Attachment C – Technical Summary

Experience

Inventive Wireless of Nebraska, LLC dba Vistabeam, provides broadband access to more than 8,000 subscribers with networks spanning 40,000 square miles that cover at least 100 towns. Vistabeam has relied primarily on fixed wireless as its last mile technology since it began deploying network infrastructure in 2004, and is in the process of transitioning its network to fiber-to-the-premises (FTTP) infrastructure where feasible. Interconnections (middle-mile) are divided between lit fiber, dark fiber, and microwave backhauls with higher capacity connections in the core and lower capacity at the edges of the network.

Vistabeam is currently providing symmetrical 1 Gbps (1000/1000) broadband connections using FTTP in the Nebraska towns of Chappell, Mitchell, and Morrill, and will begin construction in Oshkosh early this year. The company provides 100/100 broadband connections using a combination of fiber and dedicated fixed wireless connections in Alliance, Bridgeport, Gering, Imperial, Mitchell, Ogallala, Scottsbluff, and Sidney.

Vistabeam currently offers voice services across the entirety of its network and will offer voices services in the project area as well.

Vistabeam also has experience providing connectivity to Valarm water monitoring systems for the North Platte Natural Resources District. See https://www.valarm.net/blog/water-flow-telemetry-remote-monitoring/.

Network Architecture

The proposed network will provide last-mile connectivity using Tarana's Gigabit 1 (G1) next-generation fixed wireless access (ngFWA) platform. Tarana's G1 system is the first and only ngFWA platform—the fixed wireless equivalent of 5G mobile technologies. It was designed from scratch to meet the goal of delivering fiber-class throughput and low latency with:

- a unique distributed real-time computing architecture (DM-MIMO) that enables unprecedented precision over the control of radio waves throughout the system, fully compensating for obstructions and motion in the environment, creating the foundation for its equally unprecedented link- and network-level performance,
- a true industry first in interference cancellation that creates a clean path to enable high performance even in busy unlicensed spectrum, and
- a family of custom digital and analog signal processing chips that make installation of the processing power required to execute all these complex algorithms at every home affordable.

For more detailed information on this innovative ngFWA platform, see Attachment H_5.

Vistabeam will deploy Tarana G1 base nodes at the tower location(s) identified in Attachment I. Tarana remote nodes located at the connected farm sites will connect to the base nodes using the 6 GHz spectrum band. Imaging and weather sensor equipment located at the farm sites will connect to the Tarana remote nodes using WiFi or an RJ45 connection.

Vistabeam will deploy from three to four base nodes per tower. Each base node delivers capacities up to 800 Mbps per link and 3.2 Gbps per sector with a one-way average latency of <5 ms and total average latency of ~40 ms. A tower with three base nodes would have an aggregate maximum capacity of 9.6 Gbps, and a tower with four base nodes would have 12.8 Gbps of capacity.

Tarana G1 can operate with near- and non-line of sight capabilities and has advanced self-interference cancellation. Measurements of deployed G1 systems have shown download speeds of ≥ to 400 Mbps for 94% to 97% of links. See Attachment H_2.

Vistabeam expects that the remote nodes will initially support a weather sensor and video streaming connectivity at each of the Key Operational Locations discussed in Attachment J_2. There will be ample capacity to add devices in the future.

Reliable and Scalable Connectivity

With up to 3.2 Gbps of capacity per sector, the initial deployment will have more than enough capacity to support this project and many future precision agriculture deployments. If demand warrants it, Vistabeam will add additional Tarana G1 base nodes that operate in the 5 GHz or CBRS bands.

Expected Useful Life

Maintenance, repair, and replacement is built into Vistabeam's business plan. The Tarana equipment that will be installed on the tower facilities and at the farm sites are high-end, high-quality components with expected useful lives of ten to fifteen years.

The network will use a combination of fiber and microwave backhaul. The useful lives of both backhaul options is fifteen years or longer.

Resilient and Sustainable

Vistabeam has demonstrated the resiliency of its existing fixed wireless and fiber networks, which have yielded a Net Promoter Score of 50, well above the telecommunications industry's average of 31.[1] Our network operations center and primary maintenance facility are both in Scotts Bluff.

[1] Net Promoter Score is a customer loyalty and satisfaction measurement derived from surveys asking customers how likely they are to recommend a product or service to others on a scale of 0-10. A score of 50 is considered "excellent."

We do not expect that our wireless network will require substantial capacity upgrades or replacement over the next ten years.

If outages occur, we have the necessary technical staff to restore service rapidly from our primary maintenance facility in Scotts Bluff.

The company is already serving areas near the project area and will continue to use the same staff to serve the project area when the fiber project is complete. With 52 employees, we have a large and very capable staff for our company's size. We currently have an infrastructure staff of 35 people working out of locations in Mitchell, Scottsbluff, Gering in Nebraska, Laramie in Wyoming, and Yuma in Colorado. Vistabeam is committed to adding more staff as the number of customers increases.

We will proactively maintain our network using the Tarana Cloud Suite software-as-a-service solution. This platform equips network engineering and maintenance teams with continuous monitoring and management. Additional information regarding the resiliency benefits of this solution is provided in Attachment H_2.

Physical maintenance of the proposed network will occur through regular visits to add, remove, and upgrade equipment as needed, scheduled inspections of the plant, and routine maintenance of electronics and backup equipment.

Engineering Attestation

We have provided in Attachment H_3 an attestation from a qualified engineer that the proposed project will consistently meet the speed requirements of 100 Mbps download and 20 Mbps upload to the farm site.