Measuring and Improving Underserved Community Access

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Research Question: How can we best measure coverage, and potentially predict problematic areas, in underserved communities? How do underserved communities experience and leverage the deployment of new Internet connectivity opportunities, such as 5G and the availability of previously-reserved spectrum for community use?

Background and Motivation. Rural regions and tribal lands are the last frontiers for Internet access in the United States. The Federal Communications Commission (FCC) acknowledges that broadband access on Tribal lands today is insufficient and significantly lacking behind both urban and rural areas[1].To add to the immediate problem of access, *there is also a significant measurement problem in understanding the extent and quality of access.* Indeed, the FCC stopped reporting on high speed Mobile LTE deployment in tribal areas after 2018 due to insufficient or misrepresented data. Crowdsourcing network measurements, which offer the potential to improve on provider reports, are only as good as the participation of the crowds on which they rely. In underserved areas, populations tend to be sparse, and these communities may lack the privileges of time and inclination to contribute to crowdsourcing. Nonetheless, tribes and other rural communities are resourceful and resilient, and some have successfully expanded local broadband deployments to specific institutions[2]. Although these efforts are promising, they do not go nearly far enough and are still inaccessible to most community members. Improving the quality of Internet access and measuring the quality are intimately linked, since measurement data can directly influence investments.

Measurement Barriers. A unique challenge of this research, particularly in the context of underserved areas, is that it requires not just a one-time data collection effort, but continuous monitoring for dynamic changes over multiple time scales. With regards to **collaboration and cooperation in data collection**, it is important to consider the cultural and political implications of carrying out network measurements within underserved communities, such as in tribal lands. How can we respect and uphold the community's sovereignty over their land during these projects? Who will own the data collected on such areas? How can we ensure that these communities are treated and/or compensated fairly during these exchanges? In terms of **equity and sustainability of data sharing**, how might communities own the measurement process especially for longitudinal measurements? Finally, it is critical to consider how to **make this data useful**. How could we go from measuring connectivity in underserved areas to actively addressing the digital divide?

NSF Support. NSF could provide significant value by supporting long-term data collection and new techniques to optimize the type and value of collected information. Establishing a repository and standards for mobile broadband measurement and data access could also be beneficial. At a meta-level, NSF can prioritize efforts in Internet access equity.

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[1] FCC. 2019. Broadband Deployment Report. https://docs.fcc.gov/public/attachments/FCC-19-44A1.pdf

[2] American Library Association, "Tribal libraries, partners leverage federal E-rate to deliver high-speed connections to six pueblos, new ALA case study shows." 2020.