

Meeting Alaska's Critical Communication Needs with Wireless Broadband

Covid-19, while unexpected and a situational first in the lifetimes of most Americans, has exposed some stark and potentially tragic realities related to the lack of suitable emergency service in rural areas during a time of national emergency. The glaring shortfalls have been exposed. Now, more than ever, it is evident how critical it is to have the necessary broadband infrastructure required to survive and function during an extended emergency situation. This unacceptable and life-threatening downfall is most apparent in Alaska's vast wilderness and rural areas, particularly in the west, northwest, and north slope coastal arctic regions. Fortunately, Quintillion is uniquely positioned to address and resolve these critical broadband needs in the areas of Alaska where there is no other realistic or available alternative. By utilizing federal support and funding that is currently being offered as part of the Covid-19 stimulus, along with anticipated funding that is likely to include programs for priority infrastructure, Quintillion will be able to provide effective broadband, accessible to the most rural of areas during the most dire of times. To do so will require \$25.5 million in immediate federal and/or state funding appropriated to Quintillion. This funding will allow Quintillion the ability to plan, implement, and operate short- and long-term solutions which are proposed below, all within six months of funding.

Recognized as a leading infrastructure provider of high-speed broadband connectivity in the Arctic region, Quintillion (www.QuintillionGlobal.com) is the first and only telecommunications operator to build a submarine and terrestrial fiber optic cable network in the U.S. Arctic. Quintillion is now planning the construction and operation of an affordable, practical, and scalable wireless broadband infrastructure in the



Arctic region. The infrastructure will be connected to Quintillion's existing Alaskan fiber network, thus providing short- and long-term solutions to Alaska's unique challenges when it comes to achieving universal connectivity as we continue to transform and improve society through information technology and communications.



In order to launch such an extensive wireless broadband network utilizing multiple towers and monopoles, Quintillion plans to leverage its extensive fiber pathways into six Arctic coastal communities and along the Dalton Highway from Prudhoe Bay to Fairbanks. The proposed network will reach up to a hundred thousand people consisting of citizens from not only Alaska's most isolated Native communities, but from other population clusters as well. All of whom remain unserved and/or massively underserved compared to the rest of the United States.

By leveraging its Arctic fiber network with its unique coastal fiber assets complemented by land routes, Quintillion will substantially improve wireless broadband availability across the state.

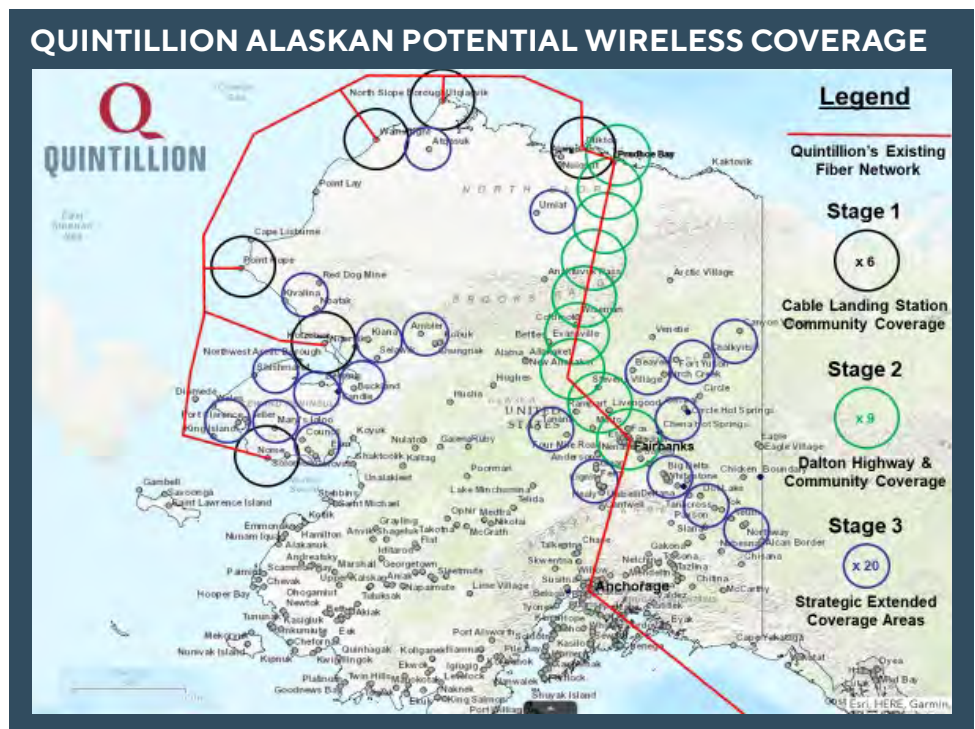
This will provide Alaskans with a network that offers extraordinary capacity, unmatched capabilities, and unwavering reliability. There are currently six (6) Arctic coast Cable Landing Stations (CLS) and eight (8) In-Line Amplifiers (ILAs) along the Dalton Highway route, all of which have existing hardened facilities with advanced equipment for operating the fiber networks. Consequently, Quintillion can not only deliver highly scalable, resilient broadband that is securely connected across a chain of well-placed towers and monopoles, but broadband that will also reach the targeted populations referenced above.

In addition, Quintillion will employ multiple wireless technologies to ensure the broadest geographical reach and capabilities of the delivered services. The proposed broadband wireless network will be supported by fiber from Quintillion’s existing facilities, in conjunction with added communications via monopoles and towers. In turn, Quintillion’s network will be prepared to support increased demand, whether it be from added use in new areas where previous connectivity did not exist, or in crisis situations when public networks become congested or inaccessible. This additional support will benefit homes, schools, and libraries, as well as workforce development and retention, and business and government operations, all while meeting potential maritime needs that currently present themselves as problematic.

This new, extensive Alaskan wireless broadband network will utilize multiple wireless technologies which include the emerging capabilities and reach of CBRS spectrum, along with White Space spectrum to support remote learning, telework, telehealth, public

safety, transportation of goods and equipment, industry and government continuity, and the general public welfare and quality of living during the COVID-19 outbreak and beyond. Alaska's ability to support and sustain its citizens and institutions in these times of pandemic emergency, while at the same time poising themselves for ongoing recovery and growth, is dependent upon its robust capabilities to connect citizens, businesses, and institutions via reliable high-speed broadband.

Given Alaska’s vast distances between small communities, combined with its rugged terrain, USDA RUS programs (including ReConnect) have disadvantaged Alaskan infrastructure projects in their grant and loan eligibility metrics. However, State and Federal pandemic responses with the CARES Act and other programs offer a historic opportunity to finally invest in broadband for these remote communities. The State of Alaska can play a crucial role regarding various regulatory matters by removing or reducing barriers to rapid deployment, as well as by leveraging State and Federal resources to provide active support for direct investment or other strategic financing alternatives.



The People and Use Cases the Expanded Wireless Network Will Serve

Alaska's remote and rugged western to northern coastal regions and nearby population clusters are extremely isolated and largely lacking in good telecommunications options. Other small population centers and facilities along the Dalton Highway share their extraordinarily severe digital divide issues and high costs. Expansion of affordable wireless broadband to these unserved and underserved areas with an array of true broadband services delivered up to 60+ miles will serve visitors, residents, enterprises, and government entities across a wide range of critical modern use cases:

Ensure delivery of government's services to citizens and businesses. Limit economic development impact by enabling telework, ecommerce, supply chain management, financial transactions, and other IT-driven processes. Ensure local government and community centers are connected and have the IT infrastructure and devices to utilize. Enhance training and retention of workforce.

Support K-12 and higher education as well as libraries as they virtualize and enable remote participation. Alaska Statewide Virtual School (<https://www.aklearns.org/aksvs>) is now offering a full range of online courses for K-12 students. The CARES Act includes significant Education Stabilization Funding and other possible educational infrastructure support.

With social distancing, telemedicine is becoming even more necessary for Alaska's residents and is readily supported. Provide remote social services, behavioral health lifeline, and remotely connect families to isolated patients. The CARES Act includes new telehealth programs to support health care facilities, providers, and patients during and in the wake of the COVID-19 pandemic.

Enhance public safety communications including AT&T's FirstNet and E911. Help remedy the lack of reasonable and reliable maritime communication. Support Intelligent Transportation Systems (ITS), highway conditions monitoring, and the advent of autonomous vehicles with DSRC and V2X.

Deliver LTE-style broadband services over available spectrum such as CBRS and TV White Space. Support expanded coverage, cellular densification, and roaming in cooperation with major mobile providers. Deliver maritime communications within range of shoreline infrastructure.

Collect Internet of Things and Industrial Internet of Things (IoT/IIoT) data utilizing Low-Power Wide-Area Networks (LPWAN) and cellular supporting oil and gas industry telemetry, security monitoring, and command & control, as well as environmental sensing and other IoT/IIoT sources.

Provide localized edge computing and cloud services for enterprises and government in conjunction with leading hyperscale providers (especially to the defense and space sectors for strategic data) infrastructure with scalable broadband backhaul.



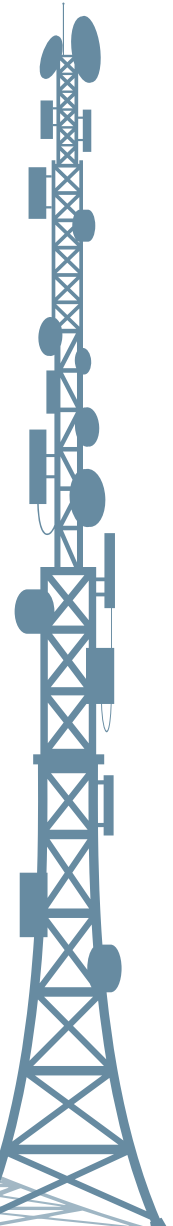
Quintillion's Wireless Broadband Expansion Strategy and Execution

Quintillion proposes to build wireless communication towers at each of its six Arctic coast Cable Landing Stations (CLS). Nome, Kotzebue, Point Hope, Wainwright, Utqiagvik (formerly Barrow), and Prudhoe Bay will be equipped to serve nearby communities within 4-6 months from initial funding. This will be followed by building out the wireless network along the Dalton Highway route from Prudhoe Bay to Fairbanks, using Quintillion's existing fiber-enabled In-Line Amplifier (ILA) buildings. Over time, Quintillion will strategically add vertical assets or collocate on existing ones to extend the wireless network's range into additional communities. Each site will deploy a variety of wireless base station transceivers and antennas to deliver an array of wireless high-performance capabilities, supporting a rich set of use cases and needs at distances between 60 and up to 100 miles away, including well into the Arctic Ocean's Beaufort and Chukchi Seas, plus the Bering Strait.

In addition to operating with traditionally licensed cellular and microwave frequencies, Quintillion plans to deliver the latest Wi-Fi 6 (IEEE 802.11ax) across multiple spectrum bands and fully utilize emerging, lightly regulated spectrum and protocols such as Citizens Broadband Radio Service (CBRS at 3.5 GHz) and White Space (White-Fi or IEEE 802.11af at 470-790 MHz) through dynamically assigned Spectrum Allocation Services (SAS). White Space will be especially important as it can travel great distances (60+ miles) non-line-of-sight (NLOS) for the broadest geographic reach. Quintillion's underlying fiber infrastructure is extremely scalable, as well as reliable, resilient, and hardened against potential cyber and physical threats.

Throughout, Quintillion will engage community stakeholders, government agencies, and elected official to help define and refine our strategy and plans to bring new wireless broadband to critical areas and populations serving a myriad of use cases and end user needs. Quintillion plans to partner with the Arctic Slope Regional Corporation (ASRC, <https://www.asrc.com/>), as well as with State and regional government and other community and economic development organizations.

Quintillion will adapt and improve its system design accordingly and do project resourcing and thorough planning, followed by detailed engineering, construction contracting, site prep, facilities installation, and phased introduction of services. Once launched, Quintillion will continue to scale up its wireless capabilities, reach, and services to expand and grow wireless broadband access across Alaska.



Quintillion Wireless Deployment Model



Microwave Point to Point

Deliver backhaul to remote tower facilities and directly to end users over significant distances using licensed frequencies

CBRS

Citizens Broadband Radio Service (CBRS) for new generation services including LTE-type mobile over lightly licensed 3.5 GHz spectrum

White Space (IEEE 802.11af)

Deliver broadband over long distances (60+ miles) non-line-of-site (NLOS) over lightly licensed 470-790 MHz former TV spectrum

Wi-Fi 6 (IEEE 802.11ax)

Deliver Wi-Fi to nearby CPE and mobile devices as well as meshing with nearby nodes for widespread regional coverage

LPWAN for IoT/IIoT Data

Collect data with Low-Power Wide-Area Networks (LPWAN) over V2X, LoRaWAN, Sigfox, NB-IoT, HaLow &/or LTE Cat M1

Cellular Colocation

Enable expanded 4G/5G cellular coverage and densification including FirstNet for public safety, consumer voice and data, and IoT/IIoT

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