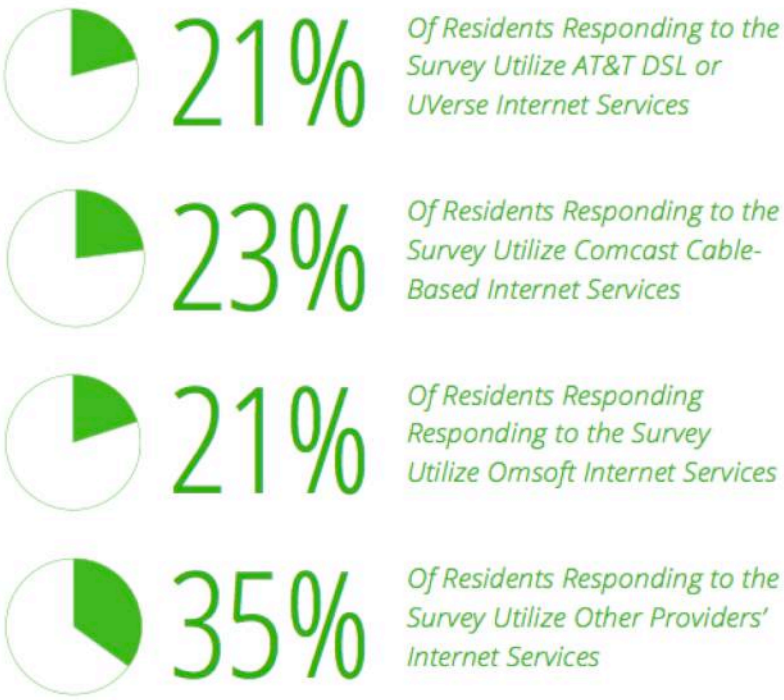
4. Broadband Community Profiles
Davis

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.

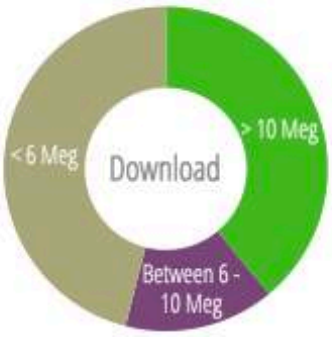
Actual speeds recorded may be different from the speeds residents purchase from service providers in the area. In general, DSL and cable broadband services are sold with speed increments that define a maximum speed for the service such as "Up to 10 megabits down and up to 1.5 megabits up." Actual speeds 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.

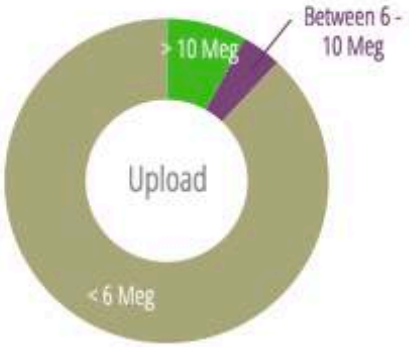
Even at the highest price point paid by residential subscribers, median speeds were 80% less than advertised speeds, which generally indicates highly oversubscribed services

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

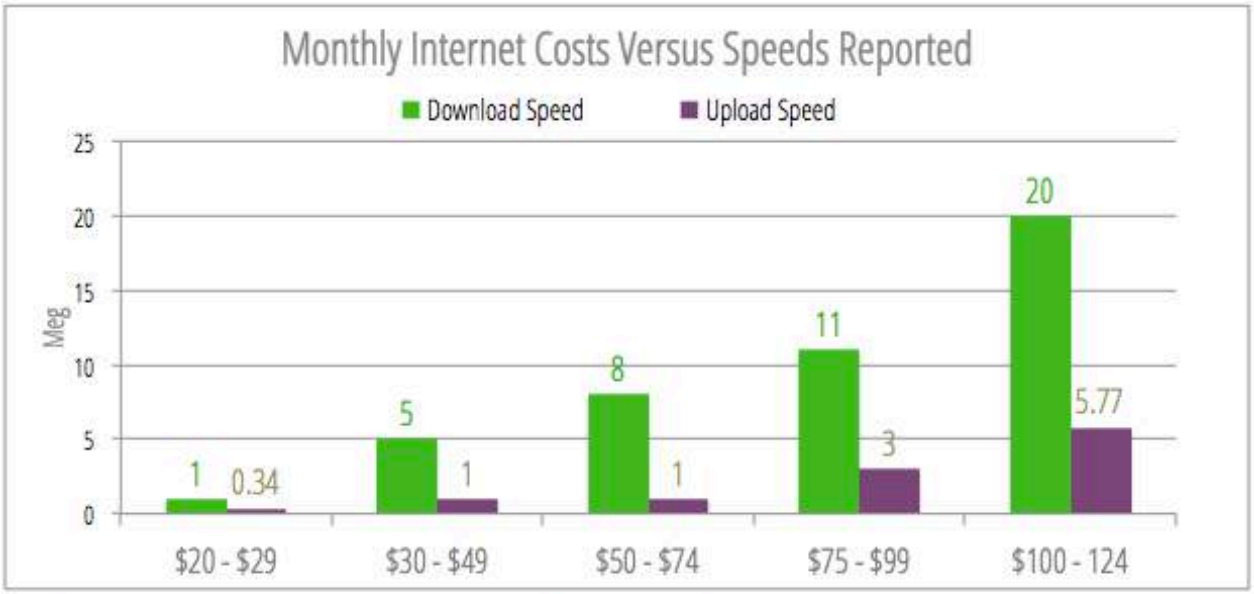


Figure 4.1: Residential Broadband Coverage in Davis *(Download Speeds Only)*

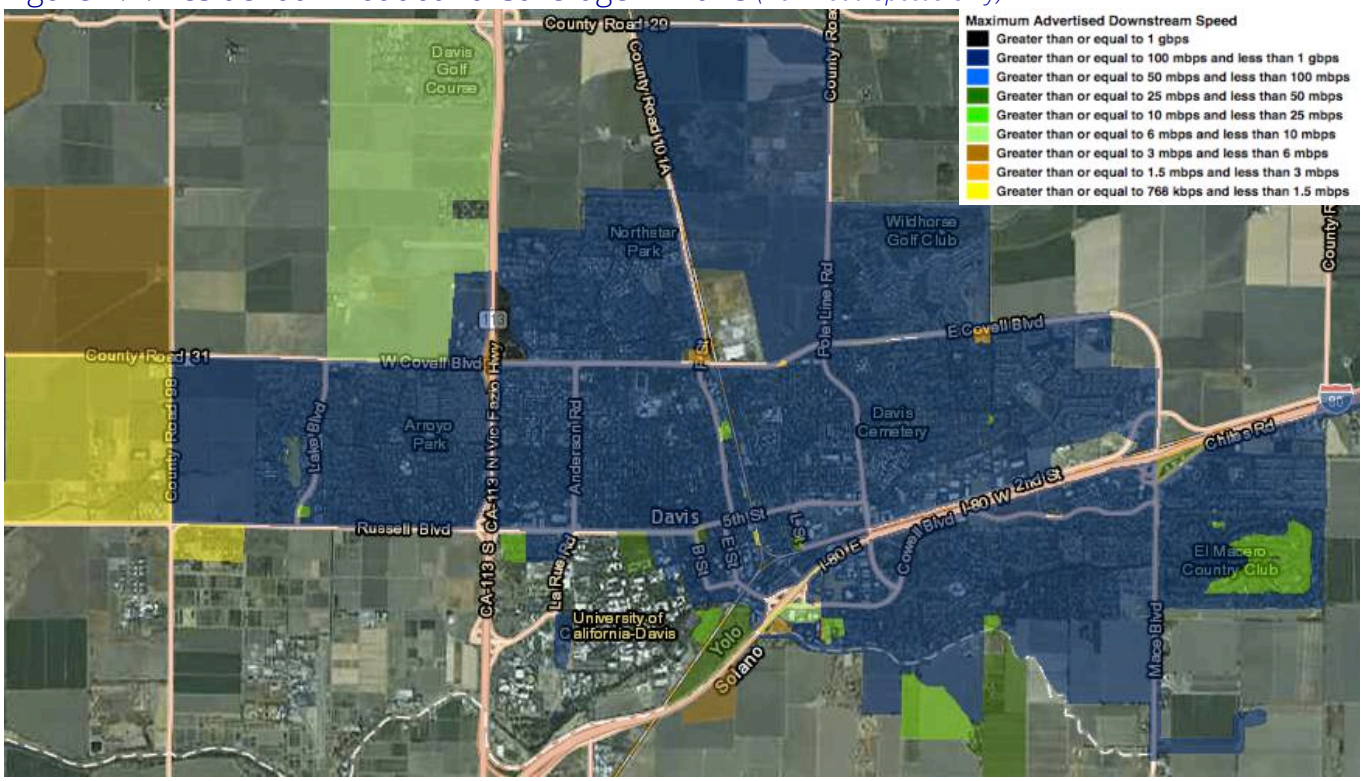
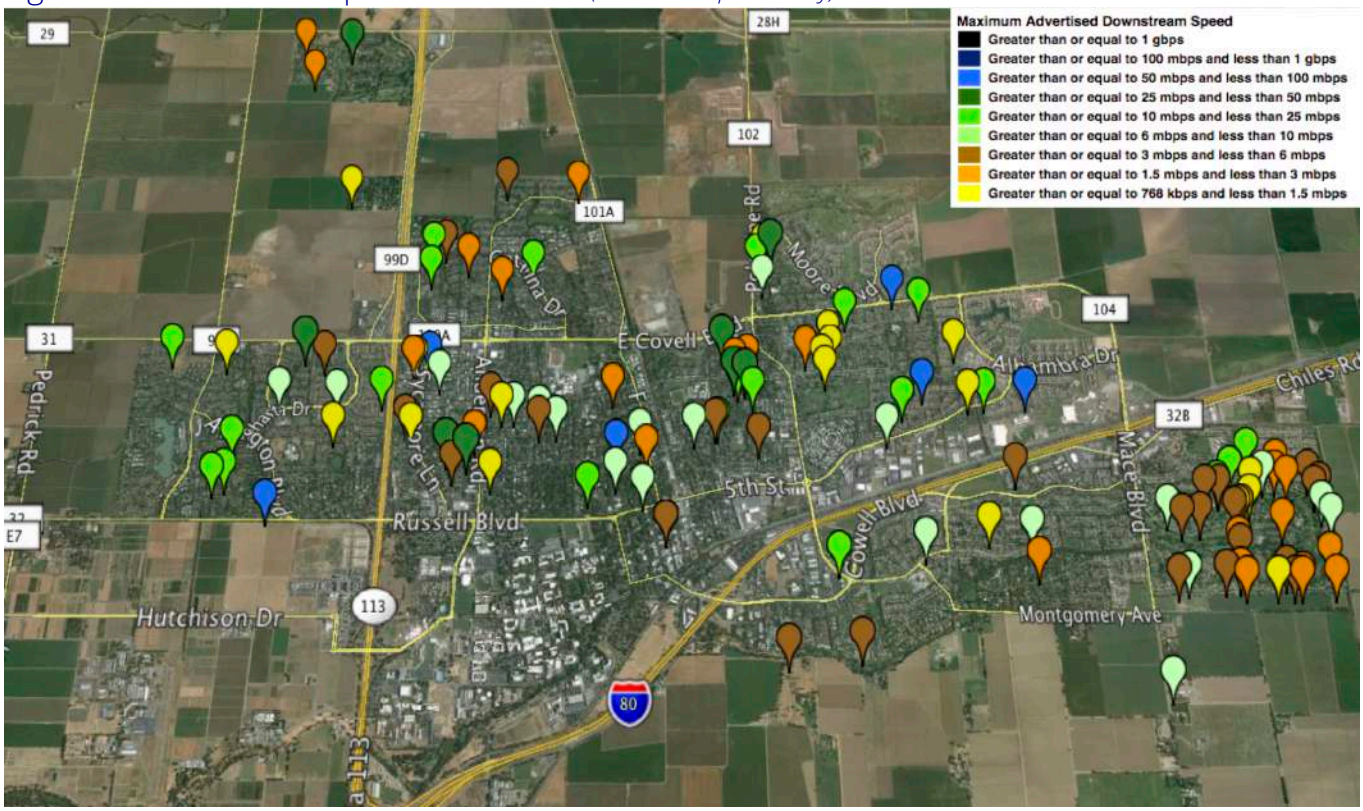
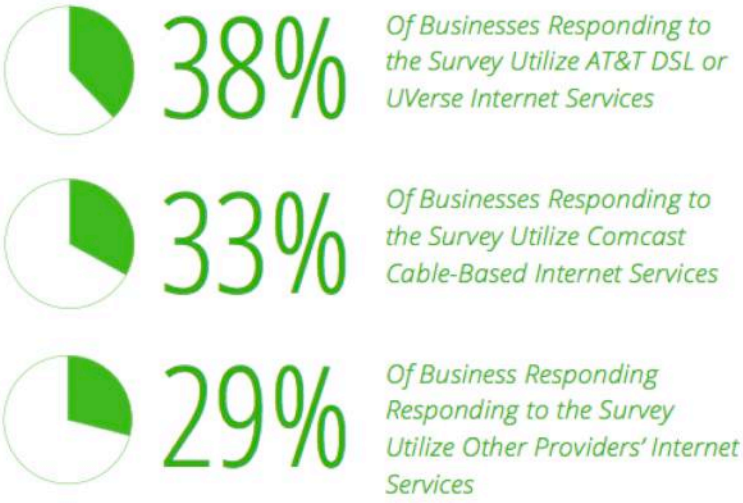


Figure 4.2: Residential Speedtest Results *(Download Speeds Only)*



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.

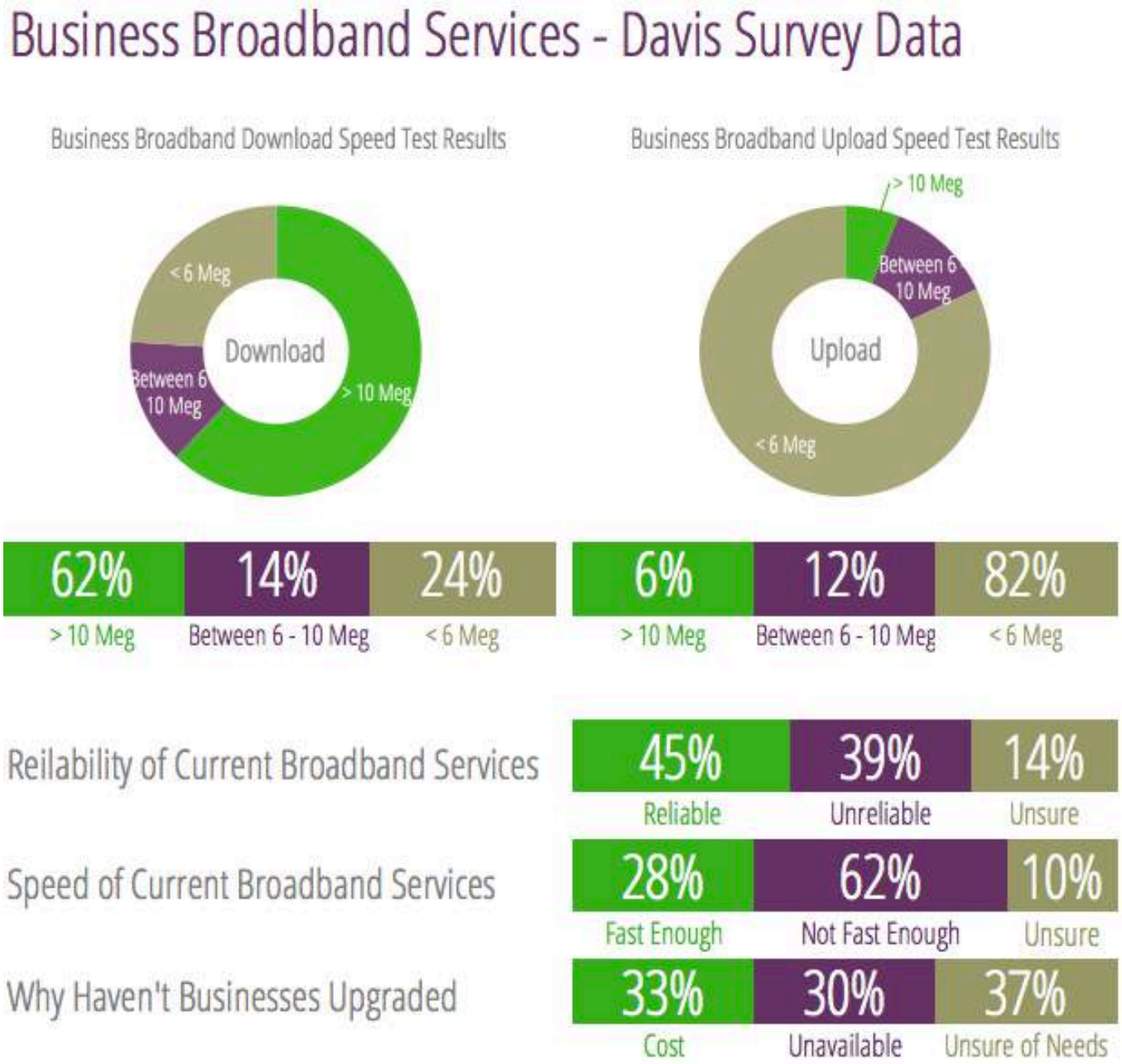


For businesses included in the assessment, 62% reported receiving download speeds of 10Meg or above. Some 24% reported download speeds of less than 6Meg. Upload speeds were commensurate with DSL and cable broadband services with the majority of businesses, 66%, reporting less than 3Meg upload. Businesses 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.