PROJECT NARRATIVE

Project Description & Timeline

Tohono O'odham Utility Authority (TOUA) is a tribally owned telecommunications company serving the Tohono O'odham Nation across Pima, Pinal, and Maricopa counties with electricity, telephone, Internet, cellular, water and wastewater services to tribal and non-tribal customers. TOUA is an Equal Opportunity Employer headquartered in Sells, Arizona and operates as a Local Exchange Carrier (LEC) providing voice and Internet services to approximately 1100 broadband subscribers. TOUA has provided Internet services since 1998, when the company first introduced dial-up service. Today, TOUA offers Internet connections via fixed wireless, digital subscriber lines, and fiber optic cable, with the goal of improving the quality of voice, data, and Internet services for the residents, businesses, and anchor institutions in the community. The Fiber-to-the-Premise (FTTP) project proposed in the FY2022 Arizona Broadband Development Grant application is located in Pima County (Census tract numbers: 040199408002,040199408003, 040199406002), classifying it under the Urban infrastructure construction category. The reservation is sizable, encompassing approximately 35% of the land mass of Pima County. The total project cost proposed by TOUA is [redacted] being requested grant funding from ABDG-Urban for construction, installation, and improvement of broadband services. TOUA is registered in the federal system for award management (www.SAM.gov) and currently has a pending application for a grant through the National Telecommunications and Information Administration (NTIA). The NTIA grant doesn't cover the service areas proposed in the ABDG.

CT&T a Palmetto Engineering and Consulting company will serve as the consultant providing engineering services that include grant preparation, infrastructure design, and budgeting. CT&T Engineering employs over 200 employees and professional engineers (PE) on staff are licensed in 40 states, including Arizona. As an engineering consulting firm, they have applied for and awarded numerous state and federal broadband grants and have worked with tribal entities for more than 30 years. The proposed FTTP project is scheduled to be completed within two years (see Appendix A).

The Nature of Improvements

TOUA proposes to improve broadband services in 13 Tohono O'odham communities within Pima County with a Fiber-to-the-Premise network (Appendix B). TOUA currently provides copper services to some premises found within the proposed service areas; however, building last mile FTTP has not been financially feasible. Upon grant award, TOUA will install 45.45 miles of fiber optic cable while passing to 423 premises. This FTTP project will deploy Next-Gen XGS-PON (10G PON) technology which will provide up to 10 Gbps symmetrical (download/upload speeds) for throughput to the premise. The proposed network will connect to TOUA's existing 2.5 GB fiber ring that connects to core routers that connect to the Internet from two 10 GB Dedicated Internet Access (DIA) connections (See Appendix C). Fiber routes to DIA connections are protected with path diversity to ensure physical redundancy.

Users in the proposed service areas will move from an infrastructure supported by DSL to a FTTP infrastructure supported by a Calix E7-2 2.5 GB fiber ring. Currently all the proposed areas are limited to maximum speeds of 15/3 Mbps through the copper infrastructure. From a FTTP network, bandwidth can be increased on demand for residents, businesses, and anchor institutions with a few key strokes. FTTP networks provide exponentially higher speeds (10 GB up/down) than copper and wireless networks and are not susceptible to interference, signal loss, and distance limitations. TOUA's fiber-to-the-premise infrastructure equipment operates in data centers designed from Tier 4 architecture

standards and is completely fault tolerant. Networks that operate from these standards typically have a designed uptime of 99.995% (26.3 minutes of downtime annually, mainly unnoticed by users).

How the Proposed Project Addresses the Broadband Needs of the Area(s) that it Serves

The PFSA's are currently underserved with no access to Internet speeds of 25/3 Mbps or greater. Based on broadband mapping provided by the FCC, residents of proposed areas do not currently have access to high-speed broadband infrastructure (See Appendix D). The objectives of these projects work toward accelerating infrastructure construction goals supported by this grant. Proposed infrastructure will not only provide services at 10 GB symmetrical speeds, but also install "future proof" infrastructure that will provide an upgrade path for decades to come. High speed broadband is vital to the wellbeing and quality of life for these rural communities. Implementation of this network infrastructure project greatly increases telework opportunities and telehealth access, just to name two. It creates entrepreneurship possibilities for the members of the community, enabling them to remain in the community while having equal job opportunities to those in developed metropolitan areas.

Key Metrics in Funding Area

The PFSA for this project will span 13 villages in Pima County, AZ on the Tohono O'Odham Reservation. The average household size for the reservation is 3.7 (CensusReporter.org). Multiplying that number by 413 households approximates the total population to be 1,529. There are 8 anchor institutions included, and there are 2 businesses, bringing the total to 423 premises. The project will require a total of 45.45 miles of fiber.

Key Metrics	
Population	1529
Anchor Institutions	8
Households	413
Businesses	2
Total Premises	423
Miles of Fiber	45.45

The Anticipated Economic Development Benefit Achieved by Construction

Broadband is key to the future of economic development, health, public safety, public works, and education across the reservation. This new infrastructure will provide the capability for first responders to employ technologies and applications to address critical safety concerns, realize significant economic and time savings, and achieve work process efficiencies. Broadband connectivity will give residents in remote areas access to hybrid, virtual, distance, and online educational opportunities, both during pandemic periods and non-pandemic times. It will also allow tribal residents to participate more broadly in existing and emerging telehealth programs, bringing services to those that are not currently able to access them. The PFSA doesn't have the same access to capital as high-density municipalities, which makes funds from this grant vital for the advancement, sustainability, and quality of life improvements. With the realization of this project, the communities can flourish in ways not possible now, enabling them to compete with fewer constraints in a contemporary world.

PROJECT NARRATIVE

Location of New Fiber

The fiber routes will consist of buried fiber in a previously disturbed existing right of way. Buried fiber is preferred, as it provides a natural barrier of protection from the elements, as well as natural disasters, such as fire and other extreme weather factors. All buried fiber will be installed in an appropriately sized ductile, allowing pulls for splicing or any potential emergency repairs, in the event of a breech. Hand-holes are typically installed at critical junctures, such as river crossings, major highway corridors, and at a minimum every five thousand feet. All hand-holes contain additional length of the main transport fiber, allowing the ability to pull slack between sections for emergency repairs. Optical budgets compensate for all fiber splices in the design aspect, allowing for additional or emergency splices when required. See Appendix E for FTTP maps for each proposed area. Each site has existing middle mile fiber, staged for opportunities to complete the proposed FTTP projects.

The file (attached to this documentation): ABDG Map.kmz has been created with multiple layers, providing an overview of the project plan. Opening this file (typically in Google Earth) provides a reasonable visual representation of the serving area. Clicking on the right-pointing arrow immediately to the left of the radio-button (or checkbox) will expand the layers as below. You can explore further for any granular detail as desired.

- ☐ ABDG Map.KMZ *(Checking this box enables all layers)*
  - ☐ ABDG Address Points *(Enables all identified address points)*
  - ☐ AZ Counties *(Enables all County Boundaries)*
  - ☐ Existing Middle-Mile Fiber *(Enables proposed fiber routes)*
  - ☐ Proposed PON *(Enables proposed PON Cabinet locations)*
  - ☐ ABDG Serving Areas *(Enables the general PON serving area boundaries)*
  - ☐ ABDG Meet Points *(Critical infrastructure termination points)*
  - ☐ Tribal Boundaries *(Enables Tohono O'Odham Tribal boundaries)*
  - ☐ Census Blocks *(Enables Census-provided tract & block information)*

Stated Commitment to Operate and Maintain the Network for Five Years

TOUA plans to fully operate and maintain the network proposed in this grant for more than five years upon the completion of the improvements. Additionally, TOUA will continually monitor and improve the network to ensure that all residents, businesses, and anchor institutions receive an inclusive, equitable, and competitive network that sets these communities up for future success. TOUA is the carrier of last resort and is required to provide service in the PFSA.

The Party or Parties That Will Perform the Infrastructure Construction

TOUA has managed multiple middle-mile and FTTP projects in recent years with the mission to provide competitive and equitable broadband to every resident. Throughout this process, TOUA has worked with numerous high-quality contractors. Utilizing these relationships, quotations for work will be received from credible contractors with proven track records. All contractors will be properly licensed, bonded, and insured. In addition, CT&T will oversee the construction from start to finish. The CT&T team is committed to providing high-quality, cost-effective telecommunications engineering and

construction services at every stage of a project. CT&T's primary areas of expertise include the following:

- Network Planning.
- Outside plant design, staking, and construction surveillance.
- Central office equipment planning, specifications, development, assistance with bidding, and acceptance testing.
- Rights of way services.
- Installation and cutover.
- Project management.

For construction, Cablevision Communications Inc. (CCI) is a trusted partner. CCI has been in business since 1983 building telecommunications and cable tv networks throughout the southwestern United States. CCI is proficient in fiber optic deployment using specialized equipment and processes, building long-haul and distribution network facilities, and providing turn-key projects with accurate and professional record keeping. CCI has worked for TOUA on the Tohono O'odham Nation since September 2020 building fiber in 8 of the 12 districts on the reservation. CCI remains in good standing with the nation by providing professional and efficient services, accurate reporting, and adherence to the nations requirements for performing business on the reservation including tribal employment compliance and transaction record keeping.

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

The funds received through the ABDG will be used to enhance the connectivity for the unserved and underserved premises within the listed TOUA project sites in order to bridge the current digital divide experienced by the residents. The intention is for the grant to partially fund the establishment of broadband infrastructure that will enhance the speed, redundancy and reach of high-speed Internet at reasonable cost to consumers in tribal communities. All grant funds will be used for costs associated with activities directly related to the construction, installation, or improvement of broadband infrastructure during the term of an ABDG-Rural award. Funds will not be used for non-construction related items that include, but are not limited to:

- Administrative costs associated with applying for ABDG funds or managing a ABDG grant award.
- Post-construction maintenance costs.
- Costs of construction that occurs before the date of an executed Agreement.
- Contingency fees.
- Network or company acquisitions.
- Sales and marketing.
- Permit fees.

The Specific Information Required Under Section 1.4

The PFSA is both considered unserved or underserved in its entirety. The proposed FTTP network will exceed speeds of 100/100 Mbps and capable of supporting maximum speeds of 10 GB symmetrical to every premise. Businesses and anchor institutions will access a reliable and scalable network offering bandwidth on demand. Within 24 months of the award date, TOUA will provide these speeds to the intended beneficiaries of the project at costs that are provided below:

Residential

[redacted]

Higher speeds will be added at a future date. It should be noted that TOUA Residents have access to multiple programs that provide a significant discount or provide free service to residents. A look at the current programs is provided below:

1) NECA's student broadband discount program - [redacted] on monthly Broadband rate for new customers only. Existing customers can upgrade to a faster speed at no additional cost.
2) [redacted]
3) Increase speed participants 107
4) TOUA Student Household discount- [redacted] monthly broadband rate. participants 83
5) USAC's EBBB- now APC – [redacted], participants 102
6) USAC Lifeline low income program, participants 173

A Timeline for Completion of the Infrastructure Improvements

See Appendix A for a Gannt Chart displaying the timeline to completion for the project.

Cash Match Contribution to be Provided

TOUA will utilize general funds match portion of the project. Funds will be utilized in the initial phase of the project to order materials and facilitate engineering pending the initial grant disbursement. The total project cost is estimated to be [redacted]. The requested grant funding is [redacted]. TOUA will commit a [redacted] match to the project of [redacted]. The matching funds will be in place at the commencement of the project.

Project Description and Timeline – Development

The Nature and Scope of the Project

TOUA will deploy Fiber-to-the-Premise (FTTP) broadband infrastructure supplying a minimum of 10 Gbps symmetrical service to tribal communities in Pima County, Arizona. The funded service area includes 423 premises and a population of 1529 all within the boundaries of the Tohono O'Odham reservation. There are eight anchor institutions in the PFSA, including two schools and multiple churches. There are two businesses in the PFSA.

TOUA is working towards comprehensive community enhancement that includes households, businesses, and community institutions. The availability of FTTP service will give residents of the

respective villages access to a plethora of new information and resources regarding employment, job training, education, health care, and business opportunities, as well as additional sources of news, entertainment, and activities. The availability of high-speed broadband service is an essential prerequisite for attracting new businesses to the area, as well as for permitting existing local businesses to expand the markets in which they sell their goods and services and in which they purchase necessary resources. Students living in the PFSA do not currently have access to adequate high-speed broadband for school resources, online classes, or research options that otherwise would be available. As part of the project and ongoing community support, TOUA will continue to work with local schools and telemedicine facilitators to address the needs of the rural community. We believe equal opportunity and access to broadband services will provide the education and resources necessary for equal opportunity and inclusive connectivity. TOUA is prepared to start the FTTP project for the entire PFSA immediately upon award.

Type of Technology to be Utilized

XGS-PON was designed as a "future-proof" solution that supports advances of end user technology without upgrading the entire network infrastructure. This project minimizes operating expenses by limiting the amount of equipment to maintain and replace. XGS-PON networks do not require powered devices between the central office and the premise. XGS-PON consist of Optical Line Terminals (OLT), optical splitters, and Optical Network Terminals (ONT). Fiber cable (24 to 288 strand fiber cable depending on passing quantity) splits (1x32) from an OLT and terminates into an ONT. From a support standpoint, this ONT offers zero-touch service activation and unmatched network analytics and visibility. The utilized OLT will be a commercial grade environmentally hardened modular platform that can be deployed in a central office or at a remote location. Its modular architecture is scalable and protects carrier investments by preventing equipment obsolescence. Services can then be transported on a per wavelength basis, using only a single fiber uplink to aggregate and transport multiple services whether for residential triple play, mobile backhaul or business Ethernet services. This platform supports flexible traffic management; Ethernet flow mapping, prioritization, tagging; and versatile management options which are required to respond to the demand for premium services.

Type of Construction to be Undertaken (Aerial or Underground)

Construction methods shall include buried fiber optic cable for this project. If specific cases arise, aerial may be substituted due to terrain difficulty or other obstacles that prevent buried construction. The grant application cost includes 45.45 route miles of fiber. TOUA will ensure compliance with all cabling and construction techniques, standards, and specifications as published by industry bodies. Construction techniques shall use a variety of methods, inclusive of:

1. Vibratory Plow
2. Horizontal Directional Drilling (HDD) (BM61(x)D; BM61(x)DR)
3. Rock Saw and Pneumatic Hammer (BM71)
4. Aerial (only if buried becomes impractical)

Qualifications of the Vendors/Contractors

As stated above, TOUA has contracted with numerous licensed, bonded, and insured professional telecommunication companies for previous FTTP projects within their existing service areas. While quotations for work will be received from multiple companies, the likely candidate for the job will be

PROJECT NARRATIVE

Cablevision Communications, Inc. (Lic: AZ ROC 222982). Cablevision Communications Inc. (CCI) has been in business since 1983, building telecommunications and cable TV networks throughout the southwestern United States. CCI is proficient in fiber optic deployment using specialized equipment and processes, building long-haul and distribution network facilities, and providing turn-key projects with accurate and professional record keeping. CCI has worked for TOUA on the Tohono O'odham Nation since September 2020 while building fiber in 8 of the 12 districts on the reservation. CCI remains in good standing with the nation by providing professional and efficient services, accurate reporting, and adherence to the Nation's requirements for performing business on the reservation including tribal employment compliance and transaction record keeping.

Engineering Analysis

CT&T has an expert staff to assist clients in the planning, design, and development of reliable data integration solutions. Their engineering team is committed to providing innovative, cost-effective services that results in business operation efficiencies. CT&T is a professional engineering firm holding licensure in 40 states, including Arizona. They employ approximately 200 employees and have worked with tribal entities for more than 30 years. CT&T will be charged with planning, designing, engineering, construction, and oversight of the ABDG infrastructure enhancement project.

Project Approach

Upon being awarded funding through the Arizona Broadband Development Grant, the project will enter multiple phases of operation including initiation, project planning, project execution, and project closing. The initiation phase includes obtaining needed authorizations, permits, and quotations from contractors. The project planning phase consists of developing the project management plan and all relevant project documents to establish the project scope of work necessary to achieve objectives. Project planning integrates all aspects necessary to execute the work required throughout the project lifecycle. The project execution phase includes all the processes necessary to complete the work defined in the project management plan. The project execution consists of coordinating people and resources, as well as integrating and performing project activities as specified in the project management plan. The project closing phase consists of executing the processes necessary to finalize all activities and formally complete the project obligations. This may include inspections, closing out procurements, archiving documents, and finalizing grant reporting as needed.

Background of the Project

The FTTP network will utilize the existing TOUA infrastructure to deliver the voice, data, and video services to customers in the PSFA. TOUA currently offers either copper or wireless services to all residents within proposed areas and will utilize existing middle mile fiber to complete the costly last mile projects in the PFSA. The existing core network uses dynamic host configuration protocol (DHCP) for Internet Protocol (IP) address management and shall use Diffserv as needed for traffic management and quality of service. TOUA has the ability to black hole traffic thus allowing for protection from denial of service (DoS) attacks as well as non-malicious user behavior. Law enforcement activities are accommodated using the equipment's CALEA features. All features of the existing network will benefit the network subscribers in the PFSA.

PROJECT NARRATIVE

Key Metrics in Funding Area

The proposed funding area for this project will span 13 villages in Pima County, AZ on the Tohono O'Odham Reservation. The average household size for the reservation is 3.7 (CensusReporter.org). Multiplying that number by 413 households approximates the total population to be 1,529. There are 8 anchor institutions included, and there are 2 businesses, bringing the total to 423 premises. The project will require a total of 45.45 miles of fiber.

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Miles of Fiber	45.45

Way in Which the Project Will Improve Redundancy and Reliability

Many villages across TOUA currently experience poor, slow, inconsistent, and unreliable Internet. Our broadband infrastructure projects would not only provide high-speed broadband, but the residents and businesses would be able to enjoy connections that rival offerings in major metropolitan areas. TOUA's existing network infrastructure is Geo-Redundant and diverse fiber paths. Central and Remote Offices that support FTTP networks are climate controlled and powered by DC powerplants with battery string and generator backup.