Summary

The City of Santa Cruz has adopted broadband infrastructure development as a civic priority, with the goal of sustainably growing the local economy, improving quality of life and enhancing social equity for all residents. Specific policies for reaching this goal have been drafted by the City, the County of Santa Cruz and other agencies at the local, regional, state and federal levels.

Private sector telecommunications companies have built fiber optic networks within the City of Santa Cruz which connect to core Internet exchanges in Silicon Valley and elsewhere. However, because some companies choose to only provide a limited menu of service choices, this infrastructure is not universally and directly available to residents and business, and in many cases has not been upgraded to current standards.

The public benefit of broadband infrastructure development has been established by the City of Santa Cruz. This finding is supported by studies and actual results obtained by other cities in California and elsewhere.

The City can take several steps, both immediate and long term, to encourage private sector investment, meet internal networking needs, extend the benefits of modern telecommunications services to people living in publicly supported housing and leverage existing City resources to promote the development of broadband infrastructure in ways that further the City's adopted goals.

Recommendations

In order to develop a sustainable economy by fostering new technology-based enterprises and expanding the City's technology infrastructure, as called for by the *General Plan 2030*, the following steps are recommended:

I. Solicit implementable ideas for upgrading Santa Cruz's broadband infrastructure. Hold informal staff discussions with local Internet service providers and provide notice to all interested parties of the City's goal of supporting equitable fiber optic network expansion.

II. Evaluate long term City networking needs. Review existing City broadband facilities and budgets with due consideration to expected future traffic loads and expectations of available resources, and identify infrastructure development projects which are potentially of mutual interest to the City and private sector providers.

III. Upgrade broadband availability in publicly subsidized housing. Identify private and public sources of investment in broadband facilities and service in public housing and develop implementable initiatives for Council review.

IV. Identify immediate opportunities for City investment. Evaluate funding available for economic development initiatives, develop recommendations for submission to the Council for applying that funding to current broadband construction plans – both public and private sector – and determine if

those funds can be directed to support those projects, either through direct investment or indirectly through administrative means.

V. Validate broadband infrastructure mapping. Review the fiber survey conducted by the CCBC and other research, incorporate the information into the City's GIS system and make it publicly available.

VI. Develop a long term broadband infrastructure roadmap. Taking into account existing resources, City networking needs, economic and social development objectives and private sector investment plans, draft specific objectives for high speed network expansion into commercial and residential areas for Council review.

VII. Complete broadband policy development. Review existing City of Santa Cruz draft policies and similar documents from other local jurisdictions, identify gaps and consolidate into a draft broadband master plan with specific policy recommendations for Council consideration, including long term investment in broadband infrastructure development.

Background

Current City of Santa Cruz Broadband Infrastructure Policy

The Santa Cruz City Council has previously approved two documents that form the basis for current policy regarding broadband infrastructure development. The first is a staff report[1] that summarizes a 2011 white paper prepared by the External Technology Committee[2]. The report was reviewed by the Council on September 27, 2011 and its recommendations were adopted unanimously. The first item put a high priority on development of fiber optic networks in the City:

> I. Fiber Policy Development: Motion to direct staff to develop and maintain a Broadband Master Plan for prioritizing connectivity needs in future years, with an emphasis on delivering high bandwidth services to Santa Cruz's industrial and commercial land use districts and community anchor organizations (education, public services, public safety, and health care).

The second document is the *City of Santa Cruz General Plan 2030*, adopted on June 26, 2012. Development of broadband infrastructure is both a specific goal and a necessary first step for achieving other goals outlined in the plan. Specifically, to achieve "a sustainable economy" (Goal ED6), the plan establishes a policy to "foster new technology-based enterprises" (ED6.7) by working "toward expanding the City's technology infrastructure" (ED6.7.2).

To do so, the plan goes on to set a goal of building "a technologically innovative community" (Goal CC11), including direction to "support and facilitate the provision of communications infrastructure

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[1] *City Council Agenda Report on External Technology Committee Policy Recommendations*, September 12, 2011.

[2] *Strategies for Effective Communication in the New Digital Media Landscape*, City Council Ad Hoc Committee on Technology, September 27, 2011.

needed by high-tech and knowledge-based industries" (CC11.1.2) and "leverage high-tech infrastructure/dark fiber at UCSC and other local educational institutions, and promote innovative partnerships to broaden access to that infrastructure" (CC11.1.3). The plan then establishes that broadband infrastructure development must be done in a way that will "reduce the visual impacts and clutter of wires, antennas, and wireless facilities" (CC11.3).

In between the adoption of the fiber development policy on September 27, 2011 and the approval of the *General Plan 2030*, staff worked with an intern, Lihn Vuong, from the Goldman School of Public Policy at the University of California, Berkeley to evaluate policy alternatives for improving Internet access, in particular by promoting the installation of underground conduit that can support development of high speed fiber optic networks[3].

This report offered several recommendations, including adopting broadband "as a key component in the City's economic development strategy", which the subsequent *General Plan 2030* accomplished. Other recommendations called for evaluating current and anticipated City networking facilities in light of plans by third parties to install conduit and facilitating that installation via street excavation policies and streamlined internal processes.

In the two years since, staff has prepared drafts of several policy documents that would form the basis of the broadband master plan authorized by the City Council. Some of this work was conducted in cooperation with the Central Coast Broadband Consortium (CCBC), an organization comprised of local agencies and private businesses in Santa Cruz, Monterey and San Benito Counties, and funded by a planning grant from the California Public Utilities Commission (CPUC).

These draft policies include:

- Outline of a broadband master plan
- Draft broadband priorities resolution
- Draft broadband development policy resolution
- Draft GIS integration policy
- Draft "shadow conduit" policy

Separately, the Public Works Department has been reviewing standards for conduit installations and fiber optic network operating policy developed in other jurisdictions.

Santa Cruz County Broadband Infrastructure Policy

The County of Santa Cruz is in the process of developing a broadband master plan of its own, and the Board of Supervisors has provisionally approved a set of broadband infrastructure development policies that include a master lease agreement for use of county-owned property, assignment of sole responsibility for review of broadband-related construction projects to the Public Works Department (instead of sharing responsibility with the Planning Department), a policy requiring the installation of conduit as an adjunct to certain other projects and draft conduit specifications.

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[3] *Install Conduit – Increasing High Speed Internet Access in Santa Cruz, California*, Lihn Vuong, May 1 2012.

The Santa Cruz County Board of Supervisors endorsed these policies at its meeting on January 28, 2014 and county staff is currently working on implementation language along with a broadband master plan.

State and Federal Broadband Infrastructure Policy

Bills requiring the installation of conduit as a routine element of highway construction projects have been proposed in both Washington and Sacramento. So far, these bills have failed to advance. Caltrans has also developed a pilot program for notification of interested parties when road projects or other work that involves underground trenching occurs.

Both the State of California and the federal government have focused on subsidizing broadband infrastructure upgrades in areas that are deemed to be underserved or completely unserved. As mentioned above, the California standard for residential and commercial broadband service is 6 Mbps download and 1.5 Mbps upload speeds. Any area that does not meet that standard is eligible for funding from the California Advanced Services Fund (CASF). Although a scattered handful of small areas in Santa Cruz technically qualify for this program, the City as whole does not.

Santa Cruz is eligible, however, to apply for grants to upgrade broadband facilities in public housing properties and support programs designed to increase broadband adoption among public housing residents. This program is also funded through CASF and administered by the CPUC. Rules for qualifying and applying for CASF public housing grants are expected to be finalized soon.

The federal standard is under review, and varies from agency to agency, but is generally in the range of 3 to 4 Mbps download and 1 Mbps upload speeds. The ongoing subsidy programs that reference these standards are primarily intended for rural areas. The federal government has not had a dedicated urban broadband development program since the expiration of the American Recovery and Reinvestment Act of 2009.

Other Policy Initiatives

A number of other local jurisdictions and some private companies have also been active in drafting and implementing broadband development policies.

Locally, the City of Watsonville is building a municipal fiber network to replace the system previously provided for free by Charter Communications under its expired municipal cable television franchise agreement. Much of this work utilizes conduit that was identified by the Public Works Department and mapped on a routine basis by GIS staff. Some of the conduit owned by the City of Watsonville was installed as a result of an informal “shadow conduit” initiative undertaken by the Public Works Department.

Likewise, the County of San Benito and the City of Hollister are collaborating on a fiber network project that will replace Charter Communications facilities, link key public agency sites and potentially be available for lease to private companies.

The Cities of Pacific Grove, Seaside and Monterey are evaluating proposals from a British company, SiFi Networks, to install fiber-to-the-premise networks in both residential and commercial areas. The documents that have been made public to date indicate that SiFi Networks is asking for substantial concessions regarding permits, allowable construction techniques and use of the public right of way.

In the San Francisco Bay Area, the San Francisco Board of Supervisors is considering adopting a policy requiring the inclusion of conduit and possibly other broadband infrastructure as a part of any road construction or other trenching work that is done in the public right of way. The City of Brentwood, which has required the installation of city-owned telecommunications conduit in new housing developments for 15 years, has just signed an agreement with Sonic.net to build a fiber-to-the-home network.

Several Silicon Valley cities are on the short list of candidates for Google's next round of fiber-to-the-home projects. Google's requested concessions[4] regarding permits, construction techniques, master leases and installation of facilities on public property have been met with varying degrees of enthusiasm. Google has not yet announced which cities it will choose for fiber builds.

Fiber Optic Networks in Santa Cruz

Several companies have installed fiber optic networks in Santa Cruz. According to a fiber survey conducted by the CCBC (see exhibits A and B), this infrastructure is comprised of:

AT&T Local fiber to neighborhood nodes to support Uverse service and inter-city fiber routes following the SR 17 and SR 1 corridors.

Comcast Local fiber to neighborhood nodes to support Xfinity service, and local and inter-city fiber routes to serve customers in unincorporated Santa Cruz County.

Sunesys Inter-city connectivity between UCSC and Santa Clara, generally following the SR 17 corridor. UCSC, Cruzio and Comcast are known to be using this fiber for middle mile connectivity to major Internet exchanges in Silicon Valley. Sunesys also has received a grant from the CPUC to build a second line through the City of Santa Cruz, south to Watsonville, Salinas and Soledad.

Cruzio Local fiber network, primarily for for government, educational and commercial customer support, generally running into downtown Santa Cruz from an interconnection point with the Sunesys network at UCSC.

NextG Middle mile fiber serving cellular telephone sites north of Santa Cruz along SR 1.

These survey results are preliminary and are subject to revision as the findings are validated.

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[4] *Google Fiber City Checklist*, February 24, 2014

The fiber networks operated by AT&T, Comcast and NextG are primarily for the purpose of feeding last mile networks that provide service to end users. These companies do not typically allow other companies or end users to access their core infrastructure, such as dark fiber, and limit customer access to a defined menu of bundled and/or managed services at retail rates.

Sunesys and, to a certain extent, Cruzio lease basic infrastructure to end users, as well as providing bundled and/or managed services, allowing companies and agencies to build higher capacity networks at lower costs than would otherwise be possible by relying solely on the retail services provided by AT&T and Comcast.

Residential and Commercial Broadband Infrastructure in Santa Cruz

Five Internet service providers (ISPs) – AT&T, Comcast, MegaPath, Sonic.net and Surfnet – have provided reports to the CPUC indicating that they offer retail residential and commercial broadband service in Santa Cruz. Cruzio also offers this type of service, but does not file availability reports with the CPUC.

Of these six companies, only AT&T and Comcast have extensive "last mile" networks in Santa Cruz. As mentioned above, Cruzio has a core fiber optic network that it uses to deliver retail service to businesses. Otherwise, Cruzio, MegaPath and Sonic.net use lines leased from AT&T to deliver Internet service to customers. Surfnet uses wireless technology exclusively.

Using an "A" to "F" grading system developed for the East Bay Broadband Consortium[5], the CCBC has evaluated the residential and commercial broadband infrastructure in the three-county region. On this scale, residential and commercial broadband infrastructure in Santa Cruz, excluding the UCSC campus, is graded a "D" with an average score of 1.0 (Exhibit C).

The reason for this low grade is primarily the ageing infrastructure maintained by AT&T. A grade of "D" indicates that only one primary wireline ISP offers service in a given census block that meets the CPUC's minimum standard of 6 Mbps download and 1.5 Mbps upload speeds.

With the exception of a few scattered pockets, Comcast offers Internet service that exceeds that standard throughout the city, however its reported speeds – generally in the less than 25 Mbps range for downloads – are also significantly worse than its benchmark speed of 100 Mbps download speed in the San Francisco Bay Area.

AT&T, on the other hand, does not provide service that meets the CPUC's standard anywhere in the City of Santa Cruz. It doesn't report offering the minimum upload speed of 1.5 Mbps in the city, and only reports meeting the 6 Mbps download standard in about half the city's neighborhoods.

If Cruzio's fiber optic network were factored into this evaluation, the specific census blocks where it offers service would receive a higher grade, but given the limited extent of its current network, the citywide average would remain in the "D" range.

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[5] *East Bay Broadband Report Card*, Tellus Venture Associates, January 28, 2014.

Outlook for Broadband Infrastructure Development

Except for the previously mentioned CPUC-funded inter-city fiber line being built by Sunesys, there are no specific, publicly announced plans to upgrade broadband infrastructure in Santa Cruz.

Comcast has not revealed any specific plans to upgrade either its fiber or legacy coaxial facilities in Santa Cruz, however it has expressed a general intent to do following the expiration of its local franchise agreement with the City earlier this year. Additionally, Comcast has held out the prospect of upgrading substandard systems, such as the one in Santa Cruz, as an incentive for state and federal officials to approve its proposed merger with Time-Warner and its takeover of Charter systems in California. In no case, however, has Comcast indicated an interest or a willingness to directly lease dark fiber strands to local businesses or agencies, beyond what it is currently required to do by contract and law.

AT&T has not announced any plans for significant broadband infrastructure upgrades in Santa Cruz. The company has announced a program of upgrading systems in core metropolitan areas, such as San Francisco and Silicon Valley, but has not included Santa Cruz in those announcements. In generally, AT&T management has said that it is focusing its capital investment in expanding its mobile networks, and building new fiber lines to serve those needs as well as a few targeted buildings in the central business districts of large cities.

Cruzio has discussed a general interest in building additional fiber routes and is evaluating its options for doing so.

Although the City of Santa Cruz owns relatively few network assets of its own, it is a major local network operator. For its own networking needs, the City currently relies on a combination of city-owned facilities, fiber leased from AT&T at a cost of approximately $50,000 per year, and Comcast fiber provided at a nominal cost until 2021, under the surviving terms of the otherwise expired municipal cable television franchise agreement.

One alternative for the City to consider is transitioning from leased fiber to lines that it owns or controls on a long term basis. Over time, money currently budgeted for leased fiber could be increasingly invested in new facilities that would support economic development, or saved for other uses. Or the City could leverage other resources – such as access to right of ways and City facilities – to encourage private sector companies to upgrade infrastructure.

One example of this kind of public/private partnership is Lit San Leandro. The City of San Leandro has worked with a local company to build an 11-mile fiber optic ring through the industrial and commercial areas of the city, for use by local businesses. The City contributed the use of traffic signal conduit and in return received 30 fiber strands for its own use. The remaining capacity on the network is available to local businesses.

Without new investment in local fiber optic infrastructure, the City – like other agencies, institutions and companies – will face increasing operating costs over time, for the use of ageing assets. The City

faces the additional problem of a sharp increase in costs when the Comcast agreement expires. Putting additional emphasis on long term infrastructure planning and investment, in cooperation with private sector carriers, is a potential solution to this problem.

Public Benefits

The benefits to a community of modern, high-speed broadband infrastructure generally break out into three categories: sustainable economic development, improved quality of life and greater social equity.

Santa Cruz has already seen some of the economic development benefits of improved access to basic fiber optic network resources. The independent fiber optic line installed by Sunesys that connects Santa Cruz to Silicon Valley has already allowed downtown businesses to connect to high speed Internet service and has cut the cost of wholesale Internet bandwidth by more than a factor of 10.

For example, Santa Cruz is considered to be the birthplace of contemporary coworking enterprises. The first such, NextSpace, opened in 2008. With the arrival of the Sunesys fiber, Cruzio established what was initially a gigabit connection to Silicon Valley in 2010, started CruzioWorks and began providing high speed connections in the downtown area. Other coworking ventures were launched and NextSpace began a nationwide expansion. It is significant that NextSpace now only chooses to locate where high speed Internet services, equal to or better than what is available in Santa Cruz, are available.

Similarly, the City of San Leandro has connected more than 90 businesses to its fiber optic network and has seen both quantitative growth in commercial real estate occupancy – now at 98% – and qualitative improvement in the types of businesses that locate there. For example, a 3D printing company, which relies on the ability to transfer large design files quickly, moved its operations to San Leandro in January 2014. It has grown from 4 employees in 2013 to an expected total of 60 employees by the end of this year.

Other communities, such as Chattanooga, Tennesse, have experienced similar results. According to a study prepared for the Fiber to the Home Council[6]

> Looking at 14 communities in nine states, we conclude that next generation broadband is likely to have a substantial impact on economic output and, consequently, consumer welfare. These gains are likely due to numerous factors, including the direct effect of infrastructure investment and increased expenditures, as well as early shifts in economic activity (e.g., job creation and occupational changes) and productivity gains.

The study concludes that those 14 communities realized an extra $1.4 billion in economic output, when compared to similar metropolitan areas that lacked extensive fiber networks. This kind of growth in economic activity will result in increased tax revenue as well, particularly sales taxes and, over time, property taxes as local real estate values increase.

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[6] *Early Evidence Suggests Gigabit Broadband Drives GDP*, David Sosa, principal, Analysis Group, September 18, 2014.

In September, Governor Brown signed Assembly Bill 2292, which explicitly connected broadband infrastructure investment to incremental sales tax increases. Bonds may now be issued by infrastructure financing districts to build local broadband infrastructure, and repaid with the additional sales tax revenue generated. This legislation acknowledges the positive impact of broadband investment – public or private – on sales tax revenue.

The case for broadband leading to an improved quality of life was made in the process leading up to the adoption of the *General Plan 2030* which concluded:

> Electronic services in particular (cable television, telephone, satellite, computer network- ing technologies, internet, radio, and other such services) create greater accessibility to and exchange of information, impact the ways people communicate, and create job opportunities. Enhancing and improving access to these resources will have a profound effect on the quality of daily life and work. Toward improving both, the City continually examines and responds to the possibilities and challenges offered by—and the implications of—technological advances and opportunities.

However, if the benefits of high speed broadband infrastructure are not universally available, social inequities will result. According to a filing with the Federal Communications Commission made by the California Emerging Technology Fund[7], this problem is becoming acute:

> California has a broadband adoption goal of 80% home use by 2017, with no single group below 70%. While our focused effort has resulted in significant progress in connecting the poorest Californians, the latest statewide survey shows that California is falling short. According to the 2014 Annual Statewide Survey conducted by the Field Research Corporation, fully one-quarter of California households do not have high-speed Internet at home. About half of households with Spanish-speaking Latinos or earning under $20,000 a year do not have home broadband access.

Closing this divide is also an adopted goal of the *General Plan 2030*, particularly to "promote universal and competitive digital services to residences and businesses" in order to create an inclusive and technologically innovative community:

> Technology forms the backbone of our local and regional economy, and will continue to do so in the future. As technology spreads through more aspects of our lives, tremendous opportunities arise to creatively and carefully use technology to shape our community. Technological innovation can help the city in many ways. It can facilitate citizen interaction with each other and government; company services to customers; and City services to visitors; and it can provide ways to showcase Santa Cruz's commitment to a sustainable environment.

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[7] *Re: Comcast-Time Warner Cable Docket #14-57*, California Emerging Technology Fund, July 11, 2014.