HiSeasNet Overview

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HiSeasNet Overview

- Internet connectivity to the University National Oceanographic Laboratory System (UNOLS) fleet
- Started in February 2002 with one ship and a leased earth station, up to 15 ships and an earth station in San Diego
- All satellites used are GEO satellites
- Yearly budget around $650K

The UNOLS Fleet

- 7 Global class ships with HiSeasNet
  - Operate 65degN to 65degS
- 8 Intermediate and Ocean class ships with HiSeasNet
  - Generally operated within 400 mi of shore
- Several more smaller ships not equipped with HiSeasNet equipment
- Almost all equipped with Fleet BroadBand as a backup system for times and places where HiSeasNet doesnt operate

Current Capacity

- Pacific region: C-band on NSS-9
  - 512kbps shore-to-ship link (shared)
  - 5x 96kbps ship-to-shore links
- Atlantic region: C-band on IS-23
  - 512kbps shore-to-ship link (shared)
  - 4x 96kbps ship-to-shore links
- North America coastal: Ku-band on SatMex5 beam 1
  - 192kbps shore-to-ship link (shared)
  - 3x 64kbps ship-to-shore links
- North America coastal: Ku-band on SatMex5 beam 1
  - 256kbps shore-to-ship link (shared)
  - 4x 64kbps ship-to-shore links

Temporary Capacity

- C-band on IS-906 in the Indian Ocean
- Ku-band coverage on G-18 for Gulf of Alaska work
- Ku-band coverage on GE-23 for west Pacific and Alaska work on a small ship
- C-band expanded bandwidth (1.6Mbit) on NSS-9
- C-band expanded bandwidth (512/512kbps) on NSS-9

Shipboard equipment

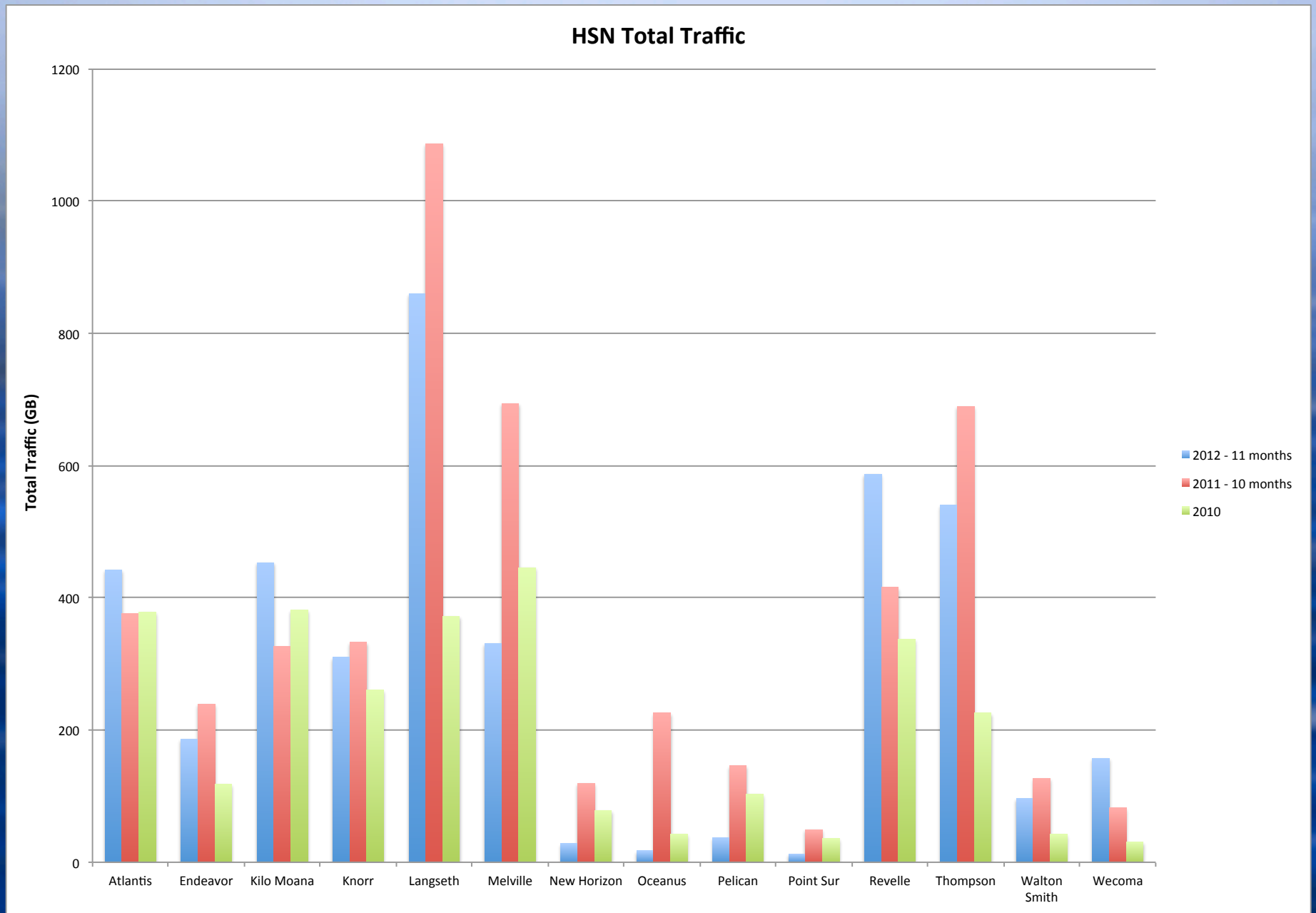
- Global class ships
  - SeaTel 9797 2.4m C-band antennas
  - Comtech CDM-550 modems
  - 40W SSPAs
  - Cisco routers
- Intermediate class vessels
  - SeaTel 4006 (1m), 6006(1.5m), 4996 (1.2m) Ku-band antennas
  - Comtech CDM-570L modems

Earth Station

- 7.2m Vertex C-band antenna to IS-23 (AOR), 150W amp
- 7.2m Vertex C-band antenna to NSS-9 (POR), 40W amp
- 3.8m Prodelin Ku-band antenna to SatMex5
- All IP traffic, uses VPN technologies to map a ship's network to be part of their campus network.

Current Usage

- Bulk of the traffic is shore-to-ship port 80 traffic…of some sort
  - Also email, updates, bulk data transfers, images, social networking/blogging
  - Frequent saturation of our shore-to-ship links (512kbps for up to 350 people)
- Primary ship-to-shore traffic is streams of data and/or still images


HSN Total Traffic
Total Traffic (GB)
1200
1000
800
600
400
200
0
Atlantis
Endeavor
Kilo Moana
Knorr
Langseth
Melville
New Horizon
Oceanus
Pelican
Point Sur
Revelle
Thompson
Walton Smith
Wecoma
2012 - 11 months
2011 - 10 months
2010

Potential Usage

- Shore-to-Ship links are constantly saturated
- Streaming video ship-to-shore
  - Ships with ROVs and large outreach projects
  - ~2Mbit C-band or 6-20Mbit for Ku-band
  - Jitter is an issue

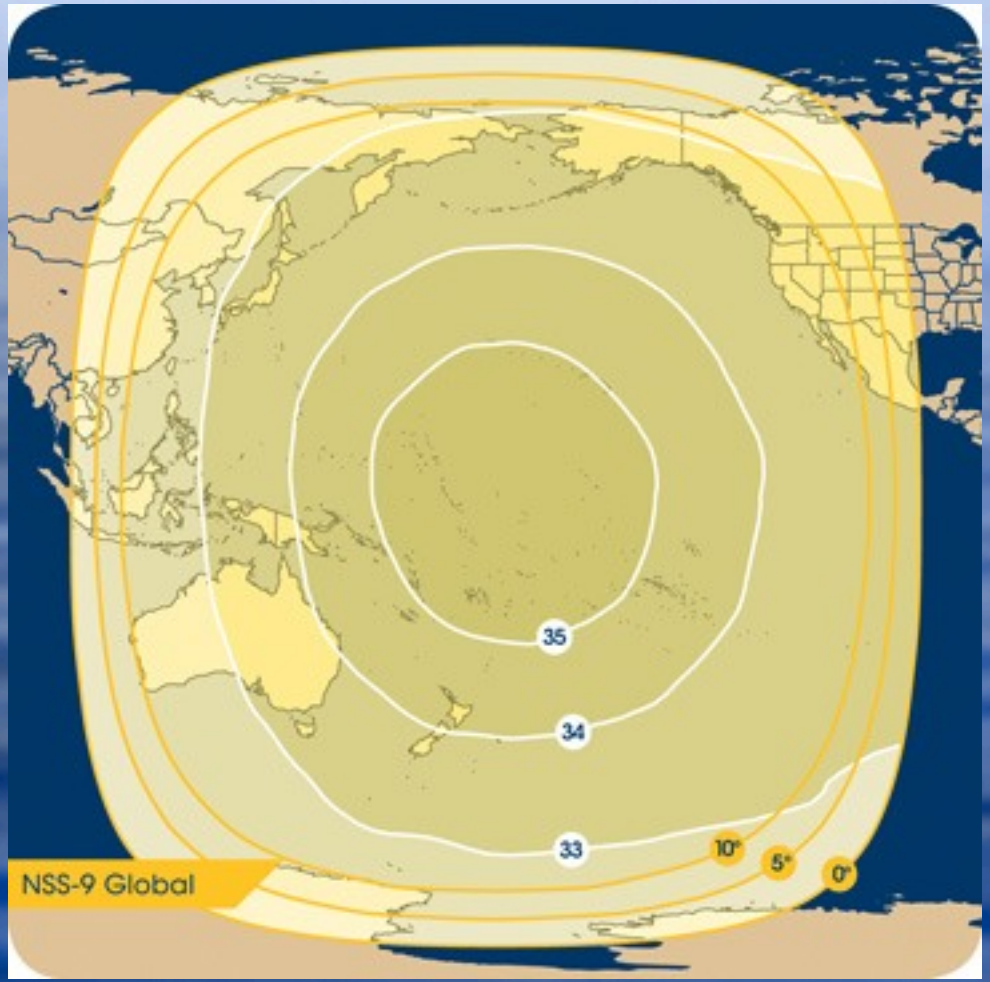
Funding

- We usually lease bandwidth on yearly contracts, direct from satellite provider
- Ships charged a communications fee in their daily operations rate
  - $250/day/ship for C-band
  - $150/day/ship for Ku-band
- Bandwidth expansions are billed at our cost (bandwidth and setup fees)

Challenges

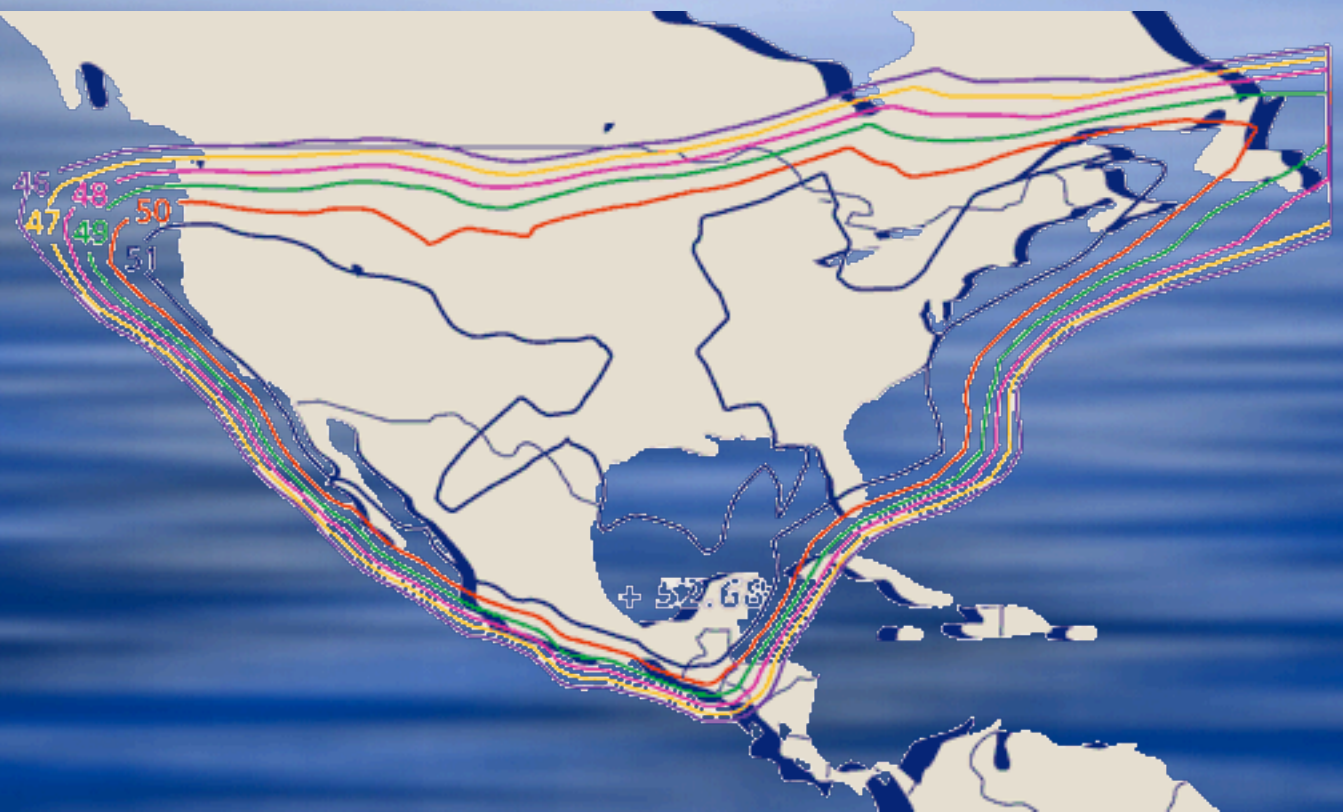
- Coverage area is global for large ships
- Ships are mobile and go all over
  - Frequent bandwidth expansion needs are realted to work in the WA and OR coastal area
  - Schedules can be fluid
- Ship equipment size may be an issue...only so much deck space on some vessels

NSS-9 (POR)



IS-23 (AOR)

SatMex5 Beam 1 (Ku-band)



SatMex5 Beam 2 (Ku-band)