HISEASNET (HSN) UPDATE

RVTEC HiSeasNet (HSN) Update
November 3, 2025
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R/V *Sally Ride*, Anacortes , Washington. *Credit: Jeff Dillon.*

THANK YOU TO OUR COLLABORATORS AND SPONSORS

Scripps researchers recover a BONGO net off the California coast.

HiSeasNet is a satellite communications network established in 2002 and designed specifically to provide continuous Internet connectivity for oceanographic research.

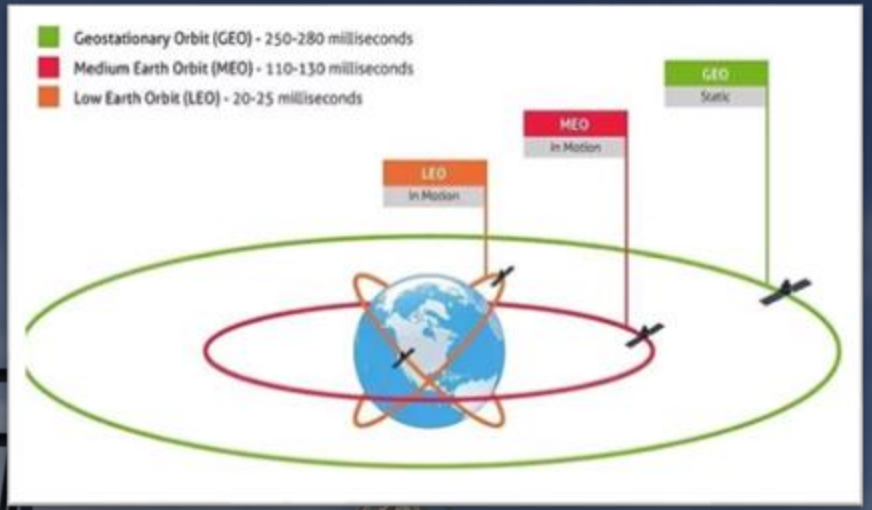
We support research vessels in the US Academic Research Fleet (ARF) as well the United States Antarctic Program (USAP)

Satellite Terms

LEO Low Earth Orbit

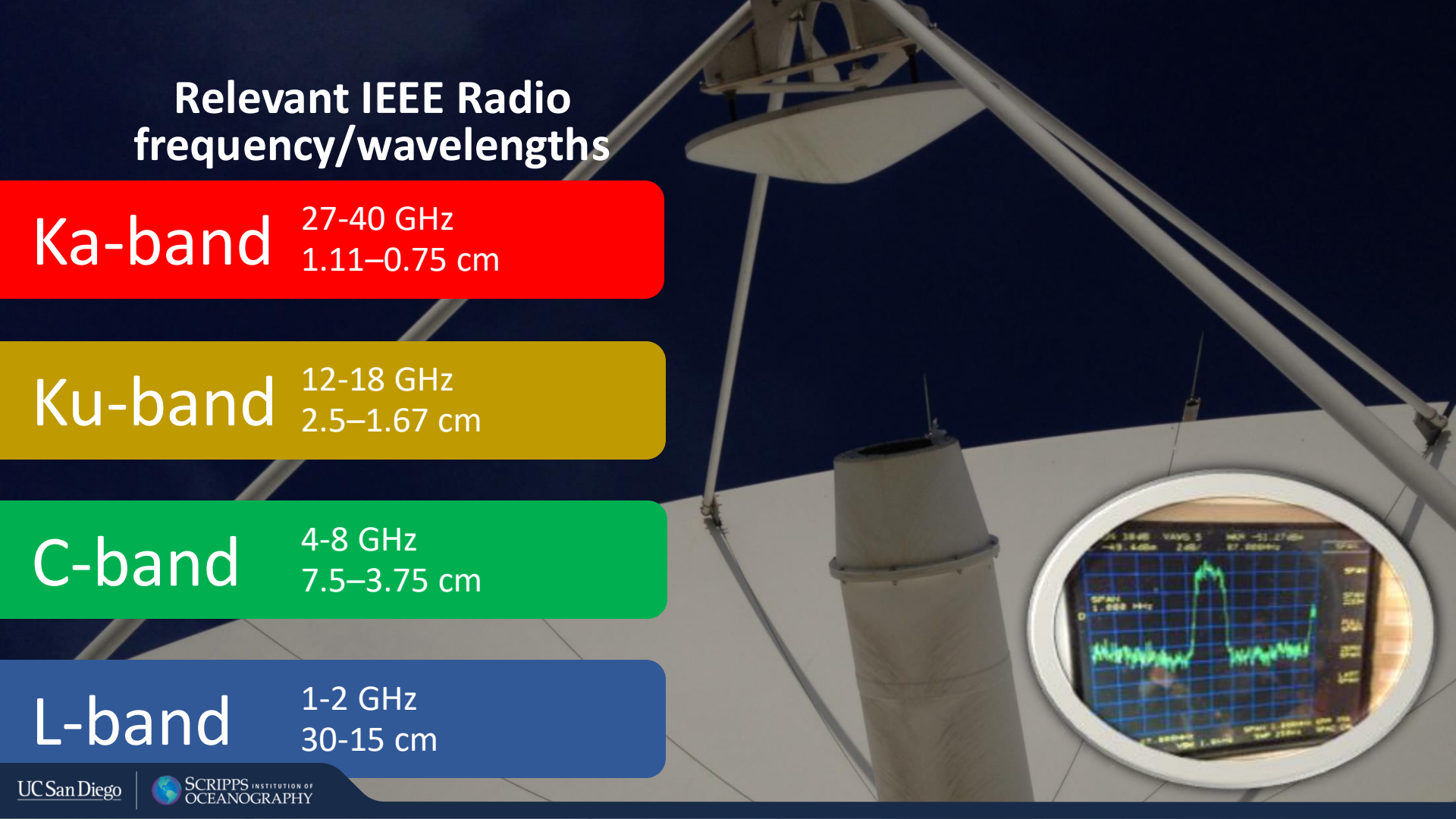
MEO Medium Earth Orbit

GEO Geostationary Orbit



Relevant IEEE Radio frequency/wavelengths

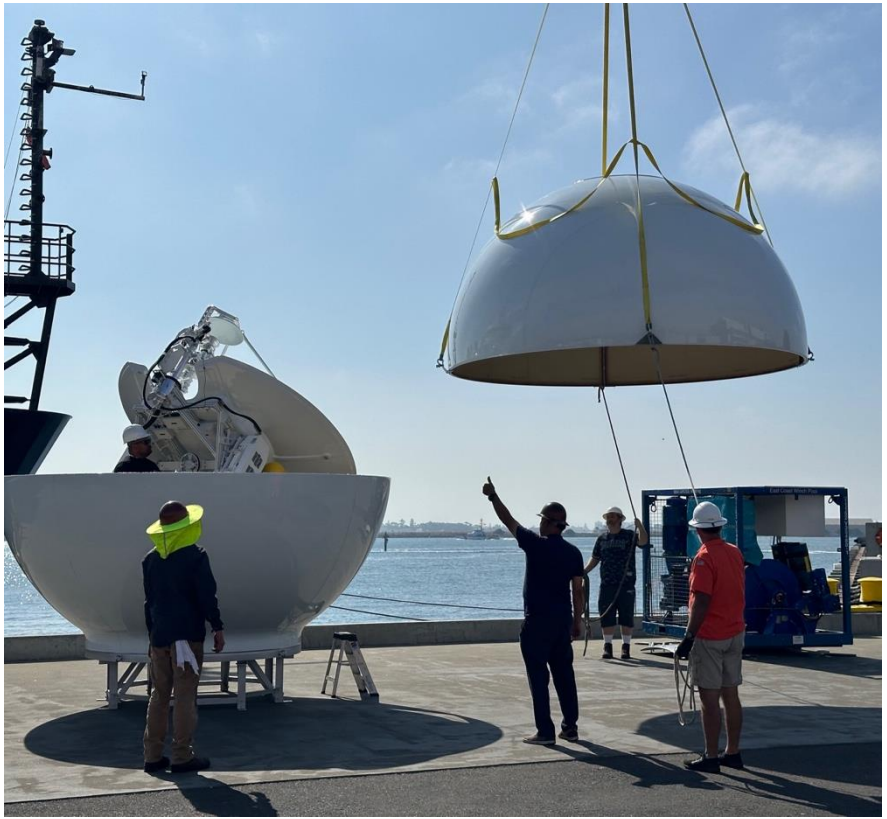
Ka-band	27-40 GHz 1.11–0.75 cm
Ku-band	12-18 GHz 2.5–1.67 cm
C-band	4-8 GHz 7.5–3.75 cm
L-band	1-2 GHz 30-15 cm



Current systems

Current GEO system: Sealink Plus

- Sealink is currently GEO only; limited capability at the poles
- Internet, phones
- Mostly capable of ~20Mbps throughput via Ku-band and C-band at global scale
- Intellian v240M-2 antennas, capable of tracking GEO/MEO/LEO
- Leases for antennas deployed in 2020 will start to end in early 2026. Due to rapidly evolving LEO options; we do not expect to continue to invest heavily in larger GEO systems.



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Retired GEO system: Fleet Xpress

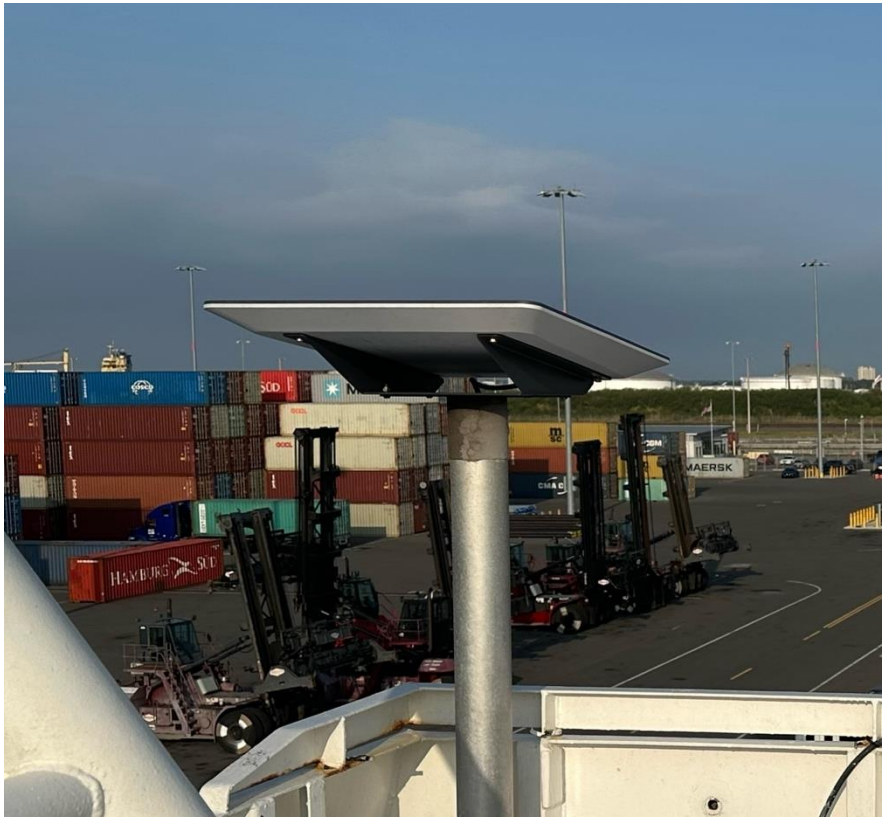
- GEO only; limited capability at the poles
- Internet, phones
- Dual antenna system, consisting of Global Xpress (Ka-band) and FleetBroadband (L-band, 432 kbps)
- Automatic cutover between Global Xpress and FleetBroadband
- Global Xpress can support speed of 2Mbps (always on) and on special occasions, up to 10Mbps
- Like many commercial operations, we phased out this service in favor of diverting funds to Starshield. Contracts canceled in 2025 though service contracts ran through July 2027.

Current LEO system : Iridium Certus

- LEO, with true global coverage
- Internet, phones
- L-band (1-2 GHz) more reliable for extreme weather, but slow (100-700 kbps)
- Used to satisfy Polar Code requirements as standalone, pooled service for phone/emergency Internet since 2022. Heated dome for -50°C use (Intellian C-700 Winterized terminals)
- Used as replacement for FleetBroadband service for phone/emergency Internet since 2023 (Intellian C-700 terminals)
- Also used in Sealink Plus as an out-of-band path for as needed "dial-in" remote support of offline Ku-band /C-band equipment since 2020 (Sailor 4300 terminals)

Current LEO system : Starshield

- LEO, Ku-band, Internet only
- Starlink Maritime became available in July 2022, Conducted pilot testing on ARF ship in fall of 2022
- Starshield announced by SpaceX December 2022, Deployed fleet-wide May 2023 through August 2024 on ARF & USAP vessels
- Speeds of "350 Mbit/s" (best effort) advertised; Typically seeing closer to 100-250Mbps shore to ship and 6-30Mbps ship to shore.
- 5TB per month or Unlimited plans available; pay per GB for usage over 5TB is option. Usage is occasionally pushing against 5TB/mo on globals.



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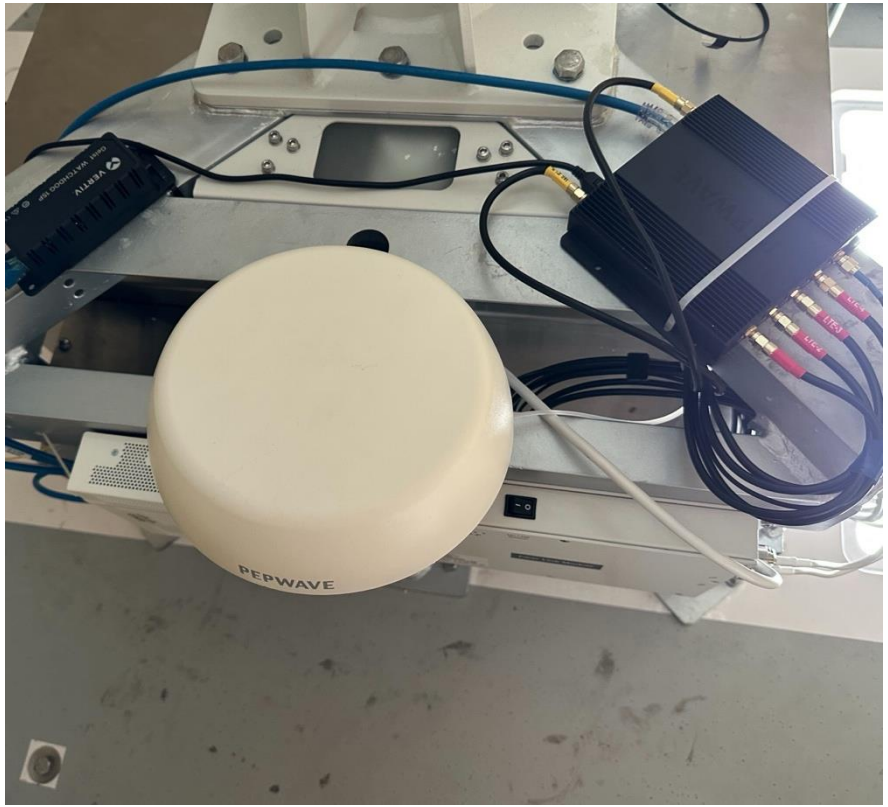
Current LEO system : Starshield

- LEO, Ku-band, Internet only
- Gen 2 Starshield Terminals have been in the field for over two years.
- SpaceX recently released “Gen 3” Starlink terminals. Gen 3 Starshield Terminals are expected to be released in late 2025
- Expect to begin replacing Starshield Terminals on Ocean and Global class vessels first in 2026. Coastal/Regional vessels likely to follow in 2027.
- Gen 3 Terminals utilize different connectors (all new cable runs)

Current near-shore systems: Cellular Modems

- Useful as an in-port Internet offload (to avoid in-port use of Starshield) when 5G is available
- Most successful test setup so far:
  - T-Mobile for truly unlimited domestic coverage
  - AT&T for $10/day foreign port coverage
  - Cellular modem that can toggle between SIMs
  - Ignore 4G and lower
- Tests of installing this system inside 2.4 Meter Sealink domes have gone well. Antennas already have built in filters for rejecting 5G cellular emissions which are close to C-Band frequencies.
- Pepwave modem can also serve as a WiFi-as-WAN gateway.



Future LEO systems of interest: OneWeb

- Polar orbit ~1200km with 634 OneWeb operational satellites now in orbit, constellation is complete and fully operational down to 35 degrees latitude with Gen1 satellites.
- Eventual expected CIR speeds up to 195Mbps (downlink) and 32 Mbps (uplink)
- In Sep 2023, Intellian and OneWeb introduced an active electronically scanned array (AESA) panel solution for OneWeb (replacing dual stabilized dome solution). These terminals were commercially released in February 2025; Kymeta Peregrine flat panel systems are also commercially available along with milspec varients.
- Original HSN plan was to retrofit dual Intellian GX100NX domes with Ku BUCs once certified for OneWeb use but the new phased array antenna solution is simpler.
- Deep sea connectivity will be a challenge till intersatellite links are introduced. Gen1 satellites have to be in range of a ground station to provide service. Initial Gen2 test satellites with intrasatellite links were launched in March 2023 but have yet to be deployed at scale.

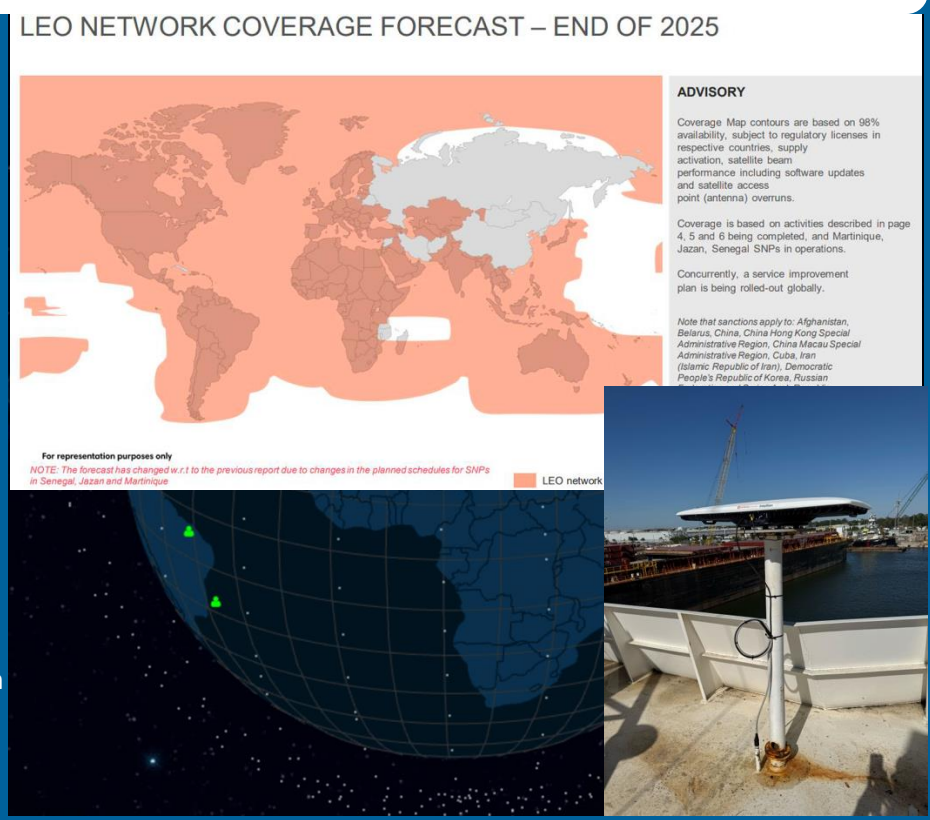
OneWeb 2025 ARF Pilot . . . The Future is Now

- Current OneWeb constellation limitations allow for full coverage in the North Atlantic Ocean in the Northern Hemisphere with plans to cover the entire Atlantic by end of 2025. Focus for initial 12-month Pilot is two ARF vessels operating in that Ocean Basin . . .

- R**evelle (OW11FM)** Deployed in Tampa, FL April 2025. Demo Plan includes speeds upto 100Mbps down 20 Mbps up with no CIR; 5TB per month usage limit (similar to Starshield). Initial terminal release only has vertical “home router” style below deck terminal as option; development roadmap includes rack mount version that can have multiple OW11FM panels attached for higher speed access.

- **Endeavor (OW10HM) D**eployed in early May 2025. Demo Plan on this vessel slower at upto 30 Mbps down and 6 Mbps up but with unlimited usage. “H” Terminal is half-duplex meaning it can only transmit or receive at any given moment. Replacing aging Seatel 6012 1.5 Meter Ku-Band Dome as primary vSat for Sealink service on vessel. System has been moved to Armstrong in October 2025.

- Terminal on Revelle will be moved to another ARF as Revelle moves to the Antarctic in early 2026.



Future(?) systems

Future LEO systems of interest: Amazon Kuiper

- Planned to consist of 3,236 satellites
- FCC license requires a 50% deployed, operational constellation by July 2026
- First 2 prototype satellites launched on October 6, 2023
- Has secured launch services to deploy constellation in 2025 – 2026 with United Launch Alliance (ULA) and Blue Origin.
- Phase 1 of deployment will be 578 satellites
- A total of five phases of constellation development are planned
- Operate at 590 km, 610 km, and 630 km orbital altitude
- Ka-band phased-array antenna ~30 cm (12 in) in width
- Expected to support "up to" 400 megabits per second . . .
- HiSeasNet currently working on NDA with Amazon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Thank you!
Questions?
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