How the Aurora & OneWeb Networks Will Help Close Alaska's Digital Divide and Serve the Arctic

PACIFIC DATAPORT

April 2021 | Pacific Dataport, Inc. | Anchorage, Alaska

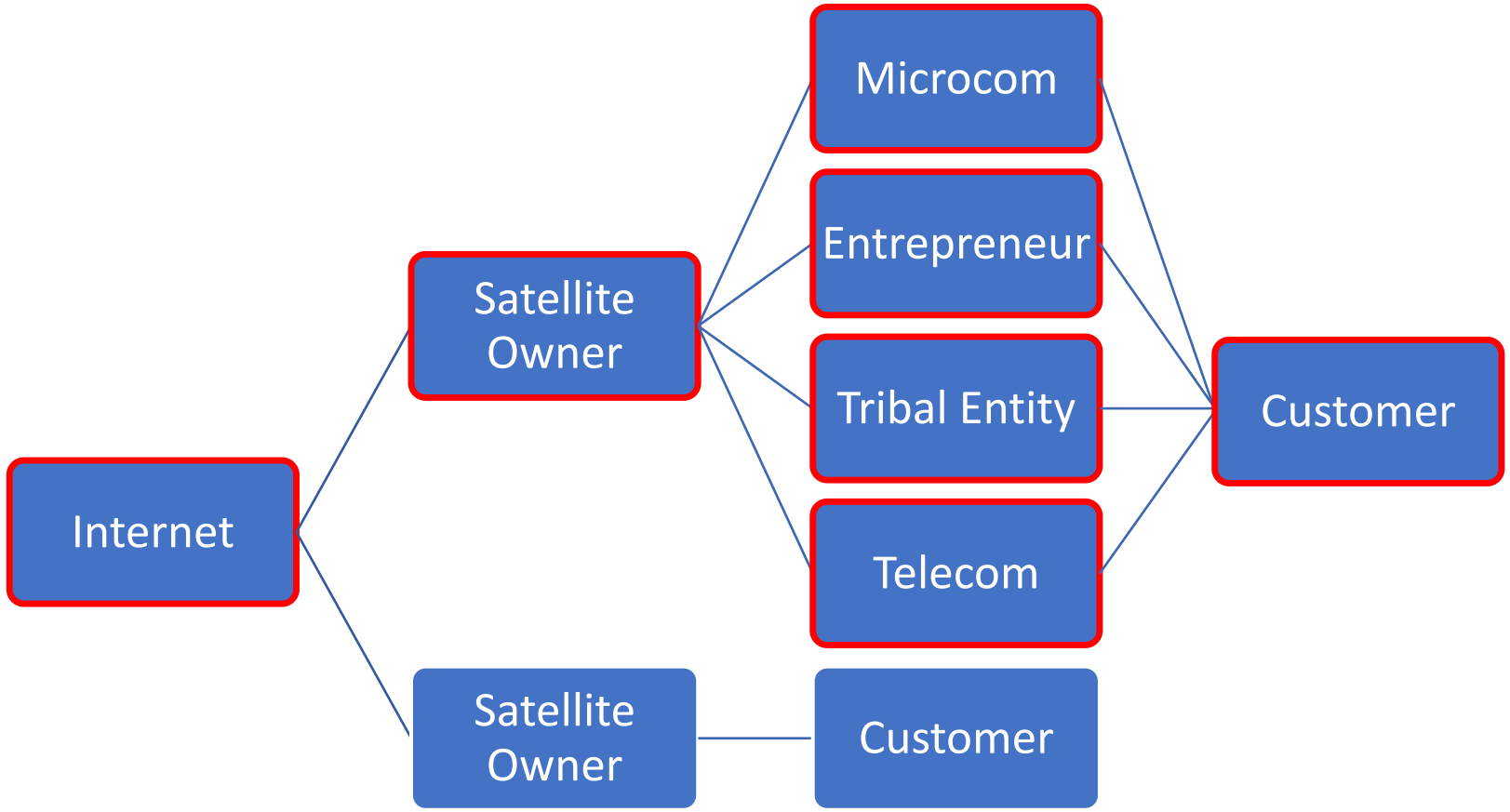
Last Mile and Middle Mile

DEFINITIONS:

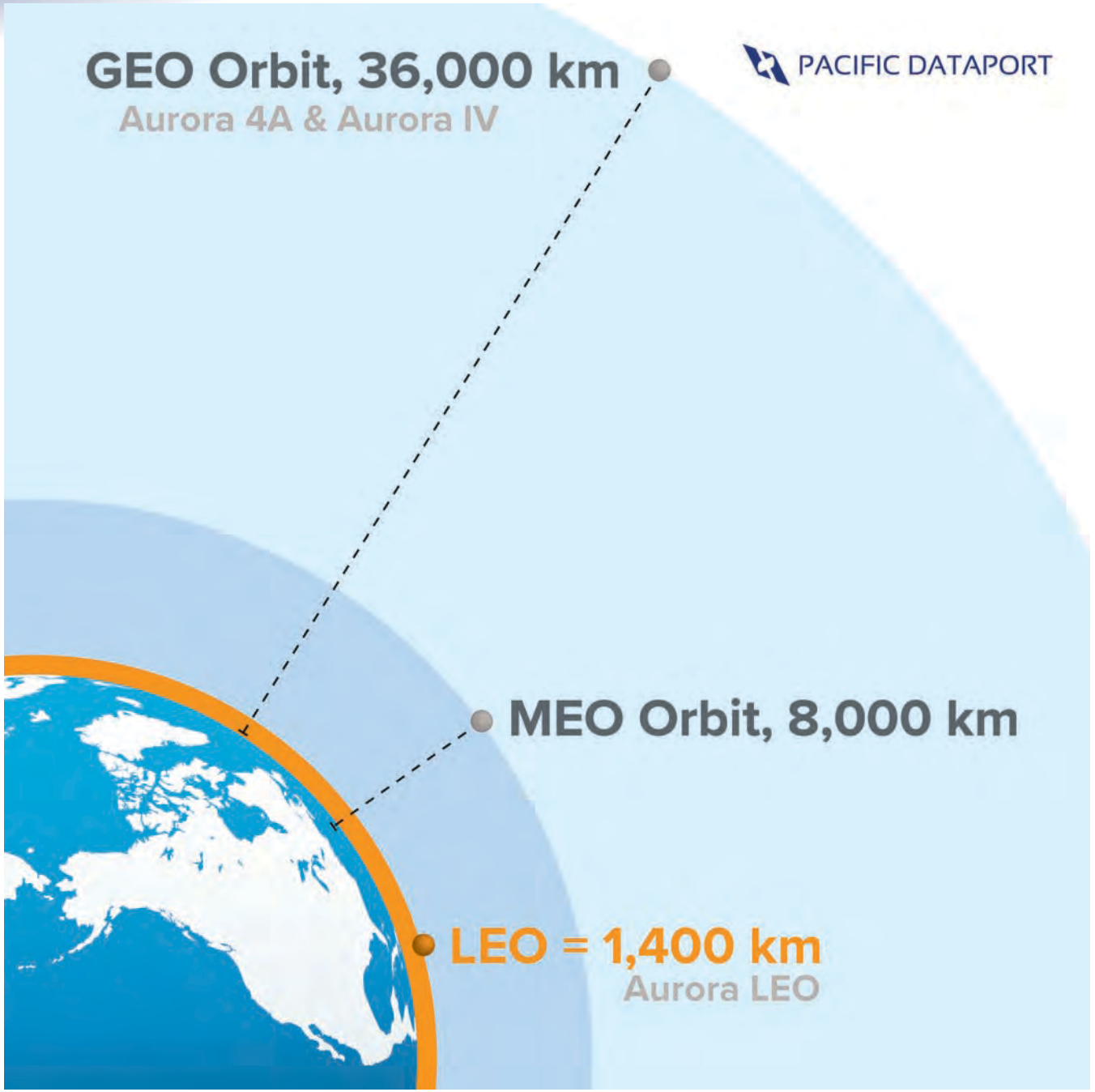
- Internet (less than 25X3)
- Broadband (25X3 and faster)
- 2.5 GHz Tribal Spectrum (Issued by the FCC)
- WISP (Wireless Internet Service Provider – Could be broadband)

PACIFIC DATAPORT

Internet Path to Customer



LEO MEO GEO Satellites



BROADBAND STATUS IN RURAL ALASKA - FUNDING

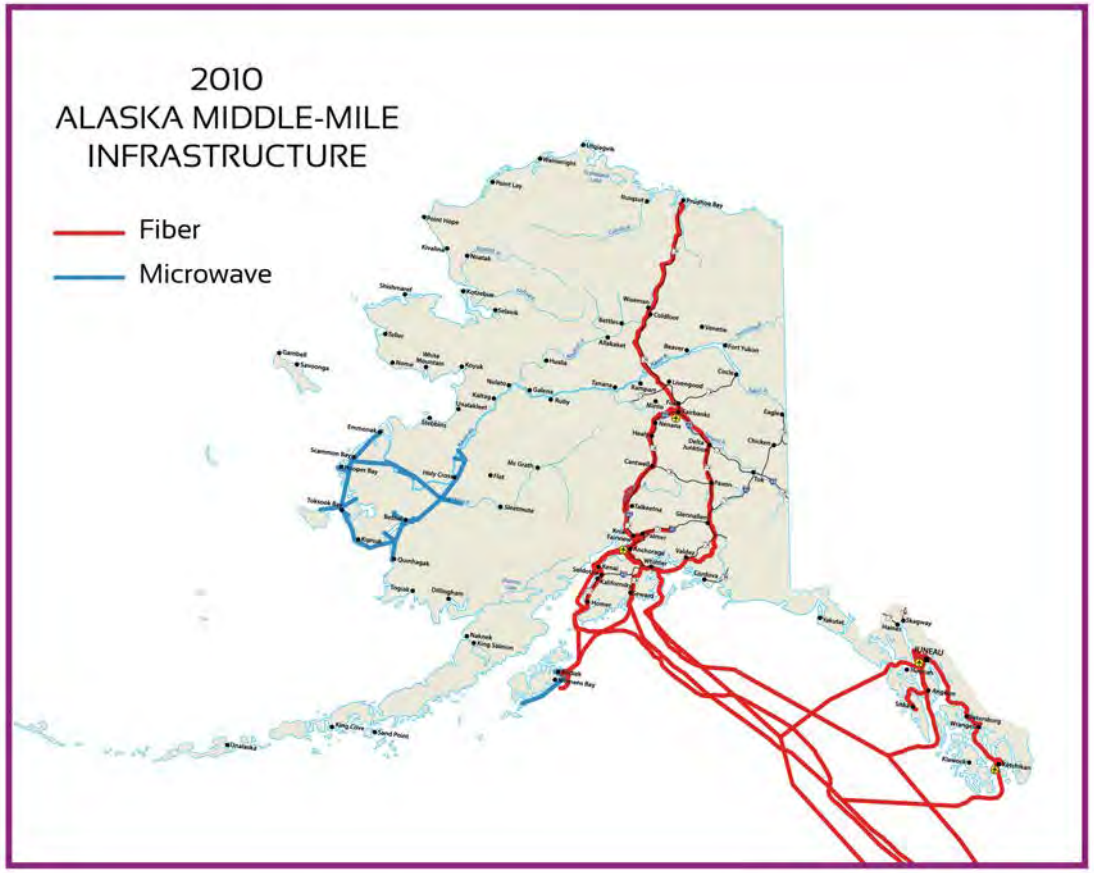
- Three areas where funding can go:
  - Middle mile infrastructure (CapEx)
  - Last mile infrastructure (CapEx)
  - Last mile (user) subsidies (OpEx)
- Alaska telecoms rely on the Federal government for ~$380M/year (total) in subsidies (telephone/broadband)
  - Alaska Plan USF Legacy Funding (FCC) – $150M/year
  - ACS USF Legacy Funding (FCC) – $20M/year
  - E-Rate Funds (FCC) – $90M
  - Rural Health Care Funds (FCC) – $120M
- ReConnect Infrastructure Grants (USDA) – Varies: $18.8M in 2019; and $57.8M in 2020
- ~90% of Federal funds coming to Alaska goes to last mile (user) subsidies

BROADBAND STATUS IN RURAL ALASKA - COST

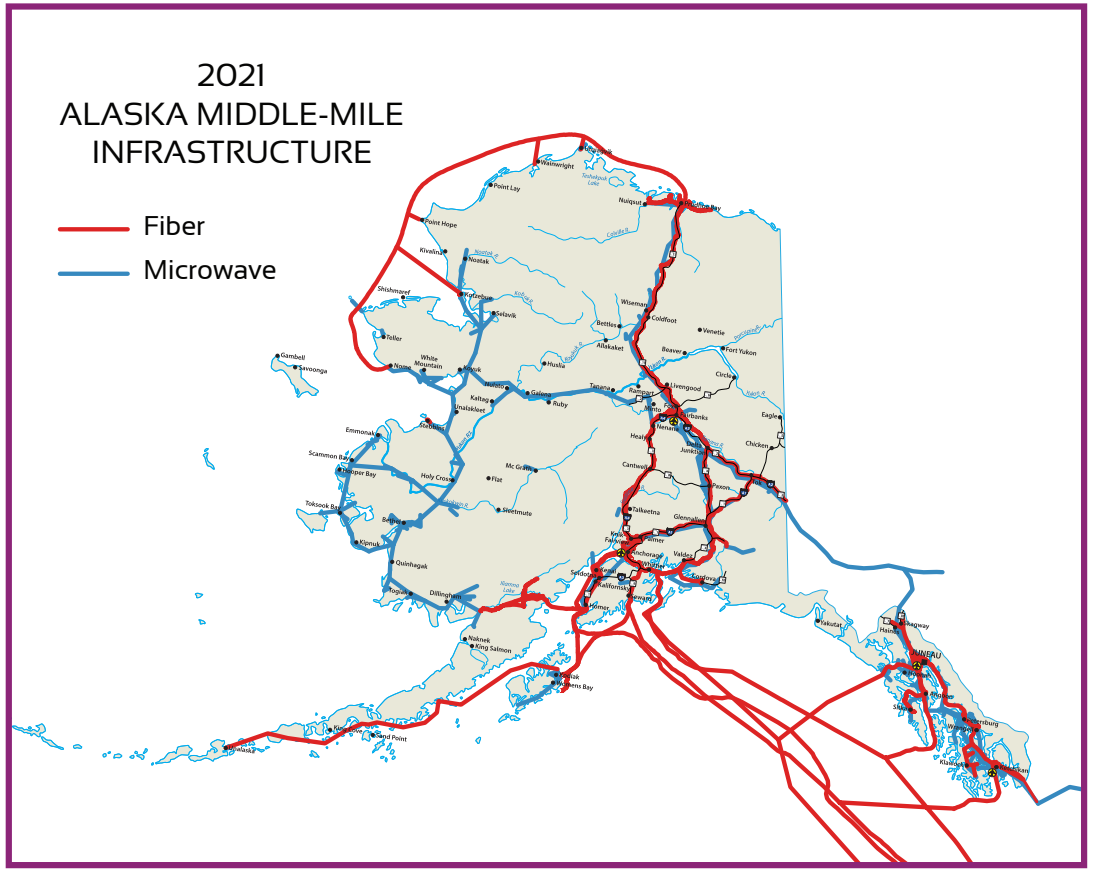
- Three options for middle mile infrastructure:
  - Microwave: $50k-70k per mile – Useful life ~25 years
  - Terrestrial Fiber: ~$100k per mile – Useful life ~25 years
  - Submarine Fiber: ~$125k per mile – Useful life ~25 years
- The USDA and FCC insist on deploying expensive fiber and microwave middle mile in Alaska
  - This results in expensive and slow internet as Alaska telecoms recoup costs
- Traditionally, the Alaska telecom business model relies on USDA/FCC last mile (user) subsidies
  - Now, owned by outside investment firms (GCI and Alaska Communications)
  - Shareholder return is #1, not expanding middle mile infrastructure to new areas
  - They will need to adapt quickly as new firms enter the market with $99/month broadband

PACIFIC DATAPORT

BROADBAND STATUS IN RURAL ALASKA - MAPS



Credit: Pacific Dataport, Inc.

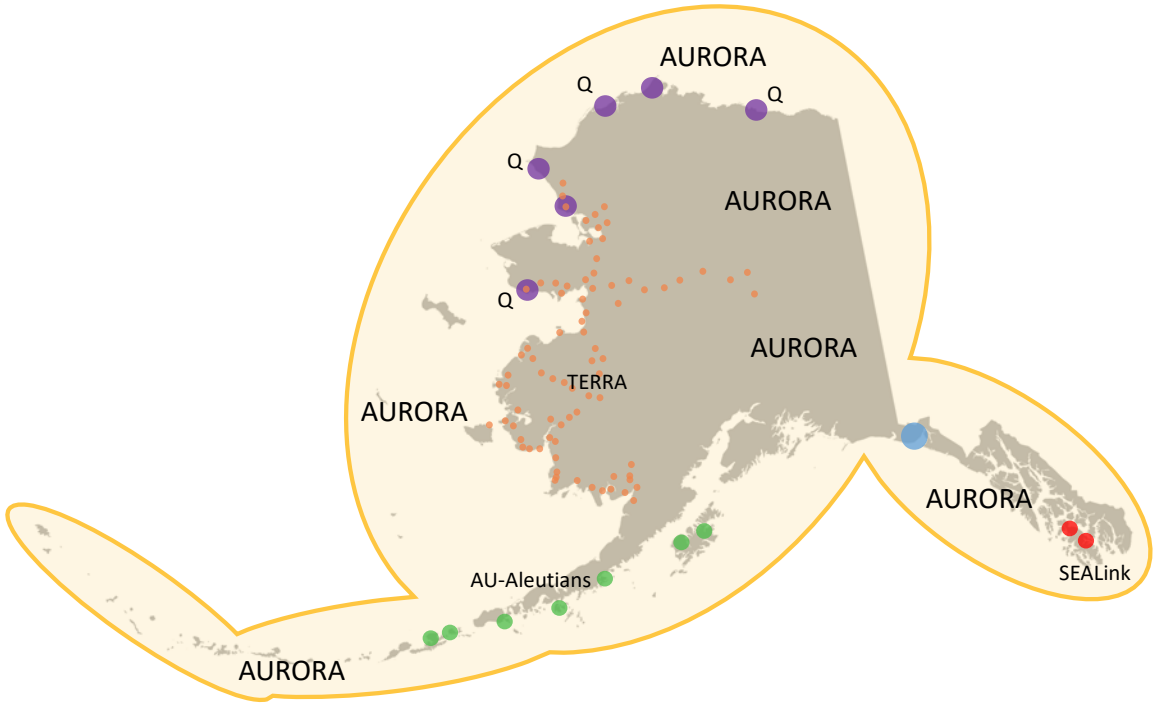


Credit: Pacific Dataport, Inc.

PACIFIC DATAPORT

MIDDLE MILE DEPLOYMENT TO RURAL ALASKA COMMUNITIES: INFRASTRUCTURE CAPEX COSTS

PROJECT CAPITAL COST PER HOUSEHOLD COMPARISON			
PROJECT	COST PER HOUSEHOLD	TOTAL HOUSEHOLDS	IN SERVICE
Aurora Network	$5,016	46,650	2021
Terra Network	$22,222	11,250	2010
AU-Aleutians Network	$31,182	1,860	2023
Quintillion Network	$69,079	3,619	2018
Yakutat Network	$92,592	270	2022
SEALink Network	$500,000	56	2025



- Terra Network by GCI 2010
- Q Network by Quintillion 2018
- Aurora Network by Pacific Dataport 2021
- Yakutat Network by Copper Valley Telecom 2022
- AU-Aleutians Network by Unicom/GCI 2023
- SEALink Network by AP&T Wireless 2025

PACIFIC DATAPORT

MIDDLE MILE & CONSUMER PRICING

MIDDLE MILE COVERAGE/PRICE/AVAILABILITY IN ALASKA (Q2 2020)				
Company	**AK Coverage**	**Cost per Mbps**	**Available Capacity (Mbps)***	**Type**
Aurora 4A	100%	<$500	~7,500	HTS
Aurora IV	100%	<$500	~70,000	VHTS
A	100%	$4,201	14	HTS
B	100%	$1,575	11.6	Ku
C	30%	$875	70	Ku
D	25%	$3,500	240	HTS
E	20%	$3,500	0	HTS
GCI TERRA**	6%	$8,208	0	Microwave
Quintillion	2%	~$1200	unlimited	Fiber

WITH THE AURORA NETWORK, OPERATORS PAY <$500 PER MBPS STATEWIDE

* Mbps to MHz conversion is 2:1; ** Retreived from: https://www.gci.com/-/media/files/gci/regulatory/20190517gciterrapostingeffective.pdf?mod=20190523233731 (1 yr Hub Port $864/1 yr Edge Port $7,344)

WITH THE AURORA NETWORK, CONSUMER PRICE IS ~$.66 PER GB STATEWIDE

CONSUMER PRICE PER GB & SPEED IN ALASKA		
Location	**Cost per GB**	**Down/Up (Mbps)**
Anchorage	$0.24	100X5
Aurora IV - Statewide	$0.66	100X10
Bethel	$3.15	10X2
Dutch Harbor	$5.95	4X1
Ft. Yukon	$6.55	1X0.5
Elim	$11.43	1X0.25
Savoonga	$11.50	1X0.25
McGrath	$16.54	1X0.25
Arctic Village	$16.54	1X0.25
Adak	$22.22	0.5X0.5

The Aurora Project

Phase I – Aurora 4A

- ~7.5 Gbps
- GEO HTS Satellite
- Statewide Coverage
- Operational Q4 2021

Phase 2 – Aurora IV

- ~100+ Gbps
- GEO VHTS Satellite
- Statewide Coverage
- Operational ~2023

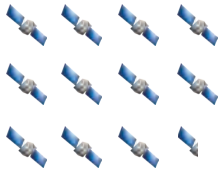
PACIFIC DATAPORT

New Technology

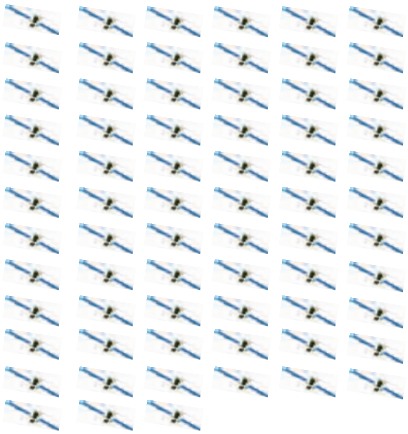
Aurora Project Satellite Capacity Comparison

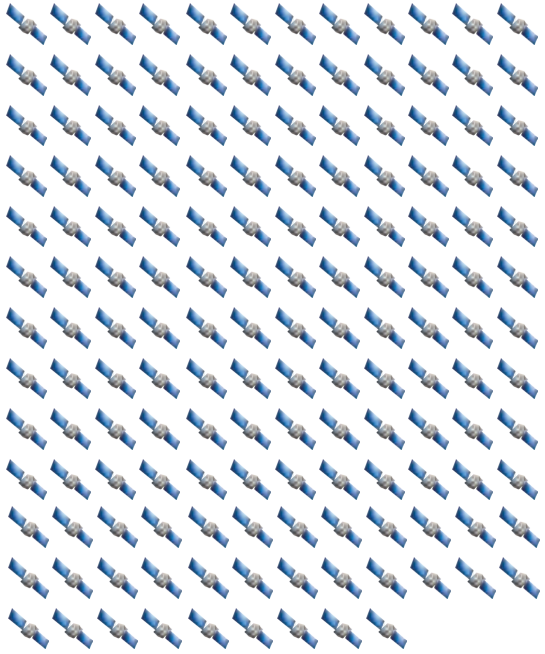
PACIFIC DATAPORT

(1) Aurora 4A = **(5.2) Ku Satellites** = **(11.5) C Band Satellites**



(1) Aurora IV = **(69) Ku Satellites** = **(153) C Band Satellites**

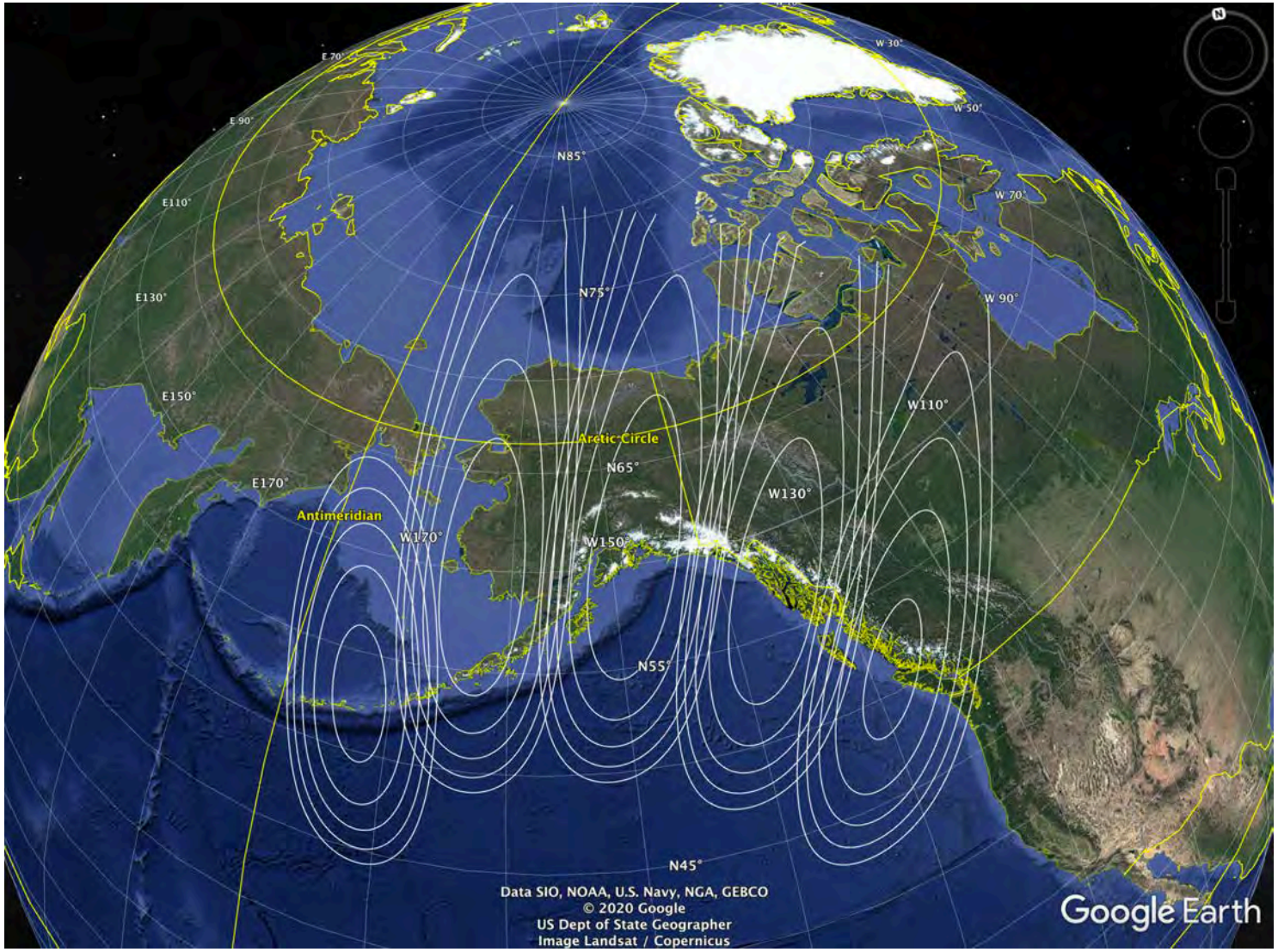




Comparison is based on the following technical capacity parameters.
Aurora 4A = 7.5 Gbps (7,500 Mbps) • Aurora IV = 100 Gbps (100,000 Mbps) • Ku Satellite = 1.448 Gbps (1,448 Mbps) • C Band Satellite = .650 Gbps (650 Mbps).

PACIFIC DATAPORT

AURORA SYSTEM ALASKA COVERAGE



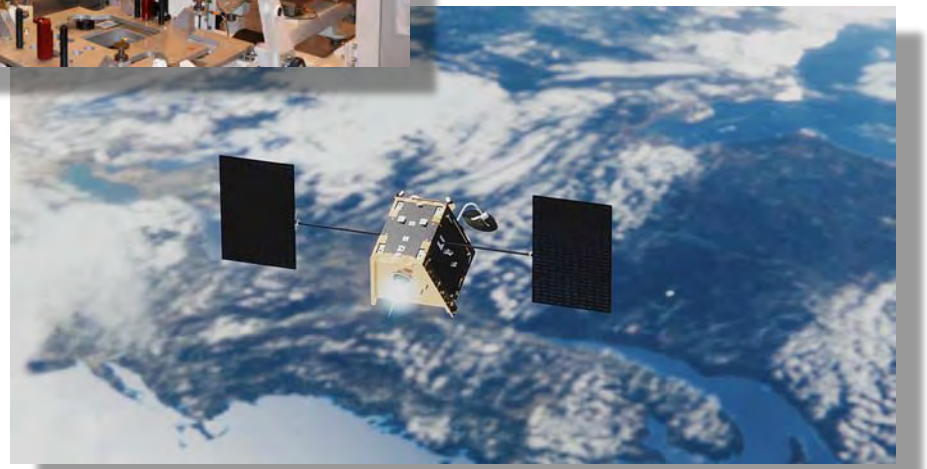
PACIFIC DATAPORT

AURORA SYSTEM ALASKA COVERAGE

PACIFIC DATAPORT

OneWeb

- Launched in 2015
- Internet access everywhere, for everyone!
- Geographically covering 100% of the WORLD
- Pacific Dataport is OneWeb's preferred distribution partner for Alaska and Hawaii
- 110 launched of 648 satellites
- Low latency solution
- Service 2021



PACIFIC DATAPORT

Microcom™
Communications Solutions

PACIFIC DATAPORT

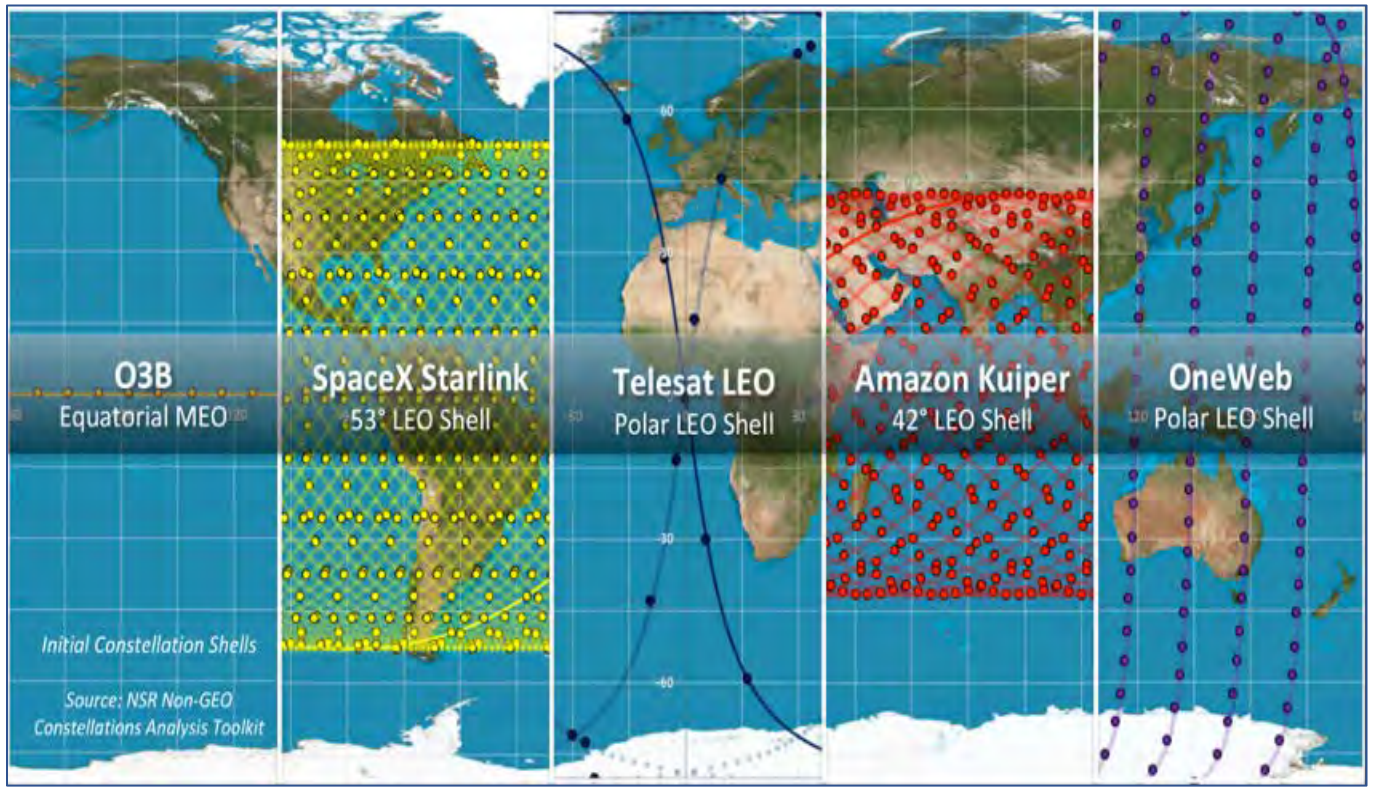
Microcom™
Communications Solutions

Talkeetna Alaska Teleport

- 90 Acre Site
- Able to host multiple gateway clients
- OneWeb first client with 29 gateways
- Statewide reach
- Redundant fiber and power
- Space for a data center, data processing and Internet exchange

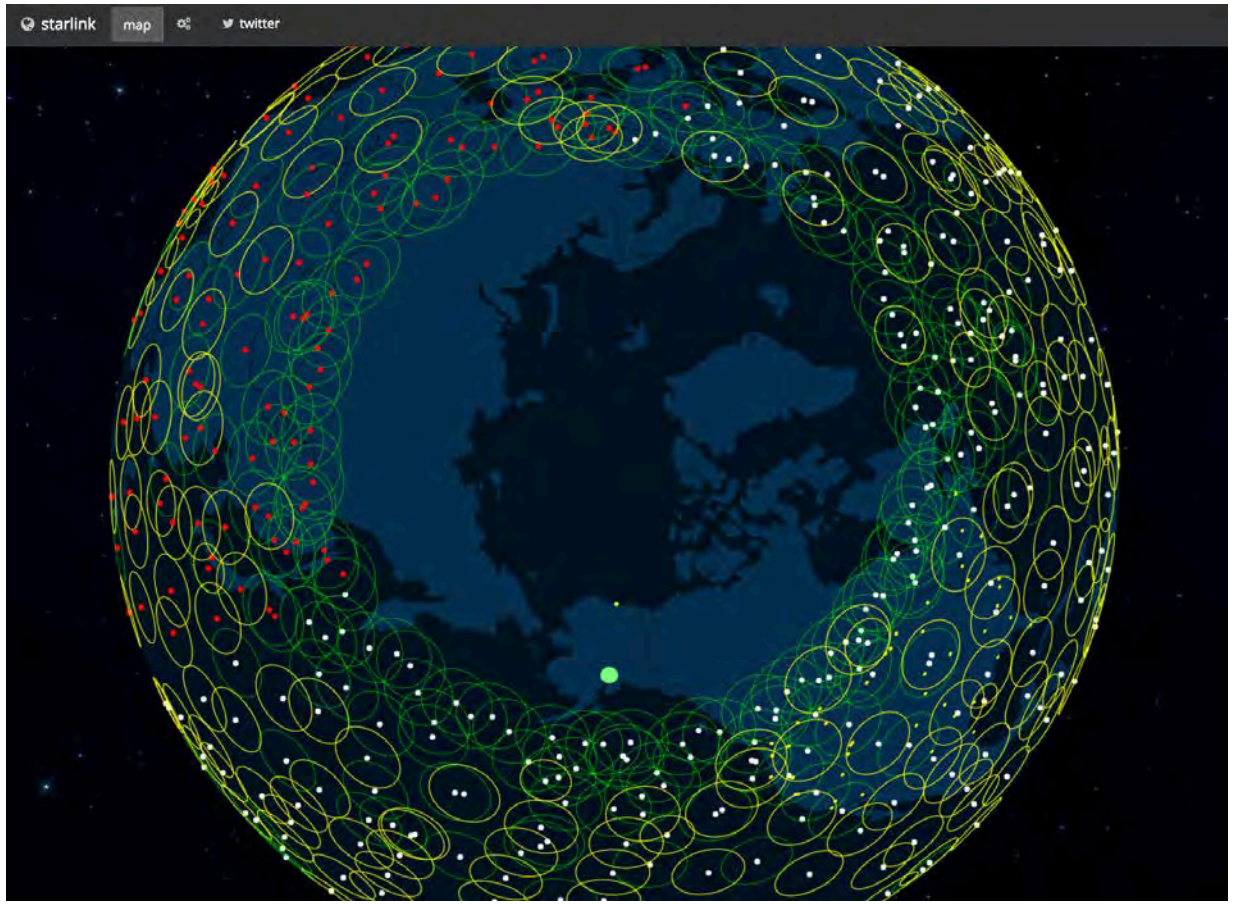
LEO/GEO COMMITMENTS TO ALASKA

	Committed to Serving Alaska	Date In Service
PACIFIC DATAPORT	YES – 100% Coverage	2021
ONEWEB	YES – 100% Coverage	2021
KUIPER (AMAZON)	No	-
Telesat LEO	No	-
STARLINK (SPACEX)	No	-
O3B	No	-



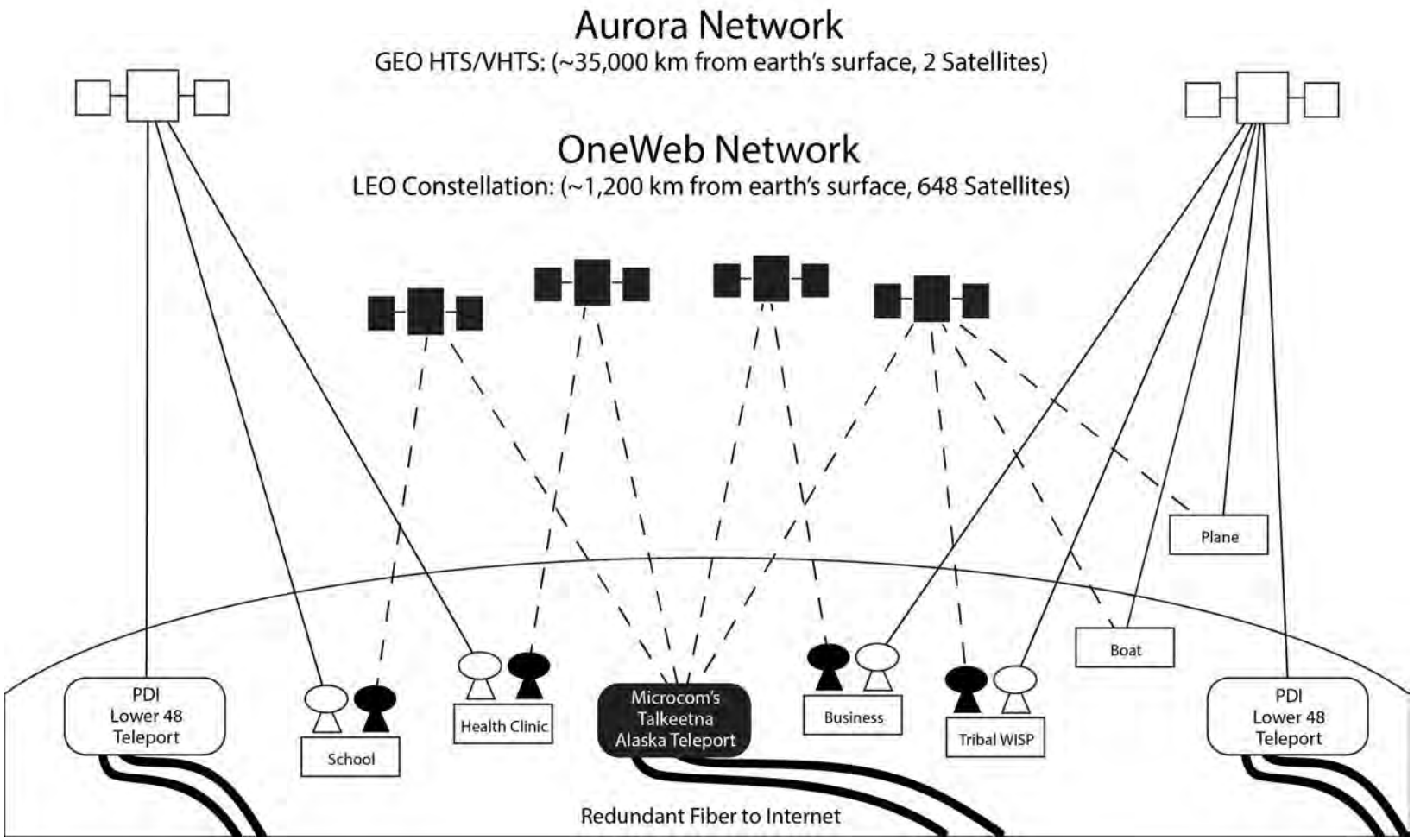
STARLINK SYSTEM ARCTIC COVERAGE

- Currently NO Ability to Cover Alaska
- No announced plan to offer service to all of Alaska (covering one area is insufficient)
- Launched ~1,000 of 4,400 satellites
- Launched 10 experimental satellites in polar orbit (needed to serve AK)
- Still developing cost-efficient laser interconnectivity
- Will need to build and launch 500-1,000 into polar orbit AFTER getting FCC permission
- Still navigating orbital debris and 12 GHz spectrum sharing challenges
- Only targeting DTC (Direct-to-Consumer)



PACIFIC DATAPORT

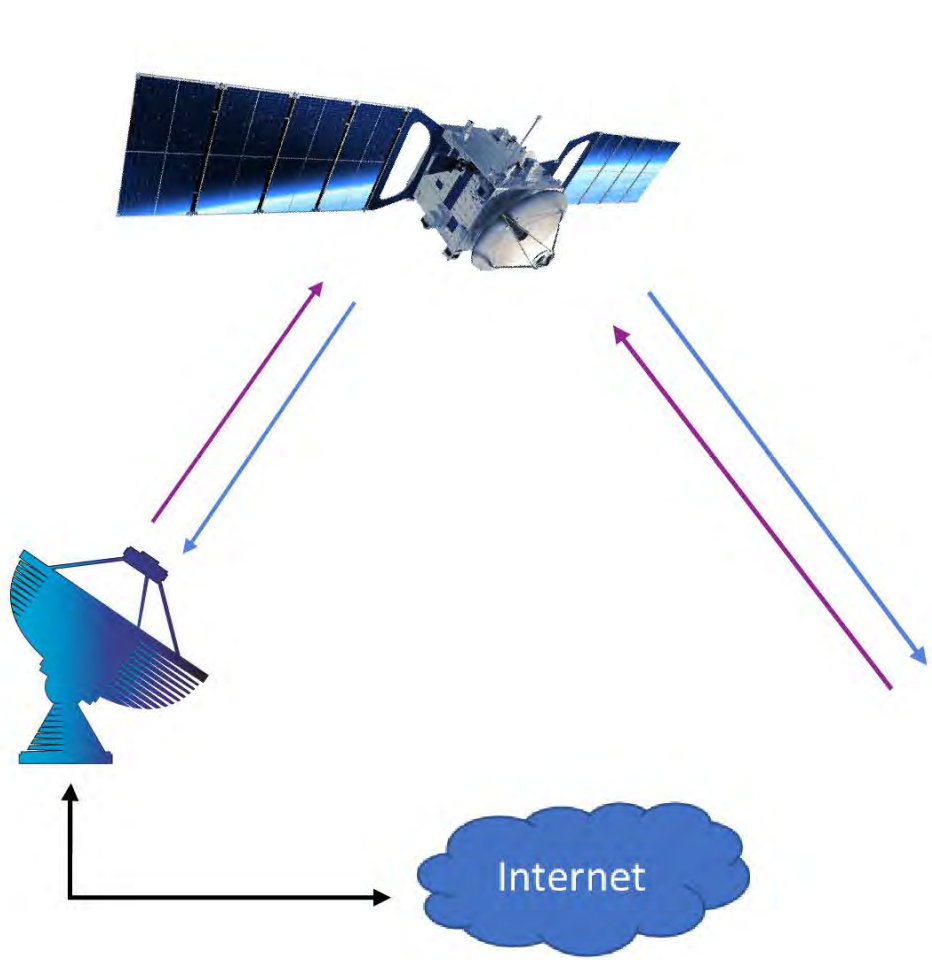
OneWeb LEO & Aurora GEO HTS HYBRID NETWORK

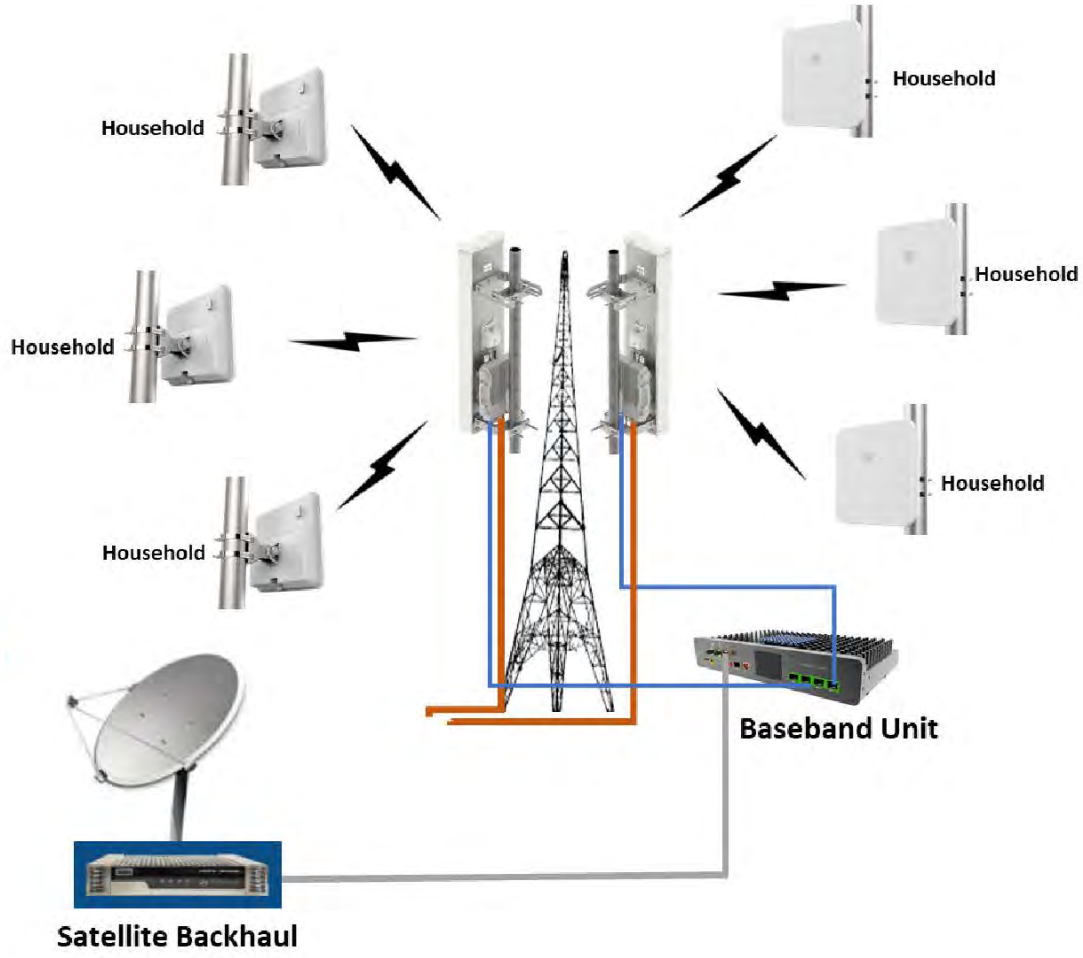


PACIFIC DATAPORT

Microcom™ Communications Solutions

2.5 GHz Tribal Spectrum WISP System





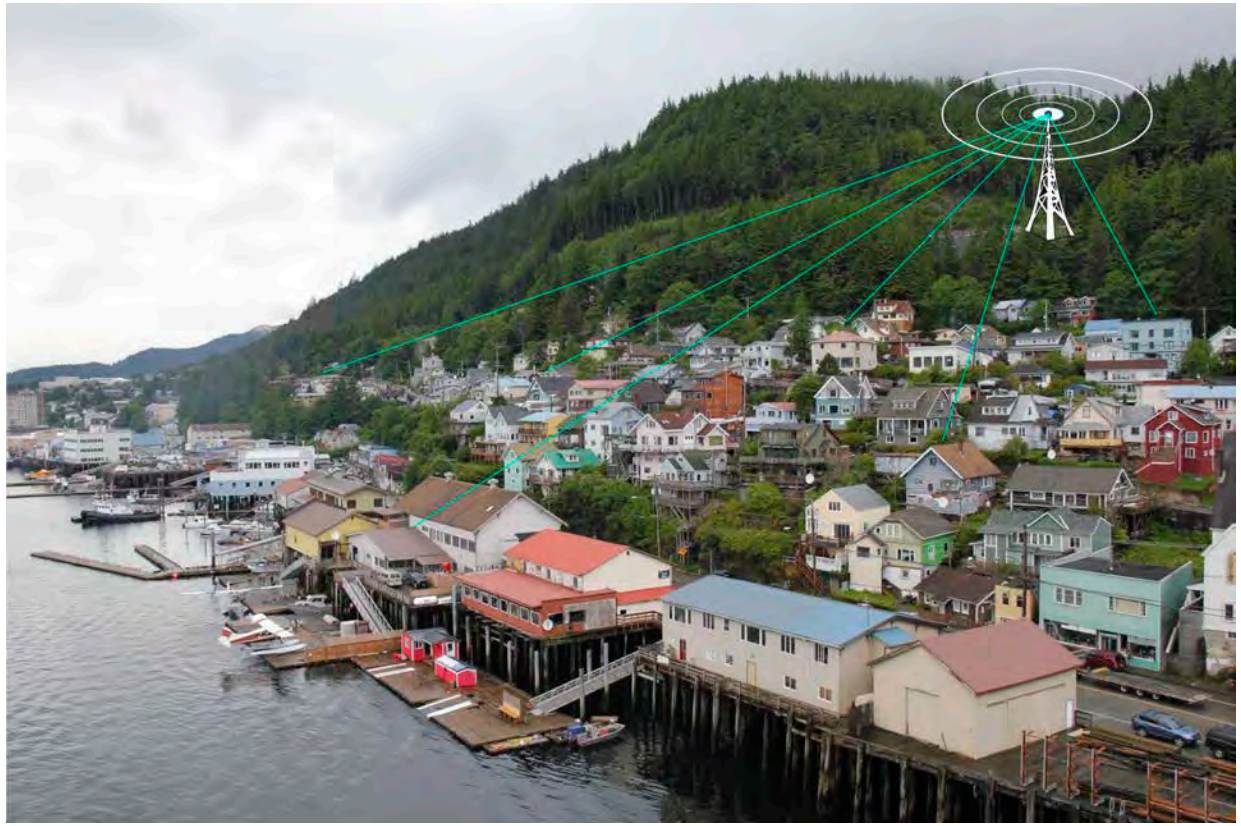
PACIFIC DATAPORT

Microcom™
Communications Solutions

2.5 GHz Tribal Spectrum WISP System

Access Point Sector Antenna

Subscriber Module



PACIFIC DATAPORT

Microcom™ Communications Solutions

2.5 GHz Tribal Spectrum WISP System "broadband-in-a-box"

PATH TO DEPLOYMENT	VENDOR DIRECT
#1 – FEASIBILITY STUDY (PLANNING)	MICROCOM
#2 – EQUIPMENT & INSTALLATION (CAPEX)	MICROCOM
#3 – MONTHLY CAPACITY (OPEX/BACKHAUL/MIDDLE MILE)	PACIFIC DATAPORT
#4 – MANAGED SERVICES (OPEX/BILLING & MAINTENANCE)	MICROCOM

WHAT PACIFIC DATAPORT IS DOING TO HELP

Launch TWO new networks to bring affordable solution for schools, health clinics, businesses & residents

- Aurora Project – Launch Q4 2021
  - 100 Gbps of New Middle Mile
  - Two NEW technology GEO HTS/VHTS satellites will cover 100% of Alaska
  - Will lower the retail price of 25X3 (or faster) broadband in rural Alaska to $99
- OneWeb Project – Operational Q3 2021
  - LEO constellation of 648 satellites will cover 100% of the world, starting with Alaska
  - Owned by U.K. Gov. & Bharti Global
  - PDI has been working for several years to bring OneWeb technology to Alaska
- Microcom‘s Talkeetna Alaska Teleport – Currently Operational
  - For LEO and GEO HTS middle mile providers
- Alaska Broadband Association
  - Started by PDI to notify rural Alaskans when broadband comes to their community
  - Purpose: Advocate for Alaskans and broadband policy improvement in Alaska
- Microcom and Pacific Dataport are working with Tribes to deploy their last mile 2.5 GHz Tribal spectrum WISP (wireless Internet service provider) Systems

PACIFIC DATAPORT

Thank you!

For additional information contact:

Shawn Fitzpatrick
VP of Engineering
907.223.7036
sfitzpatrick@pacificdataport.com

Shawn Williams
VP of Government Affairs & Strategy
907.440.1185
swilliams@pacificdataport.com