

ACCESS SONOMA BROADBAND ACTION PLAN

*Exploring the Creation of a Public Broadband Entity
to Close Sonoma County's Digital Divide.*



Prepared for the Sonoma County Economic Development Board by



Sponsors

Thank you to the partner organizations that contributed to the development of the *Access Sonoma Broadband Action Plan*, including the Sonoma County Board of Supervisors, Sonoma County Economic Development Board (EDB), Magellan Advisors, North Bay/North Coast Broadband Consortium (NBNCBC), and the Sonoma-Mendocino Economic Development District (SMEDD).



Sonoma County
Economic Development Board



North Bay/North Coast
Broadband Consortium



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1. Executive Summary

INTRODUCTION

This action plan explores the creation of a public broadband entity that has the capability of deploying, owning, and managing open access broadband infrastructure and services within the County of Sonoma in an effort to close the regional Digital Divide. Due to a multitude of deployment barriers found in unserved and underserved areas (e.g. higher costs, lower return, lack of resources, etc.), most private companies have not made it economically viable to deploy broadband in many parts of Sonoma County, focusing instead on denser populations with greater return. Simultaneously, many urban communities experience connectivity barriers due to non-infrastructure related issues and not having access to critical resources. Establishing a public broadband entity can provide our local telecommunications industry, cities, and communities with access to untapped assets and funding sources that support broadband expansion in unserved and underserved areas.

This action plan explores the formalization of an existing grass roots organization that the Sonoma County Economic Development Board administers called *Access Sonoma Broadband*.



The mission of *Access Sonoma Broadband* is to help connect Sonoma County's unserved communities to fast, affordable, and reliable internet services. *Access Sonoma Broadband* is exploring an innovative approach to make a larger impact by expanding into an infrastructure and service based organization. *Access Sonoma Broadband's* core mission will provide broadband services and programs, in partnership with internet service providers, governments, and community based organizations, to unserved and underserved disenfranchised communities that are lacking competition. *Access Sonoma Broadband* implements key recommendations from the Sonoma County Broadband Strategic Plan¹ and presents a potential solution to address historic challenges in Sonoma County's telecommunications market by catalyzing inclusive and equitable broadband access that creates positive economic and social outcomes.

¹ <http://www.mendocinobroadband.org/wp-content/uploads/Sonoma-County-Broadband-Strategic-Plan.pdf>

HISTORIC CHALLENGES

This document lays out historic challenges and presents solutions in the following areas:

1. **Digital Divide**

Many communities in Sonoma County cannot access the internet for multiple reasons, such as gaps in broadband infrastructure and adoption related barriers. From an economic perspective, this challenge affects all industries, including education, public safety, business, agriculture, and much more. As internet dependency increases over time, the Digital Divide will continue to grow exponentially unless these issues are addressed proactively. (more can be found on page 9).

2. **Broadband Infrastructure**

Fiber optics, considered as future proof broadband infrastructure, is lacking throughout Sonoma County. At the same time, existing infrastructure is either failing or outdated in unserved communities, requiring replacement with infrastructure that is resilient to the environment and disasters. Unfortunately, the costs of fiber deployment in unserved communities are restrictive to traditional private sector models, resulting in alternative solutions that are not sustainable long-term solutions. (more can be found on page 15).

3. **Broadband Adoption**

In areas where infrastructure may not be a challenge, such as inner cities, communities still experience barriers to access the internet due to adoption related issues, including affordability, technology access, and digital literacy training. Equity and inclusion are essential to close the Digital Divide in order to generate the greatest overall benefits among Sonoma County's communities. (more can be found on page 29)

4. **Ownership Models**

Sonoma County staff have explored private vs. public deployment models and have discovered that both are limited in their ability to serve due to conflicting priorities. Private sector companies tend to prioritize denser communities with a higher return on investment. Meanwhile public entities, such as the County, have limited resources, which they must balance between their existing departments' services. (more can be found on page 35)

5. **Funding Availability**

State and federal grant funding have been limited and difficult to obtain. Meanwhile service providers and government agencies have not been willing to pursue the limited funding due to strict grant parameters. As new funding develops, *Access Sonoma Broadband* can position the region to leverage funding opportunities while generating its own. (more can be found on page 35)

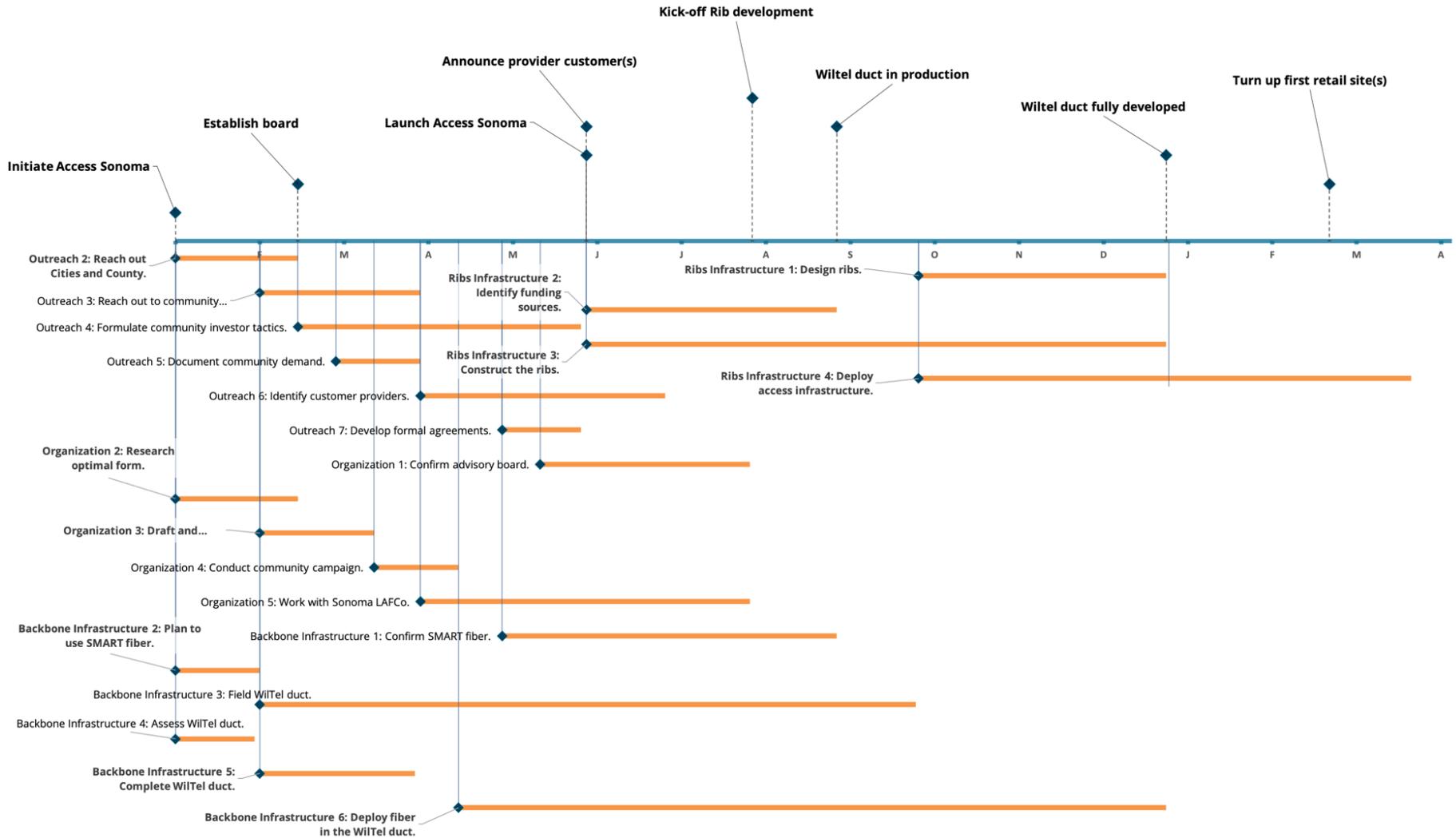
RECOMMENDED ACTION PLAN

Access Sonoma Broadband provides a solution to address Sonoma County's broadband issues. The action plan found at the end of this document (beginning on page 49) provides a guide to formalize *Access Sonoma Broadband*. As shown in the roadmap on the next page, formalization starts internally with the Sonoma County Economic Development Board (EDB) conducting outreach and organization of *Access Sonoma Broadband* with support from an advisory committee. The EDB and advisory committee will develop a recommended governance structure for *Access Sonoma Broadband* as well as a plan to incorporate. Simultaneously, EDB and the advisory committee will develop shovel-ready broadband infrastructure projects using County assets, as well as broadband adoption programs, to align with various funding opportunities upon completion of *Access Sonoma Broadband's* formalization. This phase also includes creating a sustainable revenue model and business plan to ensure success of the organization long term.

In closure, Magellan Advisors recommend that Sonoma County, its cities, and communities, execute the action plan and tasks listed (starting on page 46) to evolve Access Sonoma Broadband from a county-sponsored grassroots organization into an independent public corporation to deploy, own, and manage broadband infrastructure and adoption related programs.

ACCESS SONOMA BROADBAND ACTION PLAN

Figure 1. Access Sonoma Broadband Roadmap



2. Background

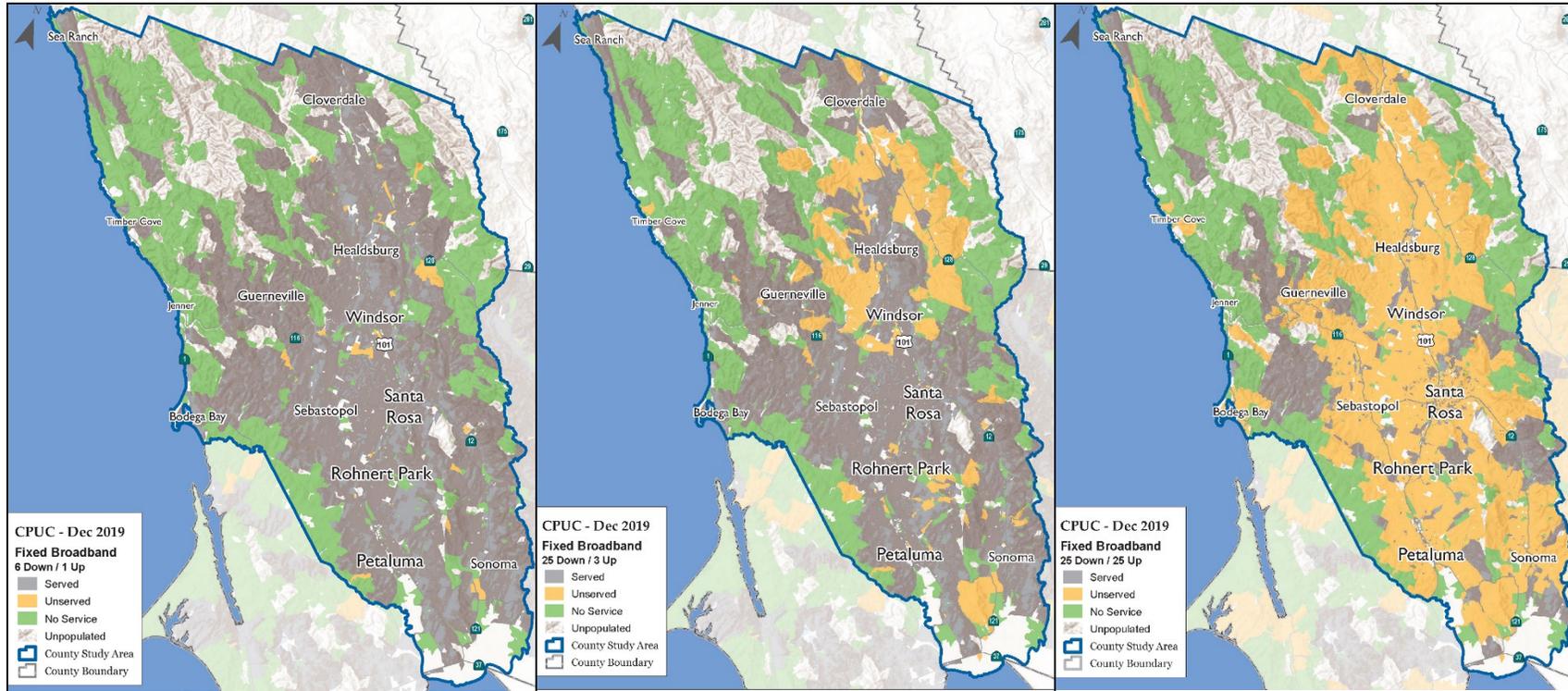
STATUS QUO

Over the last few years, catastrophic wildfires, prolonged power outages, floods, and the coronavirus pandemic have spotlighted the growing Digital Divide in Sonoma County as it continues to affect public safety and livelihood. During past wildfires and floods, residents living in high fire threat areas or flood zones relied on receiving mandatory evacuation orders from first responders to evacuate their homes; however, communities without connectivity struggled to or could not receive notifications. As the community experience the current coronavirus pandemic, students and parents are sheltering in place without high-speed internet connectivity at home and do not have the necessary resources to support an educational experience equal to those in served communities. Similarly, residents working from home without connectivity struggle to telecommute as well. The Federal Communications Commission (FCC) estimated 1,500,000 Californians do not have access to fast, affordable, and reliable broadband services at home in times when they need it most.²

Rural communities across Sonoma County face economic disenfranchisement, upward mobility, and failed economies due to inadequate broadband access, and recent disasters have heightened the need to invest in critical infrastructure within our rural economies to address economic recovery and resiliency. A key factor contributing to Sonoma County's Digital Divide is the lack of a comprehensive, cohesive, robust, redundant, and diverse broadband network throughout the County, primarily in rural and inner city areas. A lack of infrastructure capable of supporting speeds and services necessary to survive and succeed in our current economic and social climate is negatively affecting residents. As the world evolves and our dependency for bandwidth rises (growing at 10x over 10 years), our existing infrastructure is not capable of supporting our economy's current and future need for internet access.

² Based on the FCC's Form 477 broadband availability data collection reported by service providers.
<https://www.fcc.gov/economics-analytics/industry-analysis-division/form-477-resources>

Table 1: Sonoma County Wireline and Fixed Wireless Broadband Availability



The maps shown above depict broadband availability in Sonoma County at three different speed thresholds: 6 megabits per second (mbps) download and 1 mbps upload (6 down/1 up), 25 down/3 up, and 25 down/25 up. As illustrated by the maps, broadband access becomes increasingly unavailable as the speed threshold increases. Based on regional broadband standard recommendations³, communities require access to no less than 100 down/20 up to survive in today’s economy, which State legislation⁴ is making major strides to adopt in future grant programs. These maps show the potential gaps in fiber optic infrastructure which are capable of performing at 100/20 speed standards and greater.

³ https://mbep.biz/wp-content/uploads/2019/05/MBEP-Broadband-White-Paper_Nov-2018-v5.pdf

⁴ See legislative information for SB-4 and AB-14 at <https://leginfo.legislature.ca.gov/>

LOCAL LEADERSHIP

Sonoma County leaders recognize broadband as the economic development driver that supports many of the County's primary industries, including public safety, healthcare, agriculture, education, private businesses, public agencies, and more. Broadband access can empower disenfranchised communities by connecting unserved residents to the Internet and allowing them to telecommute and have access to distance learning. Broadband access also acts as a technological highway, which provides a gateway to attracting new, while improving existing, businesses and anchor institutions through technology adoption. Additionally, broadband allows our communities to respond more timely and effectively to major changes in the County's dynamic environment, including natural and man-made disasters and the current coronavirus pandemic.

Broadband networks are critical infrastructure investments. Broadband is a necessity to succeed and survive in our modern society as most aspects of modern life depend on communication networks. Unfortunately, legacy telephone and television services are becoming outdated in many regions as new, fast, and flexible internet-based services delivered via a hybrid of fiber-optic and radio (including cellular and Wi-Fi) technologies evolve. While most communities depend on the private sector to invest in broadband infrastructure within their communities, those that invest in themselves tend to have the best networks in terms of coverage and performance.⁵ Local leaders have the ability to make a technological change within their communities by advocating for public investment directed towards optimal broadband infrastructure.

SONOMA COUNTY BROADBAND STRATEGIC PLAN

In 2019, the Sonoma County Economic Development Board and Magellan Advisors collaborated to create the *Sonoma County Broadband Strategic Plan*, which analyzed the overall status of Sonoma County's telecommunications industry and provided the County with nine (9) actionable recommendations to increase competition and expand broadband access countywide. The recommendations include:

- Appoint a Sonoma County lead, countywide advisory board consisting of county, city, and industry officials to lead and coordinate implementation of the Broadband Strategic Plan.
- Create a database of publicly-owned assets (towers, buildings, parks) that could be used to locate broadband facilities.
- Develop a broadband infrastructure program leveraging municipally-owned assets to meet needs and demands of agencies and benefit the greater community.
- Formalize broadband friendly policies, procedures, and regulations, and incorporate best practices into county projects including roads, water, sanitation, and parks.

⁵ <https://muninetworks.org/content/municipal-networks-and-economic-development>

- Work proactively with telecom providers to construct high quality and resilient wireless communication systems to facilitate emergency communications throughout the County.
- Work collaboratively with telecom providers to expand and deploy broadband infrastructure to service rural and underserved areas.
- Consider options to fund broadband expansion to rural areas including grants, public private partnerships, and special tax districts.
- Consider constructing a publicly-owned broadband infrastructure system connecting county and other municipal facilities as part of Recovery and Resiliency Programs.
- Hire a full-time county employee dedicated to the coordination of all activities between federal, state, county, city, and unincorporated areas as well as industry officials necessary for the BSP implementation process.

Upon completion and review of the *Broadband Strategic Plan*, the Sonoma County Economic Development Board continued exploring the implementation of each recommendation. The scope of each recommendation ranges in terms of risk and reward as well as difficulty and time required to implement. While EDB has been able to implement some of the recommendations successfully, infrastructure based recommendations have required much more planning and resources to execute. Following major challenges and unsuccessful attempts to collaborate with private companies on high cost deployment projects using traditional business models, EDB determined Sonoma County requires a new approach to close the Digital Divide. Further research and internal discussion with county stakeholders determined the best course of action to move forward is the creation of an action plan for the development of a new broadband entity supported by the County of Sonoma – *Access Sonoma Broadband*.

BROADBAND ECONOMICS

Fundamentally, *Access Sonoma Broadband* is an economic development initiative to achieve economic transformation through a multitude of tactics: virtual learning, remote work, industrial automation, telehealth, telemetry, ecommerce, etc. It supports a shift in the County’s economic base toward technology-oriented enterprises by enabling better, lower impact, higher value ways of doing business. The goal is nothing less than deploying network infrastructure for development of human and organizational capital across all sectors of the local economy as well as digitalization of goods and services in the region.

An integrated planning approach ensures network infrastructure economically and fully supports public priorities. *Access Sonoma Broadband* primarily builds on the *Sonoma County Broadband Strategic Plan*, while also aligning with other Sonoma County sponsored economic development planning initiatives, including *Sonoma*

County's Five-Year Strategic Plan⁶, *Strategic Sonoma*⁷, and the *Sonoma-Mendocino Comprehensive Economic Development Strategy*⁸.

Broadband supports strategic objectives both directly and indirectly. For example, in Sonoma County's Five Year Strategic Plan, the five strategic pillars are:

- Healthy and Safe Communities
- Organizational Excellence
- Racial Equity and Social Justice
- Climate Action and Resiliency
- Resilient Infrastructure

Broadband directly aligns with resilient infrastructure, although, the indirect benefits of community access trickle to the other pillars, stimulating additional economic support.

Access Sonoma Broadband strengthens each of these pillars by creating synergies between these issues so that progress on one issue fosters and supports progress on another. Similarly, *Access Sonoma Broadband* supports implementation of *Strategic Sonoma* by increasing connectivity in communities to more effectively:

1. Recover from recent wildfires (e.g. build resilient broadband infrastructure),
2. Build necessary housing (e.g. develop broadband friendly construction standards),
3. Educate and support our workforce (e.g. telecommunications construction and technical training),
4. Diversify existing business clusters (e.g. integrate more technology based companies into the economy and optimize existing),
5. Be a leader in environmentally sustainable practices (e.g. support environmentally sustainable technologies such as agriculture technology or smart grids with connectivity),
6. Improve mobility and access to services (e.g. create ubiquitous and equitable access to online services).

Lastly, *Access Sonoma Broadband* presents opportunities for regional collaboration between multi-county jurisdictions, as seen in the *Sonoma-Mendocino Economic Development District's Comprehensive Economic Development Strategies*. Broadband is a nationally recognized issue and through Sonoma County's involvement in a federally supported Economic Development District, the County has the opportunity to leverage federal grant programs to fund network construction. Connectivity is a major issue among Sonoma County's neighboring counties as well. *Access Sonoma Broadband* can close the Digital Divide more effectively and expeditiously by combining resources across the multi-county region.

⁶ <https://sonomacounty.ca.gov/Board-of-Supervisors/Strategic-Plan/#:~:text=The%20County%20of%20Sonoma%20is,for%20the%20next%20five%20years.&text=Since%20late%202019%20C%20County%20leaders,base%20framework%20for%20the%20Plan.>

⁷ <http://sonomaedb.org/Strategic-Sonoma/>

⁸ [http://sonomaedb.org/Current-Projects/Sonoma-Mendocino-Economic-Development-District-\(SMEDD\)/](http://sonomaedb.org/Current-Projects/Sonoma-Mendocino-Economic-Development-District-(SMEDD)/)

Strategic Alignment

Network infrastructure deployment demands strategic coordination, as many aspects of public plans and priorities in Sonoma County require connectivity. Action items and key initiatives should align with overall economic and social goals and objectives. Plans, policies, and programs should include networks along with other components - i.e. housing, land use, and workforce. A formal organization will strategically coordinate projects whenever there is overlap and provide a case for combining resources effectively.

Education, health, and safety are core focus areas in Sonoma’s strategy. Learning can occur anywhere for persons of any age via networks that provide opportunity for collaborating, listening to an instructor, or working independently from any location. Networks provide access to health services, personal health monitoring, and public safety surveillance. Smart homes use networks to improve comfortability, efficiency, and security - all at the fingertips of the consumer.

Professionals can work remotely with broadband and provide enhanced employment flexibility while reducing the need for commuting. Almost every industry is undergoing digital transformation that depends on fast, inexpensive, reliable connectivity. Supply chains and their products rely on connectivity to monitor processes occurring in the fields or manufacturing plants, as well as during processing and distribution to consumers’ homes. Connectivity optimizes processes when creating products, saving costs and resources for producers and consumers.

Networks are essential to next-generation energy, environmental, transit, and transportation solutions—including intelligent vehicles—as well as other public services. Network infrastructure can be economically deployed in conjunction with other forms of infrastructure as an integral part of real estate development and capital improvements. The result is a valuable public asset, deployed economically, that can be used as a catalyst for economic development, generate public revenue, and improve local government operations.

Network infrastructures can be hardened and otherwise improved together to withstand earthquakes, fires, floods, and other catastrophic events. Network connectivity provides a means to increase resilience. For example, connectivity is essential to electric micro-grids that reduce impacts of Public Safety Power Shut-offs (PSPS) and incorporate alternative energy sources. More generally, networks must enable emergency and regular communications for communities to be resilient.

All persons, regardless of socioeconomic background, must have connectivity for all of the reasons listed above. Those without connectivity cannot effectively participate in modern life. Persons in low-income jobs require access to education and professional development in order to transition to higher-paying jobs. Persons at risk for disease and those with chronic health conditions must have access that is convenient and safe in order to access medical services. Disadvantaged rural communities require access to safety and security during emergencies.

3. Network Architecture

INFRASTRUCTURE OVERVIEW

The development of *Access Sonoma Broadband's* network has been broken down into a multi-phase infrastructure deployment process.

Phase 1 – Backbone: Backbone network infrastructure is used to exchange internet traffic across cities, counties, states, countries, continents, and even the ocean. In this case, the backbone infrastructure intends to connect the Northern, Central, and Southern sections of Sonoma County. In addition, *Access Sonoma Broadband's* backbone connects to inner and outer county data centers and internet exchange points, providing the organization with cheaper internet exchange “backhaul” services. Rather than leasing expensive backhaul from larger carriers, *Access Sonoma Broadband* can reduce its backhaul costs significantly by constructing its own backbone infrastructure, which can increase the economic viability for future network expansion into high cost rural areas.

To offset the upfront costs of constructing a new backbone infrastructure, the network architecture combines unused county owned assets that initially create a north-south route along Highway 101. These assets include the WilTel⁹ duct system, supplemented by fiber and conduit along Sonoma-Marin Area Rail Transit (SMART) tracks.

Phase 2 - Middle-Mile: Middle-mile network infrastructure connects smaller municipalities, residential communities, public facilities, and community anchors, as well as vertical assets used for cellular and other radio access networks, including communication poles and towers. Extending from the backbone, heading east and west across the County, are multiple middle-mile routes that are illustrated in Figure 1. These middle mile routes are:

- Westside Road between Guerneville and Healdsburg
- Santa Rosa to Kenwood then Sonoma via State Road 12
- Added communities connecting with Marin and Mendocino Counties via the backbone route

Future middle-mile routes might also include:

- Sebastopol via 116 then to Guerneville and Jenner via 116
- To Marin and Mendocino counties, from Gualala to Jenner then Valley Ford, along Highway 1
- Into Napa and Solano Counties via State Roads 12, 37, and 128
- Between Petaluma and Valley Ford along Bodega Avenue, Valley Ford Road, and Highway 1

⁹ WilTel was an independent network services provider in the 1990s that was acquired by Level 3 Communications (now part of Century Link) in 2005.

Phase 3 – Last-Mile: Located between the middle-mile routes, business sites, and residential areas are “last-mile” segments that connect to the middle-mile infrastructure and terminate curbside or near driveways at premises. Private companies may connect to the middle-mile routes and construct the last-mile segments individually, and *Access Sonoma Broadband* may do the same when and where the private sector cannot make the business case economically viable.

Multiple providers and other tech-intensive companies may use the infrastructure as an incentive for private investment and lease portions of *Access Sonoma Broadband’s* infrastructure to provide services to communities.

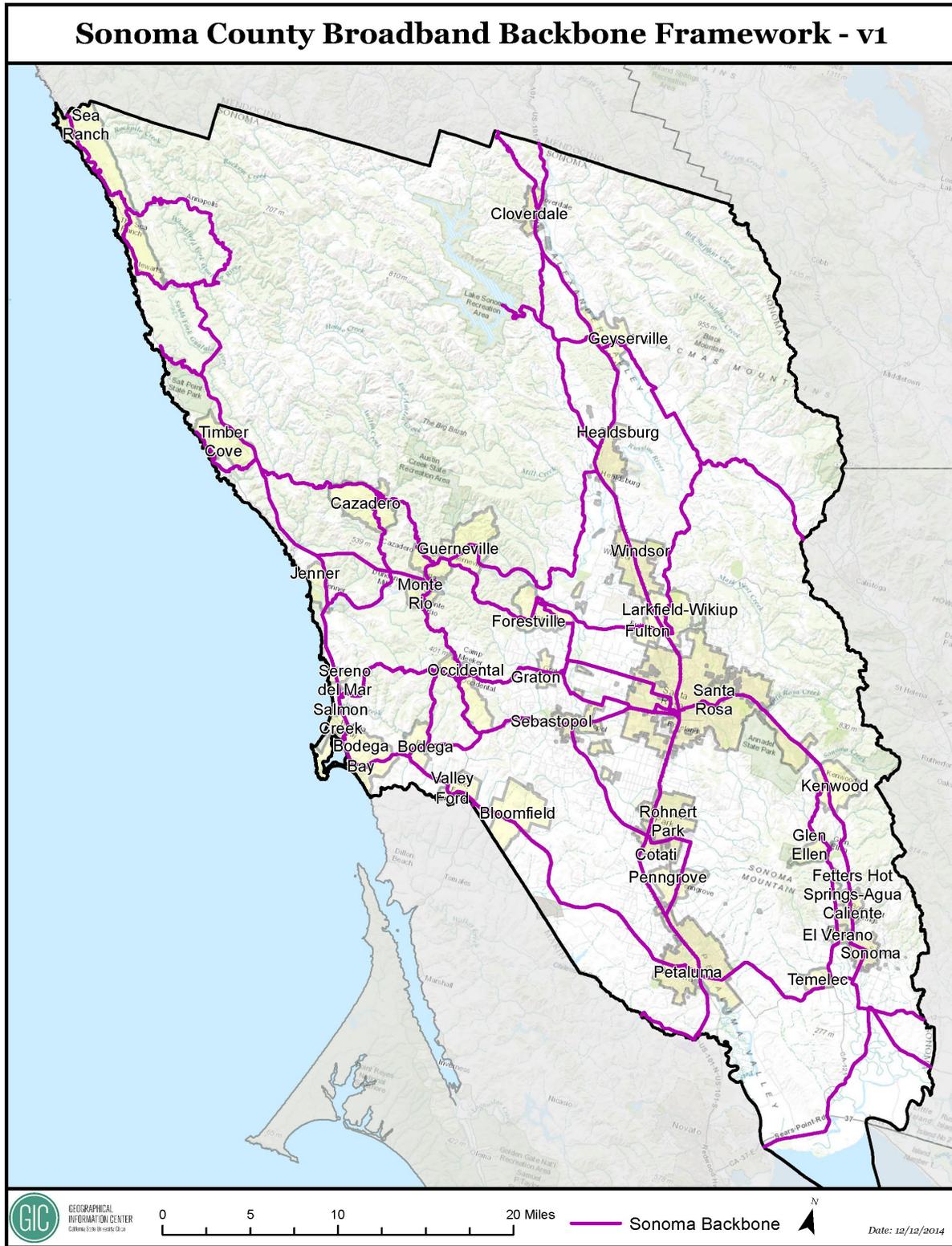


Figure 2. The Access Sonoma Broadband Network

GUIDING PRINCIPLES

When designing networks, it is critical to account for all factors contributing to the overall success of the network while capturing as many community broadband needs as possible. The following factors are guiding principles for designing *Access Sonoma Broadband's* network strategy.

- **Capitalize on current assets:** Leverage existing conduit, fiber, and communications towers to reduce upfront capital costs while generating additional funding to support the development of other assets requiring new construction.
- **Develop additional assets to drive the value of existing assets:** Increase the value of the core network by extending new conduit and fiber infrastructure east and west, including wireless assets on towers and facilities to serve communities across the County.
- **Plan for fiber and wireless connectivity in an integrated fashion to:**
 - **Integrate network infrastructure into other developments.** Incorporate horizontal (fiber) and vertical (fixed wireless facilities) network assets into all capital projects and new developments (e.g. roadways, bridges, streetlights, businesses, homes, multi-family housing, etc.).
 - **Support public-private-partnerships.** Construct network to be Open Access in order to provide affordable and non-discriminatory infrastructure access to partners. Coordinate throughout planning process to identify procedures for smooth integration of partner services and technology.
 - **Be inclusive and equitable.** Ensure the network connects in places and ways that increase access for socioeconomically disadvantaged persons and communities. Connect community anchors that provide public services as a runway to broader connectivity. Enable public agencies and private enterprises to develop effective, resilient, and sustainable next-generation practices to provide equitable community access to technology based services.
 - **Enable environmental leadership, resilience, and sustainability.** Establish standards for constructing resilient infrastructure to withstand future disasters. Deploy a variety of technologies to monitor environmental factors and utilization of energy, natural resources, and public assets. Work with partners to communicate this information back to the public in a meaningful, usable form.

DEPLOYMENT STRATEGY

Access Sonoma Broadband's deployment strategy starts at the backbone, connecting as many assets and sites as possible along that route which require connectivity, and use that as a springboard to build out the middle-mile segments east and west. The backbone design capitalizes on existing county assets, including the WilTel conduit assets, as well as conduit and/or fiber along the SMART corridor, which alleviates the need for an entirely new network buildout. This helps lower the costs and expedite deployment. Revenue from leasing core assets, available grant opportunities, consumer contributions, and public/private financing will fund the build. The authority works with a range of stakeholders, particularly education and public safety, to pursue funding for the build that is available only to public agencies to improve their services.

Network Development Process

The infrastructure consists of a dual backbone—including the WilTel duct system and fiber in the SMART easement—that runs parallel to US Highway 101. The middle-mile segments follow State Highway 12 and State Highway 116 and, from there, State Highway 1, State Highway 128, and other major corridors. The existing assets put *Access Sonoma Broadband* in a unique position. Rather than building major components of the infrastructure from scratch, the authority has a running start. The practical implication is that the development process is different for existing infrastructure rather than new development. Specifically, existing assets require a thorough assessment and documentation in order to be developed and properly managed as part of an integrated network infrastructure.

Gathering Information

Network development starts with gathering as much local information as possible about existing assets. GIS data, as-built engineering plans, existing fiber optic records, capital project plans, and other infrastructure improvements may support or provide opportunities for network infrastructure construction. Due to an agreement between Sonic and SMART, *Access Sonoma Broadband* can potentially use a limited number of fiber strands in the SMART easement immediately to connect nearby government facilities belonging to the County and the Cities. Legal/organizational challenges may exist, but the assets are physically usable today. The WilTel duct system requires improvements to fill in gaps in the network as well as potential repairs to existing duct if any of the network has sustained damage, but still presents a substantial cost savings over new infrastructure.

Fielding Existing Assets

Substantial information about the SMART fiber/conduit and WilTel duct is available, however, both require additional time and resources to assess in order to understand infrastructure accessibility, technical applications, costs to repurpose or expand upon, and associated legal components. A field survey of the assets will be necessary to

collect more information to assist broader discussion surrounding network design and costs for deployment. The fielding process, which usually comes after a high-level design, involves detailed walkouts of all routes to identify features and attributes, constructability, and hazards, including a survey of existing infrastructure. High-resolution GPS units are used for data collection via a tablet computer that records features and uploads them in real time to a GIS. Available documentation cross-references fielded data to show availability of infrastructure and options for expansion and interconnection.

For example, the WilTel conduit will require a field survey to understand the gaps in the network and required construction techniques and costs to connect segments. The WilTel conduit will also require an assessment of the existing conduit for any collapses, water containment or damage, or presence of various conduit network components like telecom cable, pull string, mule tape, etc.

As part of the SMART/Sonic Agreement, Marin and Sonoma County have access to share 6 strands of loose tube single mode fiber, as well as the cities in each county, totaling 12 strands. The municipally shared fiber is located along the SMART corridor from the Santa Rosa Airport (Northern termination point) to Larkspur in Marin County (Southern termination point). Fiber access points are located at each rail crossing in the two county region. Sonic has agreed to share the shapefile data identifying the SMART fiber route and access points, which county staff intend to map into a geographic information system (GIS), along with data collected from a field survey for the WilTel duct. Sonic has also agreed to provide technical expertise to assist Sonoma County with designing a network utilizing the SMART fiber. A field survey will help to identify equipment specifications in the access points, hazard mitigation requirements when accessing, and deployment methods to reach government facilities from each access point.

High-level Design

High-level design (HLD) determines placement and size of fiber, conduit, splitter cabinets, splice points, and other components in the network. HLD results in optimal placement of assets to keep construction costs down while avoiding any routes through sensitive areas of the community or congested rights of way. For *Access Sonoma Broadband*, the backbone, middle-mile, last-mile, and drops all require HLD, and must be fielded *after* HLD is complete and approved.

The high-level design process also involves assessing the opportunities to use existing fiber and conduit where feasible and integrate them into the overall network design. HLD for the SMART fiber will not be required for the existing route due to the newness of the infrastructure and existing documentation, although fielding may be necessary. However, HLD will be required for connecting government facilities adjacent to the route to use the asset. For the WilTel duct system, HLD focuses on closing gaps and repairing any problems with the infrastructure, which will require fielding prior to HLD.

HLD is usually a desktop analysis, done via computer with specialized software, supported by data collection, which is why fielding and information gathering are so important for existing assets. Using this method, a desktop analysis can virtually present a network design, along with key attributes, based on various assumptions about the network build. Preliminary bills of materials, cost estimates, and specifications generate from the HLD to inform decisions on how to approach network development.

Low-level Design

Engineering or low-level design (LLD) makes adjustments and specifications for deploying assets and integrating them into seamless infrastructure. The low-level design process results in specifics such as fiber cable specifications, splicing diagrams, port assignments, power budgets, cabinet sizes and types, etc. Route optimization determines the best paths for middle-mile, feeder, and distribution cables within rights of way. Constructability avoids any potential issues encountered during the fielding process.

LLD typically includes finalizing optical splitter cabinet locations and requirements for serving the homes and businesses in each fiber zone. Splitters are the edge of the last-mile distribution infrastructure that connects to the middle-mile infrastructure. Who installs the optical splitter locations will depend on whether *Access Sonoma Broadband* or another internet provider is providing the last-mile connection from the middle-mile segment. Providers generally deploy splitters along with distribution and drop cables as part of the last-mile connection, which *Access Sonoma Broadband* can also accomplish if there are no providers capable of constructing a last-mile infrastructure to an adjacent unserved community. *Access Sonoma Broadband* also requires LLD for vertical assets to support antenna, which may also involve an equipment hut, generator set, and fencing. Vertical assets may also require additional engineering from the provider to complete a last-mile connection (e.g. antenna, base station, and other network gear).

Typically, LLD occurs at 30% and 60% to finalization for corrections and modifications. Construction prints with detailed placement and routing in the right-of-way, utility separation, integration with existing fiber and conduit, preliminary fiber splice plans, cabinet layouts, pedestals, and other low-level outside plant infrastructure documentation occur around 60% completion. Preliminary cost estimates, bills of materials, and bid package documents for construction are also included at 60% review. LLD enables the *Access Sonoma Broadband* advisory board to determine if any changes are required to reduce costs, speed deployment, or accommodate additional users.

Final Design and Construction Management

The resulting final design provides clear understanding of the exact costs to serve specific areas, including the backbone/feeder infrastructure that interconnects them. LLD provides total fixed plant costs and the marginal costs to serve each customer, which are provided for *Access Sonoma Broadband*.

The specifications behind those costs are then used for permitting and procurement, including the construction bid package with all construction documents, county and city procurement requirements, construction standards, construction plans, sequencing and schedules, bills of materials, and plans to release the RFP or invitation to bid. After contracts are awarded, construction is managed to the final design through to completion and production of as-built documentation, which highlights differences in infrastructure.

4. Business Model

BROADBAND INFRASTRUCTURE PROGRAM

Several factors determine what broadband business model is best for a local government, illustrated in Figure 2. Magellan Advisors analyzed most of these factors for the *Broadband Strategic Plan*. Based on our analysis, ***the best model for Access Sonoma Broadband is infrastructure-only, open access, wholesale provider***, supported by local broadband-friendly policies and procedures. This allows *Access Sonoma Broadband* to own the assets but relieves it of the obligation to act as a direct service provider, instead allowing partners to operate the infrastructure to serve the community.



Figure 3. Input Factors to Choosing a Broadband Business Model

The current informal, grassroots *Access Sonoma Broadband* initiative evolves into a “broadband authority.” Based on the success of similar organizations located in Sonoma County, the actual form of *Access Sonoma Broadband* will likely be a Joint-Powers Authority (JPA) and/or a County Service Area (CSA) that also supports multiple Community Facilities Districts (CFD).

There is clearly pervasive need for better, cheaper, faster broadband in Sonoma County, as summarized below. Attracting clean, diverse, technology-oriented business investment should be a priority for the County, as is enabling remote work and online learning. Network service providers help the community achieve these goals and directly achieve them as they build infrastructure and hire employees in the community.

The competitive environment is similar to most other local broadband markets—two incumbent providers with limited service quality and limited service areas, supplemented by three cellular providers and a few independent internet service providers (ISP) that serve market niches. ***Access Sonoma Broadband does not compete in this market; it lowers barriers to entry***, opens up the market, and thereby makes connectivity more widely available, economical, flexible, and faster. To do this, it must be open, equitable, and carrier-neutral.

The County itself has substantial operational requirements for network services, including connecting widely geographically distributed facilities. Sonoma County government is not in a position to provide broadband services directly to consumers. It has some capabilities to build and operate networks, but those are fully engaged in internal operations. County leaders expressed some well-founded hesitations about providing service directly, although they clearly see a need for better broadband and more options for internet access.

Since local government technical capabilities for *Access Sonoma Broadband* are limited, it must minimize its operational requirements. To this end, *Access Sonoma Broadband focuses on (a) developing and managing the infrastructure and (b) engaging community anchors, residents, and service providers to use the infrastructure*, which are referred to as the “infrastructure” and “outreach” functions of *Access Sonoma Broadband*, both of which are supported by “organization” functions.

Access Sonoma Broadband may eventually deploy network gear, light the network, and provide backhaul or transport services, but its primary purpose is to develop and manage physical assets for the community. To do this, it reaches out to and engages community members who must literally, and figuratively, buy into the broadband authority for it to be successful – primarily through service subscriptions to support *Access Sonoma Broadband’s* and partnering providers’ ongoing operational costs.

The extent of Access Sonoma Broadband’s organization depends on the level to which it deploys infrastructure. The level of the authority’s infrastructure depends, in turn, on funding availability as well as input and investment from community institutional and industrial anchors, network service providers, small and medium organizations, and residents. Organization for *Access Sonoma Broadband’s* business model, including its relationships to other stakeholders, is illustrated in Figure 3.

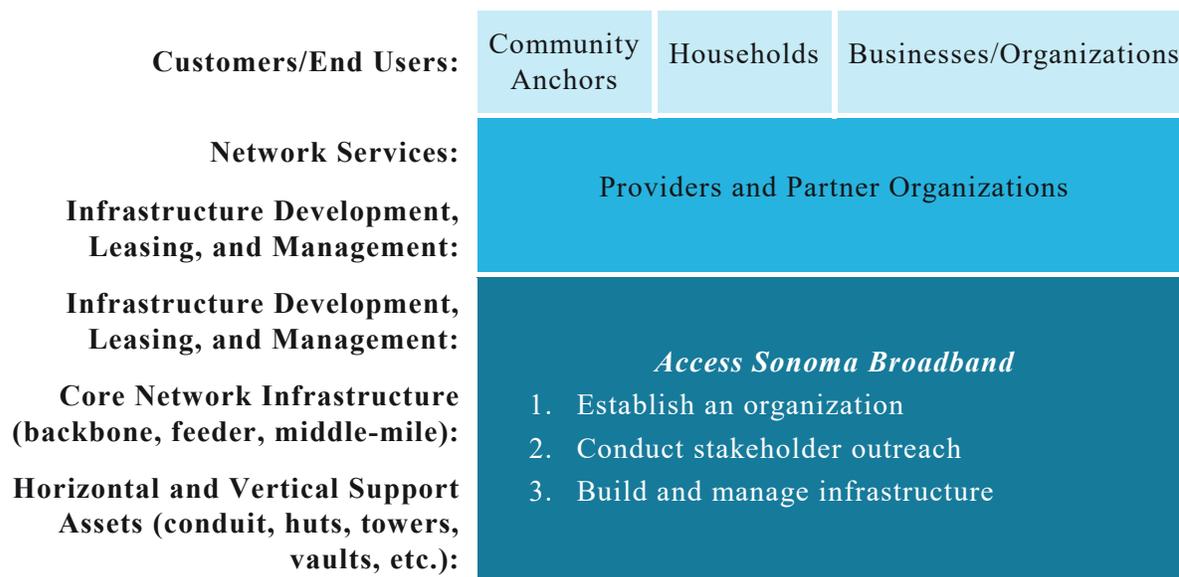


Figure 4. *Access Sonoma Broadband’s organizational relationship*

Access Sonoma Broadband will have the ability to lease and manage assets for residential, business and organizations, and community anchor institutions connections, but does not provide any network services to them other than infrastructure access. Instead, *providers and other partner organizations act as community investors by developing additional infrastructure connecting to Access Sonoma Broadband’s network, or by leasing Access Sonoma Broadband’s network to provide services to end users using an Open Access wholesale model.* Community anchors, households,

businesses, and other organizations act as community investors by subscribing to providers' services using *Access Sonoma Broadband's* Open Access network.

Entities at the top of the business model, as illustrated in Figure 3, have the opportunity to directly invest in *Access Sonoma Broadband* by subscribing to services delivered on its network. There could also be circumstances where partner organizations (e.g. public utility or service districts, homeowner associations, non-profits, etc.), connect to *Access Sonoma Broadband's* network to deploy smaller community based last-mile infrastructure that is publicly owned, managed, and paid for, via parcel taxes or other fees, by members to those organizations. End users in this circumstance address financial requirements and risk by agreeing to an on-going contribution (service fee or tax) or by making occasional or one-time contributions.

Even though *Access Sonoma Broadband* is not a network service provider, the financial requirements of the infrastructure are sizeable—approximately \$3M to startup and about \$30M to deploy core backbone fiber. While Sonoma County has adequate fiscal capacity, local leaders have numerous priorities to balance. Broadband is helpful on many fronts but is not traditionally a focus of local governments. As a broadband authority, *Access Sonoma Broadband has multiple finance options, is dedicated to addressing stakeholder needs, and offloads the risk from local government.*

PUBLIC-PRIVATE-PARTNERSHIP

A broadband public-private-partnership (P3) is a formal, negotiated arrangement between a public entity and a private company to provide broadband services in a given area. Broadband P3s can leverage public broadband assets, such as fiber, conduit, poles, facilities with private broadband provider assets, and expertise to increase the availability and access to broadband services.

Access Sonoma Broadband is a multi-sided P3, involving multiple local public entities—cities, counties, districts, etc.—and multiple network services companies. The public sector role is to increase ubiquitous access in communities by reducing private companies' costs of doing business, promoting access, and directly investing in network assets. Sonoma County and public partners—and, by extension, the citizens—will own valuable network infrastructure, such as fiber and conduit, via *Access Sonoma Broadband*, which is used to get better, more economical communications and connectivity. Open Access networks provide the opportunity for successful public-private-partnerships. By using an Open Access model, *partners may lease Access Sonoma Broadband's network to (1) deliver services to end users using an Open Access model, or (2) connect their company's networks and access backhaul services to deploy services to end users with their own business model.*

Open Access Networks

In Open Access Networks, an individual entity acts as the network owner, while partnering with other companies to operate the network and provide services to end users. The owner leases capacity, generally at wholesale pricing, to multiple retail

service providers delivering services over the same network to end users. Open Access Networks primarily have fiber-based infrastructure that are able to augment with fixed wireless technologies. Due to the successful case studies found in U.S. states and in other countries using Open Access Network models, its reputation as the next generation of broadband continues to grow based on its ability to increase competition in hard-to-serve areas cost effectively.

For Middle-Mile purposes, Open Access provides multiple service providers the accessibility to use the high-speed network to connect their last-mile networks to end users. Rather than building their own infrastructure along major corridors, Open Access Middle-Mile infrastructure allows multiple service providers to enter last-mile markets cost effectively. *For last-mile connectivity, Open Access means choice.* The Open Access model provides end users the choice to subscribe to a variety of retail service providers delivering services on a single network owned and operated by a neutral third party. The Open Access model is mutually beneficial by providing ISPs and other retail service providers with the convenience to enter new markets at a very low cost. This enables communities in all regions with the ability to choose from a variety of high quality services at competitive and affordable pricing. Figure 4 illustrates the Open Access model, showing partner relationships in more detail.

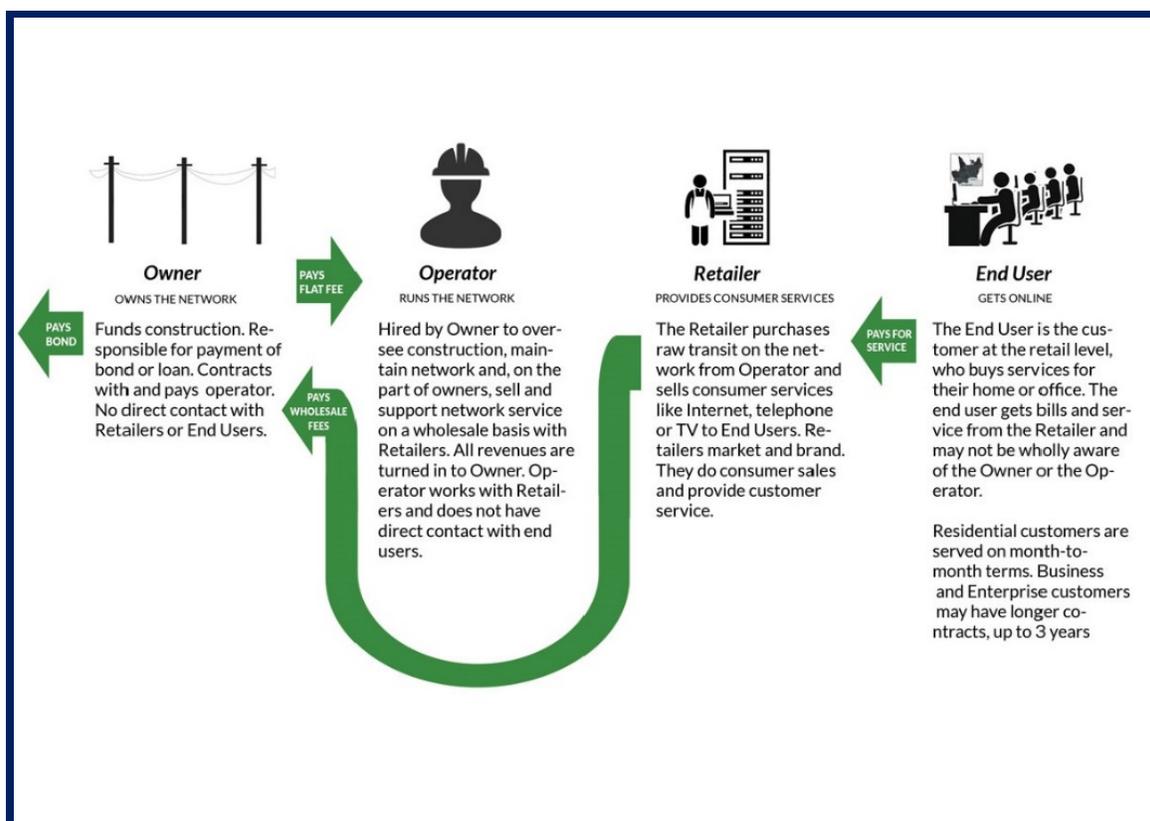


Figure 5: Open Access Model. Infographic from Peggy Dolgenos, Cruzio Internet

The sections below provide more detail on Access Sonoma Broadband's public-private partners as shown in Figure 4.

Infrastructure Owner

In the case of this action plan, *Access Sonoma Broadband* is the primary infrastructure owner. However, there may be cases where *Access Sonoma Broadband* has the option to lease dark fiber assets from other infrastructure owners, such as internet providers, utility companies like PG&E, or other private and public organizations. *Access Sonoma Broadband* will be the primary owner of the Open Access Network, but could be a co-owner of the infrastructure that the network is based upon.

As a network and infrastructure owner, *Access Sonoma Broadband* is responsible for administering the network and infrastructure, primarily by managing contracts with subcontractors who specialize in various areas related to network and infrastructure maintenance. Whenever there is an opportunity to expand or develop *Access Sonoma Broadband*, its administration makes the decisions. Similarly, whenever an issue arises, the administration is responsible for solving the problem.

Network Operators

Network operators represent multiple entities that are responsible for maintaining both the internal and external functions of the network. For example, a Network Operations Center (NOC) can monitor internet traffic transmitted on networks for any potential disruptions caused by a variety of issues (e.g. conduit or fiber breaks). NOCs can alert the infrastructure owner of the disruptions, causes, and solutions to fix, allowing the owner to respond appropriately. Network operators may also include contractors that not only build the network, but also manage physical repair or maintenance of the infrastructure on a 24/7 emergency response basis. Once the NOC has identified a network disruption and the network owner has been notified, a contractor may be contacted by the owner for further diagnosis and repairs to resume operations.

Network operators may also include other partners, such as companies that manage billing or network software. There are multiple operations related partners to help navigate and support *Access Sonoma Broadband's* network more effectively and successfully.

Retail Service Providers

Retail service providers, which can include internet service providers or other entities that require fiber optics for operational use, lease Open Access facilities, or may use them in exchange for service commitments and/or a share of revenue. Providers equate to asset utilization and revenue for *Access Sonoma Broadband*. Therefore, a basic goal for the broadband authority is to attract as many providers as possible. A core issue to address is the exclusive nature of these partnerships: ***Access Sonoma Broadband is a neutral entity that creates a competitive market by providing affordable and non-***

discriminatory access to partners, which also allows end users to have access to multiple providers - offering competitive services and pricing.

Retail service providers are investors; they invest in communities to generate profitable revenue. The more profitable they can be, the more they will invest. *Access Sonoma Broadband*, its local government partners, and community anchors have six opportunities to increase investment by private partners:

1. ***Adopt broadband-friendly policies*** to make it easier and less costly to deploy network infrastructure.
2. ***Allow private partners to use public assets or facilities*** to deploy network infrastructure either at no or very low cost.
3. ***Cultivate demand*** by training consumers, promoting internet services, and getting pre-subscription commitments, particularly in high-cost areas.
4. ***Directly invest local public funds*** into network assets and/or provide public financing for network infrastructure.
5. ***Establish local vendor/partner preference*** for procuring telecom and related services.
6. ***Seek out state and federal grant funding*** and actively recruit private partners to invest.

Partnership Requirements

Access Sonoma Broadband seeks provider partners who will actively participate in community and economic development, as well as work across the County to achieve its network vision. Prospective partners, as discussed below include facilities-based network services providers as well as access service providers. Other infrastructure owners, such as PG&E, are also prospective partners. Given the range of potential partners, it is important for *Access Sonoma Broadband* to be clear about how it approaches partnerships. Partnerships should characterize:

- ***Non-exclusivity***: *Access Sonoma Broadband* does not enter into any exclusive agreements. Non-exclusivity allows for a more competitive environment in which *Access Sonoma Broadband* may collaborate with multiple entities to get the most benefit from use of assets.
- ***Cost savings for community anchors***: *Access Sonoma Broadband* seeks partners to connect local governments and other community anchors. Targeted facilities should connect at no cost to infrastructure that the public owns.
- ***Community access and applications***: Partnerships should provide as many benefits as possible to the community. Providers that offer discounted or free services to those in need (particularly students in low-income families), small businesses, public spaces (e.g. libraries and parks), or for Smart City applications, will receive preference.

- ***New investment and infrastructure:*** *Access Sonoma Broadband* prefers to partner with providers whose infrastructure follows newly adopted guidelines and standards for wired and wireless infrastructure. Such infrastructure is (a) higher-capacity, more flexible, and more reliable than legacy infrastructure, and (b) better aligned with public interests and priorities.
- ***Low-impact construction:*** Partners must properly restore streets following construction and do not inconvenience the community by drawn out construction. Public Works engages with *Access Sonoma Broadband* to ensure this is the case. Contracts with partners clearly specify construction methods and timeframes for deployment.
- ***Revenue sharing:*** Partners may offer revenue sharing for the use of *Access Sonoma Broadband* assets. The percentage will vary depending on the infrastructure used, services offered, and terms of the agreement. *Access Sonoma Broadband* closely evaluates revenue sharing estimates to ensure they are reasonable for market prices, ramp-up periods, take rates, and use of public assets.

BROADBAND ADOPTION PROGRAM

In Sonoma County, urban areas that have broadband infrastructure access experience the most adoption related issues (e.g. affordability, technology, digital literacy). Rural and suburban areas farther away from the Highway 101 corridor experience a combination of both infrastructure and adoption related issues. County organizations and service providers have tried to support communities with adoption related services, including affordable internet service plans, digital literacy training, and computer equipment programs. Unfortunately, these efforts have not met the entire demand of Sonoma County's unserved communities, requiring longer-term solutions for inclusive and equitable broadband adoption programs.

The state and federal government provide major subsidies supporting broadband adoption efforts; unfortunately, there are not enough community based organizations in Sonoma County that are willing to sponsor special programs that utilize these funding sources. *Access Sonoma Broadband* can solve Sonoma County's broadband adoption issues and promote inclusion and equity by: 1) increasing competition and affordability of services; 2.) creating community based programs that focus on promoting digital literacy and technology adoption in underserved communities. Prioritizing inclusion and equity is a major component to accomplishing *Access Sonoma Broadband's* mission successfully. The adoption program will develop over time based on community demand for these services and available funding opportunities.

THE BUSINESS CASE

Access Sonoma Broadband's business model prioritizes the deployment of fiber optic infrastructure in unserved communities. Unserved communities are usually located in low density and high cost rural areas where wireline deployment can be expensive and cost prohibitive due to lower demand. As a result, private companies traditionally utilize fixed wireless or satellite technology to make the business case economically viable. Some companies have successfully deployed wireline infrastructure in high cost areas, sometimes on their own, and sometimes with the assistance of public grant funding. Other examples of successful infrastructure deployment in rural areas include telephone lines, or utilities such as power and water. Infrastructure projects in rural communities face many challenges and require coordination, strategy, innovation, and various funding mechanisms to make projects economically viable.

Rural broadband deployment, specifically fiber optics, is not impossible. Private telecommunications companies have made major investments in rural areas over the past few decades; however, private investment can only go so far when dealing with rural challenges. The Digital Divide is still present and growing as consumer demand for bandwidth rises exponentially every year. Deploying future-proof fiber optics infrastructure is crucial for the economic success and survivability of our rural communities, especially as other technologies become antiquated or not useful. Therefore, the question is not whether rural communities need fiber optic infrastructure or not, because they do – the question is – what can make the business case financially viable? From a business perspective, companies must carefully analyze costs and benefits prior to conducting business in high cost areas. Creating a business case for *Access Sonoma Broadband* starts with a high-level cost benefit analysis to show us an overview of the organization's chances of success.

Cost Benefit Analysis

The business case for *Access Sonoma Broadband* weighs a multitude of costs and benefits to make this effort realistic, economically viable, and sustainable over time. The general direct benefit of *Access Sonoma Broadband* is greatly improved connectivity—better, cheaper, faster, and more reliable broadband—for all of Sonoma County's communities. The largest direct costs are those incurred while building the infrastructure as well as the long-term operational costs. ***The potential long and short-term benefits of Access Sonoma Broadband seem to exceed the total lifetime costs.*** However, analyzing the various costs and benefits for *Access Sonoma Broadband* is a key next step in developing a sound business case. Because the telecommunications industry is so dynamic and fiber optics infrastructure has so many different applications, *Access Sonoma Broadband* cannot determine all the costs and benefits at this time. This section provides a general overview on some of *Access Sonoma Broadband* primary costs and benefits to help jumpstart a broader discussion that may identify additional community needs and their associated costs and benefits.

Costs

Organization and Planning:

The initial costs of Access Sonoma Broadband come from gathering information and getting organized. The authority gathers information about what members of the community—including public agencies and private corporations—have, need, and are willing to pay. It also establishes a steering committee or task force of leaders from across the community to guide network development. As *Access Sonoma Broadband* incorporates, it establishes formal service areas. All of these tasks take time and expertise, which come with costs approximately equivalent to the salary of a senior public official. Traditionally the Sonoma County Economic Development Board (EDB) has administered Sonoma County’s broadband efforts; therefore, EDB could continue to spearhead the initial development and formalization of *Access Sonoma Broadband* until it is ready to be sustainable on its own. EDB has experience doing this already with the formalization of the Sonoma-Mendocino Economic Development District, which is a Joint Powers Authority created by Sonoma and Mendocino Counties’ Board of Supervisors. State and federal grants have traditionally funded EDB Staff and consultants that are involved with these efforts, therefore, Sonoma County or EDB may have subsidies available to partially cover organization and planning.

Infrastructure Deployment:

The major costs of Access Sonoma Broadband are upfront capital expenditures from building the infrastructure. These costs include network design and engineering, construction labor and materials, and systems to manage the infrastructure. Careful alignment with other infrastructure projects, phasing, and value engineering minimizes these costs over time. The section below provides additional detail on estimated costs for the initial deployment phase of *Access Sonoma Broadband’s* network backbone.

Backbone

The *Access Sonoma Broadband* backbone consists of two existing assets that require further action and investigation from the County. The County has rights to fiber strands in the Sonoma-Marin Area Rail Transit (SMART) easement that may be used for intergovernmental connections to connect county and other government facilities. One potential use for this asset is to partner with the County of Marin to connect county data centers to increase redundancy in the event of a disaster or major emergency. To accomplish this, *Access Sonoma Broadband* must not only explore network designs to connect facilities from the fiber asset in order to formulate costs for construction, but also a business case for service subscriptions from the facilities. This will require coordination with the County of Marin, County of Sonoma, and the Cities on their facilities’ internet needs in order to understand levels of participation, locations to include in a network design, required material and labor, and costs to construct.

As described under the “Network Architecture” section, the major backbone asset is the WilTel duct system, which requires a survey to ensure it is marked and to gather detailed information about gaps that need to be filled in with new construction. To

make the asset operational, *Access Sonoma Broadband* must construct laterals to connect adjacent facilities and other assets as well as install other access facilities as needed (e.g. vaults, pull boxes, cabinets, etc.). These activities will create the largest initial costs for *Access Sonoma Broadband* but will also position it for early revenue and enable it to develop its capacity to operate and provision services.

Table 2. WilTel Duct System Fiber Optic Retrofit Costs

TASK	DISTANCE	ESTIMATED COSTS	
		Design	Construction
Field Survey – Geo-locate hand holes, fiber markers, vault entrances, and surface features	65 miles	\$34,257	
Proof Existing Assets – Open hand holes/vaults, rod, and rope ducts	65 miles	\$1,284,621	
Close Gaps – Construct new duct to complete the system	5 miles	\$32,964	\$1,326,078
Network Deployment - Install fiber optics and equipment	70 miles	\$44,824	\$1,803,176
TOTAL ESTIMATED COSTS TO RETROFIT WILTEL CONDUIT	70 miles	\$4,525,920	
Cost to build the network from scratch	70 miles	\$19,241,110	
Savings		\$14,715,190	

As summarized in Table 1, the total costs for these activities are just above \$4.5M, including about \$1.4M in design and engineering services - estimates include conservative pricing and account for additional contingency costs. It is important to note that the construction estimate is only for completing gaps in the conduit system (about 5 miles) and retrofitting the entire conduit network (70 miles) with fiber optics and equipment. In contrast, it would cost well over \$19M to build the full 70-mile fiber network today. It is not possible to project full costs for extending and repairing the duct system because there is still unknown information (a) how many laterals are needed and what sites should be connected or (b) the current state of the duct system. The existing segments may be fully usable but it is likely that at least some portions will need substantial repairs.

Middle-Mile and Last-Mile Infrastructure

The overarching objective for *Access Sonoma Broadband* is to drive investment and network access into eastern and western portions of the County. The middle-mile segments extending off the backbone not only accomplish this objective, they add value to the backbone infrastructure. They cover the middle-mile segments between major

sites—via routes described under “Network Architecture”—and serve as feeder infrastructure to last-mile distribution nodes. *Access Sonoma Broadband*, or other partners, construct last-mile distribution and access infrastructure to connect locations with end users.

Costs to build the middle-mile and last-mile portions of the infrastructure are extremely dynamic and depend on a number of factors, such as community demand, location, topography, length of network required, whether it is aerial or underground, etc. *Access Sonoma Broadband* expects middle-mile construction costs to range from \$40 to \$60 per foot, or between about \$212K and \$320K per mile. Meanwhile, wireless towers cost approximately \$100K for equipment and labor per fixed wireless “hop” between two towers. These are rough order-of-magnitude costs, which can vary significantly with market conditions. A conceptual design is necessary for accurate budgetary estimates. Generally, *Access Sonoma Broadband* works to minimize these costs via using existing public assets, joint builds and other methods.

Infrastructure Operation:

The next largest costs of Access Sonoma Broadband are operating expenditures to manage and operate the infrastructure.

Once built, the infrastructure must be maintained, so the authority has on-going costs for contractors, labor, and materials. The authority has a small staff so there are on-going personnel, office, and related costs to administer planning, community engagement, response, facilitation, etc. *Access Sonoma Broadband* subcontracts a majority of its operations to professional companies that specialize in various services to limit its operational responsibilities.

Backhaul, which is required to connect communities to the Internet, is usually leased from larger carriers depending on availability. Backhaul affordability is a large component of operational costs that must be optimized wherever possible. One difference between making the business case in rural vs. urban communities is the availability of affordable backhaul services to distribute to residents. Depending on the population density of each community, the cost of backhaul services should be affordable enough to make the business case viable.

Benefits

Community and Economic Impact

Higher performance, lower cost, more widely available broadband services is a fundamental benefit of Access Sonoma Broadband. With *Access Sonoma Broadband*, more household, institutions, and other organizations get connections for less. The community is capable of reinvesting service revenue in public infrastructure. Anyone who needs internet in Sonoma County realizes these benefits to some extent.

Organizations of all sorts benefit from Access Sonoma Broadband. Businesses and professionals benefit from working electronically, online. Local governments use the network to improve operations without worrying about whether they can afford—or

even acquire—connections. Next-generation “smart” technologies enable municipalities, transportation, and utilities to be much more efficient and responsive. Education, health, and social service organizations get better, more flexible connectivity for much lower costs, as do commercial businesses.

Residents benefit even more, overall, as everyone can get connected. All of this is because *Access Sonoma Broadband* makes it much more economical and profitable for internet service providers to serve the local market. This is what economists refer to as “network externalities,” the process of multiplying benefits while simultaneously driving down total costs.

Access Sonoma Broadband enables the innovations that foster use of alternative energy resources, environmental risks mitigation, and reduced use of resources overall. The network is a means to inclusively engage and empower all persons to build safe communities and a sustainable economy. Not only does Sonoma County get technology to protect and service residents; local companies *actually build* this technology using infrastructure deployed via *Access Sonoma Broadband* and sell it around the world.

Even in the short-term, ***Access Sonoma Broadband makes targeted investments to address critical needs in the community,*** such as pulling low-cost access into low-income areas. All of this is done via partnerships with colleges, schools, and universities, as well as employers, to upskill the local workforce while providing more flexibility for businesses and workers.

The benefits of *Access Sonoma Broadband* are realized as valuable infrastructure with income to the authority. Some of this income comes via federal and state grants. More comes from the community, in the form of direct fees, payments, or swaps from other local public entities. Most of *Access Sonoma Broadband*’s revenue comes from providers leasing assets from the authority. A substantial amount comes from revenue-sharing agreements with providers. ***All of this revenue goes directly into building and maintaining local network infrastructure.***

Funding Opportunities

Access Sonoma Broadband’s ability to succeed depends heavily on its ability to compete and generate innovative funding streams to support its capital and operating expenditures. As shown in the next section titled, “Funding Strategy,” there are several funding opportunities to support costs. Realistically, *Access Sonoma Broadband* becomes successful when its revenue exceeds costs. Therefore, it must compete to identify and secure as many funding opportunities as possible to develop the organization and support network expansion.

5. Funding Strategy

The general funding strategy for *Access Sonoma Broadband* is to use a combination of grants, service revenue, bonds, loans, and/or community investment via public authorities and special districts to build the infrastructure. One tactic is to simply minimize costs and, therefore, funding requirements. Joint builds and other partnership tactics are used to reduce upfront construction costs. *Access Sonoma Broadband* itself, as an infrastructure development and management organization administered by the EDB, has low operating costs relative to other active broadband business models.

Revenue from asset leases and other sources is used to fund maintenance and operations, pay off liabilities, and reduce need for community investment. Connecting county facilities can result in a cost savings through reduced spending on internet services from their current providers, which can reinvest back into *Access Sonoma Broadband*. Community members realize return on their investment in the form of more broadband options with better performance and lower costs. The community also receives indirect benefits from connectivity via economic development, education, health and wellness, income gains, productivity, safety and security, etc.

FEDERAL AND STATE GRANTS AND LOANS

Broadband infrastructure grants are the primary source of funding to support infrastructure deployment. Grant programs are expanding on a national level that are geared towards new innovative models to close the Digital Divide, including public/not-for-profit models like *Access Sonoma Broadband*. Prior to using other funding mechanisms, such as bonds, loans, or tax measures, grants are the primary goal. As grant opportunities arise, *Access Sonoma Broadband* will have project proposals ready to submit.

There may be other grants available to support additional programmatic operations. *Access Sonoma Broadband* could apply for grant funding that supports other community needs such as workforce or digital literacy training. Aside from providing broadband access, *Access Sonoma Broadband* can play many roles in Sonoma County to support its communities. The organization develops additional programs and expands based on the availability of public funding that supports efforts to close the Digital Divide.

Grant opportunities related to broadband frequently arise, but are often missed by applicants that do not have “shovel-ready” or other similar projects on-hand to submit. One reason *Access Sonoma Broadband* should organize itself now is to be shovel-ready and in a strong position when those opportunities arise.

Access Sonoma Broadband methodically pursues federal and state grants and loans. Appendix 1 provides a comprehensive description of these funding opportunities, including Department of Commerce Economic Development Agency (EDA), United States Department of Agriculture (USDA), and California Advanced Services Fund (CASF) opportunities. There may be additional funding for such programs, particularly

focused on COVID-19 and wildfire mitigation and recovery, in the near future. The authority maintains a funding timeline to align network development with the range of funding opportunities, including the particular focus and requirements of the various grants and loan programs. Generally, these include:

- Broadband access, distribution, feeder, and middle-mile infrastructure
- Digital equity and inclusion, particularly affordable housing
- Disaster preparedness and recovery, specifically for wildfires
- Environmental impacts reduction, sustainability, and overall resilience
- Tech-based economic development, including telework
- Demand management and other smart applications for utilities, transportation, and public safety
- Remote access to education and health services

ASSET LEASE REVENUE

Access Sonoma Broadband supports its operations primarily using revenue generated from leasing its telecommunications infrastructure to private retail service providers who make revenue from providing services to end users. Lease arrangements vary on a case-by-case basis that depend upon needs of providers and *Access Sonoma Broadband* for each project. Infrastructure owners using Open Access models generally charge a wholesale fee per-end-user served. This means that a retail service provider serves each customer using *Access Sonoma Broadband's* infrastructure and pays *Access Sonoma Broadband* a fixed rate per customer. There may be opportunities for a provider to lease dark fiber on a long-term basis from *Access Sonoma Broadband's* infrastructure as well. Therefore, *Access Sonoma Broadband's* primary source of revenue depends on demand from internet subscribers and the retail service providers serving those users.

Access Sonoma Broadband proactively seeks investors for local network infrastructure. Conduit runs, fiber optic lines, and other network infrastructure are valuable real assets that can be subdivided and owned separately. Private investors buy into them because they can generate lease revenue and be resold at a profit. These investors include holding companies that solely own and lease assets to network service providers.

The authority is structured to allow such co-investment. It establishes term sheets for portions of the infrastructure based on community and public investment and priorities. This enables *Access Sonoma Broadband* to guide investments into high-cost areas with acute needs as well as areas with strong demand from many consumers. Essentially, *Access Sonoma Broadband* “bundles” broadband opportunities, including provider customers and community investors, to investor funds and institutional investors. This approach complements bond and other debt financing, as investors can purchase equity in the network too.

PUBLIC DEBT FINANCING: BONDS AND LOANS

Local governments may opt for more traditional financing methods to support *Access Sonoma Broadband's* infrastructure, such as bonds and loans. With historically low interest rates, the current environment for such financing is favorable for the County. There are many options available from a variety of sources including:

- 63-20 bonds: Tax-exempt bonds in which a non-profit organization issues tax-exempt bonds on behalf of the County
- Revenue bonds
- Revenue notes with sub-debt to act as equity: Sub-debt is high yielding and allows investors to have a tax-exempt high return with ownership retained by the County.

Once established, special districts could also take on bonds and loans to finance construction. While incurring debt is not a preferred option, in some cases loans might make sense as a financial resource. The County should consult with its financial department regarding bonds or loans. The California Statewide Communities Development Authority (CSCDA), California Infrastructure and Economic Development Bank (IBank), and California Enterprise Development Authority (CEDA) may also be resources for debt funding, although they do not appear to have formal programs for broadband or network infrastructure.¹⁰

GENERATING LOCAL INVESTMENT DOLLARS

Community members will have the opportunity to support *Access Sonoma Broadband* as both customers and investors. In cases where *Access Sonoma Broadband* can make infrastructure projects economically viable using funding mechanisms such as bonds, grants, loans, and service revenue, community members can become a customer to *Access Sonoma Broadband* by subscribing to the internet services delivered on its network. Another option to fund *Access Sonoma Broadband's* infrastructure build-out is for community members to invest in the form of fees or taxes levied by one or more special districts:

Special districts are local government agencies that provide public infrastructure and essential services, including, but not limited to, water, fire protection, recreation and parks, and garbage collection.¹¹

Special districts, and the community members they represent, can become investors to broadband infrastructure by partnering with *Access Sonoma Broadband*. The two key

¹⁰ See <http://cscda.org/>, <https://ibank.ca.gov/>, and <https://ceda.caled.org/> for information about these organizations.

¹¹ Special District Formation Guide (2016). California Special Districts Association. https://higherlogicdownload.s3.amazonaws.com/CSDA/b24702e8-8a42-4614-8c45-bc3cba37ea2c/UploadedImages/About_Districts/2016-Formation-Guide-WEB.pdf. Page 4.

attributes of *Access Sonoma Broadband* districts are (a) a majority of citizens support formation, which is effectively required of special districts, and (b) *Access Sonoma Broadband* may pay dividends to those in the district(s) as revenues exceed costs and liabilities. These attributes ensure that *Access Sonoma Broadband* is aligned with public interests and generate real public value.

In Sonoma County, special districts are the purview of the Sonoma Local Agency Formation Commission (LAFCO).¹² There is a rigorous process¹³ and substantial costs involved in establishing special districts. As a county-sponsored, grassroots organization, *Access Sonoma Broadband* is well positioned for the process. In addition, Magellan Advisors has done a majority of the planning and research necessary for the LAFCO analysis.

Community Facilities District¹⁴

Under California law, Community Facilities Districts (CFD) enable financing of public improvements and services including streets, sewer systems and other basic infrastructure, police protection, fire protection, ambulance services, schools, parks, libraries, museums and other cultural facilities. A CFD can levy a special tax on residential, commercial, and industrial property projects to raise funds to pay for infrastructure. The tax applies to residents of the area that benefit from the funding and requires approval (by vote) of at least two-thirds of residents.

JOINT BUILD AND JOINT USE

Joint build practices such as Dig Once and joint-use allow *Access Sonoma Broadband* to take advantage of assets and projects in rights-of-way for the installation of fiber. Transportation and utility work are opportunities for the authority to expand its network at lower costs than new construction. Adding a conduit in coordination with another project can reduce costs by as much as 33%. *Access Sonoma Broadband* has opportunities to collaborate with PG&E and others on infrastructure development and hardening. Because of *Access Sonoma Broadband*'s mission, PG&E has expressed willingness to partner on pole attachments and lease dark fiber assets. Sonoma County may set up an enterprise fund as a reserve for this to ensure that when opportunities arise, funds are available for capitalizing on them.

Access Sonoma Broadband regularly reviews planned capital improvement projects to identify options for deploying conduit and/or fiber infrastructure in tandem with other excavations in the public right-of-way. It is good practice to review the locations of planned projects in the County's permitting system to see how they overlap with

¹² For additional information on Sonoma LAFCO, see <http://sonomalafco.org/About-the-Commission/>.

¹³ A checklist and requirements for application are online at <http://sonomalafco.org/How-to-Apply/Application-Requirements-and-Checklist/>.

¹⁴ [http://cscda.org/getattachment/Infrastructure-Finance-Programs/Community-Facility-District-\(CFD\)-Financing/Further-Amended-and-Restated-CSCDA-Local-Goals-and-Policies-for-use-of-Mello-Roos-CFDs-2019-\(1\).pdf.aspx?lang=en-US](http://cscda.org/getattachment/Infrastructure-Finance-Programs/Community-Facility-District-(CFD)-Financing/Further-Amended-and-Restated-CSCDA-Local-Goals-and-Policies-for-use-of-Mello-Roos-CFDs-2019-(1).pdf.aspx?lang=en-US)

targeted areas for broadband expansion. This coordination should also extend beyond the County itself to partnering public agencies such as municipalities, transportation agencies, and utilities, as well as private organizations such as telecommunications providers.

ALIGNMENT WITH OTHER PROGRAMS AND INITIATIVES

Internet access and other network services can transform lives. It has transformed business, including the business of local government. Many Sonoma County programs and initiatives could benefit from—if not require—better, cheaper, faster broadband from more providers. It is a component of affordable housing. Education, skills, and work opportunities depend on it, as do public health and safety. Local network infrastructure can support wildfire recovery and resilience. Equitable and inclusive connectivity is a major component of recovery and resiliency as well.

Access Sonoma Broadband works closely with other local agencies, boards, commissions, and departments to achieve their goals in ways that capitalize on and contribute to network infrastructure. Other programs and initiatives can increase their eligibility and impact potential via partnerships with *Access Sonoma Broadband*. Specifically, in reference to funding, grants for affordable housing, energy and environment, public safety, and workforce development go farther when linked to broadband and related communications technologies. *Access Sonoma Broadband's* funding results in connectivity that support other programs and initiatives.

Access Sonoma Broadband regularly engages county and city leaders to ensure their efforts are aligned with needs and opportunities. Alignment strengthens the authority's position for broadband infrastructure funding opportunities and builds both demand and support for its customers and private providers. It also enables *Access Sonoma Broadband* to tap into funding opportunities in partnership with other programs and initiatives.

6. Market Strategy

The purpose of *Access Sonoma Broadband* is to expand fast, affordable, and reliable broadband access to all residents in Sonoma County. In the case of this action plan, *Access Sonoma Broadband* is achieving that goal by deploying infrastructure that will reduce barriers for partners to provide services in high cost areas. *Access Sonoma Broadband* funds the infrastructure construction and then leases that infrastructure to private partners who sell those services to consumers at below market rates because they are not responsible for spending money on infrastructure. As an infrastructure based organization, *Access Sonoma Broadband's* market strategy is to aggregate as much demand for its network as possible.

Access Sonoma Broadband is the primary investor and owner of the infrastructure, leveraging public funds from a variety of sources to generate required capital for construction. County anchors and residents also have the opportunity to become investors and owners of infrastructure in partnership with *Access Sonoma Broadband* by generating funds and investing capital in construction using special districts that govern specific communities. Network service providers are the authority's customers and may become co-investors to the extent that they also deploy infrastructure. The end users, who are residents, businesses, local governments, and other institutions, buy services from *Access Sonoma Broadband's* customers, who are the providers.

CUSTOMERS

The primary customers of *Access Sonoma Broadband's* infrastructure are the retail service providers that lease network capacity to deliver services to end users, meaning end users are customers to the providers. Therefore, *Access Sonoma Broadband's* deployment strategy should support its market strategy by deploying infrastructure to as many unserved premises or communities as possible in order to attract as many providers, or customers, to *Access Sonoma Broadband's* network. On-boarding providers is essential prior to the network turning on, however, additional providers may subscribe to the network during or after the network turns on and begins operating. Thus, *Access Sonoma Broadband* continuously markets its expanding network via social media, direct outreach, meetings and events, and other communication channels to identify providers that are interested in leasing network capacity and becoming customers. Meanwhile, providers market their services to end users using similar tactics and, in some cases, community meetings and events or door-to-door knocking.

Marketing requirements for end users also depends on whether an individual provider or *Access Sonoma Broadband* is completing the physical connection to the end users and who owns the last-mile infrastructure. In the case where *Access Sonoma Broadband* is the last-mile infrastructure owner, its staff, and most likely subcontractors, will be the ones initially engaging communities through marketing to access its Open Access network. As the last-mile infrastructure provider, *Access Sonoma Broadband* and its

subcontractors will install the headend equipment, including in-house cabling and routers, along with providing instructions for end users to follow.

OPEN ACCESS EDUCATION

Part of *Access Sonoma Broadband's* market strategy, as well as its deployment strategy, requires education for its product. When a provider is interested in leasing network capacity, or when connecting premises itself, *Access Sonoma Broadband* will be responsible for educating providers and end users how Open Access models work and the required process to access its network. Generally, in Open Access models, there is one cable entering a premise that connects to one router, or Optical Network Terminal (ONT), that multiple providers are using to deliver services. This is different from the traditional Single Provider model where each time an end user switches internet service providers, a new service technician is required to come to the end user's premise to install their own equipment that usually only transmits their individual services. In an Open Access model, the end user accesses an online portal connecting to their router and *Access Sonoma Broadband's* network where they may subscribe to a variety of provider's services, or immediately switch providers if they are dissatisfied with their current provider's services.

After the premise is connected and the equipment installation is complete, additional onsite service from *Access Sonoma Broadband* or another provider should not be required. If there are physical disruptions to the network, most of the trouble shooting to fix the end user's equipment will occur virtually, using a customer service representative through *Access Sonoma Broadband's* online portal or by phone. *Access Sonoma Broadband's* goal in using an Open Access model is to minimize capital and operating costs for service providers, while making end users' experiences as smooth and enjoyable as much as possible.

COMMUNITY NEEDS ASSESSMENT

Analyzing the **demographics, economic characteristics, and trends** in *Access Sonoma Broadband's* service area is critical to understanding the community needs assessment in order to make effective strategic decisions. The demographics, economic characteristics, and trends summarized in the Sonoma County Broadband Strategic Plan are relatively the same, which shows a steadily growing, aging, and diversifying population with higher than average educational attainment that is generally well-employed and well-paid, and includes a strong base of self-employed persons. Generally, middle-income households have declined. Housing costs have increased while vacancy rates have been about as low as they can be. Homes are generally concentrated in high-density areas with substantial low-density rural areas (see Figure 4).

Population

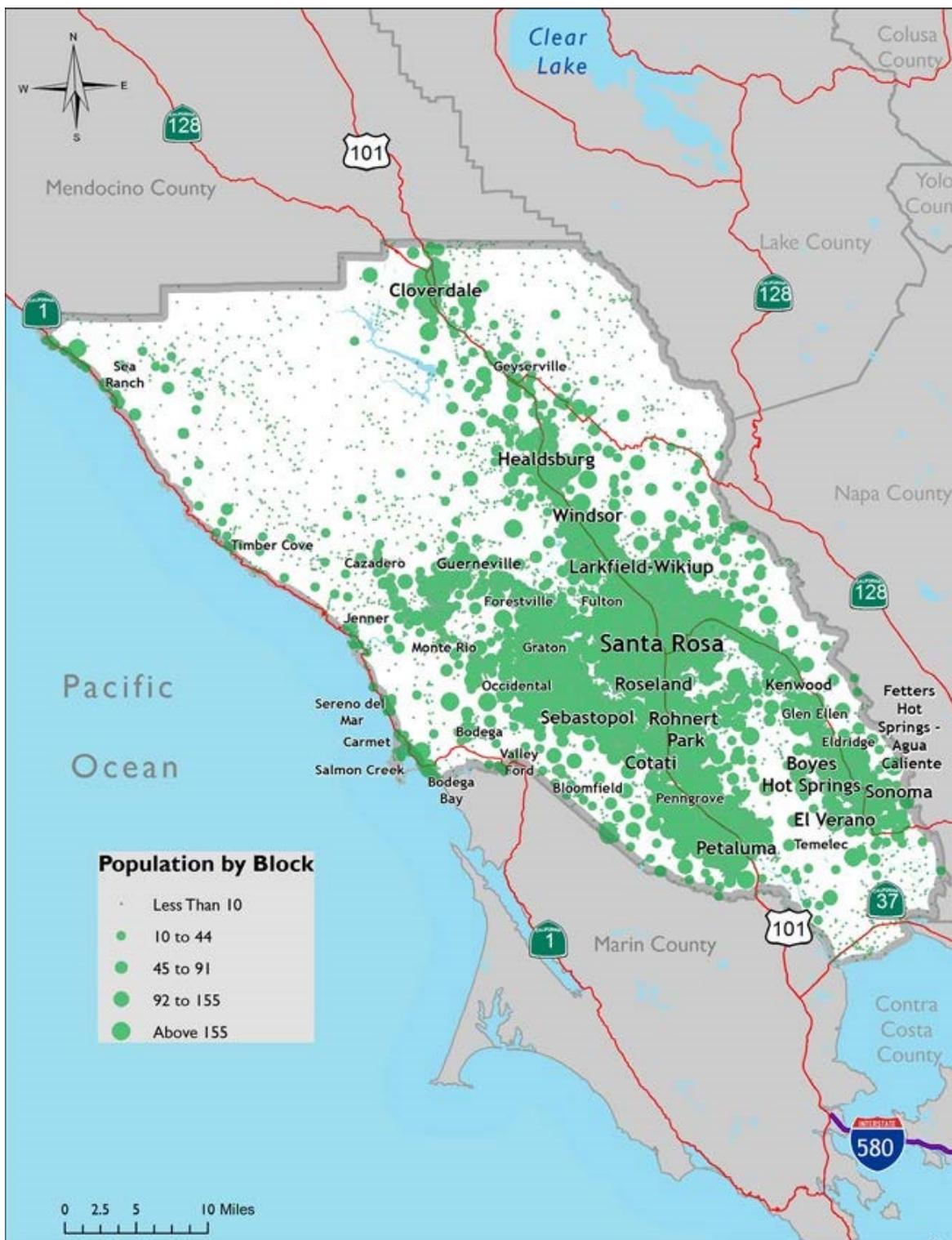


Figure 6. Population Concentration in Sonoma County¹⁵

The most densely populated areas have the lowest household incomes.

Table 3. Number and Distribution of Households by Size¹⁶

HOUSEHOLD SIZE	ALL	FAMILY	NONFAMILY
1-person	51,370	NA	51,370
2-person	68,508	55,695	12,813
3-person	26,276	23,282	2,994
4-person	27,887	27,102	785
5-person	9,630	9,397	233
6-person	4,726	4,626	100
7-or-more-person	2,292	2,215	77
Total	190,689	122,317	68,372

There are over 190,000 households in Sonoma County, as listed in Table 2, most with three or fewer members, based on 2019 Census estimates. Nearly 60% of households earned \$75,000 a year or more and the median annual household income was \$87,828, which was \$22,000 higher than the national average. Educational achievement is also relatively high in Sonoma County. All of these factors point to strong demand for broadband.

Demographics

Providing all demographics with access to inclusive and equitable broadband services is a priority for *Access Sonoma Broadband*. According to the Greenlighting Institute¹⁷,

“Nearly 22 percent of Californians are unconnected or underconnected to the internet, usually because internet access simply costs too much for too many families (1). This affordability barrier affects low-income families and communities of color the most.

- *Latino households are only about one third as likely to have access to home internet as White ones (2).*
- *California’s wealthiest households are 16 times as likely to have access to home internet as the poorest ones (3).”*

As shown in the table below, Sonoma County’s Latinx communities account for nearly 26.5% of the entire county population, followed by Asian American (4.9%), African American (2.1%), and American Indian (0.9%).

¹⁵ Source: 2018 Sonoma County Economic & Demographic Profile, <http://sonomaedb.org/WorkArea/DownloadAsset.aspx?id=2147564544>

¹⁶ Source: 2019 American Community Survey, US Census Bureau, <https://data.census.gov/cedsci/>

¹⁷ <https://greenlining.org/publications/online-resources/2020/on-the-wrong-side-of-the-digital-divide/>

Table 4: Population distribution by race/ethnicity with median age, Sonoma County 2016¹⁸

RACE/ETHNICITY	TOTAL POPULATION	% TOTAL POPULATION	MEDIAN AGE
White/Non-Hispanic	330,268	65.6%	50.8
Hispanic/Latinx	133,323	26.5%	28.8
Asian/Pacific Islander	24,670	4.9%	40.3
African American/Black	10,525	2.1%	35.1
American Indian/Alaska Native	4,463	0.9%	41.8

Industries

The County had over 14,000 business establishments employing more than 172,000 people. All together, these companies generated nearly \$9B in revenue and over \$2.1B in payroll in 2019, according to Census Bureau estimates. Health Care and Social Assistance, Retail, Accommodation and Food Services, and Manufacturing were the largest economic sectors in terms of jobs. These sectors account for nearly 40% of the economy, totaling over 5,500 establishments, supported by some of the largest employers.

Construction, Administrative and Related Services, and Wholesale Trade each had over 10,000 employees. The Construction sector had the most establishments, followed by Retail, and Professional Services. Retail is declining. On average, the largest establishments were in the Management of Companies sector. Agriculture is strong relative to other places, while Arts and Culture sector grew the most. Manufacturing had the highest wages and revenues, followed by Management and Information sectors.

¹⁸ <https://sonomacounty.ca.gov/Health/Public-Reports/Summary-Measures-2015-17/Demographics-and-Social-Characteristics/>

Table 5. Number of Firms and Employees by Sector Size¹⁹

SECTOR	ESTS	EMPS	AVG SIZE
Health Care and Social Assistance	1,543	25,337	16.4
Retail Trade	1,825	24,936	13.7
Accommodation and Food Services	1,307	23,979	18.3
Manufacturing	892	21,322	23.9
Construction	1,928	12,426	6.4
Administrative and Related Services	785	10,848	13.8
Wholesale Trade	616	10,220	16.6
Professional and Related Services	1,603	8,603	5.4
Other Services	1,143	7,865	6.9
Finance and Insurance	720	6,553	9.1
Arts, Entertainment, and Recreation	259	4,222	16.3
Transportation and Warehousing	244	3,565	14.6
Real Estate and Rental And Leasing	701	3,274	4.7
Educational Services	199	3,145	15.8
Information	216	2,948	13.6
Management of Companies	66	2,307	35.0
Agriculture and Related	88	706	8.0
Mining and Related	9	166	18.4
Industries not classified	19	23	1.2
Utilities	11	-	-
ALL	14,174	172,445	12.2

Local Government

Based on data collected from the County and six cities²⁰, they collectively spent over \$2M for just over 150 circuits in 2018. The County alone spent \$1.5M. On average, an individual connection costs local governments over \$1.2K per month. These estimates do not include sites such as volunteer fire stations; neither do they include connectivity for Smart City solutions for climate change, health, safety, and other County Strategic Pillars. Beyond the local governments, there are numerous other public entities, including 66 special districts in Sonoma County.²¹ All of these entities are prospective community investors as they could undoubtedly benefit from better, cheaper, faster, and more flexible and reliable connectivity.

¹⁹ Source: 2017 Annual Economic Surveys, US Census Bureau, <https://data.census.gov/cedsci/>.

²⁰ Based on data from 2017. At that time, the cities of Sonoma, Sebastopol, Cloverdale, and Cotati did not have data available to share.

²¹ Visit <https://sonomacounty.ca.gov/ACTTC/Administration/Special-District-Information/> for a list of these districts.

Table 6. Public Agencies' Annual Telecommunications Spend and Circuits

JURISDICTION	ANNUAL SPEND	CIRCUITS
Sonoma County	\$1,466,058	100
Santa Rosa	\$425,500	20
Petaluma	\$76,068	11
Windsor	\$62,117	6
Healdsburg	\$150,000	8
Rohnert Park	\$30,000	8
Total	\$2,209,743	153

Strategic Considerations for Community Investors

These statistics give a sense of the size of the local market, capacity, and ability to invest in broadband. ***Businesses and residents value internet access as a means for communication and information***, which reduce uncertainty for them about resources, operations, and efficacy. What efficacy means for commercial entities is profoundly different from what it means for households. Operations and resource requirements are different for businesses than residents (i.e., large companies tend to have much greater needs for connectivity than small ones, especially as compared to households, and needs vary by sector).

Businesses and residents have different bases for valuing broadband and other technology. Households invest for quality of life and to grow capabilities and wealth, which includes intangible wealth such as social relations and trust. Businesses, in contrast, invest for customer value and productivity. The gains for households tend to be longer term and less tangible than businesses. Businesses tend to invest more but also require clearer, faster returns. In the current market, most providers pay little care to what is backing the demand because consumers have no real choice. Only when the market opens up, forcing providers to compete and differentiate, will they get interested in getting to know their customers.

Access Sonoma Broadband should understand broadband demand among its customers, including what the demand is for, how much there is, and where it is located. Customers in dense areas likely want less expensive broadband while those in rural areas likely want improved, or any, broadband. What concerns or factors would cause both to support the authority? Indeed, *Access Sonoma Broadband* needs to understand what is behind demand so the authority can make the case for investment.

The general market strategy for Access Sonoma Broadband is to track the latest broadband trends to deliver community members the newest services they want and need. The authority directs their investment in a manner that addresses these underlying factors. Businesses demand broadband because it enables them to be more competitive and productive. Residents demand broadband because they use it for comfort, entertainment, health, and security as well as productive purposes like education and

work. Network infrastructure is simply the means by which *Access Sonoma Broadband* makes these outcomes more economical and possible.

PROSPECTIVE NETWORK SERVICE PROVIDERS

As detailed in the *Strategic Broadband Plan*, the incumbent cable and telephone service providers in Sonoma County are AT&T and Comcast. There are several local independent providers, including one with substantial fiber assets—Sonic—and several wireless internet service providers (WISPs) spread throughout the County serving different areas. Table 5 summarizes Sonoma County’s published broadband offerings. AT&T also provides cellular and other wireless services in the area—although through a separate division of the company—as do T-Mobile and Verizon. Multiple companies have long-haul and metro-network assets in Sonoma County, including Allstream (formerly Electric Lightwave), Century Link, and Zayo.

The cost and speed of broadband services vary widely, as show in Table 5. Some offerings, specifically fiber-based broadband from Sonic, are very economical in the Santa Rosa area. It is not clear how readily available those services are, as is the case with other services that appear to be available and priced on a case-by-case basis. Anecdotal evidence suggests competition and expansion are impeded by the high cost of serving less urban portions of the County.

*Table 7. Analysis of Published Retail Broadband Offerings in Sonoma County*²²

STATISTIC	MRC	DOWN	UP	THRUPUT	MRC/MBPS
MAXIMUM	\$200.00	1000.0	1000.0	2000.0	\$105.33
AVERAGE/MEAN	\$77.17	275.3	168.0	443.3	\$11.86
MIDPOINT/MEDIAN	\$60.00	100.0	20.0	120.0	\$0.67
MINIMUM	\$25.00	0.5	0.3	0.8	\$0.01
MOST COMMON	\$70.00	100.0	5.0	30.0	\$5.00

Cellular services are evolving quickly; however, they suffer from limited bandwidth and coverage. Metro service providers focus on commercial customers, including wireless access providers. Most long-haul providers have no interest in local markets but may be interested in network assets, especially if they are part of a larger system. Companies *without* infrastructure in the area are prospective customers/partners too.

²² “MRC” is monthly recurring cost. Some providers did not publish upload speeds; those were conservatively assumed to be 1/5 of published maximum download speed. “Thruput” is aggregate download and upload speeds. “MRC/Mbps” is the monthly cost per Mbps of bandwidth.

Strategic Considerations for Partners

The key strategic consideration for *Access Sonoma Broadband*'s partners, or network customers, is that ***they are private, profit-driven entities that generally do not like competition***. The incumbents have used predatory pricing to discourage competition and long-term contracts to lock in customers. Their profit motive can cause them to under-invest in infrastructure, support, and systems. Aversion to competition can surface as unwillingness to collaborate with local governments or other anchor institutions.

Access Sonoma Broadband provides prospective customers and partners with the opportunity to enter new markets cost effectively. Based on community participation, *Access Sonoma Broadband* facilitates service agreements for specific areas and/or types of network users that can range from exclusive to highly flexible. Providers have complete control over their access infrastructure, which *Access Sonoma Broadband* helps to site, deploy, and harden. They are approached, cared for, and “sold” as customers, which means building relationships with key personnel, methodically analyzing their goals, interests, needs, and pain-points, closing deals, and collecting revenue from them.

7. Action Plan

This action plan expands on key focus areas from the *Sonoma County Broadband Strategic Plan*. As the lead agency for public broadband development, the Sonoma County Economic Development Board (EDB) would incubate *Access Sonoma Broadband*, acting as its advisory board at least initially. The EDB is responsible for creating a charter for *Access Sonoma Broadband* and establishing its scale and scope. All of this depends, as discussed above in “Business Model,” on the extent of the infrastructure, which depends on stakeholder input. Practically, stakeholders must be engaged to define and establish the organization before infrastructure is developed.

OUTREACH

Access Sonoma Broadband’s initial outreach begins internally to execute the business model and the rest of this action plan. With EDB support, personnel begin outreach to local governments, other community anchors, and citizens to determine the specific form for the organization as well as the extent of its infrastructure. During this outreach, *Access Sonoma Broadband* identifies areas and specific locations to be connected. It also works with appointed and elected officials to adopt and implement broadband-friendly policies.

A range of agencies are involved in broadband-friendly policies. *Access Sonoma Broadband* engages development, engineering, legal, planning, permitting, and public works officials with the cities, county, and state. It advocates with elected officials for network infrastructure, in general, and policies that expedite its development. The authority provides boilerplate or model language and facilitates a dialogue with other stakeholders, particularly providers, to finalize and implement policies.

Most of Access Sonoma Broadband’s outreach focuses on community investors. Initially, the outreach focuses on making the business case for *Access Sonoma Broadband* and determining how community investors invest and how the authority is structured. For example, some unincorporated areas may want to establish county service areas, others may not. Or, existing districts may agree to allow *Access Sonoma Broadband* assets to be co-located with their assets in return for co-ownership, revenue shares, or service commitments.

Once the authority is established, *outreach focuses on identifying and addressing needs and opportunities*. A critical issue *Access Sonoma Broadband* addresses is equity and inclusion. The fundamental principle is that connecting everyone generates the greatest overall benefits. Some areas of the County are relatively costly to connect. Some consumers cannot afford to pay for broadband. Therefore, it may be necessary to waive fees/taxes to low-income families, for example, which will require means testing.

As discussed above, the focus of this outreach should be to improve quality of life as well as place and to increase competition and productivity. Broadband is only a means to these ends. *Access Sonoma Broadband provides a practical vision for using*

broadband to achieve valued outcomes for its community members. This also means identifying additional resources for actual solutions rather than just promoting broadband without a concern for how or whether it is used.

Generally, the authority needs broad support, if not a consensus, from community investors to reach all areas of the County. It also needs providers to agree to serve all, regardless of income or location. There will inevitably be trade-offs, such as discounting leases to providers in return for service commitments. *Access Sonoma Broadband has systems for identifying, engaging, and analyzing inputs from the full range of stakeholders.* This system includes formal and informal data-gathering via surveys and discussion groups as well as ongoing relationship management.

Last, but certainly not least, *outreach involves selling to providers.* *Access Sonoma Broadband* methodically identifies prospective customer providers, their representatives, and market interests. The focus of this outreach is ubiquitous, competitive connectivity. The extent and phasing of this outcome largely depends on where providers are willing to deploy services. Therefore the goal of provider outreach is to make the market as attractive as possible and eliminate any barriers or objections on the part of providers.

Tasks:

1. Confirm the EDB as interim advisory board.
2. Reach out to key city and county personnel regarding broadband-friendly policies and connectivity requirements:
 - a. Operations/Public Works
 - b. Permitting and Planning
 - c. Information Technology
3. Reach out to community associations, institutions, and special districts.
4. Formulate tactics to reach prospective business and residential community investors and get pre-commitments from them, including support for expanded or new special broadband district.
 - a. Email campaign
 - b. Social media campaign
 - c. Collaborating institutions
5. Document community demand for services and willingness to invest via surveys, discussion groups, etc.
6. Identify prospective customer providers and research the companies, particularly key representatives, and engage them to determine:
 - a. Expansion interests and plans
 - b. Cost structure; interest in infrastructure
 - c. Operating and marketing requirements

- d. How to recruit providers, e.g., Request for Information (RFI) or Request for Proposals (RFP)
7. Develop formal agreements with collaborators and customers.

ORGANIZATION

Access Sonoma Broadband must formalize as its own independent entity to develop, manage, and market broadband infrastructure. Using this action plan as a foundation, ***Access Sonoma Broadband initially operates under the Sonoma County Economic Development Board*** before developing into its own independent entity. With support from an Advisory Committee, EDB can guide *Access Sonoma Broadband* through the initial development and planning phases required to establish a new independent entity. EDB is a valuable resource for general outreach, as well as gathering and maintaining data about infrastructure assets and the communities, locations, and organizations the infrastructure connects. Eventually, *Access Sonoma Broadband* will establish its own system for this, but will initially use EDB's resources, as well as other county department services.

EDB researches the organizational options and process. *Access Sonoma Broadband* can develop into many different corporate structure options, including a community facilities district, community service district, county service area, and/or joint powers authority, but will require a thorough analysis to ensure its overall success and sustainability. Choosing the operating structure is a pivotal decision that allows *Access Sonoma Broadband* to pursue a variety of opportunities without facing major restrictions due to its legal structure. Eventually, *Access Sonoma Broadband* should be able to negotiate agreements with Sonoma County, the cities, and existing authorities to take ownership of publicly owned network infrastructure, access public financing, or make independent decisions to expand.

Once the Advisory Committee approves a business plan and operating structure for *Access Sonoma Broadband*, EDB staff will take the plan to the Sonoma County Board of Supervisors for approval to complete the formalization process. ***A formal entity is established***, which may operate as an umbrella for more geographically focused organizations, depending on stakeholder interest and legal allowances. For example, it may be appropriate or necessary for *Access Sonoma Broadband* to be organized as a joint powers authority, or a community facilities district. To the extent that the authority serves unincorporated parts of the County, it may involve county service areas or community service districts. Regardless of form, *Access Sonoma Broadband* has administrative, marketing/partnership, and operating units that are respectively responsible for its organizational, outreach, and infrastructure functions.

Tasks:

1. Confirm the EDB as interim advisory board.
2. Research the legal viability of a broadband authority and its optimal form (Community Facilities District (CFD), Community Services District (CSD), Joint Powers Authority (JPA), etc.). Consider utilizing existing entities in the interim to leverage funding opportunities and transition later.
3. Draft authority charter and present to the board for approval.
4. Conduct a campaign and vote as necessary to establish the authority.
5. Work with Sonoma Local Agency Formation Commission (LAFCO) and other stakeholders throughout this process to formalize *Access Sonoma Broadband*.

INFRASTRUCTURE***Access Sonoma Broadband starts with the County owned backbone infrastructure.***

Initially, the authority capitalizes on the SMART fiber, but it primarily focuses on the WilTel duct system long term. The backbone functions as a springboard to develop the middle-mile segments as well as a means to connect them to each other and the world. Similarly, the SMART fiber is a short-term step to the WilTel duct. Each step provides revenue to fund the next and adds value to the previous.

Tasks:

1. Confirm the restrictions on use for commercial purposes, disposition of, and access to the SMART fiber.
2. Engage community anchor investors/local governments in planning about how to best use the SMART fiber.
3. Conduct a field survey of the WilTel duct to specify its location, preliminarily assess its condition, and ensure that the route is marked.
4. Thoroughly assess the WilTel duct to determine needed improvements and repairs.
5. Design and construct additions to the WilTel duct to (a) close gaps, (b) establish laterals, and (c) make necessary repairs.
6. Determine whether and where to deploy fiber in the WilTel duct, based on demand and funding.

The middle-mile routes are built in phases based on funding and stakeholder input.

Vertical assets are developed along the backbone and middle-mile routes to support radio access network (RAN) infrastructure and can be used in the short-term to extend *Access Sonoma Broadband's* core infrastructure via point-to-point microwave links. The authority seeks out partners, including the community anchors and special districts, as well as providers, to co-invest in this infrastructure.

Tasks:

1. Develop high-level designs of middle-mile routes based on community investor participation and customer provider interests.
2. Identify other funding sources and prioritize development accordingly.
3. Develop low-level design and construct the middle-mile routes.
4. Deploy providers' access infrastructure.

Generally, *Access Sonoma Broadband* does not have access infrastructure. The authority's access investment focuses on high-cost and low-income areas. It also works with owners of large facilities to deploy provider-neutral access infrastructure where needed, such as locations with limited space for network gear or cellular dead spots. *Access Sonoma Broadband collaborates with partners to establish distribution points* where access infrastructure, such as antenna and optical splitters, is located to serve the community.

ADOPTION

In alignment with outreach, organization, and infrastructure deployment, *Access Sonoma Broadband develops adoption programs to support underserved communities with additional technology access and digital literacy training resources*. In addition to supporting inclusive and equitable access for underserved demographics, adoption programs may supplement the organization operationally with more staff and resources, allowing it to increase its chances of success and sustain long term.

Tasks:

1. Conduct community outreach to identify adoption access issues and locations
2. Align community needs with available funding sources and other partners
3. Apply for grant funding and implement programs.