



## Telecommunications - Essential to the National Strategy for the Arctic Region

The President’s National Strategy for the Arctic Region, May 10, 2013, and the accompanying Implementation Plan, January 2014, outlines multiple initiatives and action plans focused along three primary lines of effort:

- Advance United States Security Interests
- Pursue Responsible Arctic Region Stewardship
- Strengthen International Cooperation

Reliable communications, essential to all three lines of effort, is a critical foundational infrastructure component that must be improved. The US Arctic (Alaska) suffers from a lack of reliable communications largely hampered by dependency on expensive satellite and microwave backhaul.

### Fiber-Optic Broadband for Arctic Alaska

Quintillion Networks, headquartered in Anchorage, Alaska and Arctic Fibre, headquartered in Toronto, Canada, are working together to build the Arctic Fibre network, a subsea fiber optic cable planned to connect Tokyo to London transiting through the Bering Strait, Beaufort Sea and lower Northwest Passage. This network provides the opportunity to connect Arctic communities and existing telecom infrastructure via spurs off the Arctic Fibre backbone.

The Arctic Fibre/Quintillion Networks submarine fiber optic cable system currently in development will extend new, virtually unlimited broadband capabilities at substantially lower costs to currently underserved communities in Arctic Alaska. Initially the system will deliver up to 100 Gbps bandwidth at each landing on Day 1 of deployment. Per fiber pair the system will be capable of up to 100 waves of 100 Gbps each.

### Cost and Service Comparison of Internet Service

Location	Monthly Cost	Speed (mbps)	Capacity Limit	Price per mbps
Seoul South Korea <sup>1</sup>	\$30.30	1000	No Cap	\$0.03
San Francisco California <sup>1</sup>	\$30.00	200	No Cap	\$0.15
Kotzebue Alaska <sup>2</sup>	\$215.00	6	Cap of 60Gbps	\$35.84

<sup>(1)</sup> As published by Open Technology Institute, New America Foundation; “The Cost of Connectivity 2014”

<sup>(2)</sup> Quoted on GCI website, October 2014

Alaska has 255 remote, non-road-connected communities spread over 600,000 square miles; roughly an area twice the size of Texas. This distance, the unique climate, and geographic challenges limit broadband availability and capacity and can significantly impact build and maintenance costs.

Telecommunication costs in Alaska are extremely high, due in large part to the high cost of operation on satellite and

microwave systems and the limited competition in the market for backhaul service. Carrier to carrier prices on satellite range from \$1,400 to \$4,000 per Mbps per month and on microwave from \$4,000 to \$14,000 per Mbps per month.

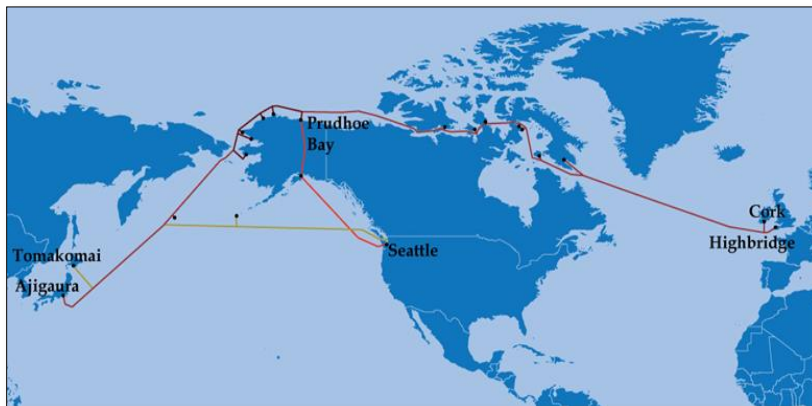


Through market research, Quintillion has found that economic development in rural areas of Alaska has been restricted due to limited access, low capacity/speed and high cost of service. The high cost of broadband impedes adoption of high-value services supporting education, health care and efficient delivery of government services. Environmental protection and emergency response are also impeded by lack of broadband capacity in these developing markets.

Quintillion's middle mile service rate will reduce carrier backhaul costs by at least 50% from average satellite capacity prices. Quintillion Networks will make capacity available to all telecoms providing services in Alaska.

Networks connecting to Quintillion will improve speed and reliability, while reducing cost, thereby providing improved interface with critical community service providers in healthcare, education, business, government, public safety, emergency, search and rescue services, radio navigation, aeronautical, maritime communications and weather services.

## Network Overview



*Arctic Fibre/Quintillion Network Map*

The Arctic Fibre back bone cable system, extending from Asia to Europe, will closely pass areas of the Alaska coast allowing for fiber optic cable spurs into key coastal communities.

Initial landing sites for the Alaska segment are planned for Prudhoe Bay, Barrow, Point Hope, Wainwright, Kotzebue and Nome. Subject to customer requirements and

applicable government approvals, a spur may also be extended to Shemya Island in the Aleutians. Quintillion is working the design, survey and permitting work for each of these landing sites as well as the development of shore side construction with participation from each community. Opportunities for follow-on projects such as terrestrial connections to neighboring communities and additional landing sites are being evaluated.

Prudhoe Bay to Anchorage and Anchorage to Seattle segments shown on the above map represent existing backhaul systems or backhaul systems currently under construction. Quintillion will inter-connect to these systems to provide a faster and technically superior backhaul option for Alaska and the Arctic region.



## Existing Infrastructure

Rural Alaska's general network technologies consist of wire line networks (copper, cable and hybrid fiber-coaxial wireline) fixed wireless networks, terrestrial broadband, high frequency (HF) radio networks, very high frequency (VHF), mobile wireless networks, Wi-Fi networks, satellite systems and microwave based middle mile networks. Networks provide general communication of voice, data and video services that can be delivered to fixed or mobile devices.

## Delivery Infrastructure

Quintillion operates as a carrier's carrier and will provide access to its network to all telecommunication service providers at substantially lower cost than existing satellite and microwave backhaul. Last mile wireline and wireless services already exist in these rural Alaska communities, but service is constrained by the lack of quality backhaul and the high cost of backhaul, which ranges from \$1,000 to more than \$10,000 Mbps per month.

Quintillions service model will allow all existing and any future service providers to access more affordable backhaul over fiber as the system is placed into service.

## Design, Surveys, Permitting and Cable Landing Site Construction



*Core Sampling Activities at Landing Site*

Marine survey activities for the Arctic Fibre system will continue through 2016.

Specific to Alaska, landing site and beach manhole locations have been identified, and procurement of sites is underway with landowners. Buildings for landing sites have been constructed and shipped to Barrow, Wainwright, and Point Hope. Buildings are not required for Nome and Kotzebue, as these are planned co-location sites with local telecoms. Required survey work, design of horizontal directional drilling bores for the shore landings, environmental assessments and permitting activities are ongoing.