C. Project Narrative

1. Project Description and Timeline

1.1 Nature of Improvements

eX² is determined to improve the quality of life for Arizonans through the development and deployment of a shovel-ready, open access, middle-mile fiber optic network designed and built to promote affordable broadband connectivity, economic development, advanced telehealth services, enriched education and technological advancement. eX² embarked on a multi-year, multi-phased initiative to develop a regional, open access network in 2016 in partnership with Arizona Hospital and Healthcare Association and Summit Healthcare Regional Medical Center (Summit Healthcare), Navajo County's largest employer. Together, we have been working to develop a program that will connect community institutions (hospitals, schools, libraries, first responder facilities and more) to a shared broadband network that begins in Navajo County and eventually expands to Apache, Gila and Coconino counties and beyond as funding becomes available. We have been working diligently to build upon our partnership and gain support from key regional stakeholders, including Northland Pioneer University, Arizona Public Service (APS), Alluvion Communications and previous applicant supporters as evident through our accompanied support letters.

We intend to expand our partnership and maximize awarded grant monies to benefit the greatest number of Arizonans as possible. We will do so by offering this open access network infrastructure to governmental entities, existing service providers, businesses, schools, healthcare providers and any other entity needing connection to high-capacity broadband infrastructure through dark fiber and our lit services provider partner, Alluvion Communications.

eX² is a vendor-neutral, turnkey communications infrastructure provider that not only specializes in network design, build, operations and maintenance services, but has decades of proven experience in developing and delivering broadband programs that can be scaled to connect and benefit unserved and underserved communities. We will collaborate with area stakeholders and likely dark fiber users, including Navajo County, Navajo County Health Department, Frontier, WanRack, ENA, Alluvion Communications, Sparklight/Cable One, Wyrred, Google Fiber and more. This infrastructure will be a purpose-built, shared network resource that promotes the growth and development of the region. Through our established relationship with APS, we will have a dark fiber connection point that can connect this network infrastructure to Flagstaff and Phoenix data centers, providing even greater possibilities for advancement.

The first phase of our broadband network initiative (Phase 1) is to build a fully functional, open access, middle-mile fiber optic backbone that will be deployed from just west of Holbrook to Pinetop-Lakeside (Figure 1). We have a 100% underground conduit and high-capacity dark fiber network infrastructure that can be deployed in [redacted] upon completion of the final design and permitting approvals. It will serve as the bedrock for this multi-phase network implementation.

Phase 1 completion will provide a usable network that serves the immediate needs of Holbrook, Snowflake, Taylor, Show Low and Pinetop-Lakeside in Navajo County (65 community anchor institutions, ~15,611 households and ~29,877 people). It will be developed and deployed as the foundation for subsequent phases to be developed. The Phase 1 project is an ideal solution for area stakeholders, including Navajo County and tribal service providers like Alluvion, to build on utilizing their ARPA, ReConnect, NTIA, RDOF and other grant monies, allowing them to maximize their funds with access points (handholes) deployed approximately every 1,500 feet along the route, or where appropriate, providing easy access and connection to the network infrastructure. These access points make the network available at over 250 locations.

Once complete, the middle-mile network will prove to be a springboard for economic activity and broadband development by eliminating the high initial costs faced by new market entrants and fostering new, innovative partnerships. Our network design does not limit the region to one or two service providers to offer end user services but invites a multitude of dark fiber users, service providers and potential

employers who want to expand into the region, bringing in competition, increased broadband service options and potentially more jobs. eX² and Alluvion will continue to build off this middle-mile network bringing additional services capability to more areas over time.

Alluvion will bring FTTx services to end users as quickly as possible once the infrastructure is developed. Alluvion offers various fiber-based services, including business data services, DWDM wavelengths, residential broadband and direct internet access. Alluvion will be the first service provider on the network providing last mile service connections and a lit service offering to the region. Rest assured, our partnership will not limit any other service providers from using the dark fiber to bring their services to the area.

Alluvion is committed to supporting the area at the onset, bringing [redacted] cash match contributions and has the capability of bringing other tribal, federal and state grant opportunities to help further develop the network. They have committed to investing in additional infrastructure development for buildouts from the middle-mile infrastructure over the next five years.

[redacted]

1.2 How the Proposed Project Addresses the Broadband Needs of the Area(s) That It Serves

Much of the proposed area lacks the broadband infrastructure needed to provide reliable, resilient internet access to businesses and citizens. There is a lack of middle mile infrastructure to adequately provide needed bandwidth to community anchor institutions such as healthcare providers, schools, libraries and emergency services. The proposed project will provide a high-capacity, fiber optic, middle-mile, open access network used to connect community anchor institutions. Excess capacity will then be available to

incumbent or new service providers to improve current offerings and reliability to local businesses and residents. This dark fiber will be available for lease on an open access, vendor-neutral, non-discriminatory basis to any wishing to expand their services throughout the region. Once in place, the fibers will be heavily marketed with emphasis on identifying partnerships and service providers interested in providing high-speed broadband services throughout the region.

In addition to supporting multiple stakeholders such as county and regional agencies, this proposed project will give Summit Healthcare the ability to offer improved telehealth services and enhanced quality patient care. Telehealth encompasses multiple healthcare disciplines, including dentistry, counseling, physical therapy and home health. It includes live videoconferencing as well as remote patient monitoring and mobile health – all of which demand increased bandwidth requirements and high-speed internet. The greatest benefit of telehealth is expanded access to care, particularly for patients in rural locations who must otherwise travel extended distances for a clinical visit. Other benefits include cost savings, improved workflows, enhanced communication between clinician and patient, improved health literacy and patient self-management with physician feedback.

The region's existing network lacks redundancy resulting in frequent outages causing public safety concerns when there are 911 service outages and an inability to achieve Next Gen 911 services. Our network infrastructure will complement any existing and legacy infrastructure to be used as a redundant path. Our underground fiber optic network design will also provide the region with increased reliability and resiliency, both of which are necessities when using the network for essential services. An underground network is protected by outages and damages resulting from wind, wildfires, snow, ice and accidents knocking down poles.

Schools and libraries are that currently experiencing poor service speeds and reliability (in some cases, the maximum bandwidth available for an entire school or library is 5 Mbps) will be able to connect to the network, enriching educational opportunities. The proposed network project will support streaming video, increased utilization of mobile devices in the classroom and personalized and cloud-based learning. In addition, students throughout the region are encountering a lack of educational opportunities as they do not have sufficient broadband connections at home and are missing out many of the distance and e-learning opportunities made available through broadband infrastructure. The middle mile infrastructure will provide instant education impacts and E-rate alternatives for schools with access point connections.

Finally, the network infrastructure will help to address the lack of economic development activities because private businesses and enterprises cannot relocate, build or grow in a region without high quality broadband. This proposed infrastructure will support any business wishing to move into the region that connects to the network, bringing additional job opportunities and driving economic development. It will allow for work-from-home opportunities that are currently limited or impossible due to limited connectivity options.

1.3 Number of Community Anchor Institutions Served

Our vision is for a user-agnostic, middle-mile infrastructure that's available to any user with interest in connecting to the network. The ultimate impact of this fiber super-highway is immeasurable, and, over time, it will expand far beyond the immediate reaches of the actual geography of the fiber. It will be the backbone foundation and springboard for future connections and phases of construction. We have planned for a reliable underground infrastructure that can serve the region for the next 30 years. The fiber count design was planned with the future in mind, preparing for technology innovations not yet but sure to be developed.

This first phase can serve the community anchor institutions in Holbrook, Snowflake, Taylor, Show Low and Pinetop-Lakeside. We will build as much fiber infrastructure as possible with the available funding with the goal to connect as many as:

- 11 healthcare providers
- 27 elementary, middle and high school facilities
- 17 public safety agency locations (police, fire and medical)
- 4 community colleges
- 5 public libraries
- 1 public administration office

1.4 Number of Households Served

The overall network, when completed, will pass 14 communities serving approximately 40,000 households. Phase 1 will serve Holbrook, Snowflake, Taylor, Show Low and Pinetop-Lakeside consisting of approximately 15,611 households.

1.5 Number of Businesses Served

For Phase 1, all businesses in the Holbrook, Snowflake, Taylor, Show Low and Pinetop-Lakeside communities stand to benefit indirectly from increased economic activity or directly through improved broadband connectivity. Private businesses and enterprise can be served through service providers having access to excess dark fiber capacity to expand and improve network offerings to private businesses. This dark fiber will be available on a vendor-neutral lease basis.

1.6 Total Population Served

The overall program, when complete, will pass approximately 60,000 residents. Phase 1 will serve Holbrook, Snowflake, Taylor, Show Low and Pinetop-Lakeside which consists of approximately 29,877 residents.

Holbrook Community Overview
Population – 5,016
Households – 1,814
Healthcare providers – 3
Community anchor institutions – 7

Snowflake Community Overview
Population – 5,590
Households – 1,312
Healthcare providers – 3
Community anchor institutions – 7

Pinetop Lakeside Community Overview
Population – 4,318
Households – 3,743
Healthcare providers – 3
Community anchor institutions – 7

Show Low Community Overview
Population – 10,841
Households – 7,796
Healthcare providers – 1
Community anchor institutions – 2

Taylor Community Overview
Population – 4,112
Households – 946
Healthcare provider – 1
Community anchor institutions – 2

1.7 Anticipated Economic Development Benefit Achieved by Construction of Such Improvements

The project's immediate economic impact will come through improved availability of remote telehealth services and the overall quality of healthcare services available. When specialists do not have to travel and can spend more time treating patients remotely, the overall quality of care is improved and costs to provide such care are reduced.

In the long-term, a broadband network will prove beneficial for job retention and economic growth. Access to affordable high-speed internet offers higher quality of life and availability of opportunities for the community including a strategic advantage when trying to attract new businesses or industry. Government services are positively impacted through real-time and ubiquitous access to data and information. Schools and higher education facilities can provide technology-based learning, advancing educational opportunities for students, regardless of location.

1.8 Total Miles of Fiber to be Installed (if applicable)

We plan to install approximately 70 miles of single mode fiber in a new underground conduit that originates at the APS Cholla Power Plant near Joseph City and runs through Holbrook along Highways 77 and 260 to Pinetop-Lakeside with future fiber laterals to service key locations. We have planned approximately 250 access points along the route. These access points will provide ready access to the

fiber for delivering services such as Fiber to the Home (FTTH) and to schools (E-rate) and healthcare facilities.

[redacted]

As previously stated, Phase 1 fiber will be installed from a connection point that originates at the APS Cholla Power Plant near Joseph City and runs through Holbrook along Highways 77 and 260 to Pinetop-Lakeside. We will primarily use underground due to superior reliability and the lower cost of maintenance it brings. The final design will be completed upon grant award and is anticipated to remain nearly 100% underground pending any unforeseen circumstances in the design process. The underground infrastructure ensures we are providing a network that is completely redundant and path diverse from the existing fiber in the area. A new network comprised of aerial fiber would have to reside on the existing pole infrastructure in the area that is already in use by the existing service provider in effect only adding additional capacity without adding truly path diverse redundancy.

1.10 Stated Commitment to Operate and Maintain the Network for a Minimum of Five (5) Years Upon Completion of the Improvements

eX²'s partner Alluvion accepts responsibility for general operations and maintenance of the fiber and duct provided for a minimum five-year term. It will staff and maintain network operation services to receive, respond to and dispatch crews for fiber repairs on a 24/7/365 basis with SLAs commensurate to the critical nature of a healthcare and public safety network.

1.11 Party or Parties That Will Perform the Infrastructure Construction (if known)

eX² will be responsible for the design, engineering, construction and initial testing and operations of the network. We have identified several regional specialty contractors who will be utilized for the major construction activities and will be further narrowed down and selected upon availability and final pricing.

1.12 The Intended Uses of the ABDG Rural/Urban Funds in Respect to the Construction or Planning

We are requesting RBDG Rural Funds to acquire materials and pay for labor costs to complete as much of Phase 1 as possible to provide connectivity to community anchor institutions in Holbrook, Snowflake, Taylor, Show Low and Pinetop-Lakeside. Based on the engineer's estimate, we believe the requested funding plus matching contributions will cover this portion of the overall program.

1.13 Specific Information Required Under Section 1.4 to the Extent Relevant

The proposed project is a fiber optic backbone that will provide equitable access to the middle and last mile fiber connections offered to anchor institutions and service providers who will offer lit services. The middle-mile provides true redundancy as the proposed route is based on new underground infrastructure providing not only the much-needed capacity to the area but also a completely path diverse service option from the existing service available in the area. As a fiber-based network, it will meet or exceed all the grant's minimum required download speeds for at least five years and be constructed within the grant timeline specifications.

1.14 Timeline for Completion of the Infrastructure Improvements

If awarded these requested grant monies, Phase 1 is anticipated to be completed in [redacted] construction time or less plus applicable time for design and permitting. Construction timeframes are subject to material availability. (Note: we have begun discussions with materials providers to identify ways to streamline ordering and receiving materials.)

[redacted]

- [redacted]
- [redacted]
- [redacted]

1.15 Cash "Match" Contribution

Please find our attached cash match commitment letter within Section E. Documentation of Commitment. Our team member, Alluvion Communication, Inc. is contributing [redacted] of the ABDG Grant plus our in-kind design and engineering services. Our cash match is immediately available and will be used to offset the shortfall of project funding for construction management and construction activities.

All partnering entities are committed to applying for additional federal, state and tribal grant monies to continue to build off the fully functional Phase1. Its important to clarify that the Phase 1 can operate and stand alone as a fully functional asset. Additional phases will only expand its reach and maximize its benefits to the region.

2.0 Project Description and Timeline – Development

2.1 The Nature and Scope of the Project

Phase 1 is a middle-mile fiber optic backbone that will be deployed from Holbrook to Pinetop-Lakeside and serves as a key starting point for a multi-phase implementation. We plan to expand the network outside of Navajo County and into neighboring Arizona counties including Apache, Gila and Coconino adding multiple communities and doubling the number of healthcare provider locations. Such infrastructure supports the provision of real-time services such as telemedicine, distance learning and public safety as well as offers dark fiber to surrounding unserved or underserved community anchor institutions and residents who would like connection to the network. Once complete, the middle-mile network will serve as a springboard for economic activity and broadband development by eliminating the high initial costs for new market entrants and fostering new, innovative partnerships.

2.2 Type of Technology to be Utilized

Phase 1 of this infrastructure program will be an open access, middle mile, dark fiber network with a primary focus of providing connectivity to healthcare providers and community anchor institutions in the region. In addition to the dark fiber offering, we have partnered with a regional tribally owned services provider Alluvion Communications to offer lit fiber and internet services on the network. Alluvion's fiber offerings utilize multiple types of technology depending on the service being provided, including GPON for residential services and symmetrical Ethernet, DWDM wavelengths and direct internet access for business services.

2.3 Type of Construction to be Undertaken (aerial or underground)

We will build the Phase 1 network using underground construction due to the reliability and lower cost of maintenance. The final design will be completed upon grant award and is anticipated to remain 100% underground pending any unforeseen circumstances in the design process. The underground infrastructure will be completely redundant and path diverse from the existing fiber in the area. Any new network comprised of aerial fiber would have to reside on the existing pole infrastructure in the area that is already in use by the existing service provider only adding additional capacity without adding truly path-diverse redundancy.

Our underground network design will provide the region with easier access to connection points and increased reliability and resiliency – two essential factors when using the network for emergency services. An underground network is protected by outages and damage resulting from wind, wildfires, snow, ice and accidents knocking down poles. Plus, underground networks are less expensive to maintain and operate.

In summary, underground fiber has significant advantage over aerial infrastructure such as:

- **Reliability** – Underground is not subject to outages and damage due to wind, ice, snow, wildfires, vehicles or other pole-damaging accidents. Reliability and resiliency are essential when this infrastructure will be used for emergency services. The network is needed most in times of emergency, and aerial fiber will likely be "down" when a natural disaster or weather event strikes.
- **Access** – It offers easier access to the connection points.
- **Control** – You are not subject to the demands and changes of the pole owners.
- **Commercialization** – Underground infrastructure is viewed as far superior to the potential end users who are wanting to use it for their FTTX business.
- **Maintainability** – Underground infrastructure is easier and less costly to maintain.
- **Longevity** – Underground infrastructure has a longer useful lifespan. Conduit has a useable lifespan of 40+ years. Fiber has a useable lifespan of +/- 30 years.

2.4 Qualifications of the Vendors/Contractors

eX^2 was founded by a team of seasoned communications and critical infrastructure professionals. For nearly 30 years, eX^2 management team members have worked together designing, building, commercializing and maintaining broadband, healthcare, energy and intelligent transportation networks

throughout the US. Together, they have more than 300 years of combined industry experience, designed and built more than 2M+ fiber miles and accumulated [redacted] in duct and dark fiber sales. And, while this experience starts with our executive management team, it is evident across our entire organization – in our project development, engineering, operations and maintenance, business development, legal and finance teams with an individual team member average of 28 years' telecom experience.

eX² is wholly owned by Vivacity, LLC, a smart infrastructure and asset development company that invests in telecommunications infrastructure for communities, transportation entities, carriers and more. Vivacity is wholly owned by Columbia Capital which has invested in internet, enterprise IT and mobility infrastructure since 1989 with over 175 companies funded and [redacted] committed. This ownership model provides a significant positive impact upon the financial position and operating capital available at eX² for organic growth and development.

eX² employs a talented staff of industry experts with numerous applicable certifications and credentials including:

- Professional Engineers
- Project Management Professionals
- Utility Locating Certified Professionals
- Certified FTTH Professionals
- Certified FTTH Designers
- BICSI Registered Communications Distribution Designers
- BICSI Fiber Optic Technicians
- Outside Plant Designers
- Numerous Cisco Certifications
- Certified Public Accountants
- Board Certified Attorneys
- QA/QC Certified Professionals
- OSHA 10 Certified Professionals
- OSHA 30 Certified Professionals

Our team members have personal experience working with numerous agencies to design and build middle mile fiber optic networks that ultimately brought broadband to surrounding rural communities, including customers such as:

- Google
- Grafton County, NH
- Illinois State Toll Highway Authority
- Indiana Toll Road
- Level 3 Communications/Lumen Technologies
- Massachusetts Technology Collaborative (MassBroadband 123)
- Mid Atlantic Broadband Cooperative
- New Jersey Turnpike Authority
- New York State Thruway Authority
- Rural Nebraska Healthcare Network (RNHN)
- Slic Network Solutions
- Town of Bristol, NH
- Town of Mount Washington, MA
- Urbana-Champaign Big Broadband (UC2B)
- Zayo

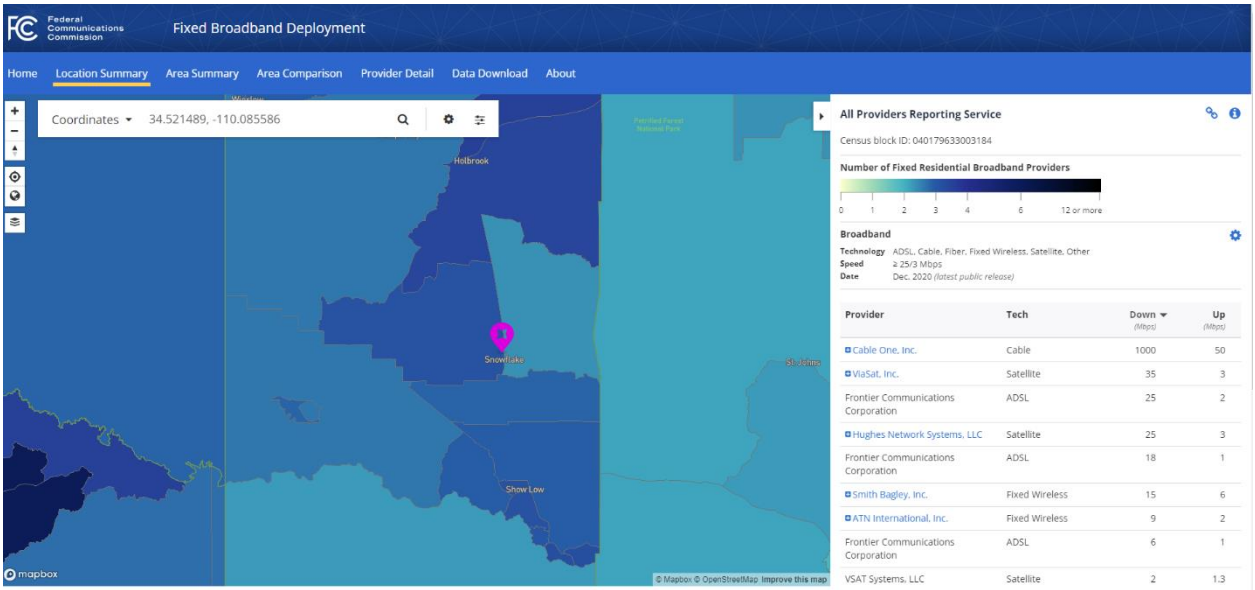
eX² is registered through the Federal System for Award Management with no negative findings. We are also a USAC registered service provider – SPIN 498/ID 143048742. eX²'s DUNS number is 07-986-7218. We have no other outstanding federally funded grant applications. For additional information about eX²'s solutions, services and experience, please visit www.ex2technology.com.

Our last mile lit services provider partner, Alluvion, is an eligible provider for a completed Capital Project Fund-funded Broadband Infrastructure and participates in federal programs that provide low-income consumers with subsidies on broadband internet access services. Alluvion has experience receiving large grants to support underserved Arizona areas, including a [redacted] in USDA ReConnect Grant in 2020.

2.5 Engineering Analysis

According to the FCC.gov broadband map, much of the targeted service area is served by only one fixed wireline provider capable of delivering the FCC-defined bare minimum broadband speeds of 25/3 Mbps. In our view the minimum broadband speeds of 25/3 Mbps barely supports the needs of most households let alone businesses and economic development. The market lacks reasonable competition and frequent outages because of this. The area needs updated infrastructure, more redundancy and increased opportunity for competition to keep up with the current rate of technology and broadband demands.

In addition to the general lack of competition and service offerings in the area, we noted a high frequency of outages. Frequent outages are typically evidence of aging infrastructure and high susceptibility to weather or damage incidents. This is just one reason we are proposing an entirely underground infrastructure. Underground infrastructure costs marginally more than aerial for the initial deployment, but much less expensive to maintain and operate.



2.6 Project Approach

We intend to design, build, operate and maintain an open access, middle-mile fiber network to enable rural broadband development options by increasing capacity, competition and redundancy for the entire region. We will provide connection access points to the network for most county, municipal facilities, schools, healthcare providers and any other community anchor institutions along the route. We will engage with as many potential stakeholders as possible to ensure we are designing a network that serves the most needs in the most economically feasible way.

In addition to offering affordable wholesale dark fiber along the route, we intend to connect our lit services partner, Alluvion Communications, to the network once complete. Alluvion will provide various fiber-based services, including business data services, DWDM wavelengths, residential broadband and direct internet access.

2.7 Background of the Project

As described in Section 1, Project Description and Timeline, eX² is dedicated to expanding rural broadband services in Arizona and improving the quality of life for Arizona's citizens by making way for robust economic development, affordable broadband connectivity, and advanced telehealth services. eX², Arizona Hospital and Healthcare Association and Summit Healthcare Regional Medical Center (Summit Healthcare) are working collaboratively and continuously on a plan to connect community institutions (hospitals, schools, libraries, first responder facilities, etc.) to a shared broadband network to enable long-term economic development tools for underserved rural areas throughout Arizona in addition to providing improved access to affordable broadband services. This project is the first phase of the network (Phase 1) and will be the cornerstone of an entire regional network. The Phase 1 network will allow community anchor institutions and healthcare providers to connect and expand telehealth and next generation broadband services to rural and underserved areas in Navajo County and throughout the greater region.

Phase 1 is a middle-mile fiber optic backbone that will be deployed from Holbrook to Pinetop-Lakeside (Figure 1) and serves as a key starting point for a multi-phase implementation. We have plans to expand the network outside of Navajo County and into neighboring Arizona counties including Apache, Gila and Coconino adding multiple communities and doubling the number of healthcare provider locations. Such infrastructure supports the provision of real-time services such as telemedicine, distance learning and

public safety as well as offers dark fiber to surrounding unserved or underserved community anchor institutions and businesses who would like connection to the network. Once complete, the middle-mile network will serve as a springboard for economic activity and broadband development by eliminating the high initial costs for new market entrants and fostering new, innovative partnerships.

2.8 Population to be Served
Please refer to Section 1.6 Total Population Served.

2.9 Number of Households Served
Please refer to Section 1.4 Number of Households Served.

2.10 Number of Anchor Institutions Served
Please refer to Section 1.3 Number of Community Anchor Institutions Served

2.11 Number of Businesses Served
Please refer to Section 1.5 Number of Businesses Served.

2.12 Ways in Which the Project Will Improve Redundancy and Reliability, if any
Redundancy and reliability will be improved in multiple ways. First and most importantly, the APS fiber connection at the north end of the network will easily allow any interested service providers or incumbent carriers to make new connections to primary Internet Exchange Points and Tier 1 data centers offering multiple paths for internet connectivity into and out of the region. In addition to the extra internet bandwidth being introduced into the region, our network will create a new diverse fiber route offering service providers, private companies and public agencies a new option for dual and redundant paths for internal private WAN connectivity. Any path utilizing the existing aerial infrastructure would not provide truly path-diverse redundancy and any attempts to provide that redundancy with microwave links would be detrimentally limited in capacity during outages.

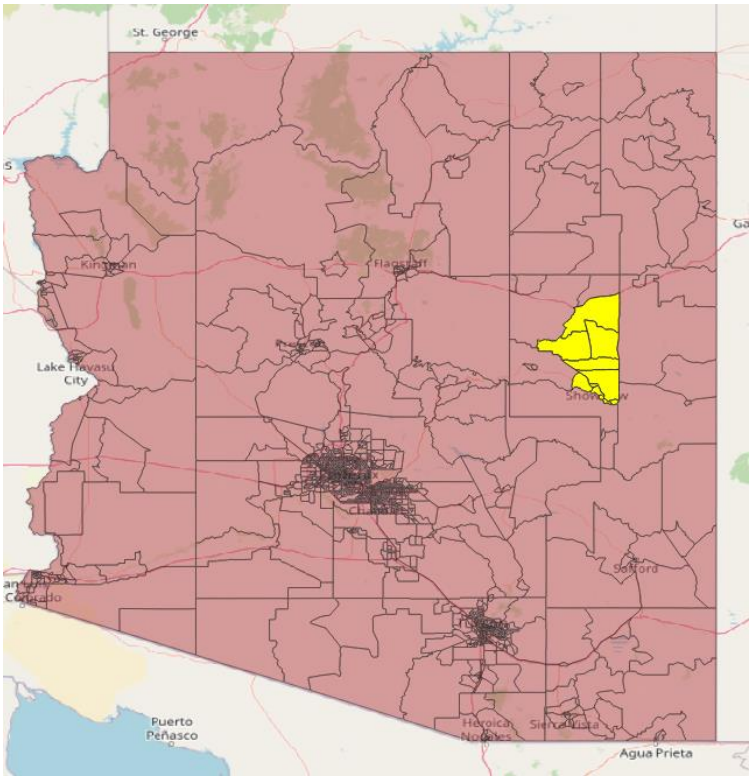
3.0 Other Project Outcomes (optional)
While many view broadband as a quality-of-life enhancement, it adds many socio-economic benefits to a community. Planning for and building an adaptable communications network is an important first step to establishing a healthier, more connected community. In the wake of the COVID-19 pandemic, it has become apparent that broadband access is an absolute necessity for today's internet-connected world. It is the backbone for bringing fiber to homes, powering smart grid applications, advancing healthcare and educational programs, improving public safety and supporting smart city initiatives.

This network will prove to be a regionally owned, open access network asset providing innumerable other benefits, connecting underserved communities and stakeholders, helping to minimize the digital divide, enabling and promoting telehealth, remote learning and improved public safety by providing reliable, resilient service to first responders.

We believe constructing Phase 1 of the fiber backbone will lay the foundation to bring high-speed broadband to the greater White Mountain Region and support the technological innovations as described throughout our application. As designed, this is a future-ready fiber optic network that will sustain the White Mountain Region's broadband needs today and support new innovations yet to be developed for many decades to come.

eX² is a middle-mile infrastructure provider, and as such, we are a vendor-neutral third party. We deploy and develop open access, user-agnostic fiber optic assets to benefit entire regions. We do not have a lit service business model or any agenda to build infrastructure that serves as a standalone business model, such as an Internet Service Provider or E-rate provider. Our only goal is to deploy infrastructure that will be made available to all on a first-come, first-served basis to maximize its usage and benefits for all. This approach ensures that this fiber infrastructure serves the entire region for decades to come.

H. Maps

Please see the following for high level route maps. The census tracts having immediate impact by the deployment of the network are listed below. Additionally, we can provide digital maps in .kmz or various GIS formats upon request.

Census Tract ID	
9652	9649
9625	9653
9617	9648
9638	9634
9602	9613