Yolo Broadband Strategic Plan

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1. Executive Summary

A. A Broadband Plan is Critical for Yolo

Broadband is a term used to identify high-speed data transfer and access on the Internet. Broadband allows Internet users to access a variety of information using a range of technologies. Broadband is essential for such activities as online video, streaming media, voice over Internet phone service, interactive websites and secure business applications. Broadband differs from dial-up Internet access in speed, capacity and the ability to provide uninterrupted service when in use. It supports a wide variety of online applications in business, education, healthcare, public safety, government and entertainment which has made access to these broadband services important ***as part of daily life***.

Broadband is a vital element of Yolo's economic sustainability that will keep our community competitive, locally and globally. Where our road systems provide the infrastructure necessary to connect our communities physically, broadband provides the digital infrastructure necessary to connect our communities virtually to the rest of the electronic world. As more of our everyday lives are lived online, broadband has becomes a fundamental need for our homes, businesses, and communities. Broadband reaches many facets of everyday life by improving the delivery of healthcare services, enriching the educational experiences of children and adults, aiding in the management and conservation of energy resources, assisting public safety personnel in the performance of their duties, and facilitating citizen interaction with our government agencies. Broadband is a driving force behind the competitiveness of our businesses, fostering innovation, productivity and access to the global economy. Affordable, available access to broadband ***means the difference between thriving in the new economy and becoming obsolete.***

Objectives of the Yolo Broadband Strategic Plan

1. *Identify short, mid and long-term broadband policies and initiatives that agencies countywide can develop to facilitate a unified broadband policy and direction*
2. *Identify broadband capacity, equity, access and affordability gaps with a goal of achieving consistent broadband services for all businesses, residents and visitors*
3. *Positively affect how broadband infrastructure and services are likely to develop countywide over the next 10 years*
4. *Positively impact the adoption of broadband services across our communities*
5. *Identify key strategic broadband investments that could improve our communities' access to and competitiveness in the digital economy*

The Yolo Broadband Strategic Plan provides a roadmap to understand our local broadband environment and forge strategies that will ensure our communities are prepared to thrive in the digital economy. In 2012, about 70% of Yolo households maintained some type of broadband connection, 6%

lower than California's statewide average of 76%. The fundamental goal of this Strategic Plan is to increase access, availability and adoption of broadband to support our community's long-term prosperity, including our residents, our businesses, our agriculture, our schools, our hospitals and our overall quality of life. This Plan provides an action oriented roadmap to meet broadband needs based on an understanding of each community and how our local government organizations can utilize effective public policy, strategic partnerships and key investments to positively influence broadband in Yolo. The Plan sets forth achievable short, mid and long-term strategies for Yolo County and each city to achieve in order to meet the broadband requirements of their communities.

Broadband's Impact on Yolo's Critical Community Functions	
Economic Development	• Businesses are more reliant on broadband to maintain competitiveness, productivity and efficiency • High-quality, affordable broadband is becoming increasingly critical to attract new business and retain existing business
Agriculture	• Seed technology and farming are utilizing more broadband on a widespread basis • Agricultural organizations access global data to support locally-grown products
Education & Training	• A quality education is increasingly reliant on access to the Internet and online applications • Modern educational technologies depend on high-quality broadband services, at school and at home
Digital Literacy & Equity	• Increasing broadband adoption will improve the competitiveness of the workforce • Access to broadband increases opportunities for non-English speaking residents
Healthcare	• The quality of patient care is directly tied to the sufficiency of broadband services • Healthcare organizations increasingly need to connect with patients virtually; broadband is critical for these organizations and at home
Public Safety	• First responders rely on high-quality, reliable access to reduce response times during emergencies • Mobile and fixed broadband are key to delivering the right information to the right personnel
Government Services	• Broadband improves capabilities, increases security and reduces cost for public organizations • Increasing access provides more opportunities to interact with citizens

B. Broadband Issues Facing Yolo's Communities

Yolo contains a mix of urban, rural, and remote communities across a diverse demographic profile and varied geographic terrain. Due to these features, broadband supply and demand varies widely across the County. Some communities are well served with more modern infrastructure and multiple providers while others do not currently have any broadband services available and are forced to use satellite or dial-up to receive their Internet services.

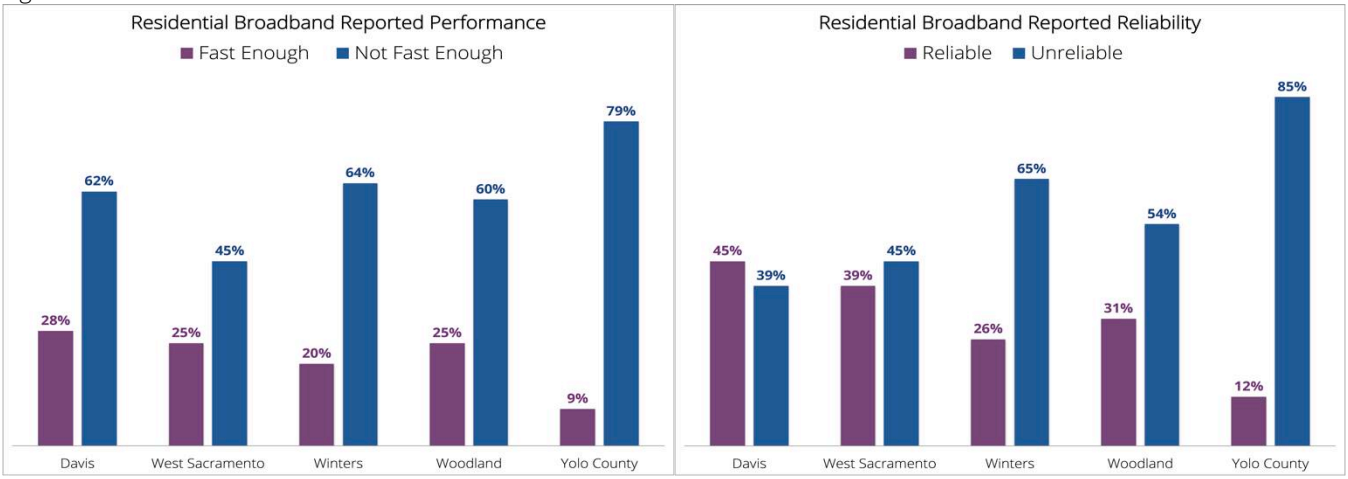
In rural and remote communities, a serious lack of broadband availability exists. Within the unincorporated county, residents are generally limited to low-speed connections that prevent these users from accessing the majority of online content. Using the Internet for anything but simple web browsing is a challenge in these communities, limiting their access to most modern Internet applications. Watching YouTube videos, making Skype calls or participating in online education is a significant challenge in these communities. The lack of broadband impedes home-based businesses from accessing their files and healthcare clinics from treating patients. Broadband adoption is also low in the rural communities, which may be attributable to affordability, the relevancy of broadband to specific users or a combination of both.

Yolo's agricultural populations are challenged as well, particularly in the farming and seed technology areas. Farms, which represent both residential and business subscribers, cannot gain access to suitable broadband services to meet their needs. With the technological revolution occurring in agriculture, these users need reliable broadband to connect their local farms with global data that helps them achieve greater productivity, and better management of their natural resources.

Yolo's cities generally have greater broadband availability and choice of providers. They don't face the critical infrastructure issues as the rural communities, and broadband providers maintain networks that provide coverage to the vast majority of residential and business addresses in each city. The challenge in each city is that in some cases, current services are not keeping up with subscriber demand. In many cases, residents and businesses need greater speeds and more reliability at prices they can afford.

Fifty four percent of Yolo's residents who participated in a recent countywide survey reported having at least 5 devices at home connecting to the Internet such as including laptops, phones and tablets. Each of these consumes a portion of the home Internet connection; a particularly large portion when they are streaming video such as Netflix, YouTube, and Hulu. However, home Internet services are used for more than entertainment; they support home-based businesses, videoconferencing and home security services. And, as more devices access more applications, residential demand for bandwidth will continue to grow. Figure 1.1 shows satisfaction levels with current residential broadband services as reported by approximately 900 residents across the 4 cities and unincorporated Yolo County. Many of Yolo's communities reported performance and reliability issues with their current services.

Figure 1.1: Broadband Satisfaction Levels in Yolo Communities



Small and medium businesses across the cities have significant need for expanded broadband services. In most cases, they utilize the same cable and DSL services that are provided to residents; however, providers generally offer greater support and performance in these "business class" packages. Across each city, these businesses report the need for higher speed and greater reliability. Larger businesses have procured fiber-optic services from local providers, however; the costs of these services are prohibitively expensive for the majority of Yolo's business community. In most cases, a significant pricing gap exists between the services they currently have and the services they need.

Community anchors across Yolo are mixed in terms of their broadband issues. Yolo's schools must meet the State's Common Core[1] criteria for online testing and curricula, which mean that they will need additional broadband capabilities to meet these requirements. Yolo Office of Education and the individual School Districts are concerned that students in low-income neighborhoods will not have adequate Internet services at home to support the transition to more online education. Healthcare organizations also experience broadband availability issues. CommuniCare facilities need expanded access to telehealth services to serve patient needs. Winters Healthcare Foundation cannot treat patients when their Internet is down, which has occurred frequently. Improved access to these services is critical for these organizations as more healthcare services are carried out online.

C. Strategies to Resolve Broadband Issues

The County and the cities have the opportunity to positively impact the availability, affordability and adoption of broadband in their region. Doing so involves a multi-faceted approach that will be carried out over different timescales; however, positively changing Yolo's broadband environment will take time. The process begins now and there are immediate steps laid out for the County and each city to take to shape how broadband will progress in Yolo. A summary of the Action Items for each community follows.

[1] Educational standards describe what students should know and be able to do in each subject in each grade. In California, the State Board of Education decides on the standards for all students, from kindergarten through high school. www.cde.ca.gov/re/cc/

City of Davis Action Items:

Recommendation 1: Pursue viable options to mitigate the impending expiration of the Comcast I-Net agreement and additional costs the City may incur:

a) Identify potential partnerships with other broadband providers that may provide a means to replace the current I-Net agreement and support stakeholder needs for broadband;

b) Consider conducting a feasibility study to develop the business case for a community broadband network. This feasibility study should include:

(1) What organizations and service providers are anticipated to use the network;
(2) An engineering design for the network;
(3) An estimated timeline for construction of the network
(4) Cost estimates, financial plan and financing options for the network;
(5) A plan for managing the network's operations and maintenance; and
(6) Community benefits to be gained from a network; and,

c) Should the City seek renegotiation of the expiring Comcast agreement, ensure that negotiations are not delayed such that it jeopardizes the City's strategic options.

Timing: The City should agree on the terms of the renegotiation with Comcast or plan to utilize another network (which may include building its own community broadband network) no later than September of 2016.

Common Action Items

Recommendation 2: Adopt General Plan policies that incorporate broadband as a public utility and create a policy framework to promote its deployment in public and private projects as appropriate. This includes:

a) Tailoring the sample policies and standards (included in the appendix) to the City's specific needs and adopt them into local policy, codes and standards (including policies, dig-once, joint trenching, engineering standards, etc.);

b) Incorporating broadband in the City's Development Impact Fee program and the City's Capital Improvement Plan (CIP) as appropriate and make a commitment to fund broadband infrastructure;

c) Identifying opportunities to install broadband infrastructure in conjunction with public and private construction projects as appropriate;

d) Developing a process so that Planning and Public Works coordinate with IT to identify projects that could install this infrastructure at reduced costs;

e) As the City builds out its network, maintaining broadband infrastructure in the City's GIS system, requiring GIS-based as-builts and implement any other means for accurate documentation;

f) Evaluating ways to streamline the broadband permitting processes within public rights of way to ensure broadband providers do not face unnecessary obstacles to building infrastructure; and

g) Evaluating fees levied to broadband providers for constructing broadband infrastructure to ensure they do not discourage broadband investment.

Timing: The City should adopt General Plan policies and implementing codes and standards over the next 12 months. Implementation should be ongoing.

Recommendation 3: Coordinate with other agencies with facilities in the City (i.e. Davis Joint Unified School District, UC Davis, Unitrans, Yolo County, Yolo County Housing, Yolo County Office of Education, etc.) on a regular basis to leverage opportunities to reduce broadband construction costs by:

a) Reviving the regular Utility Coordination Meeting attended by the cities/County (and potentially add the public agencies listed above) to facilitate the long-term planning of broadband infrastructure; and,

b) Coordinating on a regular basis to identify opportunities for joint construction, use and broadband infrastructure sharing between local agencies to lower costs and maximize public benefit.

Timing: The City should develop these collaborative programs with other public agencies over the next 3 months.

City of West Sacramento Action Items:

Recommendation 1: The City should continue to develop its broadband infrastructure to reduce internal costs, expand capabilities and protect against future cost increases by:

a) Developing a GIS-based map that identifies the City locations that should be interconnected including the City's current infrastructure;

b) Installing conduit with all public projects;

c) Expanding the City's capability in negotiating agreements for private providers to utilize the City's infrastructure for public benefit; and,

d) Coordinating with other local public agencies (i.e. WUSD, Los Rios Community College District, Yolo County Transportation District, Yolo County, Yolo County Housing, Yolo County Office of Education, etc.) as potential users of the City's infrastructure.

Timing: The City should begin the process of identifying areas for direct and joint investment in broadband infrastructure with other public agencies over the next 12 months.

Recommendation 2: The City needs to work with local broadband providers to ensure business corridors are equipped with the necessary broadband services to support the City's economic development needs as follows:

a) Actively market and make any City-owned infrastructure available for use by broadband providers;

b) Equip business corridors with City-owned broadband infrastructure in the areas identified in the Demand Areas for Expanded Broadband Services, as detailed in the West Sacramento Community Profile;

    (1) Developing relationships with broadband providers who will utilize City-owned infrastructure; and,
    (2) Making this infrastructure available to broadband providers on a non-discriminatory basis.

Timing: The City should work internally to institute the processes to incorporate broadband infrastructure into its planning over the next 12 months.

Common Action Items

Recommendation 3: Adopt General Plan policies that incorporate broadband as a public utility and create a policy framework to promote its deployment in public and private projects as appropriate. This includes:

a) Tailoring the sample policies and standards (included in the appendix) to the City's specific needs and adopt them into local policy, codes and standards (including policies, dig-once, joint trenching, engineering standards, etc.);

b) Incorporating broadband in the City's Development Impact Fee program and the City's Capital Improvement Plan (CIP) as appropriate and make a commitment to fund broadband infrastructure;

c) Identifying opportunities to install broadband infrastructure in conjunction with public and private construction projects as appropriate;

d) Developing a process so that Planning and Public Works coordinate with IT to identify projects that could install this infrastructure at reduced costs;

e) As the City builds out its network, maintaining broadband infrastructure in the City's GIS system, requiring GIS-based as-builts and implement any other means for accurate documentation;

f) Evaluating ways to streamline the broadband permitting processes within public rights of way to ensure broadband providers do not face unnecessary obstacles to building infrastructure; and

g) Evaluating fees levied to broadband providers for constructing broadband infrastructure to ensure they do not discourage broadband investment.

Timing: The City should adopt General Plan policies and implementing codes and standards over the next 12 months. Implementation should be ongoing.

Recommendation 4: Coordinate with other agencies with facilities in the City (i.e. WUSD, Los Rios Community College District, YCTD, Yolo County, Yolo County Housing, Yolo County Office of Education, etc.) on a regular basis to leverage opportunities to reduce broadband construction costs by:

a) Reviving the regular Utility Coordination Meeting attended by the cities/County (and potentially add the public agencies listed above) to facilitate the long-term planning of broadband infrastructure; and,

b) Coordinating on a regular basis to identify opportunities for joint construction, use and broadband infrastructure sharing between local agencies to lower costs and maximize public benefit.

Timing: The City should develop these collaborative programs with other public agencies over the next 3 months.

City of Winters Action Items:

Recommendation 1: Conduct a study to determine the feasibility of constructing a citywide broadband network that can serve the needs of Winters' residents, businesses and community anchors. The feasibility study should:

a) Determine the physical network required to serve the City's needs;

b) Identify the best business model for Winters to utilize to meet the broadband needs of the community, retail, wholesale or infrastructure-only;

c) Incorporate the broadband needs of other public agencies that have offices in Winters into the study;

d) Determine the role local service providers will play in the development of this network, including potential public-private partnerships;

e) Assess the financial feasibility and funding requirements for the network, including potential federal and State grant opportunities; and,

f) Develop an action plan and timeline for buildout of the network.

Timing: The City should consider conducting the feasibility study within the next 12 months and implement any action plan per its timelines.

Recommendation 2: To improve local broadband conditions, the City needs to help key community anchors get the broadband services they need, by:

a) Focusing on community anchors described in the Winters Community Profile that are currently not receiving adequate broadband service;

b) Developing a broadband construction fund (via Development Impact Fees or other mechanism) that will allow the City to jointly fund construction of broadband infrastructure to these anchors, in cooperation with local service providers;

   i) Finance the upfront costs for "last mile" connection fees to get community anchors the services they need; and,
   ii) Work with local providers to jointly build this infrastructure and ensure that the City maintains rights to install additional conduit and fiber-optic cable in these projects.

Timing: Ongoing until broadband has been extended throughout the community.

Common Action Items

Recommendation 3: Adopt General Plan policies that incorporate broadband as a public utility and create a policy framework to promote its deployment in public and private projects as appropriate. This includes:

a) Tailoring the sample policies and standards (included in the appendix) to the City's specific needs and adopt them into local policy, codes and standards (including policies, dig-once, joint trenching, engineering standards, etc.);

b) Incorporating broadband in the City's Development Impact Fee program and the City's Capital Improvement Plan (CIP) as appropriate and make a commitment to fund broadband infrastructure;

c) Identifying opportunities to install broadband infrastructure in conjunction with public and private construction projects as appropriate;

d) Developing a process so that Planning and Public Works coordinate with IT to identify projects that could install this infrastructure at reduced costs;

e) As the City builds out its network, maintaining broadband infrastructure in the City's GIS system, requiring GIS-based as-builts and implement any other means for accurate documentation;

f) Evaluating ways to streamline the broadband permitting processes within public rights of way to ensure broadband providers do not face unnecessary obstacles to building infrastructure; and

g) Evaluating fees levied to broadband providers for constructing broadband infrastructure to ensure they do not discourage broadband investment.

Timing: The City should adopt General Plan policies and implementing codes and standards over the next 12 months. Implementation should be ongoing.

Recommendation 4: Coordinate with other agencies with facilities in the City (i.e. WJUSD, Yolo County, Yolo County Housing, Yolo County Office of Education, PG&E, etc.) on a regular basis to leverage opportunities to reduce broadband construction costs by:

a) Reviving the regular Utility Coordination Meeting attended by the cities/County (and potentially add the public agencies listed above) to facilitate the long-term planning of broadband infrastructure; and,
b) Coordinating on a regular basis to identify opportunities for joint construction, use and broadband infrastructure sharing between local agencies to lower costs and maximize public benefit.

Timing: The City should develop these collaborative programs with other public agencies over the next 3 months.

City of Woodland Action Items:

Recommendation 1: The City should continue to develop its broadband infrastructure to reduce internal costs, expand capabilities and protect against future cost increases by:

e) Developing a GIS-based map that identifies the City locations that should be interconnected including the City's current infrastructure;

f) Installing conduit with all public projects;

g) Expanding the City's capability in negotiating agreements for private providers to utilize the City's infrastructure for public benefit; and,

h) Coordinating with other local public agencies (i.e. WJUSD, Woodland Community College, YCTD, Yolo County, Yolo County Housing, Yolo County Office of Education, etc.) as potential users of the City's infrastructure.

Timing: The City should begin the process of identifying areas for direct and joint investment in broadband infrastructure with other public agencies over the next 12 months.

Recommendation 2: The City needs to work with local broadband providers to ensure business corridors are equipped with the necessary broadband services to support the City's economic development needs as follows:

a) Actively market and make any City-owned infrastructure available for use by broadband providers;

b) Coordinate with Yolo County to identify infrastructure to serve agricultural businesses surrounding Woodland, potentially using wireless to reach these organizations;

c) Equip business corridors with City-owned broadband infrastructure in the areas identified in the Demand Areas for Expanded Broadband Services, as detailed in the Woodland Community Profile;

    (1) Developing relationships with broadband providers who will utilize City-owned infrastructure; and,
    (2) Making this infrastructure available to broadband providers on a non-discriminatory basis.

Timing: The City should work internally to institute the processes to incorporate broadband infrastructure into its planning over the next 12 months.

Common Action Items

Recommendation 3: Adopt General Plan policies that incorporate broadband as a public utility and create a policy framework to promote its deployment in public and private projects as appropriate. This includes:

a) Tailoring the sample policies and standards (included in the appendix) to the City's specific needs and adopt them into local policy, codes and standards (including policies, dig-once, joint trenching, engineering standards, etc.);

b) Incorporating broadband in the City's Development Impact Fee program and the City's Capital Improvement Plan (CIP) as appropriate and make a commitment to fund broadband infrastructure;

c) Identifying opportunities to install broadband infrastructure in conjunction with public and private construction projects as appropriate;

d) Developing a process so that Planning and Public Works coordinate with IT to identify projects that could install this infrastructure at reduced costs;

e) As the City builds out its network, maintaining broadband infrastructure in the City's GIS system, requiring GIS-based as-builts and implement any other means for accurate documentation;

f) Evaluating ways to streamline the broadband permitting processes within public rights of way to ensure broadband providers do not face unnecessary obstacles to building infrastructure; and,

g) Evaluating fees levied to broadband providers for constructing broadband infrastructure to ensure they do not discourage broadband investment.

Timing: The City should adopt General Plan policies and implementing codes and standards over the next 12 months. Implementation should be ongoing.

Recommendation 4: Coordinate with other agencies with facilities in the City (i.e. WJUSD, Woodland Community College, YCTD, Yolo County, Yolo County Housing, Yolo County Office of Education, etc.) on a regular basis to leverage opportunities to reduce broadband construction costs by:

a) Reviving the regular Utility Coordination Meeting attended by the cities/County (and potentially add the public agencies listed above) to facilitate the long-term planning of broadband infrastructure; and,

b) Coordinating on a regular basis to identify opportunities for joint construction, use and broadband infrastructure sharing between local agencies to lower costs and maximize public benefit.

Timing: The City should develop these collaborative programs with other public agencies over the next 3 months.

Yolo County Action Items:

Recommendation 1: The County should continue to develop its broadband infrastructure to reduce internal costs, expand capabilities and protect against future cost increases by:

a) Developing a GIS-based map that identifies the County locations that should be interconnected including the County's current infrastructure;

b) Installing conduit with all public projects;

c) Expanding the County's capability in negotiating agreements for private providers to utilize the County's infrastructure for public benefit; and,

d) Coordinating with other local public agencies (i.e. cities, school districts, UC Davis, YCTD, Yolo County Housing, YCFCWCD, Yolo County Office of Education, etc.) as potential users of the County's infrastructure.

Timing: The County should begin the process of identifying areas for direct and joint investment in broadband infrastructure with other public agencies over the next 12 months.

Recommendation 2: The County needs to develop additional broadband infrastructure in cooperation with cities, other local agencies and local broadband providers by:

a) Working with each County and other public agencies to build a map of locations where these organizations jointly need broadband connectivity by:

   i) Developing a GIS-based map illustrating these locations by utilizing the existing Yolo GIS Cooperative;
   ii) Incorporating County and County CIP projects onto this map to identify the companion projects and joint build opportunities;
   iii) Sharing maps and data between organizations; and,
   iv) Making sure the maps are updated at least annually.

b) Coordinating with broadband providers on specific broadband infrastructure projects in communities described in the Critical Unserved and Underserved Communities in Yolo County's Community Profile:

   i) Identifying infrastructure routes that the County needs;
   ii) Identifying infrastructure routes that the broadband providers need;
   iii) Sharing information between organizations for joint build opportunities;
   iv) Developing a joint build agreement with local broadband providers that allows each organization to install their own broadband infrastructure in these projects; and,
   v) Identifying resources that would be available to fund these projects, including internal County funds and/or available grant or loan programs as described in Recommendation 3.

c) Coordinating with public agencies and private broadband providers to use broadband infrastructure, towers and other resources to expand wireless coverage into agricultural areas, by:

i) Working with broadband wireless providers to make access available to County-owned tower infrastructure, ground space at the base of towers and rooftops, ensuring compliance with legislative and security requirements governing access to these resources;
ii) Collaborating with other agencies with physical assets in the rural areas such as Yolo County Flood Control and Water Conservation District, Yolo County Transportation District, Yolo County Housing and UC Davis to leverage joint opportunities to expand wireless access in the rural areas of the county;
iii) Developing agreements for lease or in-kind exchange of these County-owned assets by broadband wireless providers; and,
iv) Where feasible, interconnecting County-owned fiber-optic networks with these assets to provide fiber backhaul to broadband wireless providers.

d) Developing agreements with each County and broadband providers for joint use of broadband infrastructure by:

i) Strengthening the current MOU to include joint use agreements that allow sharing of infrastructure between the County and the cities;
ii) Actively marketing and identifying opportunities to expand infrastructure with broadband providers.

Timing: The County should accelerate the process of coordinating with other public agencies and broadband providers over the next 12 months and identify opportunities to leverage public broadband infrastructure continuously as a County-level initiative.

Recommendation 3: Target specific State and federal grant and loan programs that will provide funding for Yolo County's unserved and underserved communities by:

a) Through the Tactical Plan, designating a resource at the County that will develop, apply for and manage broadband grants;

b) Building on the initial grant analysis completed in this Plan for the County to pursue CASF funding (and other programs defined in Appendix D) for these communities;

c) Developing relationships with broadband providers that define how grant funds will be received and managed and how broadband services will be provided to these communities; and,

d) Applying for CASF grant funding to expand wireless and broadband services in Yolo County Public Housing facilities;

Timing: The County should immediately identify an internal resource to manage the broadband grant efforts on behalf of the County.

Common Action Items

Recommendation 4: Adopt General Plan policies that incorporate broadband as a public utility and create a policy framework to promote its deployment in public and private projects as appropriate. This includes:

a) Tailoring the sample policies and standards (included in the appendix) to the County's specific needs and adopt them into the Tactical Plan, local policy, codes and standards (including policies, dig-once, joint trenching, engineering standards, etc.);

b) Incorporating broadband in the County's Development Impact Fee program and Capital Improvement Plan (CIP) as appropriate and make a commitment to fund broadband infrastructure;

c) Identifying opportunities to install broadband infrastructure in conjunction with public and private construction projects as appropriate;

d) Developing a process so that Planning and Public Works coordinate with IT to identify projects that could install this infrastructure at reduced costs;

e) As the County builds out its network, maintaining broadband infrastructure in the County's GIS system, requiring GIS-based as-builts, and implement any other means for accurate documentation;

f) Evaluating ways to streamline the broadband permitting processes within public rights of way to ensure broadband providers do not face unnecessary obstacles to building infrastructure; and,

g) Evaluating fees levied to broadband providers for constructing broadband infrastructure to ensure they do not discourage broadband investment.

Timing: The County should adopt General Plan policies and implementing codes and standards over the next 12 months. Implementation should be ongoing.

Recommendation 5: Coordinate with other agencies with facilities in the County (i.e. cities, school districts, UC Davis, YCTD, Yolo County Housing, YCFCWCD, Yolo County Office of Education, etc.) on a regular basis to leverage opportunities to reduce broadband construction costs by:

a) Reviving the regular Utility Coordination Meeting attended by the cities/County (and potentially add the public agencies listed above) to facilitate the long-term planning of broadband infrastructure; and,

b) Coordinating on a regular basis to identify opportunities for joint construction, use and broadband infrastructure sharing between local agencies to lower costs and maximize public benefit.

Timing: The County should develop these collaborative programs with other public agencies over the next 3 months.

2. Introduction

Broadband is a term used to identify high-speed data transfer and access on the Internet. Broadband allows Internet users to access a variety of information using a range of technologies. Broadband is essential for such activities as online video, streaming media, voice over Internet phone service, interactive websites and secure business applications. Broadband differs from dial-up Internet access in speed, capacity and the ability to provide uninterrupted service when in use. It supports a wide variety of online applications in business, education, healthcare, public safety, government and entertainment which has access to high-quality broadband services important as part of daily life.

Broadband is a vital element of economic sustainability that has only begun to take shape in the early 21st century. Where our road systems provide the infrastructure necessary to connect our communities physically, broadband provides the digital infrastructure necessary to connect our communities virtually to the rest of the electronic world. As more of our everyday lives are lived online, broadband has becomes increasingly important, for our homes, businesses, and communities. Broadband reaches many facets of everyday life by improving the delivery of healthcare services, enriching the educational experiences of children and adults, aiding in the management and conservation of energy resources, assisting public safety personnel in the performance of their duties, and facilitating citizen interaction with government agencies. For businesses, broadband has become a driving force behind competitiveness, innovation, and efficiency. Affordable, available access to broadband means the difference between thriving in the new economy[2] and becoming obsolete.

Business, education, healthcare, agriculture, public safety, and government are reliant on broadband services as more of their functions are enhanced through the Internet

Broadband is a transformational infrastructure that transcends physical limitations of more traditional infrastructure, such as road systems and electric grids. Rather than connecting one community to another, it connects a community to the entire electronic world and global marketplace. This is a key reason why broadband is so important to the future of communities. Communities that have access to high-speed broadband will continue to take advantage of all of the opportunities the global

[2] A coined term describing new, high-growth industries that are on the cutting edge of technology and are the driving force of economic growth. The new economy is commonly believed to have started in the late 1990s, as high tech tools, such as the internet, and increasingly powerful computers, began penetrating the consumer and business marketplace.

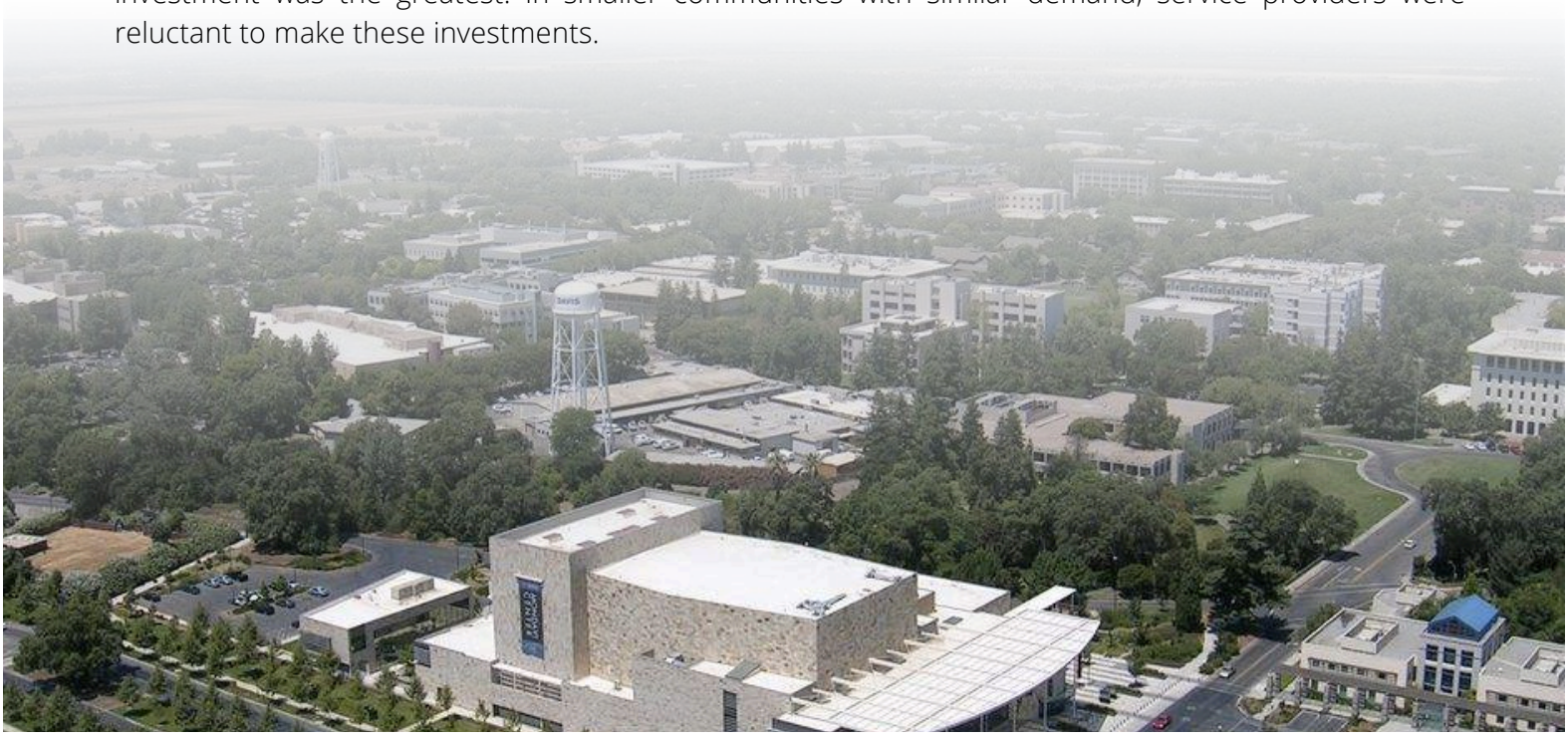
marketplace affords them in business, education, healthcare, entertainment, and general well-being. Communities that lack access to this infrastructure or do not have ubiquitous access to it will be less equipped to thrive in the digital economy.

A. Broadband is a Local Issue for Yolo

For Yolo's communities, affordable access to broadband services is a critical aspect to support long-term needs of its residents, businesses, and anchor institutions. Yolo's diverse mix of demographics among rural and urban centers results in an uneven distribution of broadband services and as a result, some users receive satisfactory broadband services while others don't have access to or cannot afford the services they need. Urban areas, such as Davis and West Sacramento receive higher speeds and reliability generally, whereas rural areas such as Esparto and Knight's Landing have no broadband services available to them.

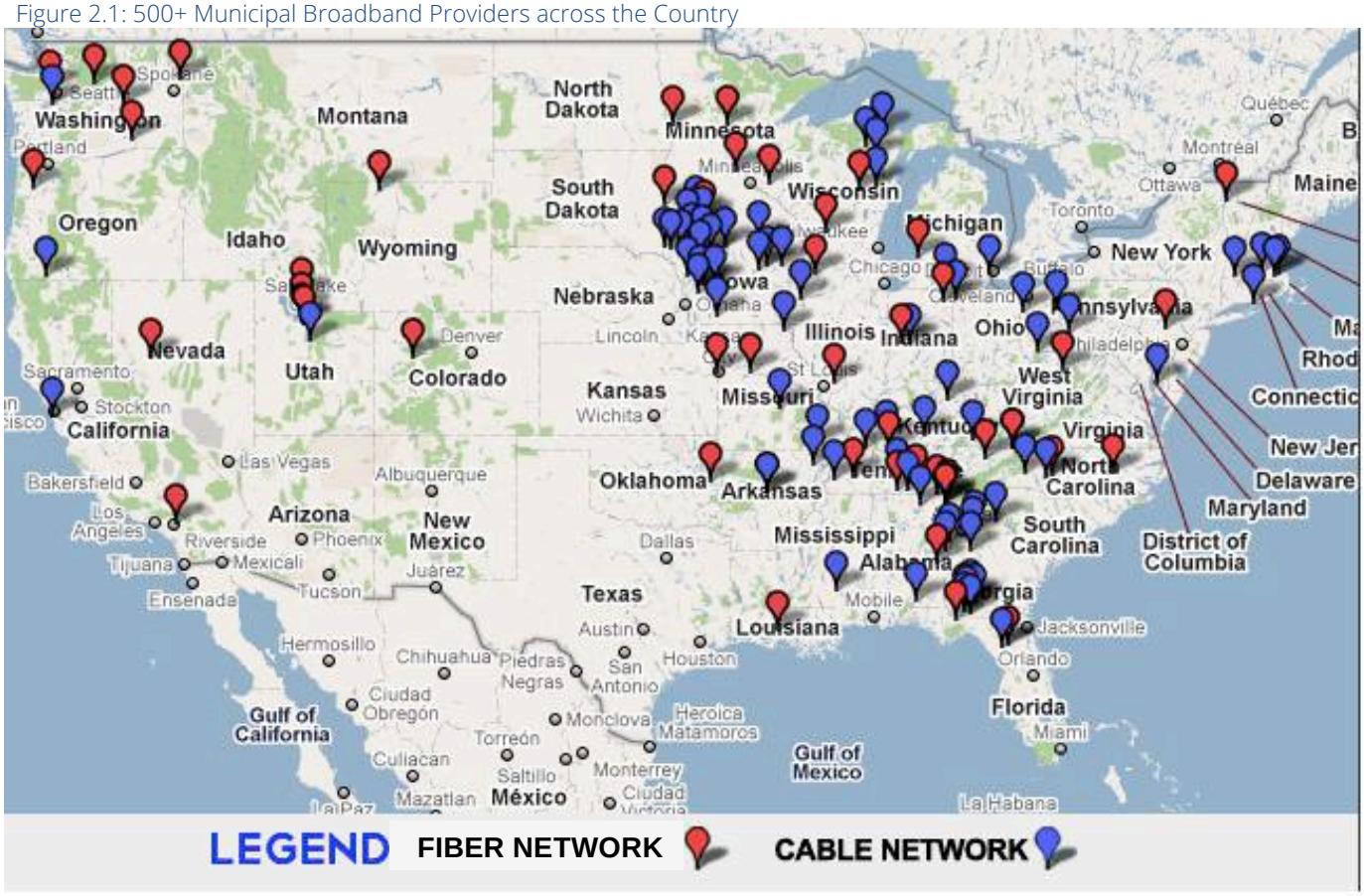
As broadband demand and Internet penetration grows among these communities, it is important for Yolo to take an active role in ensuring end users are receiving the services they need. In cases where they are not, Yolo County and the cities have the opportunity to take action by utilizing reasonable measures to improve services across their communities. Using a combination of broadband-friendly public policy initiatives that accelerate the deployment of broadband and strategic investments in broadband infrastructure, Yolo County and the cities have opportunities to help ensure their communities have the services they need to succeed in the digital economy.

Traditionally, broadband providers have been solely responsible for the development of broadband services in communities. In the mid-1990s, local governments began to take notice of a developing trend within their communities; demand for broadband services was growing. Businesses needed more bandwidth. Schools, hospitals, and government organizations were shifting more of their operations online. Residents were accessing more applications. As this pace accelerated, broadband supply was not keeping up with broadband demand. To meet the demand, service providers began upgrading their networks in the largest cities where density was the highest and where return on investment was the greatest. In smaller communities with similar demand, service providers were reluctant to make these investments.



This trend has become more pronounced as communities' demand for bandwidth has increased exponentially. Over the past 15 years, many local governments have taken an active role in ensuring their communities are equipped with the broadband services they need. It has become a local issue for many communities as broadband has become a public necessity. It has also become a local issue because the infrastructure that powers broadband services is local itself; installed in underground conduits or on poles within the community. Communities that believe it is a public necessity have taken an active role in ensuring their citizens and businesses have access to affordable broadband services. They have done so by using broadband-enhancing public policy and strategic investments in broadband infrastructure to complement the networks of private broadband providers. In most cases they have developed public-private partnerships with these providers to utilize their public broadband infrastructure. These networks have significantly improved broadband access and affordability in their local communities. In addition, these networks have become platforms of innovation to fulfill and enhance other community needs.

Figure 2.1: 500+ Municipal Broadband Providers across the Country



For Yolo County and its cities, strategic initiatives such as broadband-enhancing public policy and strategic investments in broadband infrastructure, will directly impact the accessibility and affordability of broadband services in local communities. However, this infrastructure is capable of much more than just providing broadband services. It can provide a publicly owned communications infrastructure that can be used for additional public benefits, including enhanced municipal utilities, new e-government applications, technology collaboration, and infrastructure sharing programs. In addition, a community-

owned broadband infrastructure for Yolo will provide a platform for long-term innovation of Smart Community technologies and applications, ranging from smart homes to energy conservation and management to green building programs. While the initial goal of this infrastructure is to enhance local broadband services, it will become a long-term asset to support Smart Community programs that increase efficiency, lower cost, reduce environmental impact, and enhance quality of life.

Reasons Why Local Governments Are Investing in Broadband Infrastructure

Broadband Services

- Common backbone for all anchors
  - County & City
  - Schools
  - Libraries
  - Hospitals
  - Clinics
  - Public Safety
  - Community Support
- Interconnection with service providers
- WiFi in public centers

IT Collaboration

- E-Government applications
- Bulk Internet purchasing
- Application sharing
- Disaster recovery
- EOC communications

Public Safety Applications

- Video monitoring
- First responder support
- Collaboration with State & Federal agencies
- FirstNET preparedness

Future Energy & Utility Management

- Smart Grid & Demand Response
- Automated Meter Reading
- Advanced Metering Infrastructure
- SCADA communications and control

B. The Yolo Broadband Strategic Plan

Yolo communities want to ensure that affordable broadband is available to its citizens, businesses, and anchor organizations across urban and rural populations. These services support Yolo's educational institutions to expand online programs and blended learning while ensuring school districts meet their electronic testing requirements with the State of California. They support Yolo's hospitals and clinics by enabling electronic health records and telehealth applications. They support Yolo's public safety organizations ensuring vital communications are available for fire, police, and emergency responders. They support the local government applications and how these organizations interface with citizens. They are also essential to enhance Yolo's economic development strategies, support local businesses, and attract new industries. They also support technology transfer[3] programs from the University of California Davis that result in new startups within the community.

Broadband is a fundamental requirement for Yolo County's citizens, businesses, and anchors to ensure they have access to all of the opportunities the Internet has to offer.

Public organizations in Yolo have the opportunity to positively influence the deployment of broadband services for the benefit of the community. Yolo County and the cities of Davis, West Sacramento, Winters, and Woodland can positively impact the accessibility and affordability of broadband services by utilizing a combination of public policy tools, education and adoption programs, and public investment in broadband infrastructure. The Yolo County Broadband Strategic Plan provides the strategies that Yolo County and the cities can utilize to improve access and affordability of broadband across their communities. It provides a roadmap for broadband development based on an understanding of each community's needs and how the Yolo's local government organizations can utilize public policy and new investment to ensure their needs are met. The Plan sets forth achievable short, mid, and long-term initiatives for Yolo County and the cities to achieve in order to meet the broadband requirements of their communities. The Plan includes the recommendations, action plans, and timelines for Yolo County and the cities to utilize to implement broadband-friendly public policy, develop strategic partnerships and fund key investments in broadband infrastructure.

[3] Technology Transfer, also called Transfer of Technology (TOT), is the process of transferring skills, knowledge, technologies, methods of manufacturing, samples of manufacturing and facilities among governments or universities and other institutions to ensure that scientific and technological developments are accessible to a wider range of users who can then further develop and exploit the technology into new products, processes, applications, materials or services.

Yolo's Communities Must Have Affordable Access to High-Speed, Reliable Broadband Services to Compete, Innovate, and Thrive in the 21st Century Economy.

C. Project Background & Methodology

i. Overview

In September of 2013, the Local Agency Formation Commission of Yolo County issued a Request for Proposals seeking a qualified consultant to develop a Yolo Broadband Strategic Plan. The goals of the RFP were focused on how Yolo's public organizations could participate in the development of broadband within the County through the utilization of public policy tools, grant opportunities, public-private partnerships and potential public investment in broadband infrastructure. A Broadband Working Group composed of representatives from the LAFCo, Yolo County, and member cities was assembled to conduct the evaluation and selection of the consultant. Magellan Advisors was selected through a competitive procurement to assist the Broadband Working Group and LAFCo develop the Yolo Broadband Strategic Plan. Magellan specializes in developing broadband strategies that local governments can use to foster the development of affordable, high-speed broadband services, in conjunction with local service providers, community anchors, businesses, and residents.

Magellan and the Working Group began the project in October of 2013 and through a 9-month planning process developed the Yolo Broadband Strategic Plan. The project began with a thorough needs assessment for Yolo. Magellan conducted significant outreach with Yolo's stakeholders across business, agriculture, education, healthcare, local government, public safety, and community support organizations. This process also included city and county economic and community development initiatives to ensure that the Strategic Plan accounted for each community's long-range planning needs. The needs assessment conducted a series of interviews and group meetings that helped gain an understanding of how these organizations utilized broadband, sufficiency of their current services, issues, and future needs. This information was analyzed by Magellan and the Broadband Working Group to determine common themes around how broadband was currently used by Yolo's organizations and some of the key issues they faced in receiving adequate services.

In addition to the stakeholder outreach, an online survey was conducted of residential and business broadband subscribers in Yolo. The surveys provided insight on residential and business broadband penetration in Yolo, including:

- Types of services and providers
- Pricing for services
- Issues with services
- How services were utilized

The survey was posted in late 2013 and was presented to residents and businesses through the outreach efforts, which included distribution through city and county agencies, libraries and community groups. Over the 9-month period, 919 unique residents and 131 unique businesses responded to the survey. A listing of the relevant survey questions and response summaries are provided in Appendices B and C. Raw response data is provided in an attached Excel file that accompanies this report, named Yolo Survey Response Data.xlsx.

Magellan also conducted a countywide market analysis that evaluated the current broadband environment in Yolo and documented the services, pricing, providers, and availability of broadband services. Recent FCC, CPUC and information collected from the business and residential surveys was utilized to build broadband availability and penetration maps across Yolo. These maps provided indications of current broadband penetration, speeds and coverage gaps. CPUC broadband data and corresponding broadband maps were also reviewed for their accuracy in reporting broadband availability in Yolo. CPUC broadband availability data was cross-referenced against local data collected through survey information and through FCC Form 477 data to identify any discrepancies that misrepresented broadband speeds and availability. This analysis was not able to precisely identify discrepancies between CPUC data and the project data in every case; however, it did provide indications of errors in CPUC data in certain cases. In these cases, Yolo can work further with the CPUC to refine the CPUC's maps to more accurately represent broadband speed and availability in Yolo. The accuracy of these maps is important to support State and federal public policy initiatives such as broadband grants for Yolo's communities.

Information in the needs assessment, surveys and market analysis was utilized to identify key issues facing Yolo, focused on availability and access to broadband services in its communities. An analysis was conducted comparing the current availability and pricing for services against the needs of the community stakeholders. This analysis evaluated the gaps in availability and affordability of broadband services within each community. Based on the gaps that were identified, strategies for each city and Yolo County were developed that would aid in bridging these gaps over short, mid and long-term periods. These community strategies focused on initiatives that Yolo County and cities could undertake to positively influence the affordability, availability, and expansion of broadband services in Yolo. Finally, a list of action items was developed for Yolo County and each of the cities to begin implementing in their communities to achieve these goals.

ii. Broadband Working Group

The Broadband Working Group was established to engage in the development of the Broadband Strategic Plan in conjunction with Magellan Advisors as the prime consultant on the project to Yolo LAFCo. The Broadband Working Group is composed of representatives from Yolo County and the Cities. Over the 9-month span of the project, the Broadband Working Group has worked with LAFCo and Magellan Advisors to engage stakeholders in the strategic planning process, coordinate local resources, provide input on organizational needsfor broadband and provide guidence on the development of the Plan. Members of the Broadband Working Group include:

Name	Position	Organization
Rob White	Chief Innovation Officer	City of Davis
Sarah Worley	Deputy Innovation Officer	City of Davis
Diane Richards	Economic Development Director	City of West Sacramento
John Donlevy	City Manager	City of Winters
Lynn Johnson	Senior Management Analyst	City of Woodland
Wendy Ross	Economic Development Manager	City of Woodland
Ken Hiatt	Community Development Director	City of Woodland
Kevin Yarris	Director, Dept of General Services	Yolo County
Patty Wong	County Librarian	Yolo County
Christine Crawford	Executive Officer, LAFCo	Yolo LAFCo
Tracey Dickinson	Associate Management Analyst	Yolo LAFCo

iii. Detailed Stakeholder & Community Outreach

In the needs assessment process, LAFCo, the Broadband Working Group and Magellan Advisors conducted significant stakeholder and community outreach across the County to understand current and future broadband needs. The information collected included the current inventory of current broadband infrasructure assets from organizations including Yolo County, the Cities of Davis, West Sacramento, Winters and Woodland, UC Davis, the Yolo Flood Control District and Yolo Transportation District. This information was utilized to build a comprehensive broadband map of public infrastructure in Yolo. In addition, each organization included in the outreach process provided anecdotal information about their current broadband penetration, future needs and the technologies that are driving those needs. Magellan utilized this information to compile both the Countywide needs assessment and the individual Community Profiles within this Plan.

Summarizing the findings of the outreach resulted in several common themes that were consistent across the entire County. In each case, users cited a growing requirement for reliable, high-speed broadband services to support the business requirements of their organizations. Businesses, schools, hospitals and government organizations all noted the same trend that more of their operations were being transitioned online, requiring robust broadband Internet connections to support these applications.

Overall, local government connectivity needs are rather similar in that more bandwidth is required between sites, connectivity for cameras and wireless is required throughout areas of each city and more collaboration across city boundaries is deemed beneficial to the region. The County and Cities have worked to establish a collaborative approach to building infrastructure through an interlocal MOU, but have acknowledged that this process needs improvement to be effective at a Countywide level.

Small and medium businesses Countywide reported general dissatisfaction with their current broadband Internet services, citing issues with speed, reliability, and consistency. The majority of the businesses interviewed utilized cable or DSL services with a few of the larger businesses connected via fiber-optic. A few businesses also utilized wireless connectivity for their Internet services.

Economic development agencies all viewed reliable, affordable broadband as a key issue facing Yolo's ability to attract and retain businesses. Agencies realized that Yolo competes with Sacramento County for businesses, and that Yolo is currently not as well supplied with broadband as Sacramento County, which has a negative impact on business recruitment.

A more detailed account of the key needs of each sector, across Yolo County and each city can be found in the individual Community Profiles within this Plan.

Stakeholder Meetings – January 28 – 31, 2014

- California Telehealth Network
- City of Woodland IT Department
- Yolo County IT Department
- UC Davis IT Department
- Woodland Small & Medium Businesses
- West Sacramento Chamber of Commerce
- City of Davis IT Department
- Winters Broadband
- Winters Healthcare Foundation
- "West of 505" Community Meeting
- CPUC & CA Department of Technology
- Yolo County Office of Education
- Yocha Dehe Wintun Nation
- West Sacramento City and IT Departments
- Davis Small & Medium Businesses
- California Emerging Technology Fund
- Om Networks
- CommuniCare
- Yolo County Housing

Magellan Advisors' first site visit in Yolo County took place between January 28 - 31, 2014. The Yolo LAFCo team scheduled meetings with a diverse group of stakeholders throughout the region from government, healthcare, education, and business sectors. In nearly each instance, the need for high-speed connectivity was deemed necessary within the region and each city.

The Magellan team met with each city in Yolo and Yolo County IT Departments to discuss the government organizations' needs around connectivity. Several organizations currently operate fiber optic networks throughout their territory in addition to services provided by local service providers. The County owns and operates a fairly extensive network throughout the City of Woodland and greater

Yolo County. The County has taken advantage of opportunities to jointly build their fiber network on the backs of other service provider and capital improvement initiatives. The County has also led an effort to develop an MOU for joint trenching throughout the region, however it doesn't appear as though all parties have embraced this concept. Each of the Cities currently depend on service providers to provide a major portion of their local connectivity requirements. Each constructs conduit and fiber infrastructure as opportunities present themselves, however, it doesn't appear to be a coordinated effort, even within each local organization. The City of Davis currently operates a dark fiber I-NET (Institutional Network) provided by Comcast through the City's cable franchise agreement. The franchise agreement ends in the coming years, and it has been noted that there is a good chance that Comcast will not honor the I-NET going forward. Overall, the Cities connectivity needs are rather similar in that more bandwidth is required between sites, connectivity for cameras and wireless are required throughout areas of each city and more collaboration across city boundaries is deemed beneficial to the region.

During our meeting with the California Telehealth Network (CTN) it was discovered that CTN started in 2007 through the business incubator at UC Davis. CTN is charged with increasing access to healthcare through the innovative use of technology, including telehealth, telemedicine and health information exchange. Their mission is to promote advanced information technologies and services to improve access to high quality healthcare focusing on medically underserved and rural Californians. CTN secured a $22 million grant from the Rural Health Pilot Program and is currently serving 265 healthcare facilities throughout California with an additional 30 sites pending connection.

UC Davis has significant high-speed connectivity requirements to support its research initiatives. It has built fiber infrastructure throughout sections of the City of Davis where high-speed connectivity is required and utilizes commercial carriers in other instances. The University also maintains high-speed connectivity to the CENIC network (4 – 10Gb connections), National Lambda Rail, Internet 2, and Digital California. UC Davis has a requirement for 6 facilities within the city to be connected to fiber and would welcome faster service to commercial apartments and house rentals throughout the area, as this impacts the student's and faculty's ability to interact with the University off campus.

During business group meetings in Woodland and Davis, our team had the ability to hear first hand from business and local users. In numerous instances we heard that businesses have issues getting access to the services they need and that speed and reliability are both major concerns that impact businesses throughout the region. While DSL and Cable services are widely available in the cities, fiber access is more difficult to come by and when available is very expensive. Economic Development is stating that "one of the first things companies are asking for is telecommunications availability," the problem is that this data is not readily available. During our meeting with the "West of the 505" group, the Mayor of Winters communicated her concerns for the rural areas. She is very concerned that children in the area are required to sit at the library till all hours to access Internet service. Many of the rural areas are either underserved or the families simply lack the ability to pay for Internet based services.

While visiting the City of Winters, our team had the opportunity to meet with the Winters' Healthcare Foundation, a local clinic. The clinic just switched to Wave Broadband when it was made available and are currently reviewing options to connect to the California Telehealth Network. The medical records system is in the cloud, therefor high-speed, reliable connectivity is key to the operation. Winters' Healthcare Foundation is unable to service the community when its connections are down as all applications and records depend on connectivity, nothing is stored locally.

The Yolo County Office of Education provides fiscal oversight for the County while each City has its own District. During this meeting the Office of Education, Davis School District, Woodland School District, West Sacramento School District and the Washington School District were present. The Winters School District was unavailable. Every district manages E-Rate independently. The Districts procure and maintain their own connectivity between facilities and each District has a connection back to the Office of Education to access shared services. The Districts bandwidth requirements are expected to grow as state mandated online testing comes online and to support BYOD and 1 to 1 initiatives. The Office of Education and the Districts are concerned about the low-income neighborhoods and children on the free and reduced lunch program. A few districts provide wireless air-card services to children, and other partner with providers such as Comcast for lifeline Internet programs.

The Yolo County Housing Authority operates water, sewer, and electric utilities in many areas of the region, primarily supporting the thousands of housing units under their control. The Housing Authority has developed a strategy to implement community Wi-Fi hotspots at various locations under their management and has had discussion to expand this service. The Authority has done quite a bit of research into various technologies that could be used to expand its services and has spoken with numerous providers. California AB 1299 allows the California Advanced Services Fund to spend money on broadband in public-housing projects. The Housing Authority is considering making application for funds to expand its service capability.

Stakeholder Meetings – March 19 – 21, 2014

- Clark Pacific
- Yolo County Flood Control and Water Conservation District
- Nugget Markets
- Woodland Community College
- City of Winters/PG&E
- Pacific Coast Producers
- Yolo Transportation District
- Woodland Memorial Hospital
- UC Davis Real Estate
- Marrone Bio Innovations
- FMC/Shilling Robotics
- DMG Mori
- Old Sugar Mill
- City/County Managers
- Los Rios Community College
- Nippon Shokken
- West Sacramento Economic Commission
- J Burton & Associates

The second site visit to Yolo was from March 19 – 21, 2014. The plan for this visit was to continue to meet with project stakeholders as well as key businesses throughout the region and more specifically in the cities of Woodland, Davis, Winters and West Sacramento. These meetings provided additional data in support of the need for highly available fiber based broadband services in these areas.

The meeting with the Yolo County Flood Control and Water Conservation District provided great insight into the SCADA (Supervisory Control and Data Acquisition) systems utilized throughout the district for monitoring, and control of the various water resources and structures managed by the agency. Staff also detailed the extensive wireless network utilized to provide access to dozens of sites throughout and outside of Yolo County. While the wireless network cannot be utilized as an asset in the Yolo Broadband planning process, there is potential for collaboration on tower sites, which are required to provide basic wireless connectivity for the districts systems. District staff may provide a "towers" layer in GIS outlining the current tower infrastructure, pending management approval.

Meetings with Woodland Community College and Los Rios Community College proved to be interesting in that the need for broadband access between these two organizations were at polar opposites. Woodland Community College uses CENIC (Corporation for Education Network Initiatives in California) and has access to the bandwidth and services needed to support current operations. Los Rios Community College in West Sacramento also uses CENIC where possible; however, connectivity between the remote campuses is provided over AT&T Optiman fiber service. Los Rios reported that data needs for the college continues to increase exponentially and current bandwidth levels are insufficient and are currently constrained due to cost of services. Los Rios would welcome new cost effective methods for providing connectivity to its various sites.

During Magellan's visit with the Yolo Transportation District, staff provided us with the "vision" for technology infrastructure as it relates to the transportation services provided throughout Yolo County. There are several plans for digital signage at bus stops, wireless networks on the buses as well as advanced communications between the vehicles and headquarters. Currently, the district relies heavily on 3G/4G mobile devices which currently only provide enough bandwidth to provide AVL (Automatic Vehicle Location) services. Higher speed wireless and connectivity at bus stop locations would be valuable to the district in support of these organizational goals.

UC Davis Real Estate handles all architectural, construction/project management and real estate development services for UC Davis. During our discussions with staff, and review of infrastructure maps, we learned the extent of the University's fiber network. The entire campus, as well as a few off campus locations, is served by the University's network. This could potentially be a valuable asset for the Yolo Broadband project as the fiber passes through several business/industry parks located around the UC Davis campus. Additionally, the University maintains facilities in downtown Davis, which are not currently served by fiber. There could be opportunities for fiber sharing/swapping agreements in the future.

The additional meetings included a number of businesses in the region, mainly large/medium size organizations. These meetings reinforced a number of the issues we've heard regarding the local

broadband offerings, primarily around the concepts of a lack of local access and non-existent service. Some businesses have the services they require because they were lucky to have fiber infrastructure nearby, some stated service was in the area but costs to connect were too great, while others learned to "work with what they have" because services are not available in their area. A few businesses we met within Davis stated they currently have fiber-based access primarily because they were fortunate to be able to afford the $30,000+ capital construction fees to connect. These construction fees are normally collected upfront to offset the costs the provider must bear in order to connect the customer. These can typically be paid upfront or in some cases, rolled into the monthly recurring charge (MRC). During another meeting, a company representative explained to us how his company recently invested $30 million to build a manufacturing plant located in Southport Industrial Park in West Sacramento. During the completion of the site, a T-1 (1.554 Mbps) circuit was installed at the site, and later upgraded to bonded (2) T-1 circuits capable of delivering 3 Mbps of bandwidth to the site. The business has stated it would take a fiber-based service as soon as one is made available, as the current connection is in adequate to support the North American operation.

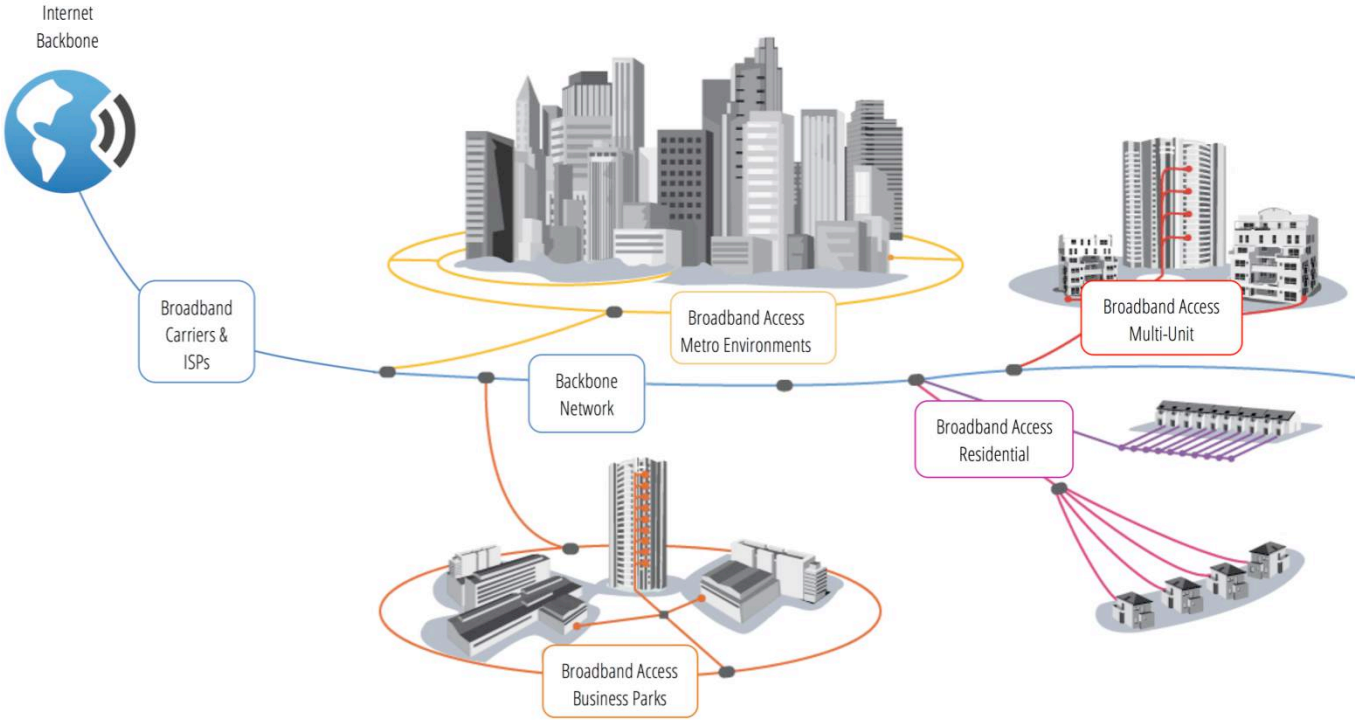
This last instance is really the worst-case scenario for broadband access in an industrial park, which is highly marketed, and core to the City of West Sacramento's Economic Development strategy. This is a prime example of a situation where any high-tech company moving to the area would most likely pass on choosing a site in this industrial park because of a lack of broadband access.

D. Overview of Broadband Technologies

Broadband is deployed throughout communities as wired and wireless infrastructure that carries digital signal between end users and the content they want to access. The content comes in many forms and from many locations across the world in the networks that connect the local community to the Internet backbone. Websites, television, streaming video, videoconferencing, cloud services, and even telephone service are just a few types of content that are delivered across local broadband networks. Access to this content is made available through the type of infrastructure and kinds of connections available in the local network. Robust local infrastructure results in faster, more reliable access to content. Conversely, local infrastructure that is aging and built on older technologies results in slower, less reliable access to content.

Broadband bandwidth, or speed, is commonly measured in megabits per second. "Meg" or "Mbps" are generally used to describe the rate of data transfer through a broadband connection. Broadband connections have a download rate, the rate that data is transferred to the subscriber from the broadband network, and upload rate, the rate that data is transferred from the subscriber to the broadband network. The greater the bandwidth, the faster a subscriber is able to access information over the network, such as Internet web pages. Greater bandwidth also allows subscribers to utilize real-time applications, such as Internet video services such as Netflix and Hulu. Without sufficient bandwidth, these applications do not function because the subscriber is not able to access this content at a fast enough rate through the broadband connection, which results in these applications not functioning correctly and the subscriber experiencing "freezing" or "buffering" conditions when trying to view online content such as web pages, images, and videos.

Figure 2.2: How Broadband Connects Our Communities



The majority of America still utilizes copper-based broadband infrastructure to transmit information from a user to the Internet; this media includes twisted-pair copper telephone and coaxial cable lines. Most of this infrastructure was installed years ago but in many areas of the country, it is still being installed in new communities today. As time has progressed, broadband providers have continued to upgrade equipment in their networks to make these lines faster and more reliable, however; several fundamental issues exist with underlying copper infrastructure:

- Broadband signals degrade significantly as distances increase in copper-based networks.
- Broadband signals are susceptible to electrical interference and signal degradation in copper-based networks, particularly as they depreciate.
- Copper-based networks delivering broadband services generally utilize shared bandwidth among pools of users that results in an uneven distribution of speed to these users.

The limitations of local copper-based networks are overcome by deployment of new technologies such as fiber-optic infrastructure. The old standard of copper in local broadband networks is transitioning to fiber-optic, however; the pace of this transition is slow. Costs for deployment of fiber-optic infrastructure are extremely high, particularly in areas where no fiber-optic infrastructure exists. Providers understand that fiber-optic broadband provides the only long-term solution to the ever-growing bandwidth needs of homes, businesses, and community anchors. Fiber-optic broadband connectivity is considerably different than its copper-based predecessor, in the following ways:

- Fiber optic technology converts broadband data signals to light 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 Meg.
- Actual speeds are always dependent on the services provisioned by the service provider who operates the system, however; speeds generally range from 10Mbps to 100Gbps
- Telecommunications providers sometimes offer fiber broadband in limited areas and have announced plans to expand their fiber networks and offer bundled voice, Internet access, and video services.
- Variations of the technology run the fiber all the way to the customer's home or business, to the curb outside, or to a location somewhere between the provider's facilities and the customer

Figure 2.3 compares traditional broadband technologies such as DSL, cable, and wireless to fiber-based next-generation broadband. Whereas traditional broadband technologies have an upper limit of 150Mbps, next-generation broadband surpasses these limitations and can provide 1Gbps and greater.[4]

Figure 2.3: The Evolution of Broadband Speeds Across Technologies

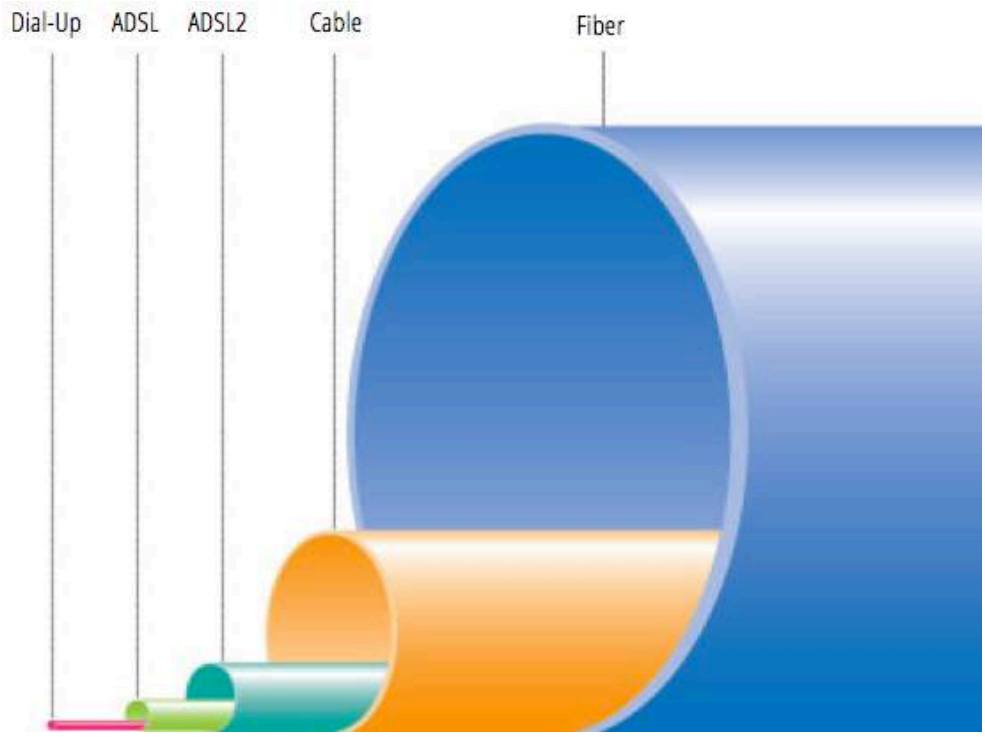
Dial-Up – 56Kbps
- Legacy technology
- Shared Technology

ADSL – 10Meg
- First Generation of DSL
- Shared Technology

ADSL2 – 24Meg
- Second Generation DSL
- Shared Technology

Cable – 150Meg
- DOCSIS 3.0
- Shared Technology

Fiber – 1Gbps
- PON, Active Ethernet
- Shared and
- Dedicated Technology

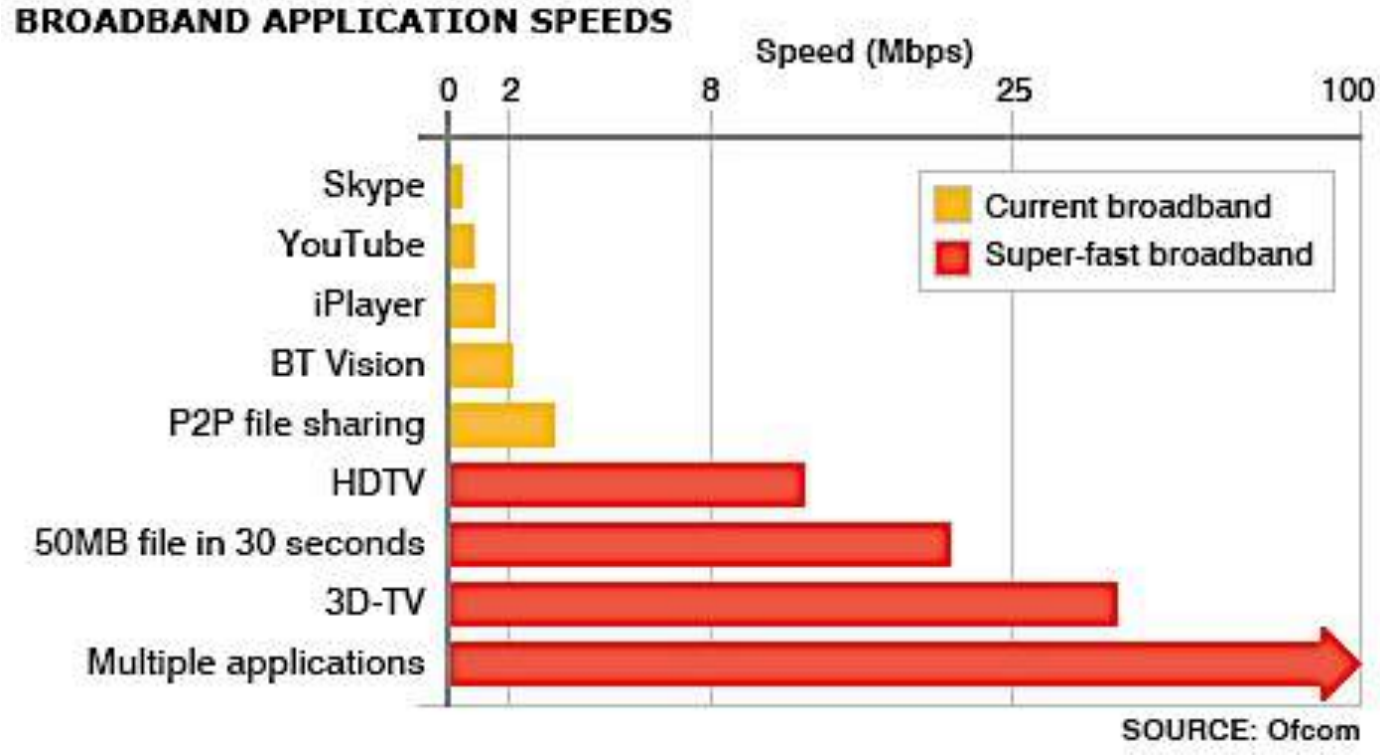


[4] Actual speed and quality of service will depend on the specific service contracted by the end user, whether using a traditional broadband service or a next-generation broadband service.

E. What is Driving Broadband Demand?

Broadband technologies have evolved to carry more and more data because of the advancements in online applications. Every application requires a certain amount of bandwidth on a broadband connection to function properly. As time has progressed, we have witnessed significantly more applications and significantly more bandwidth used by those applications. Figure 2.4 illustrates the bandwidth requirements of common applications and the impact of multiple applications running across a broadband connection.

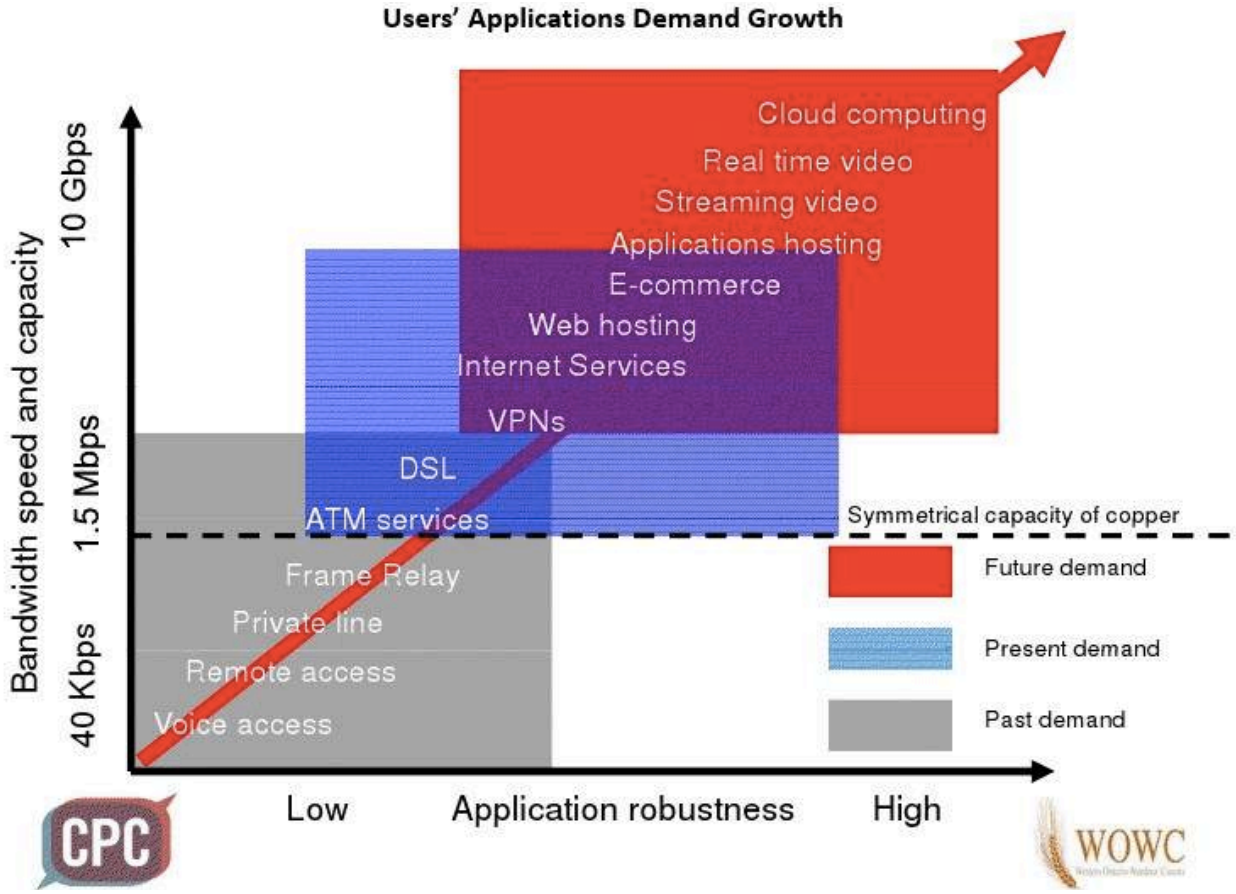
Figure 2.4: Broadband Application Speeds and The Impact of Multiple Applications



Today, broadband subscribers across every user class are utilizing more and more online applications and particularly those that consume larger amounts of high-quality bandwidth. Figures 2.4 and 2.5 illustrate user demands for applications today and the increases in broadband that are necessary to accommodate this demand. Currently, broadband subscribers make heavy use of the core Internet functions, consisting of Internet browsing, web hosting, e-commerce, virtual private network connectivity and voice services. However, subscribers are beginning to consume more real time video and streaming applications, which require significant bandwidth, reliability and performance out of their broadband connections. We are still early in the lifecycle of Internet video applications and these are expected to grow significantly over the next 10 years, replacing much of the text-based Internet.

In addition, the myriad of cloud services is driving the need for more symmetrical[5] broadband as real time and cloud applications require additional bandwidth, both in download speed and upload speed. As more of these applications are deployed and replace traditional PC-based software, broadband connections will need to accommodate the increased bandwidth load. Many times these applications synchronize in real time, meaning that they are always consuming bandwidth at a constant rate rather than only when the user is actively engaging the application.

Figure 2.5: User Demands for Applications Over Broadband Connections



Broadband and Education

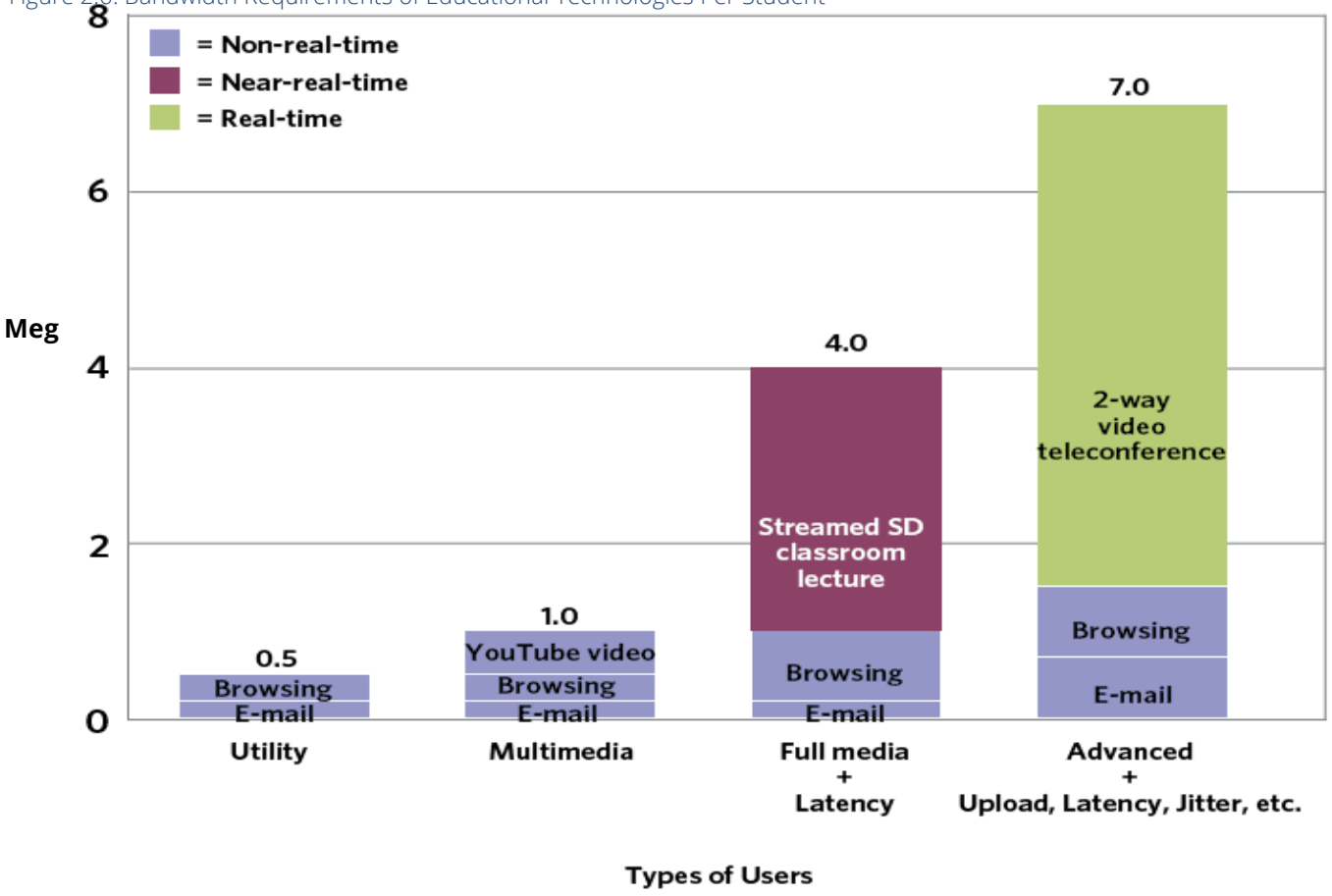
Some of the largest users of broadband services in our communities come from educational organizations and their needs continue to grow, including K-12 schools, community colleges and higher education. Online applications used by these organizations require not only high-bandwidth broadband, but also services that meet strict quality and performance requirements to support real-time video and voice applications such as distance learning and teleconferencing. In addition,

[5] Symmetrical broadband connections provide equal download and upload speeds, such as 10 Meg down, 10 Meg up, instead of traditional asymmetrical broadband services that provide unequal speeds, such as 10 Meg down and 2 Meg up.

educational institutions are utilizing more online content to support their curricula, from sources such as YouTube, Vimeo and Facebook.

Figure 2.6 illustrates the bandwidth requirements per student for common educational applications and the quality and performance requirements of these applications. Basic educational tools, such as web browsing and YouTube, consume up to about 1 Meg per student. However, moving up to more advanced educational technologies such as streamed classroom lectures and 2-way video teleconferences, use significantly more bandwidth per student, 4 Meg and 7 Meg, when combined with the basic educational tools. In addition, these advanced tools require not only more bandwidth but also strict broadband quality metrics that allow them to function properly, such as low latency and higher upload speeds.

Figure 2.6: Bandwidth Requirements of Educational Technologies Per Student[6]

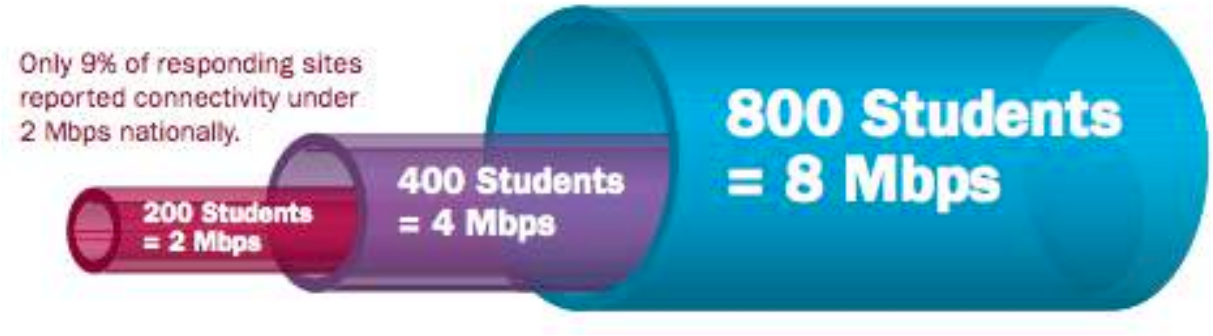


Many States have instituted requirements for online testing or are in the process of doing so. California's Common Core State Standards take effect in 2014, and districts will be moving into this program this 2014-2015 school year. These tests require approximately 20Kbps per student, and school districts will be required to dimension their broadband services to accommodate online testing.

[6] National Broadband Plan. "Current State of the Ecosystem" http://www.broadband.gov/plan/3-current-state-of-the-ecosystem/. Accessed June 2014.

For example, a school with 800 students may require up to 8 Meg of bandwidth to ensure its online testing is completed successfully. This 8 Meg is in addition to the school's existing broadband consumption, which for some schools may be a challenge, particularly because online testing may be competing for bandwidth with other online educational content that the school is using.

Figure 2.7: Bandwidth Requirements for Online Assessments[7]



Educational institutions continue to integrate online applications into their curricula, particularly emphasizing more video, including distance learning and online collaboration.

Broadband and Healthcare

Healthcare technology is rapidly evolving and in order to support these major advances in medical science, broadband infrastructure needs to be in place to allow effective management of medical data and facilitate communication between doctors and patients. Doctors are now using very advanced diagnostic imaging systems that require large amounts of storage and bandwidth to work efficiently. Patients rely on the Internet for the ability to interconnect with their healthcare providers virtually instead of making in-person visits; what traditionally required an office visit in the past can now be done virtually in many cases.

Additionally, by virtue of having high-speed, reliable broadband, healthcare organizations such as hospitals, doctor's offices, urgent care centers, and emergency first responders can all be connected to the same system, enabling virtual collaboration (in real time), remote patient diagnoses and monitoring, and other telemedicine applications. With the advancement of electronic health records, broadband infrastructure will become one of the most critical infrastructure needs for healthcare professionals and organizations. Currently, to support the use of electronic health records, the FCC recommends the following minimum bandwidth speeds:

[7] Smarter Balanced Assessment Consortium. "The Smarter Balanced Technology Framework and Testing Device Requirement", http://www.smarterbalanced.org/wordpress/wpcontent/uploads/2011/12/Tech_Framework_Device_Requirements_11-1-13.pdf, Accessed July 2014.

Single Physician Practice – 4 megabits per second (Mbps)

- Supports practice management functions, email, and web browsing
- Allows simultaneous use of electronic health record (EHR) and high-quality video consultations
- Enables non real-time image downloads
- Enables remote monitoring

Small Physician Practice (2-4 physicians) – 10 Mbps

- Supports practice management functions, email, and web browsing
- Allows simultaneous use of EHR and high-quality video consultations
- Enables non real-time image downloads
- Enables remote monitoring
- Makes possible use of HD video consultations

Nursing home – 10 Mbps

- Supports facility management functions, email, and web browsing
- Allows simultaneous use of EHR and high-quality video consultations
- Enables non real-time image downloads
- Enables remote monitoring
- Makes possible use of HD video consultations

Rural Health Clinic (approximately 5 physicians) – 10 Mbps

- Supports clinic management functions, email, and web browsing
- Allows simultaneous use of EHR and high-quality video consultations
- Enables non real-time image downloads
- Enables remote monitoring
- Makes possible use of HD video consultations

Clinic/Large Physician Practice (5-25 physicians) – 25 Mbps

- Supports clinic management functions, email, and web browsing
- Allows simultaneous use of EHR and high-quality video consultations
- Enables real-time image transfer
- Enables remote monitoring
- Makes possible use of HD video consultations

Hospital – 100 Mbps

- Supports hospital management functions, email, and web browsing
- Allows simultaneous use of EHR and high-quality video consultations
- Enables real-time image transfer
- Enables continuous remote monitoring
- Makes possible use of HD video consultations

Academic/Large Medical Center – 1,000 Mbps

- Supports hospital management functions, email, and web browsing
- Allows simultaneous use of EHR and high-quality video consultations
- Enables real-time image transfer
- Enables continuous remote monitoring
- Makes possible use of HD video consultations

Broadband and Public Safety

We live in a changing world where public safety agencies must address new threats and challenges both natural and man-made. It's no longer enough for first responders to rely on a push-to-talk (PTT) network for situational awareness. Police, fire, and emergency medical services (EMS) play the central roles in emergency response. Mobile technology capable of sending and receiving bandwidth-intensive information can help first responders do their jobs much more effectively and safely. These emergency response organizations need broadband networks that let them share streaming real-time video, detailed maps and blueprints, high resolution photographs, and other files that today's public safety and commercial wireless networks cannot handle, especially during major events or catastrophes.

Broadband technology and infrastructure is critical to the success of our first responders because it provides them with enhanced situational awareness in emergency situations. By leveraging broadband networks, public safety organizations can gain access to site information, video surveillance data, medical information or patient records, and other information that would be useful in an emergency situation. These networks also support and improve 9-1-1 Public Safety Answering Points (PSAPs) response time and efficiency by establishing a foundation for transmission of voice, data, or video to the responding entity.

New broadband technologies give first responders new tools to save lives. These tools include:

- Next-Generation Radio Systems
- Advanced Security Camera Systems
- Gunshot Detection Systems
- Chemical, Biological, Radiological, Nuclear, and Explosives Sensor Systems
- Body-Worn Cameras
- Next-Generation Wireless Data Systems

Broadband and Local Government

Broadband networks become key drivers of efficiency as more and more municipal applications are enabled online. As they expand online services broadband will become an even more critical component of the daily operations to serve communities. Applications migrated to a community network enjoy greater availability and increased bandwidths over what has traditionally been available; creating a more effective and efficient municipal organization. High-speed, reliable broadband enables these organizations to:

- Improve operational efficiencies
- Reduce direct and indirect costs
- Enable new interactions with citizens and businesses
- Respond more quickly to the local community
- Ensure better preparedness in times of emergency
- Provide enhancements to public safety
- Provide more information to citizens and businesses

Broadband and Community Support

In order for a community to thrive and grow, community support organizations must be in place. Organizations such as local chambers of commerce, human services organizations, churches, and other organizations that help connect people to the services they need in the community. These organizations traditionally access the needs and resources available in the community and collect the data necessary to help fill the gaps in services and investigate opportunities to solve community problems and issues.

Broadband plays a vital role in helping these types of organizations fulfill their missions. Whether it is as simple as a community church streaming their weekly service or the local chamber of commerce advertising their latest event through their web presence and email, broadband equips these organizations with one of the most critical communication tools necessary to ensure they are successful in their support roles.

Broadband availability inspires these organizations to be innovative in their use of technology and brings a higher level of welfare to the communities they serve. Take for example All Saints Church in rural Norlfolk County, UK. The church is utilizing it's spire (the tallest structure in the area) to deliver wireless Internet service to the surrounding community. Now, in a community that was lucky to see speeds up to 1 Mbps, speeds of over 8 Mbps are not uncommon. This community support organization has brought broadband service into an area that was previously underserved and is helping to bridge the digital divide that plagues many communities around the globe.

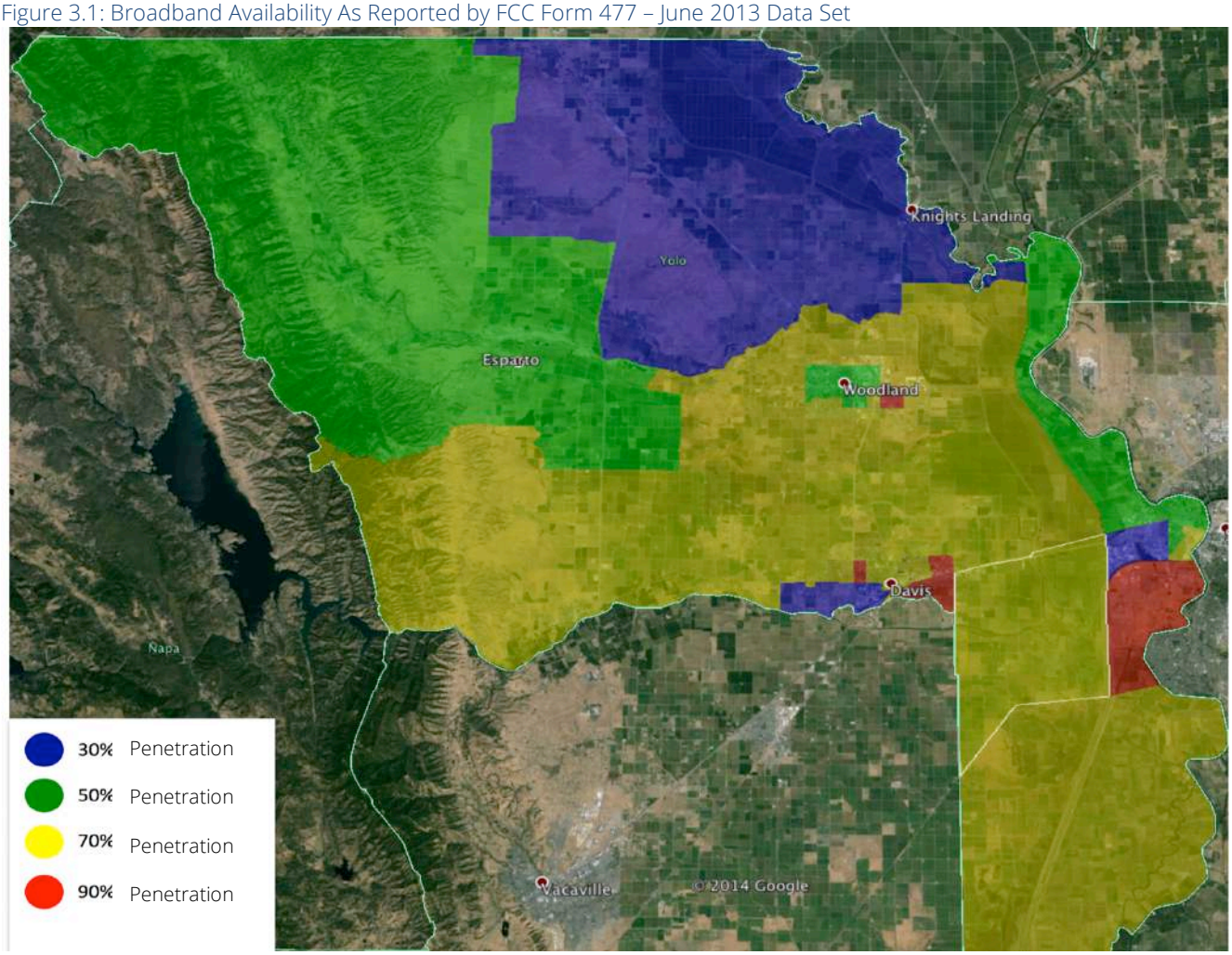
3. Current Broadband Conditions in Yolo

A. Broadband Penetration & Availability in Yolo

Broadband Penetration in Yolo Per FCC Data

Figure 3.1 illustrates the most recent residential broadband penetration data, as reported in FCC Form 477 by providers that serve Yolo County. Data is reported per census tract for every census tract in the County. Census tracts are shaded below to illustrate the average broadband penetration. Penetration means that amount of residential households that have subscribed to a wireline broadband service such as cable or DSL Internet service. Tracts shaded in blue exhibit 30% average penetration, tracts shaded in green exhibit 50% average penetration, census tracts in yellow exhibit 70% average penetration and census tracts in red exhibit 90% average penetration. Cities exhibit significantly higher broadband penetration whereas rural areas exhibit lower rates. The predominant reason why broadband penetration is lower in rural census tracts is due to a lack of broadband availability in these areas. The FCC data reports actual broadband lines connected, not availability of broadband services.

Figure 3.1: Broadband Availability As Reported by FCC Form 477 – June 2013 Data Set



High (90% average) broadband penetration is found in portions of the urbanized areas of Woodland, West Sacramento and Davis, which exhibit the greatest population centers and the most density in the County. Census tracts that cover rural portions of the County maintain significantly lower penetration, particularly those in the Northern portion of the County covering the Capay Valley, Esparto, Dunnigan, Knight's Landing and Yolo. In cases where few or no households exist within a census tract, these tracts will exhibit low penetration. For example, pockets of low penetration occur in urbanized census tracts within Davis and West Sacramento (shown in Blue and centrally located in these Cities), due to the fact that these tracts contain mainly commercial parcels and few households.

Magellan calculates the actual users subscribing to broadband in these communities by multiplying the average availability in each census tract by the occupied households data provided by the 2010 census via American FactFinder. This data provides an indication of the total number of residential households served by wireline broadband such as cable or DSL in each census tract and in unincorporated Yolo. Based on this data, 66.8% of Yolo households subscribe to a wireline broadband service. Figure 3.2 illustrates these results broken down by City and unincorporated Yolo.

Figure 3.2: Households Subscribing to Wireline Broadband in Yolo Communities

Community	Households with Broadband	Wireline Broadband Penetration
Davis	18,375	77.3%
West Sacramento	10,233	64.2%
Winters	1,464	56.2%
Woodland	12,609	61.9%
Yolo County (Unincorporated)	4,003	55.9%
Countywide	46,684	66.8%

Broadband Availability in Yolo Per CPUC Data

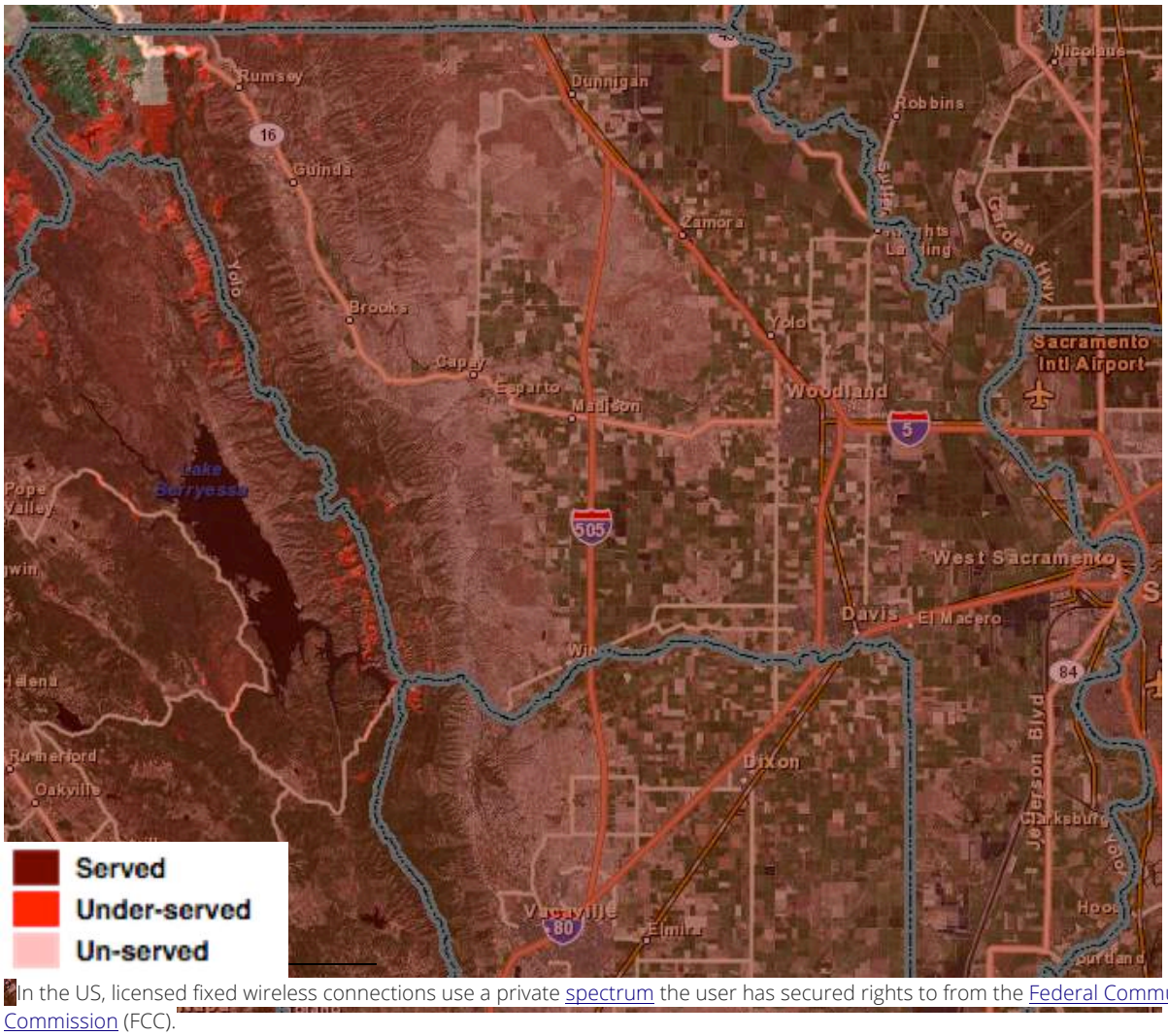
Current CPUC maps provide availability, services and provider information across Yolo County. The most current report released by the CPUC entitled "State of California Fixed Broadband Availability"[8] dated June 16, 2014 states that 100% of Yolo County's households have access to broadband services of at least 6 Meg download and 1.5 Meg upload. The report lists a total of 70,699 of 70,716 households for which this speed of broadband is available.

On closer inspection of the data, it is important to analyze the actual services that exist in Yolo to which households have access and a "real-world" sense of the availability of broadband in Yolo. The 100% availability reported by the CPUC includes both wireline and fixed wireless broadband services. An area (census block) is considered served if at least 1 provider with either of these technologies serves the area. Wireline broadband services include such technologies as DSL, cable and fiber-optic services. In

[8] ftp://ftp.cpuc.ca.gov/telco/BB%20Mapping/Round%209/R9%20Dec%202013%20Availability%20by%20County-Alphabetical.pdf

Yolo, DSL and cable technologies were found to be available to households in the majority of the county. No Fiber To The Home ("FTTH") services were found in Yolo County. Although many of the service providers' networks employ fiber-optic services to interconnect their service areas to one another, no fiber-optic services extend directly to individual homes. Fixed-wireless broadband services include both licensed[9] and unlicensed[10] wireless broadband that can be delivered to households. When comparing the CPUC's availability maps for wireline and wireless services, a significant discrepancy was found between the two. The wireline broadband maps illustrated coverage for a significantly lower percentage of total households whereas the fixed wireless broadband maps illustrated wireless coverage for 100% of Yolo. In reviewing broadband availability map for Yolo, as shown in Figure 3.3, 100% availability is shown in by red shaded area across nearly the entire county, except for the northeast corner, east of Rumsey, there is a lack of coverage. This would indicate that every household in Yolo is served by either a wireline broadband technology or a fixed wireless broadband technology, capable of providing 6 Meg download and 1.5 Meg upload.

Figure 3.3: Yolo Wireline and Wireless Broadband Availability Map

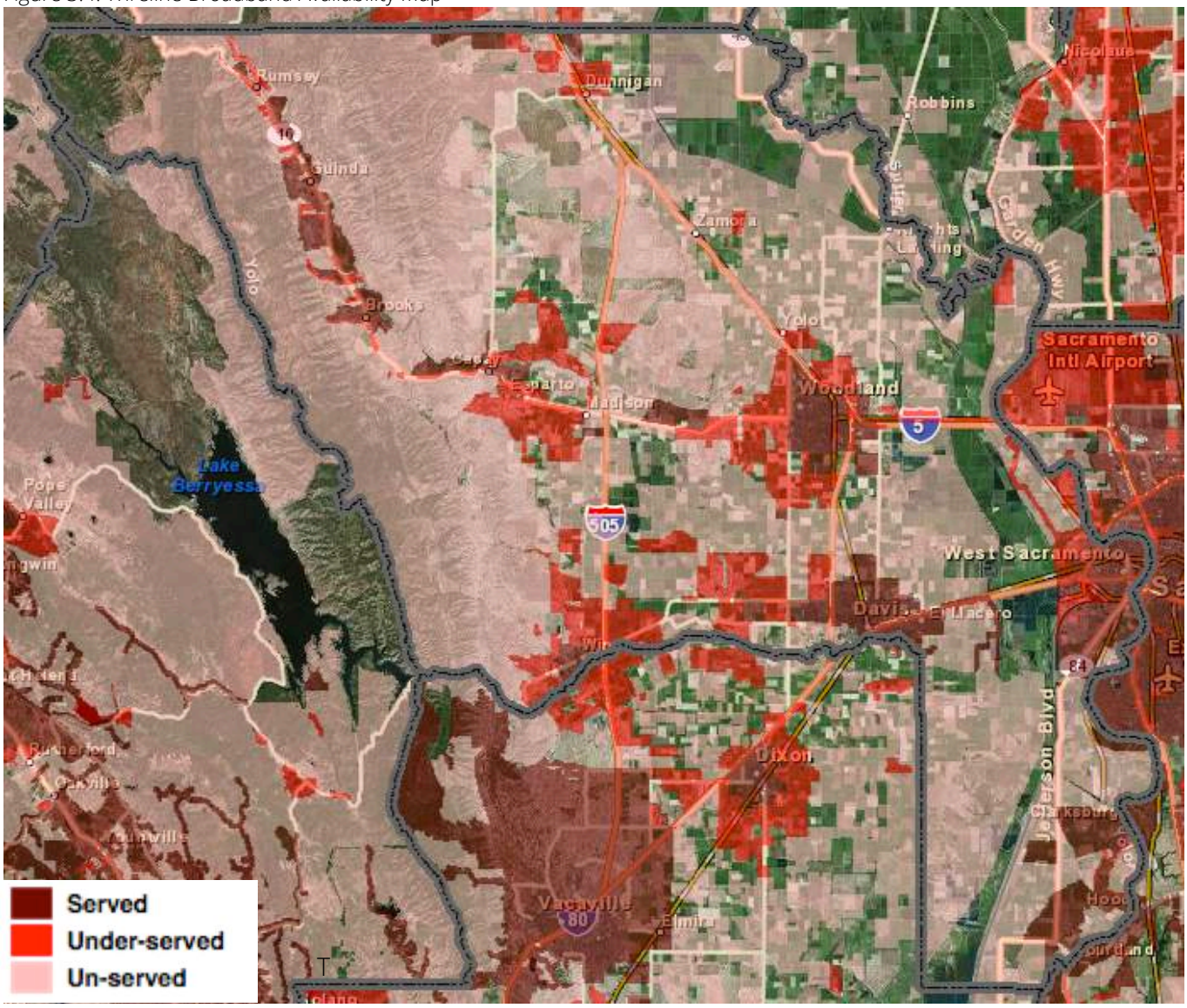


[9] In the US, licensed fixed wireless connections use a private spectrum the user has secured rights to from the Federal Communications Commission (FCC).

[10] In the US, unlicensed fixed wireless connections utilized shared public spectrum for communications which may result in interference within the wireless signal when multiple unlicensed wireless connections exist in an area.

However, when reviewing only the wireline broadband availability map for Yolo, the availability is significantly less, as shown in Figure 3.4 below. Areas in pink and bright red illustrate unserved and underserved regions of the county while areas in dark red illustrate served areas of the county.

Figure 3.4: Wireline Broadband Availability Map



The source of the discrepancy results from two fixed wireless providers reporting significant coverage in the county. Internet Free Planet claims to covers 99% of all households in Yolo County. RuralNet Wireless, LLC claimed that they did not provide services in Yolo County. Internet Free Planet was contacted but did not provide a response. Digital Path, Inc. also claims to provide wireless services in certain areas of Yolo County, namely Dunnigan, Knight's Landing, and Yolo. Based on the information gained on these providers, Yolo County should not be considered to have 100% broadband availability and RuralNet Wireless, LLC and Internet Free Planet should be removed from the list of available

providers that cover Yolo County until it can be determined that they adequately provide service in the area.

Yolo must also ensure that the broadband speeds reported by providers to the CPUC are in fact what residents receive in Yolo's communities. Accurately estimating and tracking broadband speeds is a significant challenge because of the various factors that affect the speed of the broadband service. Providers reporting the download and upload speeds associated with their broadband services often utilize the "Maximum Advertised Speed," which is the top speed that a subscriber in a pre-defined service area can expect to receive. In most broadband networks, including DSL and Cable, these speeds are rarely achieved for a variety of factors, which include:

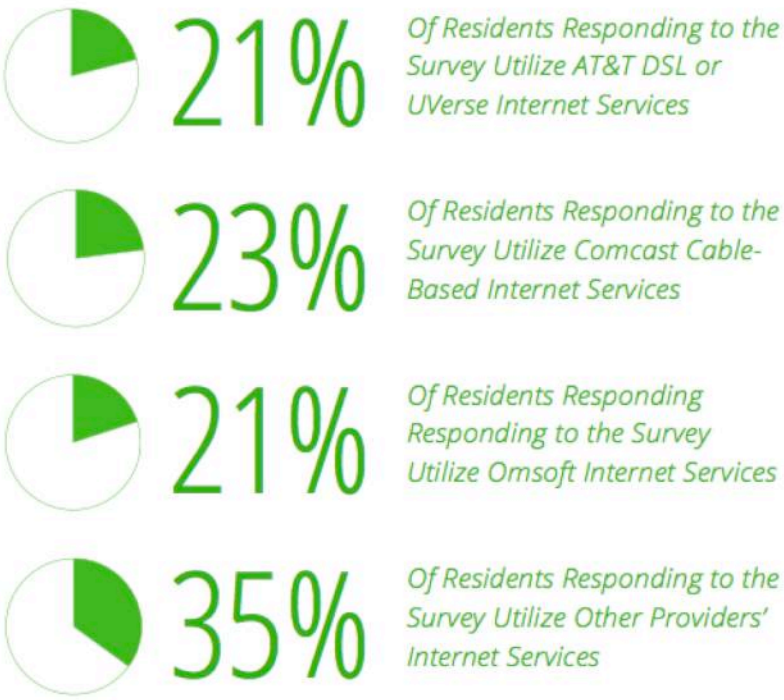
- Specific type and condition of the network
- Distance from the telecom central office or cable headend
- Number of concurrent users utilizing the service simultaneously
- Amount of traffic being transmitted over the network

Subscribers routinely experience significantly lower speeds from those advertised; this is especially true with DSL and cable Internet services. However, actual speeds should somewhat correspond to those reported by broadband providers to the CPUC. This Plan has utilized broadband speed testing to gain understanding of the actual broadband speeds that residents and businesses in Yolo experience. The speed testing provides insight into the types of services that residents and businesses subscribe to in Yolo compared with the actual speeds that they receive.

4. Broadband Community Profiles
Davis

A. Residential

The residential broadband market in Davis is served by multiple providers including AT&T of California, Comcast, Omsoft, and Davis Community Network. Fixed wireless providers also have coverage in Davis including DigitalPath and Winters Broadband. Of 290 respondents, 65% of residential subscribers utilize three providers for their broadband Internet services. Approximately 35% of respondents utilize fixed wireless, satellite, and other competitive providers. From the research conducted, wireline residential broadband services are generally provided via copper broadband infrastructure either through copper cable plant owned by the local exchange carrier or coaxial cable plant owned by the local cable company. Wireless services are provided through terrestrial fixed wireless systems and 3G and 4G mobile wireless carriers[11].



Broadband Internet download and upload speeds reported by the majority of residents surveyed were satisfactory for some but a significant amount of respondents noted issues with their current services. Some 39% of respondents reported download speeds greater than 10Meg. These speeds were generally reported in the most urbanized areas that had a high density of single-family or multi-dwelling units. Some 44% of respondents reported download speeds less than 6Meg. Upload speeds were found to be considerably lower than download speeds; consistent with asymmetrical DSL and cable

[11] AT&T Mobility, Verizon Wireless, T-Mobile, MetroPCS and Sprint

broadband services. Some 58% of respondents reported speeds of less than 1.5Meg. This was unexpectedly high given the 39% of download speeds above 10Meg. In general, higher upload speeds should correspond to higher download speeds, but in the case of these respondents, there was little positive correlation between higher download speeds and higher upload speeds. A significant number of respondents reported issues with their broadband services. Key issues included speeds that were inconsistent, speeds that never achieved their stated bandwidth tiers with service providers and reliability issues with residents' current services. A total of 41% of the respondents reported that their services were moderately to highly reliable while 30% felt that their services had sufficient speed. Some 30% reported that services were unreliable and 60% reported that they did not have sufficient speed.

Measuring the pricing for services against the speeds of services that residents received indicated that there was a direct correlation between the price paid for services and the amount of bandwidth ("speed") received by residents. The following chart illustrates the price of services subscribers in Davis pay and the realized download and upload speeds they experience. The general trend was that higher prices equaled faster speeds and at the highest price tier, residents were receiving up to 20Meg downloads and 5.77Meg uploads for between $100 and $124 per month. These prices are significant for residential Internet services and although Davis prices are competitive to similar communities, the realized speeds are much lower than communities where fiber broadband services have been deployed.

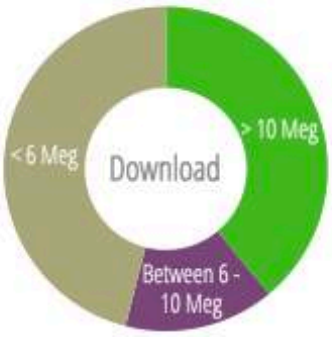
Actual speeds recorded may be different from the speeds residents purchase from service providers in the area. In general, DSL and cable broadband services are sold with speed increments that define a maximum speed for the service such as "Up to 10 megabits down and up to 1.5 megabits up." Actual speeds vary depending on the physical location of the service and how many subscribers are concurrently on the system. The "maximum advertised speed" should not be construed to mean a sustained maximum but instead the top speed of the service which may be considerably lower over long periods of time. However, there is a relationship between the price Davis residents pay for their services and the speeds they realize, as demonstrated through this data.

Analysis of the services available in the area indicates that providers are offering packages in some areas of up to 105Meg download and 20Meg upload on cable-based networks, and 45Meg download and 5Meg upload on DSL based networks. Broadband coverage data also shows this availability. Through deeper analysis into Davis' neighborhoods, these services were found to be available in some communities while others lacked access to these services. In addition, some residents reported upgrading to these higher speed services but did not feel that they were getting the speeds advertised. Results of the survey data validated speeds up to 57Meg in areas reported where these services were offered however, the majority of survey respondents recorded significantly lower speeds. Even at the highest price point paid by the subscribers the median speed was 80% less than the advertised speed.

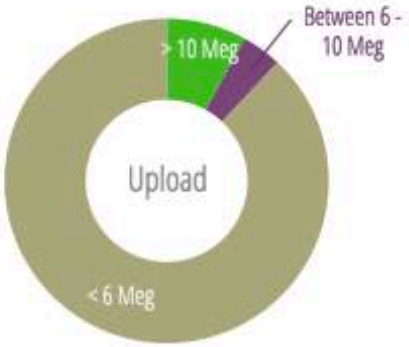
Even at the highest price point paid by residential subscribers, median speeds were 80% less than advertised speeds, which generally indicates highly oversubscribed services

Residential Broadband Services - Davis Survey Data

Residential Broadband Download Speed Test Results



Residential Broadband Upload Speed Test Results



Reilability of Current Broadband Services

Speed of Current Broadband Services

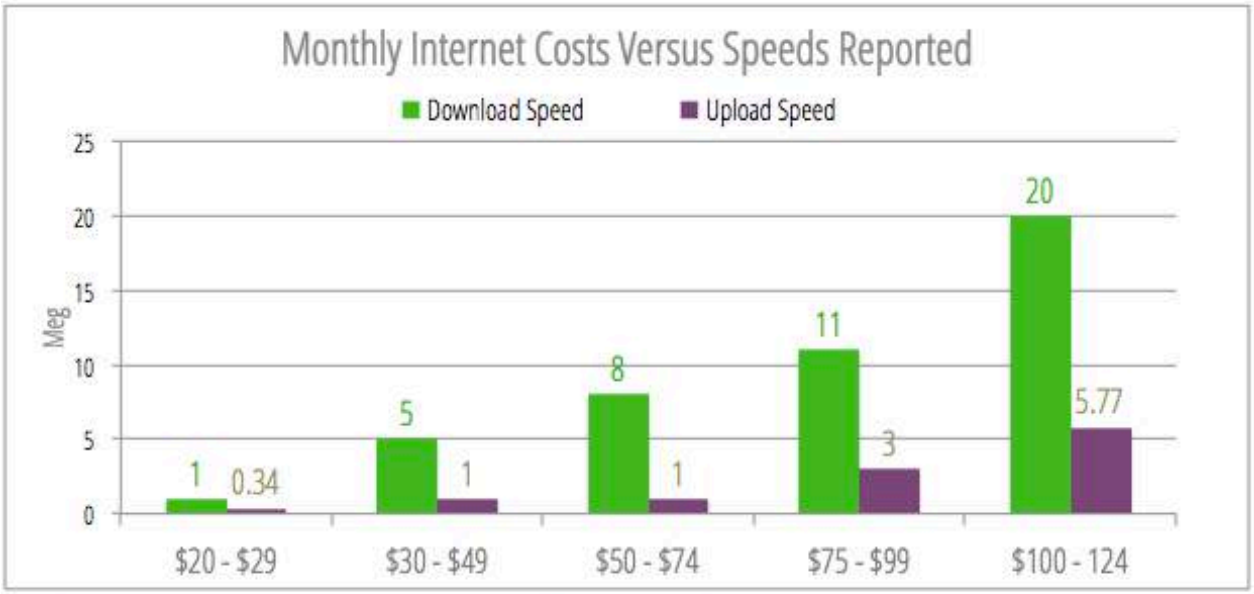


Figure 4.1: Residential Broadband Coverage in Davis *(Download Speeds Only)*

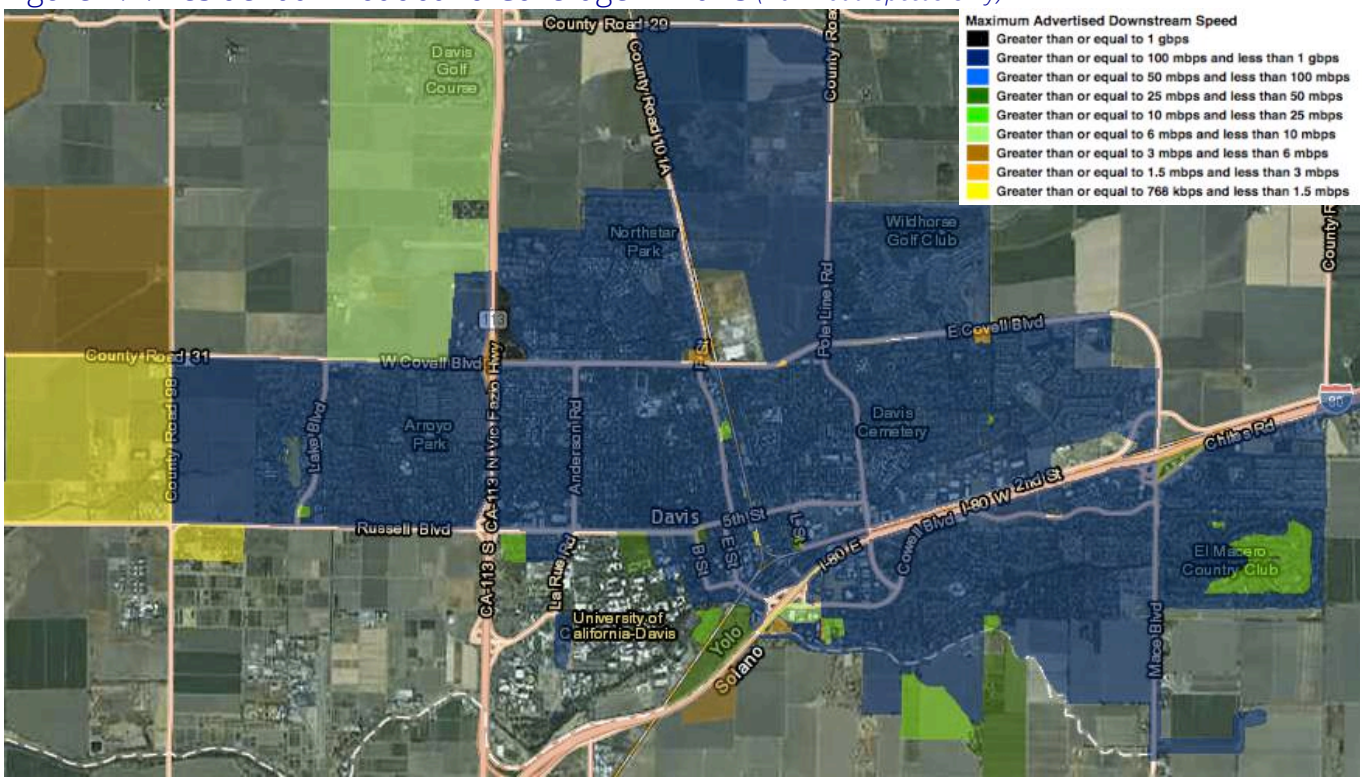
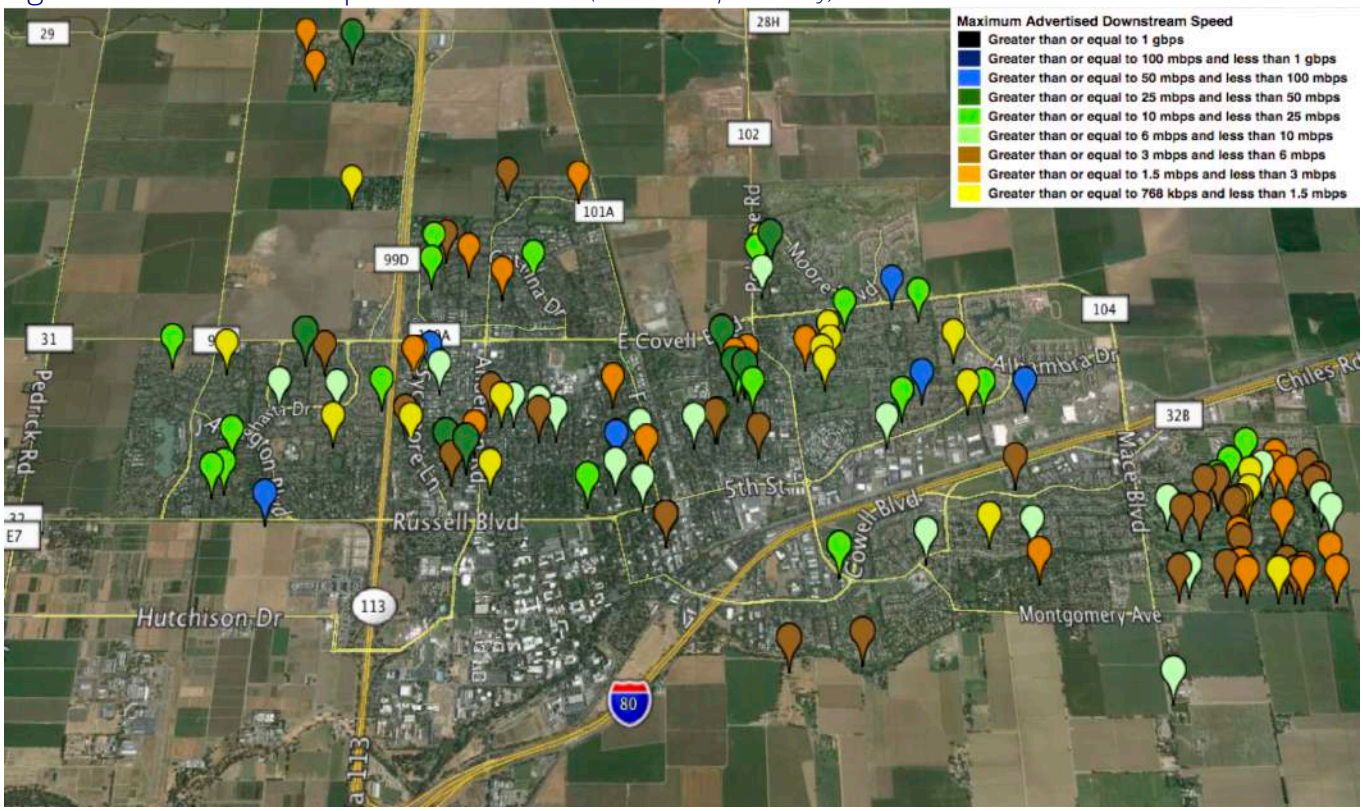
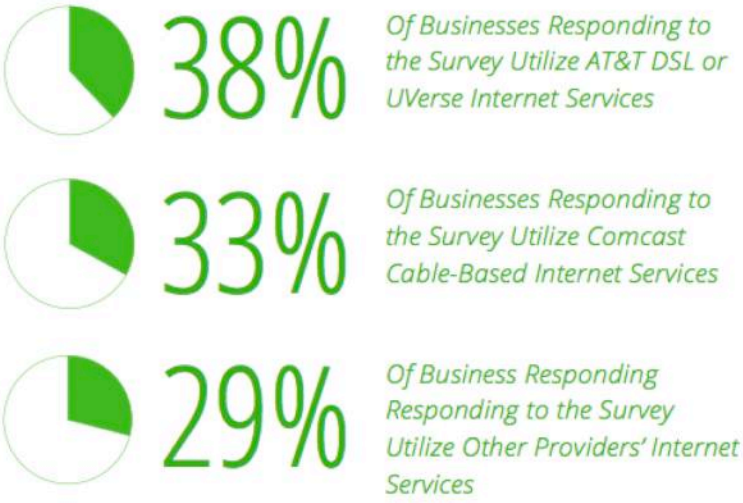


Figure 4.2: Residential Speedtest Results *(Download Speeds Only)*



B. Business

46 businesses in Davis responded to the business survey. Businesses in Davis subscribe to a mix of wireline providers and resellers including AT&T of California, Comcast, and Omsoft. A few businesses also reported utilizing fixed wireless providers including DigitalPath, Inc. and Succeed.net. In general, these services are branded as "business class" and come with a higher quality of service that prioritizes business services over residential services that run across the same physical infrastructure. Pricing for DSL and cable based services were found to range from $39.99 for the lowest speed service to $249.99 for the highest speed service.

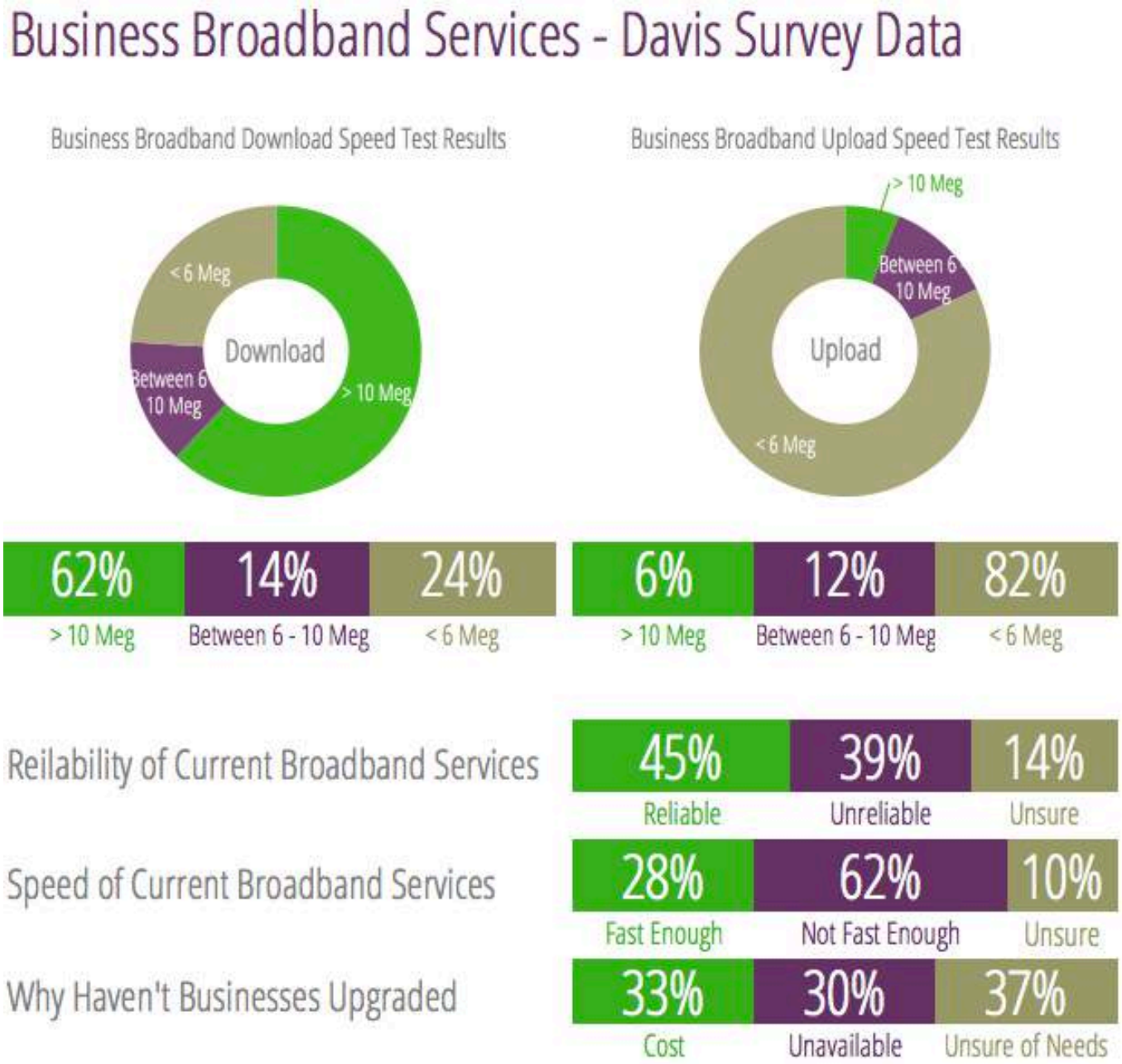


For businesses included in the assessment, 62% reported receiving download speeds of 10Meg or above. Some 24% reported download speeds of less than 6Meg. Upload speeds were commensurate with DSL and cable broadband services with the majority of businesses, 66%, reporting less than 3Meg upload. Businesses reported moderate issues with their current broadband Internet services as 33% of respondents indicated that their current services were not sufficient to meet their business needs. Another 33% reported that they were unsure whether their Internet services were sufficient for their needs.

Local businesses cited numerous examples of the issues they faced with their existing broadband services. Big Data companies provided evidence of how their broadband services were inadequate to process the large amounts of data needed to run their operations. Some businesses have considered relocating to other cities that have affordable next-generation broadband; several companies have already done so. Many companies are small in terms of employees but have large data needs since they utilize significantly more bandwidth than larger companies in other industries. The University also spawns a significant amount of new startups in Davis. As these startups move from the University setting to "off campus," they encounter a significant reduction in broadband capabilities. For these small businesses, three options exist: (1) live with the issues, (2) pay significantly higher costs for next-generation broadband or, (3) relocate to a community where these services are available and affordable.

Only two business reported utilizing a fiber-optic broadband connection in Davis, Breyta, Inc. and an anonymous response. These businesses received direct fiber connectivity providing speeds in range from 20 Meg to 100Mbps. Breyta, Inc. reported that the reliability was low and the price was too high. The vast majority of businesses responding to the survey utilized DSL and cable services because they

could not afford other services or the services were not available in the area. Apart from these few organizations, use of fiber-optic broadband was not reported by Davis' businesses. One potential reason for these high prices is the lack of available distribution of fiber infrastructure in the Davis area. In many communities, providers are beginning to equip business and residential areas with fiber-to-the-premise infrastructure by overbuilding their existing DSL and cable infrastructure. This fiber distribution infrastructure is specifically designed to deliver high-speed, reliable fiber broadband services to residents and businesses at lower costs than are available today. This study did not find any fiber distribution infrastructure in the Davis area that was available to business customers.



One third of the businesses surveyed had not upgrades their services because of cost and 30% had not upgraded because services were not available in their area. Demand for higher speed, higher reliability service necessitates a less costly, more accessible solution for Davis' businesses. New businesses that are cultivated require these services to become mature. Davis' high-tech focus, thriving Seed Tech industry and high concentration of startups need a foundation of next-generation broadband to grow. Big Data driven companies that may be small in employee size but large in their broadband needs must have access to affordable, scalable broadband services that exceed the capabilities of traditional the traditional small business DSL and cable broadband services.

Small companies that have an international presence also require affordable, enhanced broadband services to connect to international branch offices and partners. General businesses would also benefit from these services as they begin to utilize more online applications that improve productivity and competitiveness. Davis should implement a broadband strategy that includes both the heavy users of broadband services but also those that do not have such high demand for bandwidth, but instead need reliable, stable broadband. Many of Davis' small businesses need consistent broadband service, regardless of the amount of bandwidth.

Comments from Businesses in Davis:

Home-Based Web Development Firm – "Must have guaranteed bandwidth. Only way to achieve this was through expensive bonded T-1's which theoretically should provide 3Meg but need much higher speed..."

Property Management Company – "Frequent drop-outs and slowdowns even though we clocked a fast speedtest."

Small Tech Business – "We are forced to use the University's connectivity for our online data processing research, our office connection is way too slow"

C. Community Anchors

Education

The Davis Unified School District is supplied with fiber-optic connectivity via the local I-Net that was provisioned as part of the City of Davis Franchise Renewal Agreement with Comcast of California Inc. The I-Net enables high-bandwidth interconnection between schools. Internet connectivity is supplied through a second fiber connection to the Board of Education that provides 250Meg of Internet to the district's schools in the area. The majority of the District's schools are connected however there are several smaller sites that receive lower speed access; particularly with Fairfield Elementary School and those in south Davis where schools maintain 1.5Mbp T1 services for their broadband needs. As online education grows for school districts, the importance of their broadband services becomes even more important to deliver a blended curriculum to their students. As new testing requirements from California's Common Core State Standards take effect this year, districts will rely on their broadband connectivity for more advanced online testing programs. Therefore, the long-term broadband needs of the Davis Joint Unified School District should be considered as a part of Davis' broadband development efforts.

University of California at Davis has significant broadband capabilities on campus and to some of the University's off-campus locations within the city. 10Gbps connections to the Internet, research, and education networks all provide immense connectivity to students, faculty, and staff, however; there are some off-campus locations for which Davis does not currently have high-speed connectivity. In addition, several off-campus housing facilities could potentially benefit from expanded broadband services, enabling students to maintain the same quality and speed as when they are on-campus. Furthermore, the University's needs for expanded broadband reach into the residential areas of Davis and greater Yolo County. Faculty, staff, and students all live in the vicinity of the University and need high-speed, reliable connections back to the University.

Los Rios Community College maintains a presence on the UC Davis Campus. Los Rios reported that data needs for the college continues to increase exponentially and current bandwidth levels are insufficient and are currently constrained due to cost of services. Los Rios would welcome new cost effective methods for providing connectivity to its various sites.

Healthcare

Healthcare organizations in Davis could derive significant benefit from expanded broadband capabilities. Several organizations have expressed issues with existing broadband connectivity and are looking for solutions to "keep up" with the latest electronic health technologies. These organizations serve Davis and its surrounding communities. They need broadband connectivity between one another that allows them to use the latest technologies to deliver quality patient care. CommuniCare locations across Yolo County (Davis Community Clinic) still utilize T1 technology to interconnect with the California Telehealth Network, which delivers a suite of Telehealth, telemedicine, and health information exchange services. A T1 connection for these services is barely enough bandwidth to enable these facilities to take advantage of new electronic health services that will be transported

across these connections. CommuniCare is looking for options to upgrade these current T-1 services to fiber in order to have access to more online telehealth applications.

Local Government

The City currently maintains fiber-optic connectivity between its major sites as part of its renewed cable services Franchise Agreement with Comcast, Davis' local cable provider. The franchise agreement was renewed on October 1, 2005 and expires on September 30, 2018 (13 years). The Franchise Agreement details the services, terms, conditions and payments that will be made between the City of Davis and Comcast. As part of the negotiated agreement, Comcast has provided 6-strands of fiber to 22 "Major Facilities" throughout the city. It also connects three Yolo County facilities that are within the City of Davis, which provides interconnection with the greater Yolo County fiber network. The Comcast network, known as the "I-Net" or Institutional Network, enables the city to provide connectivity for municipal operations, utilities, public safety, and general administration. The I-Net also serves 17 schools with fiber connectivity. Covenants in the Franchise Agreement limit the use of this network for institutional purposes only. The City is prohibited from any "non-commercial applications and purposes and shall not lease, resell or grant access privileges to I-Net capacity or services to a third party."[12]

Although this agreement will remain in force for the next several years, the City should begin considering the implications of a potential non-renewal of this agreement. Cable television franchising has been migrated to the State of California, managed by the California Public Utilities Commission by way of the Digital Infrastructure and Video Competition Act of 2006 (DIVCA). Prior to DIVCA, cable television franchises were issued by cities and counties individually. DIVCA replaces the local franchising system with one in which video franchises are now issued by the CPUC, rather than these local entities. In many cases, this has negatively affected local municipal power to negotiate favorable terms and conditions of service in their communities. As a result, many I-Nets and municipal networks that were negotiated between municipalities and cable companies have been threatened and cable companies have either discontinued municipal use of these networks or have charged prohibitively high fees for continued access.

For Davis, this is an issue that could have significant financial impacts to the City, County and Davis Joint Unified School District (DJUSD) beginning in 2018. If Davis is unsuccessful in renegotiating similar terms of use of the I-Net, it could mean an ongoing operational cost for the City, County, UC Davis and DJUSD, as all entities utilize the I-Net for fiber connectivity. Based on the original Franchise Agreement (dated Oct. 1, 2005) 39 sites were to be connected to the I-Net dark fiber network as follows:

- City of Davis Sites: 16
- Yolo County Sites: 3
- Davis Joint Unified School District Sites: 17
- UC Davis Sites: 1

[12] Franchise Renewal Agreement Between The City of Davis and Comcast of California X, Inc. Accessed June 2014.

D. Strategies & Action Items

Recommendation 1: Pursue viable options to mitigate the impending expiration of the Comcast I-Net agreement and additional costs the City may incur:

a) Identify potential partnerships with other broadband providers that may provide a means to replace the current I-Net agreement and support stakeholder needs for broadband;

b) Consider conducting a feasibility study to develop the business case for a community broadband network. This feasibility study should include:

(1) What organizations and service providers are anticipated to use the network;
(2) An engineering design for the network;
(3) An estimated timeline for construction of the network;
(4) Cost estimates, financial plan and financing options for the network;
(5) A plan for managing the network's operations and maintenance; and
(6) Community benefits to be gained from a network; and,

c) Should the City seek renegotiation of the expiring Comcast agreement, ensure that negotiations are not delayed such that it jeopardizes the City's strategic options

Timing: The City should agree on the terms of the renegotiation with Comcast or plan to utilize another network (which may include building its own community broadband network) no later than September of 2016.

Common Action Items

Recommendation 2: Adopt General Plan policies that incorporate broadband as a public utility and create a policy framework to promote its deployment in public and private projects as appropriate. This includes:

a) Tailoring the sample policies and standards (included in the appendix) to the City's specific needs and adopt them into local policy, codes and standards (including policies, dig-once, joint trenching, engineering standards, etc.);

b) Incorporating broadband in the City's Development Impact Fee program and the City's Capital Improvement Plan (CIP) as appropriate and make a commitment to fund broadband infrastructure;

c) Identifying opportunities to install broadband infrastructure in conjunction with public and private construction projects as appropriate;

d) Developing a process so that Planning and Public Works coordinate with IT to identify projects that could install this infrastructure at reduced costs;

e) As the City builds out its network, maintaining broadband infrastructure in the City's GIS system, requiring GIS-based as-builts and implement any other means for accurate documentation;

f) Evaluating ways to streamline the broadband permitting processes within public rights of way to ensure broadband providers do not face unnecessary obstacles to building infrastructure; and

g) Evaluating fees levied to broadband providers for constructing broadband infrastructure to ensure they do not discourage broadband investment.

Timing: The City should adopt General Plan policies and implementing codes and standards over the next 12 months. Implementation should be ongoing.

Recommendation 3: Coordinate with other agencies with facilities in the City (i.e. DJUSD, UC Davis, Unitrans, Yolo County, Yolo County Housing, Yolo County Office of Education, etc.) on a regular basis to leverage opportunities to reduce broadband construction costs by:

a) Reviving the regular Utility Coordination Meeting attended by the cities/County (and potentially add the public agencies listed above) to facilitate the long-term planning of broadband infrastructure; and

b) Coordinating on a regular basis to identify opportunities for joint construction, use and broadband infrastructure sharing between local agencies to lower costs and maximize public benefit.

Timing: The City should develop these collaborative programs with other public agencies over the next 3 months.

5. Broadband Community Profiles
West Sacramento

A. Residential

The residential broadband market in West Sacramento is served by two primary providers, AT&T of California, the incumbent local exchange carrier and Wave Broadband, the local cable provider. Fixed wireless providers also provide coverage in West Sacramento, including DigitalPath and Succeed.Net. Initial data collected from surveys indicates that 80% - 90% of residential customers utilize either the local exchange carrier or the cable company for their broadband Internet services. Approximately 10% of residential customers utilize fixed wireless, satellite and other competitive providers. From the research conducted, wireline residential broadband services are provided via copper broadband infrastructure, either through copper cable plant owned by the local exchange carrier or coaxial cable plant owned by the local cable company. No fiber-to-the-home providers were identified in West Sacramento. Wireless services are provided through terrestrial fixed wireless systems and 3G and 4G mobile wireless carriers such as AT&T, Verizon and Sprint.

Broadband Internet download and upload speeds reported by the majority of residents surveyed were commensurate with cable and DSL services in the region. Samples were collected from 198 residential broadband subscribers across West Sacramento. Some 57% of respondents reported download speeds greater than 10Meg. These speeds were generally reported in the most urbanized areas that had a high density of single-family or multi-dwelling units. A total of 33% of respondents reported download speeds less than 6Meg. Upload speeds were found to be considerably lower than download speeds, consistent with asymmetrical DSL and cable broadband services. Only 6% of respondents received upload speeds of over 10Meg while 2% received between 6Meg and 10Meg and

46% *Of Residents Responding to the Survey Utilize AT&T DSL and UVerse Internet Services*

41% *Of Residents Responding to the Survey Utilize Wave Broadband Cable-Based Internet Services*

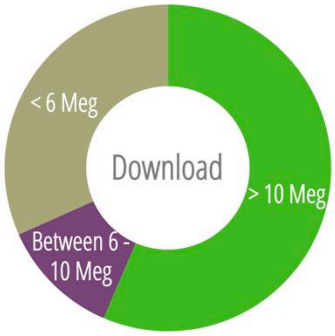
13% *Of Residents Responding to the Survey Utilize Other Providers, Including Wireless and Satellite*

92% received less than 6Meg. Respondents reported general satisfaction with the speed and reliability of their broadband Internet services. Some 80% responded that their services were moderately to highly reliable while 67% felt that their services had sufficient speed.

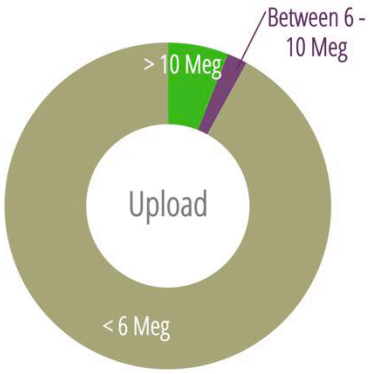
Measuring the pricing for services against the speeds of services that residents received indicated that there was a direct correlation between the prices paid for services and the amount of bandwidth ("speed") received by residents. The chart below illustrates the price of services residents in West Sacramento pay for services and the realized download and upload speeds for these services. It is important to note that the speeds reported are actual speeds recorded, which may be different from the speeds residents purchase from service providers in the area. In general, DSL and cable broadband services are sold with speed increments that define a maximum speed for the service, such as "Up to 10 megabits down and up to 1.5 megabits up." Actual speeds vary depending on the physical location of the service and how many subscribers are concurrently on the system.

Residential Broadband Services - West Sacramento Survey Data

Residential Broadband Download Speed Test Results

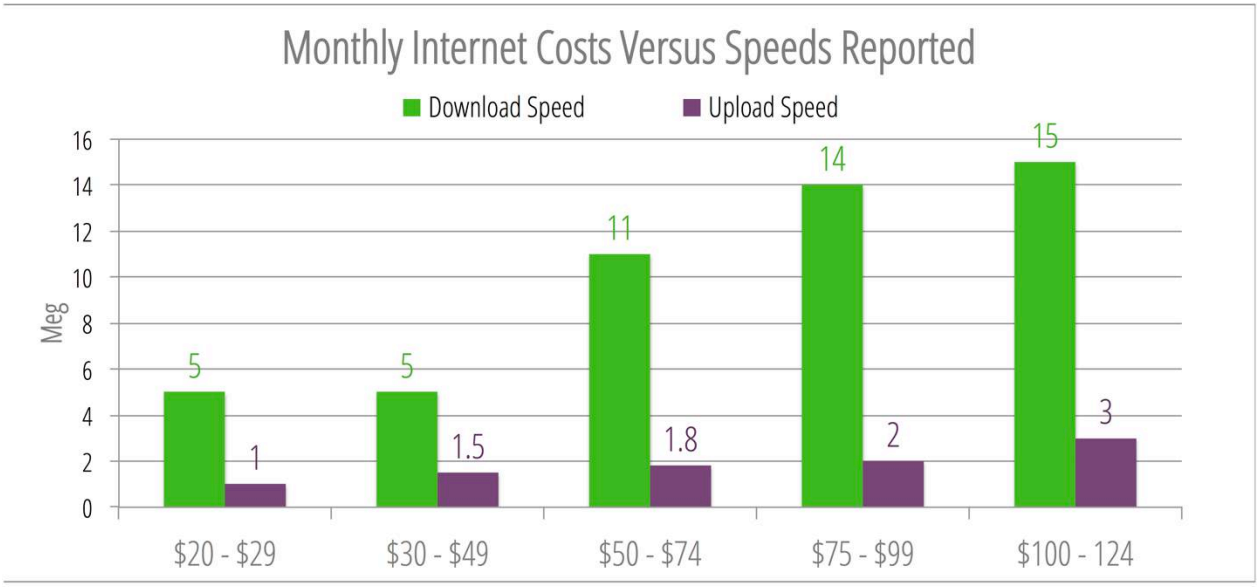


Residential Broadband Upload Speed Test Results



Reilability of Current Broadband Services

Speed of Current Broadband Services



Business Broadband Download Speed Test Results

Business Broadband Upload Speed Test Results

Figure 5.1: Residential Wireline Broadband Availability By Speed (Download Speeds)

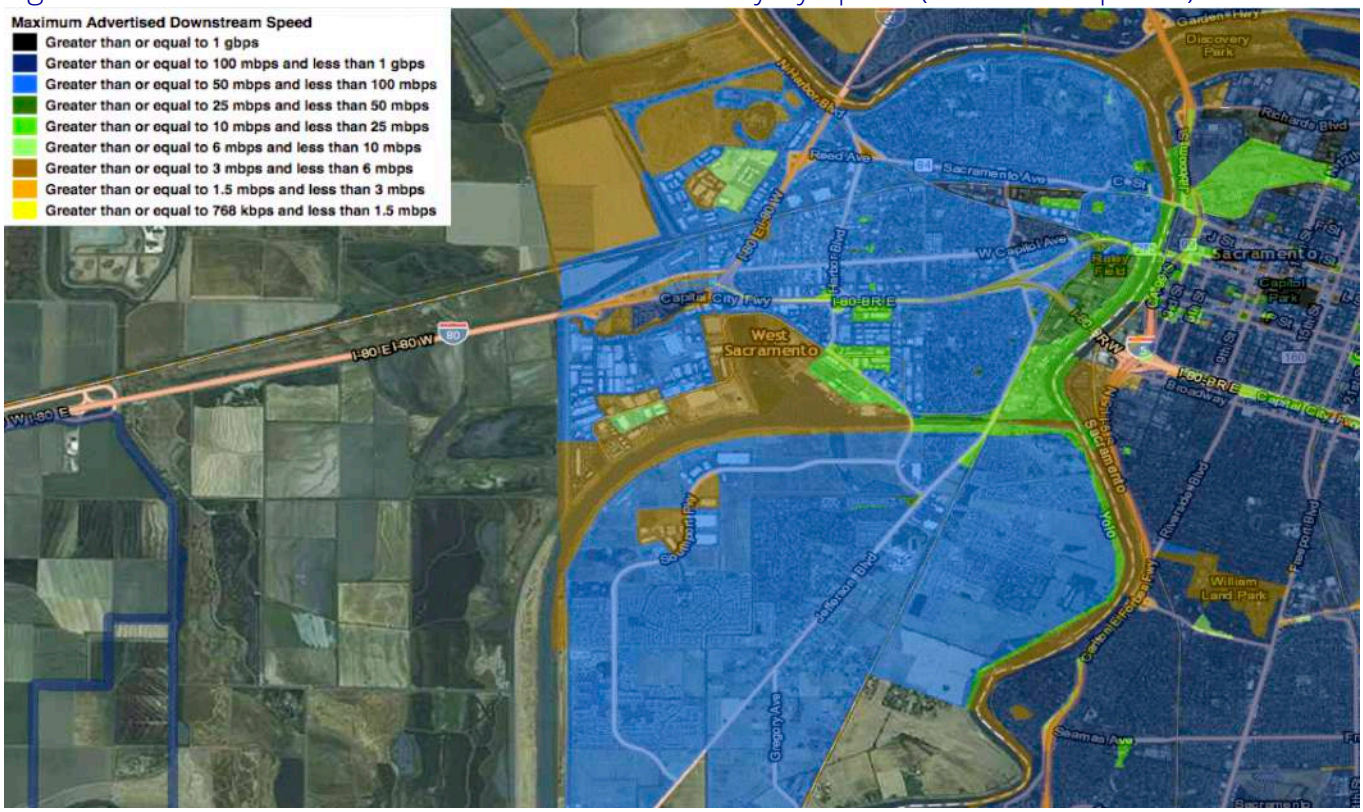
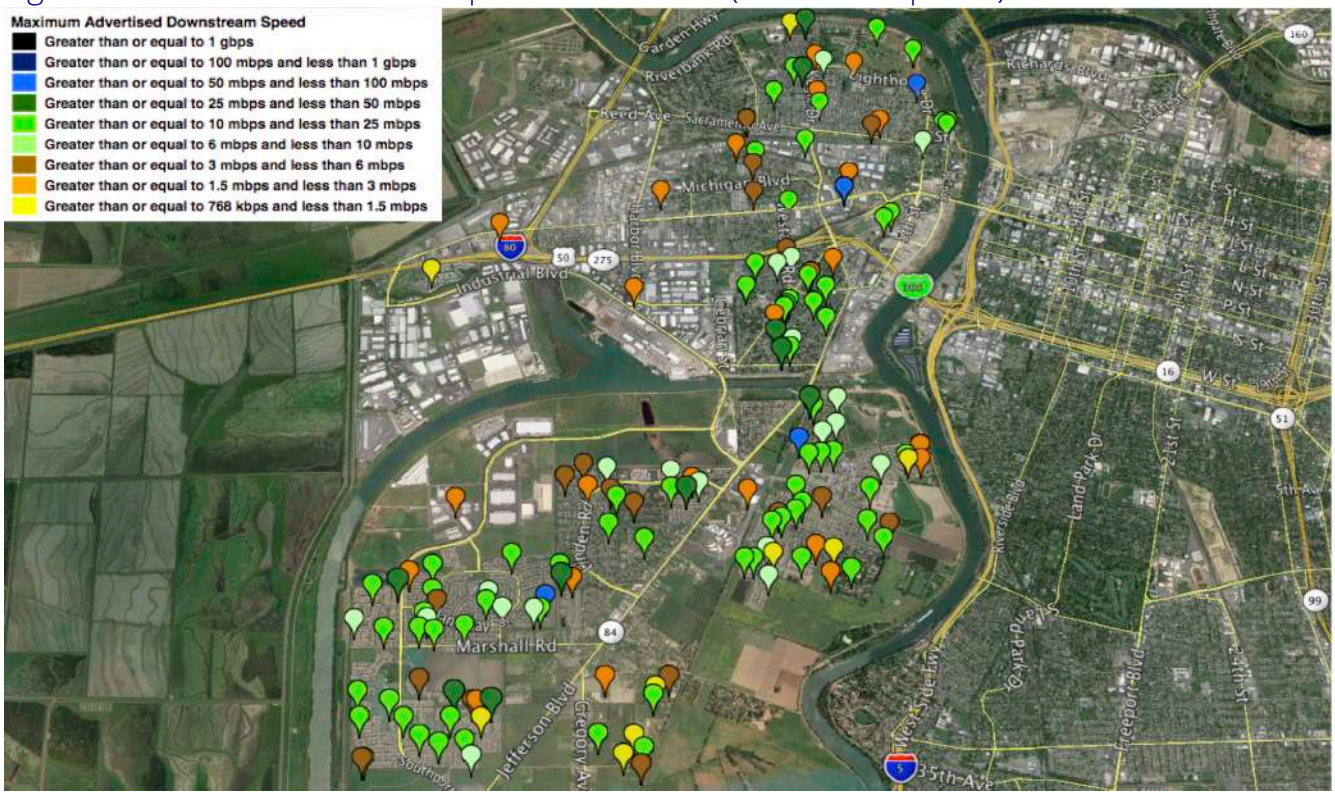
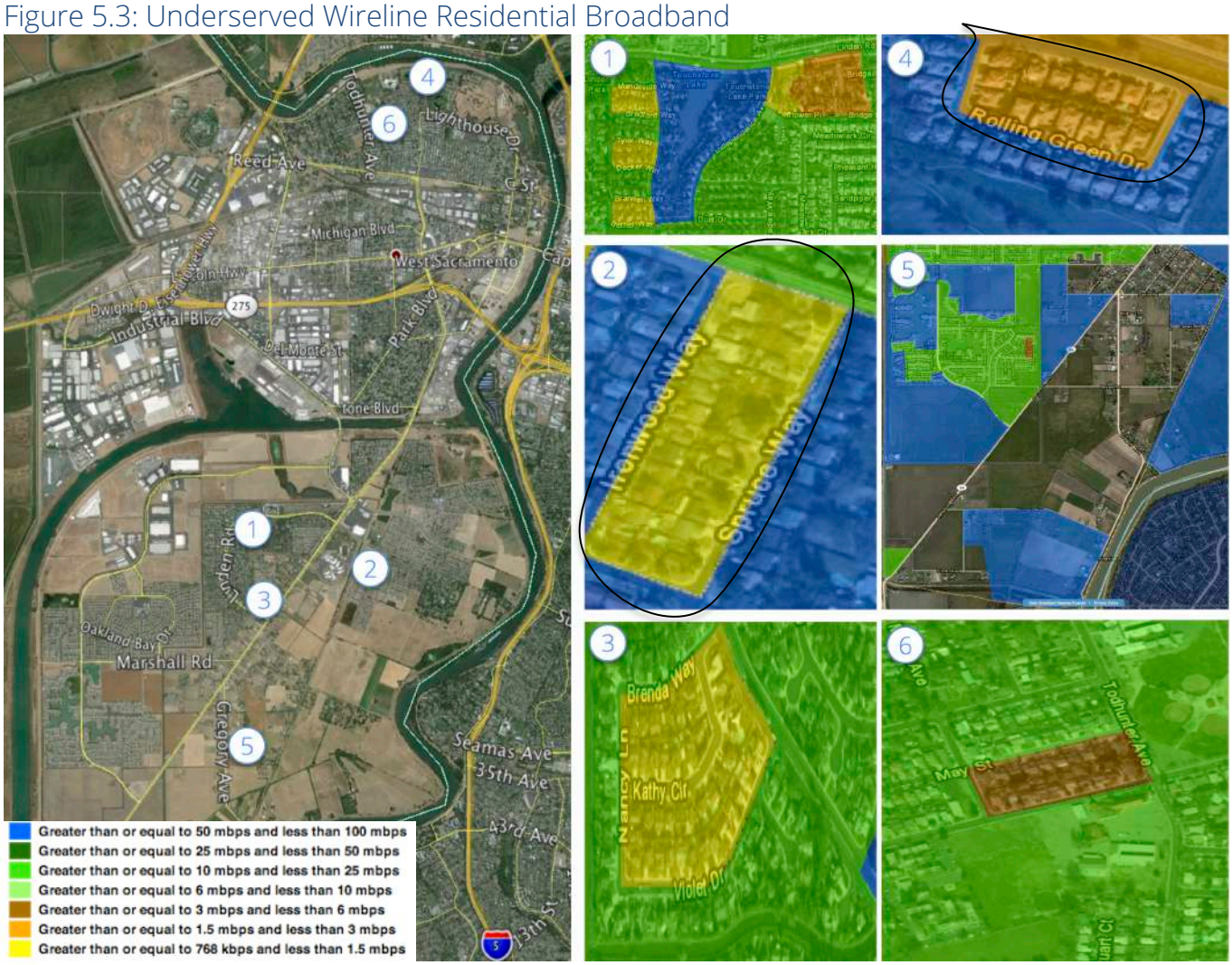


Figure 5.2: Residential Wireline Speed Test Results (Download Speeds)



Although West Sacramento is generally well served from a wireline broadband perspective, the City has several pockets that are classified as unserved or underserved per definition by the California's Public Utilities Commission.[13]. The largest area that is currently classified as unserved covers the Northeast and Southeast Villages of Southport. This area covers approximately 543 residents and 216 households. Survey data collected in this area indicates that 3G and 4G wireless is utilized as the primary means of broadband Internet connectivity. Residents reported receiving speeds between 1.2Meg and 12Meg on their wireless services fro Verizon Wireless and Clear Wireless. For television, respondents all reported receiving service from Dish, DirectTV or HughesNET. A few respondents also reported using these satellite providers for their Internet connectivity.

Figure 5.3: Underserved Wireline Residential Broadband



[13] In February 2012, the Commission adopted decision D.12-02-015, which changed the Commission's definition of areas that are underserved by broadband. The current definition states that underserved areas are offered broadband slower than 6 Meg download and 1.5 Meg upload. The previous definition was underserved areas were offered broadband slower than 3 Meg download and 1 Meg upload

1

Linden Park Area – Population 345, Households - 149

Small segments of underserved households in a residential area served by AT&T California and Wave Broadband. Wave Broadband reports serving zip code 95691 that covers this area. Per FCC Form 477 data, maximum advertised download speed greater than or equal to 768Kbps and less than 1.5Meg. Maximum advertised upload speed greater than or equal to 200Kbps and less than 768Kbps. Fixed wireless available via DigitalPath, Inc. greater than or equal to 6Meg and less than 10Meg download.

2

Lake Washington Blvd Area – Population – 644, Households - 215

Moderately sized residential underserved area served by AT&T California. Wave Broadband reports serving zip code 95691 that covers this area. Per FCC Form 477 data, maximum advertised download speed greater than or equal to 768Kbps and less than 1.5Meg. Maximum advertised upload speed greater than or equal to 200Kbps and less than 768Kbps. Fixed wireless available via DigitalPath, Inc. greater than or equal to 6Meg and less than 10Meg download.

3

Summerfield Park Area – Population – 385, Households - 119

Moderately sized residential underserved area served by AT&T California. Wave Broadband reports serving zip code 95691 that covers this area. Per FCC Form 477 data, maximum advertised download speed greater than or equal to 768Kbps and less than 1.5Meg. Maximum advertised upload speed greater than or equal to 200Kbps and less than 768Kbps. Fixed wireless available via DigitalPath, Inc. greater than or equal to 6Meg and less than 10Meg download.

4

Rivercrest Drive Area – Population – 149, Households - 56

Moderately sized residential underserved area served by AT&T California. Wave Broadband reports serving zip code 95605 that covers this area. Per FCC Form 477 data, maximum advertised download speed greater than or equal to 1.5Meg and less than 3Meg. Maximum advertised upload speed greater than or equal to 200Kbps and less than 768Kbps. Fixed wireless available via DigitalPath, Inc. greater than or equal to 6Meg and less than 10Meg. Fixed wireless available from Succeed.net greater than or equal to 100Meg and less than 1Gbps download.

5

Northeast/Southeast Villages – Population– 543, Households- 216

Moderately sized residential underserved area with no reported wireline local exchange carrier. Wave Broadband reports serving zip code 95691 that covers this area. Fixed wireless available via DigitalPath, Inc. greater than or equal to 6Meg and less than 10Meg. Dialtone service may be provided by the local incumbent local exchange carrier but no DSL capabilities have been reported in this area.

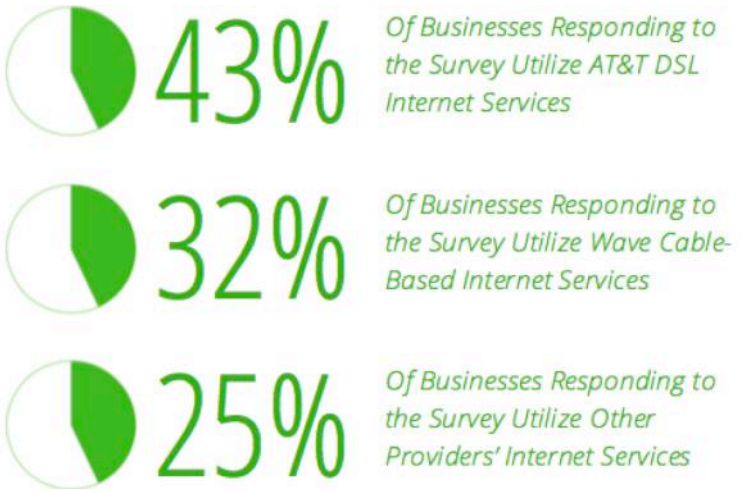
6

Todhunter Ave Area – Population – 75, Households - 20

Moderately sized residential underserved area served by AT&T California. Wave Broadband reports serving zip code 95605 that covers this area. Per FCC Form 477 data, maximum advertised download speed greater than or equal to 1.5Meg and less than 3Meg. Maximum advertised upload speed greater than or equal to 200Kbps and less than 768Kbps. Fixed wireless available via DigitalPath, Inc. greater than or equal to 6Meg and less than 10Meg. Fixed wireless available from Succeed.net greater than or equal to 100Meg and less than 1Gbps download.

B. Business

Based on the results of the survey, businesses in West Sacramento primarily subscribe to DSL or cable based services provided by AT&T of California and Wave Broadband. 59 businesses responded to the business survey. A total of 43% of respondents reported utilizing AT&T DSL services for their businesses while 32% of respondents reported utilizing Wave Broadband cable services. The remaining businesses utilize alternative wireline providers, fixed wireless providers or 3G/4G providers.



Wireline services utilize the same copper cable infrastructure that is used to provide residential services. In general, these services are branded as "business class" and come with a higher quality of service that prioritizes business services over residential services. Pricing for DSL and cable based services ranges from $49.99, for the lowest speed service to $249.99 for the highest speed service.

Fiber-optic services are also available on an Individual Case Basis or "ICB"[14] in certain areas of West Sacramento. In general, this suggests that there is no fiber-to-the-premise technologies being implemented in West Sacramento and providers deploy these services in a "point to point"[15] configuration. Several businesses have reported using fiber-optic broadband, including the Sacramento River Cats and California Fuel Cell Partnership. Public organizations also utilize fiber-optic services from local providers. They are priced significantly higher than DSL and cable broadband services and are generally only utilized by larger businesses and government organizations in the area. As of the date of this Plan, neither AT&T nor Wave Broadband had responded to Magellan's request to meet with them to gain further information on their fiber-optic services, pricing or maps.

For businesses included in the assessment, 33% reported receiving download speeds of 10Meg or above. Some 54% reported download speeds of less than 6Meg. A total of 85% of businesses reported upload speeds of less than 6 Meg which corresponds to a similar proportion of residential broadband users in West Sacramento – 92% of residential respondents did not receive uploads greater than 6 Meg. Businesses reported key issues with their current broadband Internet services, as 47% of

[14] Individual Case Basis means that there is no standard service or rates attached to the particular telecom product. In the case of fiber broadband, ICB denotes that the services are available but each service will be specified individually in terms of the cost to provide the service and the its technical configuration.

[15] Point-to-Point configuration denotes a fiber broadband connection that is built to a customer's location off of the provider's backbone fiber rather than through fiber-to-the-premise technologies that are more cost effective for the provider and end user.

respondents indicated that their current services were not sufficient to meet their needs. The majority of businesses cited speed and reliability of their current services as challenges to their daily operations. Some 45% of businesses reported speed as the key issue with their current service and cited access to online business applications such as accounting, cloud, videoconferencing and data storage as the reason why their Internet services are critical in their operations. Many businesses reported "slow downs" in their services that caused disruptions in video and telephone calls and loss of connectivity to online business applications. These issues impacted both commercial parcels and residential home-based businesses.

When asked why these businesses haven't upgraded their services, a significant amount of businesses cited cost as the number one reason, accounting for 39% of respondents. The next two reasons went hand in hand; 30% of businesses reported that services were not available to them and another 30% reported that they either unsure of what services they needed for their businesses or did not have the technical expertise necessary to upgrade their services. This indicates a possible education and adoption issue with West Sacramento's businesses if they are not informed of the options that are available in the market to them.

Cost is a key issue in the West Sacramento market. Demand for higher-speed services from the business community necessitates a less costly solution than is currently available. Businesses from various geographic locations in the city all report the same issue. In some cases, fixed wireless services may provide a cost effective alternative to fiber however, no businesses reported using fixed wireless for their broadband needs. Fixed wireless may be a complementary broadband solution in some instances but depends on the propensity of businesses to rely on a wireless solution for their critical business needs. The absence of affordable, available fiber broadband infrastructure results in many businesses "living with" their current services, which results in less efficiency and competitiveness for these businesses. High-speed, reliable broadband is a differentiating factor for businesses. Without it, current businesses will continue to remain impaired and West Sacramento will have difficulty attracting new business to the area.

> *Businesses in West Sacramento want higher speed and reliability in their broadband services; however, their only option is a fiber-optic connection, which starts around $1,000 per month for a 30 Megabit connection and is unaffordable for most businesses.*

Comments from Businesses in West Sacramento:

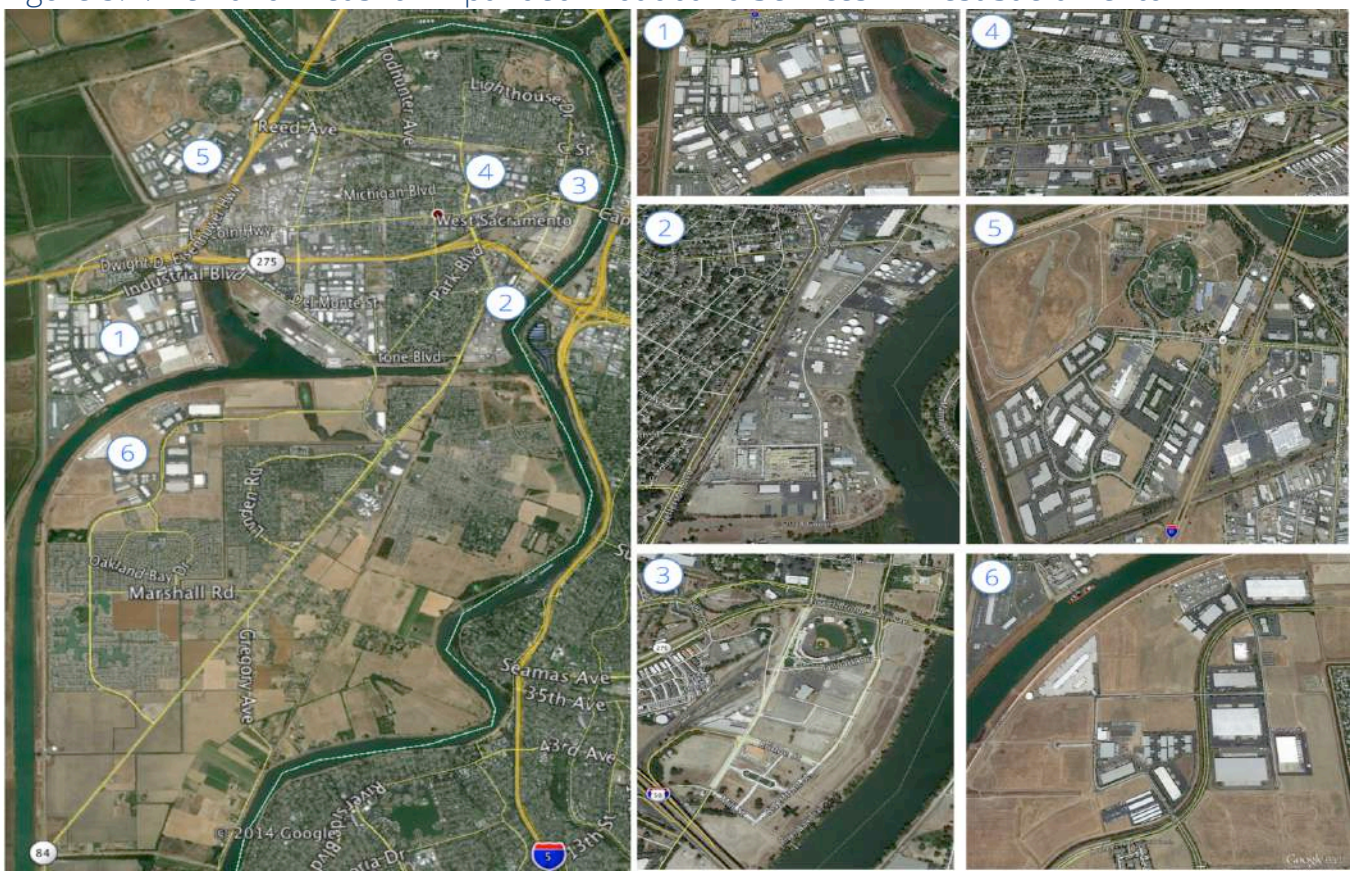
Home Service Business – "Our provider is slow, unreliable goes down every day for minimum of 1/2 hour, we have no other options at our location."

Real Estate Office – "Our current provider cannot provide high speed Internet service because we are too far away from their hub."

Local Bank – "We work in the cloud, no Internet, no work. When issues occur, nothing gets done in our office."

For West Sacramento, a key part of the City's economic development strategy should address the sufficiency of broadband services for its business community. This strategy should target key areas of the city to ensure affordable fiber broadband is available to the Bridge District, business parks, redevelopment areas and the downtown corridor. The below illustrate these target areas for high-speed broadband services, along with a description of the broadband needs.

Figure 5.4: Demand Areas for Expanded Broadband Services in West Sacramento



1

Port Industrial Park

The Port of Sacramento Industrial Park is located on Enterprise Boulevard south of the I-80/Enterprise Boulevard interchange with easy access to I-80, Business 80/US 50, I-5, and the Sacramento Metro Airport. Primarily small to medium sized organizations reported utilizing DSL and cable-based services. The high concentration of businesses and potential economic development opportunities make this a prime location for expansion of next-generation broadband.

2

Pioneer Bluff Area

South of I-80 along the waterfront, DSL and cable based broadband infrastructure was reported in the majority of the district. No fiber distribution was identified for small and medium business broadband needs, however several large businesses reported access in this area. More analysis should be completed to determine the need for fiber broadband services in the area.

3

Bridge District

This waterfront redevelopment area encompasses 125 net developable acres bounded by the Sacramento River on the east, former S.R. 275 on the north and U.S.50/Business 80 Capital City Freeway on the south Raley Field is served with fiber broadband but no other fiber distribution was located in this area. Long-term planning for fiber broadband would enhance the redevelopment efforts for the Bridge District. The City already maintains a 4.5 mile conduit system in this area which could be leveraged in partnership with providers to deploy affordable, accessible broadband services.

4

Washington Specific Plan Area

The Washington Specific Plan Area is immediately north of the Bridge District and includes substantial Class "A" office space. Twelve-acres of this Plan Area have a planned unit development in place, permitting a mix of office, residential, and retail uses. Other riverfront properties in the Washington area are zoned similarly. No fiber broadband services were reported by businesses in this area, but only a few businesses provided information. More analysis should be completed in this area to assess the need for fiber broadband infrastructure.

5

Riverside Center

Riverside Commerce Center is a 75 acre, mixed use business park located at Interstate 80 and Reed Avenue designed for light industrial, flex and office space for leading edge, technology-focused companies. Businesses in Riverside Center all reported using DSL and cable based services and could potentially benefit from upgraded fiber broadband services, particularly for high-growth companies.

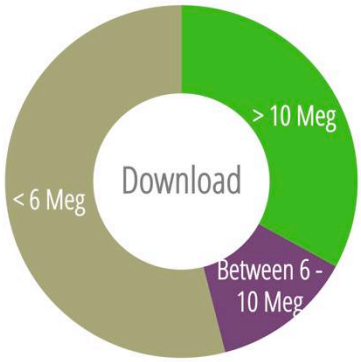
6

Southport Business Park

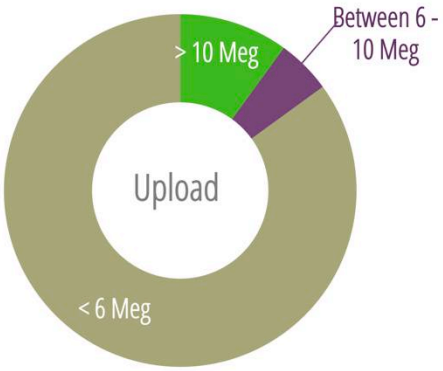
Southport Business Park is a new, 670-acre, master planned, mixed-use business park located near the US 50 / Harbor Boulevard interchange. Cable and DSL based broadband services are available in the Park. The Park is bordered by fiber infrastructure but very little fiber distribution is available within the Park to provide affordable broadband services.

Business Broadband Services - West Sacramento Survey Data

Business Broadband Download Speed Test Results



Business Broadband Upload Speed Test Results



Reilability of Current Broadband Services

Speed of Current Broadband Services

Why Haven't Businesses Upgraded

C. Community Anchors

Education

The majority of Washington Unified School District's sites are interconnected to one another with fiber connectivity supplied by local providers in the area. Generally these schools are equipped with the high-speed, reliable services they need to deliver online educational programs to their students. Schools continue to push more of their services to the cloud as blended learning incorporates a significant amount of new online applications. Therefore, it is important that the District has the future bandwidth necessary to grow these programs to ensure the best educational experiences for its students. In conjunction with the City of West Sacramento, the School District should evaluate the opportunities that a municipal broadband network could provide to further its mission in the local community; not only in supporting high-speed connectivity within its schools but also ensuring that broadband reaches its students in their homes.

Los Rios Community College in West Sacramento uses CENIC where possible; however, connectivity between the remote campuses is provided over AT&T Optiman fiber service. Los Rios reported that data needs for the college continues to increase exponentially and current bandwidth levels are insufficient and are currently constrained due to cost of services. Los Rios would welcome new cost effective methods for providing connectivity to its various sites.

Healthcare

Healthcare organizations in West Sacramento could derive significant benefit from expanded broadband capabilities. Local doctors' offices and clinics reported several issues with existing broadband services; also reported in other communities within Yolo County. CommuniCare's Salud Clinic currently maintains a T-1 to California Telehealth Network, which is insufficient for the volume of patient electronic data that runs across the link. CommuniCare is looking to upgrade this link to fiber but to date has been unable to do so.

As healthcare organizations move more of their operations online, broadband becomes a critical part of their daily business. Doctor's offices and clinics generally require reliable, high-speed connectivity back to their primary providers whether locally in West Sacramento or remotely in other regions. These organizations require greater broadband connectivity to enable electronic health records, Telehealth and virtual imaging applications. For West Sacramento, ensuring that the community's healthcare providers are equipped with these services has a direct impact on the quality of care patients receive from local providers in West Sacramento.

Local Government

The City utilizes a combination of fiber and cable connections for its connectivity needs. These services provide connectivity between municipal facilities to connect departmental resources to a common network. The City realizes that significant upgrades to its existing broadband services are critical to

support departmental and community needs over the next 10 years. Some examples of these needs include:

- Public Safety
  The public safety departments are currently utilizing Verizon Wireless for their mobile data needs. The City expects public safety personal will have an increased need or job demand to utilize more applications in the field to make better, faster decisions. At one point the City considered investing in a wireless mesh technology that the City would own and would provide faster wireless data to public safety users.

- Cameras & Streetlights
  The City currently has many different camera systems in place, with additional needs every year. Some of these camera systems are connected via expensive T1 lines. The City would like to have cameras at all streetlight locations in the future, which would require extending fiber to each intersection. It would also be beneficial to standardize on one camera platform and connection method for both the City's security and streetlight cameras.

- Fiber Plan
  The City's Department of Information Technology is in the beginning stages of creating a fiber plan to provide fiber to all City facilities to replace broadband and T1 line expenses. This would also include connecting the City's streetlights to fiber infrastructure.

- Increased Internet Bandwidth
  As the City moves its server and services infrastructure to the cloud, Internet bandwidth will need to increase to support the internal demand of end users.

- Future Facilities
  Over the next 5 – 10 years, the City will see various relocations of existing facilities to different areas of the city. Each of these moves pose communication problems depending on their new location and the services provided in that area.

The City has started the process of incorporating conduit into its capital projects such as the Bridge District improvement project. As more of these projects are completed, the City can potentially build interconnections between these conduit projects together to form a municipal network. This may provide the opportunity for the City to interconnect more locations together. Doing so would have multiple benefits. First, it would allow the City to develop a municipal fiber network to provide connectivity between its facilities, enabling significantly more capacity and reducing costs for its internal operations. Concurrently, this network could be utilized as a backbone for service providers to deliver more broadband into the West Sacramento area to serve business, residential and community anchor markets. In addition, Yolo County maintains several sites in West Sacramento, including the Arthur F. Turner Community Library,

D. Strategies & Action Items

Recommendation 1: The City should continue to develop its broadband infrastructure to reduce internal costs, expand capabilities and protect against future cost increases by:

e) Developing a GIS-based map that identifies the City locations that should be interconnected including the City's current infrastructure;

f) Installing conduit with all public projects;

g) Expanding the City's capability in negotiating agreements for private providers to utilize the City's infrastructure for public benefit; and

h) Coordinating with other local public agencies (i.e. WUSD, Los Rios Community College District, YCTD, Yolo County, Yolo County Housing, Yolo County Office of Education, etc.) as potential users of the City's infrastructure.

Timing: The City should begin the process of identifying areas for direct and joint investment in broadband infrastructure with other public agencies over the next 12 months.

Recommendation 2: The City needs to work with local broadband providers to ensure business corridors are equipped with the necessary broadband services to support the City's economic development needs as follows:

d) Actively market and make any City-owned infrastructure available for use by broadband providers;

e) Equip business corridors with City-owned broadband infrastructure in the areas identified in the Demand Areas for Expanded Broadband Services, as detailed in the West Sacramento Community Profile;

    (1) Developing relationships with broadband providers who will utilize City-owned infrastructure; and,
    (2) Making this infrastructure available to broadband providers on a non-discriminatory basis.

Timing: The City should work internally to institute the processes to incorporate broadband infrastructure into its planning over the next 12 months.

Common Action Items

Recommendation 3: Adopt General Plan policies that incorporate broadband as a public utility and create a policy framework to promote its deployment in public and private projects as appropriate. This includes:

h) Tailoring the sample policies and standards (included in the appendix) to the City's specific needs and adopt them into local policy, codes and standards (including policies, dig-once, joint trenching, engineering standards, etc.);

i) Incorporating broadband in the City's Development Impact Fee program and the City's Capital Improvement Plan (CIP) as appropriate and make a commitment to fund broadband infrastructure;

j) Identifying opportunities to install broadband infrastructure in conjunction with public and private construction projects as appropriate;

k) Developing a process so that Planning and Public Works coordinate with IT to identify projects that could install this infrastructure at reduced costs;

l) As the City builds out its network, maintaining broadband infrastructure in the City's GIS system, requiring GIS-based as-builts and implement any other means for accurate documentation;

m) Evaluating ways to streamline the broadband permitting processes within public rights of way to ensure broadband providers do not face unnecessary obstacles to building infrastructure; and

n) Evaluating fees levied to broadband providers for constructing broadband infrastructure to ensure they do not discourage broadband investment.

Timing: The City should adopt General Plan policies and implementing codes and standards over the next 12 months. Implementation should be ongoing.

Recommendation 4: Coordinate with other agencies with facilities in the City (i.e. WUSD, Los Rios Community College District, YCTD, Yolo County, Yolo County Housing, Yolo County Office of Education, etc.) on a regular basis to leverage opportunities to reduce broadband construction costs by:

c) Reviving the regular Utility Coordination Meeting attended by the cities/County (and potentially add the public agencies listed above) to facilitate the long-term planning of broadband infrastructure; and

d) Coordinating on a regular basis to identify opportunities for joint construction, use and broadband infrastructure sharing between local agencies to lower costs and maximize public benefit.

Timing: The City should develop these collaborative programs with other public agencies over the next 3 months.

6. Broadband Community Profiles
Woodland

A. Residential

The residential broadband market in Woodland is served by two primary providers, AT&T of California, the incumbent local exchange carrier and Wave Broadband, the local cable provider. Fixed wireless providers also provide coverage in Woodland, including DigitalPath and Winters Broadband. 184 residential responses were received in the survey. Initial data collected from surveys indicates that 85% of residential customers utilize either the local exchange carrier or the cable company for their broadband Internet services. Approximately 15% of residential customers utilize fixed wireless, satellite and other competitive providers. From the research conducted, it appears that all wireline residential broadband services are provided via copper broadband infrastructure, either through copper cable plant owned by the local exchange carrier or coaxial cable plant owned by the local cable company. Wireless services are provided through terrestrial fixed wireless systems and 3G and 4G mobile wireless carriers[16].

Broadband Internet download and upload speeds reported by the majority of residents surveyed were commensurate with cable and DSL services in the region. Samples were collected from residential broadband subscribers across Woodland. A total of 47% of respondents reported download speeds greater than 10Meg. These speeds were generally reported in the most urbanized areas that had a high density of single-family or multi-dwelling units. Some 40% of respondents reported download speeds less than 6Meg. Upload speeds were found to be considerably lower than download

[16] AT&T Mobility, Verizon Wireless, T-Mobile, MetroPCS and Sprint

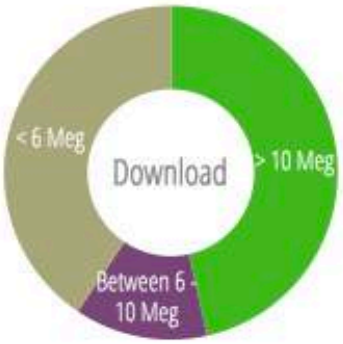
speeds, consistent with asymmetrical DSL and cable broadband services. Some 45% of respondents reported speeds of less than 1.5Meg and another 35% reported upload speeds of less than 3Meg. Respondents reported general satisfaction with the speed and reliability of their broadband Internet services, however, many residents felt that speeds were inconsistent and at certain times of the day, services were considerably slower than others.

A total of 59% of the respondents reported that their services were moderately to highly reliable while 50% felt that their services had sufficient speed. Some 30% reported that services were unreliable and 34% reported that they were not fast enough. Measuring the pricing for services against the speeds of services that residents received indicated that there was a direct correlation between the prices paid for services and the amount of bandwidth, ("speed"), received by residents. The chart below illustrates the price of services residents in Woodland pay for services and the corresponding download and upload speeds for these services. It is important to note that the speeds reported are actual speeds recorded, which may be different from the speeds residents buy from service providers in the area. In general, DSL and cable broadband services are sold with speed increments that define a maximum speed for the service, such as "Up to 10 megabits down and up to 1.5 megabits up." Actual speeds vary, depending on the physical location of the service and how many subscribers are concurrently on the system. The "maximum advertised speed" should not be construed to mean a sustained maximum but instead the top speed of the service, which may be considerably lower over long periods of time.

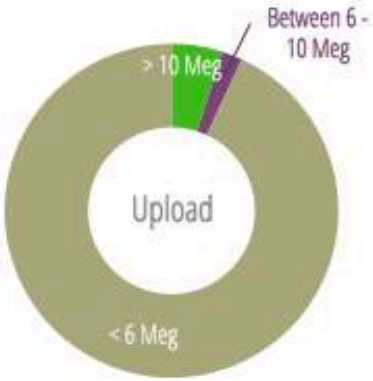
The majority of the urban areas in Woodland are served by DSL and cable infrastructure supporting speeds between 10Meg and 25Meg download and 3Meg and 6Meg upload. These are the maximum advertised wireline speeds offered in the area. Results of the survey data validated speeds up to 25Meg in areas reported where these services were offered; however, the majority of survey respondents recorded significantly lower speeds, as shown in the chart below. This issue was evident in respondents' answers to many of the survey questions as well. Many residents reported significant issues with speed and overall reliability of their home Internet services citing daily "slowdowns" and "drops" in their service. A recurring comment described the lack of consistency in service during certain times of the day, mainly afternoons and evenings.

Residential Broadband Services - Woodland Survey Data

Residential Broadband Download Speed Test Results



Residential Broadband Upload Speed Test Results



Reilability of Current Broadband Services

Speed of Current Broadband Services

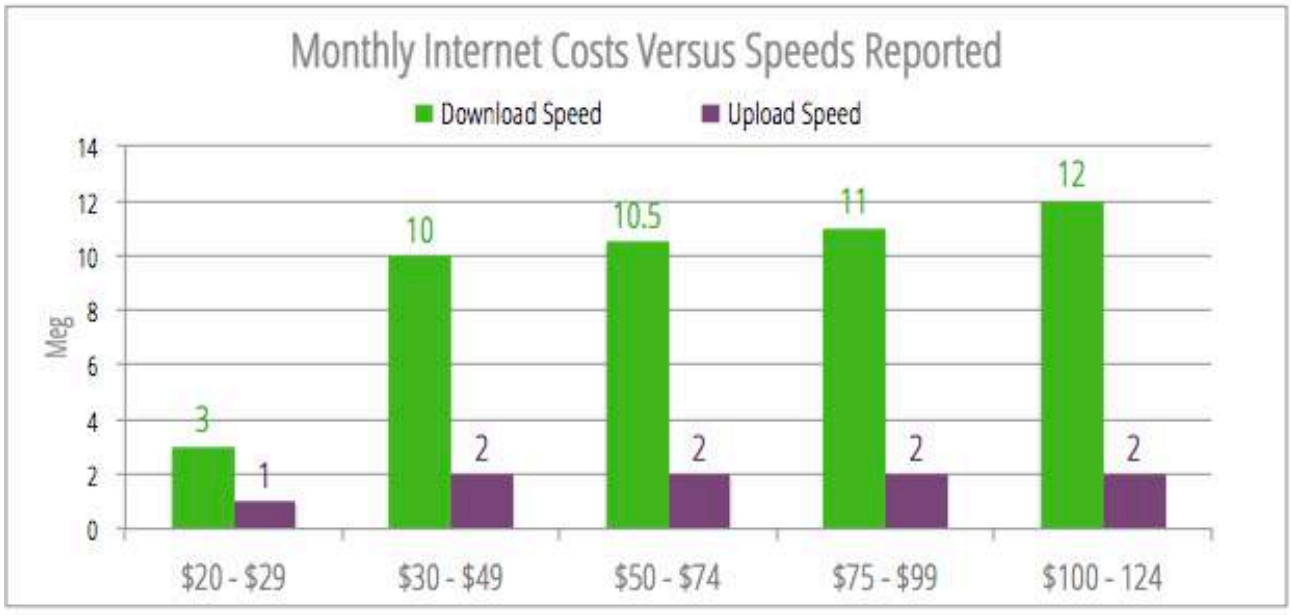


Figure 6.1: Residential Wireline Broadband Availability By Speed (Download Speeds)

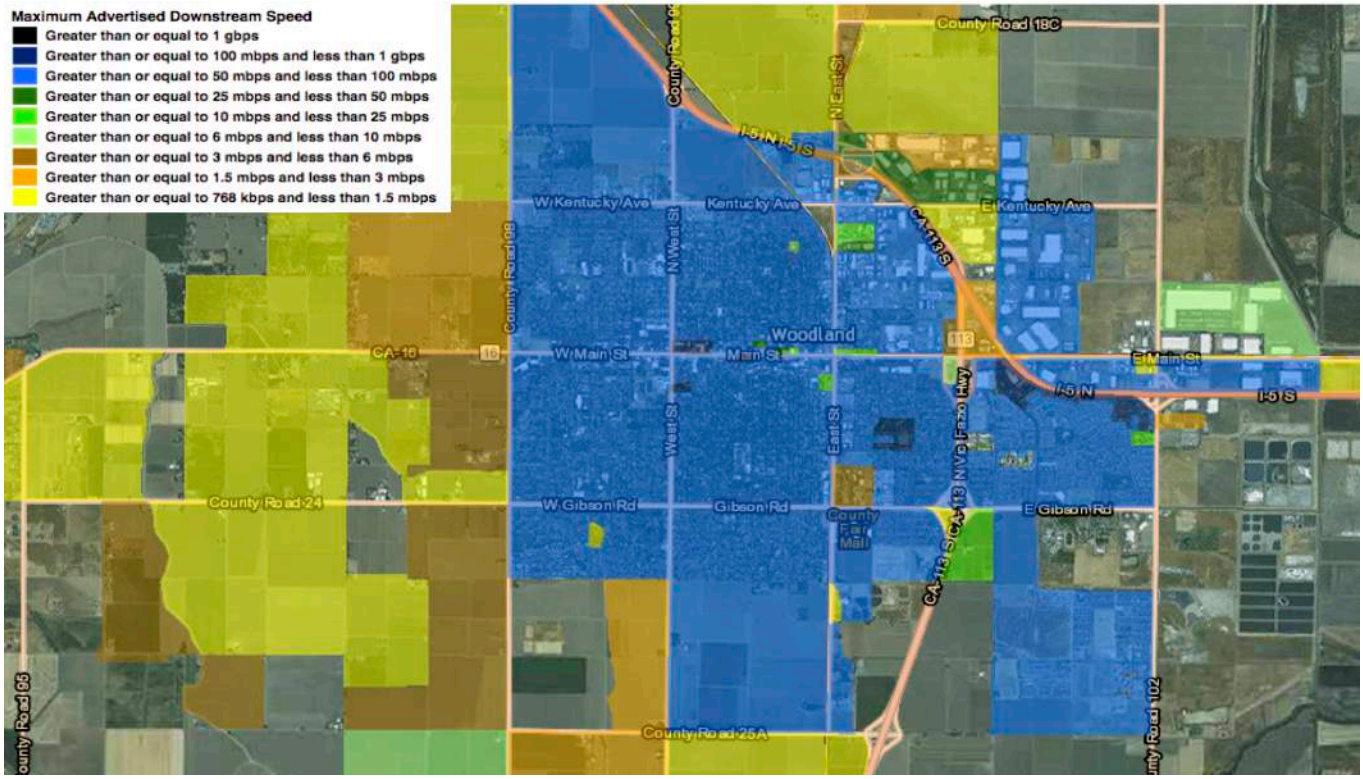


Figure 6.2: Residential Wireline Speed Test Results (Download Speeds)

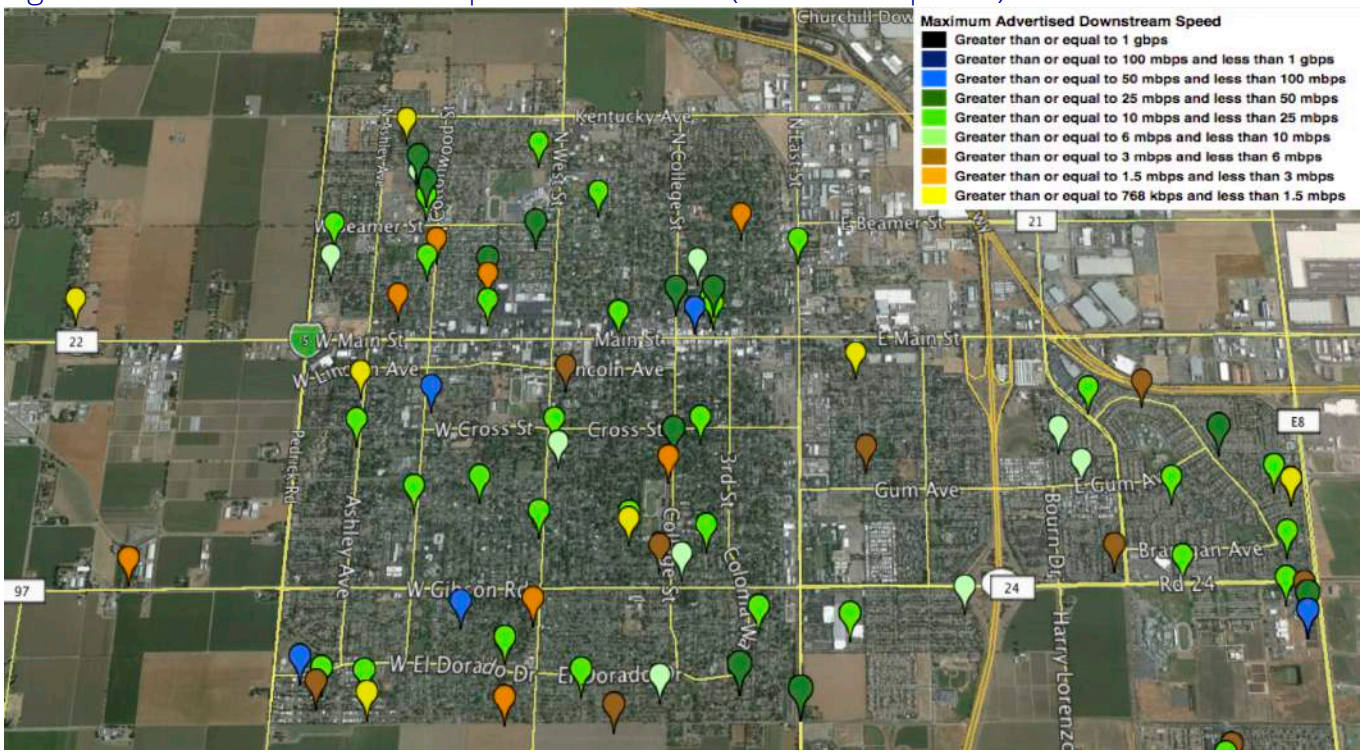
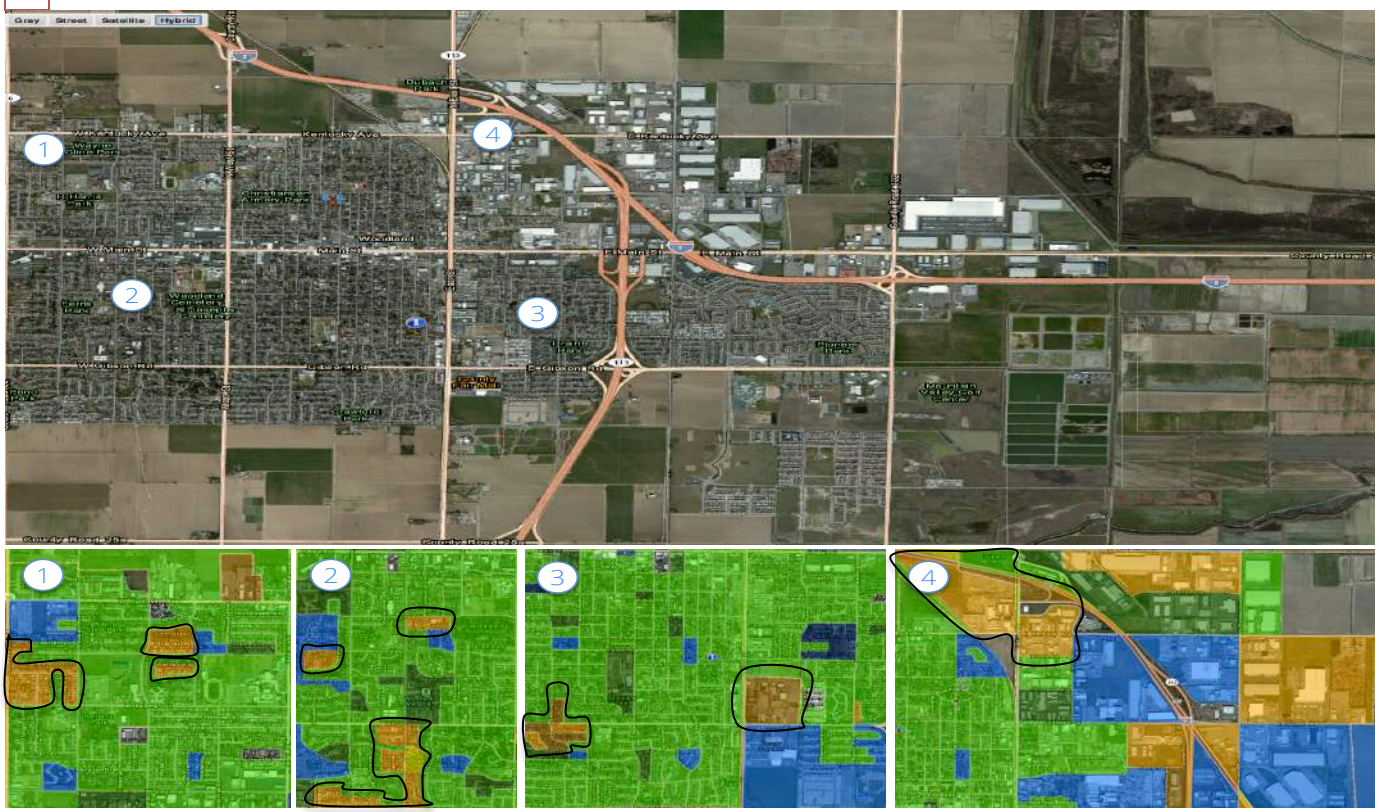


Figure 6.3: Underserved Wireline Residential Broadband



1

Northwest Woodland – Population – 621, Households - 158

Small segments of underserved households in a residential area. No reported residential cable provider although residents reported available Wave Broadband services. Maximum advertised download speed greater than or equal to 1.5Meg and less than 3Meg. Maximum advertised upload speed greater than or equal to 200K and less than 768K. Fixed wireless available via DigitalPath, Inc. greater than or equal to 6Meg and less than 10Meg download.

2

Southwest Woodland – Population – 1,044, Households - 418

Moderately sized residential underserved area. No reported residential cable provider however residents reported available Wave Broadband services. Maximum advertised download speed greater than or equal to 1.5Meg and less than 3.0Meg. Maximum advertised upload speed greater than or equal to 200K and less than 768K. Fixed wireless available via DigitalPath, Inc. greater than or equal to 6Meg and less than 10Meg download.

3

Southeast Woodland – Population – 100, Households - 33

Small residential underserved area. No reported residential cable provider. Maximum advertised download speed greater than or equal to1.5Meg and less than 3Meg. Maximum advertised upload speed greater than or equal to 200K and less than 768K. Fixed wireless available via DigitalPath, Inc. greater than or equal to 6Meg and less than 10Meg download.

4

Northeast Woodland – Population – 120, Households - 35

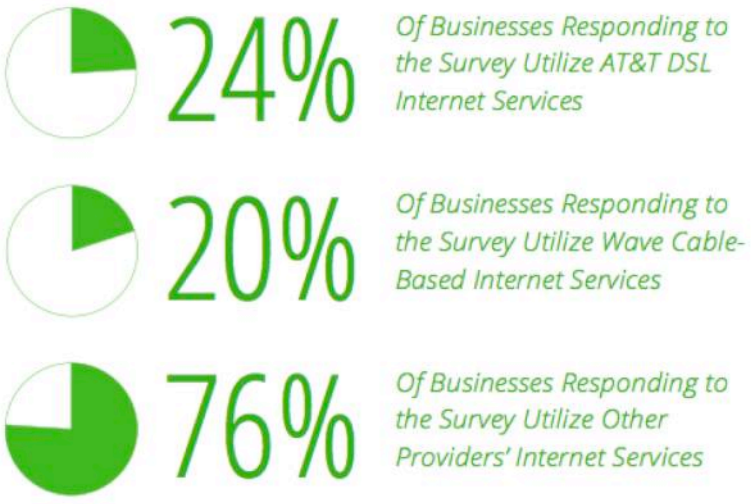
Moderately sized residential underserved area. No reported residential cable provider. Maximum advertised download speed greater than or equal to 1.5Meg and less than 3Meg. Maximum advertised upload speed greater than or equal to 200K and less than 768K. Fixed wireless available via DigitalPath, Inc. greater than or equal to 6Meg and less than 10Meg.

B. Business

Businesses in Woodland subscribe to a mix of wireline providers and resellers, including AT&T of California, Wave Broadband, AFES Wireless Network Services, and Omsoft. A few businesses also reported utilizing fixed wireless providers including Winters Broadband and DigitalPath, Inc. 25 businesses responded to the business survey. A total of 24% of respondents reported utilizing AT&T DSL services for their businesses while 20% of respondents reported utilizing Wave Broadband cable services. The remaining businesses utilize alternative wireline providers, fixed wireless providers or 3G/4G providers. In general, these services are branded as "business class" and come with a higher quality of service that prioritizes business services over residential services that run across the same physical infrastructure. In general, pricing for DSL and cable based services ranges from $49.99, for the lowest speed service to $199.99 for the highest speed service in the DSL and cable business broadband services.

For businesses included in the assessment, 13% reported receiving download speeds of 10Meg or above. Some 87% reported download speeds of less than 6Meg. Upload speeds were commensurate with DSL and cable broadband services, with the majority of businesses, 76%, reporting less than 6Meg upload. Businesses reported key issues with their current broadband Internet services, as 47% of respondents indicated that their current services were not sufficient to meet their business needs. The majority of businesses cited speed and reliability of their current services as challenges to their daily operations. Some 60% of businesses reported speed as the key issue with their current service and cited access to online applications such as cloud data storage, videoconferencing, security monitoring, online video training and scientific research (specifically noted by the seed technology and agricultural businesses) as critical applications that are often affected by their broadband Internet services.

Several of the seed technology and agricultural businesses provided information on their broadband services as well. Most of the respondents utilized DSL or cable services and two of the organizations utilized satellite Internet. All of these organizations reported that their services were insufficient for their current needs and that unreliable service was the number one issue. When asked why they haven't upgraded their services to something that meets their business needs, each organization reported that services were not available in their area. None reported costs as a significant factor of why they



had not upgraded their service.

Only two businesses reported utilizing fiber-optic broadband services in Woodland. Based on an infrastructure analysis of Woodland's key business corridors, limited fiber broadband services are available to businesses at reasonable costs. In these corridors, providers do maintain fiber-optic cable plants that connect end users; however, these plants are not typically utilized for providing a low-cost option to the majority of businesses in Woodland. If a business wants fiber, a provider will build off of its existing fiber-optic cable plant to the subscriber using an "Individual Case Basis," or ICB pricing model. Each fiber connection built by the provider will result in a different cost to the end user, depending on the proximity of the provider's existing cable plant to the subscriber. In these cases, costs for fiber broadband are very often high and for most small businesses, unaffordable. Pricing for fiber was found to be over $1,000 for a 50 Meg connection in Woodland, from survey data collected. In cases where fiber broadband service is available, affordability is a key issue and as a result, businesses utilize lower costs DSL and cable broadband. Some 40% of businesses surveyed report that their current services are insufficient for their business needs yet they have no alternative to their current services due to a lack of affordable options.

Comments from Businesses in Woodland:

Agricultural Business – "Costs are extreme for reliable services and we cannot afford it."

Manufacturing Business – "Severe disruptions hinder our ability to update database systems in the cloud."

One potential reason for these high prices is the lack of available distribution fiber infrastructure in the Woodland area. In many communities, providers are beginning to equip business and residential areas with fiber-to-the-premise ("FTTP") infrastructure, overbuilding existing copper cable plants. This fiber distribution infrastructure is specifically designed to deliver high-speed, reliable fiber broadband services to businesses at costs similar to DSL and cable broadband prices. This study did not find any fiber distribution infrastructure in the Woodland area that was available to business customers. When asked why these businesses haven't upgraded their services, a significant amount of businesses cited price as the number one reason, accounting for 47% of respondents. A total of 30% of the businesses stated that other services are not available in their area.

Demand for higher speed, higher reliability service necessitates a less costly solution than is currently available. Businesses from various geographic locations in the city all report the same issue. They desire higher speed and higher reliability services, their options too costly. The only fiber broadband customers identified in the Woodland area included a few large businesses, city and county facilities

and the school district. In some cases, businesses could utilize a fixed wireless solution instead of fiber; however, only 2 businesses in Woodland reported using this service currently.

Figure 6.4: Demand Areas for Fiber Broadband Expansions in Woodland

1

Northeast Woodland

Adjacent to Interstate 5 is a heavy concentration of warehousing, transportation, logistics and several seed tech/agricultural businesses. Businesses in this area reported issues with current services and may benefit from upgraded broadband infrastructure. This area is a focal point for larger organizations in Woodland who may require significantly more broadband capacity in the future. If future development occurs in this area, it could also facilitate low cost construction of broadband infrastructure in conjunction with capital projects. It could also become a tool for economic development to utilize to attract more business to the area, in conjunction with the City's current service providers.

2

Downtown Corridor

The downtown corridor houses a large concentration of businesses across most sectors and is a key focus for next-generation broadband services. Some 70% of Woodland businesses that responded were located in this area and currently utilize either DSL or cable broadband services. A significant number expressed the need for more speed and reliability. This area contains a high concentration of "power users," among the professional, scientific and technical business sector. It also contains a high concentration of multi-dwelling unit commercial parcels that could benefit from direct fiber broadband connectivity.

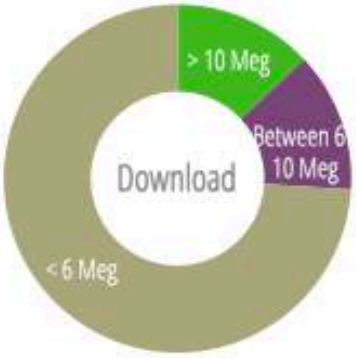
3

East Woodland

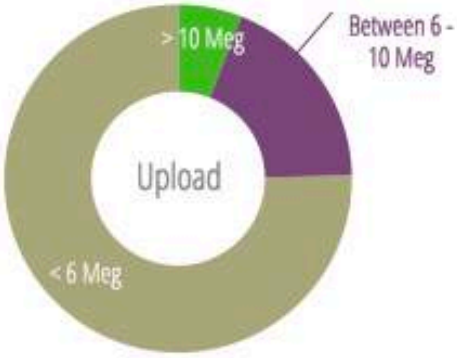
Adjacent to Interstate 5 is a heavy concentration of warehousing, transportation, logistics and several seed tech/agricultural businesses. Several businesses in this area reported issues with current services and may benefit from upgraded broadband infrastructure. Similar to the Northeast area, this area could be utilized to deploy lower cost broadband to current and prospective businesses, in conjunction with the City's economic development strategies.

Business Broadband Services - Woodland Survey Data

Business Broadband Download Speed Test Results



Business Broadband Upload Speed Test Results



Reilability of Current Broadband Services

Speed of Current Broadband Services

Why Haven't Businesses Upgraded

C. Community Anchors

Education

Woodland's schools are interconnected to one another through fiber-optic connectivity provided by AT&T. Generally these schools are equipped with the high-speed, reliable services they need to deliver online educational programs to their students. Several of the school district's sites are not connected to this network though. and may require upgraded connectivity to ensure that their students receive the same educational experiences as the schools connected through AT&T fiber. As school systems move toward more blended curricula, meaning traditional learning, online programs and self-study, broadband becomes a critical foundation to ensure that students receive the best educational experience across all three types of curricula. For Woodland's schools, it is important that students have access to high-speed broadband in the classroom and also at home. In many cases, the student's experience is not effective across classroom and remote learning because they do not have access to high-speed broadband at home. Therefore, broadband in the educational realm is a community-wide issue that impacts residents directly.

Woodland Community College uses CENIC (Corporation for Education Network Initiatives in California) and has access to the bandwidth and services needed to support current operations. Woodland Community College did not report any specific needs for additional broadband services.

Healthcare

Healthcare organizations in Woodland could derive significant benefit from expanded broadband capabilities. Woodland Memorial is a critical healthcare resource in the County and maintains connectivity to other hospitals and clinics throughout California. The hospital currently maintains fiber connectivity through AT&T OptiMan service for transport back to the main data center in Rancho Cordova and for local Internet service. The hospital utilizes MobileMD as its health information exchange and does not currently maintain connectivity to the California Telehealth Network (CTN). The Hansen Family Health Center, a member of the CommuniCare clinics utilizes T1s to CTN for connectivity to telehealth services. CommuniCare has been working to upgrade these low-speed links to fiber.

CTN has expressed significant access and cost obstacles in upgrading their services to local Yolo healthcare facilities. CTN utilizes last-mile providers, including local exchange carriers and cable companies to extend their network to these customers. Due to the high cost of doing so, several healthcare providers in Yolo remain on low-speed T1 connections to CTN; such is the case with the Hansen Family Health Center.

Local doctors' offices and clinics reported several issues with existing broadband services. As healthcare organizations move more of their operations online, broadband becomes a critical part of their daily business. Electronic health records, Telehealth and virtual imaging all require high-speed,

reliable broadband services. Organizations that utilize standard broadband connections provided through DSL and cable infrastructure may experience issues where this infrastructure is not robust enough to support high-bandwidth applications. Reports from local several local healthcare organizations have indicated that they are using these types of applications in Woodland.

Local Government

The City utilizes a combination of fiber and wireless connections for its municipal operations. These services provide connectivity between municipal facilities to connect departmental resources to a common network. The City maintains a small amount of its own fiber segments throughout the community and continues to build new fiber in conjunction with other capital projects that allow conduit to be installed for low costs. As more of these projects are completed, it allows the City to connect segments to one another to form a larger municipal network that can be utilized to interconnect its facilities. Doing so permits the City to reduce its telecommunications costs and expand the bandwidth as its connectivity needs grow. The City would benefit from developing a master plan for this fiber network in conjunction with the Yolo Community Broadband Network. This would allow the City to continue to build out local infrastructure in targeted areas, which could be used to reduce costs, create new opportunities for government collaboration and provide a new source of fiber to local service providers. These activities would assist Woodland in promoting the expansion of broadband and potentially wireless services in key areas of the community, including the downtown corridor.

Yolo County maintains many sites within the City of Woodland, including County Administration Building, Department of Agriculture, County Courts, District Attorney, Public Defender, Department of Employment and Social Services, General Services, County Health, Planning, Public Works & Environmental Health, Library, Sheriff-Coroner and County Jail. The County maintains fiber connectivity to these sites through the County's fiber-optic network that traverses downtown Woodland.

D. Strategies & Action Items

Recommendation 1: The City should continue to develop its broadband infrastructure to reduce internal costs, expand capabilities and protect against future cost increases by:

i) Developing a GIS-based map that identifies the City locations that should be interconnected including the City's current infrastructure;

j) Installing conduit with all public projects;

k) Expanding the City's capability in negotiating agreements for private providers to utilize the City's infrastructure for public benefit; and

l) Coordinating with other local public agencies (i.e. WJUSD, Woodland Community College, YCTD, Yolo County, Yolo County Housing, Yolo County Office of Education, etc.) as potential users of the City's infrastructure.

Timing: The City should begin the process of identifying areas for direct and joint investment in broadband infrastructure with other public agencies over the next 12 months.

Recommendation 2: The City needs to work with local broadband providers to ensure business corridors are equipped with the necessary broadband services to support the City's economic development needs as follows:

f) Actively market and make any City-owned infrastructure available for use by broadband providers;

g) Coordinate with Yolo County to identify infrastructure to serve agricultural businesses surrounding Woodland, potentially using wireless to reach these organizations;

h) Equip business corridors with City-owned broadband infrastructure in the areas identified in the Demand Areas for Expanded Broadband Services, as detailed in the Woodland Community Profile;

   (1) Developing relationships with broadband providers who will utilize City-owned infrastructure; and,
   (2) Making this infrastructure available to broadband providers on a non-discriminatory basis.

Timing: The City should work internally to institute the processes to incorporate broadband infrastructure into its planning over the next 12 months.

Common Action Items

Recommendation 3: Adopt General Plan policies that incorporate broadband as a public utility and create a policy framework to promote its deployment in public and private projects as appropriate. This includes:

o) Tailoring the sample policies and standards (included in the appendix) to the City's specific needs and adopt them into local policy, codes and standards (including policies, dig-once, joint trenching, engineering standards, etc.);

p) Incorporating broadband in the City's Development Impact Fee program and the City's Capital Improvement Plan (CIP) as appropriate and make a commitment to fund broadband infrastructure;

q) Identifying opportunities to install broadband infrastructure in conjunction with public and private construction projects as appropriate;

r) Developing a process so that Planning and Public Works coordinate with IT to identify projects that could install this infrastructure at reduced costs;

s) As the City builds out its network, maintaining broadband infrastructure in the City's GIS system, requiring GIS-based as-builts and implement any other means for accurate documentation;

t) Evaluating ways to streamline the broadband permitting processes within public rights of way to ensure broadband providers do not face unnecessary obstacles to building infrastructure; and

u) Evaluating fees levied to broadband providers for constructing broadband infrastructure to ensure they do not discourage broadband investment.

Timing: The City should adopt General Plan policies and implementing codes and standards over the next 12 months. Implementation should be ongoing.

Recommendation 4: Coordinate with other agencies with facilities in the City (i.e. WJUSD, Woodland Community College, YCTD, Yolo County, Yolo County Housing, Yolo County Office of Education, etc.) on a regular basis to leverage opportunities to reduce broadband construction costs by:

e) Reviving the regular Utility Coordination Meeting attended by the cities/County (and potentially add the public agencies listed above) to facilitate the long-term planning of broadband infrastructure; and

f) Coordinating on a regular basis to identify opportunities for joint construction, use and broadband infrastructure sharing between local agencies to lower costs and maximize public benefit.

Timing: The City should develop these collaborative programs with other public agencies over the next 3 months.

7. Broadband Community Profiles: Winters

A. Residential

Two primary providers serve the Winters residential broadband market, AT&T of California and Wave Broadband. Fixed wireless providers also have coverage in Winters including DigitalPath and Winters Broadband. 72 samples were collected from residential broadband subscribers across Winters to evaluate actual speeds against those reported in publicly available data from the California Public Utilities Commission ("CPUC"). CPUC data indicated that Winters' broadband providers maintained coverage across the entire city boundary, with download speeds in the majority of the downtown up to 24 Meg and in certain areas of the city, up to 100 Meg.

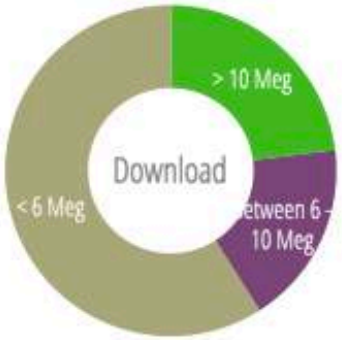
> *Upon further investigation into Winters' census tracts, it was found that about two thirds of the City is reported as underserved in wireline broadband services and there was little indication that these speeds were actually available to residents.*

Pockets of high-speed wireline broadband services do exist within the City, however; residents have reported significant issues receiving speeds anywhere close to the speeds they have purchased from providers. Speed test data has verified speeds up to 10Meg download and 1.2Meg upload for cable broadband services. Speed test data for has verified speeds up to 7Meg download and 1.1Meg upload for DSL broadband services.

A total of 58% of respondents reported download speeds of less than 6 Meg while 89% of respondents reported speeds of less than 6 Meg. Residents reported significant reliability and speed issues with their current services; 50% of respondents felt their services were unreliable and 59% felt that their services were not fast enough for their needs. Of the 4 cities, Winters residents reported the lowest realized speeds for the cost of residential broadband services, particularly with upload speeds. At higher prices, residents received only marginally higher realized speed. For example, at the lowest price point, $20 - $29 per month, residents realized upload speeds of .8 Meg while at the highest price point of $100 - $124, residents realized upload speeds of 1.9 Meg, only a small increase in speed for a 4x increase in price. This may indicate that Winters' local broadband infrastructure is not capable of providing upgraded, higher-speed services.

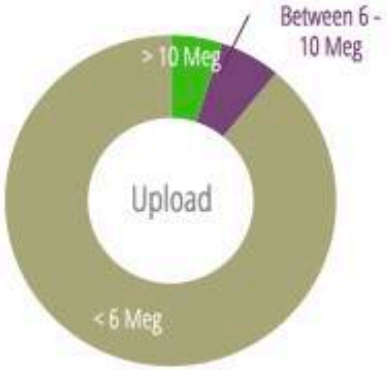
Residential Broadband Services - Winters Survey Data

Residential Broadband Download Speed Test Results



23%	18%	59%
> 10 Meg	Between 6 - 10 Meg	< 6 Meg

Residential Broadband Upload Speed Test Results



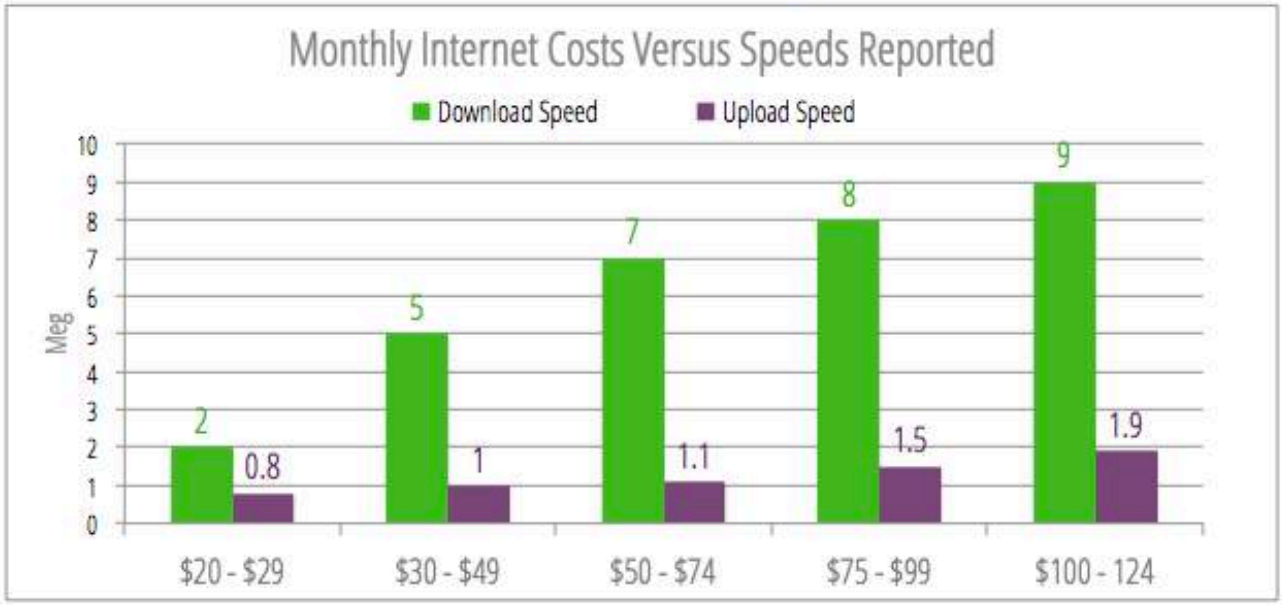
5%	6%	89%
> 10 Meg	Between 6 - 10 Meg	< 6 Meg

Reilability of Current Broadband Services

40%	50%	10%
Reliable	Unreliable	Unsure

Speed of Current Broadband Services

26%	59%	15%
Fast Enough	Not Fast Enough	Unsure



Winters' residents need broadband services that are on par with the larger communities in Yolo. The city's remote location makes it even more important for residents to have sufficient broadband access that allows them to do more online rather than drive long distances for their products and services. Winters' residents need to ensure their children have the most opportunities for education and technology-based learning tools they receive from the schools can be used in their homes. Without sufficient broadband access, these tools are ineffective. Home-based businesses in Winters also need high quality broadband services, similar to Winters' commercial businesses. Without them, these businesses also suffer, being less competitive with their commercial counterparts.

Figures 7.1 and 7.2 illustrate the key residential broadband issues facing Winters. Large segments of the city still remain underserved in the speeds of broadband services available to them as reported by the CPUC in the 06/30/2013 dataset. Since then, the CPUC has received updated data for the Winters area that shows coverage of approximately 80% of the city by Wave Broadband. This data has only recently been uploaded and should be verified to ensure its accuracy. Bright red areas illustrate underserved parts of the city. Everything South of Grant Ave is included in this region as well as about half of the area North of Grant Ave within the city boundary. In addition, rural areas outside the city boundary are almost all underserved or in some cases unserved. For these residents, their only options are generally fixed wireless, satellite or 3G/4G mobile broadband. Although Figure 7.1 reports high-speed broadband available, Figure 7.2 contradicts this availability in many areas of the city. Although Figure 7.21 illustrates a large portion of the city covered by broadband infrastructure supporting speeds between 10 Meg and 25 Meg, Figure 7.1 shows this area as underserved. Data is inconsistent as reported to the CPUC. Through the speed test results, a few residents received speeds above 10 Meg, 77% of residents reported speeds of 6 Meg or below.

Figure 7.1: Wireline Residential Status – Unserved & Underserved Areas

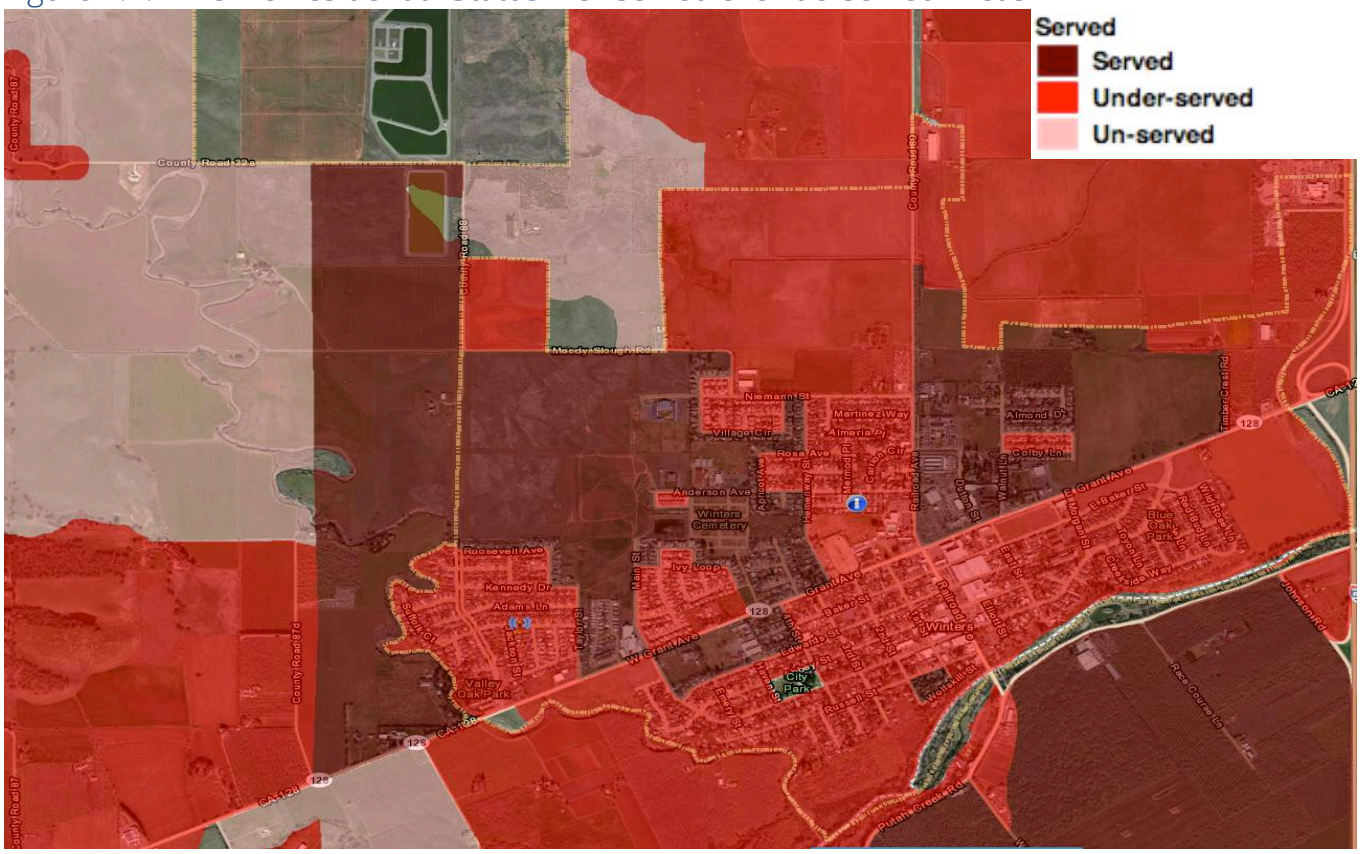


Figure 7.2: Residential Wireline Broadband Availability By Speed (Download Speeds)

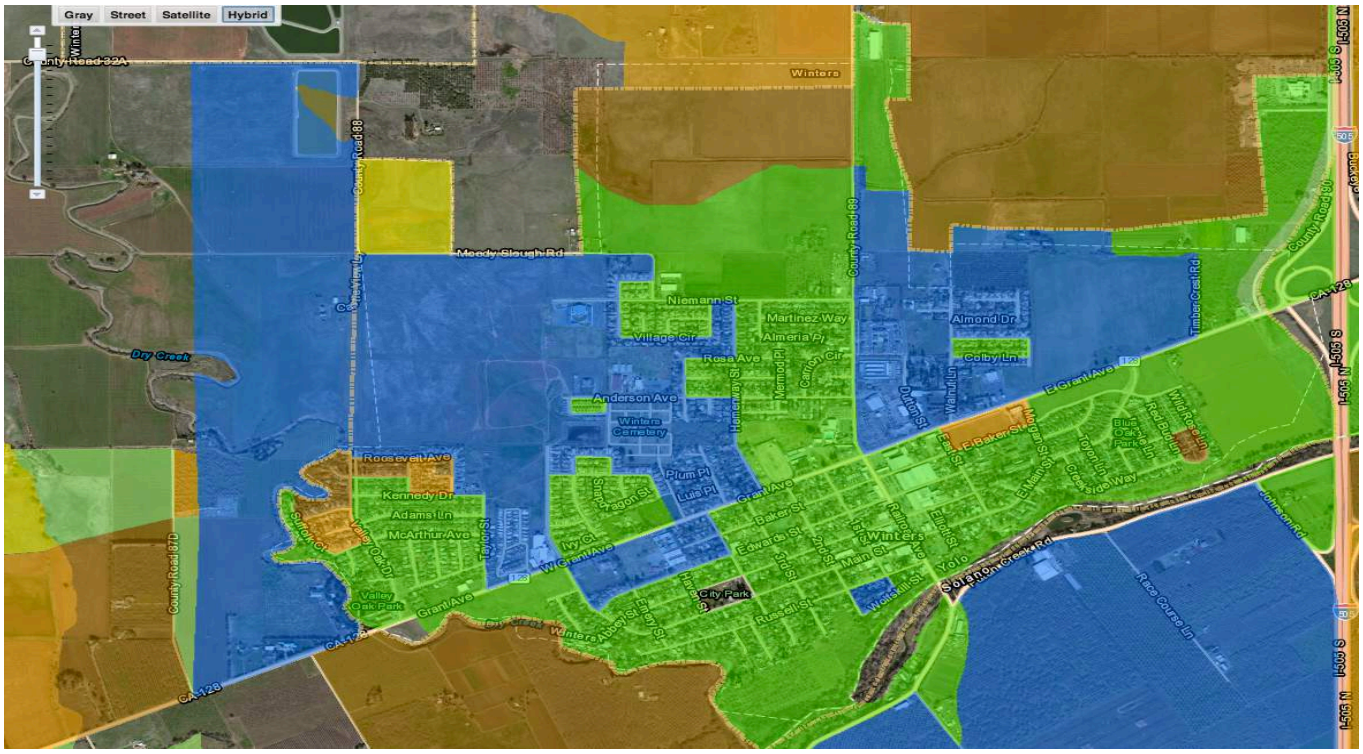
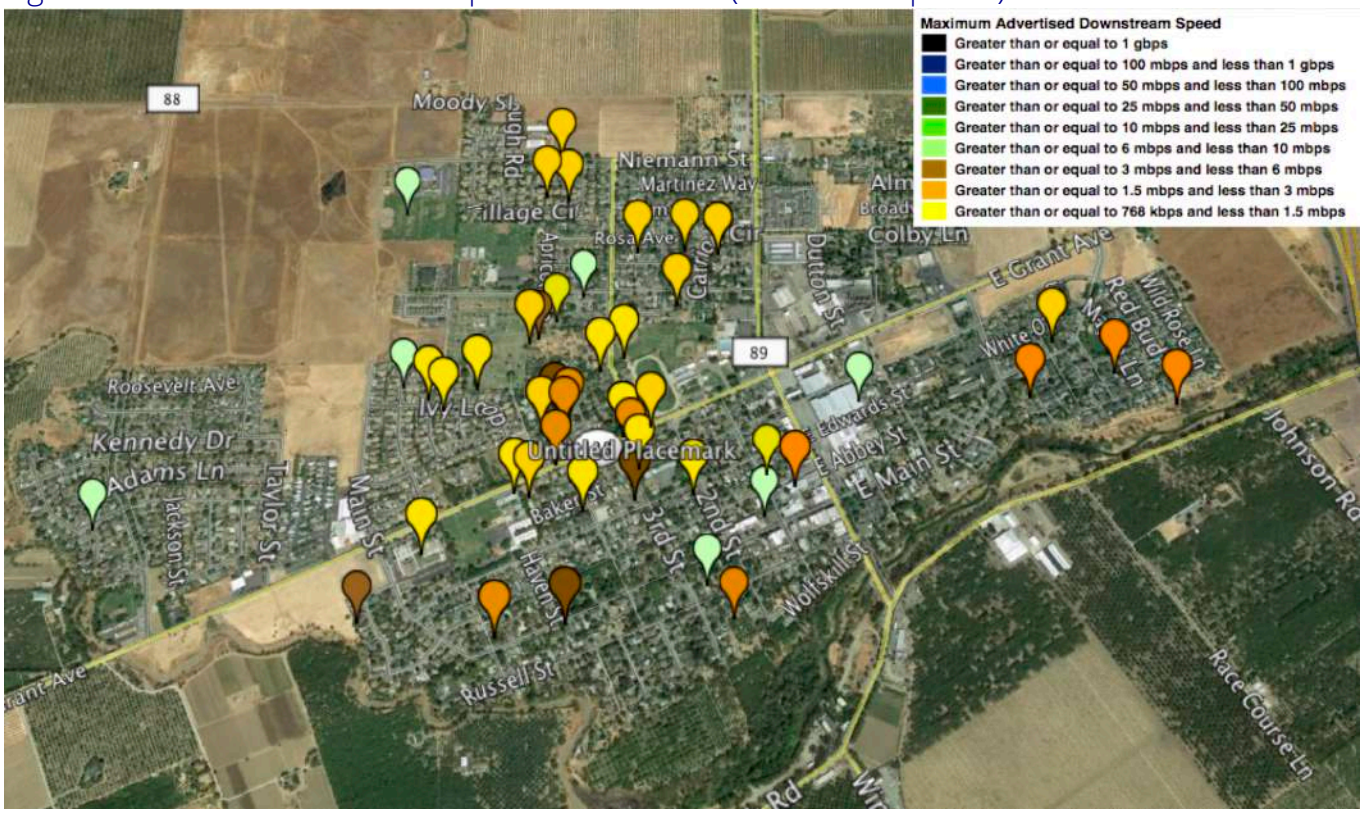


Figure 7.3: Residential Wireline Speed Test Results (Download Speeds)



B. Business

Local businesses in Winters suffer from many of the same issues as residential users. The same DSL and cable infrastructure is utilized to provide business services in Winters as residential services. Service is not consistent across the city and businesses reported particular issues getting reliable service in the downtown corridor along Grant Street. A few businesses reported utilizing T1 services, which provided more reliable connectivity, however prices for these services were extremely high. One business reported paying $800 per month for a single T1, which provides only 1.5Meg of service. Unfortunately T1 was the only option available, apart from their current DSL service which provided them 3Meg download and 768Kbp upload at $79.99 per month. They reported that the DSL was not reliable enough to sustain their business and were forced to upgrade. Only 10% of businesses reported download speeds above 10 Meg and only 2% reported upload speeds above 10 Meg. Some 65% reported that their services were not reliable and 64% reported that their services were not fast enough.

Winters business face significant challenges in receiving consistent, reliable broadband service. Although most businesses are small and may not be large consumers of bandwidth, they do require broadband services that enable them to reliably use online business applications, videoconferencing, cloud applications and security monitoring. At the current service levels, Winters' businesses will fall farther behind the curve as new online applications are made available that unfortunately, Winters' businesses will not be able to take advantage of, due to their insufficient broadband.

For the City's economic development goals, the current state of broadband in Winters makes it particularly difficult to attract new businesses to the area. A business that wants reliable service may pay upwards of $1,000 per month for this access in Winters. For small and medium businesses, this cost is prohibitive, particularly when businesses can locate in other communities and pay less than half of this amount for significantly faster services. Therefore, Winters must make positive strides forward to improve the availability and affordability of business broadband services in the city. Doing so will allow the City to utilize local broadband as a tool to attract more businesses to the city and reduce the costs for its current businesses.

PG&E will be building a significant training facility in Winters to train staff on operations of gas facilities and construction, approximately 100,000 sq. feet. It will be the largest gas training facility in the US. The training facility will require significant broadband services to conduct broadcast, distance learning and other data intensive applications. PG&E has already held initial discussions with broadband providers in the area to ensure fiber services are available. Providers have indicated that they can meet these needs, however; no pricing information was shared for these services. Due to PG&E's size, it is likely that they will procure whatever services are required to meet the needs of the training facility. The City could potentially partner with PG&E to bring connectivity into the new facility in a joint construction project between the two organizations. It would positively impact the City by expanding local conduit and fiber infrastructure along the route to the PG&E facility.

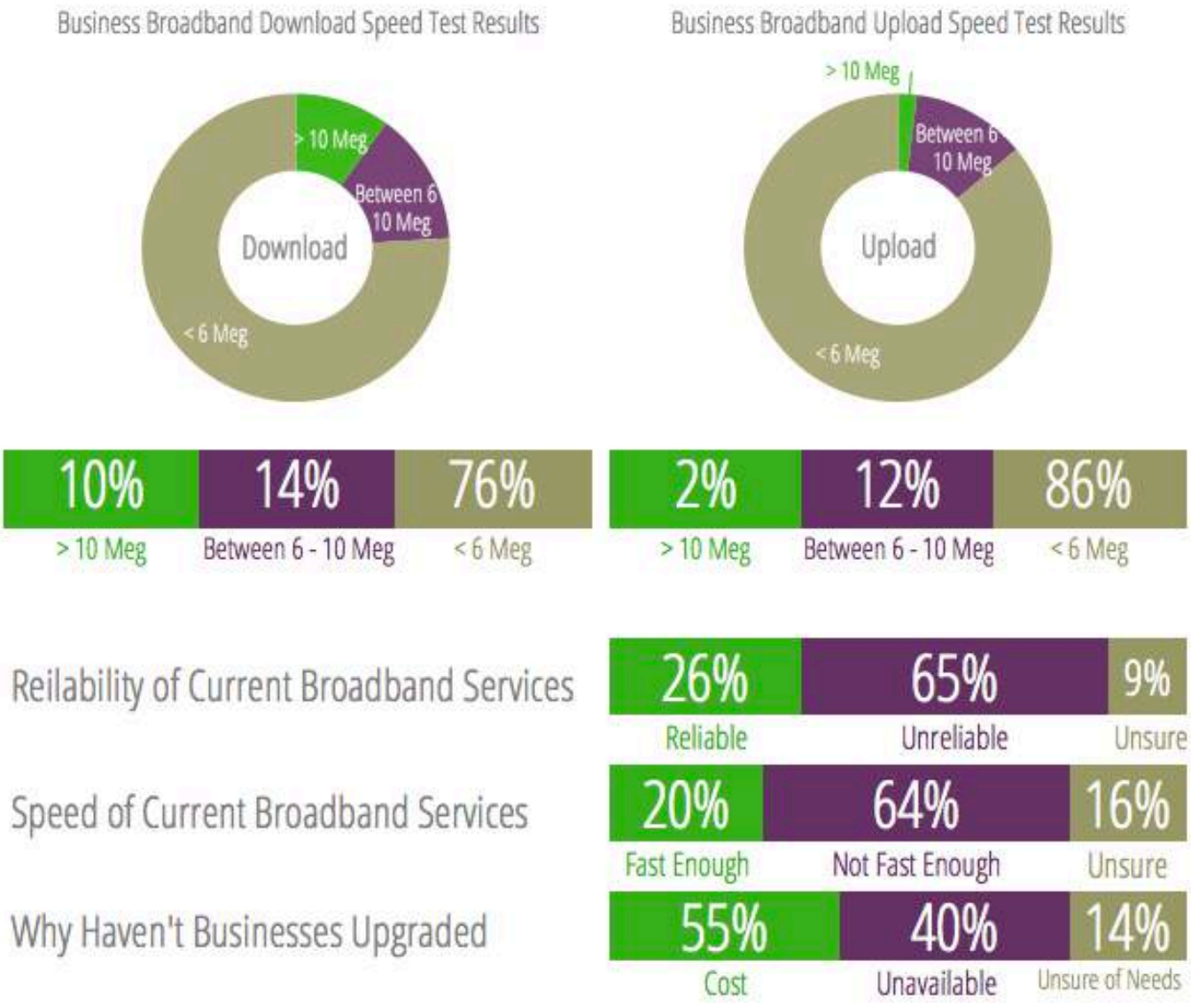
Comments from Businesses in Winters:

Agricultural Business – "On the edge of town, we use an unreliable DSL line and a wireless modem as backup when it is down"

Law Firm – "When the cable is down, our phones are down which means no billing for our staff"

Local Restaurant – "We would like to provide WiFi to patrons but can't run this and credit card machine simultaneously with our current Internet service

Business Broadband Services - Winters Survey Data



C. Community Anchors

Education

The Winters Unified School District has received some important technology upgrades recently, including new computers and technology-based teaching tools. These upgrades were provided as part of a Yocha Dehe Community Fund grant to the District. The District is planning to equip students with IPads that can be taken home to enable more self-study and computer-based learning opportunities. The District is also looking at the opportunities to integrate more cloud applications into its environment. These programs can only be successful with sufficient broadband capabilities, both within the School District's key sites and at the homes of students who are equipped with these technology tools.

Winters' Joint Unified School District currently maintains 10Mbp connectivity between schools in the area and 100Meg to the Board of Education. For the District to take full advantage of these programs and technologies, upgrades to their existing services will be required. The School District should be planning its activities to significantly increase its speeds to schools and its centralized connection to the Board of Education. The District should be planning for 100Mbp upgrades to its schools in the near term and evaluating the future needs for 1Gbp to every school (depending on the size of each school's student body).

The broadband access that students receive at home becomes an important issue for the School District and community, as students are equipped with take-home technologies such as IPads. Although students may have sufficient broadband and wireless access in the classroom, many will not have sufficient access at home to make these technologies truly effective. Two key issues emerge. First, residential broadband speeds are not evenly distributed throughout Winters. Some neighborhoods are better served than others. In neighborhoods with older infrastructure or that have not been upgraded by providers, broadband speed and reliability will be a challenge to students using these technologies.

Second, the technologies that are enabled in students' homes pose challenges for technology-based learning. Without wireless connections in the homes, students will not be able to take advantage of their technology tools. Homes must be equipped with basic wireless access to ensure that students are able to utilize the tools provided by the School District. A wireless router is needed in every home where a student uses an IPad. In these cases, the household may not have the technical skills to install a wireless router or may not be able to afford one. In some cases, wireless routers can be provided with the household's broadband service; however it is usually at an additional cost and requires the technical skills for installation. Today, students in Winters huddle around the library afterhours to take advantage of its WiFi connectivity. In many cases, this is the fastest broadband that students can receive in the community. This is symptomatic of the issues described above and if they are not mitigated, the School District's technology-based learning programs will not be fully realized in the community.

Healthcare

Winters healthcare organizations reported significant broadband issues. Winters Health Foundation has encountered serious connectivity issues across their three locations in the city. When their Internet is disrupted, they cannot treat patients. All of their patient records are cloud-based, so whenever the Internet is down, they are disconnected from these systems. In addition, they have been trying to establish connectivity with California Telehealth Network to expand their access to telehealth services but local infrastructure in the area will only support T1 connectivity. T1 service is extremely expensive and provides minimal bandwidth. Unfortunately, no other options exist in the local area; DSL and cable services cannot currently be connected to CTN's network.

The Foundation has recently upgraded their service in the downtown locations, which provides more stable connectivity between their offices. However, they are paying $800/month for this connectivity, which is extremely high given the low speed of these connections and the close proximity of their offices to one another. Several doctors' offices have also reported local connectivity issues that impact their practices. Two offices reported that they were only able to receive the lowest speed DSL services, 1.5Meg download and 768K upload and these services were currently insufficient to run their web-based applications.

Local Government

There are many options for Winters to consider in its approach to promoting broadband development in the city. Within the city boundary, the grid of homes and businesses is relatively small in geographic area that may positively benefit broadband development in the city. The City should consider the various options for development of local broadband, which include using broadband-friendly policy tools to reduce the cost of broadband construction, streamlining permitting processes and potentially building a community broadband network to serve the needs of residents, businesses and community anchors.

In all cases, it is important for the City to develop strategic partnerships with local broadband providers in effort to expand broadband in ways that mutually benefit Winters' stakeholders and the providers. Being a small city with a large underserved component, Winters may have a good opportunity to capture federal or state grant funding for expansion of local broadband infrastructure. These grant programs provide funding for service providers and public organizations to build next-generation broadband infrastructure in their communities. In addition, Winters should partner with Yolo's other public organizations, namely Yolo County to plan infrastructure improvements that mutually benefit one another. Some sites for consideration include the Winters Community Library and the Health and Human Services Center.

D. Strategies & Action Items

Recommendation 1: Conduct a study to determine the feasibility of constructing a citywide broadband network that can serve the needs of Winters' residents, businesses and community anchors. The feasibility study should:

a) Determine the physical network required to serve the City's needs;

b) Identify the best business model for Winters to utilize to meet the broadband needs of the community, retail, wholesale or infrastructure-only;

c) Incorporate the broadband needs of other public agencies that have offices in Winters into the study;

d) Determine the role local service providers will play in the development of this network, including potential public-private partnerships;

e) Assess the financial feasibility and funding requirements for the network, including potential federal and State grant opportunities; and,

f) Develop an action plan and timeline for buildout of the network.

Timing: The City should consider conducting the feasibility study within the next 12 months and implement any action plan per its timelines.

Recommendation 2: To improve local broadband conditions, the City needs to help key community anchors get the broadband services they need, by:

a) Focusing on community anchors described in the Winters Community Profile that are currently not receiving adequate broadband service;

b) Developing a broadband construction fund (via Development Impact Fees or other mechanism) that will allow the City to jointly fund construction of broadband infrastructure to these anchors, in cooperation with local service providers;

   i) Finance the upfront costs for "last mile" connection fees to get community anchors the services they need; and,
   ii) Work with local providers to jointly build this infrastructure and ensure that the City maintains rights to install additional conduit and fiber-optic cable in these projects.

Timing: Ongoing until broadband has been extended throughout the community.

Common Action Items

Recommendation 3: Adopt General Plan policies that incorporate broadband as a public utility and create a policy framework to promote its deployment in public and private projects as appropriate. This includes:

a) Tailoring the sample policies and standards (included in the appendix) to the City's specific needs and adopt them into local policy, codes and standards (including policies, dig-once, joint trenching, engineering standards, etc.);

b) Incorporating broadband in the City's Development Impact Fee program and the City's Capital Improvement Plan (CIP) as appropriate and make a commitment to fund broadband infrastructure;

c) Identifying opportunities to install broadband infrastructure in conjunction with public and private construction projects as appropriate;

d) Developing a process so that Planning and Public Works coordinate with IT to identify projects that could install this infrastructure at reduced costs;

e) As the City builds out its network, maintaining broadband infrastructure in the City's GIS system, requiring GIS-based as-builts and implement any other means for accurate documentation;

f) Evaluating ways to streamline the broadband permitting processes within public rights of way to ensure broadband providers do not face unnecessary obstacles to building infrastructure; and

g) Evaluating fees levied to broadband providers for constructing broadband infrastructure to ensure they do not discourage broadband investment.

Timing: The City should adopt General Plan policies and implementing codes and standards over the next 12 months. Implementation should be ongoing.

Recommendation 4: Coordinate with other agencies with facilities in the City (i.e. WJUSD, Yolo County, Yolo County Housing, Yolo County Office of Education, PG&E, etc.) on a regular basis to leverage opportunities to reduce broadband construction costs by:

a) Reviving the regular Utility Coordination Meeting attended by the cities/County (and potentially add the public agencies listed above) to facilitate the long-term planning of broadband infrastructure; and

b) Coordinating on a regular basis to identify opportunities for joint construction, use and broadband infrastructure sharing between local agencies to lower costs and maximize public benefit.

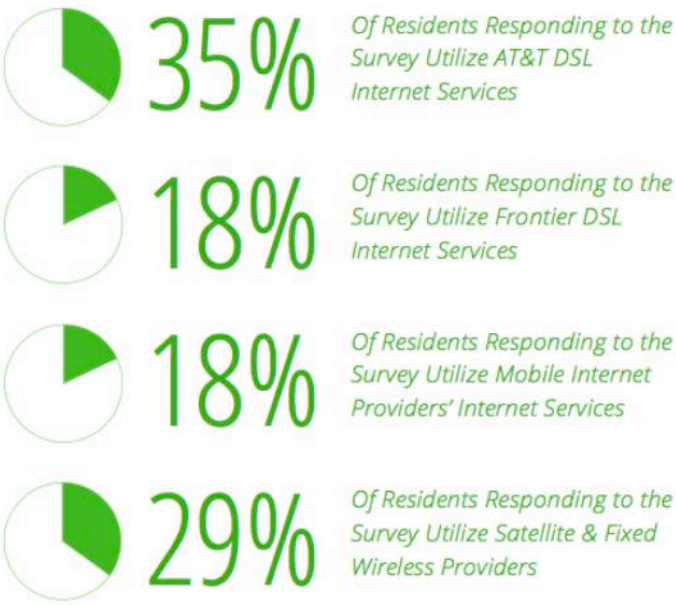
Timing: The City should develop these collaborative programs with other public agencies over the next 3 months.

8. Broadband Community Profiles Yolo County

A. Residential

The residential broadband market in unincorporated Yolo is served by multiple wireline providers including AT&T of California, Comcast, Omsoft, Frontier, and Verizon in addition to a few resellers of wireline providers in the area. Fixed wireless providers also have coverage in unincorporated Yolo including AFES, Winters Broadband, and DigitalPath. There is more penetration of satellite and 3G/4G mobile wireless broadband in unincorporated Yolo due to its rural geography and lack of wireline infrastructure.

Within the residential survey, 114 unique responses were received from residents in Yolo, including the communities of Clarksburg, El Macero, Esparto, Knight's Landing, Yolo, Zamora, and the unincorporated County. Fifty-three percent of the respondents utilized either AT&T or Frontier DSL for their broadband services. Forty-seven percent utilized fixed wireless, mobile, and satellite providers. From the research conducted, wireline residential broadband services are provided via copper infrastructure either on cable or DSL systems. Esparto reported that a local cable company served its community that provides local cable and broadband services to residents. Wireless services are provided through terrestrial fixed wireless systems and 3G and 4G mobile wireless carriers[17].



Broadband Internet download and upload speeds reported by the majority of residents surveyed were commensurate with DSL, mobile broadband, and fixed wireless services in the region, however; speeds reported were significantly lower than in any of the cities in Yolo County. Samples were collected from residential broadband subscribers across unincorporated Yolo. Only 5% of respondents

[17] AT&T Mobility, Verizon Wireless, T-Mobile, MetroPCS and Sprint

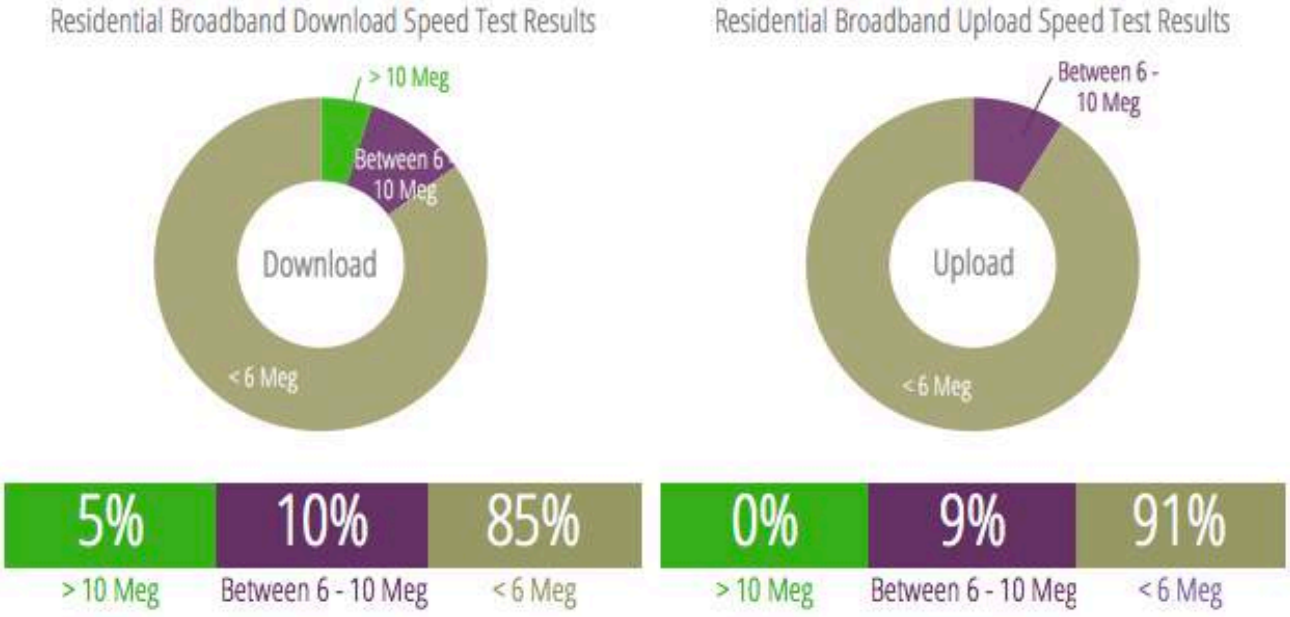
reported download speeds greater than 10Meg. Some 85% of respondents reported download speeds less than 6Meg. Upload speeds were considerably slower than in any of the cities in Yolo County. Respondents reported dissatisfaction with the speed and reliability of their broadband Internet services, citing many issues with the reliability and consistency of their Internet connections at home. A total of 85% reported their services were unreliable and 79% reported that their services were not fast enough.

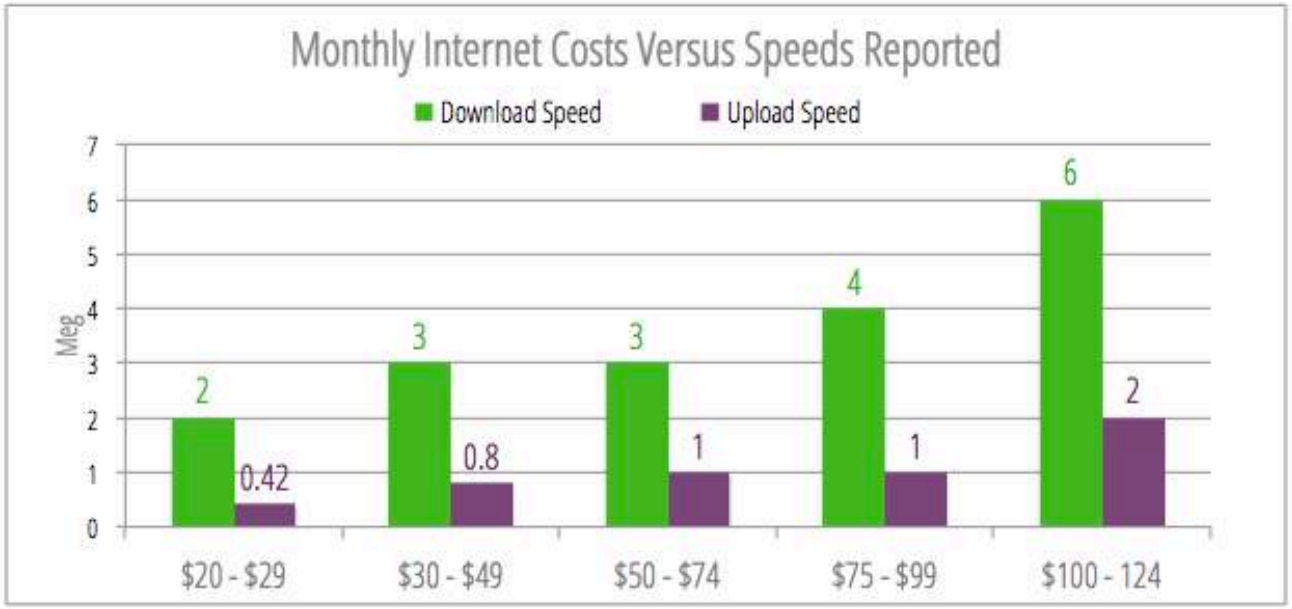
Measuring the pricing for services against the speeds of services that residents received indicated that there was a direct correlation between the price paid for services and the amount of bandwidth ("speed") received by residents. Residents appear to be paying the same prices for their services as in other communities in Yolo County but getting significantly less bandwidth. The chart below illustrates the price of services respondents in unincorporated Yolo County pay and the realized download and upload speeds for these services. It is important to note that the speeds reported are actual recorded speeds that may be different from the speeds residents buy from service providers in the area. In general, DSL, wireless, and cable broadband services are sold with speed increments that define a maximum speed for the service such as "Up to 10 megabits down and up to 1.5 megabits up." Actual speeds vary depending on the physical location of the service and how many subscribers are concurrently on the system. The "maximum advertised speed" should not be construed to mean a sustained maximum but instead the top speed of the service which may be considerably lower over long periods of time.

There are several critically underserved residential communities in unincorporated Yolo County. These communities generally have no broadband services available apart from fixed wireless and 3G/4G. In many cases, these services are intermittent in many of the communities, with significant reliability issues cited by residents responding to the survey.

Only a handful of these communities were targeted as "Priority Areas" in the California Advanced Services Fund ("CASF") as strong candidates to receive funding under this State grant program. These Priority Areas were determined on short notice by the CPUC based on data available at the time. The CASF fund would identify improvements to local broadband infrastructure that could enhance these areas with sufficient wireline and wireless broadband infrastructure. LAFCo, in conjunction with Valley Vision submitted these Priority Areas to the California Public Utilities Commission ("CPUC") to bring visibility to the most needy communities in Yolo County. A summary of these areas is provided on the following pages. In addition, Yolo's other rural and unincorporated communities are included in this Plan to identify other focus areas for future broadband development.

Residential Broadband Services - Yolo County Survey Data





The charts below identify communities in unincorporated Yolo County that are underserved, unserved or rural. These communities are sorted by unserved first (in red), followed by underserved (in yellow), followed by served (in green).

Figure 8.1: Critically Unserved Communities in Yolo County

Unincorporated Community	# of House holds	Anchors	CPUC Designation	CPUC Reported Broadband Availability	CPUC Reported Providers	Technology Type	Summary of Speeds Reported
Binning Farms	50	none	Unserved	6-10 down, 6-10 up 6-10 down, 768-1.5 up 6-10 down, 768-1.5 up	DigitalPath, Inc. Winters Broadband AT&T	Fixed Wireless Fixed Wireless DSL	None available
Dunnigan	558	Fire Station Water District	Underserved and unserved	6-10 down, 768 – 1.5 up, inconsistent data in CPUC maps	Succeed.net AT&T (Limited)	Fixed Wireless DSL (limited)	Maximum speed 5 meg down, 1 meg up
Knights Landing	343	Library Fire Station Sci-Tech Academy (K-6 charter) Community Services District	Unserved	6-10 down, 768-1.5 up 6-10 down, 6-10 up inconsistent data in CPUC maps	DigitalPath, Inc AFES	Fixed Wireless DSL (limited)	Maximum speed 3.6 meg down, .5 meg up
North Davis Meadows	95	none	Underserved	6-10 down, 768-1.5 up 6-10 down, 768-1.5 up	DigitalPath, Inc Winters Broadband AT&T	Fixed Wireless Fixed Wireless DSL (limited)	None available
Zamora	14	Fire Station	Unserved	6-10down, 768-1.5 up	DigitalPath	Fixed wireless	None available
Yolo	165	Library Fire Station Cache Creek HS (continuation) Community Services District	Unserved and Underserved	6-10 down, 768-1.5 up 768-1.5 down, 200-768 up	DigitalPath, Inc AT&T (Limited)	Fixed Wireless DSL (limited area)	Maximum speed 4.5 meg down, 1.2 meg up

Figure 8.2: Critically Underserved Communities in Yolo County

Unincorporated Community	# of House holds	Anchors	CPUC Designation	CPUC Reported Broadband Availability	CPUC Reported Providers	Technology Type	Summary of Speeds Reported
Clarksburg	182	Fire Station Library Delta K-6 School (Charter) Clarksburg Middle School Delta High School	Served, small segment of unserved	6-10 down, 768-1.5 up	Frontier	DSL	Maximum speed 3.15 meg down, .6 meg up
El Macero	351	none	Served and unserved	10-25 down, 10-25 up	Succeed,net AT&T DigitalPath	DSL Fixed Wireless Fixed Wireless	Maximum speed 6 meg down, .9 meg up
Esparto	905	Community Services District Fire Station Library Esparto K-8 school Esparto High School	Underserved, small segment of Unserved	10-25 down, 10-25 up	AT&T	Fixed Wireless DSL Fixed wireless	Maximum speed 11.26 meg down, 1.7 meg up
Monument Hills	150	none	underserved	6-10 down, 768-1.5 up	AT&T DigitalPath ,Inc	DSL Fixed Wireless	None available
Patwin Road (outside Davis)	32	none	Unserved and Underserved	6-10 down, 768-1.5 up 768-1.5 down, 200-768 up	DigitalPath Winters BB AT&T	Fixed Wireless Fixed Wireless DSL	None available
Royal Oak	120	None (Mobile home park)	underserved	10-25 down, 768-1.5up	AT&T	DSL	Maximum 3.32 meg down, .5 meg up
West Plainfield/Airport	50	Fire Station Plainfield Elementary School Yolo County Airport	Unserved and Underserved	6-10 down, 768-1.5 up 3-6 down, 768-1.5 up 3-6 down, 200-768 up	DigitalPath Winters BB AT&T	Fixed Wireless DSL	None available
Willow Oak (outside Woodland)	40	Elementary School Fire Station	Underserved	6-10 down,768-1.5 up 1.5-3 down, 200-768 up	Digital Path AT&T	Fixed wireless DSL	None available

Figure 8.3: Other Rural Communities in Yolo County

Unincorporated Community	# of House holds	Anchors	CPUC Designation	CPUC Reported Broadband Availability	CPUC Reported Providers	Technology Type	Summary of Speeds Reported
Guinda	40	Fire Station	Served	10-25 down, 1.5-3 up	Frontier	DSL	None available
Capay	25	none	Served	10-25 down, 1.5-3 up	Frontier AT&T Various fixed wireless	DSL DSL Fixed Wireless	None available
Rumsey	15	None	Served and unserved	10-25 down, 1.5-3 up	Frontier	DSL	Maximum 26 Meg down, 1 meg up
West Kentucky	22	none	Served	10-25 down, 3-6 up	AT&T	DSL	None available
Madison	137	High School (Continuation) Fire Station Post Office Community Services District	Served and unserved	25-50 down, 6-10 up	AT&T	DSL	Maximum 5.01 meg down, .5 meg up
El Rio Villa	40	Owned by Housing Authority (falls under SB 1299)					None reported

B. Business & Agriculture

A few businesses reported on their broadband services in unincorporated Yolo County. These businesses were generally from the agricultural and farming community. Due to a lack of formal reporting, it was necessary to utilize anecdotal information when trying to understand the state of broadband for these rural organizations. The reports received detailed significant wireline connectivity issues in the small towns across the County, particularly in Knight's Landing, Esparto, and Clarksburg. They cited the lack of any wireline options that provided an adequate service for them and had adopted 3G/4G wireless as their only alternative that was fast enough for their needs.

Agricultural businesses in particular cited the use of wireless technologies as the only options for their connectivity needs. In these cases, they too utilized 3G/4G wireless options as well as fixed wireless solutions from providers such as AFES, DigitalPath, and Winters Broadband. Several agricultural businesses cited the growing need for broadband services as critical to managing their businesses. The need for broadband extends to agricultural areas to support traditional and organic farms to monitor crop rotation within fields, saturation of fertilizer content, and distribution of water across farms. The concept of the "Smart Farm" enables farms to monitor and manage resources electronically to improve overall productivity and yield. A network of sensors connected within the fields allows them to collect key data but, these organizations need next-generation broadband to upload that data to the Internet and connect with suppliers, researchers, and fellow farmers. As an important agricultural and seed tech center, Yolo County must find ways to enable next-generation broadband in some of the most rural areas of the community. Doing so will require unique approaches to making broadband infrastructure available in places where it is generally most difficult to achieve.

Comments from Businesses in Yolo County:

Guinda Farm– "We have a warehouse and multiple work from home locations so it is critical for our workflow"

Guinda Local Business – "Frustrated by the lack of reliability and speed in our local services"

Capay Farm – "Mobile connectivity is the only option in our location; we have to use two to get the reliability we need"

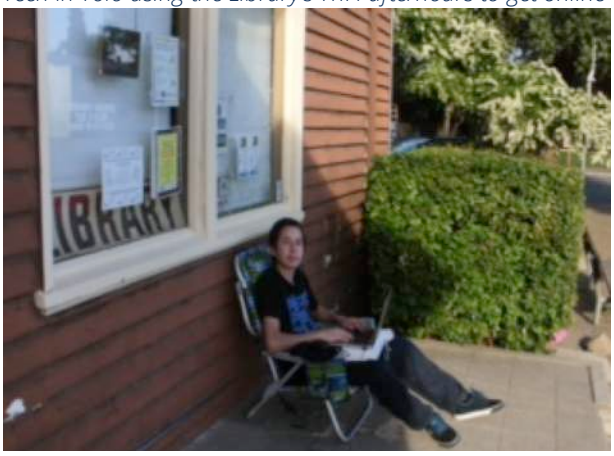
Yolo County has also been planning the development of the designated commercial areas around the Yolo County Airport to expand local economic development opportunities. The Airport is located in an area northeast of Davis that is not well served by commercial broadband services and this may become an obstacle to businesses looking to locate at or near the Airport.

C. Community Anchors

Education

Educational organizations across unincorporated Yolo County report varying degrees of need for broadband services. Many schools are located in unincorporated communities such as Brooks, Clarksburg, Esparto, Knights Landing, Monument Hills, Plainfield, Willow Oak and Yolo. Some communities are better connected than others. For example, some schools in Esparto are connected to fiber provided by a local provider and maintain high-speed connections back to the Board of Education where they receive centralized services. Others utilize T1 and DSL services because fiber options are not available or affordable to them. As online education grows for school districts, the importance of their broadband services becomes even more important to deliver a blended curriculum to their students. As new testing requirements from California's Common Core State Standards take effect this year, districts will rely on their broadband connectivity for more advanced online testing programs; therefore, the long-term broadband needs of Yolo County's schools should be considered a critical component of local broadband development. Rural schools with basic broadband infrastructure should plan for upgrades in their broadband services to ensure they have the capabilities to meet state standards. In some of Yolo's rural communities, it is questionable whether these services are even available in the local community.

Teen in Yolo using the Library's WiFi afterhours to get online



A second broadband challenge that faces education and the general community is the discrepancy that exists between students' access to broadband services at school versus at home. In many cases, schools are equipped with the necessary broadband to allow students to take advantage of all online opportunities. One of the primary issues is however, when these students go home, many residents in these communities do not have sufficient broadband access or cannot afford it. The result is that students have different educational experiences depending on where they live. Students in rural communities may have high-speed access at school but have only dial-up or satellite Internet at home whereas in urban communities residents have faster Internet at more affordable rates. This creates an equality issue that impairs students that live in rural communities.

Healthcare

Healthcare organizations in unincorporated Yolo County have a mix of broadband services that use DSL, cable, or T1 connectivity. Several healthcare providers interconnect with the California Telehealth Network ("CTN") for telehealth and other electronic health services. These organizations are currently using T1 connectivity that is marginally sufficient for their needs. The Knight's Landing Health Clinic reported basic using basic DSL services that were constantly down, resulting in their inability to access

online health applications that supported patient care. As telehealth applications grow, these organizations will require upgrades to higher speeds to take advantage of many new offerings provided by CTN. Healthcare providers also need access to next-generation broadband to ensure they are equipped for electronic medical records, distance viewing, and virtual physician visits.

Local Government

A key issue facing Yolo County government is its reliance on the Comcast I-Net fiber that is part of the Franchise Agreement between Comcast and the City of Davis. The County maintains 2 sites that are connected to the I-Net fiber and an interconnection to UC Davis that also utilizes I-Net fiber (3 connections total). If the City of Davis is unsuccessful in renewing the free use of the I-Net fiber, it will force the County to either begin paying for this connectivity or procure new connectivity from another provider in the area. The potential cost to the County could be significant and ongoing, for which the County would need to allocate a budget.

Yolo County maintains an existing fiber and conduit network that interconnects its offices through West Sacramento, Woodland, and Davis. The network provides connectivity for Yolo County and related offices. The network is currently linear but has the potential to interconnect West Sacramento to Davis directly that would "close the ring" and provide a fully redundant fiber network between the three cities. The network currently provides 1Gbps between County sites, which will be upgraded in the future to 10Gbps. The network has varied fiber counts of 12, 24, 36, and 48-count cable across different segments. The County has expressed desire in expanding the network to provide additional connectivity to new facilities. Cities have also expressed interest in using County network resources for their own applications. Local broadband providers have even approached the County to discuss utilizing the network.

Expansion of this network through collaboration with other stakeholders could become an important strategy to expand the availability of broadband infrastructure in Yolo County. The network could be utilized to provide valuable interconnection between cities in Yolo County to support municipal functions such as emergency operations, data sharing, and collaboration. It may also provide an opportunity to aggregate local government demand for Internet, voice, and other technology services that would allow these organizations to procure greater volumes of services to reduce overall costs for all Yolo government organizations. This could include connecting the school districts, healthcare providers, municipal organizations, and public safety agencies to a common network. In many cases, these networks have been found to save millions annual in taxpayer dollars. In addition, Yolo County Housing has expressed desire to expand the wireless services available at its facilities, equipping public housing with WiFi to expand residents' access to online resources. Yolo Housing Authority has also expressed interest in applying for grant funding to outfit its facilities with these wireless capabilities.

This network could also become a platform to expand broadband availability to cities, rural communities, and agricultural areas in parts of Yolo County. The network is in close proximity to many commercial districts in Woodland, West Sacramento, and Davis. It also passes areas outside of each city boundary that are not well served by existing broadband providers. In these cases, it could be

utilized as a backbone for new deployments of fiber within each city and a backhaul network to connect the three cities to one another. Furthermore, it passes rural areas that may present opportunities to interconnect with farms and agricultural businesses, which today have no other options beyond satellite and 3G wireless connections in most cases.

Evaluation of the network's capabilities will be required to better understand the feasibility of utilizing such an asset for these purposes. The network does not have a surplus of capacity and the County will need to analyze how much available capacity could be utilized. In addition, some segments of the fiber are direct buried versus placed in conduit. This poses additional challenges in accessing fiber strands within these segments. The recommendations section of this Community Profile lays out the important steps the County should take to determine the feasibility of using this asset.

The Yoche Dehe Wintun Nation

The Yoche Dehe Wintun Nation maintains significant connectivity to its Cache Creek Casino facility to support the data needs of the casino and resort. Tribal members living on the reservation also maintain broadband access to their homes; however, this service is not tied directly to the casino itself. Although high-speed connectivity currently terminates at the Casino, this line may provide a future "jumping off point" to equip other communities surrounding the Casino with upgrades to existing broadband that services residential communities in Esparto, Guinda and agricultural users within the Capay Valley. The Yoche Dehe Wintun Nation and Yolo County should work together to identify where mutual needs exist to support each other's communities with enhanced broadband services, to support public safety, emergency management and fire department coordination between the organizations.

D. Strategies & Action Items

Recommendation 1: The County should continue to develop its broadband infrastructure to reduce internal costs, expand capabilities and protect against future cost increases by:

a) Developing a GIS-based map that identifies the County locations that should be interconnected including the County's current infrastructure;

b) Installing conduit with all public projects;

c) Expanding the County's capability in negotiating agreements for private providers to utilize the County's infrastructure for public benefit; and

d) Coordinating with other local public agencies (i.e. cities, school districts, UC Davis, YCTD, Yolo County Housing, YCFCWCD, Yolo County Office of Education, etc.) as potential users of the County's infrastructure.

Timing: The County should begin the process of identifying areas for direct and joint investment in broadband infrastructure with other public agencies over the next 12 months.

Recommendation 2: The County needs to develop additional broadband infrastructure in cooperation with cities, other local agencies and local broadband providers by:

a) Working with each County and other public agencies to build a map of locations where these organizations jointly need broadband connectivity by:

   i) Developing a GIS-based map illustrating these locations by utilizing the existing Yolo GIS Cooperative;
   ii) Incorporating County and County CIP projects onto this map to identify the companion projects and joint build opportunities;
   iii) Sharing maps and data between organizations; and
   iv) Making sure the maps are updated at least annually.

b) Coordinating with broadband providers on specific broadband infrastructure projects in communities described in the Critical Unserved and Underserved Communities in Yolo County's Community Profile:

   i) Identifying infrastructure routes that the County needs;
   ii) Identifying infrastructure routes that the broadband providers need;
   iii) Sharing information between organizations for joint build opportunities;
   iv) Developing a joint build agreement with local broadband providers that allows each organization to install their own broadband infrastructure in these projects; and,

v) Identifying resources that would be available to fund these projects, including internal County funds and/or available grant or loan programs as described in Recommendation 3.

c) Coordinating with public agencies and private broadband providers to use broadband infrastructure, towers and other resources to expand wireless coverage into agricultural areas, by

   i) Working with broadband wireless providers to make access available to County-owned tower infrastructure, ground space at the base of towers and rooftops, ensuring compliance with legislative and security requirements governing access to these resources;
   ii) Collaborating with other agencies with physical assets in the rural areas such as Yolo County Flood Control and Water Conservation District, Yolo County Transportation District, Yolo County Housing and UC Davis to leverage joint opportunities to expand wireless access in the rural areas of the county;
   iii) Developing agreements for lease or in-kind exchange of these County-owned assets by broadband wireless providers; and
   iv) Where feasible, interconnecting County-owned fiber-optic networks with these assets to provide fiber backhaul to broadband wireless providers.

d) Developing agreements with each County and broadband providers for joint use of broadband infrastructure by:
   i)
   ii) Strengthening the current MOU to include joint use agreements that allow sharing of infrastructure between the County and the cities;
   iii) Actively marketing and identifying opportunities to expand infrastructure with broadband providers.

Timing: The County should accelerate the process of coordinating with other public agencies and broadband providers over the next 12 months and identify opportunities to leverage public broadband infrastructure continuously as a County-level initiative.

Recommendation 3: Target specific State and federal grant and loan programs that will provide funding for Yolo County's unserved and underserved communities by

a) Through the Tactical Plan, designating a resource at the County that will develop, apply for and manage broadband grants;

b) Building on the initial grant analysis completed in this Plan for the County to pursue CASF funding (and other programs defined in Appendix D) for these communities;

c) Developing relationships with broadband providers that define how grant funds will be received and managed and how broadband services will be provided to these communities; and,

d) Applying for CASF grant funding to expand wireless and broadband services is Yolo County Public Housing facilities;

Timing: The County should immediately identify an internal resource to manage the broadband grant efforts on behalf of the County.

Common Action Items

Recommendation 4: Adopt General Plan policies that incorporate broadband as a public utility and create a policy framework to promote its deployment in public and private projects as appropriate. This includes:

a) Tailoring the sample policies and standards (included in the appendix) to the County's specific needs and adopt them into the Tactical Plan, local policy, codes and standards (including policies, dig-once, joint trenching, engineering standards, etc.);

b) Incorporating broadband in the County's Development Impact Fee program and Capital Improvement Plan (CIP) as appropriate and make a commitment to fund broadband infrastructure;

c) Identifying opportunities to install broadband infrastructure in conjunction with public and private construction projects as appropriate;

d) Developing a process so that Planning and Public Works coordinate with IT to identify projects that could install this infrastructure at reduced costs;

e) As the County builds out its network, maintaining broadband infrastructure in the County's GIS system, requiring GIS-based as-builts and implement any other means for accurate documentation;

f) Evaluating ways to streamline the broadband permitting processes within public rights of way to ensure broadband providers do not face unnecessary obstacles to building infrastructure; and

g) Evaluating fees levied to broadband providers for constructing broadband infrastructure to ensure they do not discourage broadband investment.

Timing: The County should adopt General Plan policies and implementing codes and standards over the next 12 months. Implementation should be ongoing.

Recommendation 5: Coordinate with other agencies with facilities in the County (i.e. cities, school districts, UC Davis, YCTD, Yolo County Housing, YCFCWCD, Yolo County Office of Education, etc.) on a regular basis to leverage opportunities to reduce broadband construction costs by:

a) Reviving the regular Utility Coordination Meeting attended by the cities/County (and potentially add the public agencies listed above) to facilitate the long-term planning of broadband infrastructure; and

b) Coordinating on a regular basis to identify opportunities for joint construction, use and broadband infrastructure sharing between local agencies to lower costs and maximize public benefit.

Timing: The County should develop these collaborative programs with other public agencies over the next 3 months.

9. Appendix A: Glossary of Terms

3G – Third Generation	The third generation of mobile broadband technology, used by smart phones, tablets, and other mobile devices to access the web.
4G – Fourth Generation	The fourth generation of mobile broadband technology, used by smart phones, tablets, and other mobile devices to access the web.
ADSL – Asymmetric Digital Subscriber Line	DSL service with a larger portion of the capacity devoted to download communications, less to upload. Typically thought of as a residential service.
ADSS – All-Dialetric Self-Supporting	A type of optical fiber cable that contains no conductive metal elements.
AMR/AMI – Automatic Meter Reading/Advanced Metering Infrastructure	Electrical meters that measure more than simple consumption and an associated communication network to report the measurements.
ATM – Asynchronous Transfer Mode	A data service offering that can be used for interconnection of customer's LAN. ATM provides service from 1 Mbps to 145 Mbps utilizing Cell Relay Packets.
Bandwidth	The amount of data transmitted in a given amount of time; usually measured in bits per second, kilobits per second (kbps), and Megabits per second (Mbps).
Bit	A single unit of data, either a one or a zero. In the world of broadband, bits are used to refer to the amount of transmitted data. A kilobit (Kb) is approximately 1,000 bits. A Megabit (Mb) is approximately 1,000,000 bits. There are 8 bits in a byte (which is the unit used to measure storage space), therefore a 1 Mbps connection takes about 8 seconds to transfer 1 megabyte of data (about the size of a typical digital camera photo).
BPL – Broadband over Powerline	A technology that provides broadband service over existing electrical power lines.
BPON – Broadband Passive Optical Network	BPON is a point-to-multipoint fiber-lean architecture network system which uses passive splitters to deliver signals to multiple users. Instead of running a separate strand of fiber from the CO to every customer, BPON uses a single strand of fiber to serve up to 32 subscribers.
Broadband	A descriptive term for evolving digital technologies that provide consumers with integrated access to voice, high-speed data service, video-demand services, and interactive delivery services (e.g. DSL, Cable Internet).
CAD – Computer Aided Design	The use of computer systems to assist in the creation, modification, analysis, or optimization of a design.
CAI – Community Anchor Institute	Community anchor institutions (CAIs, sometimes called anchor institutions) are usually non-profit organizations that often provide essential services to the public. Universities, colleges, community colleges, K12 schools, libraries, health care facilities, social service providers, government and municipal offices are all community

	anchor institutions.
CAP – Competitive Access Provider	(or "Bypass Carrier") A Company that provides network links between the customer and the Inter-Exchange Carrier or even directly to the Internet Service Provider. CAPs operate private networks independent of Local Exchange Carriers.
Cellular	A mobile communications system that uses a combination of radio transmission and conventional telephone switching to permit telephone communications to and from mobile users within a specified area.
CLEC – Competitive Local Exchange Carrier	Wireline service provider that is authorized under state and Federal rules to compete with ILECs to provide local telephone service. CLECs provide telephone services in one of three ways or a combination thereof: 1) by building or rebuilding telecommunications facilities of their own, 2) by leasing capacity from another local telephone company (typically an ILEC) and reselling it, and 3) by leasing discrete parts of the ILEC network referred to as UNEs.
CO – Central Office	A circuit switch where the phone lines in a geographical area come together, usually housed in a small building.
Coaxial Cable	A type of cable that can carry large amounts of bandwidth over long distances. Cable TV and cable modem service both utilize this technology.
CPE – Customer Premise Equipment	Any terminal and associated equipment located at a subscriber's premises and connected with a carrier's telecommunication channel at the demarcation point ("demarc").
CWDM – Coarse Wavelength Division Multiplexing	A technology similar to DWDM only utilizing less wavelengths in a more customer-facing application whereby less bandwidth is required per fiber.
Demarcation Point (demarc)	The point at which the public switched telephone network ends and connects with the customer's on-premises wiring.
Dial-Up	A technology that provides customers with access to the Internet over an existing telephone line.
DLEC – Data Local Exchange Carrier	DLECs deliver high-speed access to the Internet, not voice. Examples of DLECs include Covad, Northpoint and Rhythms.
Download	Data flowing from the Internet to a computer (Surfing the net, getting E-mail, downloading a file).
DSL – Digital Subscriber Line	The use of a copper telephone line to deliver "always on" broadband Internet service.
DSLAM – Digital Subscriber Line Access Multiplier	A piece of technology installed at a telephone company's Central Office (CO) and connects the carrier to the subscriber loop (and ultimately the customer's PC).

DWDM – Dense Wavelength Division Multiplexing	An optical technology used to increase bandwidth over existing fiber-optic networks. DWDM works by combining and transmitting multiple signals simultaneously at different wavelengths on the same fiber. In effect, one fiber is transformed into multiple virtual fibers.
E-Rate	A Federal program that provides subsidy for voice and data circuits as well as internal network connections to qualified schools and libraries. The subsidy is based on a percentage designated by the FCC.
EON – Ethernet Optical Network	The use of Ethernet LAN packets running over a fiber network.
EvDO – Evolution Data Only	EvDO is a wireless technology that provides data connections that are 10 times as fast as a traditional modem.
FCC – Federal Communications Commission	A Federal regulatory agency that is responsible for regulating interstate and international communications by radio, television, wire, satellite and cable in all 50 states, the District of Columbia, and U.S. territories.
FDH – Fiber Distribution Hub	A connection and distribution point for optical fiber cables.
FTTN – Fiber to the Neighborhood	A hybrid network architecture involving optical fiber from the carrier network, terminating in a neighborhood cabinet with converts the signal from optical to electrical.
FTTP – Fiber to the premise (or FTTP – Fiber to the building)	A fiber-optic system that connects directly from the carrier network to the user premises.
GIS – Geographic Information Systems	A system designed to capture, store, manipulate, analyze, manage, and present all types of geographical data.
GPON- Gigabit-Capable Passive Optical Network	Similar to BPON, GPON allows for greater bandwidth through the use of a faster approach (up to 2.5 Gbps in current products) than BPON.
GPS – Global Positioning System	a space-based satellite navigation system that provides location and time information in all weather conditions, anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites.
GSM – Global System for Mobile Communications	This is the current radio/telephone standard developed in Europe and implemented globally except in Japan and South Korea.
HD – High Definition (Video)	Video of substantially higher resolution than standard definition.
HFC – Hybrid Fiber Coaxial	An outside plant distribution cabling concept employing both fiber-optic and coaxial cable.
ICT – Information and Communications Technology	Often used as an extended synonym for information technology (IT), but it is more specific term that stresses the role of unified communications and the integration of telecommunications, computers as well as necessary enterprise software, middleware, storage, and audio-visual systems, which enable users to access, store, transmit, and manipulate information.
IEEE – Institute of Electrical Engineers	A professional association headquartered in New York City that is dedicated to advancing technological innovation and excellence.
ILEC – Incumbent Local	The traditional wireline telephone service providers within defined

Exchange Carrier	geographic areas. Prior to 1996, ILECs operated as monopolies having exclusive right and responsibility for providing local and local toll telephone service within LATAs.
IP-VPN – Internet Protocol-Virtual Private Network	A software-defined network offering the appearance, functionality, and usefulness of a dedicated private network.
ISDN – Integrated Services Digital Network	An alternative method to simultaneously carry voice, data, and other traffic, using the switched telephone network.
ISP – Internet Service Provider	A company providing Internet access to consumers and businesses, acting as a bridge between customer (end-user) and infrastructure owners for dial-up, cable modem and DSL services.
ITS – Intelligent Traffic System	Advanced applications which, without embodying intelligence as such, aim to provide innovative services relating to different modes of transport and traffic management and enable various users to be better informed and make safer, more coordinated, and 'smarter' use of transport networks.
Kbps – Kilobits per second	1,000 bits per second. A measure of how fast data can be transmitted.
LAN – Local Area Network	A geographically localized network consisting of both hardware and software. The network can link workstations within a building or multiple computers with a single wireless Internet connection.
LATA – Local Access and Transport Areas	A geographic area within a divested Regional Bell Operating Company is permitted to offer exchange telecommunications and exchange access service. Calls between LATAs are often thought of as long distance service. Calls within a LATA (IntraLATA) typically include local and local toll services.
Local Loop	A generic term for the connection between the customer's premises (home, office, etc.) and the provider's serving central office. Historically, this has been a wire connection; however, wireless options are increasingly available for local loop capacity.
MAN – Metropolitan Area Network	A high-speed intra-city network that links multiple locations with a campus, city or LATA. A MAN typically extends as far as 30 miles.
Mbps – Megabits per second	1,000,000 bits per second. A measure of how fast data can be transmitted.
MPLS – Multiprotocol Label Switching	A mechanism in high-performance telecommunications networks that directs data from one network node to the next based on short path labels rather than long network addresses, avoiding complex lookups in a routing table.
ONT – Optical Network Terminal	Used to terminate the fiber-optic line, demultiplex the signal into its component parts (voice telephone, television, and Internet), and provide power to customer telephones.
Overbuilding	Building excess capacity. In this context, it involves investment in additional infrastructure projects to provide competition.
OVS – Open Video Systems	OVS is a new option for those looking to offer cable television service outside the current framework of traditional regulation. It would allow more flexibility in providing service by reducing the build out requirements of new carriers.

PON – Passive Optical Network	A Passive Optical Network consists of an optical line terminator located at the Central Office and a set of associated optical network terminals located at the customer's premise. Between them lies the optical distribution network comprised of fibers and passive splitters or couplers. In a PON network, a single piece of fiber can be run from the serving exchange out to a subdivision or office park, and then individual fiber strands to each building or serving equipment can be split from the main fiber using passive splitters / couplers. This allows for an expensive piece of fiber cable from the exchange to the customer to be shared amongst many customers, thereby dramatically lowering the overall costs of deployment for fiber to the business (FTTB) or fiber to the home (FTTH) applications.
QOS – Quality of Service	QoS (Quality of Service) refers to a broad collection of networking technologies and techniques. The goal of QoS is to provide guarantees on the ability of a network to deliver predictable results. Elements of network performance within the scope of QoS often include availability (uptime), bandwidth (throughput), latency (delay), and error rate. QoS involves prioritization of network traffic.
RF – Radio Frequency	a rate of oscillation in the range of about 3 kHz to 300 GHz, which corresponds to the frequency of radio waves, and the alternating currents which carry radio signals.
Right-of-Way	A legal right of passage over land owned by another. Carriers and service providers must obtain right-of-way to dig trenches or plant poles for cable systems, and to place wireless antennae.
RMS – Resource Management System	A system used to track telecommunications assets.
RPR – Resilient Packet Ring	Also known as IEEE 802.17, is a protocol standard designed for the optimized transport of data traffic over optical fiber ring networks.
RUS – Rural Utility Service	A division of the United States Department of Agriculture, it promotes universal service in unserved and underserved areas of the country with grants, loans, and financing.
SCADA – Supervisory Control and Data Acquisition	A type of industrial control system (ICS). Industrial control systems are computer controlled systems that monitor and control industrial processes that exist in the physical world.
SNMP – Simple Network Management Protocol	An Internet-standard protocol for managing devices on IP networks.
SONET – Synchronous Optical Network	A family of fiber-optic transmission rates.
Steaming	Streamed data is any information/data that is delivered from a server to a host where the data represents information that must be delivered in real time. This could be video, audio, graphics, slide shows, web tours, combinations of these, or any other real time application.
Subscribership	Subscribership is how many customers have subscribed for a particular telecommunications service.
Switched Network	A domestic telecommunications network usually accessed by

	telephone, key telephone systems, private branch exchange trunks, and data arrangements.
T-1 – Trunk Level 1	A digital transmission link with a total signaling speed of 1.544 Mbps. It is a standard for digital transmission in North America.
T-3 – Trunk Level 3	28 T1 lines or 44.736 Mbps.
UNE – Unbundled Network Elements	Leased portions of a carrier's (typically an ILEC's) network used by another carrier to provide service to customers.
Universal Service	The idea of providing every home in the United States with basic telephone service.
Upload	Data flowing from your computer to the Internet (sending E-mail, uploading a file).
UPS – Uninterruptable Power Supply	An electrical apparatus that provides emergency power to a load when the input power source, typically main power, fails.
USAC – Universal Service Administrative Company	An independent American nonprofit corporation designated as the administrator of the Federal Universal Service Fund (USF) by the Federal Communications Commission.
VDSL – Very High Data Rate Digital Subscriber Line	A developing digital subscriber line (DSL) technology providing data transmission faster than ADSL over a single flat untwisted or twisted pair of copper wires (up to 52 Mbit/s download and 16 Mbit/s upload), and on coaxial cable (up to 85 Mbit/s down and upload); using the frequency band from 25 kHz to 12 MHz.
Video on Demand	A service that allows users to remotely choose a movie from a digital library whenever they like and be able to pause, fast-forward, and rewind their selection.
VLAN – Virtual Local Area Network	In computer networking, a single layer-2 network may be partitioned to create multiple distinct broadcast domains, which are mutually isolated so that packets can only pass between them via one or more routers; such a domain is referred to as a Virtual Local Area Network, Virtual LAN or VLAN.
VoIP – Voice over Internet Protocol	A technology that employs a data network (such as a broadband connection) to transmit voice conversations using Internet Protocol.
VPN – Virtual Private Network	A virtual private network (VPN) extends a private network across a public network, such as the Internet. It enables a computer to send and receive data across shared or public networks as if it were directly connected to the private network, while benefitting from the functionality, security and management policies of the private network. This is done by establishing a virtual point-to-point connection through the use of dedicated connections, encryption, or a combination of the two.
WAN – Wide Area Network	A network that covers a broad area (i.e., any telecommunications network that links across metropolitan, regional, or national boundaries) using private or public network transports.
WiFi	WiFi is a popular technology that allows an electronic device to exchange data or connect to the Internet wirelessly using radio waves. The Wi-Fi Alliance defines Wi-Fi as any "wireless local area network (WLAN) products that are based on the Institute of

	Electrical and Electronics Engineers' (IEEE) 802.11 standards".
WiMax	WiMax is a wireless technology that provides high-throughput broadband connections over long distances. WiMax can be used for a number of applications, including “last mile” broadband connections, hotspot and cellular backhaul, and high speed enterprise connectivity for businesses.
Wireless	Telephone service transmitted via cellular, PCS, satellite, or other technologies that do not require the telephone to be connected to a land-based line.
Wireless Internet	1) Internet applications and access using mobile devices such as cell phones and palm devices. 2) Broadband Internet service provided via wireless connection, such as satellite or tower transmitters.
Wireline	Service based on infrastructure on or near the ground, such as copper telephone wires or coaxial cable underground or on telephone poles.

10. Appendix B: Countywide Survey Results

A. Residential Survey

Residential Survey Questions

1.

Please use the link below to report your Internet speed. Once you click the link, you'll see a new web browser window appear that goes to speedtest.net. You'll see a "Begin Test" icon in the middle of your screen. Click this icon to begin the speed test. Wait a few moments while the test runs and measures your download and upload speeds. Once the test finishes, please record these speeds in the boxes below.

Speedtest Link - Click Here

Download Speed:

Upload Speed:

2. Please provide your name and physical address where you are testing your Internet connection. (This information will be used solely for determining the availability of broadband in Yolo County, California and may become publicly accessible however no names or email addresses will be provided as public information).

Name

Street Address

City

Zip Code

3. Do you have Internet service in your home? If not, please answer No and move on to question 4.

- Yes
- No
- Not sure

4. What is the NUMBER ONE reason why you don't have Internet service at home?

- Too expensive
- Slow connection in my area
- Not available in my area
- Don't know much about technology
- I have Internet at work, school, library, etc., and don't need it at home
- Other

Other (please specify)

5. From which broadband Internet service provider do you receive service?

6. What type of broadband Internet service do you have?

- High-speed (e.g. DSL, cable modem, fiber)
- Mobile Internet for a phone or tablet
- Dial-up
- Not sure
- Other

Other (please specify)

7. How many devices that connect to the Internet such as computers, iPads, tablets, Kindles, iPods, TiVo, Xbox, PlayStation, etc. do you have in your home?

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10 or more
- Not sure

8. Do you have a wireless router set up in your home?

- Yes
- No
- Not sure

9. On a scale from 1 to 10, how important is high speed Internet to members of your household? 1 means "It's unnecessary" and 10 means "We couldn't live without it."

It's unnecessary									We couldn't live without it.
○	○	○	○	○	○	○	○	○	○

10. Do you or any members of your household have a home-based business?

- ○ Yes
- ○ No
- ○ Not sure

11. Do you or any members of your household telecommute?

- ○ Yes
- ○ No
- ○ Not sure

12. What is the best estimate of the cost of your home internet connection?

- ○ Less than $20 per month
- ○ $20 to $29 per month
- ○ $30 to $49 per month
- ○ $50 to $74 per month
- ○ $75 to $99 per month
- ○ $100 to $124 per month
- ○ $125 to $149 per month
- ○ $150 to $199 per month
- ○ $200 or more per month

13. Does that cost include something else besides internet connection, such as cable TV, mobile phone, etc.?

- ○ Yes
- ○ No
- ○ Unsure

14. What kind of impact do Internet problems including reliability and speed have on your home experience?

- ○ No disruption
- ○ Minimal disruption
- ○ Moderate disruption
- ○ Severe disruption
- ○ Total disruption
- ○ Other

Other (please specify)

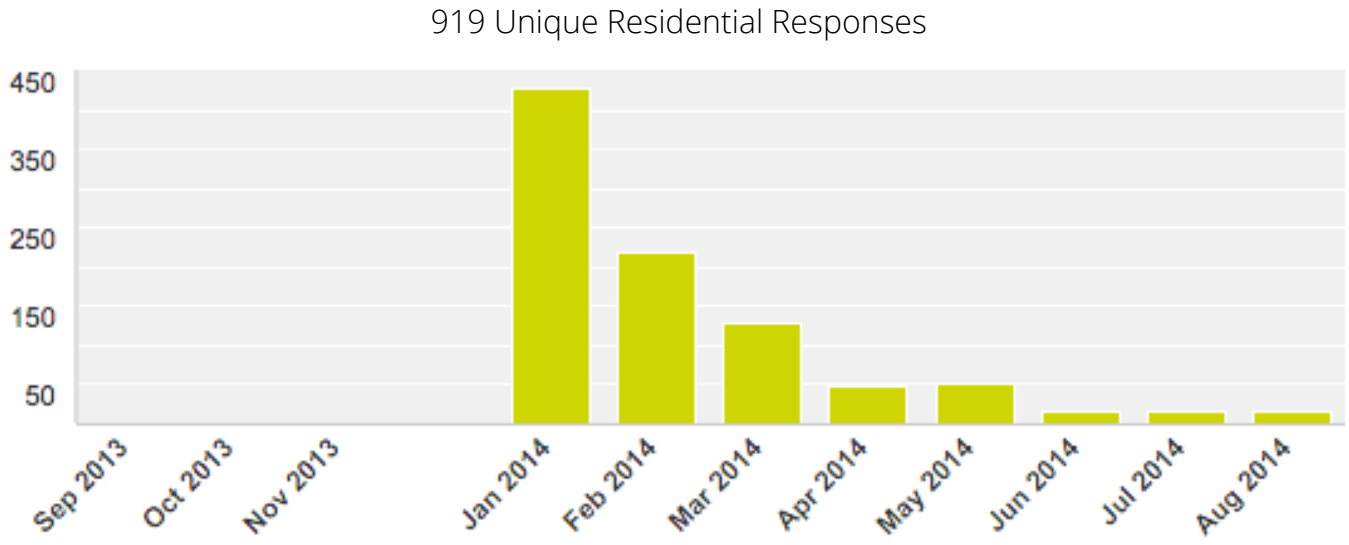
15. Please rate your current Internet services on a scale of 1 - 5, with 5 being the best.

	1	2	3	4	5
Price	○	○	○	○	○
Reliability	○	○	○	○	○
Speed	○	○	○	○	○
Customer service	○	○	○	○	○

16. Do you currently have a "triple-play" offering available in your area? Triple-play includes Internet, voice and video services.

- ○ Yes
- ○ No
- ○ Unsure

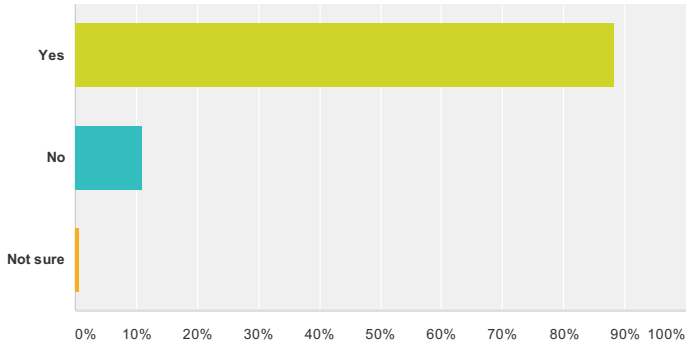
Residential Survey Collection Results



Residential Survey Response Results

Q3 Do you have Internet service in your home? If not, please answer No and move on to question 4.

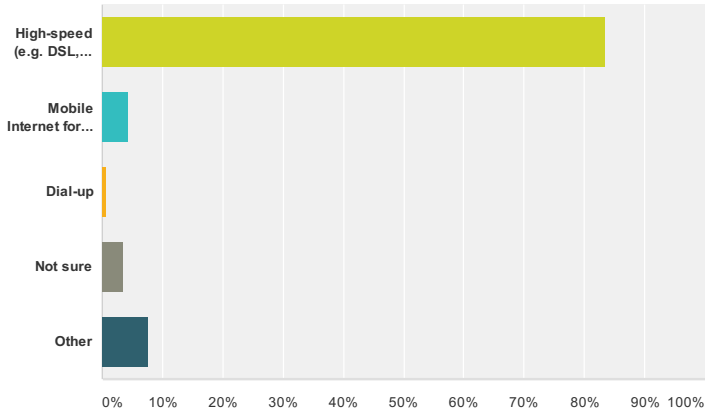
Answered: 893 Skipped: 26



Answer Choices	Responses	
Yes	**88.24%**	788
No	**11.09%**	99
Not sure	**0.67%**	6
Total		**893**

Q6 What type of broadband Internet service do you have?

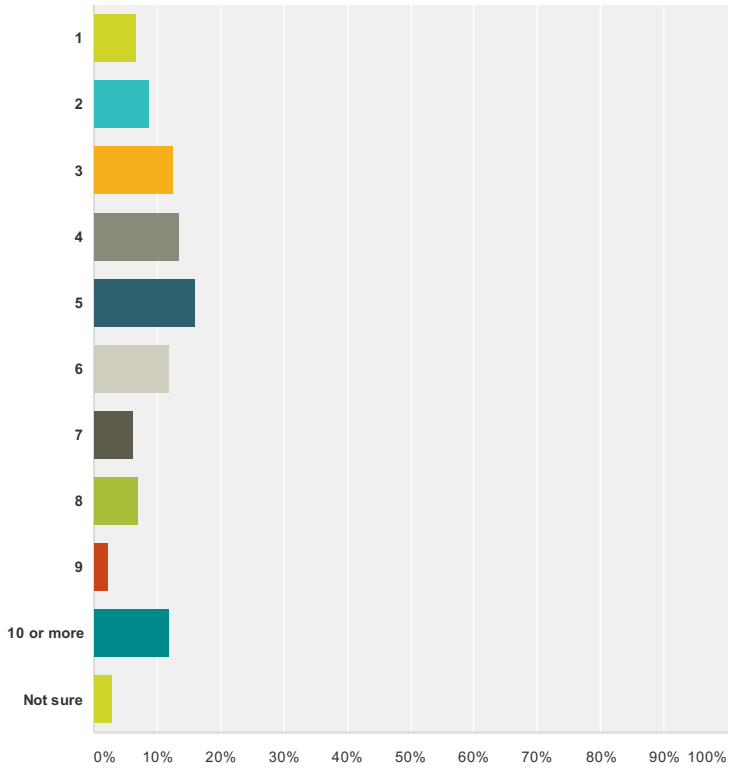
Answered: 831 Skipped: 88



Answer Choices	Responses	
High-speed (e.g. DSL, cable modem, fiber)	**83.51%**	694
Mobile Internet for a phone or tablet	**4.45%**	37
Dial-up	**0.72%**	6
Not sure	**3.61%**	30
Other	**7.70%**	64
Total		**831**

Q7 How many devices that connect to the Internet such as computers, iPads, tablets, Kindles, iPods, TiVo, Xbox, PlayStation, etc. do you have in your home?

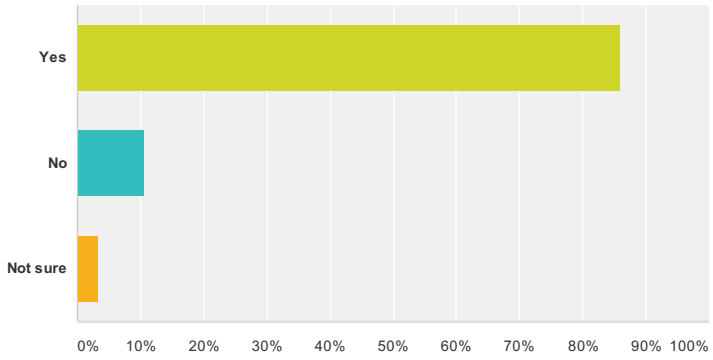
Answered: 849 Skipped: 70



Answer Choices	Responses	
1	6.60%	56
2	8.72%	74
3	12.60%	107
4	13.55%	115
5	16.14%	137
6	11.90%	101
7	6.36%	54
8	7.07%	60
9	2.24%	19
10 or more	11.90%	101
Not sure	2.94%	25
Total		849

Q8 Do you have a wireless router set up in your home?

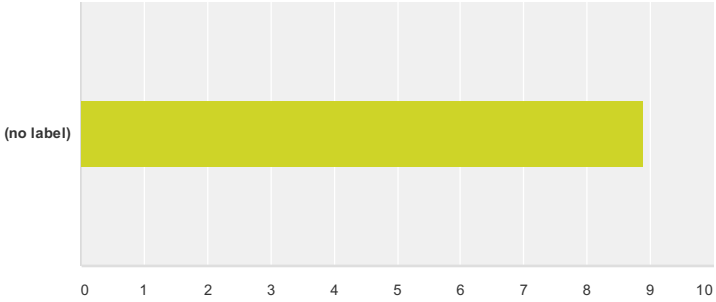
Answered: 846 Skipped: 73



Answer Choices	Responses	
Yes	**86.05%**	728
No	**10.64%**	90
Not sure	**3.31%**	28
Total		**846**

Q9 On a scale from 1 to 10, how important is high speed Internet to members of your household? 1 means "It's unnecessary" and 10 means "We couldn't live without it."

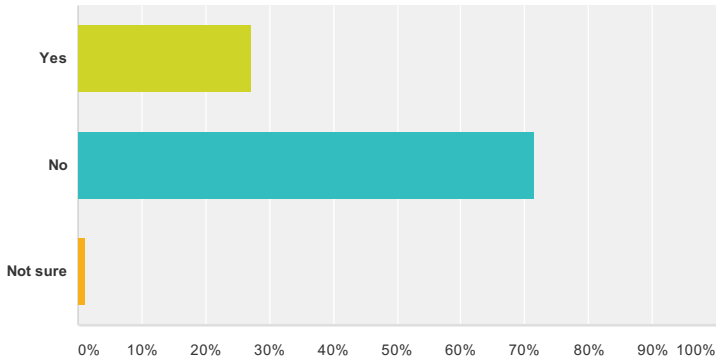
Answered: 853 Skipped: 66



	It's unnecessary	(no label)	(no label)	(no label)	(no label)	(no label)	(no label)	(no label)	(no label)	We couldn't live without it.	Total	Average Rating
(no label)	**1.64%** 14	**0.59%** 5	**0.35%** 3	**0.35%** 3	**1.41%** 12	**2.58%** 22	**6.21%** 53	**15.01%** 128	**20.40%** 174	**51.47%** 439	853	8.90

Q10 Do you or any members of your household have a home-based business?

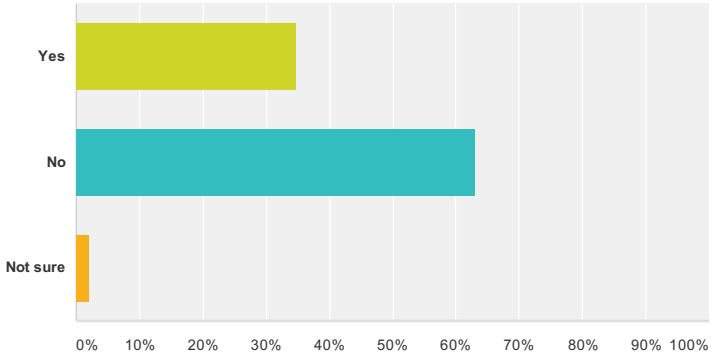
Answered: 854 Skipped: 65



Answer Choices	Responses	
Yes	**27.05%**	231
No	**71.66%**	612
Not sure	**1.29%**	11
Total		**854**

Q11 Do you or any members of your household telecommute?

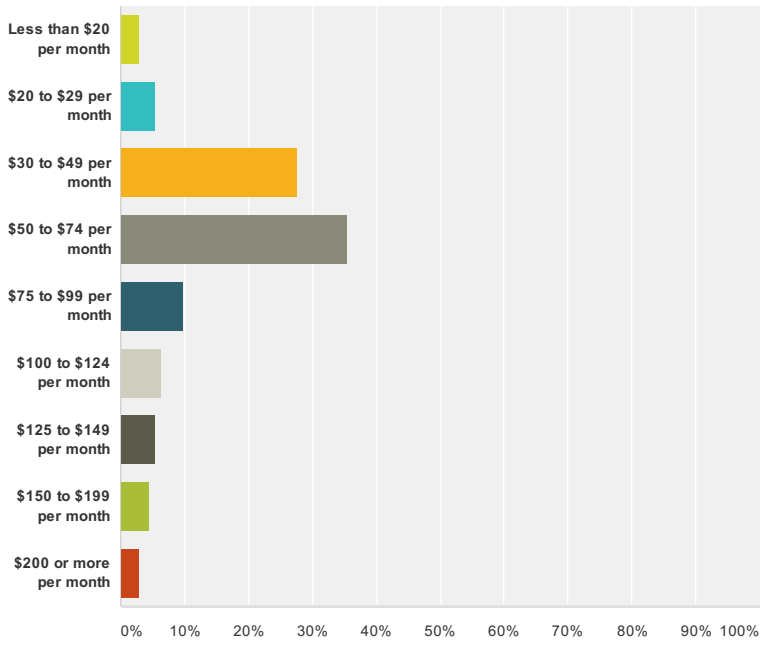
Answered: 857 Skipped: 62



Answer Choices	Responses	
Yes	**34.89%**	299
No	**63.01%**	540
Not sure	**2.10%**	18
Total		**857**

Q12 What is the best estimate of the cost of your home internet connection?

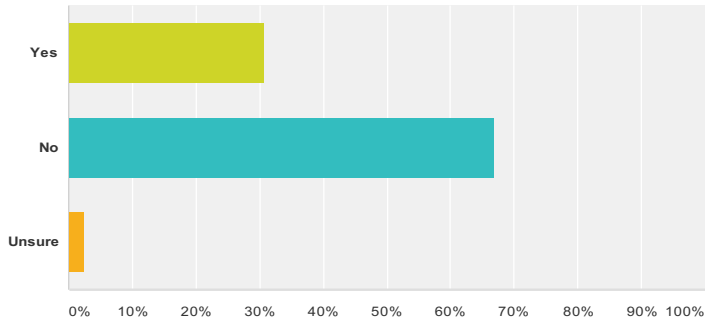
Answered: 841 Skipped: 78



Answer Choices	Responses	
Less than $20 per month	2.85%	24
$20 to $29 per month	5.35%	45
$30 to $49 per month	27.47%	231
$50 to $74 per month	35.55%	299
$75 to $99 per month	9.75%	82
$100 to $124 per month	6.18%	52
$125 to $149 per month	5.47%	46
$150 to $199 per month	4.40%	37
$200 or more per month	2.97%	25
Total		**841**

Q13 Does that cost include something else besides internet connection, such as cable TV, mobile phone, etc.?

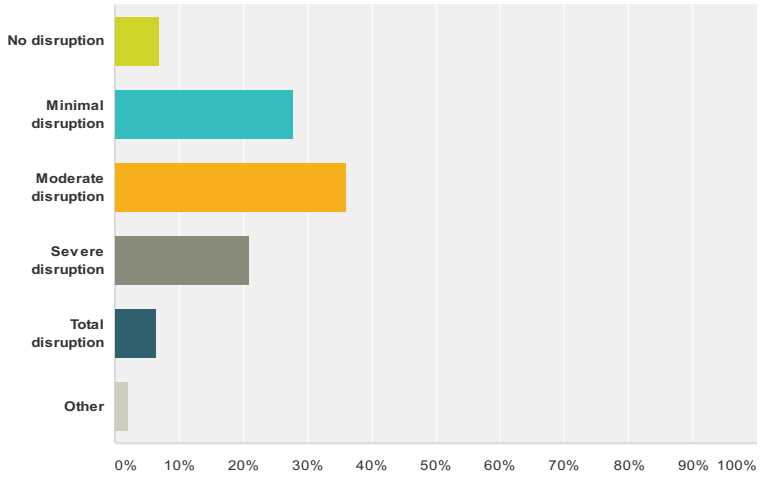
Answered: 845 Skipped: 74



Answer Choices	Responses	
Yes	**30.65%**	259
No	**66.75%**	564
Unsure	**2.60%**	22
Total		**845**

Q14 What kind of impact do Internet problems including reliability and speed have on your home experience?

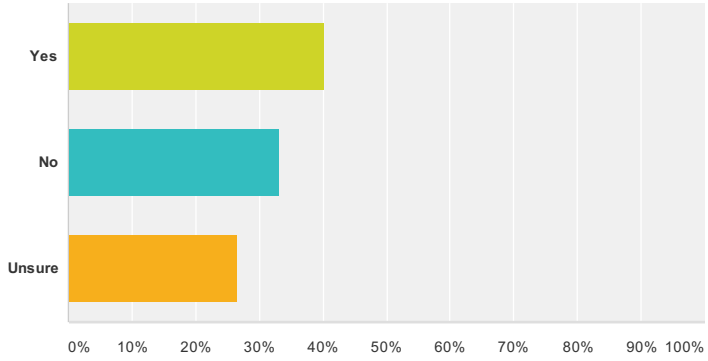
Answered: 840 Skipped: 79



Answer Choices	Responses	
No disruption	**6.79%**	57
Minimal disruption	**27.74%**	233
Moderate disruption	**36.07%**	303
Severe disruption	**20.95%**	176
Total disruption	**6.43%**	54
Other	**2.02%**	17
Total		**840**

Q16 Do you currently have a "triple-play" offering available in your area? Triple-play includes Internet, voice and video services.

Answered: 857 Skipped: 62



Answer Choices	Responses	
Yes	**40.37%**	346
No	**33.14%**	284
Unsure	**26.49%**	227
Total		**857**

	1	2	3	4	5	Total
Price	**19.38%** 162	**22.85%** 191	**36.48%** 305	**16.99%** 142	**4.31%** 36	836
Reliability	**9.28%** 77	**13.25%** 110	**28.31%** 235	**36.99%** 307	**12.17%** 101	830
Speed	**16.00%** 133	**17.93%** 149	**28.40%** 236	**28.88%** 240	**8.78%** 73	831
Customer service	**14.39%** 118	**16.46%** 135	**25.73%** 211	**26.83%** 220	**16.59%** 136	820

B. Business Survey Results

Business Survey Questions

1.

Please use the link below to report your Internet speed. Once you click the link, you'll see a new web browser window appear that goes to speedtest.net. You'll see a "Begin Test" icon in the middle of your screen. Click this icon to begin the speed test. Wait a few moments while the test runs and measures your download and upload speeds. Once the test finishes, please record these speeds in the boxes below.

Speedtest Link - Click Here

Download Speed:

Upload Speed:

2. Please provide your physical business address where you are testing your Internet connection. (This information will be used solely for determining the availability of broadband in Yolo County, California and may become publicly accessible however no names or email addresses will be provided as public information).

Business Name

Street Address

City

Zip Code

3. Please provide the number of staff in your Yolo County location.

4. Please provide your industry.

- ☐ Agricultural & Farming
- ☐ Construction
- ☐ Manufacturing
- ☐ Retail trade
- ☐ Transportation and warehousing
- ☐ Finance and insurance
- ☐ Real estate, rental and leasing
- ☐ Professional, scientific, and technical services
- ☐ Educational services
- ☐ Healthcare and social assistance
- ☐ Arts, entertainment, and recreation
- ☐ Accommodation and food services
- ☐ Hospitality

Other (please specify)

5. From which broadband Internet service provider do you receive service for your business?

6. Please indicate all of the ways you use the Internet (Check all that apply):

- ☐ General use: email, general Internet browsing
- ☐ Online business applications such as accounting, payroll or other
- ☐ Online credit card processing
- ☐ Online banking
- ☐ Gathering online research and information
- ☐ Agricultural research
- ☐ Farming technologies
- ☐ Social media applications for your business
- ☐ Online data backup services
- ☐ Video and/or television, (including video conferencing)
- ☐ Security monitoring
- ☐ Web hosting
- ☐ Telephone services such as Vonage, Skype or other
- ☐ Online file sharing and collaboration

Other (please explain)

7. Based on Question 2 above, would your business benefit from the services below if not currently in use? (Select all that apply)

- [ ] General use: email, general Internet browsing
- [ ] Online business applications such as accounting, payroll or other
- [ ] Online credit card processing
- [ ] Online banking
- [ ] Gathering online research and information
- [ ] Social media applications for your business
- [ ] Online data backup services
- [ ] Video and/or television, (including video conferencing)
- [ ] Security monitoring
- [ ] Web hosting
- [ ] Telephone services such as Vonage, Skype or other
- [ ] Online file sharing and collaboration

Other (please explain)

8. What kind of impact do Internet problems including reliability and speed have on your business?

- ○ No disruption
- ○ Minimal disruption
- ○ Moderate disruption
- ○ Severe disruption
- ○ Total disruption

Other (please explain)

9. Are your current Internet services sufficient for your business needs?

- ○ Yes
- ○ No
- ○ Not sure

10. If you answered "No", to Question 9, how are your Internet services insufficient for your business needs?

- Not fast enough
- Unreliable
- Availability of options
- Access to technical support

Other (please explain)

11. If you answered "No", to Question 9, why haven't you upgraded your Internet services?

- I don't know who can provide services in my area
- Services are not available in my area
- I don't have the technical skills necessary
- The price is too high

Other (please explain)

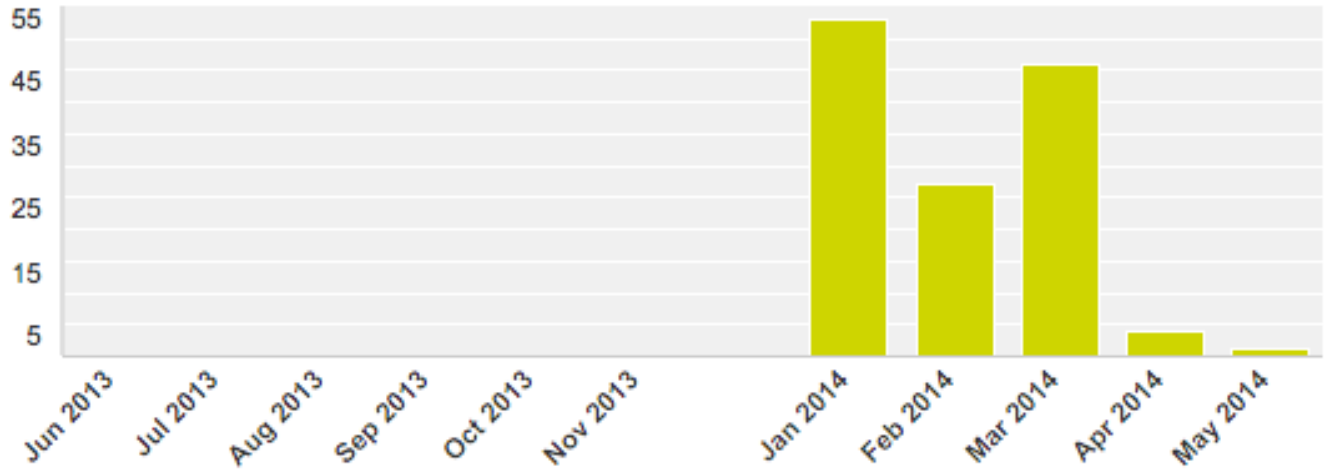
12. Please rate your current Internet services on a scale of 1-5, with 5 being the most important.

	1	2	3	4	5
Price					
Reliability					
Speed					
Customer Service					

13. How important is having multiple choices of Internet and broadband providers to your business.

- Not important
- Somewhat important
- Moderately important
- Very important
- Extremely important

Business Survey Collection Results

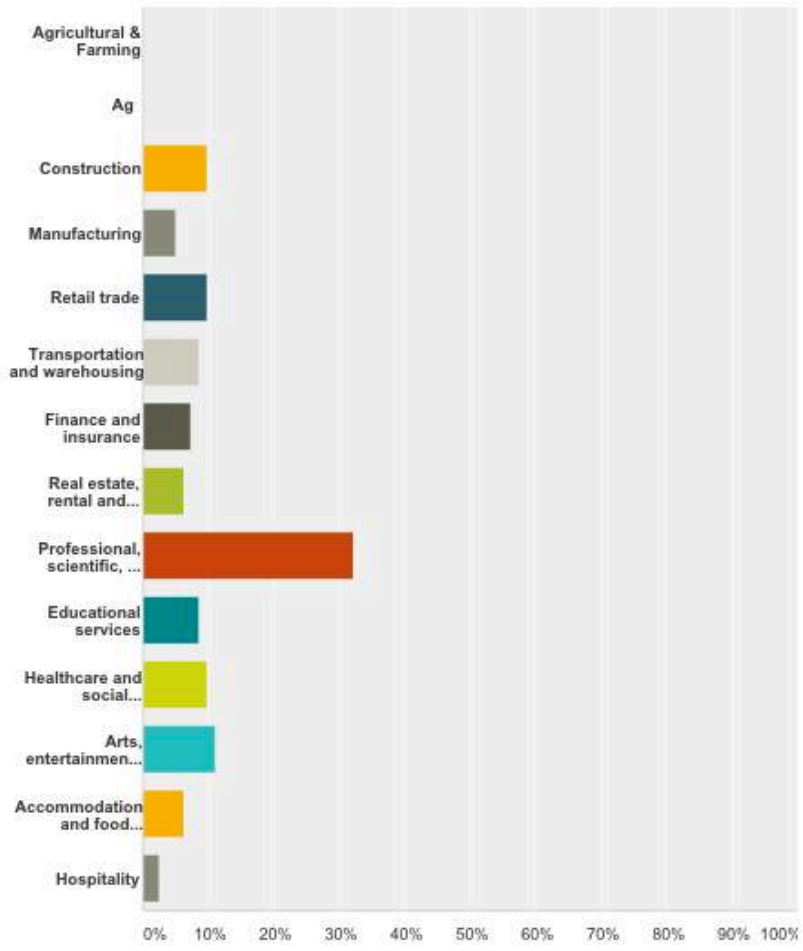


131 Unique Business Responses

Business Survey Response Results

Please provide your industry.

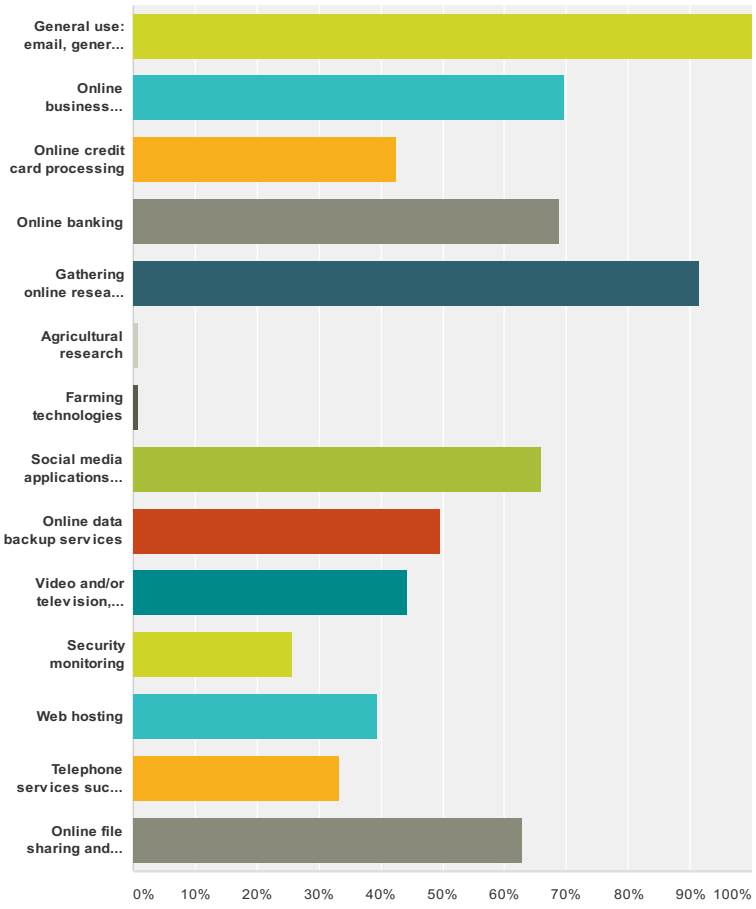
Answered: 81 Skipped: 50



Answer Choices	Responses	
Agricultural & Farming	0.00%	0
Ag	0.00%	0
Construction	9.88%	8
Manufacturing	4.94%	4
Retail trade	9.88%	8
Transportation and warehousing	8.64%	7
Finance and insurance	7.41%	6
Real estate, rental and leasing	6.17%	5
Professional, scientific, and technical services	32.10%	26
Educational services	8.64%	7
Healthcare and social assistance	9.88%	8
Arts, entertainment, and recreation	11.11%	9
Accommodation and food services	6.17%	5
Hospitality	2.47%	2
Total Respondents: 81		

Q6 Please indicate all of the ways you use the Internet (Check all that apply):

Answered: 129 Skipped: 2

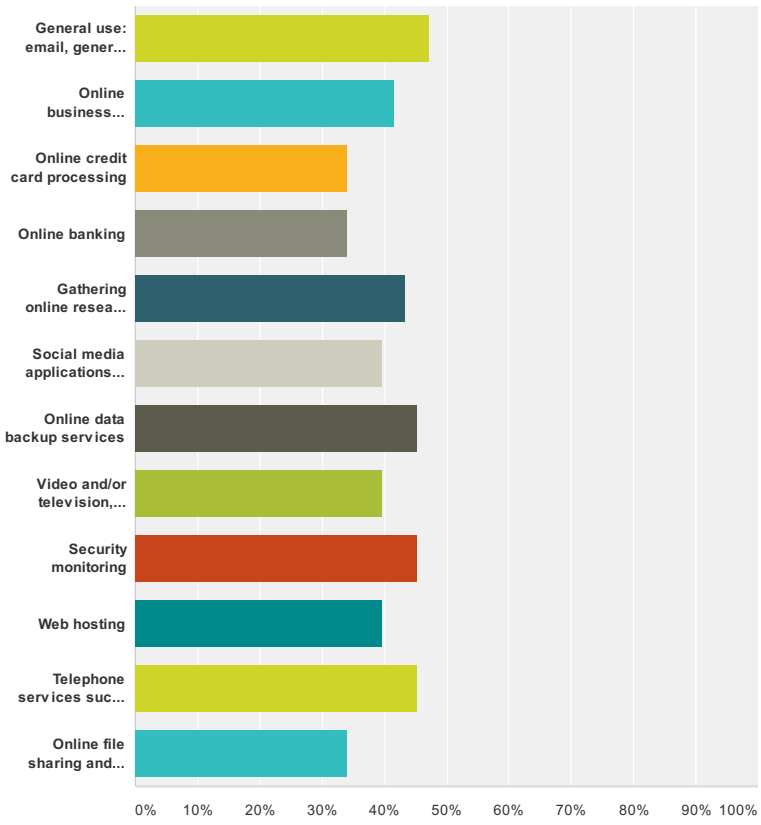


Answer Choices	Responses	
General use: email, general Internet browsing	100.00%	129
Online business applications such as accounting, payroll or other	69.77%	90
Online credit card processing	42.64%	55
Online banking	68.99%	89
Gathering online research and information	91.47%	118
Agricultural research	0.78%	1
Farming technologies	0.78%	1
Social media applications for your business	65.89%	85
Online data backup services	49.61%	64
Video and/or television, (including video conferencing)	44.19%	57
Security monitoring	25.58%	33
Web hosting	39.53%	51
Telephone services such as Vonage, Skype or other	33.33%	43
Online file sharing and collaboration	62.79%	81

Total Respondents: 129	

Q7 Based on Question 2 above, would your business benefit from the services below if not currently in use? (Select all that apply)

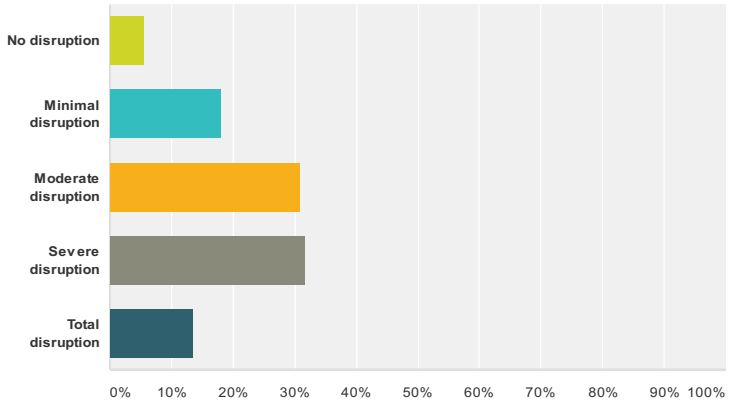
Answered: 53 Skipped: 78



Answer Choices	Responses	
General use: email, general Internet browsing	47.17%	25
Online business applications such as accounting, payroll or other	41.51%	22
Online credit card processing	33.96%	18
Online banking	33.96%	18
Gathering online research and information	43.40%	23
Social media applications for your business	39.62%	21
Online data backup services	45.28%	24
Video and/or television, (including video conferencing)	39.62%	21
Security monitoring	45.28%	24
Web hosting	39.62%	21
Telephone services such as Vonage, Skype or other	45.28%	24
Online file sharing and collaboration	33.96%	18
Total Respondents: 53		

Q8 What kind of impact do Internet problems including reliability and speed have on your business?

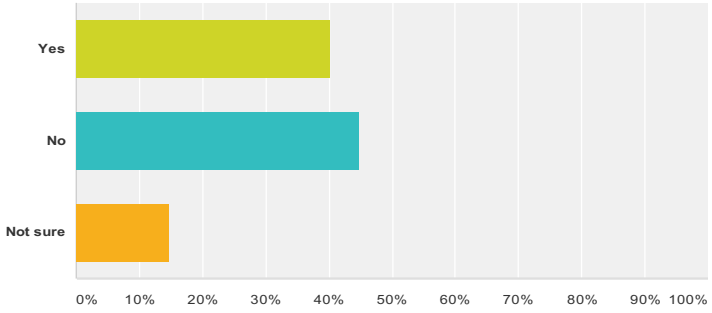
Answered: 126 Skipped: 5



Answer Choices	Responses	
No disruption	5.56%	7
Minimal disruption	18.25%	23
Moderate disruption	30.95%	39
Severe disruption	31.75%	40
Total disruption	13.49%	17
Total		126

Q9 Are your current Internet services sufficient for your business needs?

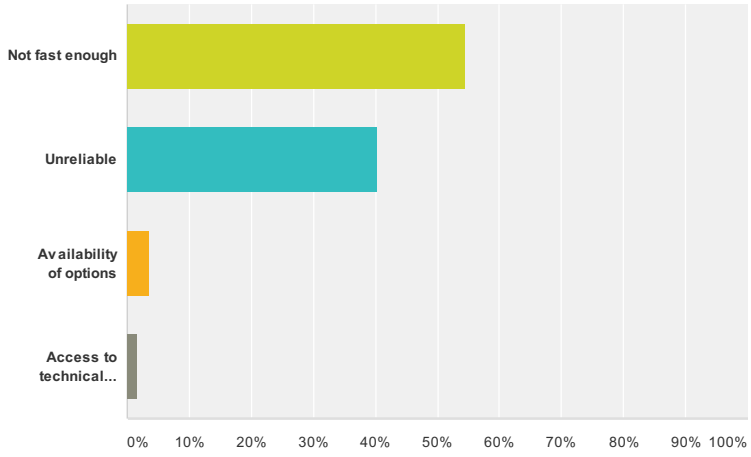
Answered: 129 Skipped: 2



Answer Choices	Responses	
Yes	40.31%	52
No	44.96%	58
Not sure	14.73%	19
Total		129

Q10 If you answered "No", to Question 9, how are your Internet services insufficient for your business needs?

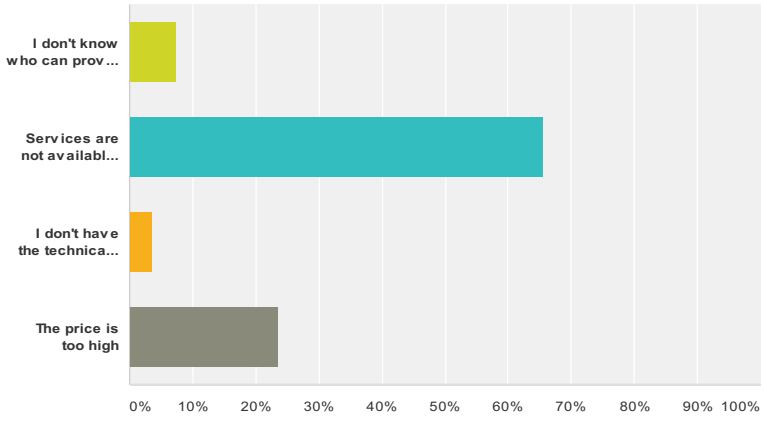
Answered: 57 Skipped: 74



Answer Choices	Responses	
Not fast enough	**54.39%**	31
Unreliable	**40.35%**	23
Availability of options	**3.51%**	2
Access to technical support	**1.75%**	1
Total		**57**

Q11 If you answered "No", to Question 9, why haven't you upgraded your Internet services?

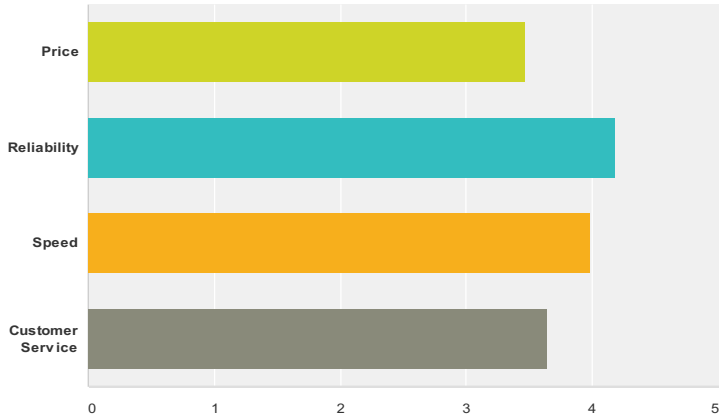
Answered: 55 Skipped: 76



Answer Choices	Responses	
I don't know who can provide services in my area	7.27%	4
Services are not available in my area	65.45%	36
I don't have the technical skills necessary	3.64%	2
The price is too high	23.64%	13
Total		55

Q12 Please rate your current Internet services on a scale of 1-5, with 5 being the most important.

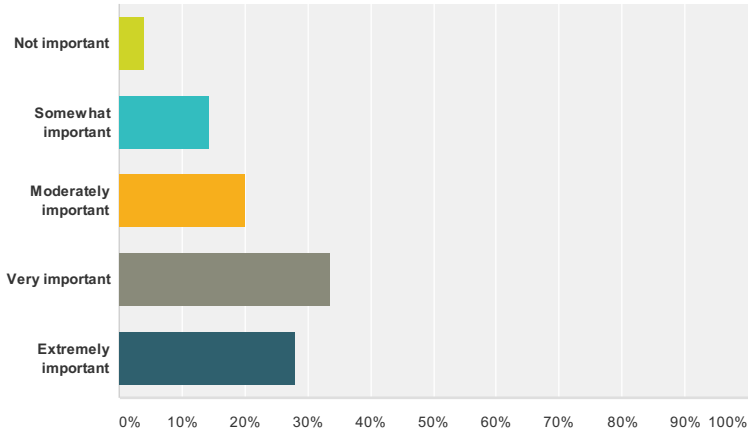
Answered: 124 Skipped: 7



	1	2	3	4	5	Total	Average Rating
Price	4.31% 5	11.21% 13	36.21% 42	30.17% 35	18.10% 21	116	3.47
Reliability	6.45% 8	4.84% 6	11.29% 14	17.74% 22	59.68% 74	124	4.19
Speed	5.65% 7	7.26% 9	12.90% 16	30.65% 38	43.55% 54	124	3.99
Customer Service	5.08% 6	11.86% 14	24.58% 29	31.36% 37	27.12% 32	118	3.64

Q13 How important is having multiple choices of Internet and broadband providers to your business.

Answered: 125 Skipped: 6



Answer Choices	Responses	
Not important	**4.00%**	5
Somewhat important	**14.40%**	18
Moderately important	**20.00%**	25
Very important	**33.60%**	42
Extremely important	**28.00%**	35
Total		**125**

11. Appendix C: Conceptual Community Broadband Network

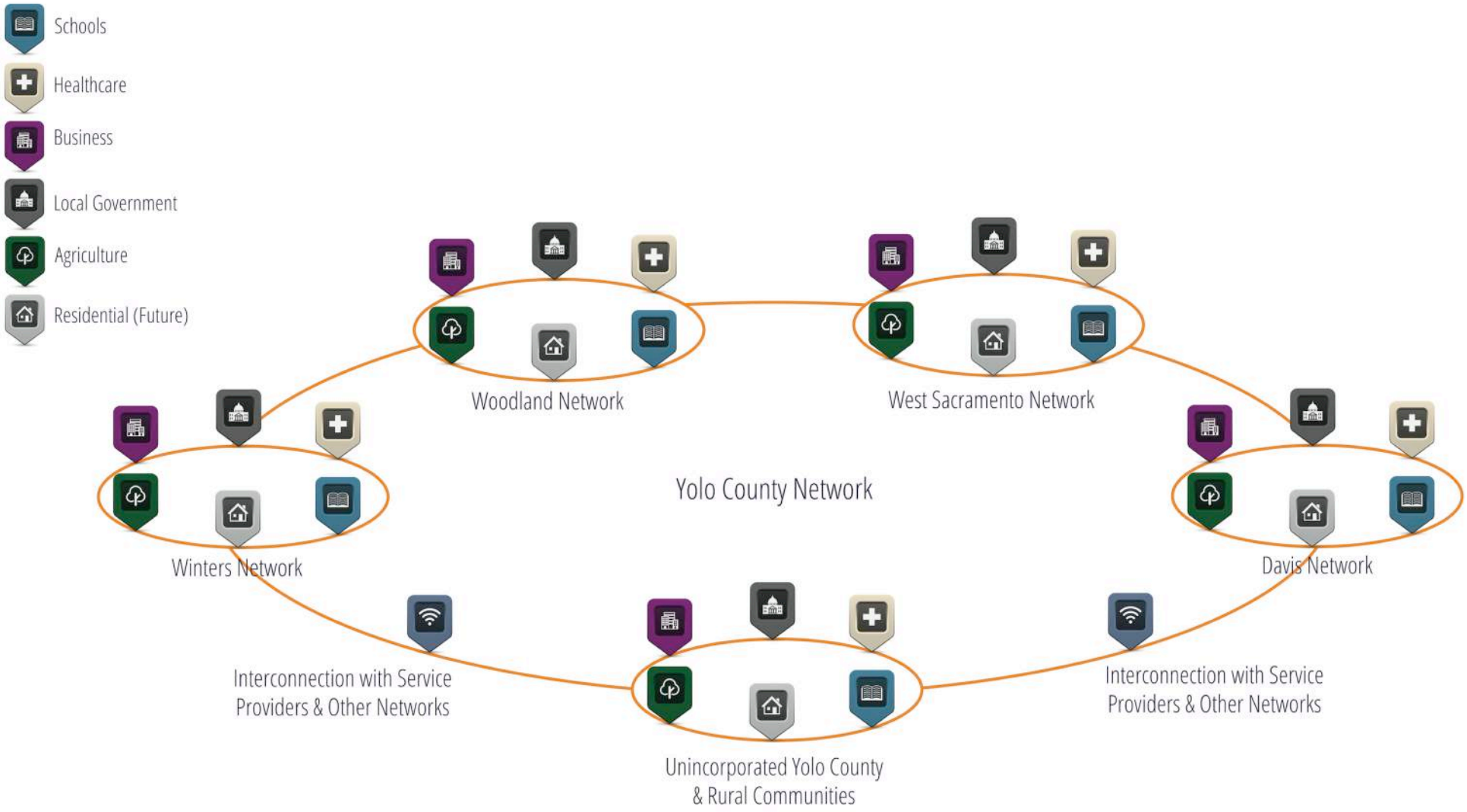
For Yolo communities, the development of a community broadband network would create a countywide publicly owned fiber system that interconnects community organizations, businesses, service providers, and potentially even residents. It would include fiber infrastructure connecting each of the cities to a common network backbone and local distribution fiber infrastructure used to connect organizations to the network. The network would provide either dark or lit fiber services between all organizations; allowing each organization the necessary capacity it requires throughout the entire footprint of the network.

The network would provide advanced, high-bandwidth broadband services to the County, cities, schools, hospitals, doctor's offices, and other community organizations. The network would interconnect with service providers at multiple points throughout the county and enable them to provide fiber-rich services to community anchors, businesses and even residents if desired.

Yolo County already owns fiber infrastructure connecting Woodland to West Sacramento and Davis. The County also owns fiber infrastructure throughout the City of Woodland to connect various County facilities. Yolo County has a successful track record of working with providers and utilities to jointly construct broadband infrastructure. This practice will continue to allow the County to build more backbone routes throughout the region while supporting the concept of a countywide network.

Each City would implement a fiber-based local broadband network to support their local broadband initiatives and connectivity needs. Several cities including West Sacramento and Woodland already maintain current fiber infrastructure and could expand on this to deploy additional network to connect more of their sites as well as business districts and redevelopment areas. These networks would allow high-speed connections between each city's various facilities allowing for significantly expanded capacity while reducing their recurring telecommunications costs. The countywide network should be planned and built collaboratively between all participating organizations to ensure the maximum benefits at the lowest overall cost. For example, connectivity into West Sacramento may hold value to all the cities connected to the Yolo Community Broadband Network to gain access to the regional data center for Internet services, disaster recovery, and cloud applications.

Yolo County Community Broadband Network – Conceptual Design



Who Could Use it?

The Yolo Community Broadband Network would provide a foundation of fiber connectivity for use by a comprehensive list of community stakeholders, including:

- Yolo County
- City of Davis
- City of West Sacramento
- City of Winters
- City of Woodland
- Yolo County Office of Education
- Davis Joint Unified School District
- West Sacramento Unified School District
- Winters Joint Unified School District
- Woodland Joint Unified School District
- Yolo Private Schools
- Broadband service providers
- Wireless and cellular providers
- Yolo County Flood Control and Water Conservation District
- Yolo County Farm Bureau
- Yolo County Housing Authority
- CommuniCare central offices and clinics
- Woodland Memorial Hospital
- Doctors' offices and clinics
- Yoche Dehe Wintun Nation
- Local Businesses and Enterprises
- Agricultural Industry
- Current and Future Utility Providers
- Broadband Service Providers
- Others to be determined

What Benefits Would it Provide?

A broadband network could become a part of region's long-term strategic planning and provide a valuable resource that both the Cities of Yolo and Yolo County can leverage to achieve their organizational objectives. By creating a high-speed, redundant and scalable network environment that will support further growth of municipal services that rely on network resources, more of the cities' and County's municipal operations can take place electronically; saving money and staff time while increasing convenience for citizens. Additionally, this new community network could facilitate greater collaboration between public organizations within Yolo County. These organizations could potentially benefit in the following ways:

- *New opportunities to collaborate with local government organizations across a common communications platform.*
- *Share critical needs across multiple local government organizations including Internet, Intranet voice services, backup services, and others.*
- *Share municipal applications across multiple local government organizations including GIS, expanded public safety dispatch/records management systems, and web applications.*
- *Develop shared disaster recovery and business continuity programs utilizing common infrastructure.*

- *Reduce taxpayer spending across all participating public organizations in the Yolo County region.*

- *An investment into infrastructure that will provide a long-term reduction in telecommunications operating expenses.*

For other community anchors, businesses, and potentially residents, a community broadband network would mean increased options for receiving telecommunications services from current and new providers. In addition, the network would "level the playing field" for service providers across Yolo ensuring equal access and equal pricing for wholesale services on Yolo's Community Broadband Network. This would positively impact the competitive landscape, enable more providers to operate across Yolo's communities, and potentially drive down prices for broadband services.

Potential benefits to the community include:

- *Broadband price stability across all anchors connected to the network.*
- *Enhanced economic development tools to attract and retain businesses.*
- *A new source of fiber infrastructure for local service providers.*
- *New capacity for Yolo's growing tech sector and related companies.*
- *Improved technology transfer from UC Davis to new startups.*
- *Enhanced services and new capabilities for Yolo's schools.*
- *Scalability to accommodate current and future broadband needs.*
- *A platform for municipal operations that enable new capabilities and reduce cost.*
- *A platform that supports integrated utilities that help Yolo manage water and energy resources.*

How Would it Be Built?

Most successful community broadband projects are built incrementally and on demand. Regional broadband networks are built in phases with each phase building on the successful implementation of the previous phase. The County and each City would take responsibility for development of the network in their local jurisdiction based on the needs of each community. The County and each City should develop a conceptual design for their portion of the Community Broadband Network. This conceptual design should include all City, County, and Community Anchor facilities and should include preliminary fiber routes throughout the local area and the connections to the County's inter-city routes. The County and cities should also coordinate the development of their local networks

with the larger regional network to ensure full interoperability between systems and to ensure the network serves the countywide needs of the stakeholders.

A steering committee composed of representatives from the County and each City should be established to ensure the multiple projects are coordinated with one another and each organization's goals remain aligned in the development of the network. The steering committee would carry forward the mission of implementing the Community Broadband Network and tracking its impact within Yolo.

Once a total investment has been developed from the conceptual design, the preliminary fiber routes can begin to be vetted against potential opportunities to cut build costs. Alignment with upcoming capital improvement projects such as water, sewer, road widening, and other undergrounding efforts can positively impact the costs to build infrastructure. Additionally, underground vs. aerial routes should be further analyzed to determine the best options for these routes. Opportunities to IRU or swap fiber with local providers should also be explored as these are great options to potentially reduce the overall capital investment of building a network.

Who Would Own and Operate It?

There are many options available for developing an ownership and operational model for the Yolo Community Broadband Network. These options range in organizational and operational complexity yet offer the cities and County the ability to manage as much or little of the asset as they deem appropriate. As an owner of the infrastructure assets, each City and Yolo County would have a direct ability to impact how broadband infrastructure is developed in the region. The participants will have to jointly decide how an organization is developed to oversee the deployment of future network resources and how the network is managed and operated.

Using simple dark fiber assets in an unlit network, the cities and County would have to dedicate a certain amount of fiber for their own communications needs while providing local capacity to the greater Yolo Community Broadband Network. This type of architecture is less efficient as it relates to the use of the dark fiber assets. Excessive use of fiber strands is required to interconnect facilities and sites because of the requirement to dedicate fiber strands for each connection. A lit model would allow the network to operate on the basis of network capacity instead of dark fiber strands. A lit network would require the provisioning of circuits at predetermined levels of bandwidth. This architecture allows for a much greater efficiency in the use of fiber strands as network traffic can be aggregated on the core backbone links throughout and between the Cities. Under either architecture, an agreement as to how the network will be operated and maintained must be reached.

The following questions must be answered:

- Who should operate the network? The County? The cities? A Consortium?
- How will the network be maintained from an outside plant perspective?
- How will operations be funded?

- Are there private partners that can participate?

What Must Be True to Develop a Community Broadband Network?

A number of key factors must be present for Yolo to develop a successful community broadband network.

1. *Community anchors must commit to utilizing the network*
   Yolo's community anchors will be the largest beneficiaries of the network and must commit to using its resources. They must be willing to participate and subscribe to services from the network at agreed upon fees.

2. *Yolo's service providers must commit to utilizing the network*
   Without the participation of Yolo's service providers, financial sustainability of the community broadband will be more challenging for Yolo. Secondly, without service provider participation, Yolo's businesses and potentially residents will not receive the benefits from the network in terms of more affordable rates and higher quality services. A key goal of the network is to make a new source of affordable next-generation broadband available to the community. If service providers do not utilize the network this goal may remain unachieved.

3. *Yolo must develop the right operational model for the network*
   Development of a sound operations strategy for the network is important to ensure that network performance, reliability, and capacity is managed to the levels required by both service providers and end users. This includes determining the party that will provide management of the network and which components will be maintained by Yolo County, cities and/or outsourced network operators.

4. *Yolo must find ways to reduce costs for construction for the network*
   Building the community broadband network without cost reducing construction methods will yield an expensive proposition for the community and one that may be challenging to sustain financially. A combination of joint trenching opportunities, companion capital projects, use of existing network assets, and wise investments in broadband infrastructure will help reduce the high costs of building significant fiber infrastructure throughout the County.

5. *The network must achieve an operating break-even and pay its debt service*
   The network must achieve at minimum a breakeven scenario where incoming revenues from community anchor organizations and service providers cover all operating costs and repay debt service over the period of the project. Adequate financing structures will also need to be achieved to ensure the network's cash flows can support its debt service.

What Other Communities Have Built These Networks?

A significant number of communities across the country have built community broadband networks to provide reliable, high-capacity fiber infrastructure to their stakeholders. There are over 1,000 similar networks across all States, including California. Some of these include:

City of Palo Alto, CA

In 1996, Palo Alto built a 33-mile optical fiber ring routed within the City to enable better Internet connections. Since then, we have been licensing use of this fiber to businesses. For the past decade, this activity has shown substantial positive cash flow and is currently making in excess of $2 million a year for the city. We now have that money in the bank earmarked for more fiber investments."

Santa Cruz County, CA

The Santa Cruz County board of supervisors in November 2013 approved an eight-month timeline to overhaul its broadband infrastructure plans and regulations. Specific areas of focus include permitting fee reductions and a proposed "dig once" ordinance that would make it easier to install new fiber optic cables during other work on area roads or utilities lanes. "The County will continue a focus on broadband infrastructure throughout the county to enable businesses to function in the digital era, and students and households to have high quality access to information and communication. The County will work with industry providers to develop a Broadband Master Plan in order to identify focus areas within the county that will be most suitable for gigabyte services, particularly as the Sunesys backbone line is constructed during 2014 and 2015. The County will work with service (last mile) providers to ensure that these focus areas are deemed a priority, in order to support streaming requirements, product development, job creation and online selling capability."

City of Palm Coast, FL

In 2006, the Palm Coast City Council approved a 5-Year fiber-optic deployment project funded at $500,000 annually for a total investment of $2.5 million. The network was developed to support growing municipal technology needs across all public organizations in the area, including city, county, public safety and education. It was also planned to support key initiatives such as emergency operations, traffic signalization, collaboration and video monitoring. The City utilized a phased approach to build its network using cost reducing opportunities to invest in new fiber-optic infrastructure. As each phase was constructed, the City connected its own facilities and coordinated with other public organizations to connect them; incrementally reducing costs for all organizations connected to the broadband network. Showing a reasonable payback from each stage of investment allowed the City to continue to fund future expansion of the network. Through deployment of this network, the City has realized a savings of nearly $1 million since 2007 and projects further annual operating savings of $350,000 annually. In addition to these savings, the City's network provides valuable new capabilities that enhance its mission of serving the residents and businesses of the community.

Seminole County, FL

Over the last 15 years, Seminole County, FL has developed its own fiber-optic network to serve the broadband needs of its municipal, public safety, education an utility needs. The 450-mile fiber network has connected 26 fire stations, 58 county buildings, 44 schools, 4 SCC campus, 41 city buildings and 17 water treatment plants to the fiber network and maintains and repairs over 375 traffic signals, 148 school flashers at 73 locations, 46 beacons and flashers and 29 VMS (variable message signs). The network saves taxpayers in the County millions of dollars a year and provides a significant backbone of high-speed broadband services to serve nearly all of Seminole's community functions.

12. Appendix D: Applicable Broadband Grant & Loan Programs

Federal Funding Programs

Connect America Fund - Rural Broadband Experiments

http://www.fcc.gov/encyclopedia/connecting-america

On January 31, 2014, the Commission released the Technology Transitions Order which, among other things, adopted targeted experiments to help learn more about the impact of technology transitions on rural America. In addition to furthering the Commission's goal to gain experience and data on how to ensure universal access as networks transition, this experiment is designed to help inform the policy decisions in various proceedings pending before the Commission. As part of these experiments, the Commission invited expressions of interest by March 7, 2014, from entities willing to deploy robust, scalable broadband to eligible high-cost areas with additional Connect America funding.

For Yolo County, the Rural Broadband Experiments portion of the Connect America Fund may provide an opportunity for local government organizations, private service providers, or partnerships between the two to apply for funding in the USF high cost census tracts throughout Yolo County. This fund would potentially enable areas within Yolo's most underserved and unserved communities to receive new broadband infrastructure. Whereas the USF dollars originally funded basic broadband infrastructure, the Rural Broadband Experiment dollars may fund more advanced types of infrastructure such as fiber and/or wireless. These dollars may also be utilized to fund not only unserved and underserved residents but also community anchors and potentially businesses in qualified census tracts.

Healthcare Connect Fund (HCF)

http://www.usac.org/rhc/defauly.aspx

The Healthcare Connect Fund (HCF) Program is the newest component of the Rural Health Care Programs. The HCF Program will provide a 65 percent discount on eligible expenses related to broadband connectivity to both individual rural health care providers (HCPs) and consortia which can include non-rural HCPs (if the consortium has a majority of rural sites). For new applicants, the filing window will open late summer 2013, with funding beginning on January 1, 2104. Starting in Funding Year 2014 (July 1, 2014 to June 30, 2015) all applicants will be on the same funding year schedule.

This program may be particularly applicable for Yolo County's rural healthcare organizations. In these cases, rural healthcare providers such as Winters Health Foundation and rural clinics throughout Yolo County may develop strategies to interconnect to broadband networks such as

California Telehealth Network at lower costs than they are doing so today. Currently, these rural healthcare providers maintain cable, DSL, and T1 infrastructure which limits their capabilities for telehealth and other electronic health applications. The HCF fund may be an opportunity for these organizations to build new fiber-based broadband infrastructure to reach other healthcare organizations, health information exchanges, and the Internet. In many cases, these organizations have partnered with private service providers to go after funding in a mutually beneficial way. For Yolo, a HCF-funded healthcare network could be used to expand healthcare services in Yolo County and enable new fiber capacity in rural communities that could be utilized to deliver expanded broadband services to businesses and residents.

State of California Funding Programs

Most states have recognized that broadband is a key aspect of long-term development of their regions and have developed State agencies to deal with these important issues. In 2009, the Department of Commerce's Broadband Technology Opportunities Program provided a pool of grant funding specifically designed for States called the State Broadband Initiative (SBI) to "implement the joint purposes of the Recovery Act and the Broadband Data Improvement Act which envisioned a comprehensive program, led by state entities or non-profit organizations, working at their direction to facilitate the integration of broadband and information technology into state and local economies."[18]

Many states have expanded on this initial program to develop state-funded broadband program offices that continue to deal with broadband policy, infrastructure, and adoption issues in their jurisdictions. States vary in terms of their participation in the broadband expansion process. Some focus on public policy measures that promote the expansion of broadband. Others take an active role in sourcing State funding for programs that build infrastructure.

In California, the California Public Utilities Commission ("CPUC") has taken an active role in shaping broadband policy and providing broadband grant funding programs to accelerate the deployment of broadband services across the State. The CPUC received $7,981,304 in grant funding from the NTIA as part of the Broadband Data & Development Program to create California's statewide broadband map. The California Interactive Broadband Map is a tool for California citizens to find and investigate broadband services in their area. The map displays all of the broadband providers offering service within the area around a particular address. This map was created by the team efforts of the California Public Utilities Commission (CPUC) Video Franchise / Broadband Deployment Group and the California State University Chico Research Foundation through a grant from the State Broadband Initiative (SBI) Grant Program. This map was utilized as one of the data sources for determining broadband availability in Yolo County.

The CPUC manages and monitors broadband policy within the State as well as administers several State grant and loan funding programs that are focused on deployment of broadband infrastructure into the areas of greatest need. There are several programs that are pertinent for Yolo County. These programs provide grant and loan funding for the construction of broadband infrastructure to

[18] State Broadband Initiative. http://www2.ntia.doc.gov/SBDD. Accesses April 2, 2014

serve unserved and underserved communities in Yolo County. Funding is also available for development of education and adoption programs for consortia organizations across the state. The following programs have been identified as strong opportunities for Yolo to pursue in its countywide broadband development program.

California Advanced Services Fund

http://www.cpuc.ca.gov/PUC/Telco/Information+for+providing+service/CASF/

California Advanced Services Fund (CASF) promotes deployment of high-quality advanced communications services to all Californians. Funding is allocated to four CASF accounts (please go to the linked page for a description of the account).

Broadband Infrastructure Grant and Loan Accounts

CASF grants and loans are designed to assist in the building and/or upgrading of broadband infrastructure in areas that are unserved or are underserved by existing broadband providers.[19] CASF funding is available to entities with a Certificate of Public Convenience and Necessity (CPCN) that qualify as a "telephone corporation" as defined under P.U. Code section 234 or wireless carriers who are registered with the Commission (i.e., hold a WIR). Wireless carriers need not obtain a CPCN to qualify for CASF funding.

For Yolo, this program would not represent a direct grant or loan funding mechanism that could be received by a local government organization due to the CPCN eligibility requirement (service providers), however; Yolo could effectively work with its local providers to identify the areas of the community that are unserved and/or underserved as potential targets for funding.

Rural and Regional Urban Consortia Account

The Rural and Urban Regional Broadband Consortia Account (Consortia Grant program) is intended "to fund the cost of broadband deployment activities other than the capital cost of facilities as specified by the Commission." Grant funds will be used to promote ubiquitous broadband deployment and to advance broadband adoption in unserved and underserved areas by:

- Increase sustainability of broadband infrastructure and projects.
- Promote broadband deployment (availability) for residences in California.
- Promote broadband access and adoption (knowledge of service options and ability to utilize services as well as subscription of services) for residences in California.

[19] An "unserved" area is an area that is not served by any form of wireline or wireless facilities-based broadband, such that Internet connectivity is available only through dial up service. An "underserved" area is an area where broadband is available, but no wireline or wireless facilities-based provider offers service at advertised speeds of at least 6 Meg download and 1.5 Meg upload.

- Increase the rate of broadband adoption by facilitating the impact of consumer education, outreach, and training.
- Support those community-based parties, especially anchor institutions, who are working to increase deployment, access, and adoption.

Approximately $2.75 million has been appropriated to regional consortia across the State under this program. For Yolo, this grant represents an important continuing funding source for broadband planning, access. and adoption activities that should follow the development of this Strategic Plan. The grant affords regional consortia such as the Connected Capital region (of which Yolo is a member) funding programs for community education, outreach, training, and related programs.

Broadband Public Housing Account

Up to $20 million from the Broadband Public Housing Account ("BPHA") will be available for grants and loans to a publicly supported community as defined in the statute to finance a project to connect a broadband network to that publicly supported community. AB 1299 also authorizes up to $5 million from the BPHA to be available for grants and loans to a publicly supported community to support programs designed to increase adoption rates for broadband services for residents in that publicly supported community.

Comments are currently being received by the CPUC for the scoping of this funding program. This grant would provide potential benefit to the Yolo Housing Authority to make improvements to public housing enabling residents to receive improved connectivity to broadband providers in the area. It may also provide opportunities for Yolo Housing Authority to upgrade internal infrastructure at public housing developments including wireless access points, in-building wiring, and related equipment to enable improved broadband service. Yolo should continue to track this grant as it develops with the CPUC.

California Emerging Technology Fund

http://cetfund.org

The mission of the California Emerging Technology Fund is to provide leadership statewide to minimize the Digital Divide by accelerating the deployment and adoption of broadband and other advanced communications services to underserved communities and populations. CETF is accomplishing this mission by making investments in programs and projects to improve access, applications, affordability, accessibility, and assistance - the "5As" requisite to achieve adoption and close the Digital Divide - and the essential components of Digital Inclusion. In addition, CETF has three priority consumer communities: Rural and Remote Areas; Urban Disadvantaged Neighborhoods, and People with Disabilities.

There are several funding programs that Yolo should target as funding becomes available in the region including the GetConnected Initiative, Telehealth Initiative, Digital Literacy Initiative, School2Home Initiative, and Smart Community Initiative. Funding programs are released at various intervals so it is important for Yolo to stay abreast of the latest news from the CETF as part of its long-term broadband development strategy.

13. Appendix E: Public Policy Implementation & Case Studies

Dig Once Policy Implementation

It is important for Yolo to develop and establish a Dig-Once policy to ensure an efficient mechanism is in place for the deployment of broadband infrastructure. A Dig-Once policy is a standard policy that is being adopted by many broadband savvy communities that maximizes excavation efforts through coordination of stakeholders mandated by the policy. Through the adoption of a Dig-Once policy, Yolo will have better opportunities to control the highest cost of broadband deployment; the burying of fiber-optic cables and conduit underground.

In order to effectively implement a Dig-Once policy, Yolo must reach out to and include all possible stakeholders to gather input and build support for the policy. Necessary stakeholders could include the following entities:

- Local Government IT Staff
- Local Government Planning & Zoning
- Local Government Public Works Staff
- County/City Attorney
- Broadband Providers
- Other Local Governments
- State Department of Transportation
- Selected Elected Officials

These primary stakeholders will be able to provide a solid foundation for drafting and finalizing a local Dig-Once policy and will be able to provide the technical expertise necessary to create the policy. Since the County and local municipalities will control the majority of the Rights of Way, it is important for those entities to take the lead when developing this policy. The policy should include language that provides a mechanism for communication between entities notifying them of planned excavations, incorporate Joint-Trench agreements (discussed later) that may already be in place, provisions for installation of empty conduit in ROW during excavations to prepare for future broadband requirements, and the use of trenchless technologies such as directional drilling and microtrenching. By assuming the leadership role, the local governments will be able to craft the primary language that will go into the policy and incorporate the appropriate sections from other stakeholders.

Since the ultimate purpose of the Dig-Once policy is to promote the development of broadband locally and making broadband more accessible to the community, it is important to structure the policy to not prevent or impede necessary excavations of the ROW and build a policy that strongly supports and encourages cooperation among stakeholders; creating a truly cooperative planning process. The County organization is in a prime position to take the leadership role in this endeavor since it is the agency that approves the utility permits to install and conduct work in the ROW and is usually responsible for the majority of the management and maintenance of the roadways. Therefore, it is essential that local governments implementing a Dig Once policy review their utility

permitting process to find gaps that may make their community "unfriendly" to expansion of local broadband infrastructure. To ensure that it is beneficial for telecommunications providers and developers to install conduit and fiber, local governments must address the following issues (at a minimum):

- The time needed to apply for and receive approval for a utility permit.
- If necessary, modify utility permit process to allow County staff to approve permits instead of an appointed land development board. This will give applicants a sort of "fast track" to move ahead.
- Adjust the fee structure associated with utility permit. Whenever possible, these fees should be reduced or waived to incentivize fiber and conduit installation.

As the policy is developed with input from the various stakeholder groups, it will be important for any fundamental changes to the policy be thoroughly vetted by County staff to ensure that modifications and revisions support the overall spirit of the policy and enhance the opportunities for broadband development within the community; rather than solely benefit the wishes or needs of a particular single stakeholder.

Once a consensus final draft of the policy has been developed, it is crucial that the policy is adopted by all stakeholders and it is incorporated into local building codes and adopted by the County's Board of Commissioners. Since all local governments differ somewhat in their processes and procedures, there will be some variation in the implementation of this process. Implementing a Dig-Once policy at the local level is preferable than at a higher level due to these differences in process and the complexities involved when creating a policy that will span multiple jurisdictions.

Joint-Trenching Policy Implementation

A Joint-Trench Agreement, often included as part of a larger Dig-Once Policy, is an agreement between two entities (usually two telecoms or a local government and a telecom) to share the cost of excavation and installation of underground conduit. These agreements typically include very specific details as to what costs will be shared between entities, who is responsible for performing specific tasks, adoption of a standard multi-utility installation design, and how the costs will be distributed among the Agreement's participants, and many other contractual responsibilities of the parties involved.

Just as the Dig-Once Policy involved several stakeholders' participation, the Joint-Trench Agreement will as well. Generally, the local government's Planning and Zoning or Public Works departments take the lead with Joint-Trench agreements as they are the entity that are most directly affected by these sorts of agreements. In addition to Planning and Zoning and Public Works, it will be necessary to gather the input from both County/City Attorney's office and the IT Department.

It will be important for the County to actively seek Joint-Trench Agreement opportunities between these types of organizations to bolster local infrastructure and avoid potential overbuild/overlap in the Yolo community. Critical to the success of this plan is the cooperation and participation of

service providers with stakeholders in the community. We believe that community infrastructure should be positioned to make service providers more effective in delivering advanced services to the community, not to compete against them. When properly implemented, the Joint-Trench Agreement will afford various benefits to the involved parties including:

- Fewer construction crews working in the area at any particular time, thus reducing the risk of worker injury and the risk of damaging other underground utilities.
- Savings of approximately 30% to 40% by jointly installing conduit and/or fiber facilities.
- Shortened construction timeline when utilizing a standard, multi-utility, installation design.
- Conservation of the Right-of-Way.
- Uniform design makes it easier to locate existing facilities in future excavations.

Through the implementation and adoption of Joint-Trench agreements with other local governments, incumbent telecom providers, and other local utilities, the community will stimulate broadband development while relieving undergoing congestion of utilities and reduce overall cost to implement broadband infrastructure. A sample Joint-Trench Agreement from the City of Burbank is provided in Appendix XX.

Comprehensive Broadband Standards Implementation

A Comprehensive Broadband Standards document will support both the Dig-Once Policy and Joint-Trench Agreements. The Comprehensive Broadband Standards will provide a solid foundation and technical guidelines with regard to how broadband infrastructure will be built in the Yolo community. By outlining technical specifications for conduit and fiber and specifying specific installation standards for multi-utility trench design, Yolo County will standardize and automate the process of broadband infrastructure deployment; thus ensuring that broadband infrastructure becomes a part of the design for all relevant capital projects.

Yolo County's Planning and Zoning or Land Development Department must take the lead and develop Comprehensive Broadband Standards that are adopted and codified into the County's Land Development Code. This process will require the input of the County's IT Department, the County Attorney's Office, and potentially local stakeholders such as incumbent telecom providers, developers and builders, and potentially the local Chamber of Commerce to refine community needs. These Standards will outline construction materials, installation guidelines and design, and other broadband technical standards and will require all future broadband infrastructure deployments to adhere to the standards defined by the County with the ultimate goal of ensuring uniformity of design and implementation of requirements ensuring broadband components (at a minimum conduit installation) are installed every time excavation or new development occurs.

We will work with Yolo County to identify the requirements for infrastructure components that will support the broadband needs of the community both today and in the future. These Standards should include engineering and design standards for both new construction and excavation of existing utility infrastructure as well as a standard, multi-utility, installation design to be utilized in all future builds. By adopting and codifying a Comprehensive Broadband Standards document, Yolo

County will be ensuring that broadband infrastructure will be installed whenever excavation or new development occurs just as power, water, and sewer utilities are deployed. The Comprehensive Broadband Standards document should be developed as a living document that can be modified if needed to incorporate future broadband intensive application needs such as smart home/building technology which then could be implemented into the community's building standards.

Cases and Success Stories

Local governments across the country have successfully implemented the previously mentioned policies to varying degrees and with much success. Although it is a rare community that has implemented all of these strategies, examples of communities that have implemented select policies abound including Riverside, CA, San Francisco, CA, Portland, OR, and Loma Linda, CA.

Joint Use Success Story

In an effort to address the lack of broadband infrastructure in their communities, several organizations have entered into Joint-Build or Joint-Use agreements or ordinances. These sorts of agreements lead to better planning, coordination, and efficient use of conduit and fiber infrastructure but often times do not require the actual deployment of fiber. Although these agreements do not require the actual deployment of fiber, the high cost of conduit installation is shared between the municipality and the service provider; lowering the cost for all parties involved in the Joint Use agreement. These types of agreements are in place currently in Riverside, CA and Merced County, CA. By establishing this type of ordinance, the municipality, is ensuring that it will have access to and use of any conduit that is constructed in the right-of-way.

Another potential approach to the Joint Use and Dig Once policies is to require that telecommunications organizations integrate construction of infrastructure into the planning process of the municipality. This is the approach that is currently being proposed in San Francisco, CA. Although this approach would require greater coordination of projects between municipal organizations and telecom providers up to and through the excavation process, this approach will ensure that all parties are given the opportunity to install their infrastructure during the excavation process.

Comprehensive Broadband Planning Success Story

In 2004, the City of Loma Linda adopted a comprehensive broadband plan, *the Connected Community Program*, which included policies to promote the deployment of a citywide fiber optic network and made modifications to its building codes to ensure that development will be designed to meet the needs of future telecommunications technologies. For their efforts, Loma Linda has received international recognition for its ordinance which states:

> *"In recognition of the need to provide local residents and businesses within the community with additional options to meet their telecommunications needs, as adopted by city council resolution, all new development projects within the city, regardless of whether such new development falls within the fiber- optic master plan area, and additions that exceed more than fifty percent of the*

original structure that fall within the fiber- optic master plan area, will be required to participate in, and will be bound by, the connected community program." (Ord. 629 § 1, 2004)

By adopting this local ordinance, the City of Loma Linda has secured its broadband future by ensuring that fiber-optic infrastructure will be installed anytime new development or major renovations are completed within the City.

Dig Once Policy Success Story

In 2011, the City of Portland, Oregon's City Council unanimously adopted Portland's Broadband Strategic Plan (BSP) by bringing together City officials and community partners. The plans was a result of the recognition and foresight of City leaders that high-speed affordable broadband to every home and business was a requirement if the community was to thrive in the twenty-first century. The success of the BSP will have important benefits for the City's economic development strategy, climate change strategy, and to the continuing impact of the economic recession. Included in the BSP is a formal Dig Once policy; an excerpt is included below:

"Implement a 'dig once' policy that cost-effectively enables gradual deployment of infrastructure. In this model, a community implements a policy mandating installation of conduit (or fiber) any time a trench or road is open in the public rights-of-way, thus enabling build---up of a critical mass of infrastructure at relatively low incremental cost. Ideally, the conduit and fiber are specified in advance and, of course, they must be impeccably mapped and recorded. Such a policy is most effective where there exists extensive planning and coordination among the various departments responsible for infrastructure and construction (public works, transportation, IT, permitting authorities, and utilities). It also helps to coordinate the construction timelines of various departments so as to facilitate cost-effective placement of conduit and fiber. This strategy enables deployment of infrastructure for backhaul and middle-mile fiber that can be leased to the private sector and stimulate offering of services. It can also enable placement of conduit directly to wireless facilities sites, thus facilitating not only deployment of next---generation wireless services but also reducing the cost for new competitors to enter the market. This strategy recognizes that certain sections of our city are rich with fiber infrastructure such as in the Central Business District. If moved to the work plan stage, the 'dig once' strategy will be planned for the sections of Portland that are currently deficient in fiber infrastructure."

Frequently Asked Questions

If I have a companion project going on, water, sewer or other, how am I going to manage installing conduit on top of this other infrastructure, similar separation issue?

It is imperative that as the local government, you adopt a detailed multi-utility installation design for the right-of-way. These design specifications should be codified in your organizations Land Development Code, thus ensuring that separation of infrastructure is preserved.

Where's the money going to come from to fund installation of new infrastructure by the county and cities?

Although many times installation is paid for through general fund dollars, there are opportunities to reduce the burden through various federal and state grant programs. Also, through the adoption of Joint-Trench and Dig-Once policies, opportunities will become available to share costs with telecommunications providers and developers resulting in lower expenses to the local government.

Why would service providers be interested in joint trenching?

With regard to service providers, a dig once policy could be extremely beneficial. Just as it is the local government's desire to deploy broadband infrastructure in the most effective and efficient manner, this also applies to service providers. Advantages of joint-trenching and dig once agreements to service providers include:

- Lower frequency of construction in the right of way
- Lower instances of damaging existing infrastructure
- Lower installation costs
- Increased access to new markets
- Decreased time to deploy fiber infrastructure

Who needs to be involved from the County and city perspective?

Since these policies and ordinances will have an effect on several departmental functions, it is very important that the local government assemble a team that is includes members from:

- Leadership (City/County Manager or representative)
- City/County Attorney's Office
- Land Development/Planning and Zoning
- Information Technology
- Public Works
- Economic Development

By including team members from all of the departments mentioned above, you will ensure that there are representatives available to answer any questions that may arise and will be able to address any technical, legal or policy issues.

14. Appendix F: Yolo Broadband Statistics & Datasets

Figure 16.1: Broadband Penetration Per Census Tract in Yolo

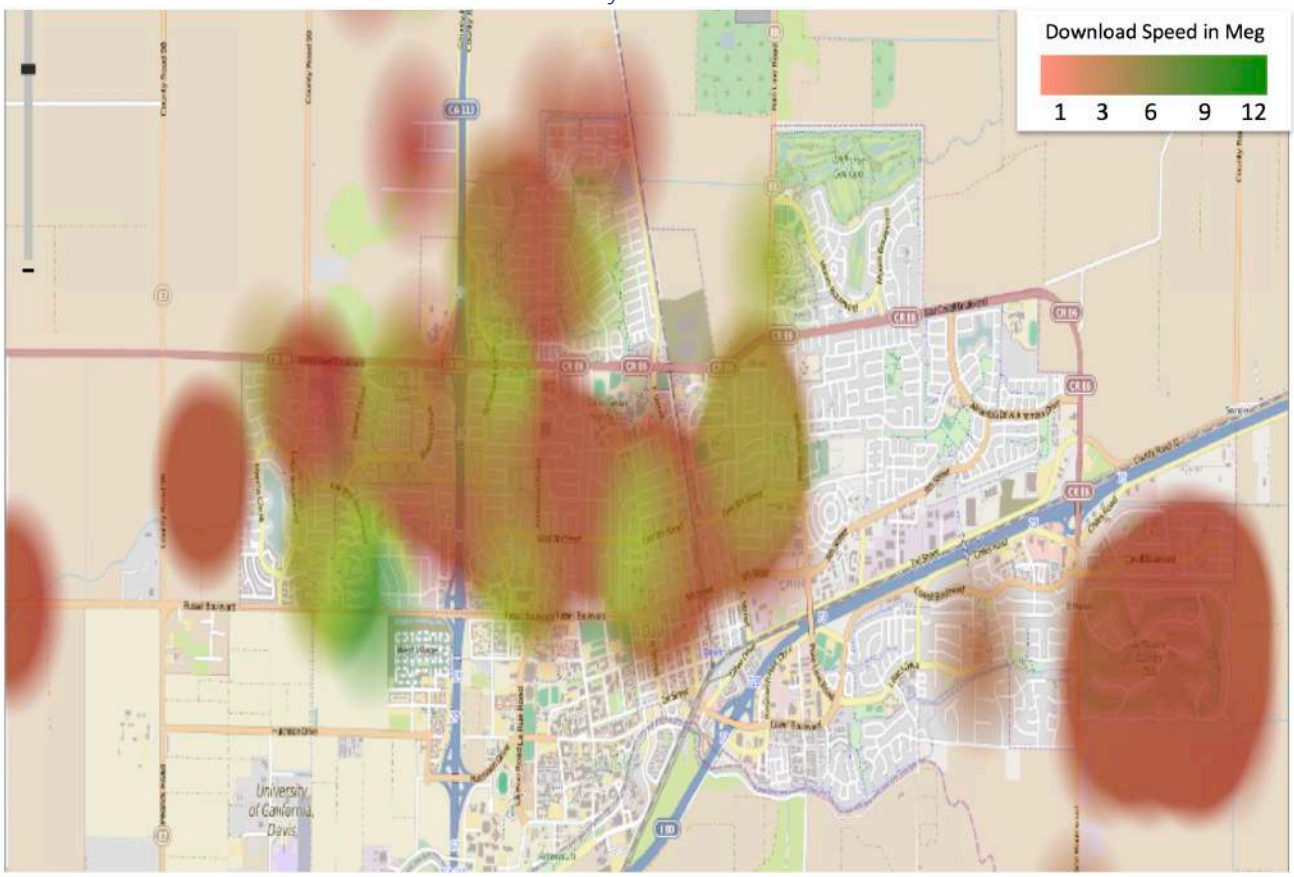
Census Tract Name	Total Household	Occupied	Vacant	Average Penetration	Households with Broadband
Census Tract 101.01	2,628	2,219	409	50%	1,110
Census Tract 101.02	2,468	2,321	147	50%	1,161
Census Tract 102.01	1,213	1,114	99	70%	780
Census Tract 102.03	2,293	2,014	279	30%	604
Census Tract 102.04	2,233	2,173	60	50%	1,087
Census Tract 103.02	2,663	2,432	231	90%	2,189
Census Tract 103.10	1,843	1,819	24	90%	1,637
Census Tract 103.12	2,023	1,852	171	90%	1,667
Census Tract 104.01	1,921	1,790	131	70%	1,253
Census Tract 104.02	1,249	1,173	76	90%	1,056
Census Tract 105.01	1,127	1,093	34	30%	328
Census Tract 105.05	1,779	1,627	152	70%	1,139
Census Tract 105.08	1,064	983	81	70%	688
Census Tract 105.09	1,330	1,330	-	70%	931
Census Tract 105.10	2,104	2,068	36	70%	1,448
Census Tract 105.11	1,255	1,204	51	70%	843
Census Tract 105.12	1,182	1,182	-	90%	1,064
Census Tract 105.13	1,201	1,150	51	90%	1,035
Census Tract 106.02	2,606	2,360	246	70%	1,652
Census Tract 106.05	1,202	1,138	64	90%	1,024
Census Tract 106.06	2,831	2,728	103	70%	1,910
Census Tract 106.07	1,650	1,580	70	90%	1,422
Census Tract 106.08	2,045	1,909	136	90%	1,718
Census Tract 107.01	2,076	1,939	137	70%	1,357
Census Tract 107.03	1,878	1,711	167	90%	1,540
Census Tract 107.04	914	864	50	70%	605
Census Tract 108	1,457	1,370	87	50%	685
Census Tract 109.01	1,907	1,881	26	50%	941
Census Tract 109.02	2,581	2,368	213	50%	1,184
Census Tract 110.01	2,612	2,441	171	50%	1,221
Census Tract 110.02	1,439	1,375	64	70%	963
Census Tract 111.01	1,213	1,063	150	50%	532
Census Tract 111.02	1,635	1,560	75	50%	780
Census Tract 111.03	1,144	1,124	20	70%	787
Census Tract 112.03	1,074	994	80	70%	696
Census Tract 112.04	1,759	1,731	28	70%	1,212
Census Tract 112.05	2,645	2,427	218	90%	2,184
Census Tract 112.06	2,287	2,037	250	70%	1,426
Census Tract 113	2,634	2,606	28	70%	1,824
Census Tract 114	1,515	1,372	143	10%	137
Census Tract 115	1,959	1,738	221	50%	869
Totals	74,639	69,860	4,779		46,684

Source: 2010 Census Data Reported Through American FactFinder and the FCC Form 477 Report for July 2013

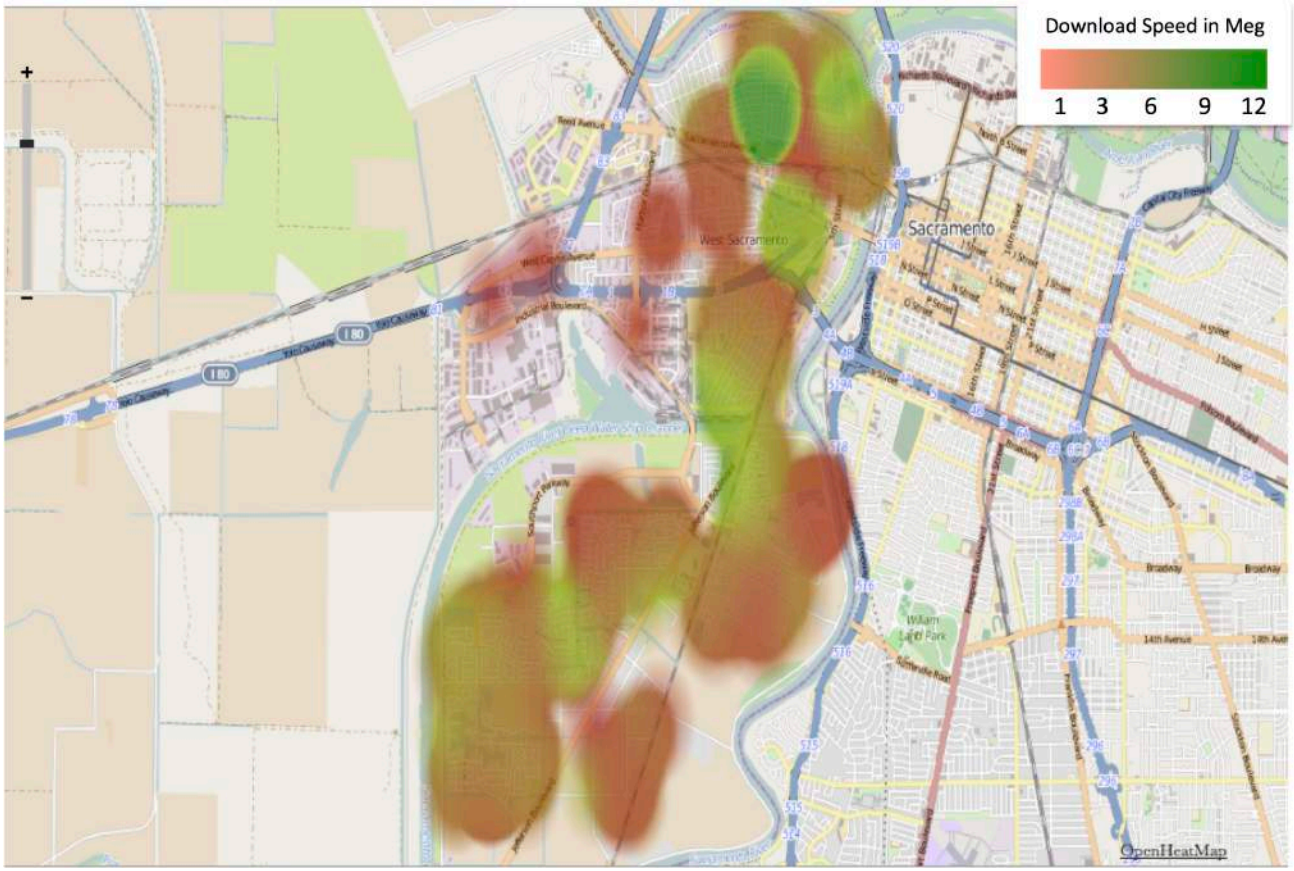
15. Appendix G: Yolo Broadband Speed Test Heat Maps

This series of heatmaps illustrates the concentration of broadband download speeds in each City within Yolo County. It provides a visual illustration of the concentration of broadband speeds, based on speedtest results reported in the project. Areas in green illustrate higher speeds of up to and above 12 megabits down. Areas in red illustrate lower speeds of not greater than 1 megabit down.

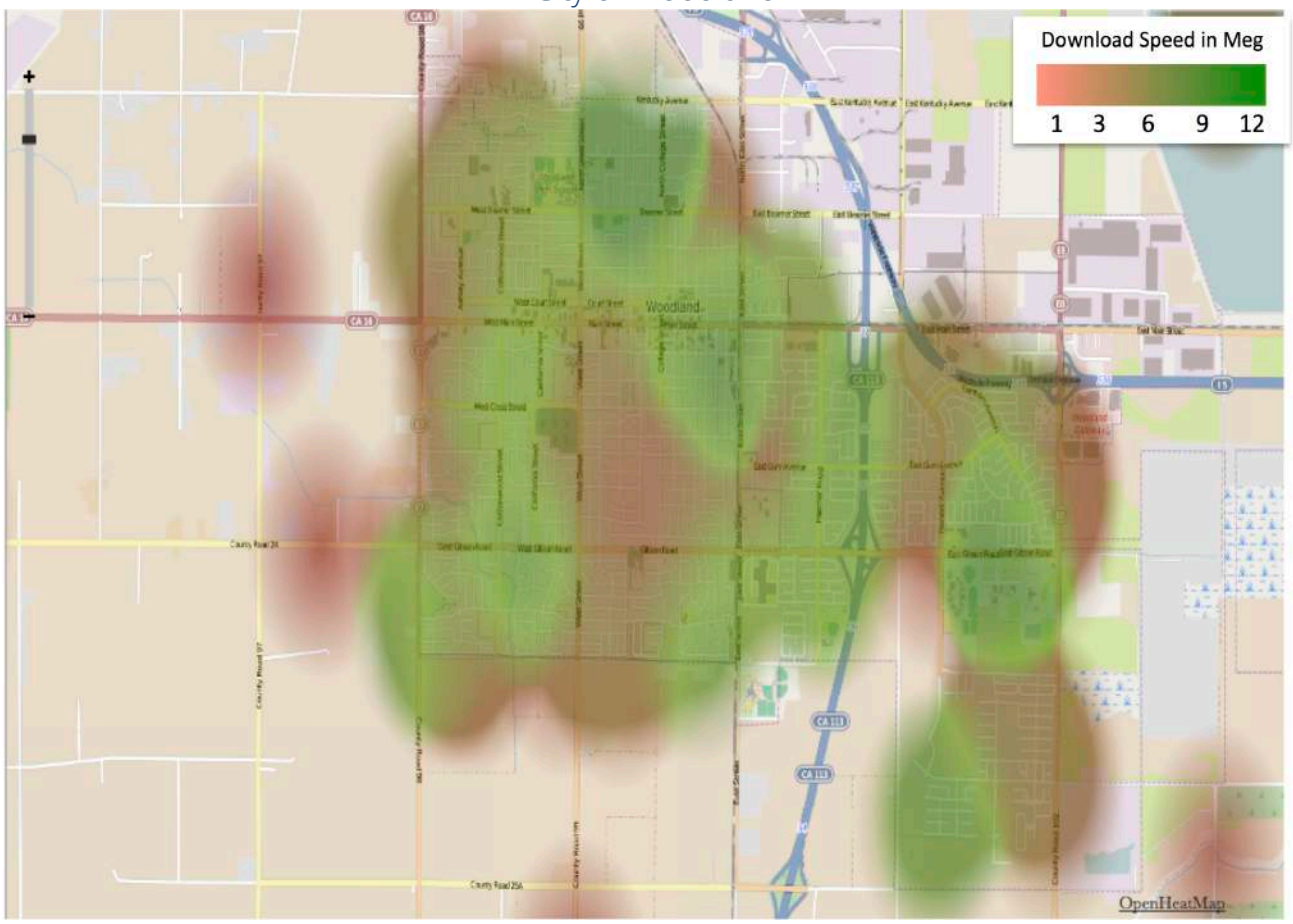
City of Davis



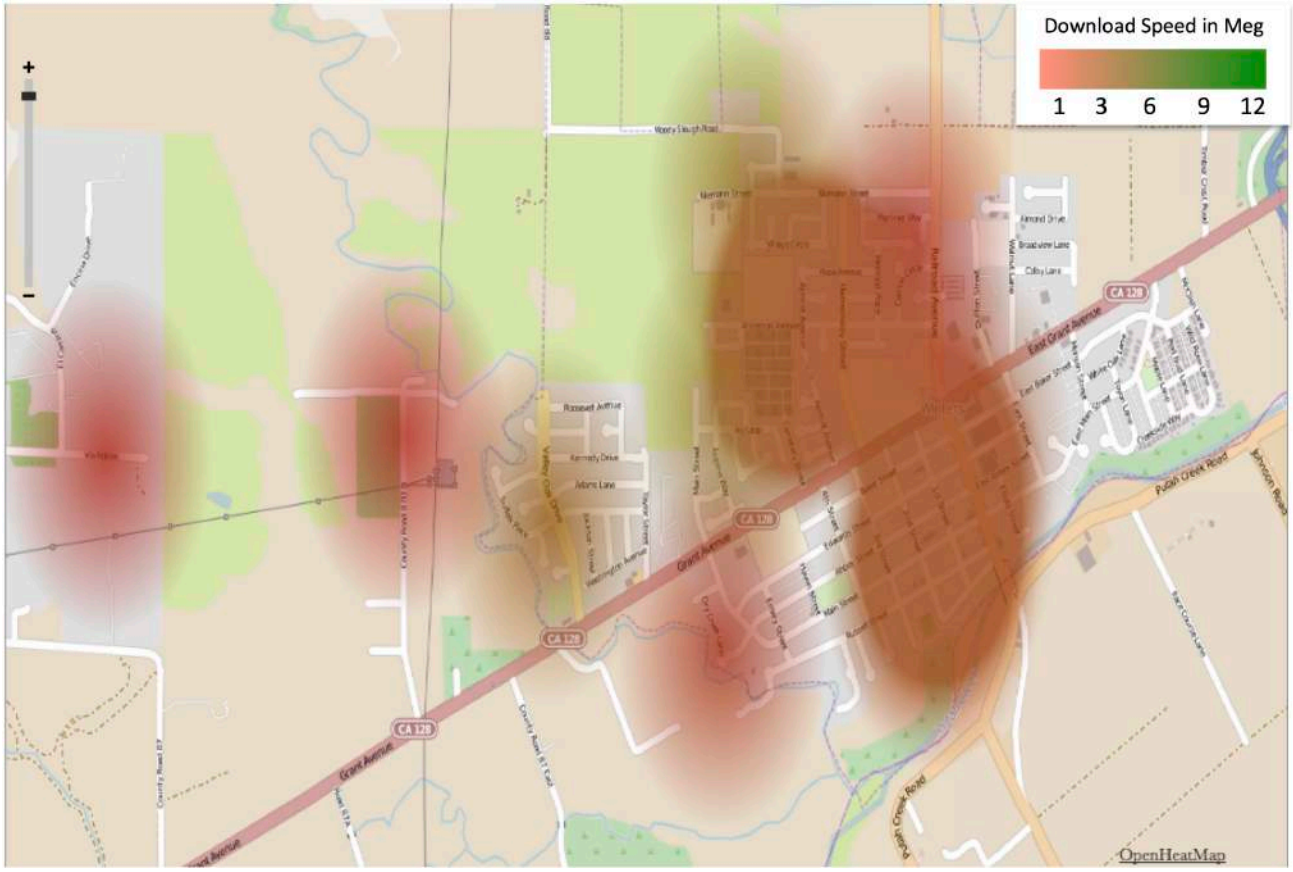
City of West Sacramento



City of Woodland



City of Winters



Yolo County (Countywide Heat Map)