Frontier Technical Capability Statement
Attachment E

Experience

Frontier's mission is to "Build Gigabit America" and create the future of broadband. Frontier is focused on supporting a digital society, with inclusion for all, while protecting the environment. Frontier aims to accomplish its mission through "future-proof" fiber deployment, ubiquitous availability, providing a great customer experience, and enhanced efficiency. These efforts are coupled with adoption outreach both through low-income offers and affirmative initiatives to target underserved community members.

Nationally, Frontier and its affiliates offer broadband over fiber to 4M locations in 25 states and have 1.34M fiber broadband customers.[1] In 2021 alone, 638,000 locations were added to the 25-state footprint and another 1,000,000 on target to be built in 2022.

Frontier is a fixed broadband service provider in Nebraska. The majority of Frontier's existing Nebraska broadband service offerings are copper-based DSL technology. However, Frontier does currently provide fiber-based broadband service with minimum speeds of 100 Mbps for both download and upload to a small number of customers in Columbus, Nebraska (census block number 311419653001079). Speed tests confirming this service level for a sample of these customers are provided in *Attachment M*_1 of this application.

In April 2021, Frontier Communications Parent, Inc., collectively with its subsidiaries, emerged as a new corporation, complete with new owners, a new board of directors, new leadership, and a brand new vision for the future – "Building Gigabit America".

Our new organization is well-positioned to leverage its experience as a broadband provider with its new leadership, vision, and strong liquidity. Our new organization is laser-focused on expanding highly resilient, fully fiber facilities which will deliver symmetrical gigabit service over a highly scalable network. Importantly, Frontier is committed to broadband adoption and has low-income service offerings to assure all residents can take advantage of the benefits of the service and have access to meet the growing culture of learning and working remotely. Although not an eligibility requirement for funding under this grant program, Frontier is an incumbent local exchange carrier designated as an eligible telecommunications carrier ("ETC") pursuant to Section 214(e) of the Communications Act of 1934 (47 U.S.C. 214(e)). This designation demonstrates its long commitment to providing telecommunications service to all in its Nevada service areas.

In 2021, Frontier added 638,000 new fiber network locations nationwide. In addition to expanding its fiber network, Frontier recently announced plans to expand its already best in class fiber-based service offering—Frontier FiberOptic Gig Service—and unlock next-gen digital service in 2022, with speeds up to 2 Gbps. The fiber investments and deployments proposed in the project, would also make this level of service available across the project service area.

[1] https://s1.q4cdn.com/144417568/files/doc_financials/2021/q4/Frontier-Fourth-Quarter-2021-Earnings-Presentation_final.pdf

Frontier has decades of experience constructing, operating and maintaining an advanced, interconnected telecommunications network, including its more recent and extensive Fiber-to-the Premises ("FTTP") infrastructure deployments which deliver symmetrical gigabit broadband service and improve network performance and reliability. Frontier has experience with both greenfield FTTP deployments as well as fiber overlays in brownfield areas to replace copper infrastructure. As a newly re-organized Frontier, we are well-positioned to execute our new vision of "Building Gigabit America." Frontier recently announced its intention to deploy FTTP infrastructure to 10 million locations nationwide by the end of 2025.

Frontier has a demonstrated history of enhancing and improving broadband availability, performance, and reliability in the communities it serves both through its private investment and through public-private partnerships. Further, Frontier has the knowledge and expertise necessary for successful fiber deployments at every level of the organization. Frontier has a new Executive Management Team, brought together under the new leadership of President and CEO, Nick Jeffrey, and Executive Board Chair, John Stratton, who together have decades of experience in the telecommunications industry.

Additionally, Frontier's Chief Network Officer, Veronica Bloodworth, who joined Frontier in April 2021, brings extensive expertise in successfully planning, designing, constructing and maintaining fiber wireline network infrastructure across a national footprint. Bloodworth directs a centralized engineering management organization that works in close coordination with local resources to design, engineer, and manage Frontier's network and FTTP infrastructure deployments. Supporting the Executive team, Frontier also has a deep bench of highly skilled telecommunications professionals located in all 25 states. Collectively, the Leadership team has a proven ability to execute complex network deployment projects—including FTTP deployments—in remote, rural, suburban, urban, and Tribal communities. Frontier has successfully completed previous infrastructure deployment projects in all 25 states which have been funded at least in part through state and/or federal grants. As a result, Frontier brings a unique combination of skills and experience to this project opportunity.

Based on past success in grant-supported fiber deployment, Frontier has developed a comprehensive and tested project management approach that includes key milestones, budget tracking, and the ability to leverage internal expertise, operational synergies, and economies of scale which enable sound project execution. Our approach includes project representatives from all functions involved (e.g. Engineering, Construction, Marketing, etc.), providing clear line of sight to project progress, supporting cost-effective full completion of grant-funded projects.

Frontier will draw upon its vast experience in planning, engineering, constructing, provisioning, and operating FTTP networks that provide symmetrical gigabit service to residential and commercial customers. This expertise is critical to overall project success. It also identifies and mitigates any potential project issues, promptly responding to unexpected events and contingencies, and timely implementing plan revisions, when needed. The project and the on-going provision of gigabit broadband service will also rely on Frontier's existing capabilities for installing and providing service to end users, further supplementing the cost efficiency of the project.

Technical Expertise

Frontier primarily relies upon local, highly-qualified technicians from IBEW and CWA for service installation, repair, and related activities, and compensates these valued professionals at or above prevailing rate in wages and benefits.

Frontier currently has 5 technicians in the Kearney, Nebraska market who are dedicated to supporting service to our existing telephone and broadband customers in this area. These professionals will also serve the project area once complete. Additional staff are available from nearby areas to further support the project area in times of high demand. We will also allocate experienced construction personnel and engineers who will perform any necessary repairs and upgrades to the network upon completion.

Network Resilience and Sustainability

Frontier will use best-in-class xPON - Gigabit Passive Optical Network ("GPON") (ITU-T G.984), XGS-PON (ITU-T G.9807.1). Frontier has experience using xPON architecture where Frontier makes fiber-to-the-premises ("FTTP")/fiber-to-the-home ("FTTH") available, including markets in California, Connecticut, Texas, Florida, New York, Indiana, Minnesota, North Carolina, West Virginia, and South Carolina.

This best-in-class network technology currently supports symmetrical 2Gbps broadband speeds meeting ≤100 ms latency, and has the capability of offering higher speeds on its xPON fiber network but has not yet done so because the customer premises equipment to support that speed is still too costly for retail deployment. The xPON technology is capable of supporting 5, 10Gbps, 25Gbps, and 50 Gbps speeds and Frontier has begun to test these speeds in preparation for deploying them as market demand and customer premises equipment become available in future years. Additionally, as reflected by the publicly-available results of the FCC's Measuring Broadband America Program, xPON technologies readily meet speed and latency requirements.[2]

To deliver fiber-based access to multi-dwelling units ("MDUs"), Multimedia over Coax Alliance ("MoCA") will be used to connect the optical line terminal ("OLT") to the individual unit, where available. Otherwise, Ethernet or fiber to the unit can be placed pending agreements with the MDU management. Frontier prefers fiber to the Optical Network Terminal ("ONT") for each living unit. If the multi-dwelling unit ("MDU") prefers to use in-house wiring, we limit delivery of services to 100 meters or less over RG6 coax or CAT 5e and above.

Frontier uses industry standard backhaul and middle-mile technologies. Most commonly, OLTs are connected to Frontier's core network via Ethernet (IEEE 802.3) ports based on the expected capacity demand. These ports are further aggregated via higher speed Ethernet and optical transport technologies and transported via leased or on-net circuits to one of Frontier's points of presence ("POPs").

[2] *See generally* FCC, *Measuring Broadband America* (last accessed Jan.30,2021). https://www.fcc.gov/general/measuring-broadband-america

Frontier peers with two Tier 1 service providers, Cogent and Lumen (formerly CenturyLink), for paid transit peering in all peering data centers across the country. Settlement-free/bilateral peering is established with major content providers and local Internet Exchanges at the data centers.

Frontier's peering is supported in nine regional locations in the US (Ashburn VA, Atlanta GA, Chicago IL, Dallas TX, Los Angeles CA, Miami FL, Palo Alto CA, Secaucus NJ, and Seattle WA) by large-scale, high-capacity routing and switching infrastructure via the eBGP protocol (IETF RFC4271). Routers used to support peering traffic include the Juniper MX Series equipment and QFX Series routers.

Peering and transit agreements are comprised of bilateral, settlement-free, and paid peering relationships with other carriers and content networks. Peering for Frontier's internet traffic is advertised out of multiple POPs and in the event of a service disruption at any POP, the advertisements will be redirected to alternate locations. Frontier currently supports 23.9 TB of peering capacity, with 9.8 TB in use to allow for redundancy. Frontier's target utilization is 45% network-wide.

At the highest level, Frontier is deploying fiber-to-the-premises—the most scalable, best-in- class broadband infrastructure, which is designed to accommodate ever-increasing application requirements, increasing quality demands, and lower response/latency demands for ever- increasing usage of highly interactive applications. As such, Frontier is well-versed in building scalable networks to meet ever-increasing demand for fiber broadband.

Frontier follows current best practices for capacity management and quality of service. We regularly monitor our transport network for capacity, latency, jitter, and packet loss and take appropriate action when SLAs are compromised. Frontier utilizes IEEE 802.1p and DSCP (IETF RFC2474) and MPLS EXP (IETF RFC3032) to mark voice traffic and prioritize it over other best effort traffic across last and middle-mile networks. Once in the core network, links are managed to ensure both capacity and diversity requirements are met.

All upstream connections for the XGSPON network are at the 10 Gbps and above level and are monitored regularly and augmented to ensure there is no congestion during peak usage periods. Prior to possible congestion, Frontier will proactively add 10G links to ensure capacity remains available.

Backbone capacity from regional hubs is maintained with capacity standards requiring an upgrade at 45% link utilization on a single path and/or greater than 80% failover for redundant routes. Any regional hub requiring greater than 3 Gbps of bandwidth is upgraded to diverse 10 Gbps connections to the core. For customer facing routers (broadband network gateway ("BNG")), augments are started at 70% failover.

Review of Opportunity

Frontier is excited for the opportunity to partner with Nebraska in achieving our mission to "Build Gigabit America", supporting a digital society, with inclusion for all. Frontier has a demonstrated history of enhancing and improving broadband availability, performance, and reliability in the communities it serves both through its private investment and through public-private partnerships. Further, Frontier has the knowledge and expertise necessary for successful fiber deployments at every level of the organization.