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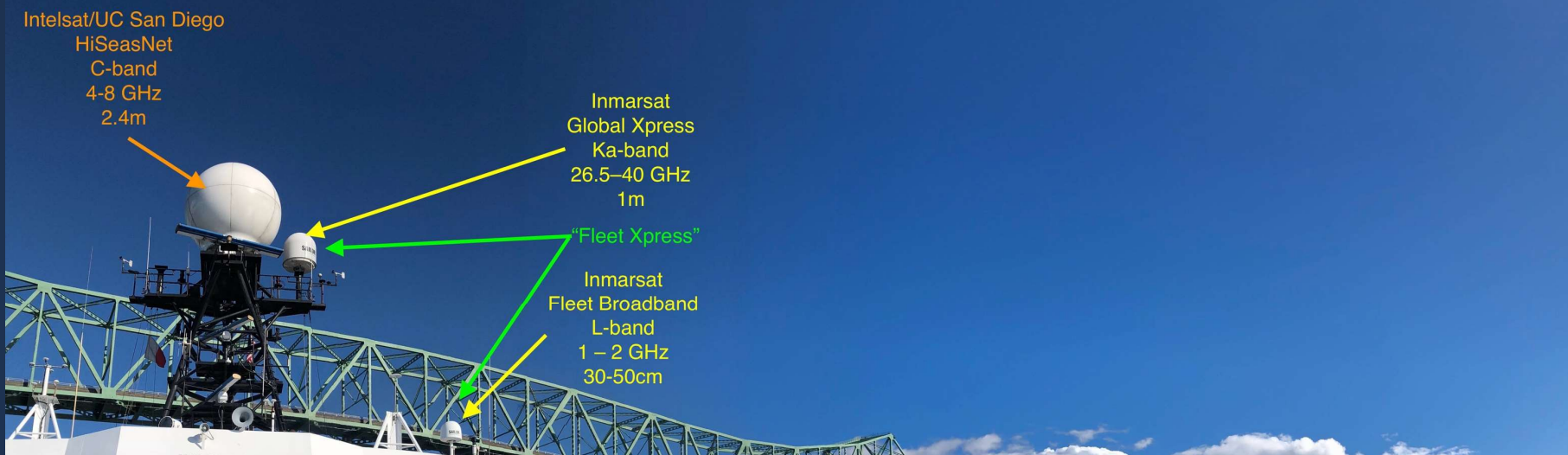
HISEASNET AND THE SECONDARY SATELLITE NETWORK 2019-NOV-21 (UNOLS FALL COUNCIL 2019)

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HISEASNET AND THE SECONDARY SATELLITE NETWORK

Information about the transition of both satellite systems
HiSeasNet (HSN) and the Secondary Satellite Network (SSN)

WHAT'S IN A NAME?



Names as we've known them...

- **HiSeasNet ("HSN")**: IEEE C-band and Ku-band satellite communication service to your ship. Mostly custom, sometimes commercial. In service since 2002.
- **Secondary Satellite Network ("SSN")**: commercial-only Inmarsat IEEE L-band (Fleet Broadband aka FBB) and Ka-band (Global Xpress aka Gx). FBB and Gx, together, are Fleet Xpress ("Fx"). In service since 2010.

FREQUENCIES

IEEE Frequency Designation	Frequency	Wavelength
L-band	1-2 GHz	30-15 cm
C-band	4-8 GHz	7.5-3.75 cm
Ku-band	12-18 GHz	2.5-1.67 cm
Ka-band	26.5-40 GHz	1.11–0.75 cm

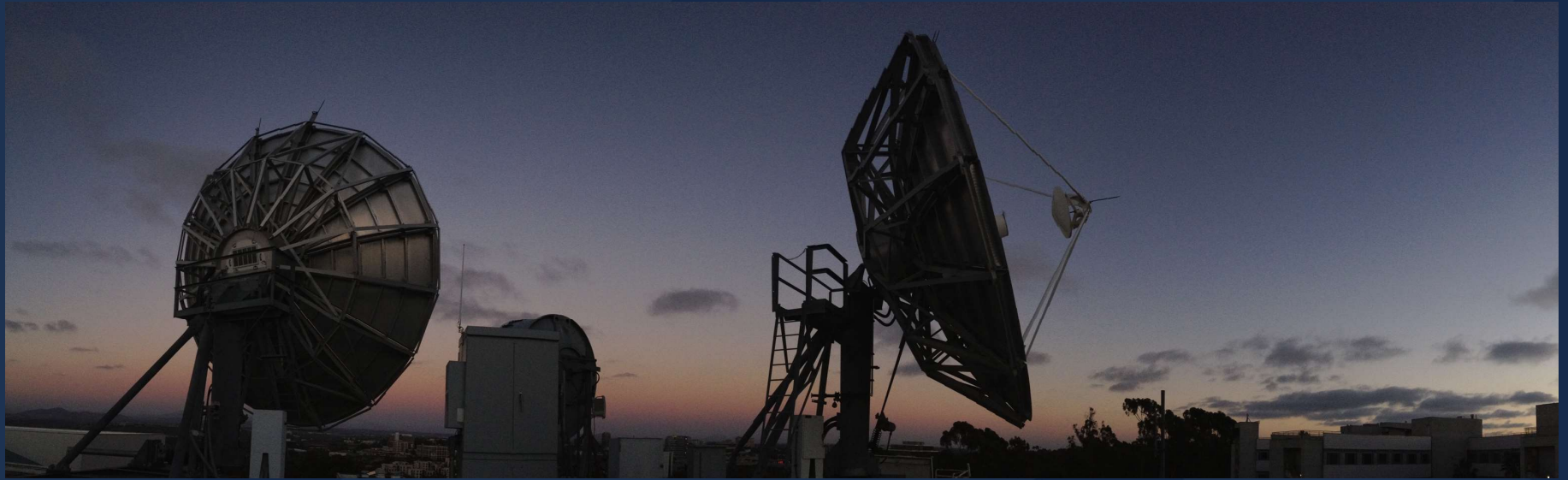
- **L-band:** Inmarsat Fleet Broadband
- **C-band and Ku-band:** HiSeasNet
- **Ka-band:** Global Xpress

History

- **2002:** HiSeasNet begins putting radomes on UNOLS vessels
- **2010:** Fleet Broadband (FBB) added to the fleet
- **2011-2012:** overages in FBB cause more bytes/mo to be bought
- **2014:** HSN bandwidth increased 400%
- **2015:** Fleet Xpress systems started to be used, but system not yet useful worldwide
- **2018:** Fleet Xpress working worldwide



TRANSITION OF SECONDARY SATELLITE NETWORK





Transition Timeline

- **February 2019:** Scripps/UC San Diego selected for NSF solicitation 18-562
- **Summer 2019:** phase 1 of hiring and onboarding additional personnel
- **Fall 2019:** University of California competitive bid process with vendors
- **November 2019:** contract selected for UNOLS et al
- **January 2020:** new five-year contract expected to begin



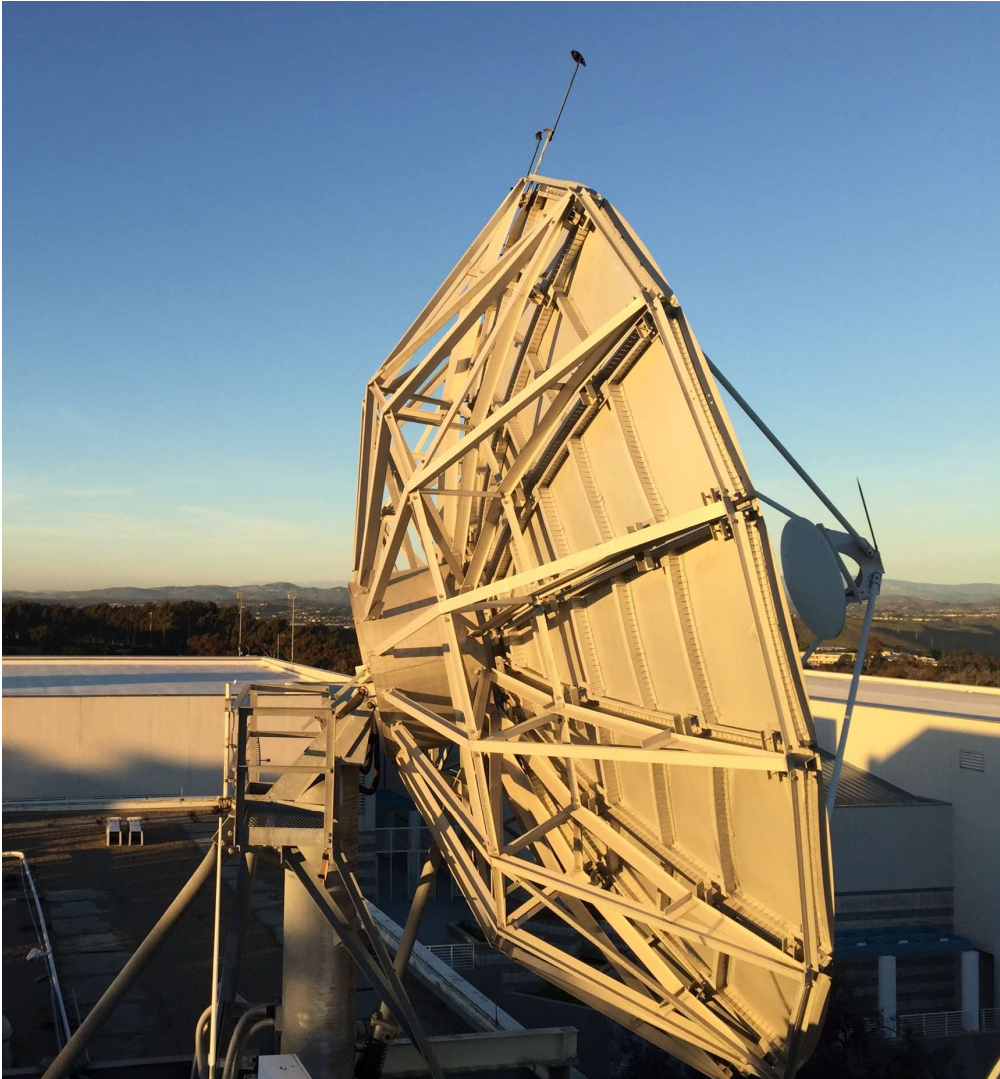
Five-year goals (general)

- Financial solvency and efficiencies
- Eliminate standalone Fleet Broadband systems from UNOLS
- Design bandwidth that accounts for ships' berthing and ships' Full Operational Year (FOY), as practicable
- Work with our program on moving toward 21st century levels Internet while at sea
- Establish support hours



Five-year goals (technical)

- Use network engineering on SSN to provide similar “remote campus” behavior to HSN
- As a network bastion point, align with program cybersecurity goals
- Geographic diversity for network bastion points
- Establish installation requirements such as planned lifecycle and 99% uptime
- Have secure, out-of-band access to satcoms gear for our support team



Goals for 2020

- No budgetary changes for 2020, but be ready for 2021
- Smooth contract transition on Fx
- Migrate Ku ships to commercial service
- Upgrade several FBB systems to Fx and reduce FBB GB/mo based on expected Fx rollout
- Establish new network paths and metrics collection

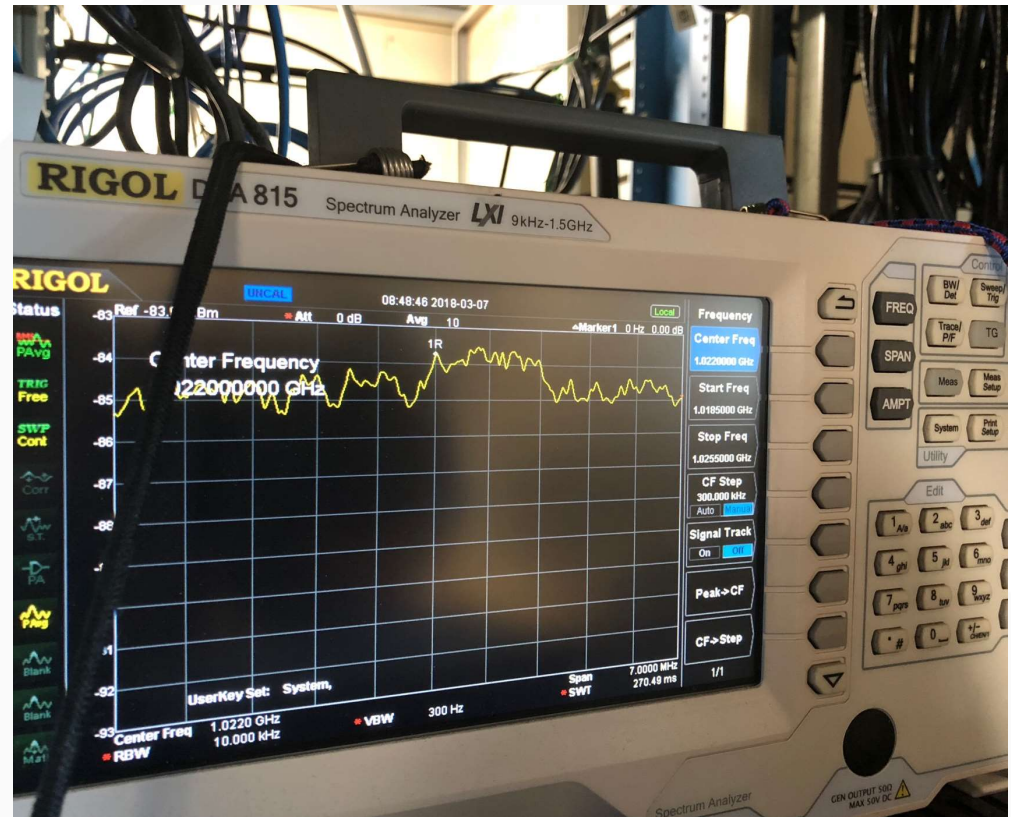
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SUPPORT HOURS

Discussion of issues with supporting UNOLS

SUPPORT HOURS IN 2020 AND BEYOND

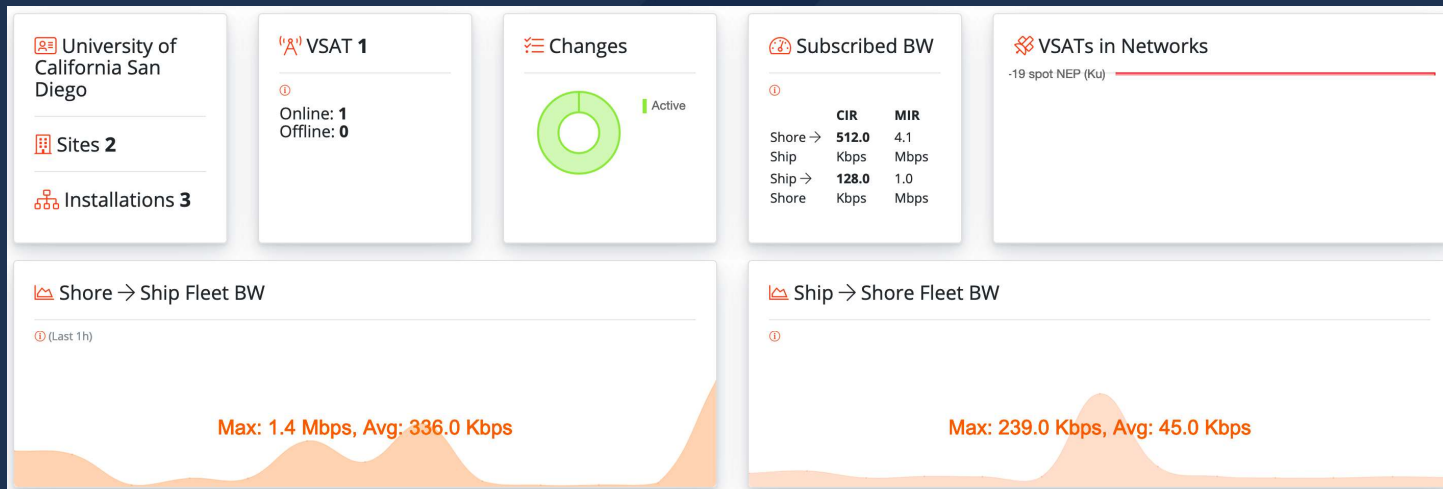
- HiSeasNet personnel are growing; it will become important to communicate through shared messaging mechanisms
- We also need to define expected working hours as a result of scaling. We are not funded for 24/7 support
- Expected working hours will start at 8 hours per day x 7 days per week: Tu-M 0800-1630 Pacific
- There are options for for 24/7/365 support, but they will inevitably involve a process where we have tiered support, escalating to HiSeasNet personnel when emergencies happen



DAY RATE CHANGES FOR 2021

Discussion of issues of solvency and our Internet purchasing

KU SHIPS AND COMMERCIAL SERVICES



We aim to convert Ku ships to a commercial link

- Proved out on Oceanus, using Marlink
- Running our own ground station at the throughput we buy costs more
- While commercial services cost less, there may be more logistical challenges in getting expansions

2021 PROPOSED RATE CHANGES

Ship Class	Berth Range	HSN Day Rate Estimate	Fx Day Rate Estimate
Global/Ocean (HSN+Fx, higher FOY)	40-60	\$600	\$600
Intermediate (Fx only?, moderate FOY)	25-35	\$550	\$450
Regional (Fx only? Mixed FOY)	10-24	\$550	\$350

- Rates are preliminary estimates only; we are finalizing a financial plan with NSF
- Rates factor in berthing count as a factor

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THANK YOU!
QUESTIONS?