WRITTEN TESTIMONY

OF

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BEFORE THE

COMMITTEE ON ENERGY AND COMMERCE

SUBCOMMITTEE ON

COMMUNICATIONS & TECHNOLOGY

HEARING ON

OUR WIRELESS FUTURE:

BUILDING A COMPREHENSIVE APPROACH TO SPECTRUM POLICY

WASHINGTON, D.C.

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Good morning Chairmen Doyle, Ranking Member Latta and members of the subcommittee. My name is Mariel Triggs and I am the CEO of MuralNet, a young

nonprofit dedicated to helping tribal nations build high-speed wireless Internet networks on their lands. I am here to tell you a story about a small troop of volunteers who thought they could solve the homework gap on rural lands, how The Havasupai Tribe and local partners worked with us to build their network providing high-speed Internet service to the bottom of the Grand Canyon, and how spectrum acquisition became our biggest challenge time and time again.

Last week, the FCC approved a tribal priority window for unlicensed Educational Broadband Service (EBS) spectrum before it goes to auction. While this was a groundbreaking measure that will connect many people on tribal lands, a 90-day outreach period followed by a 60-day application window is too short and expecting tribal nations to build out networks twice as fast as major telecoms is unjustifiable. We support a year-long outreach and application window with rolling automatic approvals for tribal governments so that buildouts can happen quickly, thus serving as an example to neighboring tribal communities of what is possible and inspiring them to do the same.

MuralNet

MuralNet was founded in February of 2017 by Martin Casado and Brian Shih, after they had a conversation about the homework gap on tribal lands. As schools increase their connectivity, teachers assign more online homework. In order to meet academic expectations, students with no access to sufficient Internet at home have to go to extreme measures such as working out of McDonald's parking lots to pick up free WiFi or traveling to the highest point near town to catch a cell phone signal, often hitting data caps a week into their billing period. According to the FCC, in 2017 98.4% of Urban, non-tribal households had broadband (25/3 Mbps) access. That number drops to

58.4% for rural non-tribal areas. For rural tribal areas that number is halved to 28.9%.[1] And that is based on data that overstate actual coverage on tribal lands.[2,3]

Martin grew up in Flagstaff, AZ, and wanted to give back to the greater Northern Arizona community by helping to bridge the digital divide on tribal lands. Brian had deployed rural Internet networks around the world and was an expert in E-rate policy. On the back of a napkin, they came up with a game plan to bring broadband to under-connected people on a grand scale and connect rural tribal lands in the United States.

Most anchor institutions such as schools, hospitals, and chapter houses, already had access to broadband. This infrastructure had been built by Internet service providers, government entities and tribally-affiliated organizations like AMERIND Risk, the Middle Rio Grande Pueblo Consortium, Tribal Digital Village and Red Spectrum pushed by people such as Matt Rantanen of the Southern Tribal Chairman's Association, Danae Wilson of Nez Perce, Valerie Fast Horse of the Coeur d'Alene and countless others. What we could offer was a wireless last mile to the home solution that is affordable, protected, quickly deployed, easily maintained and available now.

Equipment was easy. Prices have fallen and radios have become reliable as LTE technologies mature. Base stations and antennas could be mounted on existing

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[1] Comparison of Broadband Coverage, Fig. 5. *See* FCC, *Report on Broadband Deployment in Indian Country, Pursuant to the Repack Airwaves Yielding Better Access for Users of Modern Services Act of 2018,* https://docs.fcc.gov/public/attachments/DOC-357269A1.pdf (May 2019).

[2] Though staff examine FCC Form 477 data for quality and consistency, the data may understate or overstate deployment of services to the extent that broadband providers fail to report data or misreport data. *See* FCC, *Explanation of Broadband Deployment Data,* https://www.fcc.gov/general/explanation-broadband-deployment-data (Nov. 20, 2017).

[3] FCC considers broadband to be "available" for an entire census block if the provider could serve at least one location in the census block. This leads to overstatements of service for specific locations like tribal lands. FCC, tribal stakeholders, and providers have noted that this approach leads to overstatements of broadband availability., See GAO, *Broadband Internet: FCC's Data Overstate Access on Tribal Lands*, GAO 18-630, https://www.gao.gov/assets/700/694386.pdf (Sept, 2018).

infrastructure such as poles, rooftops, and water towers. And we had access to free open source systems with user-friendly, cloud-based interface operations portals. However, a wireless solution requires spectrum.

EBS spectrum is the perfect band for starting a rural wireless Internet network. A signal in this range has great propagation and penetration characteristics throughput. Since licenses are required, the networks have a guarantee of reliable operations without worry of interference that unlicensed spectrum has. And licenses are free for schools and nonprofits. We knew Citizens Broadband Radio Service (CBRS) spectrum in the 3.5 GHz would be available soon, however, physics and power limitations meant it only traveled half as far as EBS. We use it when EBS is unavailable or if our partners want to expand service. Low band TV whitespace is great for traveling long distances, but it supports only a fraction of what EBS band networks can do. Open EBS licensing has been frozen since the mid-nineties but we found a solution by applying for a special temporary authorization, building a network and then applying for a permanent license. In the Spring of 2017, we were ready to build a pilot and reached out to Dr. Chad Hamill, the Vice President of Native American Initiatives at Northern Arizona University.

The Havasupai Tribe

These are the words of Councilwoman Ophelia Watahomigie-Corliss of The Havasupai Tribe. “Education is important. We live in a canyon, but we also live in the bigger world. Our children deserve the same chance to learn and earn the same education as anyone else.”

The village of Supai is home to about 400 members and is located at the bottom of the Grand Canyon. Travel there requires a helicopter or an 8-mile hike through

difficult terrain. The extreme remoteness of the town greatly limits educational and economic opportunities. Havasupai Elementary struggles with staffing shortages that close the school for weeks at a time. Jaqcueline, the Health and Disabilities Coordinator at Head Start, had to leave Supai every other weekend for a semester to take early education classes at a local community college. The commute is long and expensive, and she had to leave her only child at home, but it was the only option. Online classes were available but Aspiring Early Head Start teachers could not take the certification programs necessary to meet the national organization's practice standards because they lacked sufficient Internet speeds to stream the videos. Supai desperately needed educational supports and learning options that are easily available online. But, high-speed Internet in homes was prohibitively expensive and too slow.

In May of 2017, Ophelia spoke with Dr. Hamill about a Silicon Valley nonprofit that offered to bring high-speed Internet to tribal lands. After vetting MuralNet, she worked with her community for a few months to ensure that there was agreement amongst the Tribe to bring high-speed Internet to their village. By October, The Havasupai Tribal Council passed a resolution to partner with MuralNet, Northern Arizona University and a local wireless Internet service provider called Niles Radio Communications to build their own high-speed Internet community network.

Spectrum Application Hurdles

Supai needed access to spectrum for their network. In November 2017, our lawyers applied for an emergency Special Temporary Authorization from the FCC to use the A channels of the EBS spectrum. What we thought would be a routine

application review that would take two weeks instead took four months. The wait was excruciating.

Within a few days of being granted spectrum access, the Havasupai Tribe made their first end-to-end high-speed Internet connection using the LTE network they built. It took half a day of labor to deploy the base station on the rim of the Grand Canyon. It provided signal to the whole town, with the village center reaching speeds up to 32 Mbps. A week after the FCC STA was granted, twelve homes and the Early Head Start building were connected to the Internet and students could pursue their studies at home. Now they have a library system such that students that wish to study for the GRE or SAT can check out a CPE (small device like a router) from the tribal council office. The network was a success, so we applied for a permanent license for the EBS spectrum. Eventually, the Havasupai Tribe was granted a permanent license, but it took another year with lawyer fees topping costing over 60% than equipment fees.

FCC Rule Changes

The delay was due to the FCC's efforts to make the most of the unlicensed EBS spectrum by transforming the 2.5 GHz licensing rules. They proposed opening a tribal priority window, an educational priority window and then auctioning off the remaining spectrum.[4] At this point I realized that the tech was trivial and that the real challenge was spectrum acquisition. I learned everything I could about EBS spectrum policy from organizations like Schools, Health and Libraries Broadband Coalition and the National EBS Association. Councilwoman Ophelia Watahomigie-Corliss and I met with members of Congress, their representatives and all the FCC Commissioners' offices, telling them

[4] *See Transforming the 2.5 GHz Band,* Notice of Proposed Rulemaking and Order, FCC 18-120 https://docs.fcc.gov/public/attachments/FCC-18-59A1.pdf (released May 10, 2019).

of the success of our pilot. We wanted them to know what was possible if EBS spectrum became available to other tribal nations. Our efforts had an impact. Last week, the FCC announced that there will be a 90-day outreach period, 60-day tribal priority windows for tribal nations and their affiliates to apply for spectrum and then an auction.[5] Educational priority windows were not included in the order despite the original intent for the spectrum and the massive predicted positive social and economic impact an educational priority window.[6]

Maximizing a Tribal Priority Window

While having a tribal priority window before an auction is an admirable first step, its impact will be stunted because the window of time is not adequate. Decision makers within the tribal governments have been methodical and thorough when it comes to infrastructure projects. They take the time to research and understand the technology and the ways in which it will impact their community. Before proposing the high-speed Internet project to the Havasupai Tribal Council, Councilwoman Ophelia Watahomigie-Corliss spent hours meeting and communicating with representatives of Northern Arizona University, Niles Radio Communication, and MuralNet in order to understand the capabilities of an LTE high-speed Internet network and what was needed to maintain it. She then solicited input from community members about what they would want from an Internet network and worked with her colleagues to draw up a plan that

[5] See *Transforming the 2.5 GHz Band*, Report and Order, FCC 19-62, https://docs.fcc.gov/public/attachments/FCC-19-62A1.pdf (Jul 11, 2019).

[6] An educational priority window would reduce the rural digital divide in America by 18.28% versus 1.49% if it isn't implemented. Similarly, an educational priority window would see GDP increase of $70.93 billion versus $4.94 billion with just a competitive auction. *See: The Economic Benefit of Keeping the "E" in EBS: A Comparison of Licensing Unassigned EBS to Educators and Nonprofits vs. Commercial Auctions*, http://www.shlb.org/uploads/Policy/Policy%20Research/SHLB%20Research/SHLB%20EBS%20Economic%20Study.pdf (June 2019).

reflected her people's values, aspirations, and way of life. Nearly five months after the initial discussions regarding the broadband project, the Tribal Council passed a resolution to build their high-speed Internet network.

The Havasupai Tribe's original application for special temporary authorization of use of the A channels over their land was fairly simple: the geographic service area (GSA) would be bounded by a 35-mile circle centered in the village of Supai and MuralNet would provide the funds for equipment, legal and engineering needs. It only took a month to gather the necessary data and finish the application. Maintenance of the networks takes only a few hours a month, so financial sustainability is not an issue.

This is not the case for MuralNet's later projects. With five times the amount of spectrum available, network plans are more ambitious and expensive. It takes time to find funding and determine a realistic geographic service area (GSA) that can maximize coverage while meeting the proposed FCC buildout requirements. Smaller grants needed to cover around fifty homes near an anchor institution take a few months to secure. Larger projects require more capital than government grants and loans can provide. Government funding such as the Distance Learning and Telemedicine Grant or the Reconnect Grant and Loan Program take six to nine months from pre-application data collection to the announcement of awards. Public/private partnerships can cover capital expenditures and operational expenditures costs, but it has taken at least five months to develop fair business plans, draw up the agreements, notify the FCC, and receive approval for the projects to move forward. This is well beyond the 150 days proposed for outreach and application.

Many communities are wary of what Internet access would bring and what it would entail to build and sustain a network. Considering these things takes time, and Internet connectivity champions within the community often seek information regarding nearby networks to explore their options and avoid potential pitfalls. Once they see the ease of deployment and develop confidence that the community has or could build the capacity to run their own network, they are inclined to move forward. After the deployment of the Havasupai Tribe's pilot network (first wave), other nearby tribal communities took notice. Representatives of five other tribal nations contacted Councilwoman Ophelia Watahomigie-Corliss to learn about what they had built. Now MuralNet is partnering with or advising six communities in Arizona (second wave). In this case, regional growth was sparked by a model deployment nearby. There are similar outreach models for high-speed Internet projects in New Mexico and Oregon, with each consecutive wave growing exponentially. If the tribal priority window allows for immediate buildouts for neighboring tribal communities to observe, the successive wave will lead to more tribal nations claiming EBS spectrum, more buildouts and more people on rural tribal lands being effectively connected to the Internet.

Havasupai Network Expansion and Continued Spectrum Issues

The success of our pilot project with MuralNet has motivated the Tribe to devote a part of its resources to upgrading the LTE Internet network. Currently, only seven homes in the center of the village with a direct line of sight to the tower have had broadband speeds while homes on the outskirts of the community have some connection issues. The planned network expansion would bring broadband coverage to the whole village, increase backhaul from fifty Mbps to one Gbps, provide emergency

communications throughout the Canyon, connect an online charter high school, and allow for telemedicine in the new clinic, which will begin construction next year. To make the community network financially sustainable, high-speed Internet access can be sold in the campgrounds to the 35,000 tourists that visit the local falls each year. The Tribe is ready to build their own broadband network and they know that they will have to do it themselves. There is no financial return on investment to motivate outsiders to connect a community this small and remote.

MuralNet won private grants so that each structure in the village can get broadband. We are finding funding to increase backhaul and bring high-speed Internet to the campgrounds. We are so confident that we can make The Havasupai Tribe's vision of a broadband network throughout the canyon that Niles Radio Communications applied for the spectrum licenses in the 6GHz band. This would allow us to increase the microwave backhaul to 1Gbps. However, their application may be rejected because, in 2015 another company expressed interest in the frequencies through the prior coordination notification (PCN) process.[7] Even though this other company did not apply for a license until Niles Radio made their interest public, their application had seniority. If Niles Radio's objection is rejected, we must wait eighteen months to try again. That is a year and a half of schooling, telemedicine and economic development lost.

Next Steps

[7] *See: Informal Objection to govNET Licenses LLC's Applications to Operate Certain FIxed Microwave Facilities,* https://wireless2.fcc.gov/UlsEntry/attachments/attachmentViewRD.jsp;ATTACHMENTS=8sMQdr1QlMnD16JpTTL1YnJFcPLTh1JnHXH8bh1XqnT39JXQyDdQ!-1629455447!-1227740452?applType=search&fileKey=1213730309&attachmentKey=20632000&attachmentInd=applAttach (entered Jun 8, 2019).

The rural digital divide is surmountable. We have made LTE network starter toolkits and are partnered with organizations to develop training curriculum for local operators. 5G is arriving in urban areas, but issues with range and cost will prevent deployments in rural America for years. The infrastructure we erect, and the skills our tribal community partners are building will make eventual 5G upgrades easy.

Right now, we are developing the culturally relevant educational materials, face-to-face outreach systems, and technical planning tools to make the application for spectrum manageable. And yes, we are developing an app for that. But these plans need time to work. Please create policy that maximizes positive outcomes for those most at need. For new 2.5 GHz licenses, that means a year-long tribal priority window with rolling application approvals for tribal governments. And please keep buildouts fair by requiring the same deadlines and specifications for licenses granted under a tribal priority window and licenses granted at auction.

I will be honored to address any questions the Committee has. Thank you for your time.