

Attachment E: Technical Qualifications and Experience

Windstream NE CPF 23 - Malcolm

Our executive leadership is a group of seasoned telecommunications professionals committed to building a team of employees dedicated to the people they serve, to exceeding customer expectations by providing the best network and customer service, and to driving results not only for our company but for the customers and communities that are part of the Windstream family.

In 2021 our company was recognized by cNET as the Best Rural Internet Service Provider. Windstream is an annual supporter of the Nebraska BRIDGE Program and has been awarded funding for 12 projects across our footprint in the state.

In pursuing our commitment to deliver more speed and more possibilities to more people, Kinetic is investing \$2 billion to deploy fiber-fast connectivity deeper into communities across the county.

Windstream has been providing Telecommunication Services in Nebraska, for 120 years, under various and different company names. Windstream has been operating as Windstream Nebraska, and therefore will be able to continue providing service to the proposed area for the next 15 years.

In Nebraska alone, Windstream has a robust Field Operations team that currently consists of 149 employees. This team includes management and field technicians. In addition to Field Operations team, we have an Outside Plant Engineering team that consists of 12 employees. This team includes management, engineers, project managers, and analysts.

We recently created a new fiber construction organization to manage broadband expansion across our footprint. This added nearly 800 jobs across 18 States including 38 in Nebraska as we work toward the future with the communities we serve. By controlling construction internally or contract it out as needed, we are better be able to manage costs and scale. We can also respond quickly to changes in market needs.

Windstream is predominantly placing buried fiber optic cable facilities and therefore will be resilient and sustainable for decades to come. The network equipment that Windstream is deploying can easily last 10-15 years. Windstream also upgrades network equipment where appropriate as technological advancements such as 10 Gig capability become available.

Our expertise extends beyond the executive, technical and operational. We are also experienced at identifying locations in need of improved broadband services, securing grant agreements, and satisfying build requirements for local, state, and federal network communications construction projects.

The company has a track record of successful fiber broadband deployments in the 18 states where Windstream operates a local broadband provider. They are experienced at identifying locations in need of improved broadband services, securing grant agreements, and satisfying build requirements for local, state, and federal network communications construction projects. In 2020 alone, Windstream

participated in programs across nine states, as well as national programs such as CAF2 and the recent RDOF auction. The company had a solid history of using internal and contract resources as needed on deployment projects. As of year-end 2020, Windstream offered service to more than four million locations across its coverage area.

Windstream seeks to continue to be strong partners with the state of Nebraska by expanding gigabit broadband access, to unserved and underserved census blocks of Malcolm as well as serving as good stewards of the funds that are being allocated through this program for the expansion of reliable broadband access. The total estimated cost of the project is \$3,393,549. Windstream is requesting a grant of \$3,393,549 from the 2023 Nebraska Capital Projects Fund. The grant funds requested would be 100 percent of the project cost.

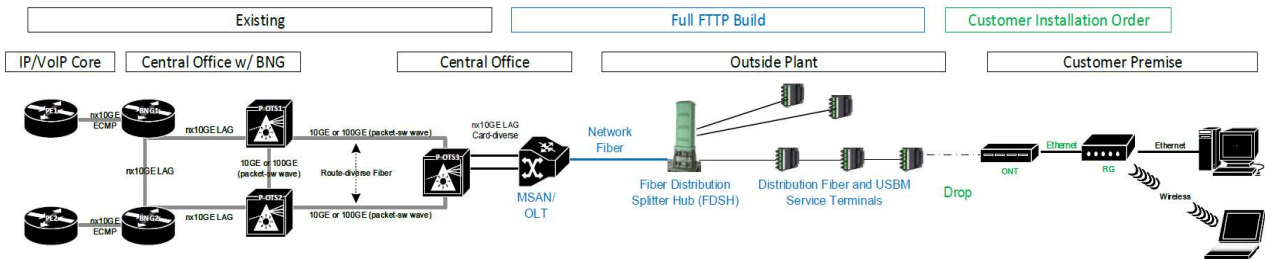
Inadequate broadband access in unserved areas is not due to a lack of concern, but from lack of an economically feasible way to reach these homes and businesses. Windstream, the local ILEC provider, has invested heavily in Malcolm and is working hard to upgrade services wherever possible. But additional funding is necessary to assist in providing broadband access in areas where economic deployment has been impractical.

The intent of the proposed project is to expedite deployment of fiber to the home access broadband service to the project areas that are currently underserved by at least 120/20 and unserved by at least 25/3 broadband service. The final project would deliver symmetrical gigabit broadband access, easily meeting and surpassing the program's required minimum speed of 100 Mbps download, and 100 Mbps upload. These areas are financially challenging to serve, especially with future-proof fiber service, given the population density, the topography of the region, and existing infrastructure.

The proposed program would provide gigabit-speed broadband access to 315 underserved locations, via 41 miles of fiber in the areas most lacking access in Malcolm. In extending gigabit-speed broadband opportunities for these unserved and underserved homes and businesses, some additional nearby locations will benefit from the fiber installation.

Below is the general fiber-to-the-home network architecture proposed.

FTTP Architecture



- Multiservice Access Node (MSAN) is a shelf that houses Optical Line Terminal (OLT) equipment in support of PON fiber networks. Windstream deploys both Adtran and Calix MSAN/OLT equipment and considers them equal.
- Adtran MSAN = TA5000 or TA5004
- Calix MSAN = E7 or E3-2
- Fiber, PON splitters and terminals are sourced from multiple suppliers including Commscope and Clearfield. These items are included in the material price per foot.
- Specific quantities and cost information included in application spreadsheet.

- IP Core = Juniper MX, Nokia 7750 SR-7S
- IP Provider Edge (PE) = Juniper MX and Cisco ASR9K
- IP Broadband Network Gateway (BNG) = Nokia 7750 SR-7/SR-12
- Transport Packet Optical Network (POTS) = Ciena Z-Series, Z77/Z33/Z22

- Residential Gateway (RG) = Actiontec T3260
- Optical Network Terminal (ONT) depends on MSAN/OLT vendor and individual customer requirements.
- Adtran Most Common ONTs = TA352, TA411, TA372
- Calix Most Common ONTs = 760GX, 803Gv1, 711GE

Our existing fiber network is a great foundation for expansion in the local communities. Windstream fiber middle-mile facilities would provide connectivity back to an area Central Office.

At the Central Office, all services are then connected to the existing broadband and voice networks.

Internet Interconnection:

At the IP edge, Windstream's middle-mile network connects over redundant fiber uplinks to redundant pairs High-Availability Broadband Network Gateway (HA-BNG) routers that employ several standards-based protection mechanisms (LAG+LACP, VRRP, and SRRP) to provide uninterrupted connectivity between the access network edge and Windstream's IP Core network.

Distributed across 30 separate Windstream central offices, these next-generation HA-BNG routers aggregate broadband traffic from Windstream's middle-mile transport network for direct hand-off to Windstream's

nationwide IP Core network that currently services over a million Residential, Enterprise and Wholesale customers.

This network includes Nx100 Gbps POP-to-POP connectivity as well as connectivity to multiple Tier 1 IP Transit providers, Private Peers, and Public Peers in locations across the country.

Middle-Mile Network:

Windstream will use our existing middle-mile network, augmenting capacity where necessary, to aggregate last-mile access traffic and efficiently route it to core broadband and voice resources.

With roughly 5000 node locations across our footprint in over 1,400 exchanges and interconnected via 100 Gbps DWDM waves, Windstream's middle-mile transport and aggregation network provides Ethernet aggregation and Carrier Ethernet service capabilities, along with DWDM wave-switched optical services, to provide multi-point Ethernet transport that connects Windstream's last-mile access networks to its IP edge POPs.

This all-optical, packet-switched network is designed to be highly protected and highly redundant, incorporating route-diverse rings and sub-rings and utilizing standards-based Layer 1, Layer 2, and Layer 3 network protection mechanisms (G.8032 ERPS rings, MP-EVLAN services, LAG+LACP protection).

Last-Mile Network:

Windstream's last-mile access network will use a proven Fiber-to-the-Premise (FttP) architecture using standards based GPON and XGS-PON technologies to deliver symmetrical gigabit per second broadband and voice access to connect subscribers to the internet over a fiber network.

This last-mile FttP network will provide each subscriber with a fiber connection to a dedicated Optical Line Termination shelf at an established central office location where individual voice and broadband services will be aggregated and uplinked to Windstream's existing middle-mile transport and aggregation network over fully redundant 10/100Gbps fiber connections.