatly from a number of opportunities ranging from enhanced educational options to social connectivity.

Benefits of Digital Literacy

- As more services go online, digitally versatile workers have an increasing advantage in many sectors ranging from information technology (IT) to the service industry. Digital skills apply to and transfer across many professions, and even enhance a worker's ability to apply for a job.

- Digitally literate students improve the quality of their school work by easily accessing online resources including lecture videos, library databases and teacher-student e-mail correspondence.
- Digitally literate people save time and money by paying bills, applying for jobs, doing their taxes and banking online.
- Digitally literate computer owners are far more likely to incorporate the Internet into their daily routine and realize the countless benefits of broadband.
- When an entire family is digitally literate and connected to broadband, social networking, video conferencing, and e-mail correspondence can strengthen family ties across vast geographic distances.

Economic Benefits

- Studies show that each additional $5 billion investment in broadband creates 250,000 jobs – 100,000 direct and indirect jobs from telecom and IT equipment spending plus another 150,000 in "network effects" spurring new online applications and services. With every percentage point increase in broadband accessibility, employment expands by nearly 300,000 jobs.[5]
- Jobs involved in the building and expansion of broadband networks pay 42 percent more than the average manufacturing jobs in America.
- From 1998 to 2002, communities with mass-market broadband service experienced greater growth in overall employment, an increase in the total number of businesses, and more IT-intensive businesses than communities without broadband service.[6] From 1998 to 2002, employment in communities with broadband grew 1 percentage point more than in communities without it.
- Broadband networks attract investment in areas that would not otherwise be viable to many businesses such as rural areas and inner-city regions.
- Communities that gain access to broadband service experience an employment increase of 1-1.4 percentage points and increases in rental value of up to 6 percentage points.[7]
- For every $1 U.S. consumers spend online, information available on the Internet influences a further $3.45 spent in stores. Broadband leads to well-informed purchase decisions, travel reduction by pre-locating the product, and facilitating cost comparisons between vendors.[8]
- Broadband contributed 198,000 jobs and $11.6 billion to the California economy 2002-2005. Over the next decade, it is estimated that broadband, if aggressively deployed and adopted, could generate 1.8 million jobs and contribute $132 million payroll above the baseline.[9]

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[5] The Brookings Institution
[6] 33rd Research Conference on Communication, Information and Internet Policy, 2006
[7] U.S. Department of Commerce, 2006
[8] eMarketer, 2008
[9] Sacramento Regional Research Institute, 2008

- Live videoconferencing at 115 health facilities reduced the cost of follow-up care by 42% and reduced overall costs by 6%.[10]

Benefits to underserved communities

- Education: With the accessibility of high speed broadband, students in the most impoverished inner-city neighborhoods and distant rural regions can take advantage of the same Internet resources as students in the most affluent suburbs. Living on a farm hours away from city libraries would no longer put students at an educational disadvantage.
- Economic development: Broadband availability creates wealth and opportunity for underserved low income areas by attracting businesses that want to locate near a high speed Internet network, such as IT and communications companies that cannot operate competitively without broadband. A study by the Brookings Institution shows that for every percentage point increase in broadband availability, employment expands by almost 300,000 jobs.
- Public Health: With a broadband connection, those without health insurance (who are more likely to live in areas without high speed Internet) could access general information about health care to manage their health and gain understanding of their condition(s) and options for care. Telehealth offers cost-effective health care solutions for urban and rural residents.

Benefits to rural communities

- When given access to affordable broadband, rural businesses restricted to local markets, such as "mom and pop" shops or home-based businesses, can expand their market reach across the nation and even the world.
- Broadband brings the opportunity for direct access to education and health care for rural residents who are otherwise forced to travel long distances for college courses and medical treatment.
- Rural libraries, newly enhanced by high speed Internet, often experience a resurgence of community interest and participation. High speed Internet provides rural residents access to global information and cultural resources.
- Broadband availability attracts tourists and extends their stays.
- Affordable broadband enables historically urban businesses like graphic design, web site design, and other creative industries to experience new life in rural settings while competing on the same level as city-based companies.
- Farmers gain real-time access to vital information such as crop prices, weather forecasts, and marketing opportunities through high-speed networks.

Distance Learning Benefits

- Self-paced, online learning frees people with irregular or inflexible work schedules from rigid classroom-based course schedules.

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[10] California HealthCare Foundation, 2008

- Advanced two-way communications enable students and workers to not only watch lectures and training programs from home but to ask instructors questions and engage their classmates and colleagues via video conferencing.
- Training specialists from distant areas can reach workers more easily, saving everyone time and money by eliminating costly travel.
- Broadband-enabled social networks enhance online learning by creating a community of learners that can share educational and training resources or work together on group projects.
- Many different types of communities have shown great success already with online learning: Low income workers seeking advanced job skills, rural students unable to reach city libraries and incarcerated individuals training for future employment all benefit from distance learning

Benefits of E-Government and Civic Engagement

- Government forms completed online from Web sites open 24 hours a day are faster, cheaper and consume fewer resources than hard copies delivered through regular mail.
- High speed Internet allows a wide range of government services to be completed electronically including business filings, review of Medicare prescription drug options, real-time web-displayed public transit updates, and online car registration.
- The rapid download of video and data lets citizens tap countless resources on government and political issues, be they local, national or international.
- High speed Internet allows citizens to communicate with their elected officials or other candidates through e-mail, online petitions and even social networks.
- Two-way video streaming opens public government meetings to interact with remote constituents in geographically dispersed areas.
- Online social networks allow citizens to connect with like-minded individuals to organize politically, participate in online campaigns, and make their voices heard.

Health Care System Benefits

- Real-time transmission of medical imagery enables the interpretation of MRI, ultrasound, X-rays, and other diagnostic procedures to be performed remotely.
- The number of strenuous patient transfers, such as from a nursing home to a doctor's office, or for expectant mothers seeking prenatal care from a distant hospital, can be significantly reduced though remote monitoring and online consultations only possible through a high speed Internet connection.
- A study from the University of Texas estimates that the U.S. health care system can save $4.28 billion from the elimination of patient transfers alone. This benefit of high speed Internet does not include the potential savings from remote monitoring or interpretative services.
- High speed Internet allows physicians to connect with distant specialists for real-time guidance in emergency situations, potentially saving lives by eliminating the delay of long ambulance rides when seconds count, such as during a stroke or heart attack.

K-12 Education Benefits

- Two-way, interactive video conferencing allows busy parents to interact with their students' teachers more frequently and conveniently.
- Fast connection speeds allow students to easily form online study groups and work on school projects both in face to face and virtual communities.
- Broadband connections enhance curricula at every grade level with dynamic and interactive Internet applications. For example, virtual field trips take students on tours of distant places such as to our nation's capitol and the streets of foreign cities, or even to the depths of oceans and to the far reaches of outer space.
- Students in remote locations can have access to education specialists.
- Elementary and high school students with high speed Internet at home can access the resources of their school libraries remotely, including digital videos and high-volume data files.

Benefits to Libraries

- Students use connected libraries to download educational videos, view course lectures and access scholarly journals.
- Librarians use the Internet for business functions, such as running online catalogs, managing digitized content and serving patrons through e-mail and online reference.
- Residents in underserved communities such as rural or low income areas where most homes lack access to high speed Internet rely on Internet connectivity from their local public library.
- As central public meeting spaces within communities, libraries connected to high speed Internet can serve as disaster response centers, such as during a flood, fire or hurricane.
- Senior citizens, many of whom do not own home computers, find public libraries helpful for finding information on health issues or government programs, and maintaining connections with family and friends who live far away.
- Many libraries provide information literacy training that allows less tech-savvy individuals to engage the Internet in ways they otherwise would not.

Benefits to People with Disabilities

- Live streaming video and instant text communications liberate people who are deaf, hard of hearing or have speech disabilities, from dependency on the phone.
- High speed Internet makes new services available to people with physical disabilities, such as attending classes remotely, online medical consultations with faraway specialists, or applying for and securing jobs, thereby eliminating the need for unnecessary or difficult commutes or trips.
- Programs that read text and describe visual contents aloud in a synthetic voice or a Braille display enable people who are blind or visually impaired to search the Internet, understand videos, and communicate online.

- For persons with certain mental conditions or learning disabilities, slow download speeds discourage Internet use.
- Video relay services (VRS), which require high speed Internet to run, allow people who are deaf to have phone conversations in their native sign language by means of an online interpreter.

Public Safety Benefits

- Fire & Emergency Services: Faster connections let first responders receive area maps and allow multiple responders from numerous agencies to view the same images and data simultaneously. Better and faster data can be sent to emergency rooms to prepare them for incoming accident victims. Fire commanders can direct their units using voice, video and data-enhanced communications at an emergency scene or from a remote location.
- Police: High speed Internet allows the rapid upload of video and data from on-the-ground law enforcement personnel to police command centers, and allows monitoring of officers or suspects in high risk situations. Images and fingerprints of suspects, video clips of criminal activity, and layouts of areas can be downloaded to police vehicle computers. An individual who snaps a cell phone photo of someone they believe may be the abductor of a missing child can share this with the appropriate authorities in an instant.
- National Security: Broadband facilitates biometrics screening - the measurement of personally identifiable physical characteristics like fingerprints or retinas - at entry points into a country or a sensitive facility, and enhances remote surveillance of borders, airports, ports, train stations, and government buildings. In the event of damage or destruction to vital government office space, high speed Internet can restore government services by enabling public officials and their staff to work remotely.

Benefits to the Environment

- Telemedicine, long-distance and business communication programs, and e-commerce are all high speed Internet-based applications that replace basic everyday carbon-intensive activities with carbon neutral alternatives. The Climate Group finds that broadband-enabled travel substitution could save $20 to 40 billion annually in gross fuel savings in the U.S. by 2020.
- Smart meters, smart buildings, and smart grids built with high speed Internet capabilities can increase control over home and building energy consumption, reducing energy use and cost. The Climate Group also finds that a national smart grid could reduce carbon dioxide emissions in America by 230 to 480 million metric tons per year by 2020.
- A study by the American Consumer Institute found that the U.S. could achieve a net reduction of 1 billion tons of greenhouse gas over 10 years, which, if converted into energy saved, would constitute 11 percent of annual U.S. oil imports if we invested in broadband-enabled energy efficiency.

- A $50 billion investment in smart grid technology would create 239,000 new U.S. jobs, according to the Information Technology and Innovation Foundation. Smart communications networks, sensors and information technology can create an intelligent and connected power grid that will deliver electricity more efficiently, while two-way communication systems like "smart meters" and "smart appliances" allow households and businesses to control and substantially reduce energy consumption.
- Broadband deployment and adoption has the potential to reduce greenhouse gas emissions by more than 1.1 billion tons over the next 10 years. Of these reductions, 60% was a direct result of telecommuting efficiencies, 18% from electronic commerce simplifying business processes and distribution, 17% from teleconferencing replacing meetings, and 5% from electronic media replacing paper and/or plastic products. The potential greenhouse gas reduction is equivalent in emission savings to a decrease of 11% of U.S. oil imports.[11]
- Electronic commerce, as compared to conventional shopping, generates 36% less air pollutants, 23% less hazardous waste, and 9% less greenhouse gases. [12]
- Electronic grocery shopping with e-delivery generates 18% to 87% less greenhouse gases than conventional grocery shopping.[13]

Roles of Local and Regional Governments in Broadband Expansion

Local and regional government officials can have substantial impact on the deployment and adoption of broadband through their many leadership roles: policy leaders, planners, regulators (particularly of land use), consumers, and service providers.
These roles are embedded in the elected governing city councils and boards of supervisors, whether or not the jurisdictions appoint specific staff to function in these roles.

As policy leaders, local and regional governments drive the promulgation of policies and ordinances, responding to and protecting the public interest as expressed by residents. They also implement the laws adopted by state and federal governments, thus, defining the mindset regarding whether or not a local jurisdiction welcomes and facilitates investment in broadband. As planners, they approve land use and other related plans that guide the development in their future. As regulators, they study and approve land uses and are in a pivotal position to require "smart" infrastructure and facilities as they approve land use projects. As consumers, local and regional governments purchase technology which, in turn, drives demand for broadband technology and services. And, as providers of community services, they direct whether or not broadband is integrated into government functions and used to provide information and access to public services online, thus encouraging broadband adoption. Local and regional governments in each of these roles have significant impacts on the deployment and adoption of broadband technology; each

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[11] The American Consumer Institute, 2007
[12] Institute of Electrical and Electronics Engineers, 2001 International Symposium on Electronics and the Environment
[13] Institute of Electrical and Electronics Engineers, 2001 International Symposium on Electronics and the Environment

role represents an opportunity to encourage or inhibit consumer behavior regarding broadband and private-sector investment in the technology. The actions in each role determine whether or not their local community, region and California as a whole will be a global leader.[14]

Policy Leader: Promulgate policies that determine the jurisdiction's attention and attitude about broadband technology and defines the approach to facilitating or discouraging capital investment in deployment and adoption by residents.

- Declare broadband an essential 21st Century infrastructure to enhance economic global competitiveness, improve productivity, decrease impacts on the environment, increase opportunities for residents, and augment quality of life (see Appendix A for the valley counties' CETF resolutions)
- Commit to helping close the Digital Divide and promote digital inclusion.
- Set an example for other communities and employers, such as developing a program for telecommuting employees or recycling computers for low-income families.
- Designate a responsible person or agency for implementing the jurisdiction's policies, plans and ordinances related to broadband deployment and adoption.

Planner: Prepare general plans, sustainable communities strategies, Blueprint plans and other related documents that guide development in their jurisdictions, thereby determining how smart growth will be and defining quality of life for residents.

- Incorporate the need and preference for broadband into general plans as a separate element and/or into all the relevant elements, such as economic development, circulation (transportation and mobility), housing and environment.
- Promote broadband as part of smart growth efforts and develop specific implementation plans.
- Monitor broadband deployment and adoption in the local jurisdiction and update relevant plans to ensure infrastructure is adequate for future applications and consumer demand.

Regulator: Adopt implementing ordinances for policies and plans that promote "smart" infrastructure and facilities.

- Adopt ordinances to facilitate and streamline the approval of permits to use rights of way or public facilities consistent with principles of fairness and competition.
- Analyze and approve land uses and construction permits that require "smart" infrastructure and facilities.

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[14] CETF *Getting Connected for Economic Prosperity and Quality of Life: A Resource Guide for Local and Regional Government Leaders*

> *Consumer: Purchase and utilize technology which can enable residents to access information and services, increasing demand for the technology and encouraging innovation and competition to develop new applications that will increase productivity.*

- Develop and adopt a technology plan for the jurisdiction that utilizes state-of-the-art equipment and software to improve internal government functions and to enable residents to use broadband.
- Establish a process to monitor technology innovations and application trends along with a process to regularly update the technology plan.
- Consider join ventures or collaborations with other local governments in purchasing equipment and utilizing broadband technology.

> *Provider of Community Services: Provide information and services online through broadband that increase the relevance of the technology to consumers, which encourages adoption and reduces impacts on the environment.*

- Provide online all policies, plans, ordinances, and information about the jurisdiction.
- Facilitate real-time online participation of residents in all public meetings.
- Establish online public forums and mechanisms (email, surveys, etc) to increase civic engagement and participation.
- Report online data about the jurisdiction to inform the public and increase transparency.
- Deliver online as many public services as possible to decrease trips and reduce impacts on the environment.

Leadership is key to closing the digital divide in the San Joaquin Valley and throughout California. As California has emerged in recent years as a national leader in promoting the deployment and adoption of broadband, it is now pivotal that local and regional officials embrace a larger leadership role to accelerate the deployment and adoption of broadband in their communities.

A local or regional government may decide to initiate a leadership role with the adoption of a resolution or it may adopt a stand-alone policy to promote broadband deployment and adoption. The adoption of a resolution or policy may be followed by the promulgation of an implementing ordinance(s). A local jurisdiction also may decide to incorporate broadband policy into other foundational governing and planning documents, such as the General Plan, Specific Plans, Sustainable Communities Strategies, and Emergency Reponse Plans. The effectiveness of policy can be enhanced by ensuring that all foundational governing documents are aligned to the jurisdiction's priorities and consistent with one another.

Broadband Initiatives and Resources in California

California Advanced Services Fund (CASF)
The Fund provides $100 million in grants to "telephone corporations" to promote broadband services in unserved areas of California. Monies for the Fund are collected via a 0.25% all-end-user-surcharge on telecommunications customers' bills.

California Broadband Task Force (CBTF)

The CBTF force is composed of public and private stakeholders with the expertise to advise policymakers on a framework for California's broadband policy. The task force issued a final report in January 2008, which offered a comprehensive assessment of the state of broadband in California. It includes detailed maps of wireline and wireless availability, analysis of adoption, a pricing survey, and recommendations to increase broadband access and adoption.

California Emerging Technology Fund (CETF)

A nonprofit corporation established by the California Public Utilities Commission, the CETF provides matching funds for projects focusing on providing broadband infrastructure, affordable Internet access, and computer equipment to rural and disadvantaged communities. In addition, at least $5 million of the CETF's fund are earmarked to provide direct grants for telemedicine applications serving California's underserved communities.

California Teleconnect Fund (CTF)

The CTF supports the provision of infrastructure for digital divide projects via a 50% discount on monthly recurring charges for high-speed telecommunications services incurred by schools, libraries, hospitals and health clinics that are owned and operated by a municipal or county government, a hospital district, or a community based organization.

California Telehealth Network (CTN)

Created in 2007 through a three-year $22 million grant from the FCC's Rural Health Care Support Mechanism, CTN will allow the University of California and its partners to begin to establish a statewide broadband telehealth network aimed at improving the rural health care infrastructure throughout California.

Corporation for Educational Network Initiatives in California (CENIC)

In partnership with industry groups, CENIC designs, implements, and operates CalREN, the California Research and Education Network, a high-bandwidth, high-capacity network designed to meet the needs of California education and research communities at K-20 educational institutions.

Proposition 1D

The Proposition, which received voter approval in November 2006, enabled California to issue a $10.4 billion statewide education bond. Funds raised by the bond's issuance allowed the University of California to invest $200 million in the building and enhancement of telemedicine services statewide.

Appendix 1: San Joaquin Valley CETF Resolutions