



Witte said the tribe took a two-pronged approach to its internet problem. The first task was to put computers or iPads in the hands of all students. Money for that project came from the BIE and resulted in each of the Lower Brule School's 300 or so students being assigned their own iPad or Chromebook computer.

But even after making sure each student had a computer, the tribe still needed to get its students connected to the internet. The solution had its roots in a 2019 Federal Communications Commission decision. The ruling allowed for the auctioning of leases for a lightly used portion of the radio wave spectrum.

The FCC regulates who can broadcast signals through the nation's airwaves to prevent interference in critical communications systems. Periodically, the FCC auctions exclusive rights to portions of the radio wave spectrum. The rights to each piece of the spectrum are assigned via a broadcast license.

The 2.5 GHz band hasn't come up for auction since the late 1990s and happens to be an ideal candidate for use in broadcasting an internet signal. The band can be broadcast with enough power to penetrate obstacles such as tree leaves and walls, so anyone using the network will just need a simple router.

The FCC plan was to allow tribes to submit applications for licenses to use the 2.5 GHz spectrum between Feb. 2, 2020 and Sept. 2, 2020. By the end of Sept. 2, tribal governments had submitted 349 individual applications for 2.5 GHz spectrum broadcast licenses on their reservations. On Sept. 15, the FCC

"It's like the tribe claiming the air, which is afforded to us by the FCC, much like we would claim our mineral rights," said Witte.

**Nonprofit tech firm helped set up network**

In June, the Lower Brule Tribal Council partnered with a Silicon Valley nonprofit called MuralNet to plan and build its wireless internet network. The tribe's goal was to broadcast a high-speed internet signal to each home on the reservation by the time school started on Sept. 8.

To meet its goal, the tribe applied for a temporary broadcast license so it could broadcast its internet signal before receiving the official FCC license.

MuralNet was founded in 2017 specifically to help Native American tribal governments exert sovereignty over their tribal internet connections. With the nonprofit's help, the Lower Brule Tribe applied for and received a temporary permit to broadcast an internet signal using the 2.5 GHz spectrum.

The tribe, with MuralNet's help, negotiated to buy a large, commercial internet connection that could be broadcast and shared among the network's users. MuralNet, which has a partnership with the tech conglomerate Cisco Systems to build wireless networks for tribes, then helped the tribe set up antennas

Essentially, the Lower Brule tribe built its own cellular network, said Mariel Triggs, MuralNet's CEO.

"They're passing out their own hotspots, so there are no subscription fees," Triggs said. "They have control over it, they get to maintain it and all they have to do is pay for the connection to the internet pipe for the whole system."

Owning its own network means the tribe can buy internet access at less expensive wholesale prices and can control what its people pay for in-home internet access.

Broadcasting a high-speed internet connection, as opposed to running fiber optic cable to each house, means the tribe's network will cost a fraction of a traditional hard-line network. A small tribal community in Arizona's Grand Canyon, for example, was able to provide internet connections for all of its residents.

Laying fiber optic cables to connect rural homes to the internet can cost between \$16,000 and \$60,000 per mile, according to a 2019 report by the South Dakota Governor's Office of Economic Development.

A wireless network also takes far less time to build. From start to finish, the Lower Brule Tribe network only took about two months to get up and running, Triggs said. The tribe first met with MuralNet on June 1 and its network was broadcasting by the end of July.

"Lower Brule is actually our record right now," Triggs said. "And they're already in the process of expanding their network so that they can add on more students."

As of Sept. 29, there were 25 Lower Brule households accessing the tribe's network, Goumeau said.

Because wireless internet technology is so much more affordable, virtually any tribe who wants to try setting up its own network can, Triggs said. While the Lower Brule Tribe was able to secure a federal license for exclusive use of the 2.5GHz band of radio wave spectrum, there are other spectrum bands that

Still, broadcasting an internet signal comes with some inherent problems. For one thing, the signal requires a line of sight to each home trying to access it. A house whose line-of-sight to the tribe's antenna is blocked by a hill won't be able to connect, Triggs said. The signal also doesn't yet have enough range

There are workarounds for the network's limitations, Triggs said. One workaround to the lack of range would use parabolic microwave antennas to shoot a powerful, narrow beam of signal to far-flung communities on the reservation. A weaker signal could then be broadcast from an antenna on a telephone pole

Another option would be to run a fiber optic cable out to a reservation community, attach an antenna to it and broadcast a signal from there. But running fiber optic cables is an expensive prospect.

Right now, the Lower Brule Sioux Tribe is paying for its internet connection using money from the CARES Act, the federal coronavirus relief package. The tribe's next big challenge will be figuring out how to make the new network sustainable, Triggs said. Normally, a sustainability plan would have been one of

For the immediate future, the tribe will remain focused on ensuring its students have immediate and ongoing internet access, said new Lower Brule Tribal Chairman Clyde Estes, who became chairman in October.

The potential long-term economic benefits to the entire community could be huge if a fast, reliable internet service can be implemented and maintained, he said.

"I think we're really ahead of the game," Estes said. "I believe it will be a great thing because there are a lot of people that need to do business online. Maybe we can teach adults and elders who have never done internet stuff before how they could access their financial information or keep up with current news

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