NAVAJO COUNTY, ARIZONA

Broadband Strategic Plan

FINAL DRAFT
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Magellan ADVISORS

www.MAGELLAN-ADVISORS.com

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1. Executive Summary

High-speed internet has been tied to many pillars of community sustainability, including economic development, education, healthcare, and quality of life. The COVID-19 pandemic has also reinforced the importance of high-speed internet as a digital lifeline for communities. In response, the federal and state governments have allocated significant funding for broadband to empower local communities with high-speed internet.

In early 2021, Navajo County (the County) retained Magellan Advisors to develop a Broadband Strategic Plan that assesses the opportunities for Navajo County to improve high-speed internet for its communities. The objectives of this Plan are intended to inform County leadership of tangible steps that can be taken by Navajo County to enhance the availability of broadband for years to come. Key aspects of the planning process included:

- Analysis of Navajo County's current broadband market conditions
- Assessment of current and future need for broadband among residents and organizations
- Evaluation of partnership opportunities for collaboration with public and private entities
- Development of a high-level design for a countywide broadband network
- Identification of funding opportunities to pay for new network infrastructure
- Creating actionable recommendations for proceeding with implementation of this plan

Several workshops were conducted to speak with stakeholders about their needs and broadband issues. An online survey tool with an embedded speed test was also deployed to collect additional information about the performance of current internet services and future needs. Speed test results revealed that much of the County is not currently receiving broadband level services, defined by the Federal Communications Commission (FCC) as always-on high-speed internet connections with a minimum speed of 25/3 mbps[1]. The current market lacks competition and customers experience frequent slowdowns and occasional outages due to lack of redundancy and aging infrastructure. Overall, outreach to the community has confirmed that there is significant need for better broadband connectivity throughout all areas of the County.

[1] Speeds are in megabits per second (Mbps) download over megabits per second upload, commonly expressed as "download/upload mbps."

The asset assessment and market analysis revealed that there are few fiber-optic assets available in the County. Much of the existing infrastructure is aging coax, which is being used by the two primary internet service providers to deliver services. Although one of these primary providers does have fiber-optic infrastructure in some areas of the County, many households and businesses are not getting adequate speeds and reliability due to a lack of availability, redundancy and capacity.

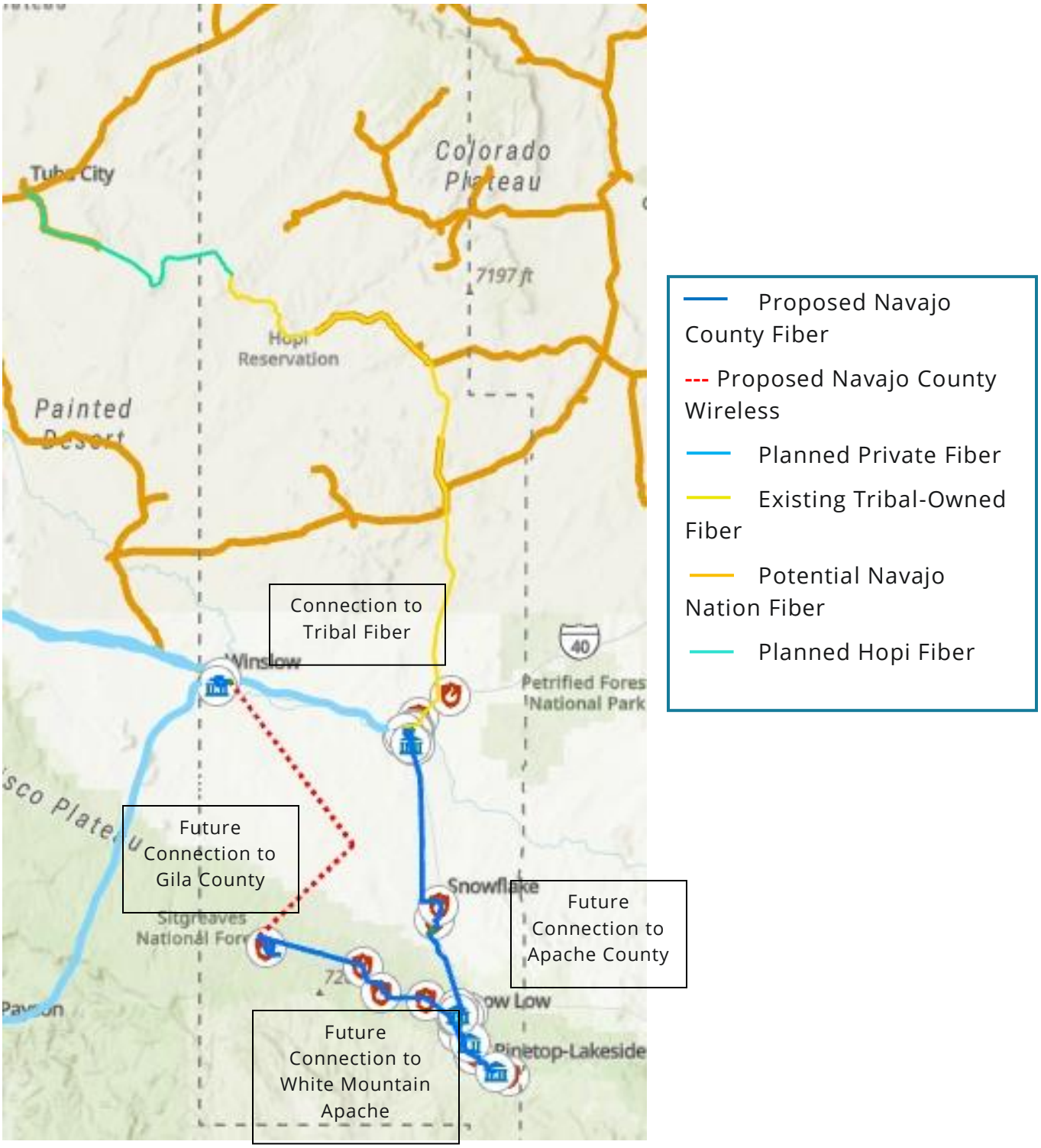
There are some plans for new broadband infrastructure to be built in the area, including a plan for Arizona Public Service (APS) to run a new fiber line from Payson to the Cholla Power Plant in Joseph City, which will provide some additional backhaul but will not directly serve most of the County. In the north, Hopi Telecom has plans to deliver fiber-to-the-home services throughout the Hopi Reservation and Navajo Nation is considering plans to invest in fiber to some of their chapter houses as well as bolstering wireless coverage on the Nation. Other broadband planning projects are also underway in the Township of Kayenta and the Dilkon Chapter areas of Dilkon, Indian Wells, Jeddito, Teesto, Whitecone, and Greasewood Springs. In the south, Sparklight is pursuing grant funds through the National Telecommunications and Information Administration's Rural Broadband Grant program, with the County as a partner, to complete a fiber-to-the-home buildout in Heber-Overgaard, a critically underserved community that will greatly benefit from this investment. The White Mountain Apache Tribe is also pursuing funding to build out fiber on its Reservation lands. While all of these investments are beneficial to Navajo County, additional actions will need to be taken to ensure that all residents and businesses have the services and reliability they need.

Navajo County should make investments in new fiber-optic infrastructure along the County's major corridors in a County-owned middle-mile network that will connect County facilities and anchor institutions such as healthcare providers. This middle-mile fiber infrastructure will lower the cost of investment for new internet service providers looking to enter the market by lowering their costs to deploy services in Navajo County. The service providers can use the County's middle-mile fiber infrastructure as a jumping off point to make last-mile connections including fiber-to-the-home and potentially fixed wireless solutions that will reach residents in each of the communities that the middle-mile fiber runs through. The infrastructure can be leased to these internet service providers on a non-exclusive, non-discriminatory basis, allowing the County to increase options for high-speed internet for its residents and businesses while also potentially generating revenue that can be reinvested for the network's maintenance and/or further expansion. The network will also connect County facilities, ensuring continuity of operations and enabling critical public safety communications.

The network design, shown below, includes new fiber that runs through many of the County's commercial areas as well as passing residential locations. New underground routes, shown in red, are indicated in locations where poles do not currently exist to support fiber. In locations where poles do exist today, new aerial routes are indicated, as shown in blue. New wireless connections, shown in pink, are planned from Heber-Overgaard to Winslow, providing a redundant connection within the County that creates a resilient ring architecture along Hwy 377, Hwy 40, Hwy 77, and Hwy 260.

Outside of the County, additional redundancy is created by interconnecting to a variety of existing and planned fiber assets, including those planned by APS that will run from Payson to Cholla and along Highway 40, existing assets in Apache County that are owned by the County and ATNI/Commnet/Geoverse, and a fiber route used by the Navajo Nation and Hopi Telecom to connect into Holbrook, which currently runs north along Highway 77.

Figure 1-1. Map



Although there is existing privately-owned fiber along Highway 77 south of Holbrook to Pinetop-Lakeside and along Highway 260 between Show Low and Heber-Overgaard, speed test results indicate that its capacity may be limited. Building additional fiber along these routes would ensure that there is enough capacity within the County to

support the needs of its communities, as well as opening the market for new internet service providers to enter, creating a more robust, competitive broadband environment.

Navajo County should develop partnerships for interconnecting this new fiber infrastructure with its neighboring counties. Perhaps most critically, a partnership with Gila County should be developed to establish a connection west from Heber-Overgaard and down into Phoenix to an internet point-of-presence (POP). Alternatively, the County could partner with the White Mountain Apache Tribe in the south to create a connection along Highway 60 into Phoenix in coordination with the Tribe's planned fiber build. Connecting with Apache County's planned middle-mile fiber network (built in partnership with Geoverse/ATNI/Commnet) in McNary will also provide additional redundancy for both counties, as well as further incentivizing last-mile service providers to invest in the area.

By connecting to existing fiber on Highway 77 north of Holbrook, the network also provides a partnership opportunity with the Navajo Nation and Hopi Tribe. The network benefits these Tribal communities, which have plans to provide fiber-to-the-home or wireless services to their residents, by providing an additional option for backhaul that connects back to Phoenix. This option will allow entities such as the Navajo Nation and Hopi Telecom additional redundancy and capacity through the region, which ensures that the Tribal networks have the bandwidth and reliability needed to provide broadband to their communities.

Navajo County's network is also incorporated into a larger regional strategy for a redundant fiber ring that runs throughout Northern Arizona as designed for the Northern Arizona Council of Governments (NACOG) Broadband Strategic Plan. This regional strategy uses existing and planned public and private broadband assets to create a network that spans across Apache, Navajo, Yavapai, and Coconino Counties, providing vast middle-mile infrastructure that can be leveraged by last-mile providers to enter into many communities where broadband is sparse today. Navajo County should continue to partner with NACOG in realizing this strategy and work with NACOG to pursue funding for the portions of the network that are in Navajo County.

Additionally, the County should develop partnerships with last-mile internet service providers to deliver services to neighborhoods throughout Navajo County. While the County's fiber network will provide a backbone, last-mile providers will need to deliver service to the homes and businesses in the County. Navajo County should work to lower barriers that stand in the way of internet service providers provisioning services to potential customers. This includes working with the providers to ensure a streamlined permitting process, providing letters of support for grant funding applications to serve key communities, and, when possible, offering the use of public properties and assets

including leasing County-owned fiber from the network proposed in this Plan. For example, as previously stated, incumbent provider Sparklight is pursuing grant funding options for providing fiber-to-the-home services for residents in Heber-Overgaard through NTIA. The County should support providers in pursuing such grants that will benefit underserved communities and, when possible, allow the use of County properties in Heber-Overgaard which may make the build more feasible.

The cost of building the network is estimated to be approximately $17 million, as shown in the Bill of Materials provided in Appendix A of this plan. This investment could be made by Navajo County over a number of years, with an upfront investment of $10 million to begin deploying infrastructure that connects County facilities, passing businesses and households that are located between each connection site. Additional construction should take place as the additional $7 million in funds become available. A phased deployment of the network could be accomplished over the next 3-5 years, depending upon the availability of funding. Navajo County should develop a phased implementation plan for the network as a next step to this Plan.

Several opportunities exist for funding the network, including grant and loan programs at both the state and federal level. Most immediately, the County should allocate $10 million of funds through the American Rescue Plan Act, the guidelines for which specifically call out use of funds to deploy new broadband infrastructure in underserved communities. These funds will go further by leveraging them as a match for grant opportunities including the recently released Arizona Broadband Development Grant for which Navajo County intends to submit an application. Funds may also be made available through the Coronavirus Capital Projects Fund and through potential Federal infrastructure funding, both of which will likely be overseen by the State of Arizona. Additionally, programs such as the United States Department of Agriculture Rural Utilities Service Reconnect Grant and Loan Program could fund portions of the project in proposed service areas where the population is 20,000 or less.

Next steps for Navajo County to implement the recommendations of this Broadband Strategic Plan include:

1. ***Allocate available funds to begin designing and deploying County-owned network infrastructure in a phased approach, beginning with connecting County facilities, anchor institutions, and businesses and residents along the recommended routes***. The County should conduct detailed design engineering for the network as well as allocating funds in the amount of approximately $10 million to begin construction and to be leveraged as a match for grant opportunities including the Arizona Broadband Development Grant. Whether or not grant funds are awarded, the $10 million will allow the County to begin the first phase of construction, which should be to

connect County facilities in Show Low to those in Holbrook, completing a large portion of the network that will pass by many residents and businesses. Upon completion of this Plan, Navajo County should develop a phased implementation plan to determine exact network construction locations and timeline for the remaining portions of the network based on awarded grant funds.

2. ***Pursue additional funding opportunities through federal and state grant and loan programs and cost-reducing strategic partnerships to build additional infrastructure.*** Navajo County should be ready to apply for federal and state grant programs including the Arizona Broadband Development Grant and Coronavirus Capital Projects Fund that will be administered through the State of Arizona. The County should also determine locations where ongoing Federal programs such as Reconnect would be most effective for providing smaller funding amounts that will help offset costs of deployment. The Bill of Materials contained in this plan can be used to demonstrate that the project is shovel-ready for any of the grant funding opportunities. In addition, Arizona Public Service (APS) has expressed interest in potentially joint building fiber with the County along Highway 77, which could significantly reduce the costs of deployment. Salt River Project (SRP) has also expressed an interest in investing in Navajo County's broadband efforts as a part of their effort to assist coal-affected communities. Such private funding strategies should also be considered by the County.

3. ***Engage with incumbent and new-entrant providers to establish agreements about the use of County-owned assets including provisions for last-mile delivery of broadband for businesses and residents.*** Partnerships with last-mile service providers will be critical to the success of the network. The County should develop and maintain relationships with providers that are interested in the use of these assets to ensure that both the needs of the communities and the service providers who will provision service are being balanced as the County's infrastructure is deployed. Agreements for the use of any County assets should be non-exclusive and non-discriminatory so as to bring in as much competition as possible and ensure that the County is able to maintain local control. This is often best accomplished through an RFP process once the assets have been built.

4. ***Work with Tribal partners including the Hopi Tribe, Navajo Nation, and White Mountain Apache to ensure the successful implementation of their planned broadband projects.*** Although few survey responses were received from Tribal communities, other data point to the fact that Tribal areas in Navajo County are some of the most critically underserved. Each of the three Tribes is currently pursuing efforts to address these

issues, and Navajo County is a critical partner to ensuring their success. The County should engage in ongoing conversations with its Tribal partners to provide support wherever possible for these projects, which includes providing the backhaul for their last-mile networks as recommended in this Plan.

5. *Stay involved with regional partners including NACOG, Apache County, Gila County, Arizona Public Service, and Salt River Project regarding regional network development efforts.* The rural nature of Northern Arizona makes it crucial that communities work across jurisdictional boundaries to coordinate broadband infrastructure deployment and grant opportunities. Coordination with partners such as APS and SRP could reduce the County's costs for infrastructure within the County. Going outside of the County provides options for connecting backhaul routes that tie into internet points of presence in metro areas including Phoenix and Flagstaff, as well as additional options for redundant loops that run along existing highways or pole lines. The County should continue working with NACOG, Apache County, Gila County, APS, and SRP on fulfilling a regional broadband vision, as well as coordinating the pursuit of funding opportunities to manage overlap.

6. *Create workflows to review capital projects, permits, and development agreements to economically build network infrastructure.* The County should develop processes for opportunistically expanding broadband infrastructure in the County including frequent review of planned capital projects, permit applications, and development agreements that create opportunities for deploying conduit and/or fiber. Installing broadband infrastructure while the ground is already being excavated is a cost-saving measure that can reduce the costs of building such infrastructure by up to one-third. Any new commercial or housing developments should be fiber-ready to ensure that new residents and business owners have the services they need immediately upon moving into Navajo County.

7. *Develop governance for the network including a broadband working group that brings together key partners including municipal agencies, public safety entities, schools and libraries including Northland Pioneer College, healthcare providers such as Summit Health, and interested service providers.* This group should meet on at least a quarterly basis and make recommendations about use cases, proposed network expansions, and funding for the network. The group should also consider any ongoing local broadband efforts among municipalities, schools, and other key stakeholders and how to incorporate them into the County's network and overall strategy.

2. Background

Navajo County has struggled with an absence of reliable, affordable broadband options for many years. Located in the picturesque White Mountains region of Northern Arizona, the County is the historic home of trading posts, national parks, and thriving indigenous communities including the Navajo Nation, the Hopi Reservation, and the White Mountain Apache Tribe. Today, Navajo County's principal industries include tourism, healthcare manufacturing, timber production and ranching.

In the wake of the COVID-19 pandemic, Navajo County is capitalizing on the opportunity to reposition itself. The increased prevalence of remote work allows for many people who once only visited Navajo County to become permanent residents, taking advantage of the natural beauty of the area while still maintaining high-paying jobs. The out-migration of populations from urban to more rural areas has been a welcome byproduct of the pandemic among many rural communities such as Navajo County.

To realize the opportunity, broadband service must be available for residents to work from home. Residents will also expect to have broadband that supports other needs such as online learning and telemedicine. Although broadband has become increasingly beneficial to communities, little investment has been made in Navajo County's broadband infrastructure. Internet service providers (ISPs) are private companies that by design must create a profit for shareholders, which drives decisions about where they will invest. Due to the low population density of Navajo County, the business case for investing in the region has not been realistic for most ISPs, leaving residents and businesses with few options for high-speed connectivity.

Recognizing this need, Navajo County has commissioned the development of this plan, which calls for investment by the County in critical broadband infrastructure to support its growing communities. Unlike privately owned internet service providers, the County does not have a profit motive and can make investments now that will have a positive impact for years to come. Hundreds of cities and counties across the US have done just that, implementing fiber and wireless networks for economic development and quality of life.

2.1 BROADBAND INFRASTRUCTURE OVERVIEW

The term "broadband" refers to high-speed internet services that provide users access to online content including websites, television shows, videoconferencing, cloud services, or voice conversations. These applications can be accessed and shared through a variety of technologies including personal computers, smartphones, tablets, and other

connected devices. Although demands for this high-speed data are rapidly increasing, the Federal Communications Commission (FCC) defines broadband speeds as at least 25 Mbps downstream and 3 Mbps upstream. Cable, DSL, fiber, and wireless are the prime broadband delivery systems used to meet these demands by connecting users to the internet.

Fiber-optic cables (or just "fiber") are strands of glass the diameter of a human hair that carry waves of light. Unlike other connections that carry electrons across copper wire, fiber supports fast, reliable connections by using photons across glass, giving it the capacity to carry nearly unlimited amounts of data across long distances at spectacularly fast speeds. Because of this speed and reliability, fiber is considered the gold standard for supporting broadband across the full spectrum of devices and applications. Fiber's usability and resiliency have brought fiber to the forefront of broadband, making it a highly desired asset for all entities, public and private, that own or control it. The availability of a reliable, cost-effective fiber connection creates opportunities for the communities it serves.

Figure 2-1 illustrates the relative difference between common internet connection methods, comparing access technologies from basic dial-up service through DSL, cable, and fiber. Whereas traditional broadband technologies have an upper limit of 300 Mbps, next-generation broadband that utilizes fiber-optic connections surpasses these limitations and can provide data throughputs of 1 Gbps and greater.

Figure 2-1. Physical Bandwidth Capacity Comparisons

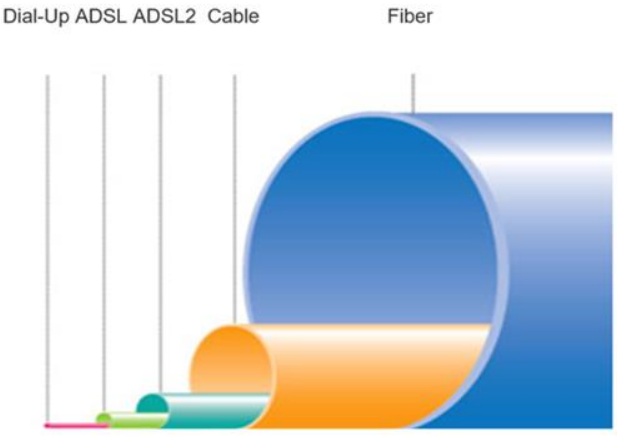
Dial-Up – 56Kbps
- *Legacy Technology*
- *Shared Technology*

ADSL – 10Mbps
- *First Generation of DSL*
- *Shared Technology*

ADSL2 – 24Mbps
- *Second Generation DSL*
- *Shared Technology*

Cable – 150Mbps
- *Data Over Cable (DOCSIS 3.0)*
- *Shared Technology*

Next Generation Fiber – 1Gbps
- *Passive Optical, Active Ethernet*
- *Shared and Dedicated Technology*



2.2 BROADBAND BENEFITS TO COMMUNITIES

Broadband supports community needs including telemedicine, aging in place, distance learning, and telecommuting. The COVID-19 pandemic has accelerated the long-term trend of digitalization of business processes, the economy overall, and everyday life. The pandemic is accelerating shifts and trends toward internet technologies and business

trials. Perhaps the obvious example is the boom in Zoom meetings but there are many other trends developing or accelerating as well, including an increase in remote telework and distance learning. The proportion of companies ramping up globally on automation technologies will at least double over the next two years, according to a Bain survey of nearly 800 executives.[2] The Wall Street Journal recently pointed out that

> "The coronavirus pandemic is deepening a national digital divide, amplifying gains for businesses that cater to customers online, while businesses reliant on more traditional models fight for survival. The process is accelerating shifts already under way in parts of the US economy in ways that could last long after the health crisis has passed…"[3]

From a community perspective, interconnection of billions of devices allows evolution of smart cities, smart homes, smart schools, safer and autonomous vehicles, and a safer, healthier, smarter place to live. From a business perspective, interconnection of devices provides data previously unavailable to inform operations, enhance decision-making and automate/innovate in the production process.

> "There is an even broader belief that using broadband to make home-based entrepreneurs a major economic development force, with 52% of respondents saying this is a likely outcome and another 25% who have had personal experience in this area." - International Economic Development Council

According to Global Workplace Analytics in 2018, telecommuting continues to grow year after year. In fact, some analysts predict that 30% of workers in industrialized countries will be telecommuting within just a few years. It's already higher than that in some industries and regions. When allowing telecommuting, employers benefit by saving money and by increasing productivity. The benefits of working from home are plentiful, but telecommuters need high quality next generation broadband in order to take full advantage of this arrangement.

Remote aspects of healthcare, both monitoring and acute care, increase demand on bandwidth through the use of robotics and haptic devices. All telehealth fields are growing, including teletherapy and telepsychiatry, with universities and colleges needing real time access to licensed counselors for interventions. Policies in remote imaging, cardiology, and transmission of Electronic Health Records are expected to increase demands further with needs for low latency becoming increasingly critical.

[2] "Pandemic Speeds Up Corporate Investment in Automation"; The Wall Street Journal, April 9, 2020.
[3] "Crisis Speeds Up Economy's Shift"; The Wall Street Journal, April 2, 2020.

"Aging in place" is a term used to describe seniors living in the place of their choice for as long as possible, while getting the services they require, and all needs met without moving in with children or being placed in a nursing or assisted living facility. New gadgets and technological advancements have been made to make "aging in place" easier and more attainable for the growing population of seniors. Home-based telehealth, or home health monitoring solutions, keep physicians in touch with patients and monitor their health without visiting an office. There have been other advances including but not limited to fall detection systems, wearable sensors that collect real time health data, and stove guards.[4] Reliable, high-speed internet access is required for these new technological advances, and the retirees of Navajo County would see value in being able to utilize these products and services.

> "As more research on housing prices and home Internet access surfaces, the value of FTTH deployments appears to be on the rise. A 2014 study by the consulting firm RVA LLC revealed a $5,250 increase in the value of a $300,000 home. Now, according to the newest study, a similar increase in value can be seen in homes worth half this amount." – Fiber-to-the-Home Americas

Housing prices increased by 50% in one year when Google decided to locate a data center in the City of The Dalles, OR, on account of its advanced technological infrastructure and high-speed municipal broadband access. A study by the Fiber-To-The-Home Council and the University of Colorado showed that single family homes that boast a FTTH connection are worth, on average, 3.1% more than their fiberless counterparts. As the testimonial above confirms, high-speed fiber-based networks are a critical component to growth and maintenance of local economies in the Digital Age.

The availability and affordability of broadband has become a driver for decisions about where people and companies locate. Infrastructure that supports a competitive environment for affordable, reliable, redundant broadband services must be readily available in areas where residential and commercial developments exist today or are being planned and built. By commissioning this Broadband Strategic Plan, Navajo County joins hundreds of local governments throughout the US that have taken it upon themselves to ensure widespread access to reliable, affordable high-speed broadband that will support their communities into the future.

[4] http://aginginplace.com

3. Current Broadband Market Analysis

3.1 BROADBAND AVAILABILITY

To analyze the current broadband environment in Navajo County, we used a number of resources including data from federal agencies such as the Federal Communications Commission (FCC) and National Telecommunications and Information administration (NTIA) as well as third party resources and information provided by the incumbent providers. Based on all available data, broadband availability in Navajo County is sporadic at best. While some of the larger markets such as Holbrook have a choice in provider, many other locations either have only one choice in provider or do not have broadband internet (as defined by the FCC)[5] available at all.

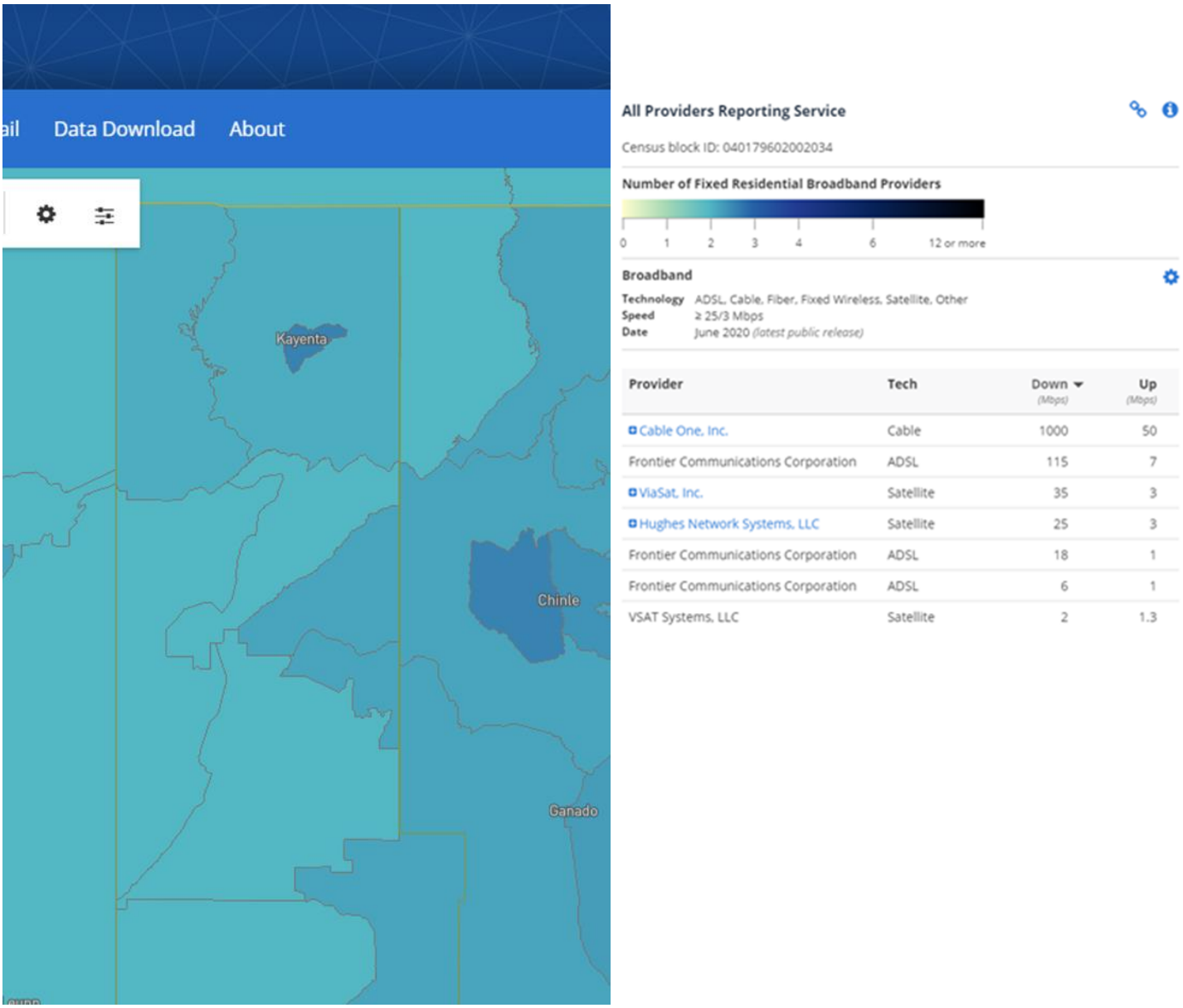
It is estimated that approximately 56,000 people in Navajo County do not have access to 25/3 broadband[6]. This equates to half of Navajo County's 110,000 population being left without options for high-speed connectivity.

Even in cases where there are multiple providers, the majority of the County only has two options for broadband-level service providers (Frontier or Sparklight) since the other available options are satellite, which we do not consider broadband due its high latency and unreliable speeds. The FCC maps below display this lack of availability. Areas in dark blue have more incumbent providers and areas in lighter blue have fewer.

[5] The FCC defines broadband as minimum speeds of 25 mbps download and 3 mbps upload.

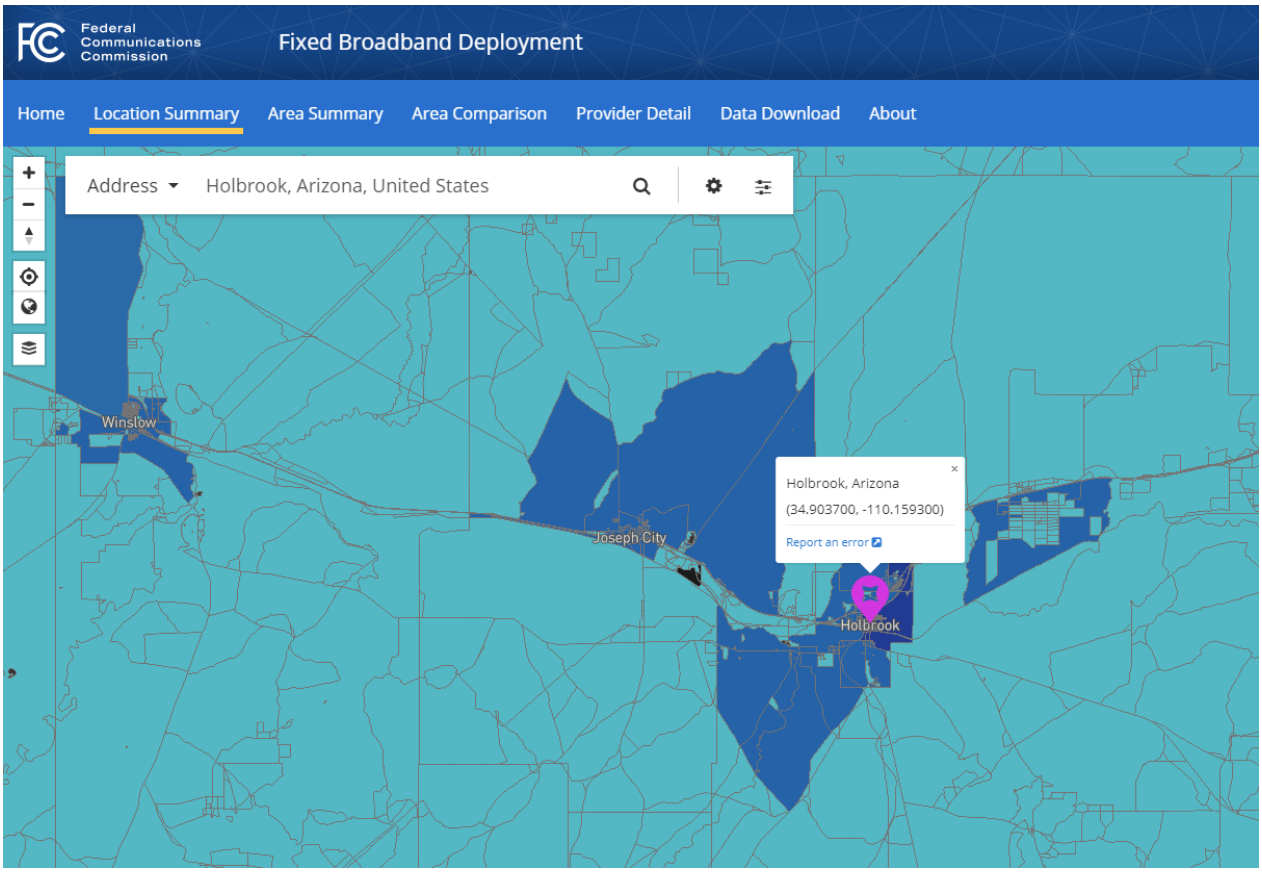
[6] According to Broadband Now, an online database of internet service offerings in communities across the US. www.broadbandnow.com

Figure 3-1. FCC Map: North County



In the northern part of the County, there are very few options for fixed broadband service. Sparklight (formerly Cable One) appears to be available in some areas, as is Frontier. However, overall, most locations in northern Navajo County only have one provider.

Figure 3-2. FCC Map: Central County



All Providers Reporting Service

Census block ID: 040179602002034

Number of Fixed Residential Broadband Providers

0 1 2 3 4 6 12 or more

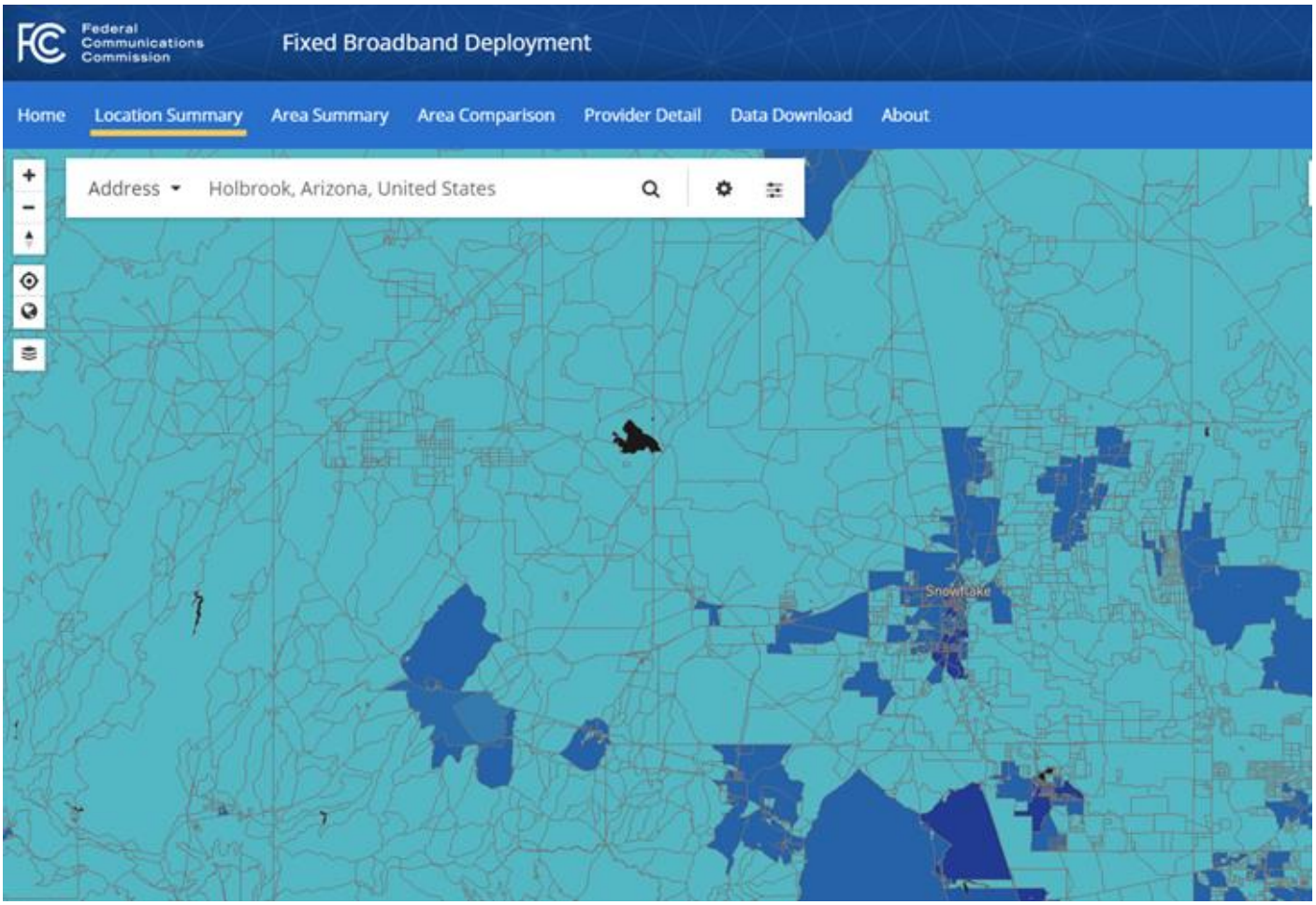
Broadband

Technology ADSL, Cable, Fiber, Fixed Wireless, Satellite, Other
Speed ≥ 25/3 Mbps
Date June 2020 *(latest public release)*

Provider	Tech	Down (Mbps)	Up (Mbps)
Cable One, Inc.	Cable	1000	50
Frontier Communications Corporation	ADSL	115	7
ViaSat, Inc.	Satellite	35	3
Hughes Network Systems, LLC	Satellite	25	3
Frontier Communications Corporation	ADSL	18	1
Frontier Communications Corporation	ADSL	6	1
VSAT Systems, LLC	Satellite	2	1.3

In the central part of Navajo County, more populated areas along the I-40 corridor like Holbrook, Joseph City, and Winslow have multiple service offerings, mostly from Frontier and Sparklight. Areas outside of the I-40 corridor, however, have few to no options for broadband.

Figure 3-3. FCC Map: South Central County



All Providers Reporting Service

Census block ID: 040179602002034

Number of Fixed Residential Broadband Providers

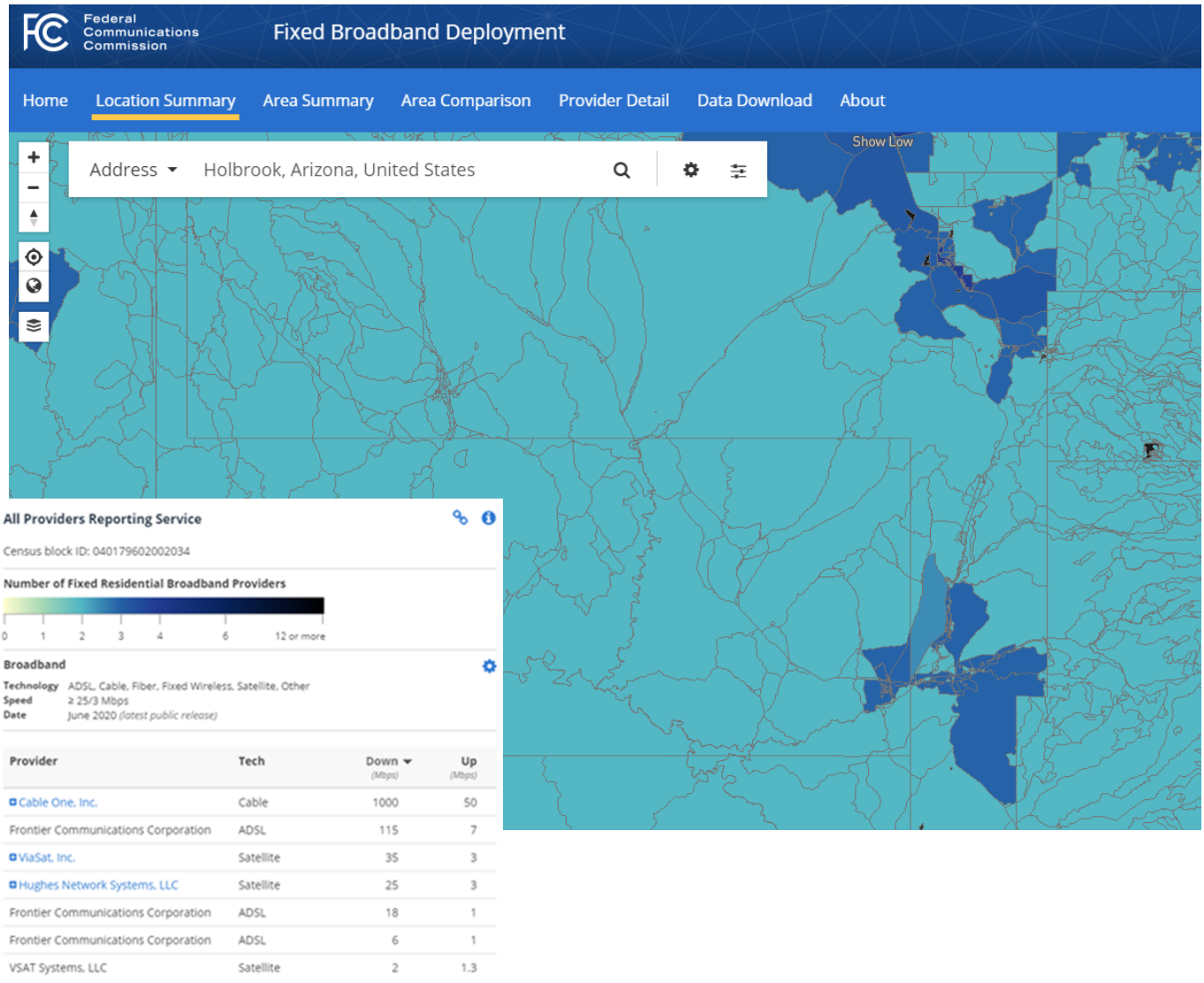
0 1 2 3 4 6 12 or more

Broadband

Technology ADSL, Cable, Fiber, Fixed Wireless, Satellite, Other
Speed ≥ 25/3 Mbps
Date June 2020 *(latest public release)*

Provider	Tech	Down (Mbps)	Up (Mbps)
Cable One, Inc.	Cable	1000	50
Frontier Communications Corporation	ADSL	115	7
ViaSat, Inc.	Satellite	35	3
Hughes Network Systems, LLC	Satellite	25	3
Frontier Communications Corporation	ADSL	18	1
Frontier Communications Corporation	ADSL	6	1
VSAT Systems, LLC	Satellite	2	1.3

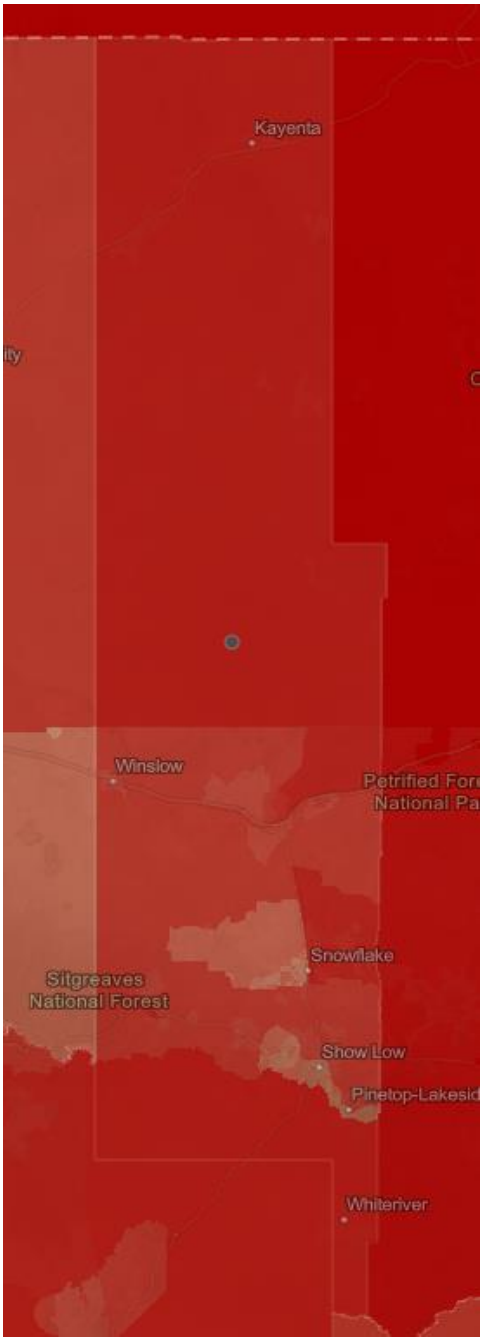
Figure 3-4. FCC Map: South County



In the southern part of the County, more populous areas along Highway 77 such as Snowflake/Taylor and Show Low have service offerings from both Frontier and Sparklight. However, as with the rest of the County, outside of these areas, coverage is sparse.

Based on the NTIA's Indicators of Broadband Need mapping data, many areas within Navajo County are in need of additional service offerings. The map below indicates need for broadband based on a variety of data points including number of providers, household broadband adoption, and average speeds, as reported by the NTIA and other federal agencies including the Census Bureau and the FCC.

Figure 3-5. NTIA Indicators of Broadband Need Map – Navajo County[7]



Legend

Level	Indicator of Broadband Need	Yes	No	No Data
County	Speed Tests - M-Lab Median Speeds Fixed Broadband Below 25/3 Mbps			
	Usage - 75% or More of Devices Connect to Microsoft Updates/Services via Fixed Broadband Download Speeds below 25 Mbps			
Census Tract	Speed Tests - Ookla Median Speeds Fixed Broadband Below 25/3 Mbps			
	American Community Survey - 25% or More of Households Report No Internet Access			
	American Community Survey - 25% or More of Households Report No Computer, Smartphone or Tablet			
Census Block	FCC Form 477 – No Provider Reports Consumer Fixed Broadband Services at 25/3 Mbps			NA

Areas shaded in darker red have more need for broaband based on these factors. The area north of I-40, the area south of Pinetop-Lakeside, and many of the areas outside of population centers are shaded dark red, indicating wide ranging need for additional service offerings.

[7] Source: https://broadbandusa.maps.arcgis.com/apps/webappviewer/index.html?id=ba2dcd585f5e43cba41b7c1ebf2a43d0

As the major incumbents, Frontier and Sparklight are well entrenched in the most populous communities. Below is more information about Frontier and Sparklight, including summaries of their service offerings. Note that all service offerings are not available in all locations; the availability of plans depends upon Frontier or Sparklight having cable or fiber infrastructure in the location where service is being provided.

Wireline Providers

Frontier is a former independent local telco (Citizens Communications Company) that made several acquisitions, including assets in Arizona, before changing its name in 2006. The company filed for bankruptcy in 2020 and sold much of its wireline infrastructure but continues to operate in Navajo County. While Frontier does have some fiber assets available in Navajo County, most of its existing infrastructure is legacy DSL, so the availability of the fiber plans in the table below is limited. A representative from Frontier indicated that although there are some plans to expand fiber through federally funded projects on the Navajo Nation, the company does not have plans for extending or improving infrastructure in Navajo County, and indeed throughout Arizona and is prioritizing other locations with denser populations as it emerges from bankruptcy. A summary of Frontier's current offerings in Navajo County is provided in the table below.

Table 3-1 Summary of Frontier's Service Offerings in Navajo County

PACKAGE	SPEED[8]	MRC[9]	MRC PER MBPS[10]	NOTES
		FRONTIER		
DSL	30/5	$49.99	$1.43	No data caps, no installation fees, modem w/ wifi included
200 MBPS FIBER	200/200	$49.99	$0.12	1-year promo rate, regular rate is $59.99. No data caps, no installation fee, modem w/ wifi included.
500 MBPS FIBER	500/500	$49.99	$0.05	1-year promo rate, regular rate is $59.99. No data caps, no installation fee, modem w/ wifi included.

[8] Speeds are in megabits per second (Mbps) download over megabits per second upload. All speeds cited in this section are those advertised by providers and should be considered maximum possible speeds. Actual speeds are likely to be lower.

[9] MRC is "monthly recurring cost."

[10] This metric is the MRC divided by the total aggregate throughput, downstream plus upstream.

940/880 MBPS FIBER	940/880	$74.99	$0.04	3-year promo rate, regular rate is $84.99. No data caps, no installation fee, modem w/ wifi included.

Sparklight (Formerly Cable One) is a major US provider of broadband internet services, delivered over both fiber and coaxial cable infrastructure. Sparklight primarily provides residential internet service but offers TV and phone service. For businesses, Sparklight offers broadband access as well as other solutions including cell tower backhaul and business ethernet. Today, Sparklight has fiber infrastructure along many of Navajo County's major corridors and provides fiber-based services to several of the most populous areas. The company plans to continue extending its infrastructure to provide additional service offerings in communities that it does not currently serve including Heber-Overgaard, where current services are limited. A summary of Sparklight's current offerings in Navajo County is provided below.

Table 3-2 Summary of Sparklight's Service Offerings in Navajo County

SPARKLIGHT

PACKAGE	SPEED[11]	MRC[12]	MRC PER MBPS[13]	NOTES
STARTER 100 PLUS (CABLE)	100/10	$39.00	$0.35	6-month promo rate, regular rate is $55.00. Data cap of 350 GB/mo.
Streamer & Gamer 200 Plus (Cable)	200/20	$65.00	$0.30	Data cap of 700 GB/mo.
Turbo 300 Plus (Cable)	300/30	$80.00	$0.24	Data cap of 1200 GB/mo.
GigaOne Plus (Cable)	1000/50	$125.00	$0.12	Data cap of 1500 GB/mo.
Fiber Internet 300 (FIBER)	300/300	$55.00	$0.09	1-year promo rate, regular rate is $75.00. Data cap of 700 GB/mo. Modem included.
Fiber Internet 600 (Fiber)	600/600	$65.00	$0.05	1-year promo rate, regular rate is $85.00. Data cap of 1200 GB/mo. Modem included.

[11] Speeds are in megabits per second (Mbps) download over megabits per second upload. All speeds cited in this section are those advertised by providers and should be considered maximum possible speeds. Actual speeds are likely to be lower.

[12] MRC is "monthly recurring cost."

[13] This metric is the MRC divided by the total aggregate throughput, downstream plus upstream.

Fiber Internet 1 Gig (Fiber)	1000/1000	$85.00	$0.04	1-year promo rate, regular rate is $105.00. No data caps. Modem included.

Hopi Telecommunications, Inc.

On the Hopi Reservation in northern Navajo County, *Hopi Telecommunications, Inc.* (HTI) offers DSL and fixed wireless internet services. HTI is wholly owned by the Hopi Tribe and serves approximately 10,000 customers on the Reservation. Although offerings currently top out at 15 mbps, HTI recently received federal funding to build additional fiber infrastructure across the Reservation and plans to provide fiber-to-the-home internet access across the communities it serves, primarily those along the 264 corridor between Jeddito and Moenkopi, with redundant paths connecting from Holbrook to Tuba City. These plans are discussed in more detail in the Partnership Opportunities section of this Plan.

Satellite and Fixed Wireless Providers

HughesNet and *ViaSat* are the "traditional" non-terrestrial ISPs. Neither of these companies provide connections that meet the FCC's 25/3 Mbps standard for broadband (although most DSL services don't meet the standard, either). Therefore, we do not consider satellite services to be broadband for the purposes of this study.

Additionally, *CellularOne Airmax* and *Choice Wireless Broadband* provide fixed wireless services to some locations in Navajo County. Choice Wireless is a division of Commnet/ATNI and partners with Navajo Tribal Utility Authority (NTUA) to offer services primarily to locations within the Navajo Nation. However, like satellite, maximum speeds for both CellularOne and Choice do not meet the federal definition of broadband, topping out at 15/5 mbps.

3.2 FIBER INFRASTRUCTURE IN NAVAJO COUNTY

As indicated above, options for fiber-based broadband services in Navajo County are relatively limited. This is further demonstrated by the maps below[14], which display current fiber infrastructure in the region. As shown, investments in fiber infrastructure in Navajo County have not occurred on a large scale, leaving most locations without access to robust fiber-based broadband.

[14] Source for maps: Fiber Locator

Figure 3-6. Long-Haul Fiber Routes

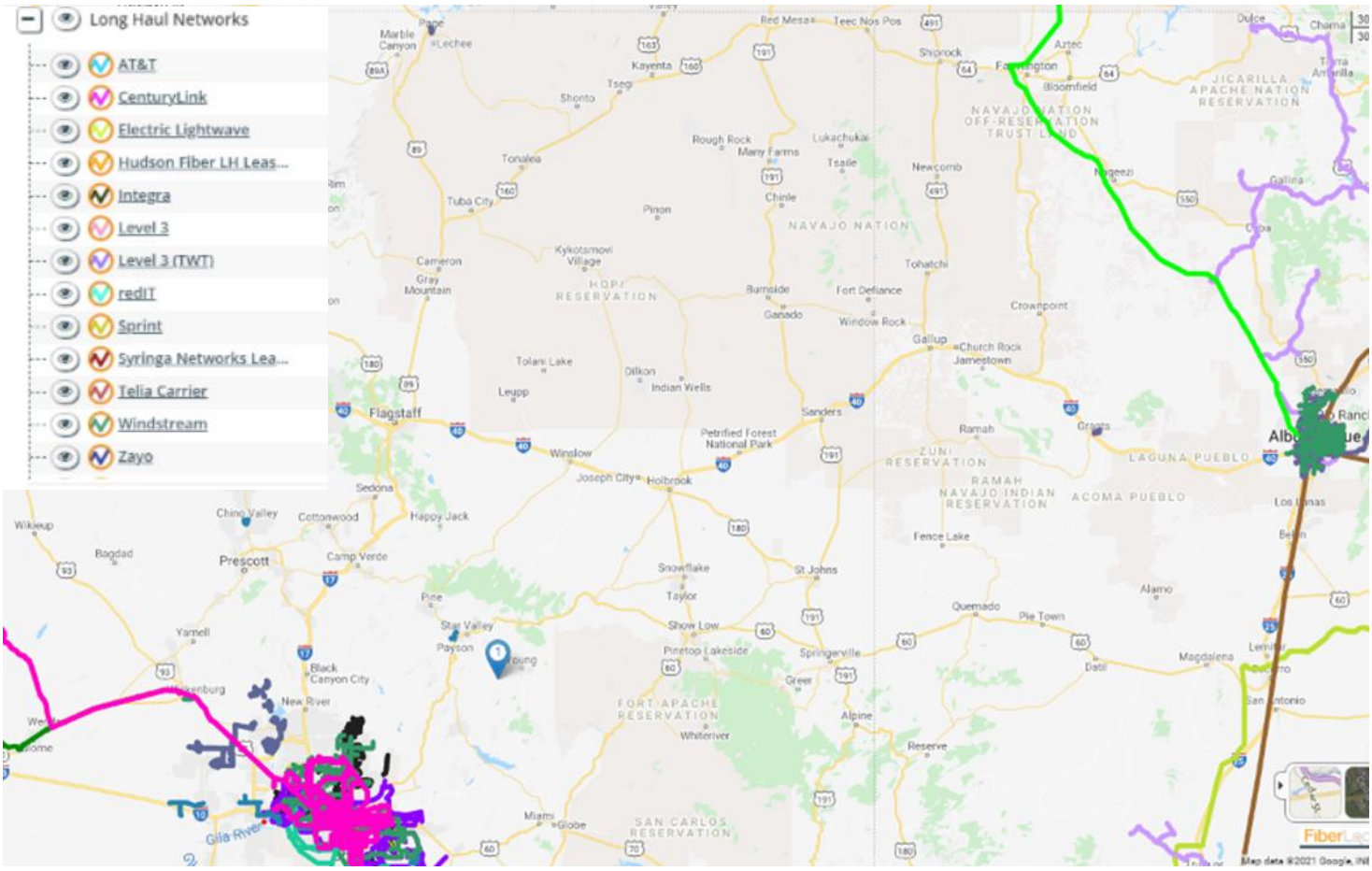
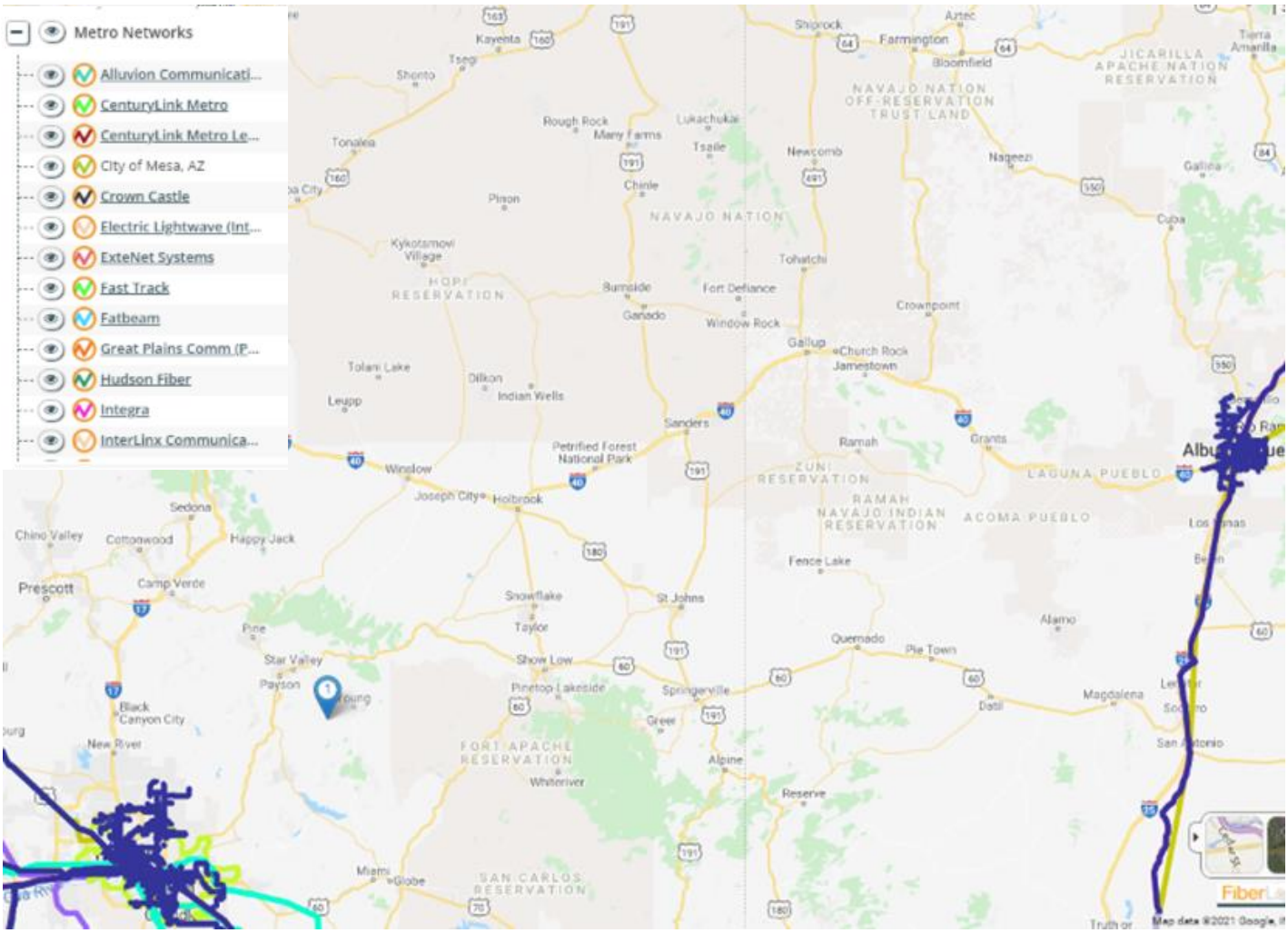


Figure 3-7. Metro Fiber Routes



We note that these maps are self-reported and do not contain all of the fiber infrastructure in the region since some providers decline to provide this information to the database. Our team was able to locate additional fiber in various areas of the County that are not displayed in this report due to various non disclosure agreements required by the infrastructure owners. We are aware that there is also fiber infrastructure owned by the Navajo Tribal Utility Authority (NTUA), mostly within the boundaries of the Navajo Nation; however, due to the sensitive nature of this data, we were unable to obtain specifics about where this infrastructure is located. Frontier also has some fiber in the County, although we were unable to obtain specific information about where it is located. There are plans for future fiber to be deployed in some locations as well, details of which can be found in the Partnership Opportunities section of this Plan.

Although fiber is available to residents and businesses in Navajo County in some locations along major corridors, the infrastructure often does not extend into neighborhoods and there are few routes that provide redundant connections. This

means that if a fiber line is cut in one location coming into Navajo County, entire communities may lose connectivity since there is no backup route to bring connectivity to and from internet points of presence in locations such as Phoenix, Flagstaff, and Albuquerque. As we will see in the Needs Assessment, this lack of redundancy causes major issues for public safety agencies, healthcare facilities, businesses, and residents within Navajo County.

3.3 CONCLUSIONS ABOUT THE BROADBAND MARKET

Overall, the broadband market in Navajo County is limited. Service offerings meeting the federal definition of broadband are limited to just two providers in most areas, although some communities have only one choice. While some investment has been made in deploying fiber infrastructure along major corridors including Highway 77 between Holbrook and Show Low and Highway 260, many of the neighborhoods that are not directly on these routes have few options for broadband. Lack of redundancy also makes the infrastructure that is available subject to outages.

These findings support the need for additional broadband infrastructure to be deployed in Navajo County that will provide resilience and redundancy and reach into more neighborhoods to provide broader coverage across all communities. The Needs Assessment will further explore the community's need for additional broadband investment including analyzing satisfaction with available service options, actual speeds, and needs for additional bandwidth.

4. Needs Assessment

4.1 COMMUNITY STAKEHOLDER WORKSHOPS

To better understand the broadband issues throughout Navajo County, Magellan Advisors and Navajo County conducted a series of stakeholder workshops held from April through August 2021. Our team spoke with a variety of stakeholders from various sectors including:

- City Managers, IT and Public Works
- Healthcare
- Libraries
- Public Safety
- Schools
- Small and Medium Businesses
- Transportation
- Utilities

Workshops included discussions about the current state of broadband in the County, emerging trends and technologies that may change the need for broadband in the future, and opportunities for partnering to enhance broadband availability. Throughout these conversations, a number of issues arose across each group, including concerns about public safety, telemedicine and mobility, the future of learning, and economic development.

Public Safety

Perhaps the most crucial and alarming concerns about the need for better connectivity came from the public safety agencies in Navajo County. Representatives from the Sheriff's office stated that their current connectivity was very, very slow and that their facilities experience frequent outages. Many times it is difficult to even open emails due to the slow connectivity and at other times, the County's 911 service has gone out completely for as much as six hours, leaving citizens with no way to report emergencies. In some cases, the cause of these outages has been fires or other disasters while in other instances, the County is not even provided with a reason for the outages. Public safety agencies worry about their citizens' ability to seek help during an emergency since many times connectivity at homes goes out due to fiber cuts and other issues. Overall, as one participant pointed out, the public safety agencies are doing their part, but can only do so much with the infrastructure that is available to them. Put simply,

> *"We take an oath to provide service, and we are prepared to, but we can't."*

Telemedicine and Mobility

Across the country and around the world, the COVID-19 pandemic has increased the need for options for telemedicine, and this need is especially apparent in the rural areas of Navajo County. Representatives from the local hospital system, Summit Healthcare, recognized the need for telehealth options for their patients before the pandemic. Chronic conditions such as diabetes are common among the population and require ongoing care. However, many of their patients live in remote areas and have mobility issues, so they often are unable to visit clinics for preventative medicine and end up in urgent care situations when their conditions necessitate immediate action. Telehealth options could provide an alternative, allowing patients to seek ongoing preventative care without having to travel the long distances required to visit the hospital. During COVID-19, the hospital developed a COVID At Home program that allows patients to be cared for virtually in order to contain infections and bypass the need for in-person care. Programs such as this and others that allow patients to see specialists in remote locations are growing.

However, participants noted that approximately half of the patient population did not have the connectivity required to conduct virtual visits via video applications, making telehealth an unattainable resource for many households. Patients often live outside of populated areas on large plots of land where investment in broadband infrastructure is lacking. So, while Summit Healthcare continues to expand its telehealth offerings to improve patient care, the organization can only do so much to meet the needs of the community. As one participant put it,

> *"Our ability to provide proactive preventative medicine is hampered by our ability to connect with patients when they are at home."*

The Future of Learning

Like healthcare, education experienced a paradigm shift as a result of the COVID-19 pandemic. Students, teachers, and parents were forced to shift rapidly to online learning environments in order to prevent the spread of the virus. This massive shift revealed the severe digital divides across many communities as students who lacked broadband access struggled to stay connected with their lessons.

In Navajo County, these issues were a concern for stakeholders. Many of the schools already pay exorbitant fees to connect their facilities, as much as $1500 per month for a 50mbps connection in one case. While some of these costs can be offset with subsidies

and grants such as those available through the E-rate program, outages occur somewhat often and stakeholders expressed concern about redundancy and backhaul for their own connections. The prevailing concern among schools and libraries, however, was about the needs of their students to connect to online learning platforms from home. Libraries report occasions of residents coming to their parking lots at all hours of the day and night to access the internet because they don't have reliable connections at home.

All stakeholders recognize the need for students to have access to broadband even when they return to in-person schooling. Research, job training, and other online resources are considered critical for student success. Some schools and libraries discussed the possibility of providing service to their community by deploying wireless towers that could serve the needs of residents. A group of private citizens in Pinedale even investigated this possibility, but found that it was too expensive. All of these stakeholders expressed a willingness to be involved in any project that would enhance options for broadband.

Economic Development

Business owners and operators from a variety of sectors participated in the stakeholder workshops and expressed concern about a similar set of issues. Business locations reported frequent outages and concerns about reliability of their connections. Some were unable to conduct simple point of sale transactions because their internet was down, while others note that getting connected at all is an issue because only one service provider is available in their area and they have a waiting list for new subscribers due to overloaded infrastructure.

The businesses noted a shift toward remote work due to the pandemic as well. Many expressed that this shift was likely to be permanent and were concerned about slow downs as more users in their households required bandwidth throughout the day. Some expressed a feeling of job insecurity due to not having adequate bandwidth. As one stakeholder stated,

> *"For virtual employees, if you can't stay connected, you're afraid you'll get called back to the office or let go."*

In addition to the current commercial sectors in Navajo County, stakeholders pointed out that new businesses were likely on the horizon as more people moved from urban areas to remote areas like Navajo County. The tourism sector was already seeing a resurgence and other burgeoning sectors such as smart agriculture and tech are prime

for areas like Navajo County. For example, there are potential sites along the I-40 and I-77 corridors that are being considered for large-scale egg farms, solar farms, and datacenters, as well as a nascent film industry looking for remote locations. As one stakeholder noted,

> *"Every one of them has questions about broadband; it is as important as power and water."*

4.2 BROADBAND SURVEY

To gain further insight into the current state of broadband and need for future connectivity, Magellan Advisors and Navajo County conducted a broadband survey among businesses and residents of the County. The survey was done in conjunction with the Northern Arizona Council of Governments (NACOG) broadband survey since the larger regional broadband project ran in tandem with Navajo County's project. Key points about the survey's findings are summarized here; a full analysis has been provided to Navajo County.

Out of 934 total survey responses from locations within Navajo County, 842 were households and 92 were organizations.

Table 4-1. Survey Respondent Type: Household vs Organization

TYPE	NUMBER
HOUSEHOLD: LOCATION IS PRIMARILY A RESIDENCE	842
ORGANIZATION: LOCATION IS A BUSINESS, GOVERNMENT, NON-PROFIT, ETC.	92
TOTAL	**934**

With 261 responses, Show Low had the most surveys compared to other locations in the County, followed by Overgaard at 125 responses, and Snowflake at 106 responses. Based on the populations of these towns and cities, we would expect to see more responses from the Winslow area as it is the second most populous town in Navajo County. At just 46 responses, Winslow is underrepresented, whereas Overgaard is overrepresented based on its population. This may be indicative of the level of need for broadband options in each of these communities; locations that have insufficient broadband often garner more community engagement than communities where broadband is less of an issue.

Demographics

The average size of respondents' households was 3 people, comparable to the Census data average size of 3.04. Respondents were slightly older than the general population, with the youngest household member averaging 34 years old and the oldest averaging 56 years old, compared with an average Census age of 37.3 years.

Respondents also had higher level of educational attainment than would be expected based on Census data. Whereas Census data indicate that 15.3% of Navajo County has a Bachelor's degree or higher, approximately 53% of respondents had at least a Bachelor's degree.

When household respondents were asked if there was any member of their household who regularly telecommutes, 54% of 600 respondents indicated yes. The survey also asked respondents to indicate whether or not someone in their household operated a home-based business. Out of 600 respondents, approximately 28% stated that someone did operate a home-based business. Household respondents were also asked about whether anyone in their household requires regular health monitoring or consulting with healthcare providers. Out of 598 total responses, about one third said that someone did.

Of the 46 responses from organizations, most came from services, including ten (10) from Other Service (except Public Administration) and Educational Services.

Internet Services

Most respondents (42%) reported having internet connections via cable infrastructure, followed by DSL (23%) and mobile/cellular wireless (11%). Only 1% of respondents had connections via fiber and 3% reported having no internet access at all at their locations.

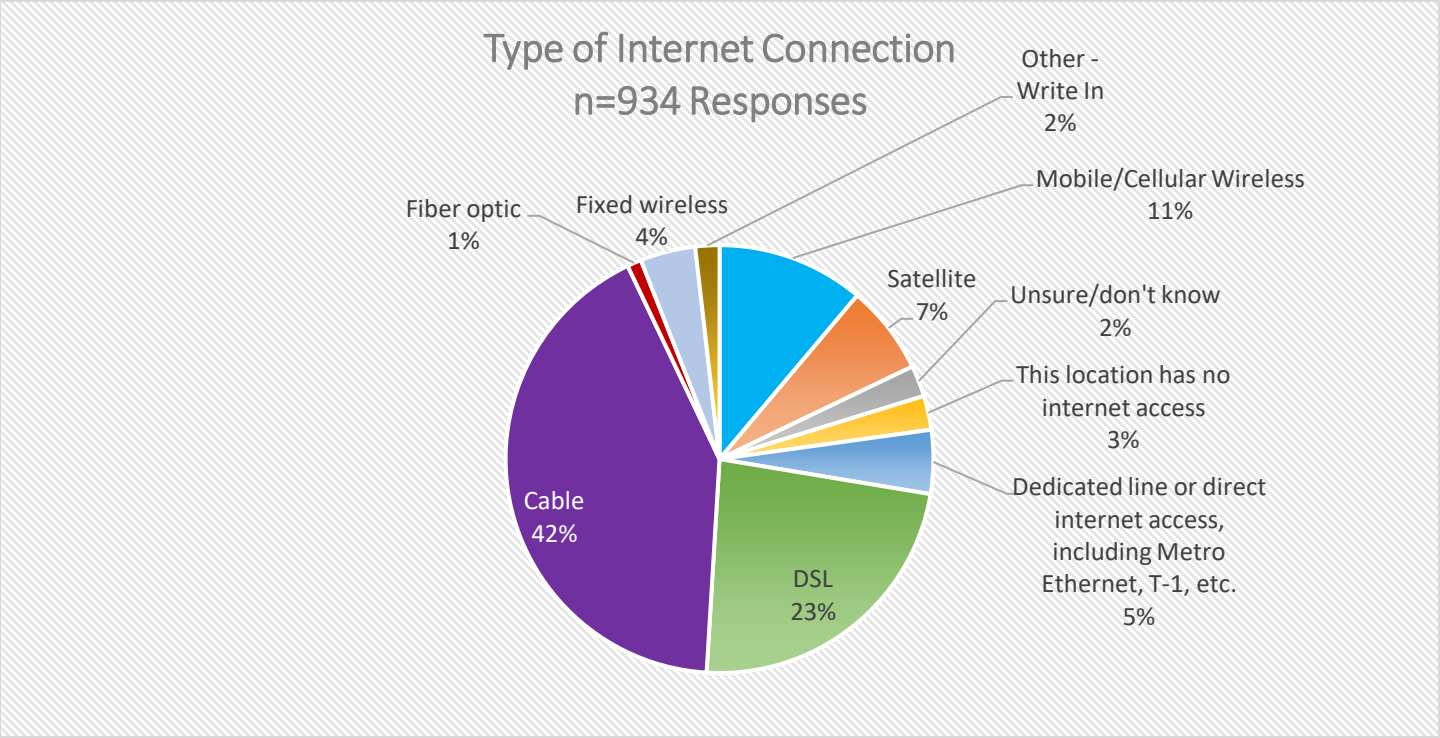
Among respondents who did not have broadband connections, the most important reason was that broadband was not available at their locations, followed by services being too slow and unreliable, and services being too expensive.

Table 4-2. Reasons for No Broadband Connection

	Access Elsewhere	Too Expensive	Too Slow or unreliable	Broadband Not Available	Do not need internet	Smartphone meets needs	Other reason not listed here
1 – Most Important	8	23	35	82	2	8	11
2	4	17	40	18	1	6	2
3	4	25	14	10	0	8	3
4	11	8	6	11	3	17	3
5	13	3	1	6	7	13	5
6	10	3	2	1	16	9	10
7 – Least Important	5	0	3	7	25	4	17
Total	**55**	**79**	**101**	**135**	**54**	**65**	**51**

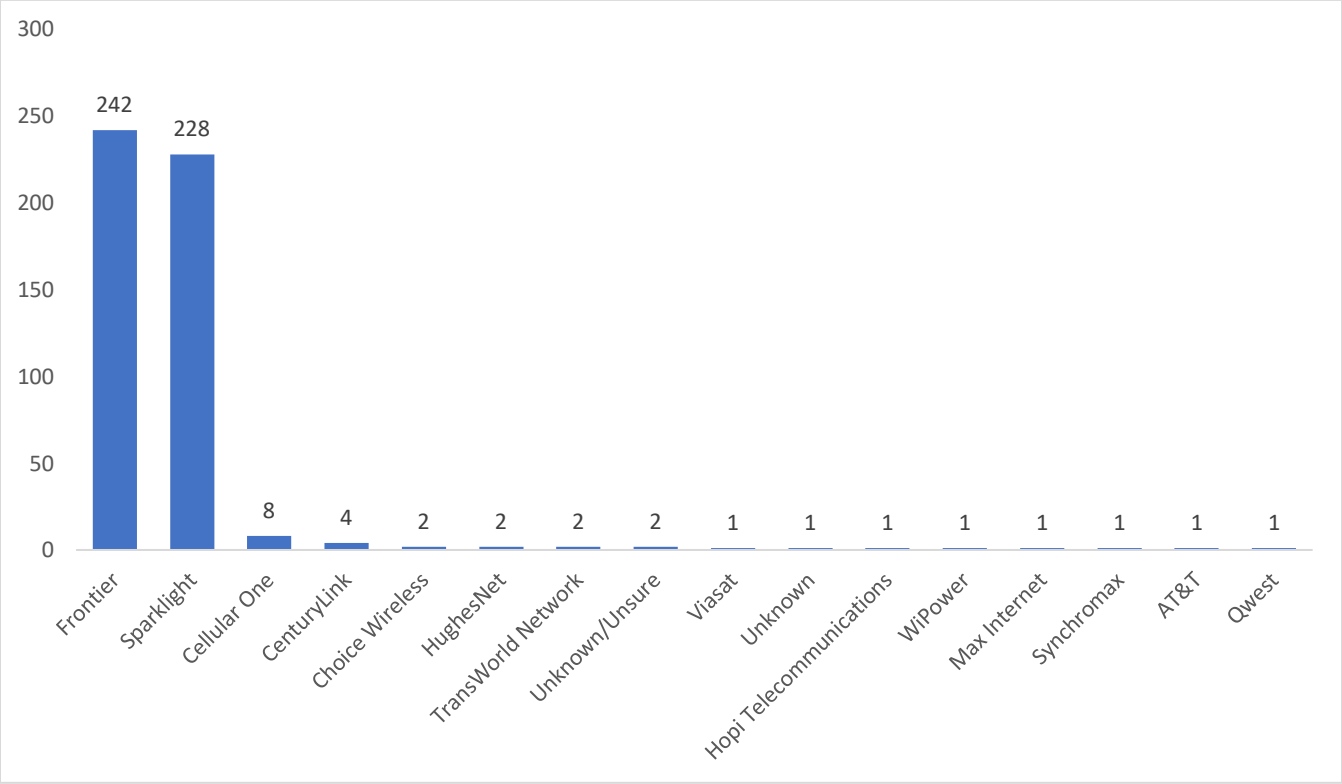
As expected based on the Market Analysis, the majority of respondents indicated that their locations were connected via either cable or DSL. Only 1% of respondents indicated that they were connected via fiber.

Figure 4-1. Survey Respondents' Type of Internet Connection



The majority of survey respondents reported having either Sparklight or Frontier, as shown in the chart below. A small amount had Cellular One, and a few others reported having Cellular One, CenturyLink, or a handful of other providers.

Figure 4-2. Survey Respondents' Internet Service Providers



On average, survey respondents were contracted to receive speeds of 150 mbps download and 93 mbps upload. However, the survey's embedded speed test captured respondents' speeds at an average of just 48 mbps download and 16 mbps upload, indicating that actual speeds are less than a third of contracted best effort. It should be noted that although the survey instructions directed respondents to perform the test while directly connected to a wired internet connection, some respondents may have taken the test over a wifi connection, which may affect the speed data.

Table 4-3. Average Contracted vs. Actual Survey Respondents' Speeds

	Down (Mbps)	*Up (Mbps)*	*Latency (ms)*
Average Contracted Speed	150.03	93.13	N/A
Average Actual Speed	47.66	15.64	172.33

Below are maps of actual download speeds by location, as collected through the online survey instrument using the Measurement Labs speed test. Throughout all areas of the

County, the vast majority of respondents did not have download speeds meeting the federal broadband definition of 25/3, although there were some responses in the central parts of Winslow, Snowflake, and Show Low that had speeds between 300 and 400 mbps.

Figure 4-3. Actual Download Speeds by Location – North County

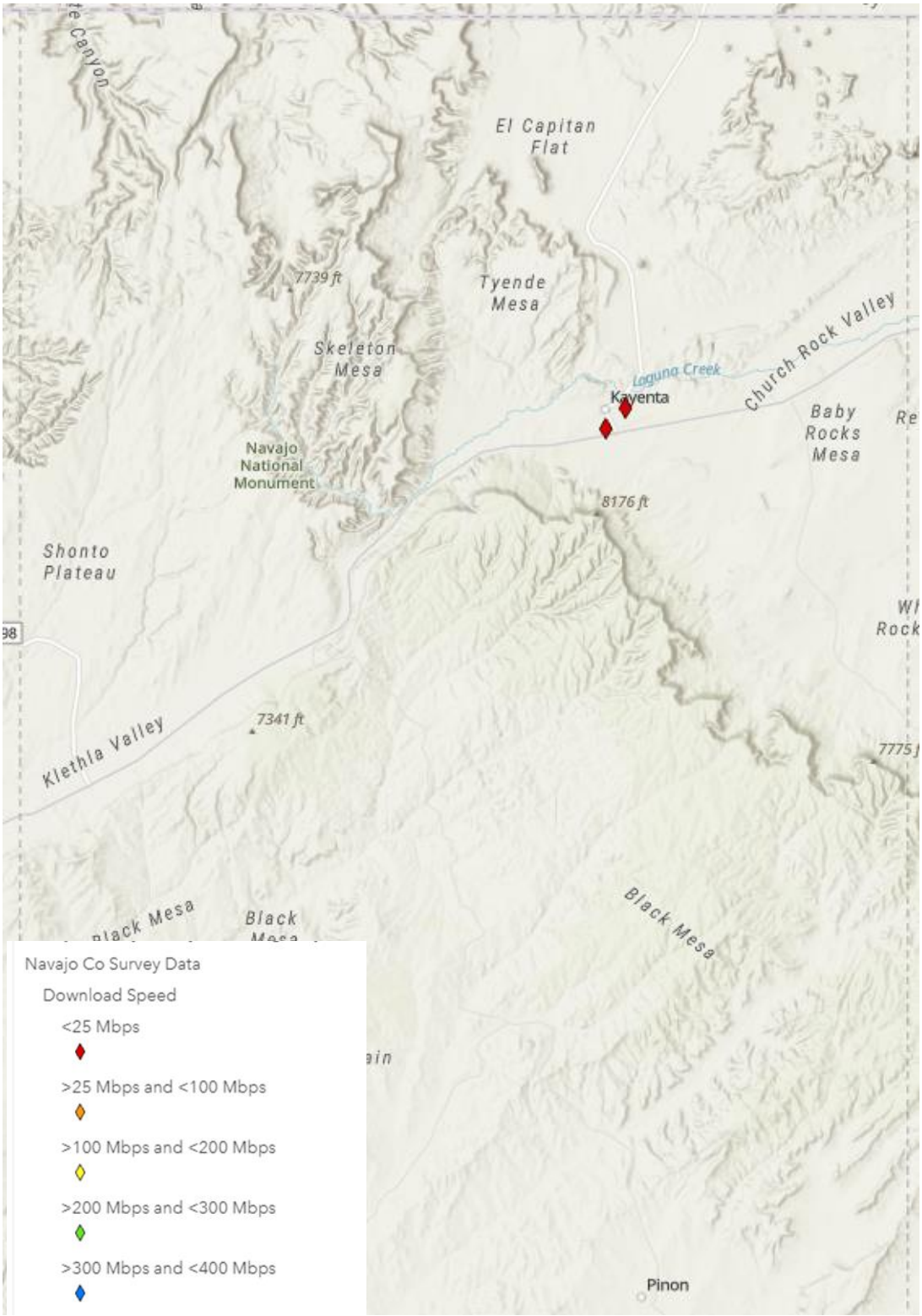


Figure 4-4. Actual Speeds by Location – Central County

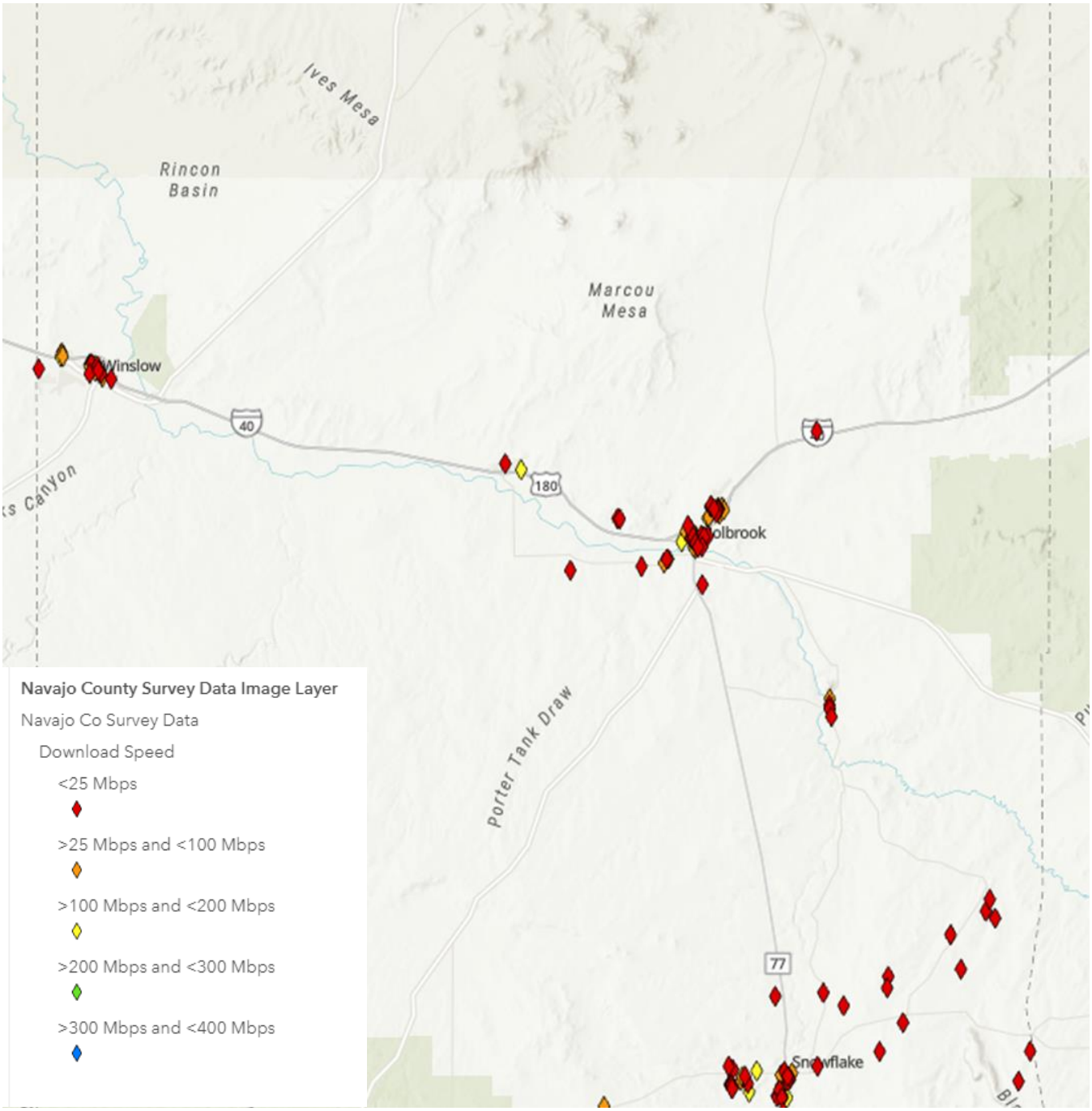
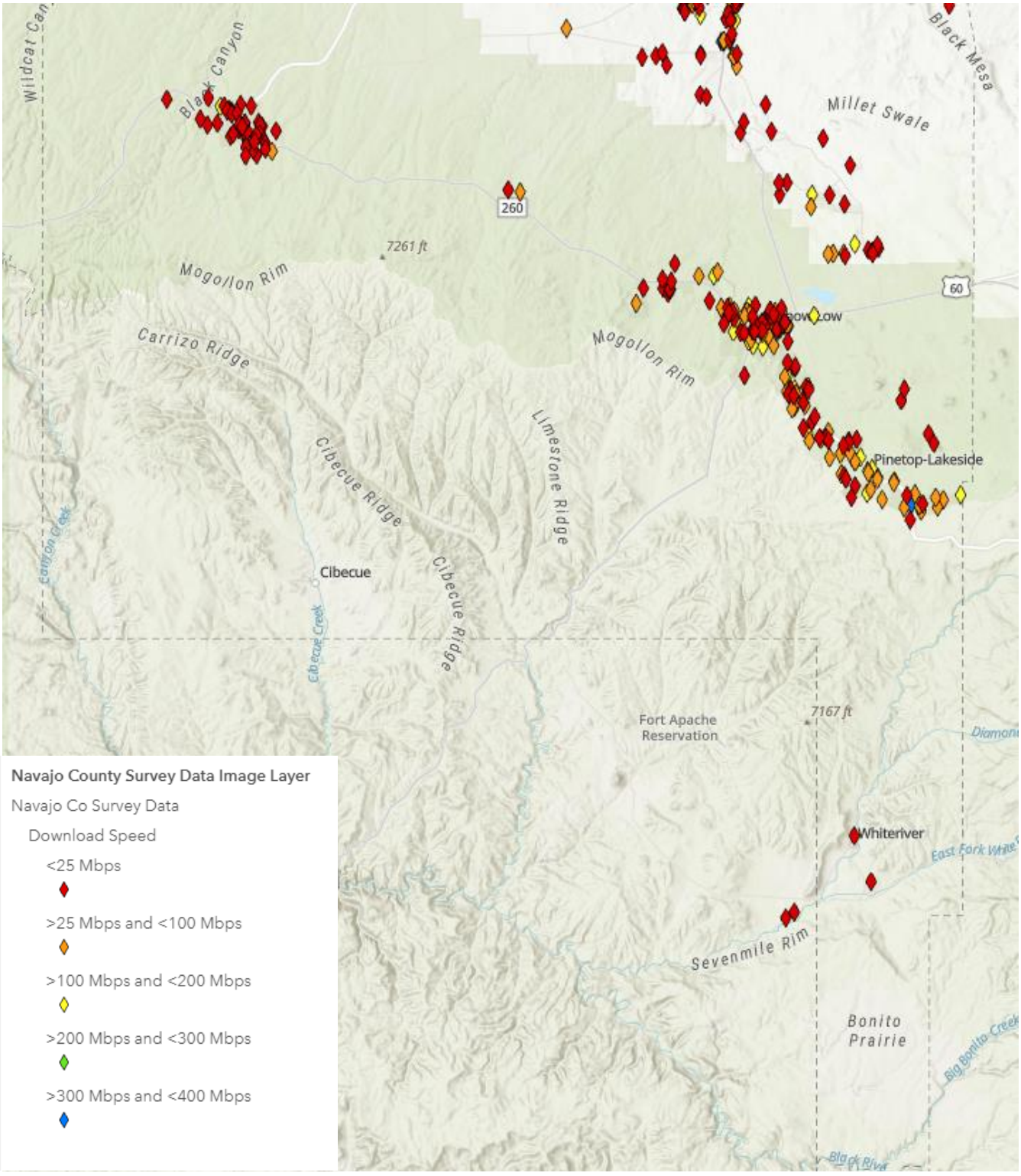


Figure 4-5. Actual Download Speeds by Location – South County



Respondents were also asked how often they experienced service slow downs and outages. As shown in the table below, a majority of respondents indicated that the service slows down daily and service outages lasting less than one day occurred every few months.

Table 4-4 Respondents' Internet Performance

	The service slows down	The service is out briefly	The service is out for less than an hour	The service is out for an hour or two	The service is out for several hours	The service is out for a day or more
Daily, every day	142	74	45	14	10	7
Every few days	115	83	78	38	22	7
Every few weeks	80	115	95	91	63	18
Every few months	77	124	136	170	153	92
About once a year	21	33	57	89	100	91
Less than once a year	9	20	23	37	79	128
Never	12	7	14	15	25	106

Respondents were also asked about their satisfaction with current services based on overall service, speed, price, reliability, and support. Most respondents were overall somewhat satisfied with their service, speed, and support. The most common reason for dissatisfaction was speed and many were somewhat dissatisfied with price and reliability.

Table 4-5. Respondents' Satisfaction with Current Services

	Overall	Speed	Price	Reliability	Support
Very Satisfied	42	34	30	27	35
Somewhat Satisfied	158	146	104	135	139
Neither/Not Sure	36	36	74	38	120
Somewhat Dissatisfied	116	104	149	142	100
Very Dissatisfied	104	137	96	112	58

The cost of broadband service was also relatively high. The average cost for broadband only (excluding all other services such as cable and telephone that might be part of a subscriber's package) was $101.98. This means that respondents were paying an average of $1.61 per mbps. High-speed, fiber-based broadband commonly provides 1 Mbps for less than $0.30 per month.

Table 4-6. Survey Respondents' Average Costs for Service

Average Cost - All Services	$	156.45
Average Cost - Broadband Only	$	101.98

When asked what better broadband mean to them, their family, their organization, and the area, respondents provided comments about a wide ranging set of issues including lack of choice, reliability, speed, and outages. Many also noted the value of bringing better broadband to the region including quality of life and economic development benefits. Below are a selection of comments provided by respondents; a full list has been provided to the County.

Broadband internet would improve working from home while keeping an eye on an elderly family member. – Survey Respondent #215

Better internet would bring peace of mind for my family. Internet outages or slow speeds can affect progress of school for high school student and college student in household. – Survey Respondent #221

My business could be more competitive and more productive in comparison to urban areas. – Survey Respondent #418

It seems as though everybody else in the world has a faster Internet connection than we do. We really need this service due to threat of wildfires and other alerts, including weather related and governmental notices. Besides keeping in touch with friends and family is difficult at these slow speeds. – Survey Respondent #517

5. Partnership Opportunities & Business Model Options

5.1 PARTNERSHIP OPPORTUNITIES

Due to the remote nature of northern Arizona and the need for diverse routes of fiber infrastructure back to major internet points of presence in locations such as Phoenix, Flagstaff, and Albuquerque, we strongly recommend that Navajo County consider partnering with its neighbors, regional planning agencies, and private entities to address its broadband issues.

Fiber infrastructure is generally best deployed along roadways, where there are already existing poles and other utility infrastructure. Due to the fact that many of the roadways in Navajo County connect into other counties, with only one route (Hwy 77) that hits most major population centers in the County, it is advantageous for Navajo County to consider how to partner with neighboring Counties and Tribes, working together to create a regional middle-mile network that will address the broadband issues across several communities that transverse County and Tribal boundaries.

Additionally, the County should consider partnering with private internet service providers, both incumbent and new entrant, to deploy last-mile services to residents and businesses since these organizations have experience as internet service providers. The County and these ISPs discuss joint build efforts as well as potential for bolstering some of the existing fiber assets in Navajo County to increase their capacity, allowing them to add new customers and provide better services to existing subscribers.

Northern Arizona Council of Governments (NACOG)

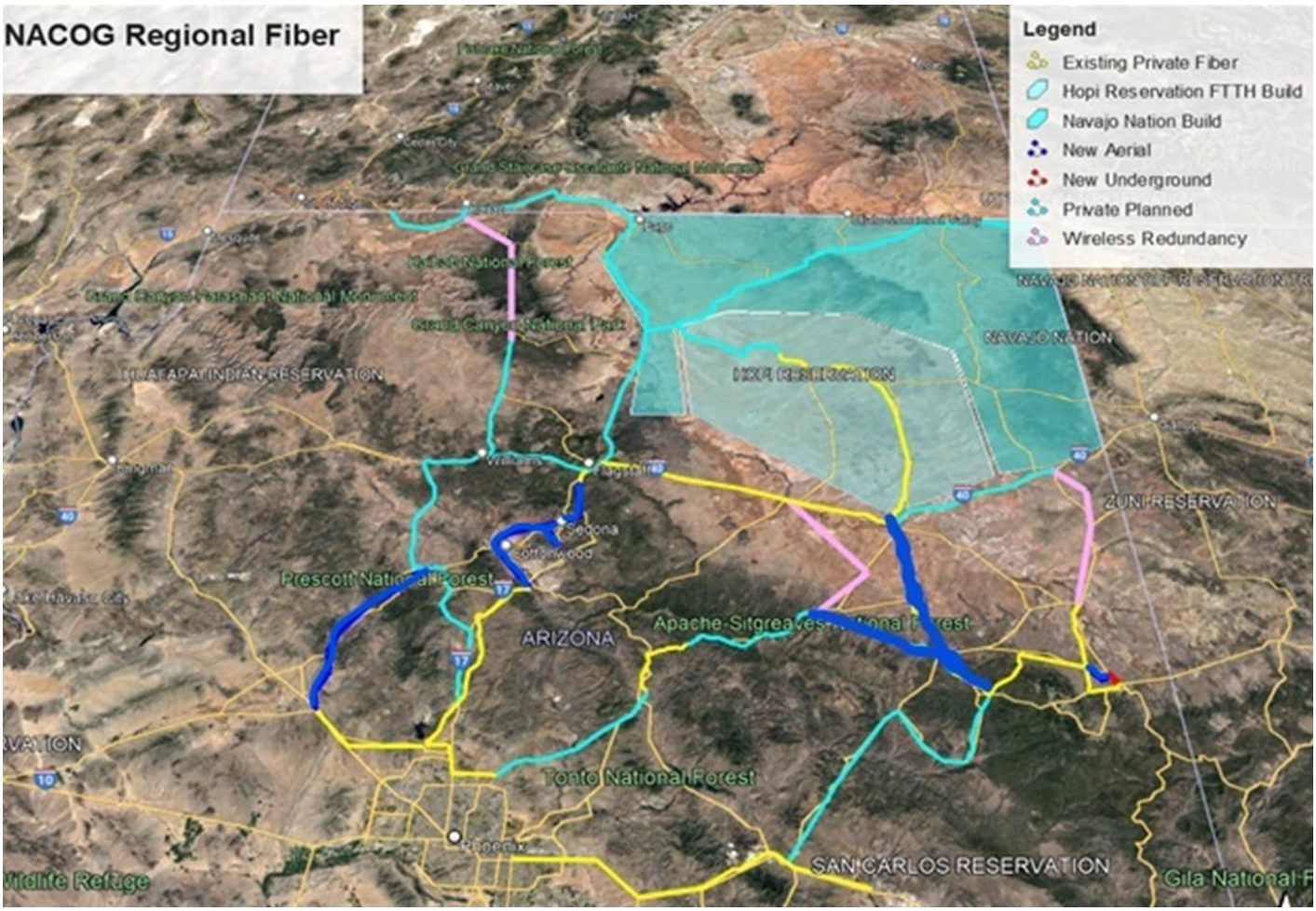
Northern Arizona Council of Governments (NACOG) Economic and Workforce Development commissioned a regional Broadband Strategic Plan to be developed in partnership with Magellan Advisors shortly after the Navajo County Broadband Strategic Planning process commenced. Throughout the course of this Plan's development, Magellan has coordinated the efforts of NACOG with those of Navajo County and NACOG has now developed a regional strategy that includes Navajo, Apache, Coconino, and Yavapai Counties as well as the Tribal entities within the region.

NACOG's Regional Strategic Broadband Plan includes the network design created for Navajo County and integrates that design into the larger region. The network design, shown in the image below, connects an array of privately-owned and publicly-owned existing and planned fiber and wireless broadband routes. Navajo County's proposed

network, as described in this plan, is incorporated into the NACOG regional network design. The regional middle-mile network, much like Navajo County's network, will serve as a jumping off point for new and incumbent ISPs to reach markets that are currently underserved, with last-mile infrastructure being managed through partnerships with ISPs on a local level. The routes provide a series of rings for redundancy throughout the region, with diverse connections to Phoenix and Flagstaff to ensure that service is not interrupted.

Through NACOG, partnerships with neighboring counties as well as other regional entities can be realized, which will be beneficial to Navajo County rather than attempting to act unilaterally. NACOG is organizing the pursuit of grant opportunities that could offset some of Navajo County's build costs as a part of the larger regional network. We strongly encourage Navajo County to work with NACOG to develop the recommended network infrastructure in order to benefit the County and the entire region.

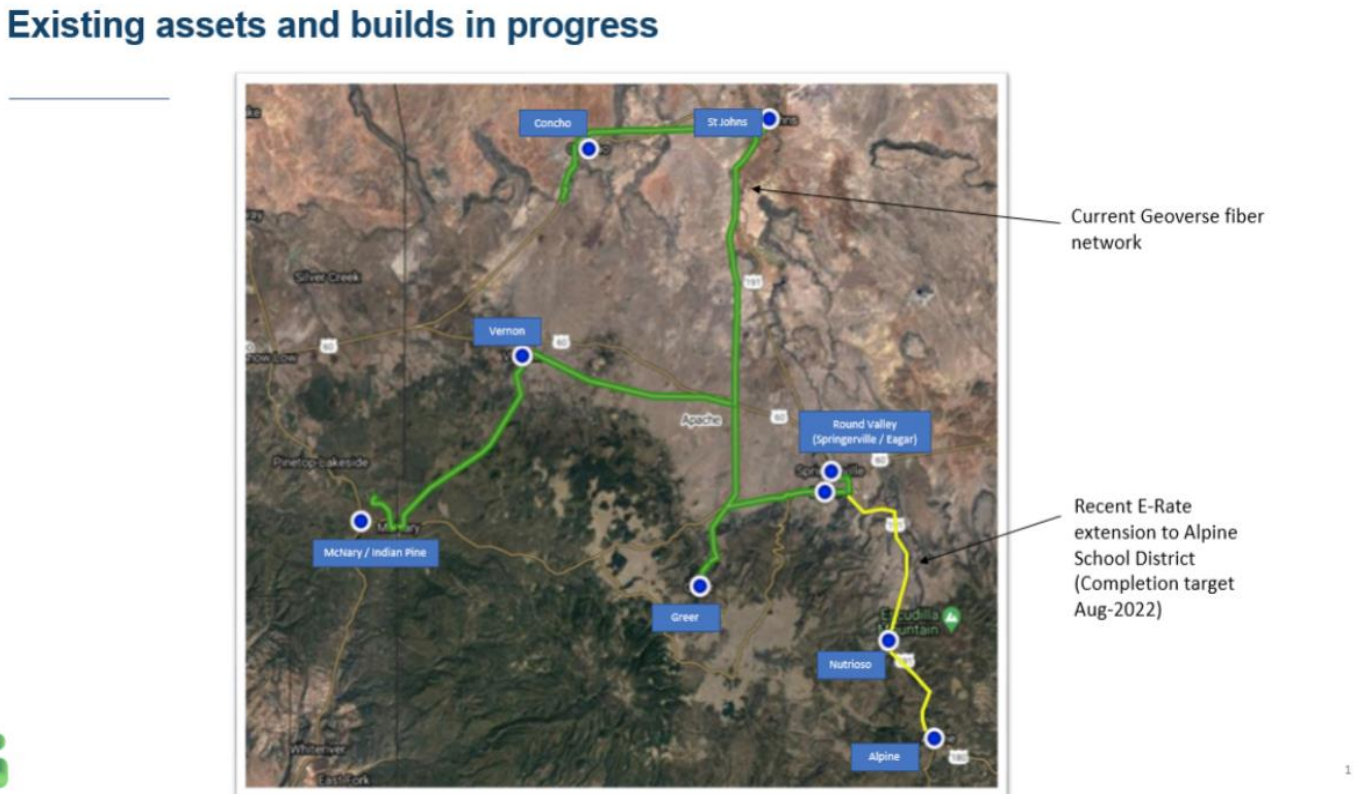
Figure 5-1. Proposed NACOG Regional Fiber Network



Apache County

Neighboring Apache County, also a member of NACOG, is a prime partner for Navajo County. Due to the geography of the area, most options for redundant network infrastructure would necessarily pass from Navajo County into Apache County. Much like Navajo County, Apache County has a dire need for better broadband and has plans to partner with Geoverse (ATNI/Commnet) to build out additional middle mile infrastructure through the E-rate project, as shown in the map below.

Figure 5-2. Existing and Planned Geoverse Fiber in Apache County



It would be extremely beneficial for both counties if Navajo County could connect additional fiber along Hwy 77 to assets owned by Geoverse/ATNI/Commnet that terminate in McNary/Indian Pine. Additionally, connecting with the existing network in Apache County by running new fiber along Hwy 60 to Vernon and/or Concho would give both existing networks additional redundancy. These interconnections are included as a part of this Plan for Navajo County, as well as in NACOG's regional plan.

Gila County

In much the same way that partnering with Apache County to the east would provide additional redundancy, Navajo County should also consider partnering with Gila County to the west and to the south. Through Gila County, the fiber in Navajo County could gain

a diverse route to Phoenix as well as interconnecting with the larger NACOG regional network by heading north into Yavapai County. In either case, Navajo County will need to work with Gila County to gain access to right-of-way or other assets that may be available to make additional connections. We engaged in discussion with Gila County, who has a high-level plan to deploy a countywide fiber buildout that will reach each of their fire district locations. Although the plans are still conceptual in nature and no timeline has been established for beginning the project, Gila County is very open to partnering with Navajo County, potentially by providing dark fiber to Phoenix either along Highway 87 through Payson or along Highway 60 through Globe, with a potential for additional partnership with the White Mountain Apache Tribe. Both of these routes would be highly advantageous for Navajo County, providing resilience for all existing and planned infrastructure in both the north and the south of the County.

Hopi Telecommunications

Hopi Telecommunications recently received funding to build additional fiber in the Hopi Reservation, allowing them to create a redundant connection from Holbrook to Tuba City along Highways 77 and 264. Hopi Telecommunications will tie into the new fiber connection that is being built by Arcadian Infracom in the north of Navajo County. They also plan to build out fiber to every premise on the reservation. These plans are very good news for many of the towns and villages in the north of Navajo County. The County should work with Hopi Telecom to ensure that they have access to any rights-of-way and timely permitting needed to complete the project. Navajo County could also assist forging partnerships between Hopi Telecommunications and providers south of the I-40 to achieve more network diversity by connecting to the route that leads into Tuba City. Additionally, providing additional fiber along Highway 77 south of I-40 to Phoenix would provide additional backhaul for Hopi Telecommunications to route back to Phoenix, with a dual route back to Flagstaff.

Navajo Nation

The Navajo Nation covers much of northern Navajo County, so it is critical that the County work to ensure that robust broadband is available on the Nation. The Town of Kayenta is currently planning a local fiber-to-the-premise project that will connect every home within Kayenta's jurisdictional borders. The project includes a plan to connect to existing and new fiber along Highway 160 to support the local network. This local solution will greatly improve the state of broadband in one of the Navajo Nation's most densely populated areas.

The Dilkon Chapter of Navajo Nation, including the communities of Dilkon, Indian Wells, Jeddito, Teesto, Whitecone, and Greasewood Springs, is also pursuing a broadband plan

to provide last-mile services to residents in these areas. The Chapter and its consultant developed surveys and engineering of the area and created a design for a local broadband network system. The Chapter is in the process of pursuing grant funding for the build, including submittal of an NTIA grant.

During the course of the project, Magellan Advisors also received information that the Navajo Nation is pursuing a fiber buildout to 71 of its chapter houses. While details of the buildout were not available at the time of this report, it will be important for Navajo Nation to have backhaul fiber for this buildout when it occurs. Navajo Nation currently has access to the planned route along Hwy 160 being deployed by Arcadian Infracom, which will provide them a connection into Flagstaff, as well as north to Denver and west to Los Angeles. However, an additional redundant route south along Highway 77 to Phoenix would also be beneficial to the Nation in the event that the Hwy 160 route is interrupted. There is an existing fiber route from the Nation south into Holbrook along Hwy 77 to the north of I-40 that could be interconnected with a southern Hwy 77 fiber route from Holbrook back to Phoenix to achieve this redundancy.

Arizona Public Service

Arizona Public Service (APS) is currently deploying new fiber routes throughout northern Arizona, including a planned route from Payson to Cholla and along Interstate 40. APS has expressed a strong willingness to partner with County and local governments by allowing them to lease dark fiber as well as for joint build efforts. Specific to Navajo County, APS has expressed interest in potentially joint building fiber with the County along Highway 77. The County should continue to have conversations with APS about this potential joint build as it could reduce the County's cost of deploying fiber along that route significantly.

Salt River Project

Salt River Project (SRP) is working in earnest on developing a coal community transition strategy for impacts of closing plants in Northern Arizona, including in areas of Navajo County. Representatives from SRP have expressed a willingness to assist both Apache and Navajo Counties with broadband initiatives that would impact economic development in the region. Navajo County should continue to have discussions with SRP about exactly how it could assist, which may include investment from SRP to help offset the cost of the Navajo County's broadband program. A partnership with Apache County would likely be key to gaining the support of SRP.

Sparklight

Incumbent provider Sparklight (formerly Cable One) is a key partner for the County in ensuring that the broadband needs of the County are addressed. Sparklight has to date

made investments in broadband infrastructure along some of Navajo County's major corridors. Sparklight has also committed to expanding service into additional communities including Heber-Overgaard, in partnership with the County.

Sparklight has already submitted an application, in partnership with the County, to deploy a fiber-to-the-home network through the National Telecommunications and Information Administration's Rural Broadband Grant program. The grant application, submitted in September 2021, was endorsed by the Arizona Commerce Authority, and covered areas of Heber-Overgaard that were not previously awarded through the FCC's Rural Digital Opportunity Fund (RDOF) program, per the rules of the NTIA grant, covering about half of Heber-Overgaard. Sparklight intends to pursue additional grant funding for the remaining portions of Heber-Overgaard through the State of Arizona's Rural Broadband Development Grant, expected to be released in early October. The County should continue its partnership with Sparklight on that grant funding opportunity.

Based upon Sparklight's willingness to partner with the County to address some broadband issues, we encourage Navajo County and Sparklight to continue an open conversation about alignment of interests and meeting community needs. We note, however, that Sparklight's ability to invest in new infrastructure, as with all private-sector entities, will largely depend on realizing a reasonable return on investment and sustaining a revenue stream. Therefore, a compelling business case must exist for Sparklight to agree to invest. The County should consider offering Sparklight (and any other interested providers) the use of County-owned sites on which it can place network facilities in an effort to facilitate further investments in key communities, as well as option for streamlined permitting processes when possible.

Summit Healthcare

Stakeholders at Summit Healthcare expressed a desire to partner with the County on expanding broadband in whatever way is feasible. They noted the need for better connectivity for their patients as well as for their clinic locations. Better broadband would also allow the County to attract a more robust medical workforce including doctors, nurses, and specialists that could serve the population. The County should consider including Summit Healthcare as a key partner in its broadband planning efforts including incorporating their facilities as anchor tenants on new County-owned fiber and partnering for grant opportunities including potential future telemedicine funding that could increase telemedicine capabilities for Navajo County residents.

Other ISPs

A competitive broadband market is key to lowering costs and improving services for residents and businesses in Navajo County. As more internet service providers enter the

market and additional investments are made in infrastructure, the supply of broadband will proliferate. It is crucial for Navajo County to engage with new entrant ISPs to lower their barriers to entry so that they are willing and able to provide services to communities that currently have few options. These partnerships with ISPs are also critical in that most grant funding opportunities require participation by an experienced network operator.

The network design as laid out in this plan is a middle-mile open access network that will be owned by Navajo County and will be used by internet service providers to reach the "last mile" in order to provide services to these communities. As such, Navajo County should market its new fiber to internet service providers, allowing them to lease fibers, as well as ensuring that permitting and right-of-way considerations are easy to navigate for building additional last-mile infrastructure, and offering the use of County-owned facilities, if available, to lower barriers to entry.

Potential ISPs that may be interested in using the County's middle mile network to enter new markets include ATNI/Commnet and Allo Communications. ATNI/Commnet, as mentioned throughout this plan, currently operates networks throughout Northern Arizona, including in neighboring Apache County. Allo Communications, headquartered in Nebraska, has formed a number of similar partnerships with cities around the US and is primarily interested in providing last-mile fiber to communities with similar sized populations to those in Navajo County with aerial middle-mile fiber infrastructure. Many other last-mile service providers have also entered similar partnerships elsewhere. Navajo County should continue to explore these options and gage interest from these and other providers.

Partnership Opportunity Matrix

Partner	Type	Interest
NACOG	Public-Public	Regional collaboration, grant funding partner
Apache County	Public-Public	Regional collaboration, redundancy
Gila County	Public-Public	Regional collaboration, backhaul and redundancy
Hopi Telecom	County-Tribal	Backhaul and redundancy
Navajo Nation/NTUA	County-Tribal	Backhaul and redundancy
Arizona Public Service	Public-Private	Potential joint build opportunities and dark fiber backhaul to major internet points in Phoenix and Flagstaff

Salt River Project	Public-Private	Potential investment in a broadband program that supports coal-affected communities
Sparklight	Public-Private	Support for entering new markets, possible additional capacity offered by the County
Summit Healthcare	Public-Private	Connecting facilities, grant funding support
Other ISPs	Public-Private	New investment in last-mile infrastructure

Criteria for Partnership Evaluation

There are several guidelines that the County should consider when evaluating opportunities for partnerships. Generally, Navajo County should seek partners who will actively participate in community and economic development by contributing to local jobs and providing maximum public benefit.

County-Led Vision and Design: It is crucial that the County lead the visioning for broadband in its communities in order to ensure that investments are made strategically to benefit the most residents and businesses possible. While private provider partners will be key to the use of the network, the County should lead the design efforts to ensure that public benefit is prioritized and that community needs are met.

Non-Exclusivity: The County should not enter into any exclusive agreements. Non-exclusivity allows for a more competitive environment in which the County can partner with multiple entities to get the most benefit from use of assets. Competition is key to the continued expansion of broadband services throughout Navajo County.

Benefit to the Community: Ultimately, partnerships with the private sector are strongest when they provide as many benefits as possible to the community. Providers may be willing to provide no- or low-cost services to areas in need, small businesses, or public spaces such as libraries that benefit students with no broadband at home. Support for Smart City applications may also be offered. Community benefits such as these should be weighed heavily during the evaluation process.

New investment and infrastructure: Where possible, the County should give preference to providers who are deploying new infrastructure. The two simple reasons are that (a) this represents new investment rather than milking legacy infrastructure to avoid additional costs and (b) new infrastructure will be better aligned with public interests, higher-capacity, and more reliable.

Construction Methods and Timelines: Some partners may propose quick, minimally invasive construction methods to speed deployment and lower costs. Magellan strongly recommends that Public Works take part in discussions about the specifics of these

construction methods and that timeframes for deployment are specifically stipulated in contracts to ensure that County roads are properly restored and that the community is not inconvenienced by drawn out construction.

Revenue Sharing: Partners may offer revenue sharing for the use of County assets. The percentage will vary depending on the terms of the agreement; Magellan has seen anywhere from 5% to 60% in favor of the County. In any case, as with all proposals, revenue sharing estimates should be heavily vetted including assumptions for take rates and ramp periods and should be evaluated against fair market rates for the use of public-owned assets.

5.2 BUSINESS MODEL OPTIONS

Selecting the right broadband business model for local government is highly dependent on several factors that will suggest the most appropriate option for the organization. For example, understanding the community needs, knowing the competitive market factors that define what infrastructure options fit well within the community, and determining organizational and operational capabilities of the local government all play into the selection process. Equally important is an understanding of the financial commitments and risk and reward that participating organizations are willing to support to fund and sustain a successful broadband initiative.

The commonly implemented business models fall on a continuum that ranges from low risk, low investment options to higher risk, high investment options. Figure 5-1 (below) illustrates this continuum. Moving along the continuum of business model options involves increasing degrees of risk and reward: risks in terms of financial, operational, and regulatory risk; rewards in terms of community benefits, revenue generation, and over potential for profit. Moving “up” the continuum generally requires increasing levels of investment and implies greater local government participation in the delivery of broadband services. Public policy and infrastructure only options are considered “passive” business models, where the government does not operate a broadband network as compared to “active” models such as Government Services Providers, Open Access Providers, and Retail Provider Options, where the government operates a broadband network. Public-private partnerships are not classified as a specific business model but instead fall along the continuum because these partnerships take many forms. Local governments must determine which business models meet their organization’s risk/reward tolerance to achieve the community’s broadband goals.

Figure 5-3. Continuum of Municipal Broadband Business Models

In many cases, multiple options may be selected by an organization; however, in some cases, a local government will not utilize multiple models, as they may conflict with one another. For example, local governments generally implement broadband-friendly public policy with any of the business models, as these policies will complement all other business model options. Conversely, a local government would not likely implement a retail model and public-private partnerships together, as these would lead to competition between the local government and one or more private partners. Table 5-1 illustrates the differences among the business models that can be utilized to achieve the County's broadband goals. While there are variations of each model, they generally fall into the categories listed.

Table 5-1. Comparison of Municipal Broadband Business Models

COMPARISON OF BROADBAND BUSINESS MODELS							
	Government Passive Models			Government Active Models			
	Public Policy Only	Infrastructure Only	Public-Private Partnerships (P3)	Public Services Provider	Open Access Wholesale	Retail Provider Business-Only	Retail Provider Residential & Business
Services Provided	None	Dark Fiber Only	None	Dark Fiber, Transport, Internet, Phone	Transport	Internet & Phone	Internet, TV, Phone & Value-Added Services
Customers	None	Broadband Providers	None	Public Organizations Only	Broadband Providers	Businesses	Businesses & Residents
Funding Required	Low	Moderate	Low to High	Moderate	Moderate	High	High
Competing with Broadband Providers	No	No	No	No	No	Yes	Yes
Operational Requirements	Low	Low	Low	Low	Moderate	High	Very High
Regulatory Requirements	Low	Low	Low	Low	Moderate	High	Very High
Revenue Generation	Low	Low	Low to High	Low	Moderate	High	Very High
Operational Costs	Low	Low	Low	Low	Moderate	High	Very High
Financial Risk	Low	Low	Low	Low	Moderate	High	Very High
Execution Risk	Low	Low	Moderate	Low	Moderate	High	Very High

Navajo County as An Infrastructure Provider

Public entities lease and/or sell physical infrastructure, such as conduit, dark fiber, poles, tower space, and property to broadband service providers that need access within their communities. These providers are often challenged with the capital costs required to construct this infrastructure, particularly in high-cost rural environments such as

Navajo County. Use of publicly-owned infrastructure provides a cost-effective alternative to providers constructing the infrastructure themselves. By building a County-owned middle-mile fiber system, Navajo County could lease the use of its infrastructure to providers looking to enter its communities at a lower cost on an open-access basis, driving competition in the County.

This middle-mile network would also allow the County to "light" the fiber and equip the network with the electronics necessary to establish a "transport service" or "circuit" to service providers interconnecting with the local network, although this would necessitate more maintenance than providing dark fiber only. The concept of open-access is designed to enable competition among service providers across an open network that is owned by the County. The County retains neutrality and non-discriminatory practices with the providers who operate on the network.

Connecting locations such as healthcare clinics throughout the County provides network anchor tenants who can subscribe to high-bandwidth services from providers using County-owned infrastructure. The network will also connect County-owned facilities to support internal operations. Currently, Navajo County is spending approximately $781,948.00 per year for phone and internet services. With investment in new fiber, County facilities could manage their own connectivity needs, getting much higher bandwidth and better reliability for lower overhead costs. While it will take time to realize a return on investment on the cost to deploy the fiber, the operating expenses of the County's current telecommunications budget can be factored into that return on investment, costing the County less money each year.

6. Network Design

Based upon the needs of the communities in Navajo County, Magellan Advisors developed a high-level design for a broadband network to be deployed by the County that will provide additional fiber capacity to bring wholesale bandwidth into the region via a middle mile network. The middle mile network is designed to attract new entrant ISPs by providing infrastructure for them to use as a starting point for last mile buildouts throughout the County. It will also provide additional capacity and redundancy for Navajo Nation and Hopi Telecom in the north and other existing service providers. Other considerations for the network design include:

1. Connect County facilities and City Halls throughout Navajo County to ensure continuity of operations
2. Connect healthcare institutions throughout the County as anchor tenants on the network
3. Pass along commercial corridors with opportunities to expand to additional residential neighborhoods to provide additional fiber for use by businesses and residents
4. Create redundancy within the County via a wireless connection
5. Connect to planned public and private fiber networks in Apache and Gila Counties and the greater NACOG network for regional redundancy and capacity to support a variety of local broadband initiatives

6.1 CURRENT STATE

Navajo County currently owns minimal fiber infrastructure that is limited to the County's campus along Highway 77 south of Holbrook. This fiber does not connect to anything and therefore is not useful for anything except interconnecting buildings at that specific location. However, some privately owned fiber does exist in the County and other routes are planned for the near future, which allows Navajo County to connect into existing networks in the region.

Specifically, Arizona Public Service (APS) plans to build a fiber route from Payson to Cholla and Interstate Highway 40. This segment will allow for Navajo County to connect with APS fiber in Holbrook, providing options for backhaul into both Flagstaff and Phoenix through APS's network.

There is also existing fiber along Highway 77 to the north of Holbrook that is currently used to connect communities on the Navajo Nation and the Hopi Reservation. Navajo County should tie into this fiber to provide additional options for backhaul for these

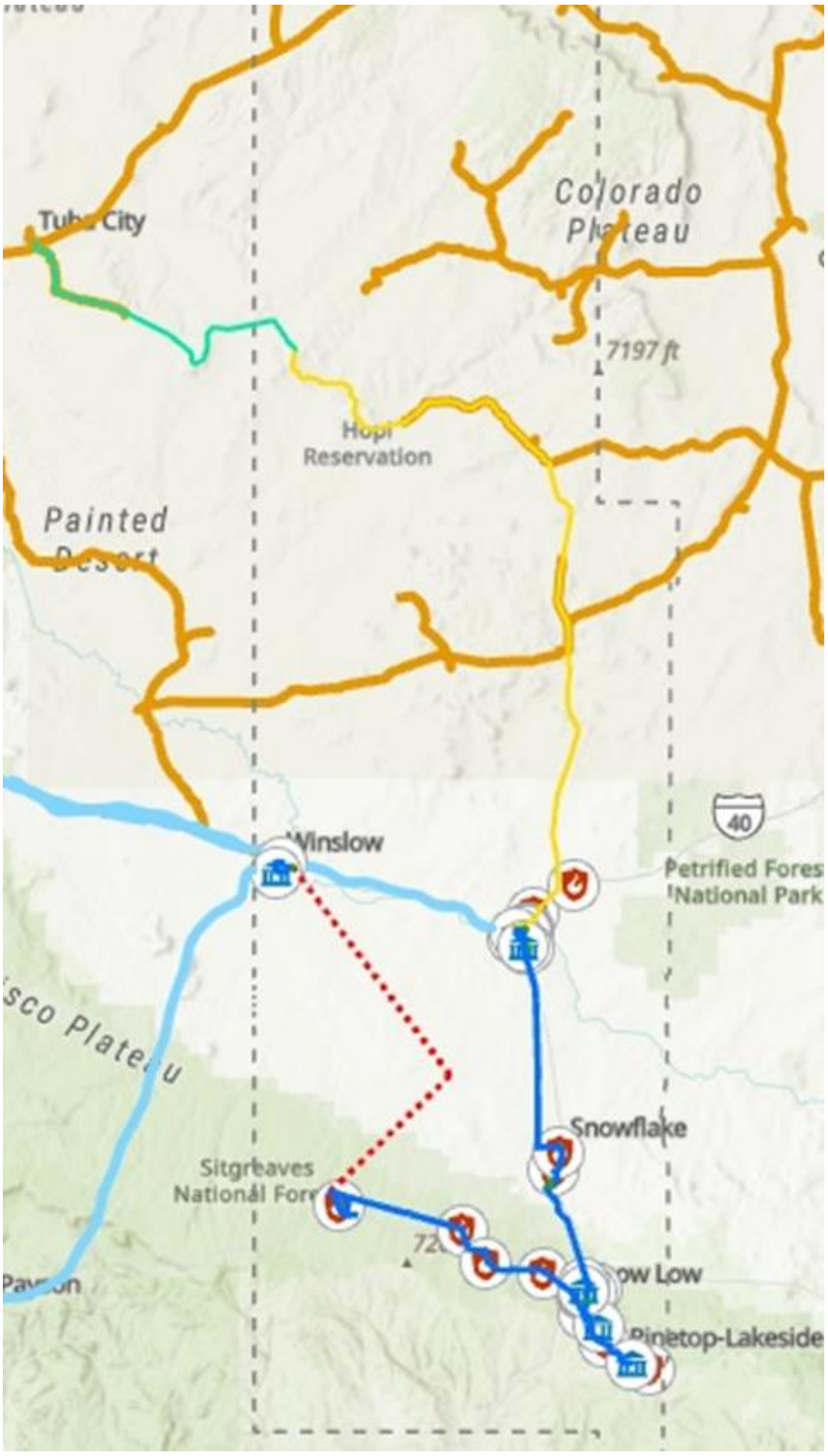
communities as they develop last mile connections to serve residents in the northern half of the County.

Additionally, fiber exists today in southern Apache County as a part of the County's e-rate network that is managed by Geoverse (also operating as ATNI/Commnet). Connecting with this fiber in McNary would allow for additional redundancy and capacity to the east of Navajo County.

6.2 NETWORK DESIGN

The network design, shown in the figure below, makes fiber connections between each of these existing fiber assets, providing a middle mile network that connects all County facilities and town halls in Navajo County. Healthcare facilities are also connected. Government and healthcare facilities are key to the business model since they operate as network anchors, justifying the business case for providers to use the fiber to provide service to such high bandwidth customers.

Figure 6-1. Navajo County Network Design



- Proposed Navajo County Fiber
- Proposed Navajo County Wireless
- Existing Tribal-Owned Fiber
- Planned Private Fiber
- Planned Hopi Fiber
- Potential Navajo Nation Fiber

Figure 6-2. Navajo County Network Design - Zoomed

In Holbrook, the network would interconnect with existing fiber along Interstate 40, which would connect from Holbrook to Flagstaff on APS's dark fiber. This would also allow interconnect with the Hopi and Navajo Nation networks in the north of the County, offering them alternate routes and additional redundancy for backhaul.

The network would extend south of Holbrook roughly along Highway 77 to Pinetop-Lakeside, where it could interconnect with existing fiber owned by ATNI/Commnet connecting into Apache County's fiber network. Although there is privately-owned fiber along this route today, we recommend overbuilding the existing assets for additional capacity and resilience based on the results of the speed tests in these communities. As previously mentioned, APS may be interested in joint building with Navajo County along this route.

There is also an opportunity for a future network expansion south from Show Low along Highway 60, passing through the Fort Apache Reservation and then through Gila County south into Globe, where it could then be connected back to Phoenix as an additional option for redundancy. This route would require coordination with the White Mountain Apache to ensure that their needs are met.

From Show Low, the proposed network heads west to Heber-Overgaard, providing additional middle mile capacity that could be used to support Sparklight's fiber-to-the-home build. As with the Highway 77 route, there is existing privately-owned fiber along Highway 260, which would be overbuilt to allow for more capacity. As a future expansion, the network could extend further west to connect into Gila County and back into Phoenix. This would require coordination with Gila County, which is currently in the process of planning its own fiber network build out to connect all of its fire stations.

The network passes along commercial corridors wherever possible, including in Show Low along Highway 260 and Highway 60. This will allow for businesses to connect as laterals are built in the future. The network also passes residential neighborhoods along many of the County's major corridors, enabling service providers to easily access homes for delivery of last-mile service options.

The proposed fiber network design is a 288-count fiber backbone, which allows for more than adequate reserve fiber to be used in the future as needs arise. In areas where poles already exist (owned by either APS or Navopache Electric Coop), the fiber will be deployed aerially. Where no pole lines currently exist, the fiber will be deployed underground in a 2" conduit. We recommend that the County also deploy an extra 2" conduit for future use or to be leased to interested parties.

In addition to the fiber, we recommend that the County deploy wireless microwave connections between Heber-Overgaard to Winslow via an existing tower near Pioneer for additional network redundancy. Because the western edge of the County is not as heavily populated with residents and businesses, we do not recommend that the County make an investment in fiber infrastructure along this route as it will not result in a net benefit to the County. Wireless connections are much cheaper to deploy than fiber,

providing the County with redundancy at a much lower cost. Although wireless connections are not as robust as fiber, this connection is sufficient to ensure that should the fiber be cut along one of the routes within the County, public safety, business and residential services can still be maintained. Costs for this wireless connection are estimated to be approximately $20,000, including all equipment, engineering, and construction management. A detailed cost estimate table is provided in Appendix A-1.

6.3 CONSTRUCTION COST

The cost of building the fiber network, including all engineering, permitting, construction, construction management, and equipment, is estimated to be approximately $17 million. A full Bill of Materials is provided in Appendix A of this Plan.

As noted previously, we recommend that the County allocate an initial funding amount of $10 million to begin the build and to be leveraged as matching funds for grant opportunities. For example, the County should apply to the Arizona Broadband Development Grant using $8.5 million of ARPA funding as proposed 50% match for the total project cost of $17 million, allowing the money to go further in building out more portions of the network.

If the grant application is not successful, the initial $10 million in ARPA funds should be used to build out the first portion of the network from Holbrook to Pinetop-Lakeside. Additional segments of the network could be built as funds become available over the next 3-5 years through seeking other grant opportunities.

6.4 MEET ME ROOM IN HOLBROOK

As shown in the network design, the Town of Holbrook is a critical meeting point for many of the existing and planned fiber assets in Navajo County. Holbrook, located at the crossroads of Highway 77, Highway 180, Highway 377, and Interstate 40, is a critical point between Albuquerque and Flagstaff. There may be an opportunity for the County to sponsor the installation of a facility in which the networks can interconnect, known as a “Meet Me Room.” Such a facility could bring attention to Holbrook as a hub for regional communications and be a boon to the local economy. The County could explore this option further including inquiring about providers’ interest in using such a facility and evaluating costs to build and operate it. However, we note that a similar, larger facility is currently being considered in Flagstaff, which may affect the carriers’ interest in Holbrook’s location.

7. Funding Analysis

In the wake of the COVID-19 pandemic, funding for broadband has become a top priority for legislators and policy makers at the local, state, and federal levels. The need for broadband, particularly in rural areas where investments have not previously been made, became increasingly apparent as people were forced to work, learn, and receive healthcare from remote locations.

Because of the rural nature of Navajo County, many funding opportunities are available through various grant and loan programs related to pandemic relief, as well as regular programs that occur on an annual basis. Below are some of the applicable opportunities.

7.1 FEDERAL FUNDING

American Rescue Plan Act

Through the American Rescue Plan Act (ARPA) of 2021, Congress and the Biden Administration provided $362 billion in federal fiscal recovery aid for state and local governments, including $65.1 billion in direct aid to counties to combat the COVID-19 pandemic. Navajo County was awarded $21,545,687, which will be allocated to the County in two equal payments, the second of which will occur on May 10, 2022.

The guidelines for the use of ARPA payments specifically call out broadband infrastructure as an eligible use, including not just construction but also design, mapping, and planning activities. Unlike many of the grant and loan opportunities, the use of the ARPA funds does not require matching funds, does not require a partner, and is largely discretionary, as long as the use of the funds fits within the US Treasury Department guidelines. Therefore, we strongly encourage Navajo County to consider ARPA funds as a primary funding source for implementing the recommendations of this plan.

Treasury authorized the use of funds for eligible broadband projects that can reliably deliver up to 100 Mbps down and 20Mbps up in areas where it is impracticable due to geography, topography, or financial cost. Projects must also be designed to serve unserved or underserved households and businesses, defined as those that are not currently served by a wireline connection that reliably delivers at least 25 Mbps download speed and 3 Mbps of upload speed. Based on survey results, much of Navajo County falls under this provision.

Funds may also be used for both last mile and middle mile projects so long as the middle mile facilities provide connectivity to last mile entrants. The IFR does not specify

a specific technology but encourages recipients to build networks that are "future proof," which indicates a proclivity towards fiber. The IFR also provides recipients with significant discretion as to how they will assess whether the project itself has been designed to provide households and businesses with broadband services that meet, or even exceed, the speed thresholds provided in the rule.

The County will be required to submit "periodic reports" providing a detailed accounting of the use of funds and funds must be spent by December 31, 2024. For more detailed information, the County should review the Interim Final Rule and other available documentation published on Treasury Department's website at: https://home.treasury.gov/policy-issues/coronavirus/assistance-for-state-local-and-tribal-governments/state-and-local-fiscal-recovery-funds

Coronavirus Capital Projects Fund

In addition to direct aid to counties, ARPA also contains provisions for broadband funding in the Coronavirus Capital Projects Fund including:

- Deployment and adoption costs to promote to use of remote learning, telework, or telehealth resources during the COVID–19 pandemic
- Broadband infrastructure deployment projects
- Projects that promote broadband adoption through affordable broadband programs, distance learning, telehealth, and digital inclusion efforts
- The construction of middle mile or last mile networks as well as interconnection costs
- Projects that support broadband education, training, access, equipment, and support to anchor institutions
- Data gathering and evaluation of digital inclusion and broadband adoption programs funded by the grant to determine their effectiveness and develop best practices.

Funds were released directly to states from Treasury and Arizona was allocated approximately $190 million through the program. States are able to identify which communities will get funding based on needs related to work, education, and health monitoring. Treasury encourages states to administer the funds through statewide broadband offices.

Projects must meet each of the following criteria:

1. Investment in capital assets designed to directly enable work, education, and health monitoring.
2. Designed to address a critical need that resulted from or was made apparent or exacerbated by the COVID-19 public health emergency.

3. Designed to address a critical need of the community to be served by it.

The rules of the program also encourage:

1. Last mile connectivity or, for middle mile projects, commitments in place to support new and/or improved last-mile service.
2. Speeds of at least 100/100 mbps, with a priority for fiber over other technologies
3. broadband networks owned, operated by or affiliated with local governments, non-profits, and co-operatives—providers with less pressure to generate profits and with a commitment to serving entire communities.
4. Addressing affordability, including providing at least one low-cost service option.
5. Prioritization of projects that are designed to provide service to households and businesses not currently served by a wireline connection that reliably delivers at least 100/20 mbps.

At least some of the funds have been allocated to the Arizona Broadband Development Grant that is currently open and will be distributed based on the grant process. More information about this program can be found below.

Federal Infrastructure Grant Funding (through NTIA)

Over the next three months, Congress is likely to pass the largest infrastructure stimulus package in history with over $42 billion dedicated for rural broadband deployment projects administered by the states. Projects will be prioritized based on the number of unserved households that will receive service. Unserved areas is defined as ones where 80% of the households receive less than 25/3 Mbps upstream, and an underserved area is where 80% of the households are those that receive less than 100/20 service, making much of Navajo County eligible.

The bill appropriates these funds to the National Telecommunications and Information Administration (NTIA), which will administer a competitive grant program sometime in Q1 2022 to state governments for broadband program funding. All 50 states will be provided a baseline amount of $100 million each. Other money will be allocated to the states based on a formula that takes into consideration the percentage of unserved areas in that state. Funds will not be distributed until the FCC completes its national broadband access maps.

The bill also allocates $1 billion to a new grant program targeting middle mile infrastructure in which grants may not exceed 70 percent of total project costs; and $14.2 billion allocated for an Affordable Connectivity subsidy program which is an extension of the Emergency Broadband Benefit of $50 per household per month. Funds will be available until expended.

States will be required to provide a statewide plan to the NTIA outlining how the funds will be distributed. We expect most states to use statewide grant program guidelines largely based on the recommended guidance in the Interim Final Rule (IFR). The bill also allocates an additional $2 billion to the NTIA's Tribal Broadband Grant program for an additional round of awards (the first round closed in early September).

As with the Coronavirus Capital Projects Fund, Navajo County should stay in close contact with officials at the state level as they determine how funds will be distributed.

United States Department of Agriculture Rural Utilities Service

The United States Department of Agriculture's Rural Utilities Service (USDA RUS) has two programs, Community Connect and Reconnect, that would be particularly applicable in Navajo County. Both of these programs are specifically designed for rural underserved communities with a population size of 20,000 or less, which means that every individual community with the County is eligible. For both of these programs, eligible applicants must have the legal capacity to own and operate a broadband network, so to get these funds, Navajo Couty would need to have a partner with operational experience. The recently published Reconnect program rules for this round no longer exclude funding that serves areas previously funded through the FCC's Rural Digital Opportunity Fund (RDOF), although a case needs to be clearly made that no other service providers are offering broadband that meets the 25/3 mbps threshold.

In many ways, Community Connect can be thought of as a smaller version of Reconnect; the major different is that the Community Connect program provides grants only, capped at $3 million, whereas Reconnect provides a combination of grants and loans with much higher caps for each option. Below are summaries of both of these programs.

Community Connect Grant Program

The Community Connect Grant program provides up to $3 million in awards to eligible applicants to deploy either fixed or mobile broadband services throughout rural and underserved communities with a population size of 20,000 or less. Eligible entities include federally recognized tribes, state or local governments, non-profit cooperatives and for-profit entities. Applicants must provide a matching contribution of 15% of the total award amount. Matching funds must be made in cash, which will be used to fund the operations of the project.

Eligible areas must be unserved with broadband at a speed of 10/1 and applicants must agree to provide broadband service at speeds of at least 25/3 to be made available to every residential and business customer in the proposed funded service area (PFSA) in the application. Funds can be used to support the construction, acquisition or leasing of

facilities, spectrum, land or buildings used to deploy broadband services throughout the PFSA.

Awardees must provide free broadband service at the minimum broadband grant speed to all essential community facilities for two years. These facilities include public schools, fire stations, public libraries and other publicly held anchor institutions.

The window for Community Connect is currently closed, but previous windows have commonly opened with a release of a Funding Opportunity Announcement around September or October with a 90 day window that closes near the end of the calendar year. We expect a similar timeline for this program in FY 2022. More information about Community Connect is available at:

https://www.rd.usda.gov/community-connect

ReConnect Loan and Grant Program

Originally authorized in 2018 as a pilot program, the RUS Loan and Grant program is the largest USDA funding source for broadband infrastructure in underserved rural and tribal areas lacking broadband service at a minimum speed of 10/1. The RUS has over $1billion funding for broadband projects in FY 2021 and recently published the Funding Opportunity Announcement (FOA) for round three of the ReConnect program. The application window will be open for 90 days with submittals due in March 2022 and awards may be issued sometime in late summer of 2022. In the previous two rounds of awards, the RUS primarily issued 100% grant funded projects and we expect that to continue.

In addition to the State broadband grant provisions in the infrastructure bill, the RUS will be allocated an additional $2 billion in funds under the same bill for the ReConnect broadband loan and grant program. These funds are separate from the USDA Rural Development FY 2022 annual appropriations bill which also adds an additional $650 million for ReConnect funds. Total funding available for ReConnect program will be a minimum of $2.7 billion for FY 2022.

Like Community Connect, eligible projects must be located in communities with a population of 20,000 or less. Eligible entities for ReConnect funds include cooperatives, for profit entities, state and local governments or tribal nations (as defined in section 4 of the Indian Self-Determination and Education Assistance Act (25 U.S.C. § 450b)).

Award amounts have previously broken into three individual products:

- 100 Percent Grant: The maximum amount per application is $25 million.
- 50 Percent Loan / 50 Percent Grant: The maximum amount per application is $25 million for loans and $25 million in grants.

- 100 Percent Loan. The maximum amount per application is $50 million.

Loans terms are set at a 2% interest rate with repayment period based on the useful life of the assets used to provide broadband.

Applications are evaluated based on points awarded for a variety of benefits brought to the community. For example, projects that are in a state or tribal area that already has a broadband plan that has been updated within the previous five years of the date of publication of the FOA will receive 10 extra points. For projects submitted by tribal communities, the program will likely award additional points.

The new rules increased the program threshold speeds to 25/3 and will include more opportunities for tribal projects in the scoring evaluation criteria. More information about Reconnect is available at:

https://www.usda.gov/reconnect

7.2 STATE FUNDING

ACA Broadband Grant

Arizona Commerce Authority (ACA) is an invaluable resource to government agencies throughout Arizona as they consider broadband planning. In addition to conducting broadband workshops and providing guidance on regional initiatives, ACA recently released an announcement for the Arizona Broadband Development Grant program to assist with expanding access to broadband throughout the state. The funding window is currently open and applications are due on January 31, 2022. Below is a summary of rules.

The grant strongly encourages regional efforts in which neighboring towns, counties, and/or tribes work together to pursue projects. State funds can be used in coordination with federal grants as long as they do not fund the same infrastructure improvements or components. As the grant information states, "the funding could be used as matching funds as required under a federal grant program. Leveraging of federal funds is strongly encouraged, but duplicative funding or 'double dipping' will not be allowed." The grant requires a cash match of at least 10%, although the County should be prepared to offer closer to 25% or even 50% match to be competitive. The maximum award is $10 million, allowing the County to put forward a proposed match of $8.5 million in ARPA funding for an $8.5 million grant that would fund the entire $17 million project.

The funded project must be new and may not already be under construction. Construction must commence three months after the award and be completed within 24 months of the award.

General guidelines are as follows:

Applications must be for projects that, within twenty-four (24) months of the award date, will provide:

- broadband service to unserved or underserved areas by actively providing speeds of 25/3 or greater to the intended beneficiaries of the project and/or;
- increase existing speeds to a minimum 25/3 to the intended beneficiaries of the project at costs that are substantially equal to urban areas and/or;
- provide redundancy to the region and/or;
- build out middle mile or last mile connections and a minimum speed of 25/3 to the intended beneficiaries of the project.

Importantly, the grant requires that applicants have a minimum of two (2) years of experience operating a broadband network, which means that Navajo County will need to partner with an experienced network operator to pursue this opportunity. This partnership should be arranged through a competitive RFP process to select an organization that will provide the greatest benefit to Navajo County's communities, including allowing Navajo County to maintain a high degree of local control.

Magellan encourages Navajo County to select a partner and apply for the state grant. More information about the grant can be found at:

https://www.azcommerce.com/broadband/arizona-broadband-development-grant-program/

7.3 REGIONAL GRANTS

In addition to federal and state opportunities, Navajo County should take an active role in regional grant activity, including broadband funding sought through Northern Arizona Council of Governments (NACOG). NACOG is currently considering pursuing a regional grant to help fund a Northern Arizona broadband network that will include infrastructure in Navajo County. Navajo County should remain in close contact with NACOG about the status of this and other grant opportunities including providing letters of support, participating in conversations with regional stakeholders, and facilitating partnerships within the County.

7.4 GRANT & LOAN FUNDING TIMELINE

Several of these grant and loan programs are expected to release rules and open application windows within the coming months. Below is an estimated timeline for each grant. **Note that these dates are estimates and are subject to change.**

	Opportunity	START	END
1	**ARPA Funds Allocated by US Treasury**	Mon 9/20/21	Tue 5/10/22
	Final Rules Published for state and local fiscal Recovery Act funds	Mon 9/20/21	Mon 1/24/22
	Round 2 Funds Released	Tue 5/10/22	Tue 5/10/22
2	**RUS Reconnect Broadband Grant & Loan Program Round Three**	Thu 9/30/21	Tue 12/27/22
	FOA Release	Fri 10/24/21	Fri 10/15/21
	Application Window	Wed 11/24//21	Wed 3/16/22
	Application Due	Wed 3/16/22	Wed 3/16/22
	Application Approvals	Tue 3/22/22	Tue 10/11/22
	Total Funding Amount $3b Distributed to Eligible Entities	Tue 10/11/22	Tue 12/27/22
3	**ACA Broadband Development Grant Round 2**	Fri 11/12/21	Mon 2/28/22
	Grant RFP Release	Fri 11/12/21	Fri 11/12/21
	Application Window	Fri 11/12/21	Mon 1/31/22
	Awards Made	Tue 2/1/22	Mon 2/28/22
4	**Infrastructure Bill Funding Through NTIA ($42b)**	Mon 9/20/21	Mon 4/18/22
	Infrastructure Bill Finalized & Passed	Mon 9/20/21	Mon 12/27/21
	Notice and Comment for Program Rules	Mon 12/27/21	Mon 1/24/22
	Competitive State Grant Program Through NTIA	Mon 1/24/22	Mon 3/21/22
	Awards for Competitive Grant Program	Mon 3/21/22	Mon 4/18/22
5	**RUS Funded Provisions of Infrastructure Bill ($2b)**	Thu 9/01/22	12/15/022
	Reconnect Broadband Grant & Loan Program Round 4 and Subsequent Rounds in 2022	Thu 9/01/22	Thu 12/15/22

7.5 CRITICAL STEPS TO BE GRANT READY

1. Review the NOFO or FOA to ensure eligibility and make a checklist of requirements.
2. Engage a grant writing resource for assistance.
3. Identify matching funds required.
4. Identify the specific project areas (corridor, town, or neighborhood). Ensure that the locations do not overlap with other federal funding awards if the grant's guidelines consider these areas ineligible.
5. Identify regional partners which may include towns, counties, and/or tribes.
6. Determine number of households, businesses, and anchor institutions that will be served by the project.

7. Develop technical requirements such as preliminary engineering reports (PERs) and environmentals.
8. As required, engage service providers as partners with operational experience.
9. Collect letters of support from key stakeholders in the project area.
10. If required, pass a Board resolution supporting the project and dedicating matching funds.

8. Conclusions & Next Steps

The current broadband environment in Navajo County is not sufficient to meet the everyday needs of the County's residents and businesses. From critical services such as public safety and telehealth to convenience and entertainment options such as online shopping and streaming, the demand for bandwidth continues to grow and the current infrastructure in Navajo County struggles to keep pace. As the County emerges from the COVID-19 pandemic, opportunities to attract new residents and businesses could spark a newly revitalized economy and housing market, but high-speed internet must be available to support telework and business operations.

Navajo County has immediate opportunities to expand the availability of broadband within its communities through a coordinated effort that includes local investment, regional partnerships, and broadband-friendly policies. This plan and the recommendations that follow provide a way forward for Navajo County to leverage existing funding and grant opportunities to deploy infrastructure that will support the needs of its communities by incentivizing internet service providers to enter new markets within the County.

Next steps for Navajo County to implement the recommendations of this Broadband Strategic Plan include:

1. *Allocate available funds to begin designing and deploying County-owned network infrastructure in a phased approach, beginning with connecting County facilities, anchor institutions, and businesses and residents along the recommended routes*. The County should conduct detailed design engineering for the network as well as allocating funds in the amount of approximately $10 million to begin construction and to be leveraged as a match for grant opportunities including the Arizona Broadband Development Grant. Whether or not grant funds are awarded, the $10 million will allow the County to begin the first phase of construction, which should be to connect County facilities in Show Low to those in Holbrook, completing a large portion of the network that will pass by many residents and businesses. Upon completion of this Plan, Navajo County should develop a phased implementation plan to determine exact network construction locations and timeline for the remaining portions of the network based on awarded grant funds.
2. *Pursue additional funding opportunities through federal and state grant and loan programs and strategic partnerships to build additional infrastructure.* Navajo County should be ready to apply for federal and state grant programs including the Arizona Rural Broadband Development Grant and Coronavirus Capital Projects Fund that will be

administered through the State of Arizona. The County should determine locations where ongoing Federal programs such as Reconnect would be most effective for providing smaller funding amounts that will help offset costs of deployment. The Bill of Materials contained in this plan can be used to demonstrate that the project is shovel-ready for any grant funding opportunities. The County should also pursue conversations with APS about their interest in joint building along the proposed routes to reduce costs, as well as discussions with SRP about potential investment in broadband infrastructure in Navajo County.

3. *Engage with incumbent and new-entrant providers to establish agreements about the use of County-owned assets including provisions for last-mile delivery of broadband for businesses and residents.* Partnerships with last-mile service providers will be critical to the success of the network. The County should develop and maintain relationships with providers that are interested in the use of these assets to ensure that both the needs of the communities and the service providers who will provision service are being balanced as the County's infrastructure is deployed. Agreements for the use of any County assets should be non-exclusive and non-discriminatory so as to bring in as much competition as possible and ensure that the County is able to maintain local control. This is often best accomplished through an RFP process once the assets have been built.

4. *Work with Tribal partners including the Hopi Tribe, Navajo Nation, and White Mountain Apache to ensure the successful implementation of their planned broadband projects.* Although few survey responses were received from Tribal communities, other data point to the fact that Tribal areas in Navajo County are some of the most critically underserved. Each of the three Tribes is currently pursuing efforts to address these issues, and Navajo County is a critical partner to ensuring their success. The County should engage in ongoing conversations with its Tribal partners to provide support wherever possible for these projects, which includes providing the backhaul for their last-mile networks as recommended in this Plan.

5. *Stay involved with NACOG, Apache County, Gila County, APS, and SRP regarding regional network development efforts.* The rural nature of Northern Arizona makes it crucial that communities work across jurisdictional boundaries to coordinate broadband infrastructure deployment and grant opportunities. Within the County, APS may be willing to co-invest in infrastructure along the proposed routes, and SRP may also be open to making investments that benefit coal-affected communities. Going outside of the County provides options for connecting backhaul routes that tie into internet points of presence in metro areas including Phoenix and Flagstaff, as well as

additional options for redundant loops that run along existing highways or pole lines. The County should continue working with NACOG, Apache County, Gila County, APS, and SRP on fulfilling a regional broadband vision, as well as coordinating the pursuit of funding opportunities to manage overlap.

6. *Create workflows to review capital projects, permits, and development agreements to economically build network infrastructure.* The County should develop processes for opportunistically expanding broadband infrastructure in the County including frequent review of planned capital projects, permit applications, and development agreements that create opportunities for deploying conduit and/or fiber. Installing broadband infrastructure while the ground is already being excavated is a cost-saving measure that has been successfully implemented by a variety of counties and municipal agencies. These practices, often referred to as "Dig Once," can reduce costs of building broadband infrastructure by up to one-third. Any new commercial or housing developments should be fiber-ready to ensure that new residents and business owners have the services they need immediately upon moving into Navajo County.

7. *Develop governance for the network including a broadband working group that brings together key partners including municipal agencies, public safety entities, schools and libraries including Northland Pioneer College, healthcare providers such as Summit Health, and interested service providers.* This group should meet on at least a quarterly basis and make recommendations about use cases, proposed network expansions, and funding for the network. The group should also consider any ongoing local broadband efforts among municipalities, schools, and other key stakeholders and how to incorporate them into the County's network and overall strategy.

Appendix A: Bill of Materials Overview

Build Summary	PRICE REGION					
	West					
DESIGN RATE PER FOOT	$1.30	*SET THESE FIELDS BEFORE RUNNING BUILD SUMMARY*				
CONTINGENCY %	20%					
			1			
OVERALL TOTAL			**Backbone**			
DESIGN	Total	Buried	Aerial	Rate/Ft	Total Design	PE Stamp Pgs/Cost
Footage	**712,344.00**	**44,015.00**	**668,329.00**	$ 1.30	**$ 926,047**	1,042
Mileage	134.92	8.34	126.58			**$ 156,700**
PREMISES	-					
Residential	-					
Business	-					
Anchors	-					
UNDERGROUND - BURIED LABOR TOTAL	$ 3,804,449.07					
AERIAL -STRAND/LASH LABOR TOTAL	$ 4,710,770.88					
AERIAL - ADSS LABOR TOTAL	$ 0.00					
WIRELESS LABOR TOTAL	$ 0.00					
SPLICING LABOR TOTAL	$ 2,014,632.00					
PATCH PANELS AND CABINETS LABOR TOTAL	$ 6,000.00					
GENERAL LABOR TOTAL	$ 0.00					
LABOR TOTAL	**$ 10,535,851.95**					
FIBER MATERIAL TOTAL	$ 1,510,601.40					
UNDERGROUND MATERIAL TOTAL	$ 150,527.65					
CLOSURES MATERIAL TOTAL	$ 168,700.00					
MST MATERIAL TOTAL	$ 0.00					
PATCH PANELS AND CABINETS MATERIAL TOTAL	$ 127,200.00					
AERIAL MATERIAL TOTAL	$ 306,155.00					
AERIAL - STRAND/LASH MATERIAL TOTAL	$ 240,601.19					
AERIAL - ADSS MATERIAL TOTAL	$ 0.00					
WIRELESS MATERIAL TOTAL	$ 0.00					
MATERIAL TOTAL	**$ 2,503,785.24**	**Cost Per Foot**	**Cost Per Mile**	**w/ Design/Stamp**		
TOTAL BID	**$ 13,039,637.19**	**$18.31**	**$96,647.18**	**$14,122,384.19**		
WITH 20% CONTINGENCY	**$15,647,564.63**	**$21.97**	**$115,976.61**	**$16,730,311.63**		

A-1: Wireless Connection Cost Estimate

Estimated costs for Microwave Heber-Overgaard to Pioneer to Winslow			
Item	Cost	Units	Total Cost
PTP Radio Cost	$3,000	4	$12,000
Tower Installation	$1,000	4	$4,000
Outdoor Router (1 per tower)	$500	3	$1,500
Subtotal			$17,500
Engineering, Project & Construction Mgmt	15%		$2,625
Total Estimated Cost			**$20,125**