

**Nebraska Central Telephone Company
Boelus Village Limits Underserved
Attachment E**

Technical Capability Statement

NCTC and Hamilton each have over 20 years of experience providing broadband to central Nebraska. After Hamilton's acquisition of NCTC, NCTC's broadband network and Hamilton's broadband network were physically interconnected. Additionally, both NCTC and Hamilton can access experienced and knowledgeable employees from across the two organizations. If awarded this grant, NCTC is poised to construct an entirely buried fiber broadband network that is maintained and serviced by a group of highly trained and experienced technicians.

Both NCTC and Hamilton are currently in the middle of fiber buildout projects; while NCTC has focused on the rural areas in the past, Hamilton has embarked on a fiber-to-the-home initiative, bringing fiber to every location in its exchanges. NCTC is proud to be one of the many companies to have earned grants in Round 1 of the Broadband Bridge Act and is in the process of deploying fiber to the 1179 in-town and 382 rural locations that comprised those successful grant applications.

NCTC currently offers a 100/100 Mbps broadband tier to its customers with the ability to provide 1/1 Gbps, depending on location and network infrastructure. The 100/100 Mbps broadband plan is available in all locations where NCTC has already deployed fiber. Network specific information is found below:

NCTC has 13 technical staff who will be dedicated to serving the project area, including: three (3) LAN/WAN Network Administrators, one (1) Network Internet Administrator, and 11 Voice/Data Technicians. Additionally, Hamilton will also make available their technical staff, which includes three (3) LAN/WAN Network Administrators, two (2) Network Internet Administrators, eight (8) Voice/Data Technicians, and eight (8) construction crew members. The Voice/Data Technicians are primarily responsible for all maintenance aspects of the facilities and on the rare occasion, fiber repair. NCTC and Hamilton both provide 24-hour on-call response to their customers.

Network Specifics:

To complete the Boelus Village Limits Underserved project, nearly a mile of new fiber will be buried and connected to NCTC's existing fiber network. NCTC and Hamilton operate a carrier grade, fiber-based wireline communications network that currently provides voice, data, and video services. NCTC will use the same internal expertise, vendors, and network architecture

used in its current network to meet its grant obligations and to provide gigabit speed fiber-to-the-home (FTTH) service to the service area, which meets or exceeds the performance tier (Gigabit) and latency (Low) standards. NCTC's existing fiber optic network will be expanded to serve those locations funded by the broadband grant.

Hamilton will fully incorporate NCTC's network into Hamilton's core. The core infrastructure includes dual routers with failover Internet connections to primary and secondary points of presence (POP). Hamilton currently terminates traffic in Denver, Omaha, and Kansas City. These connections are multi 10 Gbps and 100 Gbps connections. The bandwidth used to provide connectivity services is purchased from Tier 1 core Internet providers. Connection capacity is sized in a manner that ensures that if any primary connection fails, the remaining connections will carry the full load of current network traffic without any real or perceived impact to the end user. These routers are connected by fully redundant rings supporting the middle and last mile switches and Optical Line Terminals (OLT).

The NCTC middle mile consists of a 20 Gbps ring built with Adtran TA5000 shelves. The ring is built with Ethernet Ring Protection Switching (ERPS) to protect the network in case of a fiber cut or equipment failure in the ring. NCTC also has an existing Ciena (reconfigurable optical add drop) ROADM network. This network provides 440 Gbps capacity with a redundant mesh network to (Burwell, Ansley, Scotia, Ravenna, and Gibbon) using Ciena 6500 nodes. These nodes subtend interconnections via 80 Gbps links to (Sargent, Taylor, North Burwell, Ericson, Comstock, Arcadia, North Loup, Mason City, Litchfield, Ashton, Rockville, Elba, Dannebrog, Boelus, and Shelton). As demand grows, this network will be utilized for the capacity needed to deliver fiber services to customers.

The entire Hamilton network is built to exceed requirements necessary to backhaul major circuits, as well as 5G Network traffic and currently carries 5G traffic for various 5G providers. The network is regularly tested using RFC2544 tests to meet or exceed the standards as set forth by the major 5G carriers. It is regularly tested by Hamilton, middle mile and 5G carriers. The same standards and build requirements utilized to build out 5G networks in rural Nebraska will be applied. As a result, the Hamilton network is exceedingly capable of serving FTTH subscribers with robust voice, video, and data.

In business and residential fiber builds, Hamilton uses an active optical network. The Optical Line Terminals (OLTs) and Optical Network Terminals (ONTs) are manufactured by DZS. This provides a 1 Gbps by 1 Gbps connection to each subscriber. Using fiber to deliver the service to each customer means the base infrastructure will not need to be upgraded. As demand grows 10 Gbps OLTs and ONTs can be deployed to support it.

In some rural areas where GPON has already been deployed and is already serving customers, it makes sense to add the unserved customers to the infrastructure. Fiber will still be the medium for delivery of the service and will stand the test of time. The current GPON can be upgraded to XGS-GPON if the demand is there. Advances in transceiver and optical technology enable the simultaneous operation of GPON and XGS-GPON, also referred to as Combo PON.

The Boelus Village Limits Underserved grant project infrastructure is anticipated to last for decades with proper construction and maintenance of the technological components needed to construct the project.

Because NCTC will be burying all fiber deployed in the project, the expected life of the facilities should approach three decades, which is well in excess of the fifteen-year service period in the project area that is required for grants funded by this Capital Project Fund grant cycle. Burying the fiber will make the project resilient and sustainable in the long-term. Although buried fiber is more resilient than other types of fiber deployment, it is not impervious to environmental factors. Additionally, internet technologies will continue to advance over time and some technological components will become obsolete and have to be replaced during the life of the network. Because of that, NCTC would project that there will be ongoing maintenance costs associated with sustaining the network through its expected useful life. The expertise NCTC has in maintaining its other networks will be applied to this project as well.

The technological components used in the project are fiber-optic cable, innerduct conduit, vaults, splice kits, optical line terminals (OLTs), and optical network terminals (ONTs). When the project is completed, those components will connect to NCTC's existing fiber network. NCTC anticipates that the OLTs and ONTs will have to be replaced a few times during the life of the network due to needed upgrades and changes in technology. All other technological components will be replaced on an as-needed basis, if damaged by animals or other factors. NCTC has the ability to monitor and identify issues with the network and will diligently troubleshoot any issue that arises, just as it does with the rest of its network.