Native American Community Anchors: TV Whitespaces for Tribal Connectivity, Equity, and Inclusion

San Jose State University Research Foundation

IMLS Project Proposal Summary: This project, involving Dr. Kristen Rebmann of San Jose State University's School of Information (SJSU-iSchool), Alana McGrattan of the Tribal Libraries Program of the New Mexico State Library (TLP-NMSL), Gar Clarke (Tribal Liaison) of the New Mexico State Department of Information Technology Office of Broadband & Geospatial Initiatives (DoIT/OBGI), Donald Means of Gigabit Libraries Network (GLN), and Dr. Elizabeth Belding of University of California, Santa Barbara's Department of Computer Science (UCSB-CS) will collaborate with Tribal Libraries across New Mexico to explore dramatically improving Tribal internet connectivity, equity, and inclusion through the design and implementation of several TV Whitespace (TVWS) networks statewide. **The proposal respectfully requests a $249,554 grant to extend prior TVWS research and projects through a three-part work plan involving professional development, technology implementation via a subaward program, and evaluation research.** With its goals for addressing challenges associated with Native American equity through digital access and inclusion, the project addresses the IMLS National Digital Platform's call for Diversity and Inclusion:

"NDP work must be inclusive of the diverse communities and sovereign tribal nations that make up the United States." (National Digital Platform at Three (NDP), 2017)

Statement of National Need: In 2014, the Association of Tribal Archives, Museums and Libraries prepared a report, *Digital Inclusion in Native Communities: The Role of Tribal Libraries*, which discusses the challenges Tribal Libraries face in bringing basic broadband access to their citizens in addition to creating public spaces that provide Wi-Fi connections. The report illustrates how **Tribal Libraries play a critical role as community anchor institutions (CAIs)** in providing their community members with access to the internet (ATALM, 2014).

TVWS represents an emerging, low-cost wireless technology that has the potential of expanding Tribal Libraries' ability to extend their Wi-Fi signals beyond the building and beyond library hours to public spaces such as subsidized housing, schools, clinics, museums, senior centers, and other CAIs (Rebmann, Te, & Means, 2017). TVWS spectrum refers to radio frequencies that were released by the Federal Communications Committee in 2008 to provide license free access for the public. An important benefit of TVWS is that it does not require line-of-sight to support signals and has strong propagation qualities. Frequencies associated with TVWS reside in the lower radio frequency bands. For this reason, signals can travel for several miles and typically pass through geographic and community obstructions such as trees or buildings. Further, as long as any incumbent primary transmitters are avoided, TVWS is free to use. WiFi, with a reach measured in 10s of meters, provides great service for users within or very close to the library building. By contrast, the range of TVWS-enabled networks is measured in 100s or even 1000s of meters (Chavez et al, 2015), thus augmenting the number of patrons libraries can serve via wireless connections to the internet.

Project Design: SJSU's-iSchool, TLP-NMSL, NM-DoIT/OBGI, GLN, and UCSB-CS will collaborate with Tribal Libraries across New Mexico to explore the improvement of Tribal internet connectivity, equity, and inclusion through the design, implementation, and evaluation of several TVWS networks statewide. This project will extend the efforts of several grant-funded projects:

- 2017 Microsoft funding: Supported several TVWS networks in Michigan and Pennsylvania libraries.
- 2016 IMLS grant: Supported 5 new TVWS networks (ME, GA, Yakama Nation – WA, NE, & SD).
- 2016 National Science Foundation (NSF) EAGER (Early-Concept Grants for Exploratory Research) and NSF NeTS (Networking Technology and Systems) grants: Supported TVWS investment for Tribal Connectivity.
- 2015 Knight Foundation grant: Funded basic TVWS orientation and analysis tools for libraries.

Project Goals and Outcomes: Importantly, the 2016 IMLS and NSF-funded grants (described above) represented **very early efforts at addressing Tribal connectivity** using TV White space technology. Project

Goals and Outcomes for this proposal include: (1) to realize the potential of using **TVWS to promote equity through digital access and inclusion**, (2) to provide **professional development opportunities for Tribal Library professionals** relating to TVWS technology and its applications through an online, open-access course, (3) **to deploy 5 TVWS networks** involving Tribal Libraries, (4) to develop **a model for collaborations between Native American Sovereign Nations and their respective states for TVWS-enabled Tribal Connectivity**, and (5) **to study TVWS performance and usage** within an operational network.

Proposed Work Plan: Grant funds will support **activities over two years in three phases: professional development, technology investment and implementation, and evaluation research.**

Tribal Library Professional Development: Phase 1 involves the development of an online open course (hosted by SJSU-iSchool) for Tribal Library professionals to raise awareness of TVWS technology and scenarios for its deployment in Tribal Library and Native American community contexts. **National Impact:** This initial phase of the project will create **a freely available resource for continuous learning** and contribute to the cultivation of a digital library workforce (tenets of the IMLS National Digital Platform).

"Work in NDP focal areas supports the education and training of librarians to lead the way in the design, development, implementation, and maintenance of digital tools and services." (NDP at Three, 2017)

Tribal Technology Investment and Implementation: Phase 2 initiates TVWS investment via subawards to (5) Tribal Libraries across the state of New Mexico. SJSU's-iSchool, TLP-NMSL, NM-DoIT/OBGI, GLN, and UCSB-CS will collaborate with New Mexico's Sovereign Nations to identify sites with existing backhaul that can support TVWS networks. **National Impact:** These new TVWS networks will support the strategic extension of WiFi into new community spaces and will **augment the number of patrons able to access library programs, services, and the internet**. As part of their role as CAIs, Tribal libraries will have the opportunity to leverage TVWS to close the "homework gap" or provide convenient WiFi access for the community in new places never before served. The portability of access points might support distributed programming and wireless connections to community-based activities and events. Libraries might also use TVWS to improve disaster response planning (also) due to the portability of TVWS hotspots. By moving with populations in crisis, TVWS hotspots can potentially provide digital access to people under evacuation.

Evaluation Research and Model Development: Phase 3 collects information from partner Tribal Libraries in the form of technology performance, network usage impact, reports, planning documents, surveys, and interviews to evaluate the process and impact of the Tribal TVWS installations. **National Impact:** Led by UCSB-CS, and in collaboration with SJSU's-iSchool, TLP-NMSL, NM-DoIT/OBGI, and GLN, analyses of datasets collected in Phase 3 will assist in **developing a national model for effective deployment of TVWS-WiFi** to improve Tribal Connectivity in support of digital equity, access and inclusion. Phase 3 will also **develop a model for collaborations between Native American Sovereign Nations and their respective states for TVWS-enabled Tribal Connectivity**.

Overall National Impact: Each of the three phases associated with this project will address IMLS' National Leadership Grants for Libraries National Digital Platform **project category** by positioning TV White Space technology as a communications technology that is supportive of Tribal Libraries' role as CAIs striving for information equity, access, and inclusion.

Budget Summary (to fund activities over 2 years): Subawards to Tribal Libraries: $75,000; Director Salary and Fringe: $35,059; Consulting fees (Co-Directors and Partners): $82,000; Travel to Tribal Libraries: $3,000; Travel to Conferences: $3,000; Indirect costs (26%): $51,495. **Total Requested: $249,554.**