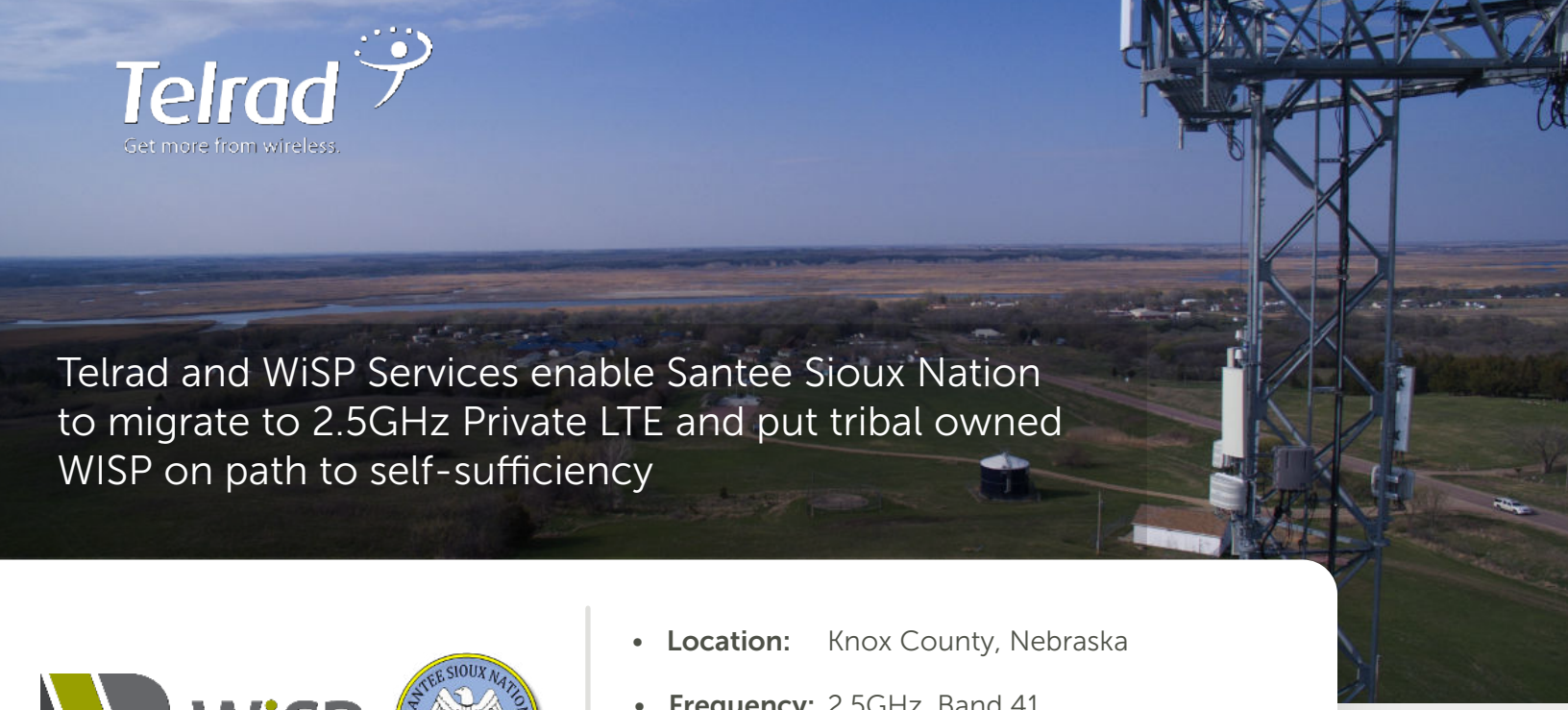

Telrad and WiSP Services enable Santee Sioux Nation to migrate to 2.5GHz Private LTE and put tribal owned WISP on path to self-sufficiency

- **Location:** Knox County, Nebraska
- **Frequency:** 2.5GHz, Band 41
- **Challenge:** Environment with large variations in weather and topography

Introduction:

The Santee Sioux Nation of Nebraska is a federally chartered business corporation established under the Indian Reorganization Act of 1934. Today, following a tribal resolution, it operates as the Santee Sioux Nation. It has an enrolled membership of over 3,000 with approximately 1,200 members living on or near the boundaries of the reservation lands. These members require broadband connectivity for essential communications and, increasingly, more specialized use cases like telehealth and remote education.

Following its acquisition of Dryad Communications, a South Dakota registered LLC, the Santee Sioux Nation created an independent wireless Internet service provider (WISP) in August 2020. This WISP, now operating as Santee Communications, made use of the 2.4GHz unlicensed spectrum to provide connectivity to a limited number of the Santee Sioux Nation. This area is called The Village and is home to approximately one-thirds of its tribal members.

A 60-foot tower that had been installed by Dryad Communications on the south side of The Village served as the primary access point for wireless services. This tower made use of Wi-Fi equipment by a well-known premium manufacturer of networking devices. A single Wi-Fi Access Point transmitted to customer premise equipment (CPEs) installed in subscribers' homes.

This solution did not provide the coverage, reliability, speed or scalability that the Santee Sioux Nation households needed. The tribe began looking for more ambitious ways to augment the network.

CHALLENGE:

Environment with large variations in weather and topography

Strict federal purchasing requirements and specifications

Needed to establish solid foundation for phased deployments

SOLUTION:

BreezeCOMPACT 3000

BreezeWAY 2020

CPE12000

BENEFITS:

Rapid roll out with scalability for future growth

High performance and resiliency for broadband services

Clear segmentation of public and private Internet access

In May 2021 the National Telecommunications and Information Administration (NTIA) issued a call for grant applications designed to aid tribal communities in closing the digital equity gap. Santee Communications and its partner, Nebraska Indian Community College (NICC), applied for the grant in the hopes of uplifting the current Wi-Fi solution to the 2.5GHz licensed spectrum.

In the meantime, the Santee Sioux Nation tribal council leveraged funding from the American Rescue Plan (ARP) to begin initial planning and demonstration of this enhanced network. This marked Phase 1 of the Santee Communications project and established a roadmap to ubiquitous 25/3 Mbps wireless broadband via the 2.5GHz EBS/BRS band.

Application

Tribal communities have historically been woefully underserved by large broadband providers and left to fend for themselves. When it comes to building out infrastructure, they are often forced to work with limited resources while contending with large expanses of challenging terrain. They have also faced industry pressure to bury copper or build expensive fiber networks despite these methodologies being ill suited to their present use cases.

> ***"The shift to remote work and education during COVID lent new urgency to overcoming these hurdles and closing the digital gap once and for all," says Justin Avery of Santee Communications. "The Santee Sioux Nation and Santee Communications resolved to leverage available resources to source the right equipment and create the optimal communications network for this community. We determined that a 2.5GHz Private LTE network would be the best solution."***

The process of moving from 2.4GHz Wi-Fi to 2.5GHz Private LTE was largely determined by three criterias. First, students on the Santee tribal land would need to have free access to the NICC network for educational purposes. This meant that the equipment had to allow for network slicing. Which is to segment public subscriber Internet service from the private free educational service.

Second, performance and scalability were absolute musts. The previous Wi-Fi network had been susceptible to storms, tree growth and slight deviations in terrain, and it was extremely limited in terms of expansion and its ability to support additional subscribers.

And finally, the stipulations of federal grant funding called for equipment from trusted manufacturers. Any vendor would have to be vetted and approved in an effort to ensure that the security and integrity of the network were not compromised out of the box.

Deployment

Santee Communications' consulting partner, WiSP Services out of Brandon, MN, proposed and endorsed Telrad LTE equipment based on the intended application.

> ***"When we reviewed the strict cost, feature, security and performance criteria for this project, our experience with Telrad engineers and solutions indicated that it would be a perfect fit," says Brian Potter of WiSP Services.***

The two organizations chose to repurpose the 60-foot tower that had been used for the Wi-Fi-based solution. This tower was primarily designed to serve The Village, which is situated in a lowland valley bordering the Missouri River is where most serviceable population is concentrated. This made it a natural starting point for network deployment.

However, Santee Communications did not want network coverage to begin and end with The Village. Santee Reservation spans an area of approximately 184 square miles, and there are homes dotted throughout the reservation lands across the hills and hidden valleys of the Northern Nebraska terrain. It was essential to Santee Communications that these homes also be served by cost-effective wireless broadband as the network expanded.

As an initial milestone, Santee Communications aimed to provide reliable 25/3 Mbps service to The Village. This is NTIA standard as well as a mandate from the federal government, which meant current and future grant funding would depend on that benchmark. From a customer standpoint, it was also important for Santee Communications to meet these speeds on account of growing demand for telehealth, remote education and mobile office use cases.

Results

In the early demo phase of the planned long-term deployment, Santee Communications has met or exceeded all of its immediate goals. The performance, reliability, scalability, segmentation capabilities and ease of use of Telrad's LTE solution have created a promising platform for growth.

"The Telrad solution is achieving a much higher percentage of uptime," says Justin Avery of Santee Communications. "And even though we have not yet received funding for Phase Two, we are already able to reach several additional customers due to the greater coverage area and our use of 2.5GHz LTE technology. This opens a path for self-sustaining operations, as Santee Communications will be able to grow its revenue stream by adding new customer locations."

This marks the first deployment of 2.5GHz LTE in the region, and its success has been noted by other communities. Santee Communications has been asked to work with two other tribal reservations to review wireless options in the future. This also speaks to the cost-effectiveness of Telrad solutions, because tribal-run WISPs typically charge less for their monthly service.

"To this point the experience has been exactly what we were promised, and we have continued to build Telrad equipment into our grant budget," Rick Noonan, Broadband Technical Advisor says. "We anticipate that our ROI projections will improve even further once our anticipated funding allows us to execute our second phase and three additional tower deployments. Full deployment will enable us to shrink the digital divide and serve as a model for other tribal communities to do the same."

Ultimately, Santee Communications envisions serving an estimated 600 households—both Native and non-Native—on tribal lands while offering segmented but parallel private LTE educational services for NICC students.