Appendix A - Broadband Terms, Abbreviations and Definitions:

Broadband downstream and upstream speeds:

Throughout this document, broadband download speeds are often referred to as “down” and broadband upload speeds are referred to as “up.” For example, Smarter Broadband, in the area along Willow Valley Road, provides “wireless with 15 down, 4 up.” Unless otherwise stated, speeds are measured in megabits per second (Mbps). In addition, the combination of download and upload speeds is referred to using the following simplified format: (down/up). For example, the above speeds of Smarter Broadband along Willow Valley Road could be written as (15/4).

Definitions:

- **WIRELINE/ WIRED:** These terms may be used interchangeably, and refer to any communications service that is delivered exclusively using physical wires.
- **WIRELESS:** Wireless service is any communications service that is delivered using electromagnetic signals that travel through the air, rather than physical wires.
    - 4G – or fourth generation – is a mobile communications standard allowing wireless internet access at a higher speed than the previous generation.
    - 5G is the fifth generation cellular network technology
- **FIXED WIRELESS:** Fixed Wireless service is any wireless service that is delivered consistently from one fixed location to another fixed location. This is in contrast to mobile service, which is delivered to devices that do not have a fixed location.
- **CABLE:** The term cable is used to describe coaxial cable, the traditional wired technology used by cable television companies.
- **FIBER**: The term “fiber” is used to describe fiber optic cables. This is by far the most modern and most efficient delivery method for broadband Internet, and falls into the category of wireline service. Fiber optic cables are the normal technology used for middle-mile and Internet backbone infrastructure.
- **INTERNET BACKBONE**: This refers to the principal physical connections which make up the foundation of the Internet. These high-capacity connections allow for communications over long distances. In order to be connected to the global Internet, all other Internet connections must ultimately be connected to the Internet backbone.
- **MIDDLE-MILE/BACKHAUL**: These terms can be used interchangeably, and refer to the infrastructure that connects communities and businesses to the Internet backbone. Middle-mile infrastructure is not meant to reach customers directly, but rather serves to connect last mile networks to the Internet backbone.
- **LAST-MILE**: Last-mile infrastructure, or last-mile networks, carry Internet communications from a middle-mile network to the end customer. It is the most local of the three major structural levels of the Internet.
- **SATELLITE BROADBAND**: Network connectivity provided through low-earth-orbit or

geostationary satellites.

- **TV WHITE SPACE**: Refers to the unused television channels between the active channels in the VHF and UHF spectrum

Abbreviations (listed alphabetically)

- **AB:** Assembly Bill (California State Assembly)
- **CAFII:** Connect America Fund Phase II Auction
- **CASF:** California Advanced Services Fund
- **CENIC:** Corporation for Education Network Initiatives in California
- **CETF:** California Emerging Technology Fund
- **CTC:** California Transportation Commission
- **DSL**: Digital Subscriber Line
- **FCC**: Federal Communications Commission
- **Gbps**: gigabits per second
- **ISP**: Internet Service Provider
- **ISRF**: Infrastructure State Revolving Fund
- **Kbps**: kilobits per second
- **Max**: Maximum
- **Mbps**: megabits per second
- **Min**: Minimum
- **OTMR**: One Touch Make Ready
- **PSC**: Publicly-Supported Community
- **ROI**: Return on Investment
- **S**: Senate Bill (United States Senate)
- **SB**: Senate Bill (California State Senate)
- **SBC**: Sierra Business Council
- **U.S.C.**: United States Code
- **USAC**: Universal Service Administrative Company
- **USDA**: United States Department of Agriculture
- **USF**: Universal Service Fund

Federal and State Broadband Definitions, and California Coverage Goal under AB 1665

According to the Federal Communications Commission (FCC): “The term broadband commonly refers to high-speed Internet access that is always on and faster than the traditional dial-up access.” Various transmission technologies can be considered broadband, such as DSL (Digital Subscriber Line), cable modem, fiber, wireless Internet, satellite, and BPL (Broadband Over Powerlines).

Broadband capability (speed) is generally measured using download and upload speeds (bits per second downstream and upstream). The current FCC definition of broadband requires speeds of at least 25 megabits per second (Mbps) downstream and 3 Mbps upstream. The state of California, however, only considers an area to be “unserved” with broadband if speeds are slower than 6 Mbps downstream and 1 Mbps upstream.

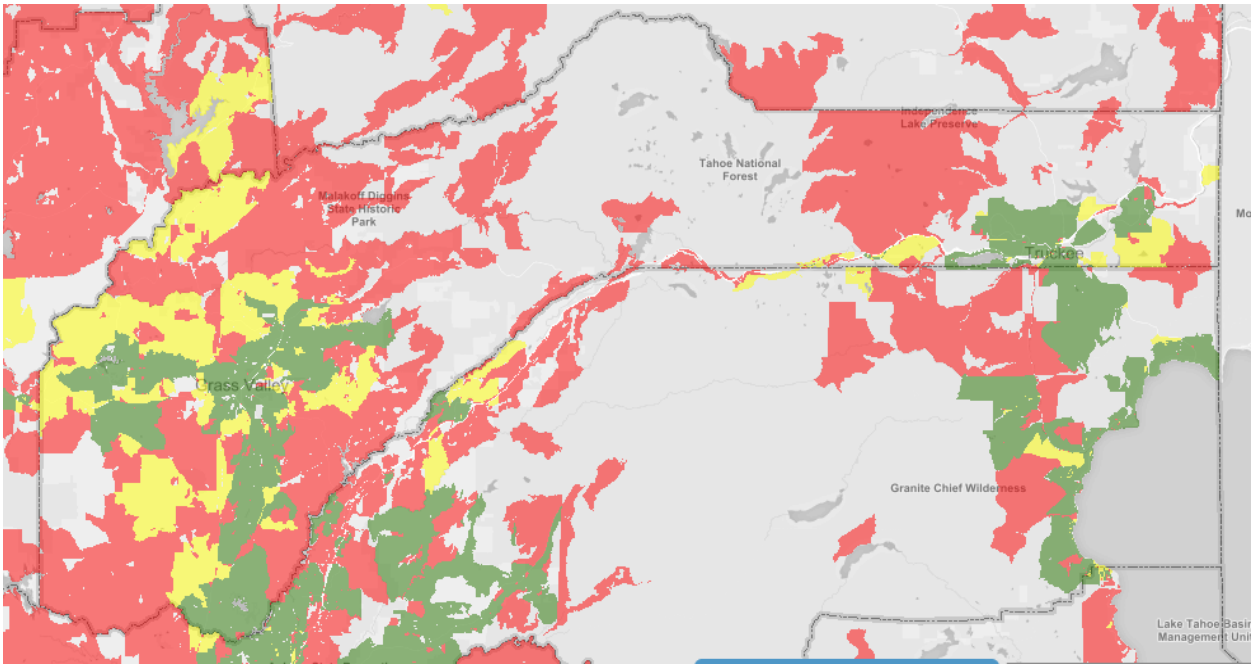
Previous to 2017, California law stated as its goal that 98% of California households have access to broadband. Given that 87% of Californians live in urban areas, however, this allows for the possibility that a large part of California’s geographical area will remain unserved. In 2017, the California legislature passed Assembly Bill 1665, which raises the bar from 98% of homes across California to 98% of homes within each of 19 designated consortium regions[1]. This more localized approach represents a major change for California’s rural communities such as those found in much of Nevada County.

[1] https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201720180AB1665

Appendix B - Broadband Service Availability in Nevada County

(Data from the California Interactive Broadband Map[2])

Wireline Service



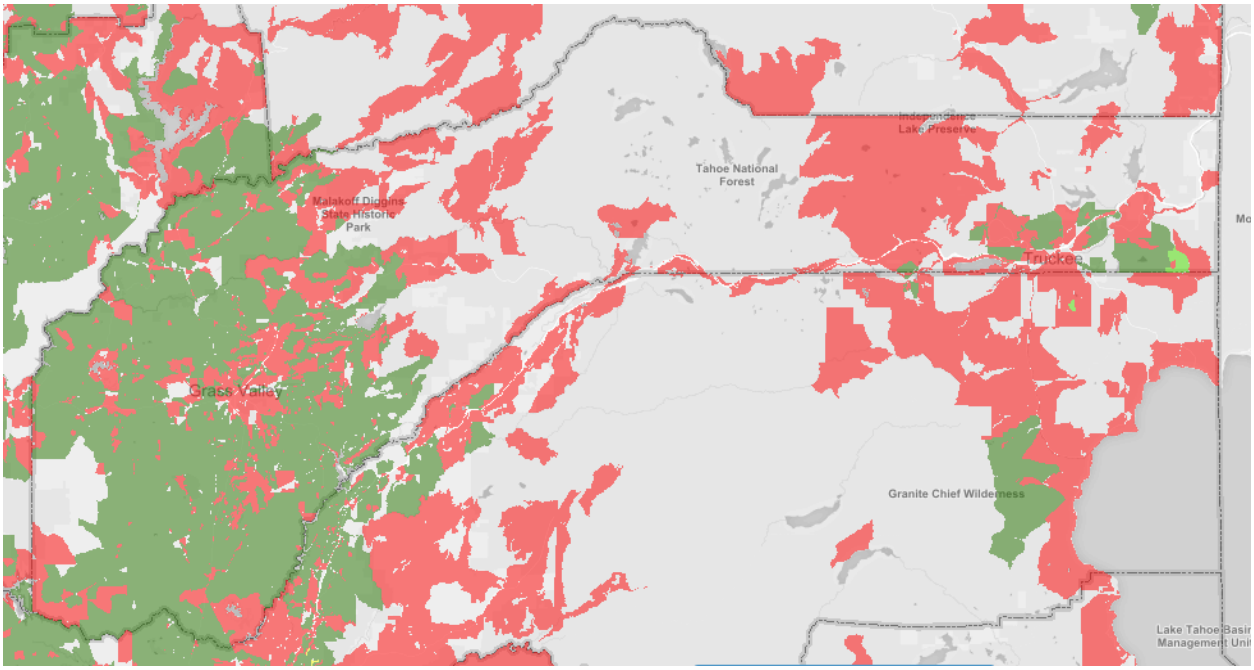
Legend:

Wireline Served Status

- Served >= 10 Mbps Down / 1 Mbps Up
- Served >= 6 Mbps Down / 1 Mbps Up
- Unserved - Slow Service
- Unserved - No Service

[2] "California Interactive Broadband Map." California Interactive Broadband Map. Accessed July 22, 2019. http://www.broadbandmap.ca.gov/.

Fixed Wireless Service



Legend:

Fixed Wireless Served Status

- Served >= 10 Mbps Down / 1 Mbps Up
- Served >= 6 Mbps Down / 1 Mbps Up
- Unserved - Slow Service
- Unserved - No Service

Appendix C - Primary Internet Service Providers Active in Nevada County

Providers of Fixed Wireless Service

*Unless otherwise stated, speeds are measured in megabits per second (Mbps) The combination of download and upload speeds is referred to using the following simplified format: (down/up). For example, the above speeds of Smarter Broadband along Willow Valley Road could be written as (15/4)
**KBPS = kilobits per second (1/1000th of a megabit per second, abbreviated as MBPS)

Provider	Active Areas	Speeds* (Max/Min)	Prices (Max/Min)	Data Usage Limit?	Installation Cost	Pricing & Speeds Avail. Online	Service Area Avail. Online
Smarter Broadband	Nevada City Grass Valley Penn Valley Rough and Ready Meadow Vista	15/4 mbps 512/256 kbps**	$199/mo $49/mo	On all plans	Starting at $199	Yes	Yes
Succeed.net	South Yuba State Park Lake Wildwood Penn Valley	40/5 mbps (residential) 1 Gig (biz) 3/1 mbps (residential) 50 /50 (biz)	$179.99/mo $1,320 (biz)/mo $64.99/mo	On some plans	Primarily biz accounts	Yes	Yes
DigitalPath	Western Nev. Cnty Alta Sierra	50/10 mbps (residential) 50/50 mbps (biz) 3/1 mbps (residential) 6 /1 mbps (biz)	$125/mo (res) $500.mo (biz) $51.95/mo (res) $99.95/mo (biz)	Yes	Yes	Yes	No
Exwire	Colfax Alta Chicago Park Donner Lake Soda Spring Norden Truckee Grass Valley	30/3 mbps 1/0.3 mbps	$198/mo $29/mo	Yes	Yes	Yes	Yes

Providers of Wireline Service

Provider	Areas Served	Delivery Method(s)
AT&T	Grass Valley, Nevada City, Donner Summit, western Nevada County (speeds vary widely)	Fiber Optic Cable, DSL
Comcast	Penn Valley, Nevada City, Grass Valley	Coaxial Cable, Fiber Optic
Suddenlink	South of Grass Valley to Lake of the Pines and Placer Cnty border, Truckee	Coaxial Cable
Race Communications	Grass Valley, Coleman, Chicago Park, Alta Sierra	Fiber to the home (FTTH)
Vast Network	Nevada City, Grass Valley, George Washington Hill, American Ranch Hill, Sugar Loaf Mountain, Lake of the Pines	Fiber Optic Cable (biz accounts only)

Appendix D - Priority Areas and Corresponding Strategies

Strategies and Next Steps

The following is an analysis of six preliminary areas which Sierra Business Council considers to be in particular need of improved broadband. These priority areas were determined based on density of both houses and businesses, existing service availability, proximity to useful infrastructure, comparative cost to deploy broadband improvements, and anecdotal evidence regarding the desire of residents. All of these locations are in conspicuous proximity to areas with significantly better connectivity; improved service, therefore, is considerably more attainable than in more isolated areas of similar need. Additional areas will be determined as this plan is implemented.

Although these areas have been carefully determined, there are certainly others in the County that deserve attention. Furthermore, there are some important factors which were not taken into account while designating these priority areas, such as the number of home-based businesses, public safety, and relative numbers of home-schooled students. The County may choose to consider some of these additional factors before finalizing these locations, and should use its internal discretion and knowledge as necessary.

With respect to approach for connecting priority areas, the County should pursue the following steps:

1. Verify and codify area as a priority area for broadband, based on County's knowledge and discretion
2. Do a high-level internal feasibility assessment (Planning Department, Public Works) seeking to leverage other planned infrastructure projects in the area (if applicable)
3. Identify applicable funding sources for project and applicable ISP partnerships
4. Engineer project planning and permitting
5. Assign County staff member to manage project and ensure project success

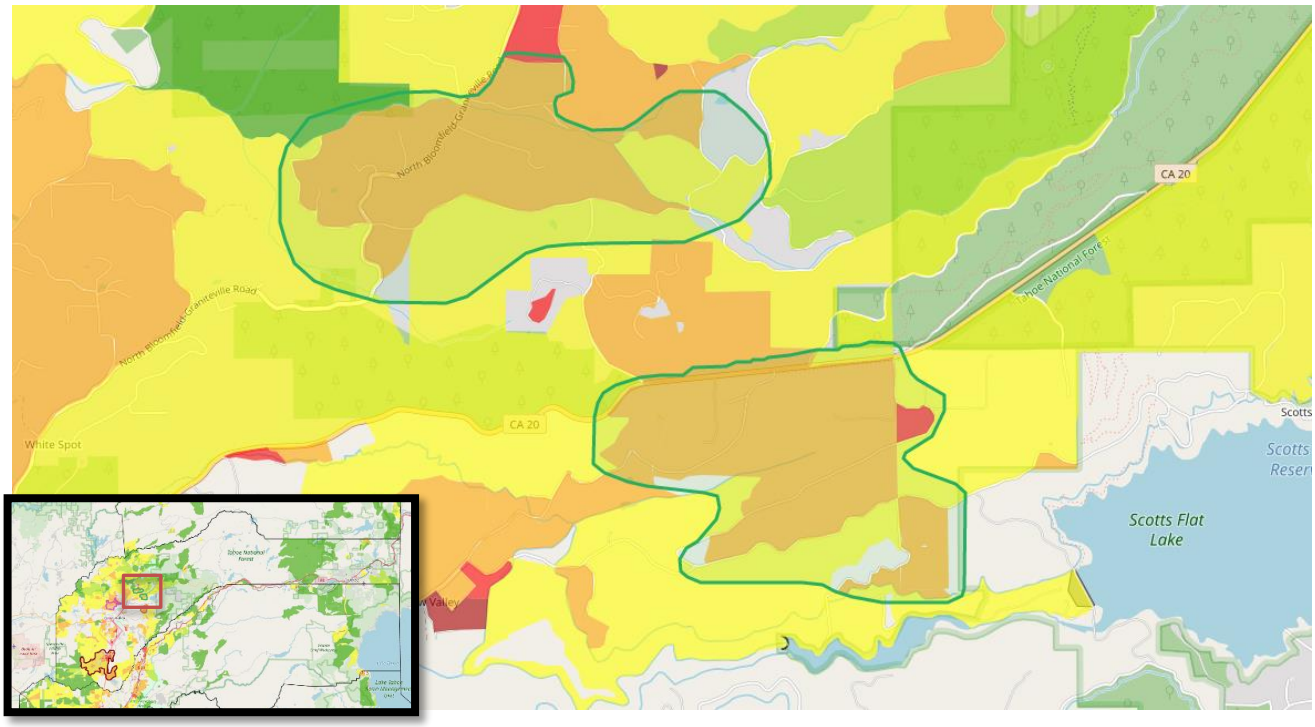
Note: *All speeds are measured in megabits per second and are notated using the format (down/up).*

Proposed Priority Areas in Nevada County

- Willow Valley Road
- Deer Creek
- Newtown Road

- Combie/Wolf Roads
- Sherwood Forest/Fairgrounds
- Donner Summit

WILLOW VALLEY ROAD



Criteria for Establishing Need

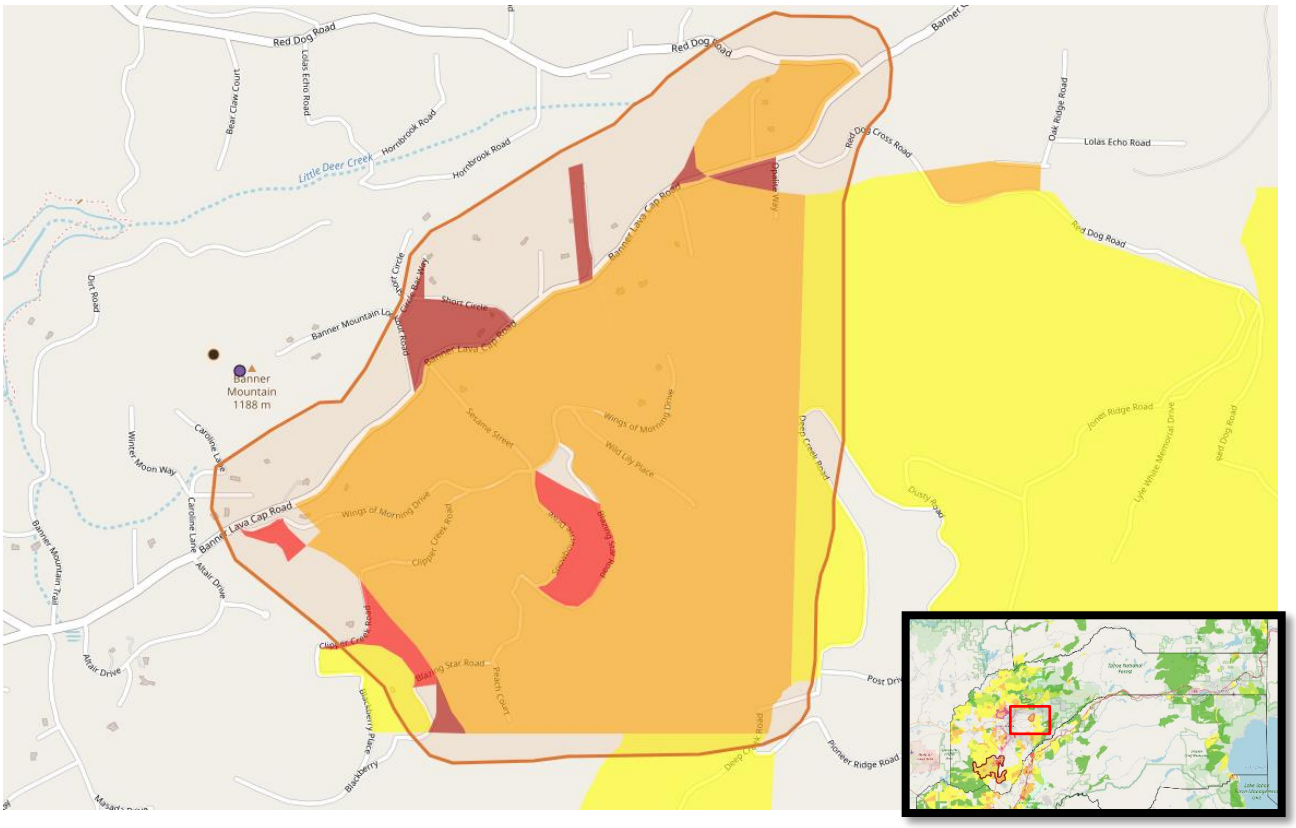
1. Density of Households: ca. 370 addresses in an area of approx. 3.9 square miles
2. Density of Businesses: ca. 0-2 businesses in an area of approx. 3.9 square miles.
3. Existing Service Availability:
   a. ISPs in Area: Smarter Broadband (wireless with 15/4) Digital Path (wireless with 10/2), ATT (DSL with 1.5/0.3)
   b. Adjacent ISPs: Comcast (wired with 986.5/35), ATT: (DSL with 18/0.7)
4. Access to Infrastructure: AT&T Fiber likely within 1 Mile, but only of some homes

Estimated Cost to Deploy: **Depends on service**

Potential Solutions:

- Construction of a new wireless tower within or adjacent to the area. This likely would require the extension of fiber into the area.
- Extension of Comcast service into area. This would require extensions of wired coaxial cable or fiber infrastructure.
- Upgrades to DSL speeds in the area. AT&T's high-speed DSL system, sometimes referred to as U-Verse, can reach broadband speeds using existing infrastructure

DEER CREEK



Criteria for Establishing Need

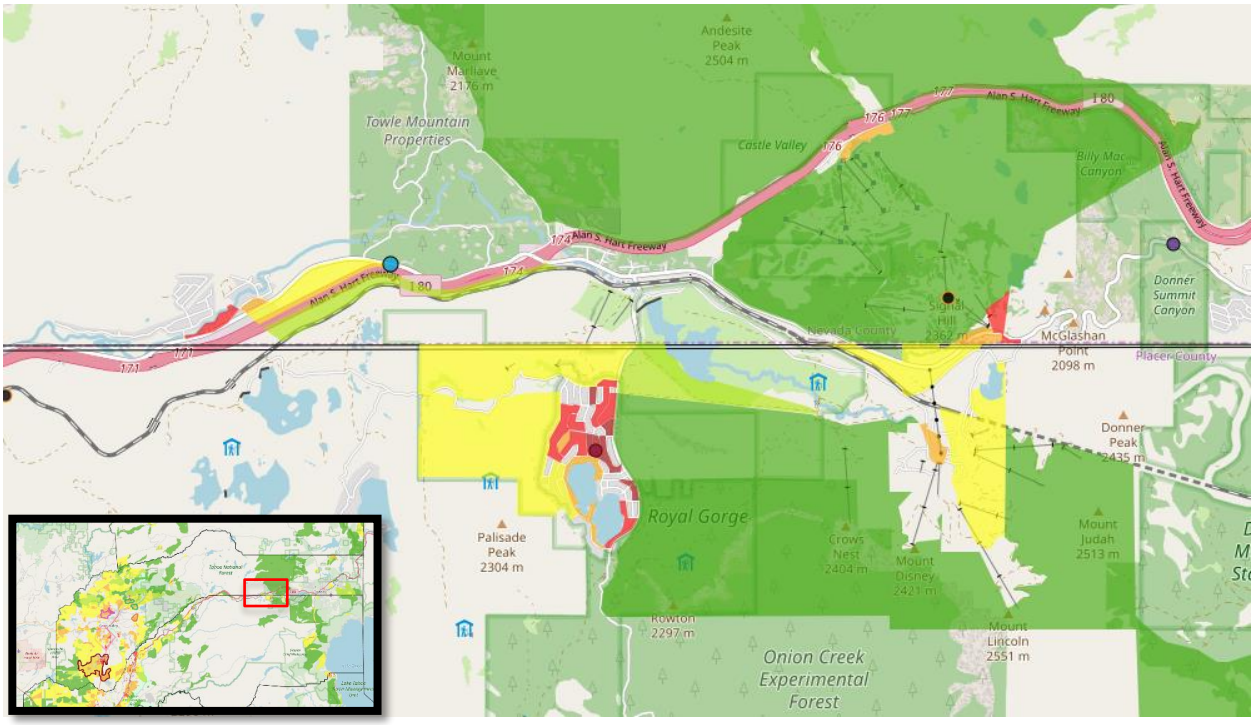
1. Density of Households: ca. 115 addresses in an area of ca. 2.2 square miles
2. Density of Businesses: ca. 12 businesses in an area of ca. 2.2 square miles
3. Existing Service Availability:
    a. ISPs in Area: Colfax.net (wireless with 15/4 and 50/50); Smarter Broadband, Digital Path, Exwire (all wireless, max 15/4)
    b. Adjacent ISPs: Comcast (cable 250/25); AT&T (6/1)
4. Access to Infrastructure: AT&T Fiber likely inside project area

Estimated Cost to Deploy: **Low**

Potential Solutions

- Addition of new fixed wireless equipment to wireless tower at 11385 Caroline Lane, or construction of new tower (both likely connected to AT&T fiber).
- Extension of Comcast service into area. This would require extensions of wired coaxial cable or fiber infrastructure.
- Upgrades to DSL speeds in the area. AT&T's high-speed DSL system can reach broadband speeds using existing infrastructure.

DONNER SUMMIT



Criteria for Establishing Need

1. Density of Households: ca. 763 addresses in an area of ca. 5.4 square miles
2. Density of Businesses: ca. 10 businesses in an area of ca. 5.4 square miles
3. Existing Service Availability:
    a. ISPs in Area: AT&T (DSL with Max. 18/0.7)
    b. Adjacent ISPs: Suddenlink (cable with 1000/ 50)
4. Access to Infrastructure: 5 Fiber networks likely within 1,000 feet of homes: Century Link, Cogent Communications, Level 3, Zayo, AT&T

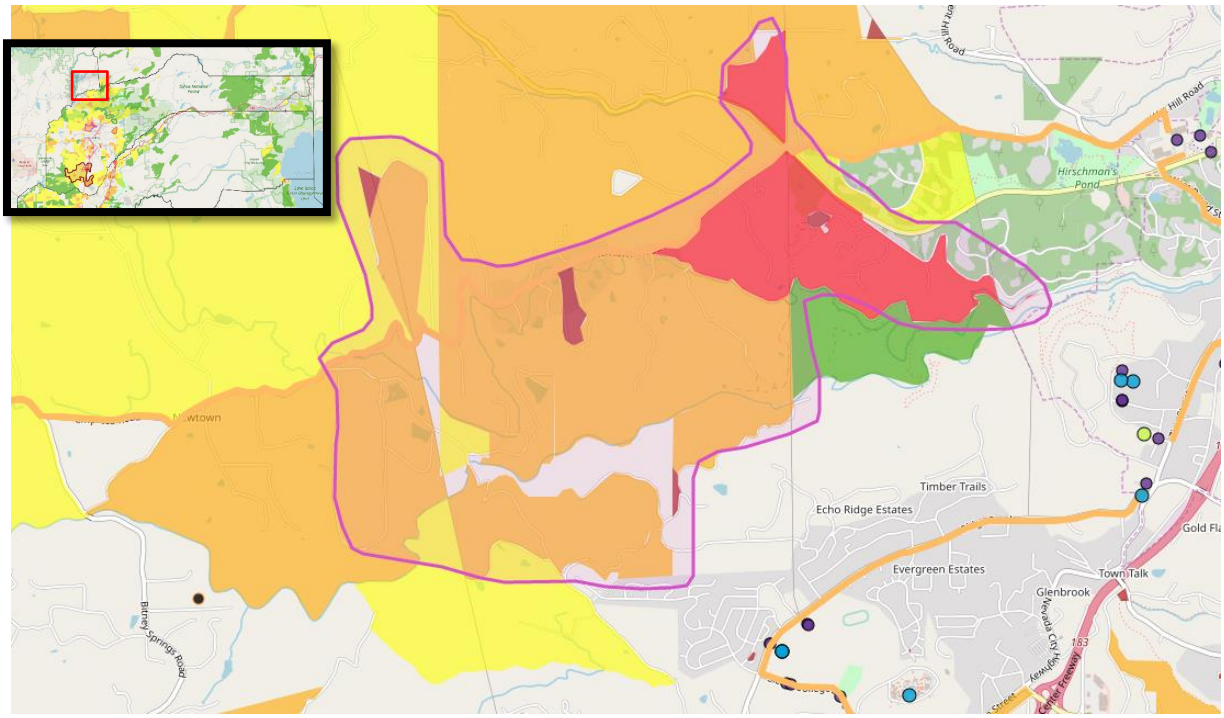
Estimated Cost to Deploy: **Depends on level of service**

Potential Solutions

- Addition of new fixed wireless equipment to wireless tower at Donner Ski Ranch, or construction of new tower (connected to one of the 5 fiber networks in the area)
- Extension of Suddenlink service into area. This would require extensions of wired coaxial cable or fiber infrastructure. This is likely the most difficult option, as Suddenlink's service area is relatively far away from homes on the summit.
- Upgrades to DSL speeds in the area. AT&T's high-speed DSL system can reach broadband speeds using existing infrastructure.

Note: The area of Donner Summit lies within an Opportunity Zone Designated by the California Department of Finance

NEWTOWN ROAD



Criteria for Establishing Need

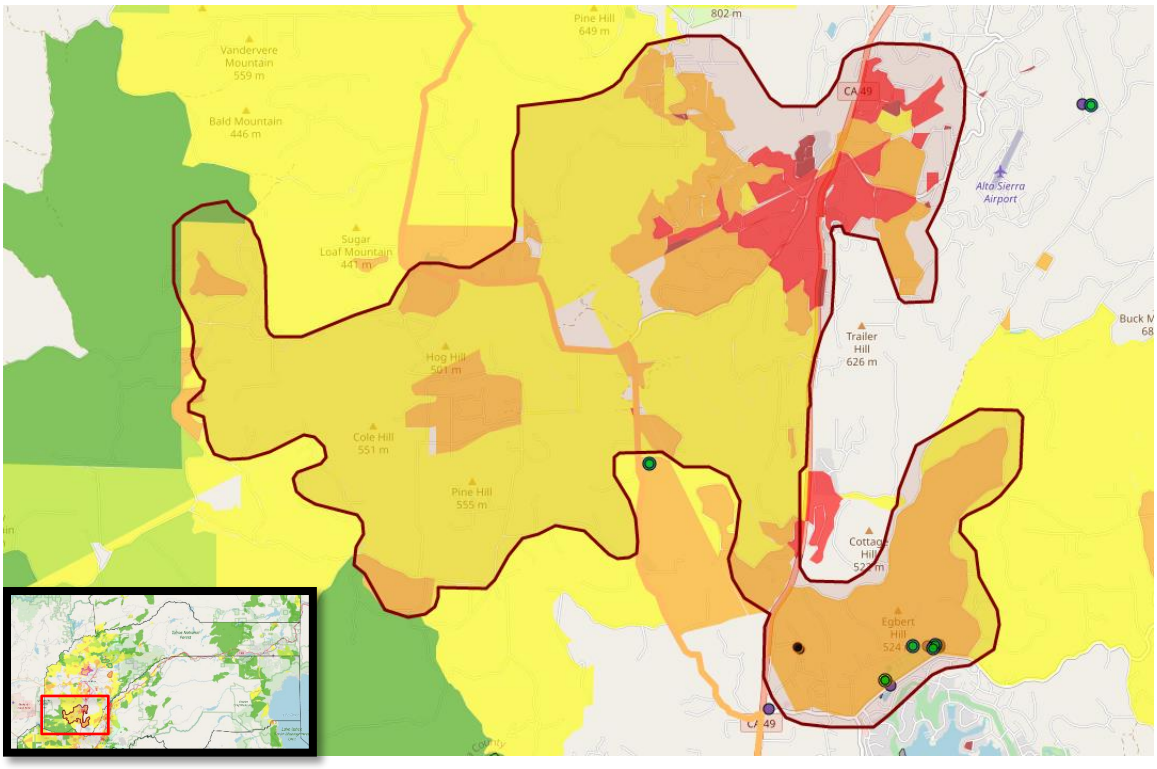
1. Density of Households: ca. 254 addresses in an area of ca. 2.1square miles
2. Density of Businesses: ca. 1 business in an area of ca. 2.1 square miles
3. Existing Service Availability:
    a. ISPs in Area: Smarter Broadband (wireless with 15/4)
    b. Adjacent ISPs: ATT (DSL with max 6/<1), Comcast (cable with 250/25)
4. Access to Infrastructure: Vast Fiber along Newtown Road, and AT&T Fiber likely on adjacent Monte Vista Drive

Estimated Cost to Deploy: **Low**

Potential Solutions

- Physical expansion of wired infrastructure by either Comcast or AT&T (both adjacent to area)

COMBIE / WOLF ROAD



Criteria for Establishing Need

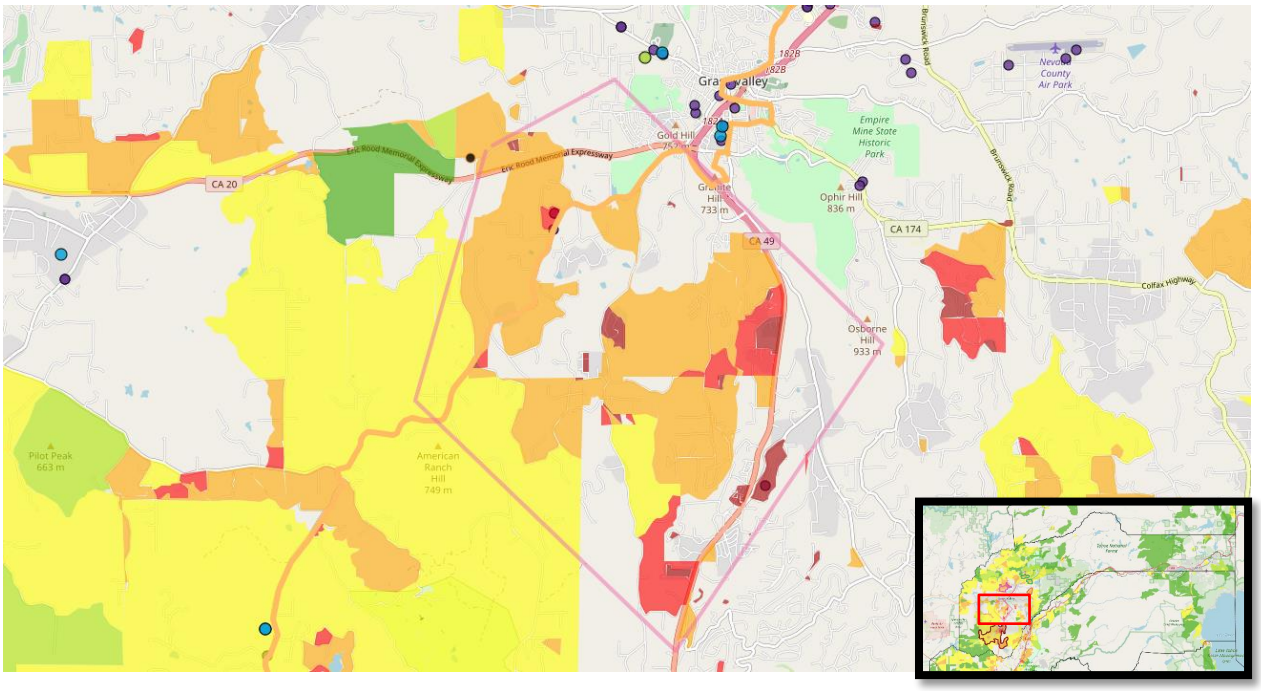
1. Density of Households: ca. 1,000 addresses in an area of ca. 15 square miles
2. Density of Businesses: ca. 0-3 businesses in an area of ca. 15 square miles
3. Existing Service Availability:
    a. ISPs in Area: AT&T (DSL with Max 18/<1); Colfax.net, Cal.net Inc., Smarter Broadband, Digital Path, Exwire (All wireless, Max. 15/4)
    b. Adjacent ISPs: Suddenlink (Cable with 150/7.5)
4. Access to Infrastructure: both Vast and AT&T fiber likely within area

Estimated Cost to Deploy: **Medium**

Potential Solutions

- Construction of new wireless tower in area; possible addition of equipment to towers at 22591 Wild Canary Road and/ or 17713 Wolf Mountain Lookout Road.
- Extension of Suddenlink wired infrastructure into area. According to Suddenlink, the main obstacle in this area is likely to be finding the proper pole infrastructure for a build.
- Upgrades to DSL speeds in the area. AT&T's high-speed DSL system can reach broadband speeds using existing infrastructure. In the case of this area, however, AT&T would also have to expand physical infrastructure into areas that it does not yet serve.

SHERWOOD FOREST/ FAIRGROUNDS



Criteria for Establishing Need

1. Density of Households: ca. 432 addresses in an area of ca. 6.5 square miles
2. Density of Businesses: ca. 1 business in an area of ca. 6.5 square miles
3. Existing Service Availability:
    a. ISPs in Area: Smarter Broadband (wireless with 15/4), Digital Path (wireless with 10/2), ATT (DSL with 1.5/0.4)
    b. Adjacent ISPs: Comcast (cable with 986.5/35), Suddenlink (cable with 150/7.5)
4. Access to Infrastructure: Vast Fiber inside project area, and AT&T Fiber likely within 2,000 ft

Estimated Cost to Deploy: **Low if wireless solution determined best to deploy**

Potential Solutions

- Construction of a new wireless tower within or adjacent to the area (likely connected to Vast or AT&T fiber)
- Extension of Comcast or Suddenlink service into area. This would require extensions of wired coaxial cable or fiber infrastructure.

Appendix E - Policy Options

Overview of Broadband Regulatory Landscape, Challenges for Nevada County

Broadband Internet access is not as universally available as familiar utilities such as water and power. The primary regulatory reason for this is the fact that it is classified by the Federal Communications Commission as an “information service,” rather than a telecommunications service. Telecommunications services, such as landline telephone connections, are regulated as utilities (otherwise known as “common carriers”) under Title II of the Communications Act of 1934, and companies that provide these services are required to build out their infrastructure to all households that request them, including in cases in which a provider initially deems such an expansion to be insufficiently profitable.[3] Because broadband Internet is not regulated as a utility, many parts of the United States, and Nevada County in particular, remain unserved, primarily due to low incomes, low housing density, or other factors that make them less profitable service areas for broadband providers.

Another roadblock to the expansion of broadband, particularly last-mile service, is the quality of the maps that are available to local, state, and federal government agencies. Both federal[4] and state[5] broadband maps rely primarily on data provided directly by ISPs rather than independently or governmentally collected data. Furthermore, federal and state maps do not provide data at a more local level than the census block level; if one household in a census block has access to broadband, the whole census block is designated as “served,” irrespective of the number of households in that census block that do not have service.
Additionally, many broadband providers consider the location of their infrastructure to be proprietary information, and local governments often do not possess location data on large amounts of both middle-mile and last-mile infrastructure. It is therefore worthwhile for local governments to invest resources in improving their maps and other data on broadband availability and infrastructure.

An additional concern is the fact that many areas have only one provider of broadband Internet, a situation which creates an incentive for ISPs to charge excessive prices for service. The Town of Truckee provides a particularly clear-cut example of this problem--Suddenlink Communications is the only provider of broadband Internet in most of the Town[6]-- but most of the County, including parts of Nevada City and Grass Valley, suffers from a similar lack of consumer choice. It is therefore ideal for the County to promote the existence, where possible, of more than one ISP in each geographical area.

[3] 47 U.S.C., § 214 (1934).
[4] "Form 477 Census Tract Data on Internet Access Services." Federal Communications Commission. December 10, 2018. Accessed May 29, 2019. https://www.fcc.gov/general/form-477-census-tract-data-internet-access-services.
[5] Broadband Maps and GIS Data. Accessed May 29, 2019. https://www.cpuc.ca.gov/General.aspx?id=1197.
[6] "California Interactive Broadband Map." California Interactive Broadband Map. Accessed May 29, 2019. http://www.broadbandmap.ca.gov/.

Wireless service, including the highly anticipated 5G[7] technology, which is now being tested by major providers, is often cited as a cost-effective way to promote competition and the expansion of service into unserved areas. Fixed wireless broadband--wireless service which is meant for permanent addresses rather than mobile phones-- is a valuable tool that can be used to fill gaps in service where last-mile wired infrastructure has not been built. However, wireless service, like other technologies, ultimately relies on access to the fiber which connects it to the wider web. Owners if this fiber are naturally disinclined to lease it to companies which may compete with them or may encroach upon their dominance in a certain region. Furthermore, the speeds offered by wireless service, though often quite fast, are slower than those offered by high-quality wired technologies, and do not allow for the significant increases in customer bandwidth use which are projected for the near future. For the above two reasons, wireless service is likely best viewed as a short-term strategy for specific areas, rather than a long-term solution for the County at large.

Although many of the structural problems related to broadband lie outside of the jurisdiction of Nevada County, there are several pieces of legislation and public sector resources that can be leveraged by local governments to help remedy the broadband-availability deficit. The following is a list of state and local policies and actions, the implementation of which can help to narrow the digital divide at the local level.

Local Government Approaches in the United States

Policy Option	Advantages	Potential Challenges
Dig Once Strategies	Allows the County in install conduit in a cost-effective manner, thus vastly reducing the cost of fiber installations. Allows for a relatively passive approach to network expansion, without significant financial risk.	May not be popular with construction companies or workers. Logistics and enforcement may be complex.
One Touch Make Ready (OTMR)	Dramatically Reduces the logistical barriers to installing new wires on poles. Reduces the cost and time associated with adding an additional line to a pole. For the above two reasons, increases competition among providers.	Strong opposition from incumbent service providers, as well as some labor unions.

[7] Although 5G technology is certain to have a major impact on Internet service, it is unlikely that it will significantly change broadband availability-- at least in the near-term--outside of dense, urban areas. Like all wireless technology, 5G cannot be deployed without a connection to physical middle-mile infrastructure. Furthermore, the most anticipated and fastest version of 5G--so-called “millimeter wave” technology-- has a range of only a few hundred feet, and often fails to penetrate physical obstacles, such as buildings and trees. For these reasons, a 5G technology deployment to unserved areas of Nevada County would require the construction of a great number of small cell towers, as well as new fiber infrastructure to connect those towers.

Open Access Fiber Networks	Allows for almost unlimited market competition by circumventing the infrastructure dominance of incumbent providers. Gives the County a permanent form of leverage in its broadband marketplace.	Financial risk is high, and projects require substantial planning and careful management. In networks with extreme amounts of internal competition, some ISPs can cease to be profitable.

Dig Once Strategies

Dig Once describes a broad range of policies that promote the coordination of fiber-optic cable or conduit installation with other underground infrastructure projects. Approaches range from non-binding coordination incentives to strict requirements that companies install certain equipment at specific times. The most aggressive dig once policy, designed for a dense, urban environment, requires new underground projects to include municipally-owned communications infrastructure, and imposes a 5-year moratorium on road excavation in an area after a project has been completed. More conservative jurisdictions have achieved substantial success merely by requiring resource sharing among public and private agencies, or by engaging in fiber or conduit trades with broadband service providers. Dig-once policies can be used to lessen unnecessary construction in densely-populated areas, to reduce the cost for private companies of installing expensive new infrastructure, especially in more rural areas, and as a cost-effective method for the development of municipally-owned conduit and/or fiber networks.

The following document from the California State Transportation Agency outlines particularly significant “dig once” policies in several state and local jurisdictions throughout the United States, and provides a list of policy options that promote or are compatible with “dig once” initiatives.

www.dot.ca.gov/hq/tpp/offices/omsp/system_planning/docs/DigOnceWhitePaper.docx

One Touch Make Ready (OTMR)

One Touch Make Ready policies could be described as the pole-attachment equivalent of Dig-Once ordinances. Although there is some variation in OTMR policies, all of them require the owners of utility poles to allow a single construction crew to make changes to multiple utility wires.

Under Federal Law, lines on a utility pole must be spaced a certain distance apart from one another (based on how many lines are on the pole), in order to lower the risk of outages or other related issues. Furthermore, under Federal Guidelines, Make Ready Work--the process of moving existing pole attachments in order to make room for a new one-- must occur sequentially, meaning that attachments can only be moved in the order in which they were placed on the line. This process can take months (or in some cases years), as every company must send out its own approved contractor to move only its own lines. Furthermore, each contractor must schedule its work so as to not conflict with other contractors doing Make Ready work on the same poles.
OTMR policies seek to streamline the process of moving pole attachments by allowing certified construction crews, chosen either by the pole owners or local governments, to make all necessary changes to a utility pole in order to make room for a new attachment.[8] Under such legislation, the owners of utility poles must agree on one or more contractors that have permission to move all existing attachments on a pole in a single visit (as opposed to sending in a separate crew to move only the equipment of one company at a time).

Currently, only three cities in the United States have One Touch Make Ready statutes: Louisville, Kentucky, Nashville, Tennessee, and San Antonio Texas.[9] The ordinances of Nashville and Louisville are nearly identical; San Antonio has taken a slightly different approach, writing OTMR guidelines into the company policy of its municipal utility, CPS Energy.
Although traditional telecommunications and cable television providers strongly oppose OTMR ordinances, one conspicuous supporter of OTMR is Google Fiber. Google has gone as far as to defend OTMR policies in court against lawsuits by major telecommunications and cable companies.

Importantly, it is legal to implement OTMR policies in only twenty states. These states have chosen to regulate their own utility poles, rather than submit to FCC regulation of poles. California is among the states that have maintained their right to self-regulate; thus, it is legal to implement OTMR policies in California.

Open Access Fiber Networks

One of the main barriers to broadband expansion is the economic status of wired broadband networks as natural monopolies: up-front investment costs are high, but operating costs on an existing network are low. For this reason, the ordinary rules of economic competition do not apply to wired broadband: once a network is built, it is often prohibitively expensive for competing providers to build infrastructure in the same physical area. As a result, most customers do not have a wide variety of choice among wired service providers. One solution to this problem, which is being adopted by an increasing number of municipalities across the United States, is the implementation of open-access fiber networks.

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[8] /@fiberbroadband. "In Depth on Pole Attachments, "one Touch Make Ready" and What's Going on in Louisville." Medium. March 16, 2016. Accessed August 07, 2019. https://medium.com/fiber-on-fire/in-depth-on-pole-attachments-one-touch-make-ready-and-what-s-going-on-in-louisville-3f13da86a50d.
[9] "One Touch Make Ready Fact Sheet." Next Century Cities | Broadband Internet & Infrastructure. April 03, 2017. Accessed August 07, 2019. https://nextcenturycities.org/one-touch-make-ready-fact-sheet/.

An open-access arrangement separates the owner of a network from the Internet service providers who use it and allows competing ISPs to operate using the same wired infrastructure. The owner of the network, usually a public entity, though in some cases a private firm, leases the right to use that network to competing service providers; ISPs then compete to provide the best services over the same infrastructure, rather than competing to gain infrastructure dominance in particular areas. Compared to a model in which ISPs own network infrastructure, open-access schemes allow for far more customer choice, which in turn fuels market competition.

There are two main types of open-access networks: two-layer models, and three-layer models:

- In a two-layer model, a municipality builds, owns, and operates the network, and private ISPs compete to provide services over that network.

- In a three-layer model, the municipality builds and owns the network, but allows an independent third-party to operate it. Private ISPs still compete to provide service over the municipally owned infrastructure.

One major exception is CityLink Fiber in Albuquerque, New Mexico. CityLink is a private company that owns and operates an open-access network. In order to help guard against the possibility that a change in management or ownership could shift the network away from an open-access model, open-access has been written into CityLink's franchise agreement.

One of the most serious challenges to municipally-owned open-access fiber networks across the United States is the emergence of state-level legislation prohibiting such networks. A number of states have passed laws that either forbid the construction of municipally-owned networks or make it prohibitively impractical to do so. California's current policy, as written in AB 1999, states that a community services district may own and operate a broadband network, and is not required to sell or lease the operations of that network unless the community services district itself deems it reasonable to do so.

The following link on muninenetworks.org (from the Institute for Local Self-Reliance) provides a more in-depth discussion of open-access networks, including options for financing open-access infrastructure, a discussion of challenges facing such networks, and lists of both existing and planned open-access networks in the United States.

muninetworks.org/content/open-access - arrangements

The same website contains an interactive "community network map," which shows the locations of open-access and other non-traditional networks throughout the United States. It can be found at the following link:

muninetworks.org/communitymap

Appendix F - Relevant State Policies & Funding Opportunities

The following table is meant to summarize the potential usefulness of the below two laws to Nevada County, in terms of the advantages they offer to the County, as well as some potential challenges that their use may bring.

Policy	Advantages	Potential Challenges
AB 1999	Allows for the construction and operation of municipal broadband networks, with a basic legal framework for how this may be done.	Does not deter incumbent private providers from taking steps to impede municipal network construction (such as by protesting grants or strategically reducing network take-rates).
AB 1549	Allows local governments to strategically install broadband infrastructure during highway projects.	Most useful for the installation of middle-mile infrastructure; less useful for the installation of last-mile networks.

AB 1999 (Chau). *Local Government: public broadband services.*

This legislation, passed in September 2018, explicitly authorizes local government agencies to finance and build their own broadband infrastructure. The main purpose of the bill is to allow counties and communities to provide themselves with broadband access in the case that traditional, private companies choose not to. This law contrasts starkly with those of several other US states which either forbid or strongly disincentivize the development of municipal broadband networks.

The actions taken by AB 1999 can be summarized by the following five points:

- The bill expressly authorizes *county service areas* to acquire, construct, improve, maintain, and operate broadband services.
- In addition to county service areas, the bill also expressly authorizes *infrastructure financing districts* to acquire, construct, or improve broadband services. It also authorizes any infrastructure financing district that does so to transfer management and operation of that infrastructure to a local government agency; previously, an infrastructure financing district would have been required to transfer management and operations to a privately-owned company.

- Previously, *community services districts* were permitted to provide broadband services of their own, under the condition that they first ascertain that no private person or company was willing or able to do so. This law removes that requirement, allowing community services districts to build and use their own broadband infrastructure without having to first check for potential private providers.
- The bill keeps a stipulation that, should a district construct and use its own broadband facilities, and, at a later date, a private person or company is willing and able to take over those operations and provide service at comparable cost and quality of service to those offered by the district, the district may either sell or lease those facilities to that private entity. The bill gives the responsibility for determining whether or not the private entity is "ready, willing, and able" to take over broadband operations to the community services district itself.
- Government districts, service areas, and agencies granted authority to provide broadband under AB 1999 will be subject to a set of specific regulations, most of which are in accordance with the concept of "net neutrality." Examples include a ban on "paid prioritization" of some forms of internet traffic over others and a ban on blocking lawful content or non-harmful devices.

AB 1549 (Wood). *Department of Transportation: state highway rights-of-way: broadband: fiber optic cables.*

This bill, law as of September 2016, requires the California Department of Transportation to notify broadband providers and relevant organizations of Caltrans-led highway projects that would be suitable for the incorporation of broadband equipment. Provided the project is compatible with the incorporation of broadband infrastructure, Caltrans will provide information to the relevant organizations via its website while the highway project is in the planning phase. The aim of this legislation is to allow broadband providers and similar parties the opportunity to install broadband conduit as a part of upcoming highway projects.

- The following is a link to the official Caltrans map of proposed transportation projects on the state highway system:

http://www.maps.arcgis.com/apps/webappviewer/index.html?id=9323116b932e4755a6acb55ba9311558

- The following document from Caltrans provides instructions for interested parties on the process of installing conduit in California state highway projects:

www.dot.ca.gov/wiredbroadband/docs/wired-broadband-facility-user-guide- 1st-ed-signed.pdf

Proposed Strategic Broadband Corridors

On November 1, 2018, the 19 regional broadband consortia of California submitted to the California Transportation Commission a list of proposed strategic broadband corridors throughout the state.

The following document from the Geographical Information Center at California State University Chico provides a list and a map of these proposed projects, along with existing strategic broadband corridors in California. This document has been incorporated into the CTC's 2018 Comprehensive Multimodal Corridor Plan Guidelines.

iebroadband.com/Portals/0/Strategic Broadband Corridors V.32.pdf

The complete 2018 Comprehensive Multimodal Corridor Plan Guidelines, as adopted in December 2018, can be found at the following link:

http://www.catc.ca.gov/programs/sb1/sccp/corridor-plan/docs/120518_Approved_CMCP_Guidelines.pdf

Note: The link to the "Strategic Broadband Corridors" document can be found in Appendix A, Page 18 of the CTC Guidelines.

Funding Opportunities

In discussions of infrastructure projects of any kind, the question naturally arises as to how they will be funded. Fortunately, there is a host of financial assistance options available to counties like Nevada for the promotion of broadband-related projects.

Notably, the majority of government action regarding broadband has taken the form of financial incentives. The federal government and the government of California both provide many millions of dollars each year to promote the expansion of broadband connectivity. In addition, there are some lesser-known but important funding opportunities available from the private sector. Both public and private sources of funding, when properly leveraged, offer an opportunity for counties such as Nevada to significantly expand service to residents without bearing the full burden of the associated financial costs. Additionally, the Nevada County Board of Supervisors recently approved a Broadband Grant Pilot Project of its own, which will likely be very useful in providing targeted funding to specific areas of high need. The purpose of this section is to provide a brief overview of the funding opportunities available for broadband expansion in Nevada County.

Available Funding Programs

1. Federal Grants and Loans

Federal Communications Commission (FCC) Universal Service Fund (USF) Programs

- Connect America Fund (CAF II)
- Low Income (Lifeline)
- Rural Health Care
- Schools and Libraries Program (E-Rate)

United States Department of Agriculture (USDA) Programs

- ReConnect Loan and Grant Program
- Community Connect Grant Program
- Rural Broadband Access Loan and Loan Guarantee Program
- Distance Learning and Telemedicine Grant Program

2. State Grants and Loans

California Advanced Services Fund (CASF) Accounts

- Broadband Infrastructure Grant Account
- Rural and Regional Urban Consortia Account
- Broadband Public Housing Account
- Broadband Adoption Account
- Line Extension Pilot Program

California Infrastructure and Economic Development Bank (IBank) Programs

- Infrastructure State Revolving Fund (ISRF) Program
- Bond Financing Program

3. **County Programs**

    - Nevada County Last-Mile Broadband Pilot Grant *(new in 2019)*

4. **Private Funding Opportunities**

    - Neighborly Broadband Opportunity Fund
    -

Relative Usefulness of Programs

Although the number of funding mechanisms for broadband-related projects is great, not all of the available programs are created equal. Some have prohibitively cumbersome or competitive application processes, while some are highly restrictive regarding the purposes for which funds may be used. Indeed others allow for the possibility that incumbent ISPs render them unusable or prohibitively expensive by methods of strategic land use or litigation. Furthermore, the organizations that administer these programs vary widely regarding transparency, financial and political obligations, and managerial attitudes toward broadband issues.

The following table ranks the relative usefulness of each of the funding methods listed in this section on a three-tiered scale. Programs' usefulness is described as High, Medium, or Low. This chart also provides a brief description of the reason that each program is given its respective rank, and lists some of the past recipients of funding from each program, where applicable. In cases where several programs are administered by the same organization, such as the FCC or USDA, the organization is given a rank of its own.

Note: The order of these programs has been changed from that of the list in the previous section. This was done in order place higher-ranked programs near the top of the chart.

Funding Mechanism	Usefulness	Reason for Conclusion	Current or Past Recipients
Nevada County Last-Mile Broadband Pilot Grant *(new in 2019)*	High	Flexible and targeted funding applications, subject to the discretion of the County Use of this program does not incur debt for the County, as it is funded through transient occupancy tax revenue Funding not subject to protest by other service providers	N/A

California IBank	High	Funding not subject to protest by other service providers IBank representatives offer technical assistance Programs primarily designed for government agency or non-profit applicants Applications accepted continuously	
Infrastructure State Revolving Fund Program	High	Designed for infrastructure and economic development projects Designed for public agencies	Sonoma County Airport City of Laguna Beach City of Paramount 22nd District Agricultural Association
Bond Financing Program	High	Funding available specifically for government-owned infrastructure that is leased to private companies (ideal for open-access networks)	YMCA of San Francisco Archer School for Girls Powerhouse Science Center Los Angeles County Museum of Art
Neighborly	High	Private investment platform dedicated to open-access broadband networks Civic microbond model built with community-investment in mind End goal of returning ownership of infrastructure to the community	Katahdin Fiber Utility (ME): Broadband Project Sonoma-Marin Area Rail Transit District City of Salinas El Gabilan Library Paso Robles Joint Unified School District, San Luis Obispo *(Note: Nevada City already accepted into the "Neighborly Broadband Accelerator Program")*
CASF Programs	Medium	Grants significantly easier to obtain than from federal programs CPUC motivated by 2022 deadline Grants subject to protest by incumbent providers in or near project area Funding intended primarily to meet California's goal of (6/1) speeds, which is lower than the national standard of (25/3)	

Broadband Infrastructure Grant Account	Medium	CPUC *required* to approve funding for last-mile projects to homes with no service Local government agencies may apply for grant if no other eligible entity does so Project funding subject to protest by IPSs that claim to serve the area	Race Communications Siskiyou Telephone Company Cal.net Inc. Frontier California, Inc. Anza Electric Cooperative, Inc. Bolinas Gigabit Network
Rural and Regional Urban Consortia Account	N/A		Gold Country Broadband Consortium
Broadband Public Housing Account	Low	Since 2017, no new applications due to new rules	None since 2017
Broadband Adoption Account	Low	Funding unlikely to be dispensed for infrastructure-related projects	California State University, Fresno Foundation Catholic Charities of Los Angeles City of Sunnyvale Contra Costa County Library-El Sobrante Library
Line Extension Pilot Program	Medium	Exists to fund individual households or property owners, specifically those with little income Goal is to fund last-mile projects to individual homes or other properties	N/A: *first applications accepted starting July 1, 2019*
FCC Programs	Low	Funding difficult to obtain, uses for funding limited Priority given to incumbent service providers	
Connect America Fund	Low	Auction finished Priority given to incumbent providers	Viasat, Inc. Cal.net, Inc. AT&T
Low Income (Lifeline)	Low	Dysfunctional (total of 0 providers involved)	
Rural Health Care	Medium	May be used for infrastructure projects which would connect anchor institutions.	California Telehealth Network Colorado Healthcare Connections Greater Minnesota Telehealth Broadband Initiative

Schools and Libraries Program (E-Rate)	Medium	Helps provide service to anchor institutions Unclear whether the funding may be used to purchase network equipment (such as conduit or fiber) Fraud, waste associated with program	Nevada County Office of Education Bitney Prep High Nevada City School of the Arts Forest Charter Clear Creek Elementary
USDA Programs	Low	Funding difficult to obtain	
ReConnect Loan and Grant Program	Low	Funding difficult to obtain	Pyramid Lake Paiute Tribe Commnet Wireless LLC E.N.M.R Telephone Cooperative Columbia Basin Electric Cooperative *(Notes: above grants are still under review; no recipients of ReConnect funding in California).*
Community Connect Grant Program	Low	Funding difficult to obtain	Karuk Tribe (Orleans, CA) ORCA Broadband Inc. (Hornbrook, CA) Yurok Tribe (Yurok Reservation, CA)
Rural Broadband Access Loan and Loan Guarantee Program	Low	Funding difficult to obtain No grant funding available	
Distance Learning and Telemedicine Grant Program	Medium	Funding significantly easier to obtain than from other USDA programs (especially with word “opioid”) Funding may be used for broadband infrastructure	California Tele-health Network Sierra Nevada Memorial Hospital Foundation Colusa County Office of Education

Appendix G - Success Stories and Best Practices

Open-Access Networks

City of Ammon Fiber Optics
Ammon, Idaho

The City of Ammon currently serves as the model for open-access networks in the United States. Although the network is now quite large (and has its own department within the town government), the way in which the network was begun is a case study in conservative and financially responsible public works operations.

While connecting water department sites, officials realized that it would be cheaper to build their own fiber connections between sites than to accept the best price offered by the private sector. After some internal deliberations regarding the implications of building and financing a project of this kind, city and water department officials came to the following agreement: the water department would pay for the construction of the lines, and would then give it to the town free of charge, on the condition that the water department would not bear the responsibility for operating it. It is in this way that the town of Ammon came to own the network without incurring any debt. Following the construction of this small network for the water department, the City encountered a second, similar situation: a public pool in the area needed an update to its Internet connection and, once again, the City found that it could build a new fiber connection to the premises for less than the lowest price offered by the private sector.

The connection of the public pool and the water department to this fledgling municipal fiber network spurred interest from other public agencies: parks, public buildings, the fire department, and schools expressed interest and, one by one, these public hubs were added to the town's network. Next came interest from the private sector: banks and credit unions requested access to the network, as well as wireless Internet service providers, who needed fiber lines to serve their cell towers. During this process, the City did not raise taxes; rather, it built the network slowly, making strategic decisions about the most effective places to lay new lines, and in this way were able to finance the project using the existing city budget.

The result of this methodical approach has been substantial economic growth, with businesses choosing to locate to Ammon, rather than neighboring communities, due to the availability of fiber-optic Internet connections. Due to the success of the network that it built for public and private agencies, the City has expanded its operations to offer service to residential communities, but only to those that express interest: on principal, Ammon does not expand its network, whether to businesses or to homes, unless the parties in question express interest. For the purpose of determining the residential areas to which it should expand service, the town uses local improvement districts: those districts that "opt in" to the network are given a connection (with an accompanying payment plan), while those networks that "opt out" remain unconnected. By this method, the town is able to expand its network only to those areas where interest is explicit, and, by passing the construction costs on to the residential areas to which it

expands, to avoid debt. At the present moment, the network provides positive net income for the Town.

The fiber optic network in Ammon is built on the principle of “open access.” The City owns the fiber optic lines that serve homes, businesses, and public agencies, but does not offer Internet service over those lines. Instead, private-sector Internet service providers pay to use the fiber optic lines, and compete to offer service to customers over the same town-owned infrastructure. By separating the owner of the infrastructure from the provider of service, this open-access network has created a competitive Internet marketplace: customers can switch from one ISP to another using an online platform similar to other online marketplaces, and switching ISP does not require the installation or removal of any hardware. In the same way that this open-access network has allowed for more consumer choice, it also removes the most serious barrier to entry into the market for new Internet service providers: the construction of infrastructure. Any company wishing to provide service may do so, for the same price as any other, using the Town of Ammon’s lines. The result, according to both local Internet service providers and customers, has been a huge increase in market competition, substantial decreases in pricing for Internet service, and the improvement of customer service and customer satisfaction.

More information regarding the town of Ammon can be found at www.ammonfiber.info

Takeaways: Open-Access Networks are the ideal for creating market competition. By separating the owner of the infrastructure from the provider of Internet Service, this type of network allows for an almost unlimited number of competing ISPs, thus driving prices down and the quality of service up. Public ownership of infrastructure also gives a permanent form of leverage to the County over the broadband market within its borders. Creating such a network without an existing foundation, however, is an undertaking that requires significant planning and contains substantial financial risk. For this reason, it is likely best for the county, when considering the Open-Access model, to begin with more conservative goals, such as establishing connections between County facilities.

Community Owned and Operated Internet Service Provider

Greenlight
Wilson, North Carolina

While Ammon has shown the benefits of a competitive, open-access environment, the City of Wilson, North Carolina has had similar success using the opposite approach: a community-owned network, complete with a single, publicly-owned and operated Internet Service Provider.

“Greenlight” is North Carolina’s first community-owned, symmetrical gigabit, Fiber-to-the-Home network. The City’s fiber network passes every home and business in the City of Wilson, and continues to spread deeper into Wilson County. It currently has 10,000 customers, and its revenues exceed its expenditures. Like Ammon’s network, the history of Wilson’s Greenlight network contains valuable lessons for other communities seeking to replicate its success.

In 2001, City of Wilson officials offered to purchase the local cable network from the incumbent cable TV provider in the area. The cable company responded that they would “rather go for a zero customer base versus sell any system.” In 2004, the City commissioned two feasibility studies on the advantages of building a community-owned fiber network; City officials found the results so compelling that, by 2005, they had succeeded in building a fiber-optic backbone to connect all municipal substations. This was, however, not initially meant to be the foundation of a completely community-owned Fiber-to-the-Home network. In 2006, the City approached both the incumbent telephone provider and the incumbent cable provider to ask if they would be interested in partnering to build a modern Fiber-to-the-Home network. The cable provider declined immediately; the telephone company engaged in negotiations until new company management ended negotiations in 2008.

In 2007, the City of Wilson began construction of the network by itself, and the incumbent cable provider reacted by seeking support for state legislation that would make it illegal to build and operate a publicly-owned Fiber-to-the-Home network. (This legislation initially failed. It was passed in 2011, but the Wilson network, which was then already constructed, was allowed to remain in use.)

Wilson built its network very quickly. Having only begun construction in 2007, the City launched Greenlight in June 2008, complete with video, voice, and residential Internet service. By September of that year, subscriptions reached 1,000 homes, and by November, network construction was complete.

By June of 2011, Greenlight’s revenues exceeded its expenditures, surpassing the projections of the business models used to build the network. In 2012, the customer base reached 6,000, and the City could afford to install hotspots in its downtown, the Amtrak train station, the local athletic complex, its airport, and its library. In 2013, the City upgraded its residential network to gigabit capacity, becoming the state’s first “gigabit city.” By 2015, the network had reached 7,700 customers, as well as all of the community’s top 10 employers, all government institutions, Wilson County Schools, small businesses and residents.

Wilson’s Greenlight network has received numerous awards, including the Vollis Simpson Trailblazer Business of the Year Award, the CLIC National Leadership Award, the Broadband Communities Cornerstone Award, and two separate awards from the Coalition for Local Internet Choice. Wilson and Greenlight have also been honored by the US Secretary of Housing and Urban Development, hosted the 2017 annual Gig East Conference, and have received global acclaim for their innovative approach to broadband, including from broadband thought leader and Harvard Law Professor Susan Crawford. Greenlight is currently operating under a 5-year plan that incorporates the following six guiding principles: 1) Be secure first, 2) maintain 99.99% availability, 3) Connect Everyone, 4) Be a smart city, 5) Be the regional technology partner and leader, and 6) Be future-ready. Of special note is the fact that, when Greenlight was first launched in 2008, North Carolina was ranked last in the nation by the FCC for percentage of

households subscribing to at least a “basic broadband” service. Now, the City is able to offer high-speed connections to public housing residents for $10 per month.

More information regarding Greenlight can be found at **www.greenlightnc.com**

Takeaways: A community-owned and operated ISP constitutes the ultimate form public-sector leverage in the broadband market. A successful ISP using this model would not only stimulate competition in the market, but could generate substantial revenue for the County. The model does, however, contain the classic pitfalls of a government-run business endeavor. In addition to the cost of building and maintaining the network, the County would have to operate an ISP as a business, and compete directly with the private sector; unless especially well-managed, such an undertaking could create an undesirable risk of financial loss.

Dig Once Policies[10]

Boston, Massachusetts

Boston’s 1994 “joint build” policy is meant to maximize the conduit included in trenching projects. Under this policy, the first company to request a trench must invite other entities to add additional conduit, for use either by the city or other private firms, and it mandates that all telecoms install their conduit “in the same trench, at the same time, on a shared-cost basis.” Perhaps more important, however, is the stipulation that both the “lead company” digging the trench and all other participants install, at their own expense, extra conduit referred to as “city shadow.” This “city shadow” becomes the property of the City, and may be used either for City purposes or rented to private telecoms if conduit space is needed. Construction costs, including digging the trench, installing the conduit and repaving, are shared by all companies participating in the build-out. In addition, the City and telecoms must collaborate to draft engineering plans, estimate costs, and submit build-out applications for review and approval. The City also obtains advance notice of private utility projects, and incorporates the specifications for conduit installation in the design phase of such projects.

Takeaways: Of the stipulations in the Boston policy, the most useful to Nevada County is likely the mandate for “shadow conduit.” Requiring all companies that dig trenches to include, at their own expense, county-owned fiber conduit is an efficient and cost-effective way to gradually build out a network of county-owned broadband infrastructure.

Chicago, Illinois

The city of Chicago has taken the approach of centralizing its data and operations regarding utilities and other underground projects. Under Chicago’s current system, public and private entities must enter their scheduled work into a Project Coordination Office database that is geocoded into the street grid. Cross-department reports are generated nightly, and weekly meetings sort out conflict and find opportunities to combine work. In addition, the Office of

[10] All information for this section from the White Paper “Dig Once Policies and Best Practices:” California Department of Transportation

Underground Coordination (housed within the Department of Transportation) serves as the distribution agency for all requests regarding existing utility information and the review and approval of construction work that is either in or adjacent to the public way; this office processes projects before permits are issued. A 2012 initiative to replace city water lines also requested that Internet service providers install conduit at the same time.

Takeaways: Of the elements of Chicago's approach, the stipulation that scheduled work be entered into a centralized, geocoded street grid is the most useful to Nevada County. One of the primary obstacles to improving broadband connectivity is the secrecy of ISPs regarding the locations of their fiber lines. If the county can, by precisely mapping future projects, assemble a database of existing middle-mile and last-mile infrastructure owned by local ISPs, it will have a far better picture of which areas are truly unserved (ideally at the house-to-house level) and what privately-owned infrastructure can be leveraged in order to expand access and competition.

San Francisco, California

The City and County of San Francisco requires the installation of City-owned communications infrastructure in all excavation projects in which it is technically and financially feasible. The City also imposes a moratorium on road excavations for five years after a project is completed. This is considered to be the most stringent "dig once" policy by the California Department of Transportation.

Takeaways: Similarly to the Boston policy, the requirement that excavations include publicly-owned broadband infrastructure would offer Nevada County an efficient and cost-effective way to gradually acquire ownership, and corresponding leverage, in the broadband sphere. This approach would result in the County having a wide range of options regarding how to use this publicly-owned infrastructure; it would significantly reduce barriers to the construction of a municipal broadband network, but the county could also choose to lease this infrastructure to private entities, thus increasing county revenue. San Francisco's five-year moratorium on road excavation, however, would likely impede broadband expansion in Nevada County, especially in rural areas; Nevada County's goal with regard to broadband, unlike that of San Francisco, is a general increase in construction.

Local Success in Nevada County

Beckville Network

The Beckville Network is a 501(c)3 nonprofit corporation operating in the neighborhood along Newtown Road in western Nevada County. It currently serves 15 homes that cannot obtain service from the local telecommunications company. Using 5 gigaherz wireless technology, it can supply downstream service at an average of 80 Mbps, and prices have never exceeded $70/ mo. This small-scale, non-profit Internet service provider exists to serve a typical Nevada

County neighborhood, and thus could serve as an example for other areas of the County that would like to take their connectivity fate into their own hands.

In 2017, the company's founders took note of the fact that, despite being unable to obtain service from the local telecommunications company, they lived in close proximity to middle-mile fiber infrastructure from Vast Networks. They contacted the company to ask if it would expand service to their neighborhood and received the following reply: Vast, on principle, only provides Internet service to business customers. In response, the founders of the Beckville Network offered to organize as a nonprofit corporation, and Vast offered to sell them service at wholesale rates.

Beckville exists as a system of 5 Gigaherz wireless transmitters set up strategically throughout the neighborhood, mostly mounted on houses and trees belonging to its subscribers. This system, in turn, is connected to a strand of Vast Networks fiber, which has been extended slightly from its position under Newtown Road to the house of one of Beckville's founders.

Beckville had 10 original customers, all of whom invested portions of their own incomes to pay for its initial construction and set-up. Each of these initial customers then paid a rate of $70 per month, which included all associated costs (such as service and repair fund contributions). This monthly rate has since come down, and is estimated to remain at around $40/mo when the network reaches its predicted final size of 20 customers. This network has no data or bandwidth caps, and rarely experiences service interruptions.

Takeaways: Though the example of the Beckville Network does not offer a County-wide solution to Nevada County's connectivity deficit, it does offer a model for myriad similar neighborhoods in the County. The service speed and reliability offered by Beckville are well above the standard offered by major ISPs in many such neighborhoods, and the price for service is comparatively very affordable. However, there are a number of circumstances that might make this model difficult to replicate. First, the neighborhood along Newtown Road lies directly along the path of Vast Networks' fiber; this is not the case for many comparable areas. Second, the primary founder of the Beckville Network is highly skilled with regard to Internet infrastructure and operations, and was able to build the network by himself; this advantage may not be shared by other neighborhoods. In addition, the effectiveness of this type of line-of-sight wireless broadband technology is affected greatly by physical obstacles, such as trees and buildings; for this reason, the landscape of a neighborhood will have a significant effect on its ability to replicate Beckville's success. With that in mind, projects of this nature are an advantageous place for the county to focus funding-related broadband strategies. Using grants and loans to incentivize the expansion of incumbent networks tends not to be cost-effective; funding the construction of Networks such as Beckville is likely a far better return on investment.

Appendix H: Sample Telecommunications Element

SAMPLE: Shasta County Master Broadband Plan

GOALS, POLICIES, AND ACTIONS

• **Goal T-1: Promote Broadband-Based Services to Increase County/City Operational Efficiency**

- **Policy T-1.1 (Promote Deployment of Broadband Services in Public Facilities) –** Promote deployment of broadband services to provide broadband-based municipal services.
  - § **Action T-1.1.1 –** Promote inclusion of broadband facilities in all public buildings, major transportation projects and all public works projects.

- **Policy T-1.2 (Develop Standards) –** Develop standards for preparing future construction and development of broadband facilities and services.
  - § **Action T-1.2.1 –** Develop broadband building and wiring standards to support broadband in new construction and buildings.
  - § **Action T-1.2.2 –** Develop broadband requirements for new public, commercial, residential and industrial projects.

- **Policy T-1.3 (Online Municipal Services) –** Promote and make all municipal services available online.
  - § **Action T-1.3.1 –** Enable all municipal services in the county's and cities' portals.

• **Goal T-2: Promote Efficient Expansion of Broadband Infrastructure to Provide High-Speed Broadband Internet Service**

- **Policy T-2.1 (Develop a Strategic Broadband Plan) –** Develop a strategic plan for supporting expansion of high-speed broadband infrastructure and services for residential, business and industrial customers and anchor institutions.
  - § **Action T-2.1.1 –** Work with public entities, non-government organizations, and business associations, among other interested parties, to asses priority areas and needs of residential, business and industrial customers and community anchor institutions (education, public services, public safety, and health care).
  - § **Action T-2.1.2 –** Based on the priority areas and needs assessments, develop a master plan to address them including objectives, strategies, partners, resources, and timelines, among other important planning elements.

- **Policy T-2.2 (Dig-Once Policy) –** Promote collaboration among public works departments, utility companies and Internet service providers to find project planning synergies to optimize resources for installation of conduit and/or fiber optics as part of county and/or city projects.

  - **Action T-2.2.1 –** Develop and implement a local dig-once ordinance by assessing the potential role of local governments and different dig-once policy approaches (i.e., open trench, shadow conduit, excess capacity utilization, etc.).

  - **Action T-2.2.2 –** Develop standards for deploying conduit and lateral connections. This will allow cost estimation of adding conduit in an excavation project in public rights-of-way, and efficient planning and deployment of fiber on standard conduit deployments.

- **Policy T-2.3 (Access to Public Assets and Develop a Master Lease) –** Assess feasibility of allowing ISPs to lease public assets (public rights-of-way, land, buildings, ducts, conduit, poles, towers, etc.) for deployment, upgrade and/or expansion of broadband networks.

  - **Action T-2.3.1 –** Develop an up-to-date inventory of broadband related city-owned assets and community anchor institutions which might include land, public rights-of-way, conduit, buildings, utility poles, light standards, towers, and any other property.

  - **Action T-2.3.2 –** Make the asset inventory available in geographic information system (GIS) format and make it publicly available through an online map viewer and data tables.

  - **Action T-2.3.3 –** Develop and implement a master lease aimed to reduce processing time and complexity for leasing county or city broadband-related assets. The agreement must include standard terms such as fee structures, agreement duration, renewal terms, access and responsibilities of the parties, and co-location rights, among other legal requirements.

  - **Action T-2.3.4 –** Develop specific procedures to grant access and/or leasing assets in a fair and transparent manner to all interested ISPs.

- **Policy T-2.4 (Streamline Permit and Authorization Processes) –** Ensure transparent and fair permit and authorization processes for all ISPs. Streamline process to deploy broadband infrastructure to allow faster and timely expansion of broadband infrastructure and services in the city.

  - **Action T-2.4.1 –** Review and assess current municipal permit and authorization application processes for deployment of broadband infrastructure, including requirements, steps, timelines, and costs associated with the applications.

  - **Action T-2.4.2 –** Update permit and authorization processes when, based on the assessment, efficiencies and faster processes can be achieved.

  - **Action T-2.4.3 –** Require digital plan files in GIS format for all upcoming works in PROWs and new developments (i.e., utilities, developers, contractors and others).

- **Policy T-2.5 (Assess Partnerships for Infrastructure Deployments) –** Assess the establishment of strategic partnerships with ISPs to support infrastructure and broadband services expansion.
    - § **Action T-2.5.1 –** Assess the potential role of the county or cities as partners to support broadband service expansion.
    - § **Action T-2.5.2 –** Explore partnerships with state agencies (i.e., Caltrans) to achieve interagency coordination.

- **Policy T-2.6 (Develop a Database of Upcoming Public Infrastructure Projects) –** Generate a database of upcoming public infrastructure projects (i.e., water, sewer, roads, paving, etc.) in public rights-of-way, including location, routes and estimated timelines.
    - § **Action T-2.6.1 –** Identify and track upcoming public infrastructure projects and generate a database.
    - § **Action T-2.6.2 –** Make the upcoming public infrastructure project database available in geographic information system (GIS) format through an online map viewer.

- **Policy T-2.7 (Promote Validation of Broadband Service Availability and Speed) –** Promote crowd validation of broadband service availability and speed for anchor institution, residential, business and industrial broadband services.
    - § **Action T-2.7.1 –** Promote downloading and using the CalSPEED (or similar professional tools) for validating broadband service coverage and speed of broadband services.