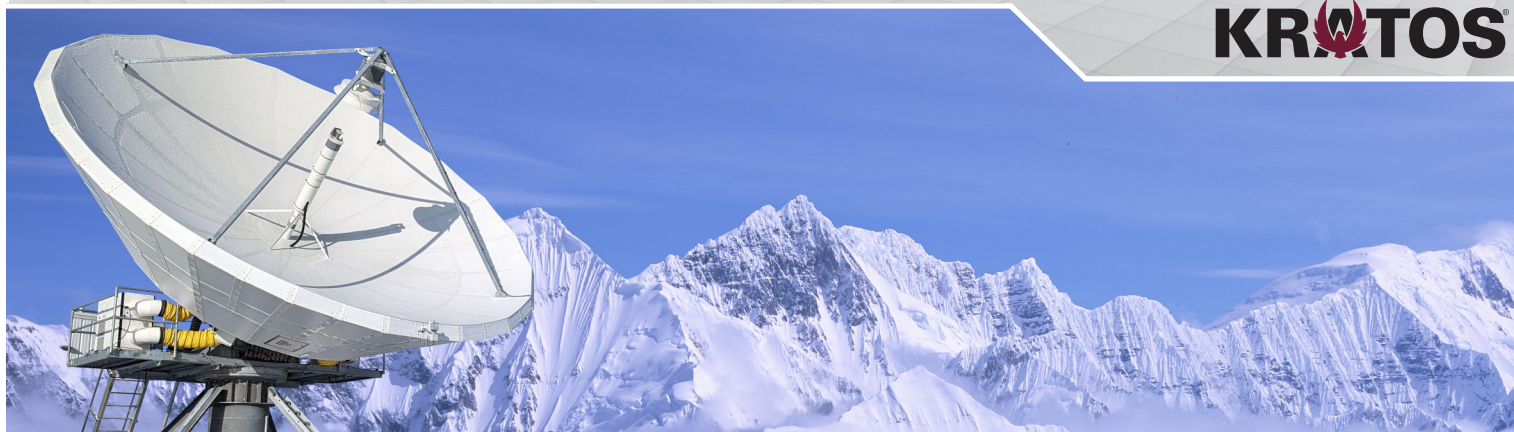


Kratos Builds a Turnkey Ground System for Pacific Dataport, Inc. to Provide Broadband to All Alaskans



In Alaska, the northernmost of the United States, an estimated 40,000 rural households are disadvantaged in access to healthcare, education, timely emergency services and basic communication because there is little to no reliable Internet connectivity. Many communications providers have been unsuccessful in finding a way to bring reliable service to Alaska affordably, until now.

The Challenge of Providing Affordable Broadband Service to All Alaskans

The roadblocks to serving all of Alaska with true broadband are many. The terrain is often too rugged and the population too dispersed for terrestrial providers to justify the investment. The existing infrastructure makes it nearly impossible to support areas outside urban communities.

Communication providers just haven't been able to find a business case to provide service to unserved and underserved areas at a price that the market will bear.

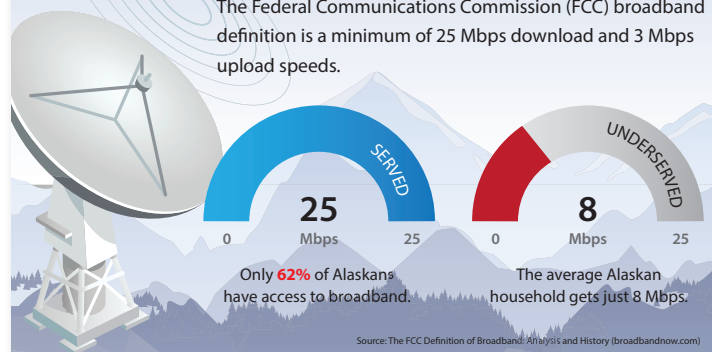
Today, only 62% of Alaskans have access to the FCC's internet benchmark for true broadband: 25/3 (25 Mbps download and 3 Mbps upload speeds). The average Alaskan household gets 8 Mbps download speeds and the service they receive tends to lapse and lose connection.

Why is so much of Alaska Unserved or Underserved for Broadband Connectivity?

- *Terrain: Difficult and remote terrain that blocks access and line of sight to terrestrial broadband and satellite internet*
- *Infrastructure: Existing services focus only specific areas, such as Anchorage, Fairbanks, and Juneau*
- *Revenue: Potential providers haven't been able to develop a business case that justifies the investment*

WHAT IS TRUE BROADBAND?

The Federal Communications Commission (FCC) broadband definition is a minimum of 25 Mbps download and 3 Mbps upload speeds.



Households that do not have access to at least 25/3 speeds are defined as “underserved.” These underserved rural Alaskans and households with no service at all are in most need of a solution that expands coverage to their area and drives down cost.

Delivering Service to All Alaskans

To achieve the performance and affordability necessary for successful delivery of broadband service to rural Alaska, Pacific Dataport, Inc. (PDI) decided to create their own multi-service network supporting both fixed and mobility applications – the Aurora Network.

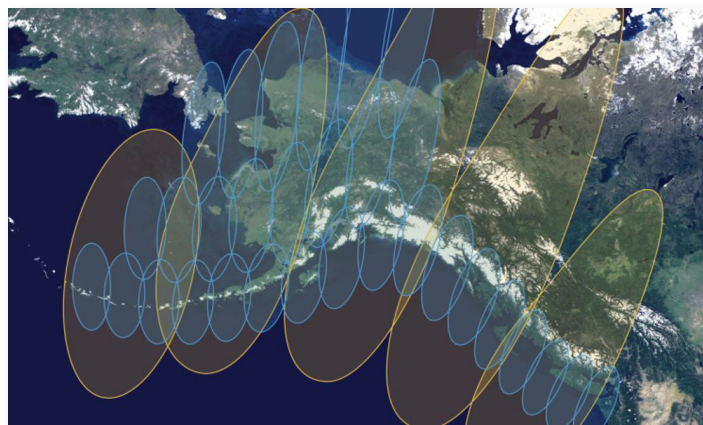
The Aurora Network build consists of two phases. The first phase includes the installation of a 9.4m Ka-band dual purpose antenna paired up with a first-of-its kind software-defined MicroGEO HTS satellite launching in the fall of 2022. The second phase includes an additional GEO VHTS satellite, with its ground system, launching in 2024. For phase one, PDI selected Kratos to build the antenna system and Astranis to deliver their innovative MicroGEO satellite.

The selection of the antenna system location, the ideally positioned orbital slots, and the partnership between Kratos and Astranis was key in supporting PDI’s project goal of maximizing performance and reliability while minimizing cost.



"Kratos had recently delivered on a next generation Ka HTS gateway project similar to ours for Kacific in the Asia Pacific. We selected Kratos because of their methodical approach, attention to detail and desire to develop a relationship more than that of just an equipment provider."

Shawn Fitzpatrick, Vice President of Engineering, Pacific Dataport, Inc.



Estimated Aurora Network Coverage at project completion in 2024. Photo Credit: PDI

Dual-Purpose Antenna System Built On-Time and On-Budget

At the end of November 2021, the Kratos team arrived onsite to begin Aurora Network first phase installation and brought the antenna system to completion before the end of December that same year. In a return trip in early 2022, configuration, testing and training for the system was completed.

Kratos’ early design work and planning facilitated an on-time completion in just over two months, despite the supply chain and access challenges presented by the pandemic. PDI also selected Kratos’ Compass software, a proven and industry leading Monitor and Control (M&C) solution for their ground system operations. All tasks that could be done remotely were done so including M&C integration and testing as well as Factory Acceptance Testing (FAT).

Delivering Reliable Service Despite Harsh Environmental Conditions

Antenna site selection has a critical influence on overall project cost and quality of service. PDI selected an LBiSat greenfield site in Utah to best support their mission.

While Utah offers good weather, mostly sunny days, reliable power, internet, and cost-effectiveness ideal for gateways, the antenna system still had to meet the



Highly ruggedized options support reliable operations in harsh environmental conditions. Photo Credit: Kratos

extreme temperature and weather challenges of the area. Kratos' highly ruggedized antenna options were selected by PDI to meet those challenges and minimize any service interruptions due to weather.

For Extreme Cold: To combat subzero temperatures, a full de-ice system, reflector, feed, and Subreflector Tracking (SRT) heater were installed.

For Rain: The effects of fast moving and often unexpected rain showers were mitigated with a rain blower, also referred to as an air knife.

For Extreme Heat: Balancing fans were installed to distribute heat, guarantee minimum temperature fluctuation, and avoid hot spots that can affect the RF signal.

Subreflector Tracking (SRT) Technology for Maximum Quality of Service

PDI selected Kratos' proprietary SRT tracking technology to incorporate a unique advantage over traditional tracking methods.

Three Reasons Why PDI Chose Sub-reflector Tracking Technology for Their Antenna System:

- *Redundancy:* If either of the main tracking motors or the sub-reflector tracking fails, the other can take over.
- *Reduced Wear and Tear:* There is less wear on the large motors because the antenna can rely on the sub-reflector to track the satellite more and rely less on the tracking in the pedestal.
- *Automatic Refocus:* The subreflector can move on its Z axis to keep it highly accurate when heat affects the shape of the reflector.

Most antennas have two axis which require a set of motors for azimuth and a set for elevation. The addition of a sophisticated antenna control sub-reflector facilitates tracking the satellite by making much smaller movements rather than moving the entire antenna using the large motors at the pedestal.

Reducing Cost and Increasing Power with an Innovative, Software-Defined MicroGEO Satellite

Astranis was selected by PDI as the satellite manufacturer and service provider for the Aurora Network because of their innovative and software defined MicroGEO satellite, Arcturus.



A Kratos antenna installed with proprietary subreflector tracking technology. Photo Credit: Kratos

Arcturus is 20x smaller than legacy GEO satellites, much more powerful than similar smallsats, and is highly adaptable and reprogrammable on orbit. All these factors made it perfect for the mission of providing advanced and affordable coverage to rural Alaskans.

As Astranis’ first satellite in orbit, Arcturus utilizes brand new technology. Kratos provided support and flexibility for the integration and testing of the system prior to launch. In addition to supporting PDI’s broadband payload, the Kratos antenna will also be used for telemetry, tracking and control (TT&C) of the MicroGEO.

Antenna features such as monopulse tracking, highly accurate pointing, and telemetry feed back into the mission operations center to support the ability to get an accurate satellite location. In addition to always knowing where their satellite is, Astranis is also assuring the spectrum with Kratos' Monics carrier monitoring software.


The Arcturus MicroGEO satellite is now in final assembly and set for launch in the winter of 2022.



Astranis’ first ever Arcturus MicroGEO satellite. Photo Credit: Astranis

Building a new, dedicated satellite system allows for specific targeting to serve all of Alaska affordably. This new infrastructure provided by Kratos and Astranis was selected and designed for Alaska to remove terrain challenges and environmental conditions from the equation, to increase performance and quality of service while at the same time driving down costs for all Alaskans.

Upon completion, the Aurora Network is expected to triple Alaska's middle mile broadband capacity and will expand 25/3 broadband service to all Alaskans at a target estimated retail price of 80% lower than current market pricing.







"It's been midnight calls, it's been traveling out to the different sites, it's been changing the plan at the drop of a pin and that support has yielded the results we are seeing now. I don't think we could have done it without all three: Astranis, Kratos, and PDI working hand in hand the whole time."

Riccardo Dina, Operations Director, Astranis

Partnering with Kratos and Astranis, PDI Provides Accessible, Affordable Broadband Service for All Alaskans

Despite the challenges that Alaska presents from its remote and rugged terrain, existing infrastructure, and few options for potential business cases, Pacific Dataport has found a way to provide true broadband service affordably through creative and innovative thinking.

Connecting 100% of Alaskans with Affordable True Broadband

	Aurora Network	Retail Price	25/3* Coverage
Today	 Antenna System Complete	\$\$\$ \$499/mo	 62% Households
Early 2023	 Satellite Launched	\$ \$99/mo	 100% Households

*The official Federal Communications Commission broadband definition is a minimum of 25 Mbps download and 3 Mbps upload speeds.