Hoopa Tribe

ARDC Report

EnerTribe Case Study (ARDC Grant)

2021 July

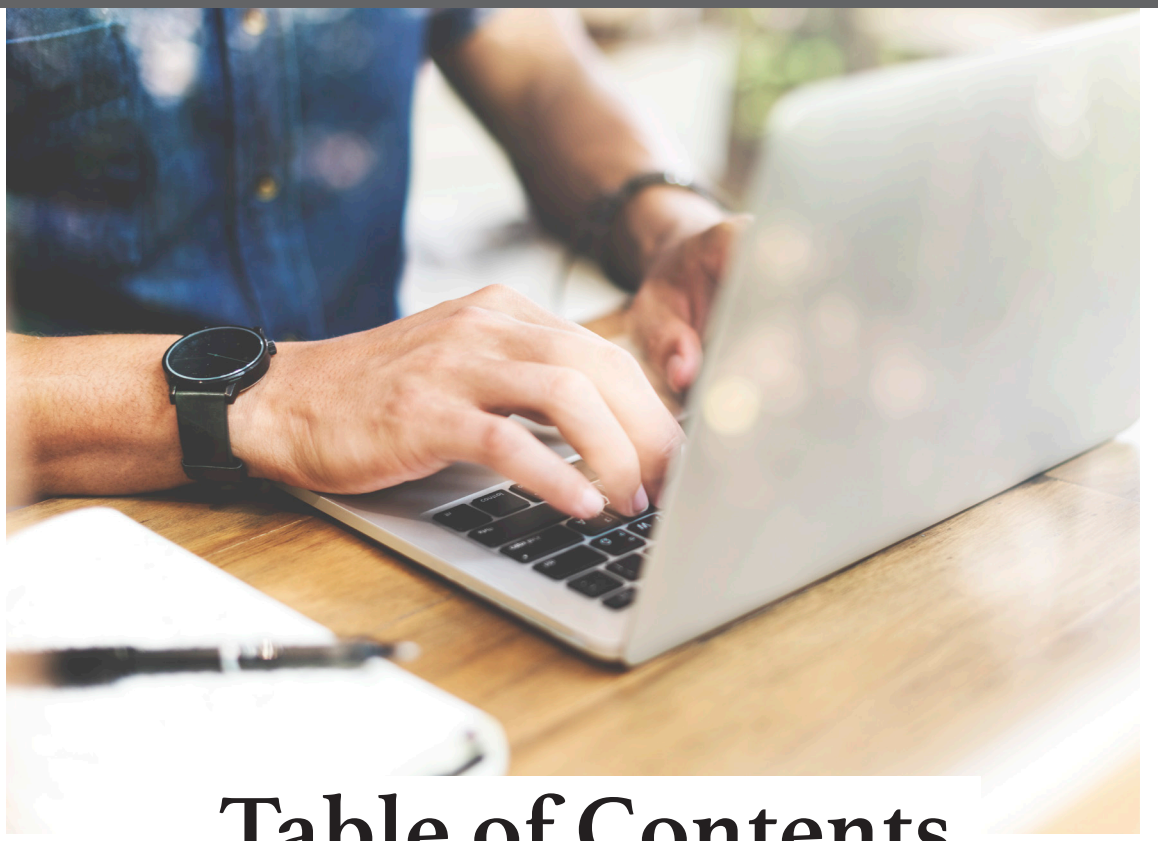
Non-Profit

ARDC's Mission

The mission of Amateur Radio Digital Communications (ARDC) is to support, promote, and enhance digital communication and broader communication science and technology, to promote Amateur Radio, scientific research, experimentation, education, development, open access, and innovation in information and communication technology.

About ARDC

Amateur Radio Digital Communications (ARDC) is a California-based foundation with roots in amateur radio (AR) and the technology of internet communication. The organization got its start by managing allocations of the AMPRnet address space, which is designated to licensed AR operators worldwide. Additionally, ARDC makes grants to projects and organizations that follow AR's practice and tradition of technical experimentation in both AR and digital communication science. Such experimentation has led to broad advances for the benefit of the general public – such as the mobile phone and wireless internet technology. ARDC envisions a world where all such technology is available through open source hardware and software, and where anyone has the ability to innovate upon it. Learn more about ARDC at ampr.org.



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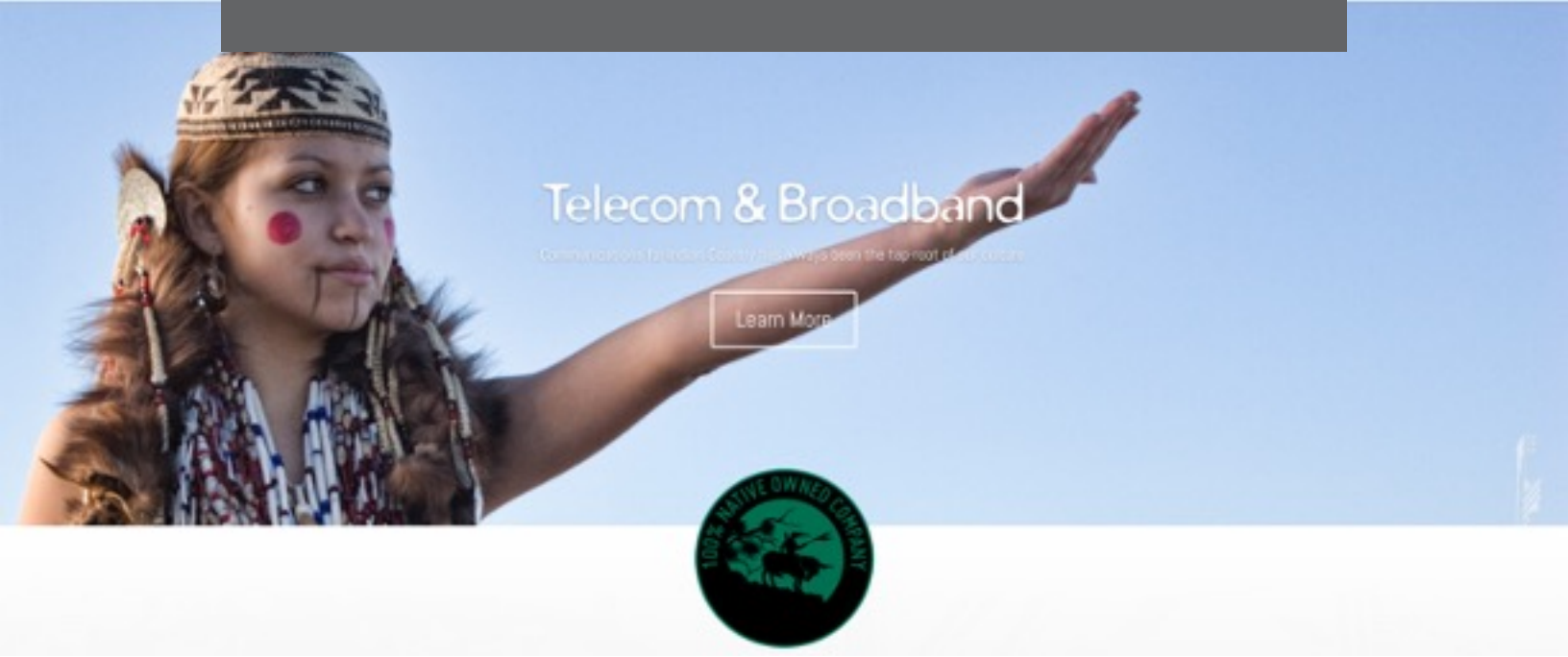
Hoopa Valley Tribe

The Hoopa Valley Indian Reservation has an approximate population of 2,100 residents and is the largest Indian Reservation in land-mass in the State of California. The partnership between the HVPUD and ARDC was born out of a dire need to solve critical and time-sensitive issues on the Hoopa Valley Indian Reservation. Since the COVID-19 Pandemic, tribes across the country have declared a State of Emergency in an effort to protect the communities and have had to operate at less than 30% capacity due to a lack of communications in general. When it comes to education, over 130 kids in the Hoopa Valley have no access to broadband and are unable to attend school remotely adding to the "lost generation" as a direct result of the COVID-19 Pandemic. Tribal Elders have been unable to obtain remote medical consultation despite being in the "at-risk" category.

The Hoopa Valley Tribes has tasked the Hoopa Valley Public Utility Commission (HVPUD) with the deployment of a new Wireless Service Internet Provider (WISP) service in the Hoopa Valley. The goal of the ARDC funded project is to address the immediate broadband needs in the Hoopa Valley as well as encourage the proliferation of two-way comms/HAM radio use on the reservation. The HVPUD has partnered with the Klamath River Unified School District to ensure priority is given to the students and has already been given the task of installing 130 students who cannot otherwise attend school.

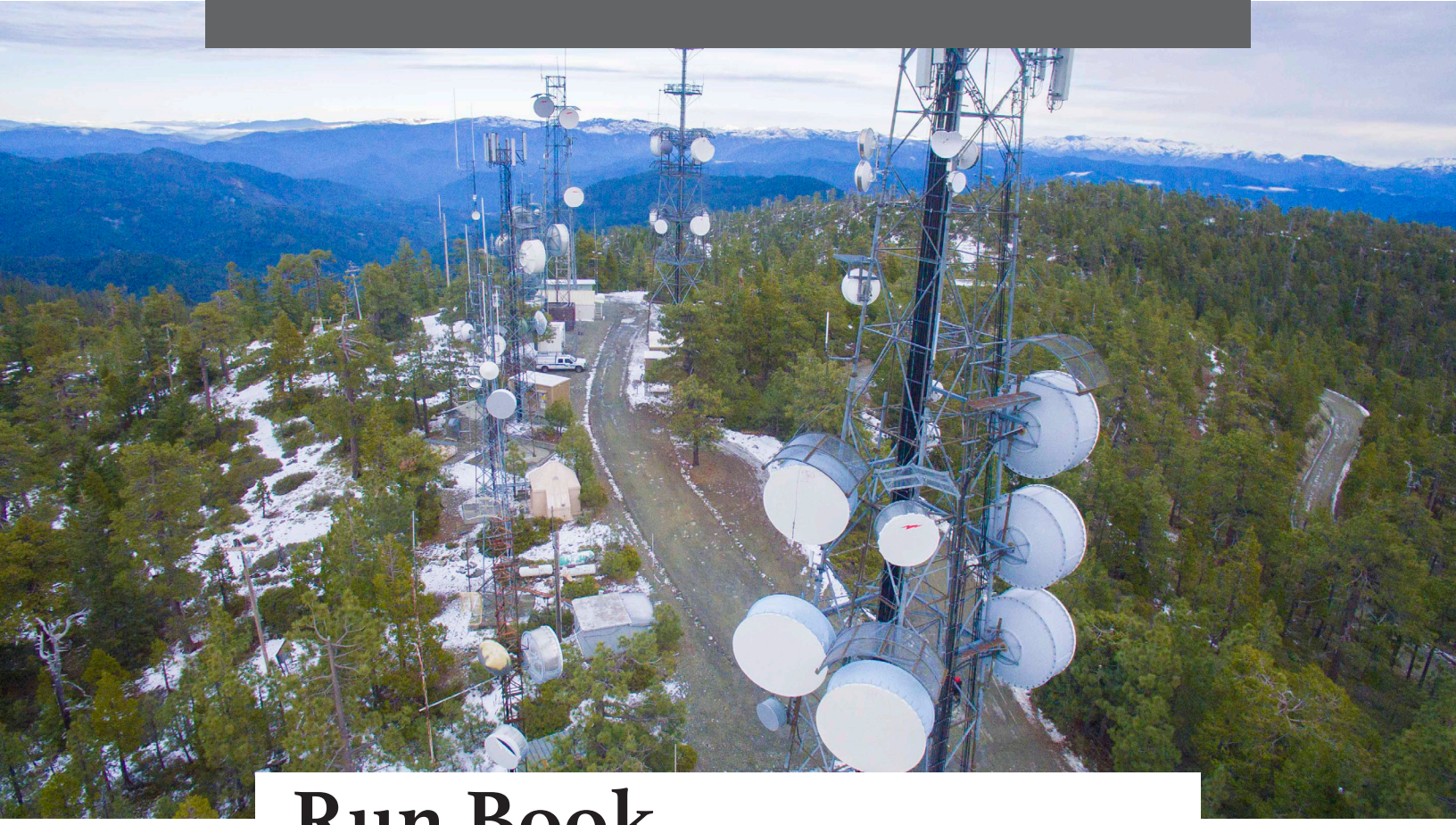


EnerTribe

EnerTribe is a Native American and Woman-owned telecommunications firm that specializes in the planning, engineering, funding, and construction of telecommunications infrastructure. EnerTribe has assisted hundreds of tribes over the past twelve years in the development of critical communications infrastructure within Indigenous communities. In addition to serving tribes, EnerTribe serves as a resource for State and Federal Agencies, and investment firms, seeking project development or stabilization on and around reservation lands. In support of nonprofits, EnerTribe assists with program development and management, as well as training in support of organizations interested in supporting the diverse needs of Indian Country.

Services include:

- Wireless & network engineering, procurement, and installation (EDX Signal Pro for engineering, licensed microwave, millimeter-wave, WiFi & two-way comms)
- Tower engineering & construction
- Electrical off-grid systems & communication huts
- Project, grant & program management
- Funding strategy & financial analysis
- Comprehensive economic development strategies
- Carrier outreach (e.g. interconnect, structure access, IRUs etc.)



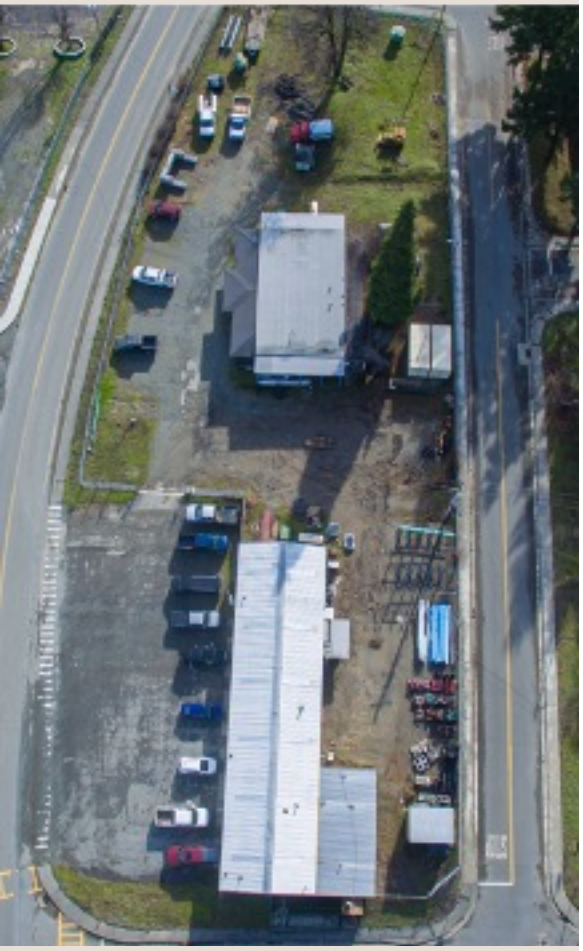
Run Book

What were the materials and technology used in the deployment?

The project was engineered around the specifications of a "carrier-grade" network by making use of the Cambium line of both point-to-point (P2P) and point-to-multipoint (PMP) equipment. By means of a licensed microwave backhaul into Eureka, the tribe has deployed a core-network and distribution system capable of providing broadband access to approximately 90% of the residents in the valley. The backhaul consists of 5 towers being used for backhaul into the community, and 3 tower sites being used for the "core-P2P network" as well as wireless distribution. The tribe was recently awarded all three frequencies of the 2.5Ghz Educational Broadcast Spectrum during the FCC's Tribal Priority Window. Additional broadband access is being distributed by means of 5Ghz and 900Mhx. The core P2P links are Cambium 11Ghz and 13Ghz radios.

What were the steps taken to install these items?

It is important to understand that, unlike standard deployments, working on an Indian Reservation requires a significant amount of collaboration with the tribe, its departments and the community. EnerTribe is a TERO-certified preferred Native American contractor to the tribe with permits to work on the reservation in partnership with the HVPUD for the ARDC funded deployment. Prior to any installations, complete engineered drawings are required as well as ongoing reporting and meetings with the respective boards and tribal councils. EnerTribe makes use of SmartSheets to ensure a project management timeline and schedule are built. By means of a field engineer and wireless engineer, several site surveys were conducted to ensure the proper bill-of-materials would be acquired for a successful deployment. Careful consideration was given to specialized bracketing systems and arrays to mount the radios maximizing the use of tower space and wind loading. Additional considerations were given to the power systems (e.g. generators, solar & battery), grounding, cabinets, and cabling for each site. Significant training was required if the tribe is to manage the newly built network and HAM radio system.



How do people in the community use and access this technology?

Similar to water and power, the true value of these resources becomes apparent by means of the "applications" that come to life once the infrastructure is in place. In this case, the applications include, remote medical monitoring and consultation, two-way communications in the mountains, WiFi hotspots in specific areas, students, and Hoopa Elementary School are eager to make use of the new services. Residents in need of medical consultation are able to minimize risk and maximize social distancing by using video chat, parents who are pursuing continued education are now able to participate in online classes. The Tribal government itself relies heavily on robust communications systems to operate its many departments, programs, and entities in the Hoopa Valley. Linnea Jackson, HVPUD Director, speaks to the critical nature of broadband when providing water and power services to the community. Wireless communications play a critical role in the economic health of indigenous communities and should be woven throughout the tribe's comprehensive economic development strategy.

How will this system be monitored and maintained?

The new wireless infrastructure will be monitored and managed through various applications such as Libre for network monitoring, CN Maestro for wireless infrastructure management as well as a more robust system such as PowerCode for one-stop-shop management systems from construction to operations. The network will be maintained by the newly formed Acorn Internet owned by the HVPUD. EnerTribe has spent extensive resources training tribal staff on the installation and maintenance of the infrastructure. On-going training and installation will continue using EnerTribe under a Master Service Contract so they and their subcontractors can continue to support the tribe. The goal is to have at least 2 individuals from the tribe get initial BICSI certifications in booth project management and outside-plant. The tribe is partnering with a local Eligible Telecommunications Carrier to build out Fiber-to-the-home in the Hoopa Valley over the course of 5 years. Acorn Internet is being trained and positioned to become the maintenance arm of the infrastructure in the valley long-term.

Application Analysis

What was the problem that needed to be solved? What was unique about this situation?

As with many communities, the challenges faced by the local tribe and residents can be seen throughout all aspects of the community. Anchor institutions face growth challenges due to a complete lack of broadband access or communications in any form. The tribe and its departments like the Office of Emergency Services have been stretched incredibly thin trying to work in a safe manner due to the Pandemic. We have seen Tribe working 7-day weeks and long hours at their own costs trying to solve issues that should be simple in nature. For instance, trying to keep the residents up to speed on critical challenges in the valley required less than safe community outreach, physical signs being placed once or twice a week to keep the residents up to speed about the pandemic as opposed to providing emails. Notifying students of changes in school or homework has to be provided with paper in person instead of simply being able to email. We have personally seen many students gathered around a single computer on dialup unable to watch the simplest of animations 60 miles from their school to get to the closest internet feed.

The unique aspect of indigenous communities when it comes to any form of communication is the real and direct impact little to no reliable communications has on the individual citizens. Tribal councils spend their days as farmers in some cases and their evenings as Tribal Council trying to keep their citizens fed, warm and healthy. Without communications, we have seen people die, unable to call 911 or radio for help after being in a tragic car accident, and unable to ask for help for days. To indigenous communities, communications serve a similar purpose as water and power.

What solutions were considered? Which ones were chosen and why?

For tribes, there is no “silver bullet” when it comes to communications. The tribe makes use of two-way radio systems for the Office Of Emergency Services which operates on an off-grid system. Satellite communications have proven inadequate and expensive for a community with a significant percentage of residents below the poverty line. The tribe has had to rely on physical contact during the pandemic to ensure students were not lost in the mix, school work was dropped offend picked up regularly with parents. Tribal citizens have been all but unable to receive any form of medical consultation especially the ones in the “at-risk” category as opposed to remote medical consultation. The in-person approach is not sustainable at this time so the broadband and two-way comms systems were chosen to enable citizens in a safe and effective manner. A licensed microwave backhaul was installed as the life-line to the nearest interconnection. Cambium wireless systems were chosen for the core network and broadband access points to avoid having a complete “rip-and-replace” in a few short years. Tribes are so used to having little to no funds they typically buy the cheapest gear on the market and end up spending more money than had they simply purchased more carrier-grade produce. EnerTribe has often encountered tribes who spend roughly 40% of their time putting out “fires” due to poor equipment quality, a nicer produce would in effect decrease the loss of duns and resources internally.

How well does this application solve the problem?

Two-way communications and a carrier-grade wireless system typically address a significant amount of the issues faced by tribal communities by essentially "flattening" the geographic area, unifying the community during the pandemic, and provide a means by which the tribal leadership can keep the community up-to-speed. Oftentimes, however, the solution to the many challenges we face as indigenous communities is not solved by a single approach and requires a multifaceted solution from many different perspectives.

What issues came up? What might we do differently next time?

This project required adopting an already constructed wireless backhaul, one that was poorly installed and lacked adequate power to run a stable and reliable backhaul into the community. Next time, a significant amount of funds and resources should have been dedicated to auditing all current infrastructure in person and reengineering it from the ground up. Assuming the previous contractors' documentation highlights all potential issues was a devastating mistake for a time and caused a great deal of struggle by all contractors and the tribe.

What skills were needed for deployment?

- Wireless engineering
- Network engineering
- Field engineering
- Tribal government & processes
- Permitting & environmental support
- Proper safety

Political & Financial Considertionas

Careful consideration is required before engaging with a sovereign government. Many contractors do not adequately plan for the intricacies that come with work with tribes. Initial working sessions with the Tribal Council, boards of directors, departments, and even tribal citizens are required for a successful project. EnerTribe was the primary planning, funding, and consulting firm tasked with giving the tribal council and their departments the guidance needed to make good decisions. The decision-making process was a combination of EnerTribe leadership and Tribal leadership working closely with the team of contractors and staff to ensure the "bigger picture" was kept in mind and the needs of the people met. The public was involved in regular tribal council meetings designed to better understand the personal needs of the community. Citizens express in writing or in person the problems they need support in solving. From an internal process for the tribe, however, careful consideration had to be given to the cultural aspects and long-term considerations of the project. EnerTribe serves as a resource between tribes and agencies, telephone companies, and organizations to ensure proper tribal protocol is clearly understood and followed. As such, working with the Tribal Historic Preservation Office, tribal elders, the planning department, realty, Office Of Emergency Services, and many other departments is required.

How was the community able to source funding? What advice would you give to future communities seeking such funding?

As with many tribal communities, funding can be difficult to come by, let alone administer throughout a project. EnerTribe has helped garner over $250,000,000 in funding to tribes for infrastructure over the past 12 years. The Hoopa Tribe partnered with EnerTribe to assist in securing funding for the longer-term goals of the tribe by means of the California Advanced Services Fund under the California Public Utility Commission. The pandemic created a dire amount of pressure on EnerTribe to help the Hoopa tribe and dozens of others in their efforts to plan, engineer, and build infrastructure. EnerTribe donates support in pursuing several other grants to help alleviate the strain on the community. EnerTribe donated a grant from the Bureau of Indian Affairs to carry out a broadband feasibility study for the tribe which was funded. EnerTribe offered to donate a business plan along with the studies to maximize the usefulness of the data. A total of 6 grants were applied to use as a "stopgap" solution for the community. The CARES acting funding assisted in this effort but the catalyst was a grant funded by the Ameture Radio Digital Communications (ARDC) group. The tribe had little, to begin with, and the ARDC funding was tantamount to the tip of the spear in addressing several dire challenges. EnerTribe entered into an agreement with the tribe to aid in the planning and completion of these projects. In January of 2021, the Hoopa tribe was awarded a $9M CASF grant to build fiber to the homes over the course of 10 years to address the longer-term goal. In order to ensure the tribe's interests were looked after the CPUC funded a Technical Assistance grant to enable EnerTribe to assist in the development of a partnership between the tribe and a local telephone company tasked with building the FTTH. EnerTribe is a grant program manager and continues to administer $100,000,000 + in grants to tribes across the country in support of indigenous communities. With nearly 600+ tribes in the United States, there is more work than there are resources and contractors to help address the issues faced by tribes.

What advice would you give to future communities seeking such funding?

If you are a community trying to identify funding looking for funding, it is important to understand basic principles. If you are looking for grant funding, it is critical you have a plan in place that outlines the project narrative, budget, and initial engineering. Grant funds are not "free" and in fact, can potentially prolong the execution of a project due to reporting and compliance requirements. Grant programs are funded based on the successful implementation of projects so the more planning you put into it, the better the project and the program will do. Projects are either funded by means of private investment, loans, or grant programs with agencies and nonprofits. We see instances where these three overlaps to pursue a complete solution using different funds for different phases. It is essential to identify a solid public/private partnership to ensure the community has the resources to complete and sustain the successful completion of a project. These partnerships may also help identify funding sources for one or more phases of a project. Bottom line, there is no "silver bullet" and ensuring you break your projects into phases will allow for a progressive approach. Here is a basic breakdown of the steps we typically include to ensure we not only fund but also complete a project.

Broadband Strategy Outline

- Funding (usually for planning)
  - USDA Technical Assistance
  - EDA Technical Assistance & Planning
  - FCC RDOF
  - PUC
  - NTIA
- Planning
  - Broadband studies
    - Feasibility (what are we trying to solve?)
    - Market (who are we solving it for?)
    - Business plan (how much will it cost?)
  - Engineering
    - Fiber
    - Wireless
    - Network
    - Towers
  - Deployment plans
- Infrastructure funding (private, federal, state, etc.)
  - This grant is often built in the engineering phase.
- Construction
  - Build fiber
  - Build wireless
  - Build towers
  - Training throughout
- Identify next project
- Operations (answered in the business plan)
- Maintenance (established during construction)