

Arcturus microGEO from Astranis ●●●

## Delivering broadband to rural and indigenous populations in Alaska ●●

According to the Federal Communication Commission's 14<sup>th</sup> Broadband Deployment Report issued on January 19, 2021, only 63.7 percent of Alaskans living in rural areas have access to wired broadband at speeds of at least 25 Mbps downstream and 3 Mbps upstream. Thanks to the efforts of Pacific Dataport, Inc., Kratos, and Astranis, Alaska's middle and last mile broadband capacity is expected to triple. The plan is to expand 25/3 broadband service to the isolated and remote communities who need it most at a price they can afford.

*Crispin Littlehales, Executive Editor,  
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**R**ugged, wild, and vast, Alaska has the nation's lowest population density—just 1.3 persons per square mile. Alaska natives, organized into 228 tribes, account for 15.7 percent of the population and approximately two-thirds of those people live in remote rural villages. A significant number of these communities are in areas accessible only by boat or aircraft. Not only is the terrain challenging and the population dispersed, but the harsh weather also makes the construction of any kind of infrastructure all but impossible during the winter months.

Given these difficulties, it is no wonder that satellite-based services were viewed as the perfect solution. Indeed, Alaska-based reseller, Microcom, has been providing satellite broadband and TV to rural Alaskans for decades and has tens of thousands of customers. However, several years ago Microcom realized that satellite operators were running out of capacity with many

Alaskans still awaiting connectivity. In 2017, Microcom spawned a new satellite communications company called Pacific Dataport Inc. (PDI) to address Alaska's digital divide.

### AURORA TO THE RESCUE

From the start, PDI's aim was to provide ubiquitous broadband coverage to Alaska at a competitive price through the creation of its own multi-service network called Aurora. Shawn Williams, Vice President of Government Affairs and Strategy for PDI notes, "Our ultimate goal is to sell cellular and broadband backhaul capacity to tribes, tribal consortiums, schools, health clinics, and Alaska telecoms. Our wholesale pricing will be a fraction of what everyone's paying right now. In fact, it will bring Alaska very close to the wholesale pricing that you see in the lower 48 and that's absolutely market disruptive."

Phase 1 of the Aurora Network includes the installation of a 9.4m Ka-band dual-purpose antenna from Kratos, coupled with a first-of-its-kind software-defined MicroGEO™ satellite from Astranis, scheduled to launch



Ruggedized options for harsh environmental conditions .  
Photo courtesy Kratos ●●●

later this year. PDI secured two orbital slots at 163 degrees and 154 degrees west and selected an LBiSat greenfield site in Eagle Mountain, Utah for the ground system. "They have almost 100 percent clear sky days and the atmospheric weather conditions are near perfect at that location. We also have access to low-cost redundant fiber-based internet services with multiple providers. Power reliability was also a big deal, along with clear look angles with no chance of blockage from future construction," explains Williams.

**A FAIL-SAFE ANTENNA**

Although Utah boasts many days of sunshine, the weather can sometimes prove challenging with temperatures

ranging from below zero to triple digits Fahrenheit. PDI needed an antenna system that was rugged enough to brave the elements with redundancy for all critical systems including tracking. Kratos, with its proven track record and highly ruggedized antenna options, proved to be the partner of choice.

Kratos installed a full de-ice system, reflector, feed, and subreflector tracking (SRT) heater to combat subzero temperatures. Kratos added a rain blower, also referred to as an air knife, to mitigate the effects of fast-moving rain showers and placed balancing fans to distribute heat, guarantee minimal temperature fluctuation, and avoid hot spots that can affect the RF signal.

PDI selected Kratos' Compass Monitor and Control (M&C) solution for their ground system operations. PDI also selected Kratos' proprietary subreflector tracking technology for redundancy, automatic refocus, and reduced wear and tear. According to Mark Lambert, President of Kratos Communications UK, "Most antennas have two axes which require a set of motors for azimuth and a set for elevation. The addition of a sophisticated antenna control subreflector facilitates tracking the satellite by making much smaller movements, rather than moving the entire antenna using the large motors at the pedestal."

At the end of November 2021, the Kratos team arrived on site to begin the installation process. The antenna system was built before the end of December with configuration, testing, and training underway the following month. "Our early design work and planning enabled us to complete the task in just over two months, despite the supply chain and access challenges presented by the pandemic," Lambert notes.

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A DEDICATED SATELLITE

One of the most exciting aspects of the Aurora Network is its use of Arcturus, the first MicroGEO satellite produced by Astranis. "This will be the first dedicated satellite just for Alaskans," says John Gedmark, CEO, and co-founder of the NewSpace startup. "It is about the size of a mini fridge, as opposed to a traditional GEO which is the size of a double-decker London bus. We took advantage of several advancements that have happened over the last 20 years, like lithium-ion batteries and electronic improvements including electric propulsion. Arcturus uses ion thrusters which have much better performance than liquid rocket engines."

Astranis also tackled two major technology challenges: how to get rid of the thermal energy generated by the tightly packed satellite and the building of a flexible software-defined radio for space. "The satellite world had been stuck in the analog radio age up until very recently," explains Gedmark. "When you move to the digital world, you have a huge range of benefits—higher performance, a cleaner signal, and most importantly for us, you get this flexibility where the satellites can be agile across these big wide ranges of frequencies. You can put up satellites without having to worry about exactly what location they're going to, or what area they're going to be serving. You just dial that into the software when you need to."

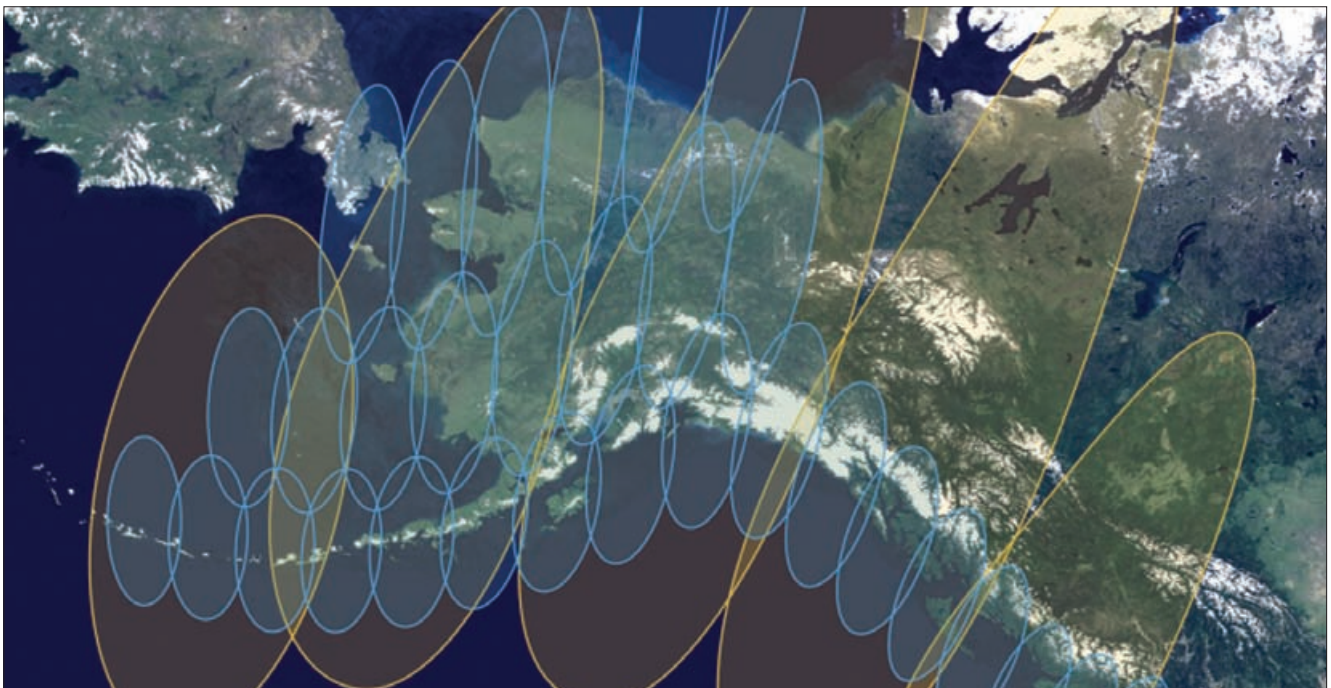
Because Arcturus uses brand new technology, Kratos provided support and flexibility for the integration and testing of the system prior to launch. In addition to supporting PDI's broadband payload, the Kratos antenna will also be used for telemetry, tracking, and control (TT&C) of the MicroGEO.

Once the Aurora network is up and running, the lives of many indigenous Alaskans will change dramatically. They will have access to health information, telemedicine,



Kratos antenna with subreflector tracking ●●●

education, and online courses. "Imagine if you're someone who has the talent and capability to become a software engineer and all you need is access to the knowledge to be able to learn those skills," says Gedmark. "I think we'll find that the next Einstein or Isaac Newton may be in one of those isolated places and that will be transformational not just for those communities but for the whole world; to allow us as humanity to have access to another thousand potential people of that caliber." ●



Estimated Aurora Network coverage at project completion ●●●