

Miles Communications –

Miles Communications is expanding in the rural NE Clinton County area. The technologies used in these areas will be an expansion upon existing deployments and existing technologies. Technologies in these eastern Iowa deployments will utilize dedicated active Ethernet services over fiber-to-the-home and fiber-to-the-business facilities. The use of fiber optic facilities and the combination of active Ethernet will meet performance specifications of up to 1 gigabit per second and more as upcoming technologies become more standardized. Because these technologies utilize land-based Ethernet over fiber optic facilities, ultra-low latency data connectivity to internet and other network services are easily achieved.

Overall Network Design.

1a) The last mile architecture is fiber-to-the premise (FTTP). The last mile design consists of 1Gb/s Active Ethernet links in a star topology originating from the access node to provide up to a 1Gb/s service to the subscriber. Each subscriber will be installed with a managed Calix ONT to provide a broadband internet service and an analog POTS service. The ONT converts the analog voice to SIP VoIP. Last mile traffic is separated with a voice 802.1q VLAN and an internet 802.1q VLAN. The voice VLAN is marked with 802.1p to establish a higher level of QOS through the network. Calix ONTs and the Calix E7 AXOS platform is the last mile access platform.

1b) The middle mile architecture is a geo-redundant fiber optic ring. The middle miles design consists of a 10Gb/s (upgradeable to 100Gb/s) G.8032 ring providing connectivity from the remote huts to the central office. The subscriber 802.1q VLANs along with the 802.1p marking and prioritization is maintained on the voice VLAN through the middle mile network. Ciena 5170 switches are used for the backhaul and provide a 2x 10Gb/s 802.3ad LACP LAG to each of the Calix E7 groups.

1c) The internet interconnection architecture is fiber optic connectivity currently to two other carriers. The interconnection design consists of two peering routers in the central office in Miles, IA, operating in a redundant fashion by providing VRRP connectivity toward the middle mile network and multi-homed eBGP routing used facing the carriers. The routers are peered to Airstream Communications with connectivity to Madison, WI and Aureon with connectivity to Cedar Rapids, IA, and both have POPs in Miles, IA. Both Airstream Communications and Aureon have direct connectivity to Tier 1 carriers. 10Gb/s links are established with the interconnection carriers and have ability to expand with multiple 10Gb/s links. 10Gb/s links are established to the middle mile network and have ability to expand to 100Gb/s. The peering hardware is a pair of Juniper MX-204 routers.

1d) Voice services are provided by Voyant, a managed voice provider via internet connectivity. Within the middle mile and last mile networks, 802.1p QOS is utilized to prioritize the voice VLAN traffic. The nature of best-effort internet structure with voice services requires attention to minimizing route hops and maintaining sufficient bandwidth headroom in internet carrier networks. Both Voyant, the managed voice provider, and Miles Communications, continue to investigate into solutions to continue and expand on the current success of a highly reliable and a consistently desirable voice service.

1e) The Miles Communications network is designed to allow for the ever-increasing customer growth and bandwidth demands. Bandwidth increases are simply enhanced by either adding interfaces into a link aggregation group or by migrating connectivity to higher speed interfaces, which are already present in the middle mile and internet core. The land-based fiber optic architecture natively supports low latency, a very high level of quality of experience, and well support any known application.

1f) The network is designed with redundancy, ring connectivity, and multiple link connectivity to maintain the highest availability as possible. Examples include dual homed peering to multiple internet providers, dual core routers, a geographically diverse middle-mile ring, and middle-mile to access network handoffs with link aggregation connections for redundancy. A highly reliable power infrastructure also assures a high availability service to the subscribers. Central offices and huts providing services are all equipped with a backup battery supply, backup power generator, and all core and aggregation equipment utilizes a dual A-B power feed.

1g) The access infrastructure including the last-mile hardware, fiber-based outside plant facilities, and other infrastructure are 100% owned by the applicant or applicant's affiliated ownership, Miles Cooperative Telephone (the affiliate). The last-mile fiber optic facilities are 100% buried. 67% of the middle-mile G.8032 ring is owned by the applicant or the affiliate. The fiber-optic facilities owned by the applicant or the affiliate, are 100% buried. The remainder of the middle-mile network is operated by a partner carrier, Wisconsin Independent Network (WIN). The WIN facilities consist of a combination of buried and aerial fiber optic facilities. The internet interconnect facilities are 100% owned and operated by the applicant or the affiliate.

1h) Assuming a 70% subscription rate for the awarded area, the calculations are based on 50 dwellings at a 1Gb/s performance tier. The expected oversubscription ratios are as follow:

Last-mile to middle-mile uplink: 5:1 oversubscription (50 subscribers utilizing redundant 10Gb/s uplinks)

Middle-mile network G.8032 ring: 15:1 oversubscription (aggregate of 1500 subscribers including the awarded area and other unassociated areas utilizing 100Gb/s backhaul)

Internet core: 25:1 oversubscription (aggregate of 2000 subscribers including the awarded area and other unassociated areas utilizing total peering uplinks of 80Gb/s)

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