Fiber for the Coast

A Tri-County Broadband Plan

Authored by Larry Samuels, PhD, and Bud Colligan, Founder & CEO, South Swell Ventures
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Premise: Public or public/private control of various network layers of broadband Internet infrastructure and services could dramatically improve the existing coverage areas, pricing, and data rates available to businesses and residences within the Monterey Bay region, spurring clean technology opportunities, improved quality of education and healthcare, and a higher level of residential, business, and public sector services.

Such changes in broadband deployment and services could spur economic development by:

1. Attracting employers to the Monterey Bay region.
2. Encouraging start-up businesses within the Monterey Bay region by allowing new types of application development and facilitating business and public sector uses which require higher data rates.
3. Enabling more Monterey Bay region workers to work from home instead of commuting out of the area.
4. Reducing Internet costs and improving services to Monterey Bay region businesses and residents, thereby increasing available dollars to be spent and invested locally.
5. Providing direct fiber connection between CSU Monterey Bay, the Naval Postgraduate School and UC Santa Cruz, enabling the establishment of new bandwidth intensive joint research projects and programs, as well as the development of commercial byproducts of that research.

These results have already been demonstrated in communities such as San Leandro,[1] Chattanooga, Kansas City,[2] and Tacoma. With both CSU Monterey Bay and UC Santa Cruz, the greater Monterey Bay region is ideal for an intergovernmental consortium such as the UC2B project between the University of Illinois and the cities of Champaign and Urbana.[3] In such a consortium, local governments provide planning resources as well as some level of funding and control. That control can prove beneficial to the municipality or county involved when opportunities for leasing publicly controlled dark fiber become available. Consider Palo Alto, which has generated $2.1 million in annual revenue by leasing its dark fiber to eighty local businesses, while also providing free Wi-Fi in certain areas of the city.[4]

There have been multiple efforts to secure financing and approvals for both larger and smaller scale broadband fiber deployments in the Monterey Bay region. Some of these efforts are still pending, in various forms, and can be considered active alternative options to the

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[1] http://litsanleandro.com

[2] Google's Ultrafast Internet Draws Startups to KC. Associated Press Jan. 13, 2013. http://bigstory.ap.org/article/googles-ultrafast-internet-draws-startups-kc

[3] http://uc2b.net/urbana-champaign-big-broadband/

[4] Palo Alto Weekly. April 22, 2013. http://www.paloaltoonline.com/news/show_story.php?id=29377

plans herein. The proposal closest to the Fiber for the Coast plan, the Connected Central Coast proposal from Sunesys, is currently being considered within the CPUC's CASF funding review cycle. Should Sunesys's plan, or other pending "middle mile" plans, be approved and funded, there may be a diminished need for Phase 1 of our proposal.

Deployment Phases

Phase 1

Deploy interconnected publicly controlled fiber backbone in the following areas of the Monterey Bay region:

- Between the cities of Santa Cruz and Watsonville in Santa Cruz County.
- Between the cities of Pajaro and Soledad in Monterey County, including trunks to the cities of Salinas and Monterey.
- Between the cities of Hollister and San Juan Bautista in San Benito County.

Phase 2

Deploy publicly controlled fiber loops in the cities of Santa Cruz, Watsonville, Salinas, Monterey, and Hollister. Deploy publicly controlled fiber trunks into the communities of Scotts Valley, Soquel, Aptos, Freedom, Seaside, Marina, Pacific Grove, and Carmel. Whenever possible, these deployments should be partnered with existing municipal works projects, reflecting the "dig once" policy adopted by Santa Cruz and San Benito counties. These loops can be revenue sources for municipalities, as seen in Palo Alto and Santa Clara.

Phase 3

Deploy public aerial fiber trunks to Greenfield, King City, Aromas, Tres Pinos, and the San Lorenzo Valley. Deploy fiber to the home (FTTH) in communities where there is sufficient funding (via private and public monies) and fiber to the curb within targeted enterprise zones. Once again, since this is a phased deployment, "dig once" deployment of conduit should be requisite for municipal works projects. In some cases, fiber can be deployed simultaneous with conduit, but the costs for pulling fiber through existing conduit are far lower than trenching solely for the purposes of new fiber.

Note: In both Phase 2 and Phase 3, interim solutions provided by fixed wireless solutions will allow a more gradual deployment of fiber as public works projects extend the reach of conduit throughout municipalities. Despite the utility of fixed wireless as an interim solution, the authors believe that an extensive build-out of fiber will allow a highly scalable network more responsive to growing local demand in the commercial, educational, healthcare, research, and residential sectors. We also believe that such a network serves as a lure to companies to grow or relocate in an area with multi-gigabit connectivity. Having local nodes of publicly controlled fiber also lowers the cost of broadband service at all levels of usage, freeing up dollars for additional local consumer, business, and research spending/investment.

Phase 1 - Network Topography

Santa Cruz County

There are two viable paths for deployment in Santa Cruz County. The first of these is the newly purchased Santa Cruz County Rail Corridor, an ideal site for trenching and laying fiber with minimal disruption to the community and a single encumbrance permit. The second choice is an aerial deployment that follows the concentration of population within the cities of Santa Cruz, Soquel, and Aptos, most likely following the Soquel Avenue utility pole network and connecting to the San Andreas Road pole network. Using an exclusively aerial route would incur significant “make ready” and permitting costs, as well as time delays; however, in areas of Santa Cruz County, the larger population segments do not live near the rail line. Because of this non-proximity, either choice of primary deployment will require some amount of aerial cabling within the communities of Soquel, Capitola and Santa Cruz if Phase 2 deployment is to be optimized.

Monterey County

Utilize joint use utility pole network from Pajaro to Salinas City limits, trench or pole usage to Salinas Hub and/or along eastern edge of Salinas City. Utilize joint use utility pole network along the 101 corridor to Soledad CENIC/CalRES hub. From Castroville to Monterey, utilize the Transportation Agency of Monterey County (TAMC) rail corridor, which may allow comparable cost savings and single permitting, such as the Santa Cruz County rail line. An added benefit of this line is the ability to easily connect to and through the cities of Seaside and Marina, as well as the CSU Monterey Bay campus.

San Benito County

Utilize existing utility pole network along Highway 156 to connect San Juan Bautista to planned fiber link between Hollister Airport and Hollister.

Projected Costs

Note: Costs for fiber deployment can vary substantially according to the method of deployment, the topography of the deployment area (e.g. mountainous, densely forested), the local climate, restrictions based upon aesthetic or environmental concerns, the costs and number of permits required, and whether existing resources (e.g. utility pole networks, existing underground conduit) can accommodate new cabling. Technology used can also affect costs dramatically. For example, boring is less expensive for underground deployment than trenching and is particularly effective in semi-urban areas. Even less expensive is deployment in existing conduits such as those used in electrical utility deployment, following the “dig once” policy. While adopted in several areas in the Monterey Bay region, this policy has yet to be implemented in public works projects. Since most current public works projects within the region do not have conduit deployment as a component of their implementation, this plan assumes little or no underground conduit availability.

The figures used in this plan reflect a composite of costs reflective of the technology available, the routes most useful in terms of population coverage and lowest deployment

distance, and the planning and permitting necessary to deploy a fiber optic network in a mixed residential/rural coastal area with multi-county and multi-municipality jurisdiction. The environmental reports and considerations required for work in the California coastal zone add additional costs and complexity to the project.

Phase 1

The project costs of installing the approximately 120 miles of fiber would vary according to the percentages of underground conduit used, whether said conduit utilizes open trench work due to construction, and how much of the proposed network is above ground (aerial) cabling. A conservative estimate of Phase 1 costs, as proposed, would be between $15-18 million, based on an average of $180,000/mile cost for new underground conduit along the SC County Rail corridor, the TAMC rail corridor between Castroville and Monterey, and within limited municipal areas (up to fifty miles in total), and $100,000/mile cost for new aerial deployment (up to seventy miles). This cost includes two 2" conduit, pull boxes spaced 2,000 ft. apart, two 96 strand single mode fiber optic cables of approximately 120 miles in length, aerial shielding and couplings, labor and components for utility pole installation, and labor and components for in-ground conduit installation. The underground cabling would use boring technology instead of trenching, which should yield substantial savings for that portion of the deployment. Aerial deployment costs in urban areas will be considerably higher than those in rural areas, but significant portions of the planned Phase 1 routing are currently within rural areas, allowing a lower average cost per mile for the aerial portions of Phase 1 deployment.

Phase 2

As the deployment for Phase 2 will necessarily follow Phase 1 by at least one year in most areas, municipalities will be able to plan the laying of conduit in tandem with existing public works projects, lowering the cost of underground deployment by as much as 75%. The size and scope of municipal deployments will depend upon the budgetary and footprint needs, but the costing metrics of Phase 1 ($180,000/mile new underground cabling, $35,000 underground into existing trenches, $100,000 for new aerial cabling) are based upon a composite of industry estimates for rural and urban environments such as those found in the Monterey Bay region.[5] [6]

Phase 3

Unlike Phases 1 & 2, Phase 3 deployment will be based upon subscription and adoption levels within the targeted communities. Phase 3, which outside of the proposed trunk extensions is primarily a FTTH and enterprise zone deployment, is expected to be the most costly phase. The cost per home in urban areas is expected to range from $900 to $2,500, depending upon the number of households in a given community that adopt the service.

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[5] CTC. Brief Engineering Assessment: Cost estimate for building fiber optics to key anchor institutions. 2009. http://www.ctcnet.us/CTCCostsForAnchorInstitutions.pdf

[6] U.S. Dept. of Transportation, Research and Innovative Technology Administration. http://www.itscosts.its.dot.gov/

However, since Phase 3 deployment is essentially an ongoing and long term effort, this phase of development can be implemented on a “pay as you go” basis, so that the subscriber base and level of services (e.g. telephone or broadcast television) can be expanded over time. Given the growth of Net based content [7] and the decline in cable and satellite subscribers, the model of broadcast television will change radically over the next decade, making Internet based delivery increasingly viable. In much the same way, users of services such as Skype are growing at a rapid pace, making Internet based long distance the norm for many households.[8] The core rationale of the proposed network, then, can be as a primarily Internet based usage network, without the need to propose the mounting of parallel services to those of the telcos or cable television networks.

Phase 3 is also likely to spur local ISPs to expand their services into their service communities, as access to publicly controlled lower cost fiber will allow them to be far more competitive in their offerings. This expansion is particularly important to those rural and mountainous households unlikely to be served by fixed wire broadband in the near term and to those households who prefer the lower costs of wireless and have little need for the attributes of high speed Internet connectivity. This proposal does not advocate for any position in regards to municipalities serving or not serving as ISPs. Instead, it seeks to create the ideal conditions for the “last mile” of broadband deployment, where public, private, or a combination can facilitate solutions for FTTH or high speed/low cost Internet access.

Benefits

As proposed in the first section of this plan, the immediate economic benefits include attracting and retaining next generation technology companies, modernizing business practices, improving medical care and government accessibility, and allowing the transmission and sharing of new modalities in communications and content. The benefits to taxpayers, as well as educational, healthcare, and commercial institutions of the Monterey Bay region are clear.

Beyond such broad benefits, cost savings benefits to citizens are real. In Tacoma, the price of Comcast Internet service is 45% lower than the same service in Seattle, a direct result of competition with the public network. Similar competition in the Monterey Bay region will increase bandwidth and lower costs for broadband, which in turn will mean more dollars in the pockets of business and residential Internet users for local investment.

Increased numbers of locally employed workers lowers the environmental impact of commute traffic, retains the tax dollars of retail expenditures by out of county commuters, and reduces the number of vehicles on the road at peak traffic times. In areas such as the Highway 1 corridor in Santa Cruz County and the Highway 68 corridor in Monterey County, peak traffic conditions hurt the environment and decrease worker (and personal) productivity.

The Monterey Bay region has wrestled tremendously with growth and job loss during the past several decades. In the period 1995-2005, the city of Santa Cruz alone lost 4,800 jobs due to

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[7] http://usatoday30.usatoday.com/tech/news/story/2011-09-09/cable-tv-internet-entertainment/50362398/1

[8] http://skypenumerology.blogspot.com

the departure of companies such as Wrigley, Lipton, Texas Instruments, and EBay.[9] The 1994 closure of Fort Ord cost Monterey County some 18,000 civilian jobs and over $1 billion in military salaries/local spending.[10] Additional losses in the manufacturing, packaging and telecommunications sectors in both Monterey and Santa Cruz counties have not been replaced with comparable employment opportunities, leaving the area increasingly reliant upon the low growth/low wage employment sectors of agriculture and tourism. The region faces the prospect of continued economic stagnation in the coming decade and the social problems that accompany such a decline.

This proposal can be a foundation for an economic renaissance for all citizens of the Monterey Bay region. It can help create clean technology jobs, reduce out of region commuting and in region traffic, strengthen the tax base, and improve the educational and health care systems, all the while balancing the economic concerns with the longstanding ethos of environmental stewardship that characterizes the Monterey Bay region. This proposal is an investment in a future where the children of the region no longer have to leave their home communities to find meaningful employment and own a home. The Fiber for the Coast project can make the Monterey Bay region economically diverse, environmentally sustainable and positioned to take its proper place as a world class region for next generation technology development and employment.

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[9] City of Santa Cruz Economic Development Office. July, 20, 2013

[10] Fort Ord ReUse Authority , November 29, 2012. http://www.fora.org/MediaReleases/2012/112912JobsInfo.pdf