HiSeasNet 2014 Review

November 17th, 2014
RVTEC at OSU

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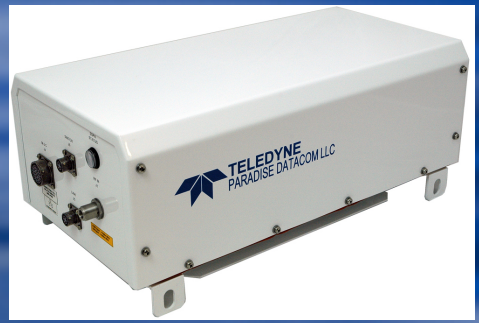
2014 Highlights

- Thompson Expansion for 6 weeks of Nereus video streaming
- Revelle Expansion for 4 weeks of data streaming
- Revelle IOR (NSS-12 Hemi) 256kbps/256kbps link for 2 months
- Atlantic Explorer expansion to 256kbps/256kbps
- Sikuliaq came online in June
- SatMex8 beam 2 expanded to 512kbps/128kbps (x4)
- New modems — Installed at earth station, being sent out to ships
- Earth station improvements:
  - New amplifiers
  - Simplified L-band equipment
  - Improved spectrum visibility
  - Improved remote control of equipment
- Accelerators removed - new modems will accelerate

Equipment Changes in 2014

- Melville's 9797B antenna was removed, stored in San Diego for now
- Endeavor's 1.2m 4996 antenna was replaced with a 1.5m 6012 antenna
- Earth station 8W 70MHz amp replaced with a 100W L-band amp
- Earth station 40W and 150W 70MHz amps replaced by 250W L-band amps
- Earth station Comtech CDM-550 and CDM-570 70MHz modems replaced by Teledyne Q-Flex modems
- Accelerators are out of use on shore, ships can remove them from their networks and surplus them or return them to SIO for surplusing



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 SatMex8 beam 1
  - 192kbps shore-to-ship link (shared)
  - 3x 64kbps ship-to-shore links
- Gulf of Mexico and S. America: Ku-band on SatMex8 beam 2
  - 512kbps shore-to-ship link (shared)
  - 4x 128kbps ship-to-shore links
- Atlantic Explorer: 256kbps both directions

2015 Plans

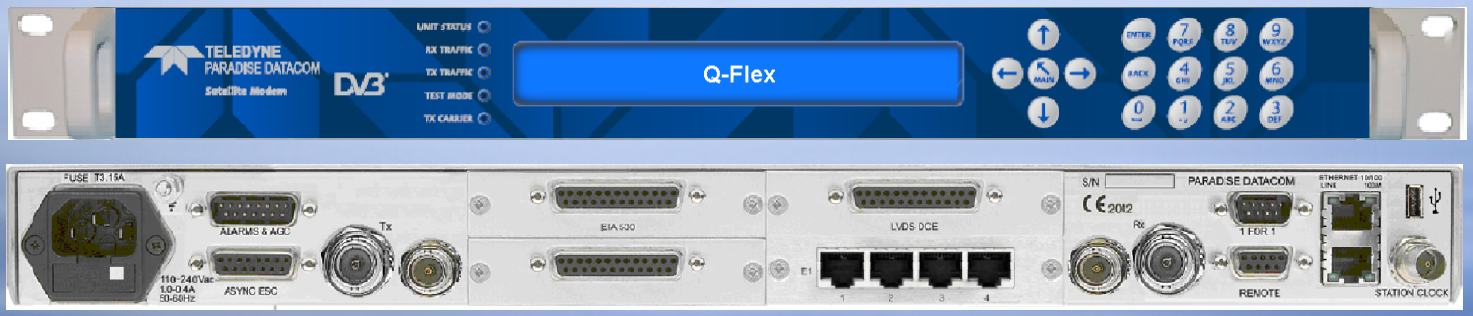
- Continue maintenance visits
- Replace older A/C units in 9797 radomes
- Revelle in IOR July-Sep 2015
- Roll out new modems with IP interface and paired carriers
- Permanent bandwidth expansions
- Short-term expansions likely

Target Expanded Capacity

- POR and AOR: 2Mbit/256kbps Shore-to-ship/ship-to-shore
- North America Ku-band: 768kbps/256kbps
- Gulf of Mexico: 1024kbps/256kbps

- Next steps include:
  - Modems installed on ships using existing serial interface
  - Frequency changes for improved bandwidth
  - Possibly 2nd round of frequency changes for more improvements
  - Additional changes when more bandwidth is purchased
  - Will activate one beam at a time when all ships on that beam have new modems installed

New Teledyne Modem



- 70 MHz and L-band so one modem goes everywhere
- Serial initially for transition, IP for long term operation
- IP acceleration and QoS features built into modem
- Increased remote control abilities from shore
- Currently 5Mbit limit, can be increased with license key
- More efficient link options (many ModCods, DVB-S2, adaptive coding for Ku-band, etc.)

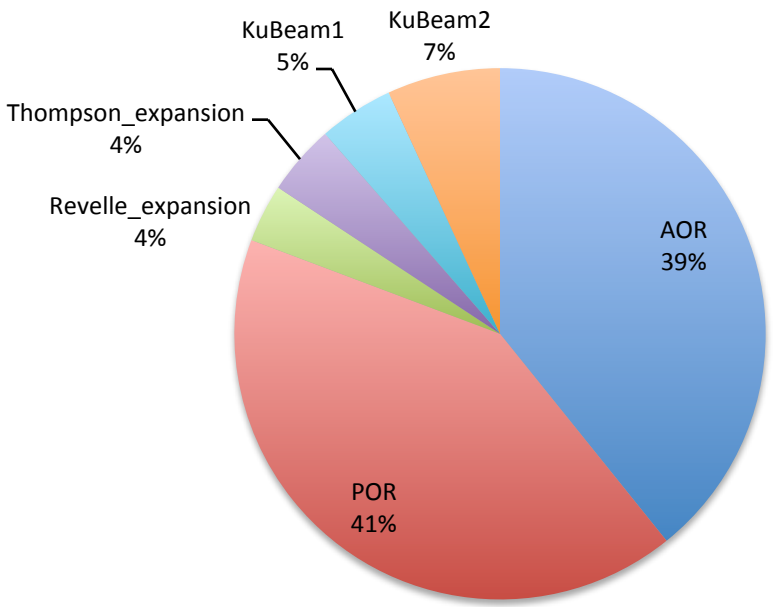
2014 Equipment Failures

3/15/14	Earth Station	RF gear power failure needing hand restart	1.25 ship days
3/8/14-4/1/14	Pelican	Level Cage failure	2 ship days
5/12/14-5/15/14	Melville	CL belt failure	3 ship days
6/4/14-6/5/14	Melville	Modem failure	2 ship days
6/7/14-6/12/14	Earth Station	Advantech amplifier failure	6 ship days
7/1/2014-7/5/2014	Knorr	DAC failure?	2 ship days
7/8/2014-7/11/2014	Melville	Level cage failure	4 ship days
7/9/2014-7/11/2014	Earth Station	Campus routing hiccup with tunnels?	6 ship days??
8/6/2014-11/1/2014	Point Sur	Cable, modem, and MXP failures	37 ship days
8/26/2014	Endeavor	Unknown tracking problem, getting new antenna	0 ship days
9/8/2014	Earth Station	RF splitter attenuating too much	1.25 ship days
9/18/2014	Langseth	Shore modem serial hiccup	0.4 ship days

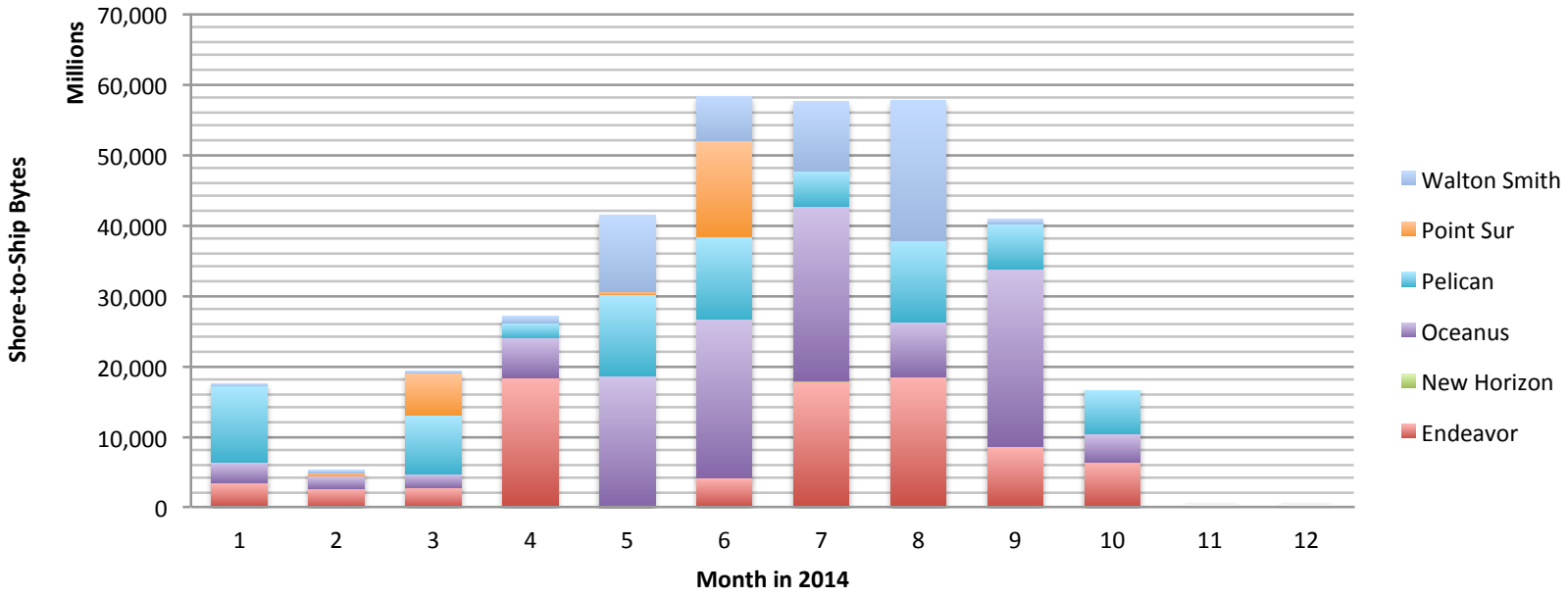
Jan-Oct 2014 Traffic Totals

- C-band (including expansions, not IOR)
  - Shore-to-Ship: 2,473,031 MB
  - Ship-to-Shore: 680,663 MB
- Ku-band
  - Shore-to-Ship: 328,263 MB
  - Ship-to-Shore: 130,439 MB

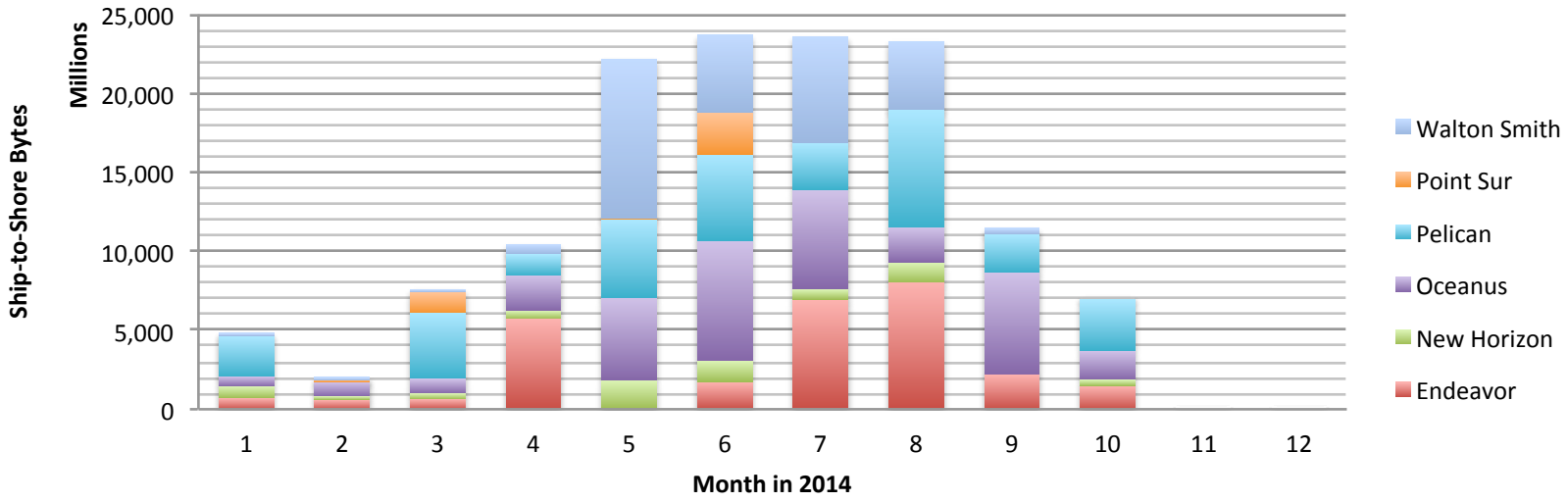
Shore-to-Ship Breakdown

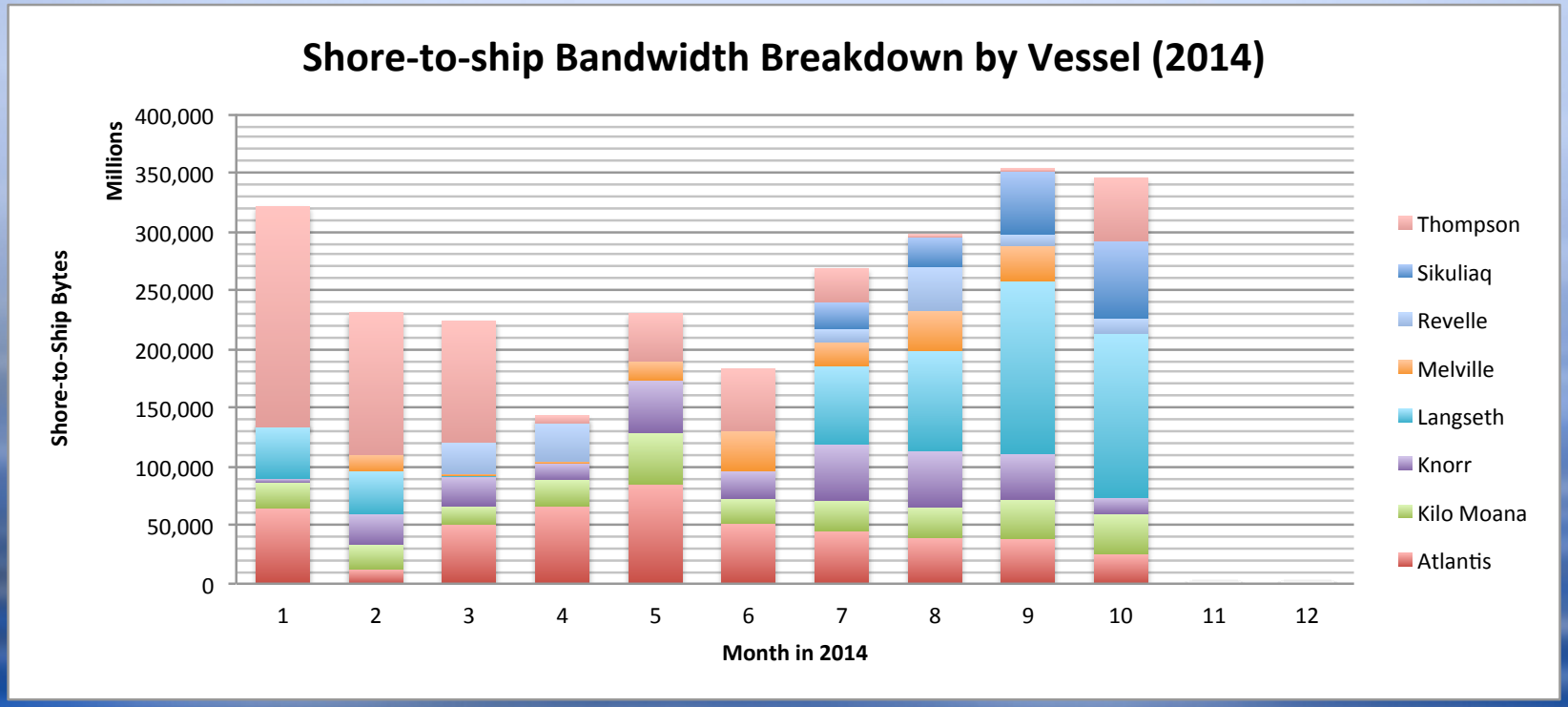


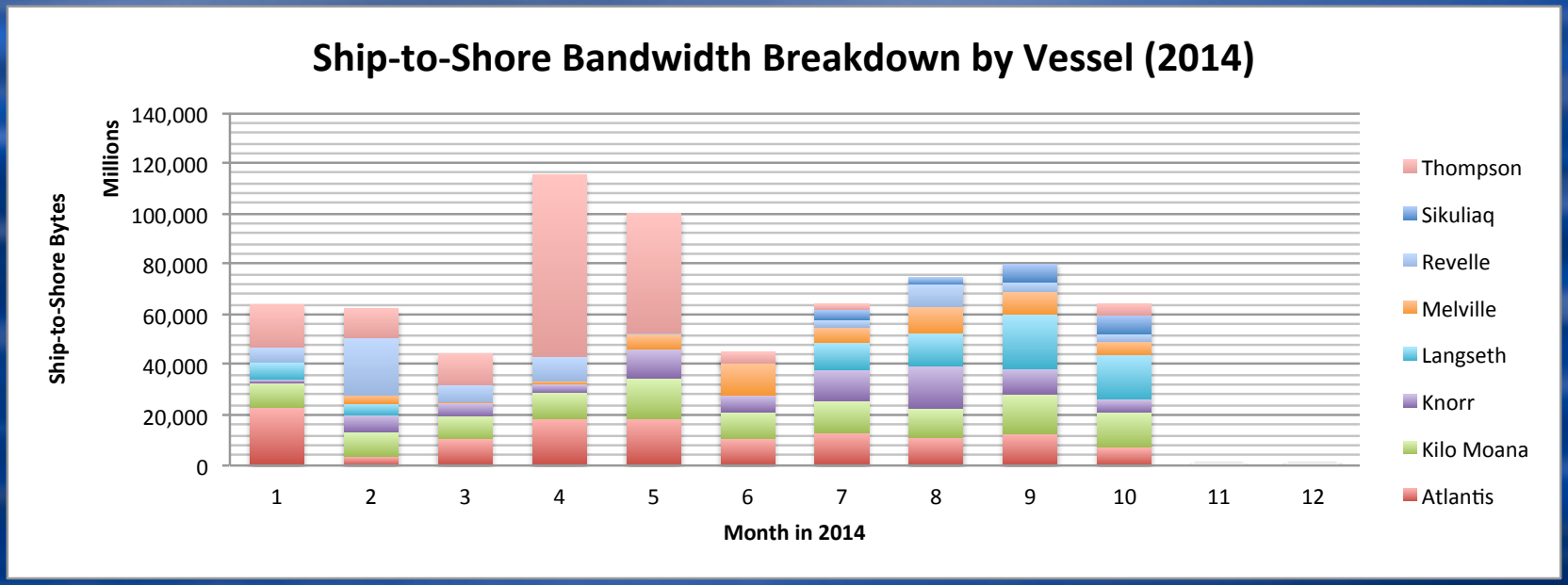
Shore-to-ship Bandwidth Breakdown by Vessel (2014)



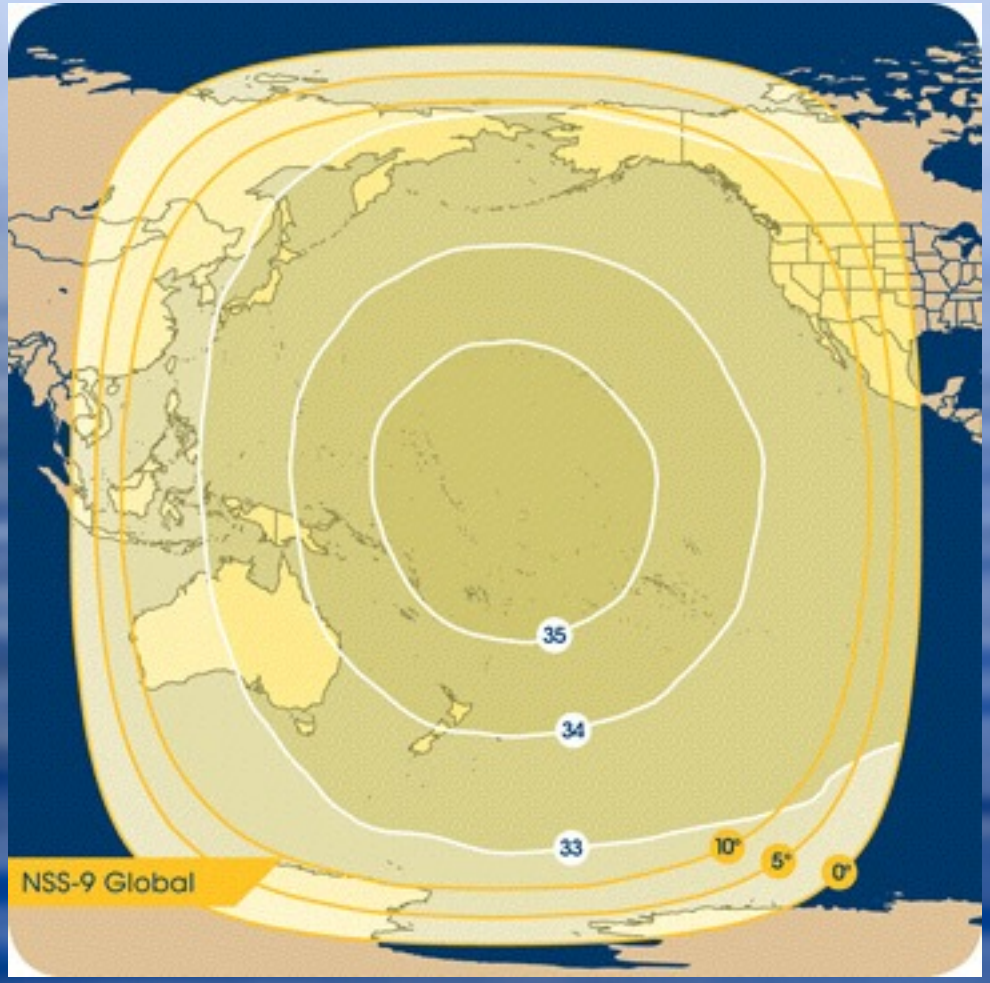
Ship-to-Shore Bandwidth Breakdown by Vessel (2014)




Shore-to-ship Bandwidth Breakdown by Vessel (2014)
Shore-to-Ship Bytes
Millions
400,000
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
1
2
3
4
5
6
7
8
9
10
11
12
Month in 2014
Thompson
Sikuliaq
Revelle
Melville
Langseth
Knorr
Kilo Moana
Atlantis

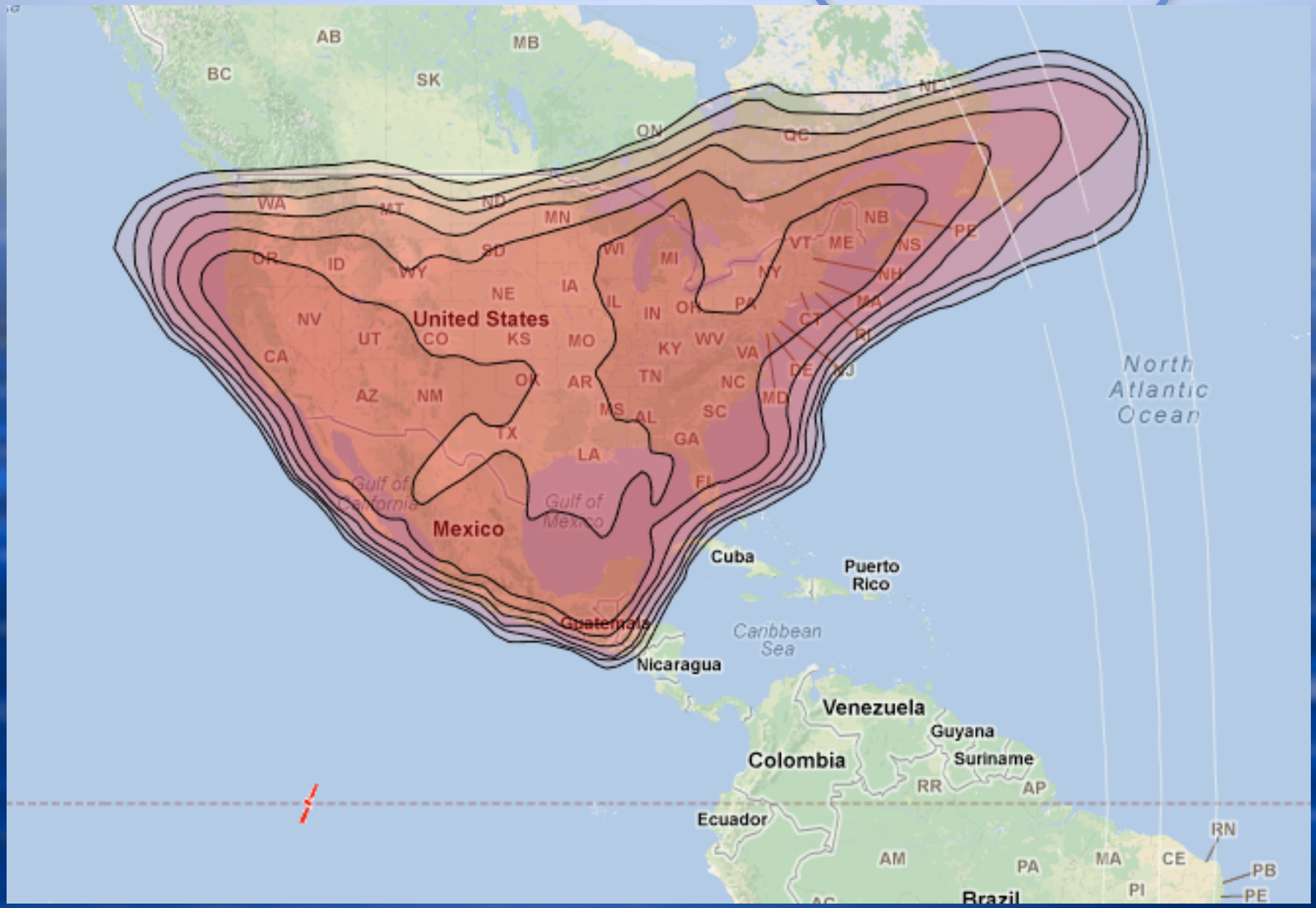

Ship-to-Shore Bandwidth Breakdown by Vessel (2014)
Ship-to-Shore Bytes
Millions
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
1
2
3
4
5
6
7
8
9
10
11
12
Month in 2014
Thompson
Sikuliaq
Revelle
Melville
Langseth
Knorr
Kilo Moana
Atlantis

NSS-9 (POR)

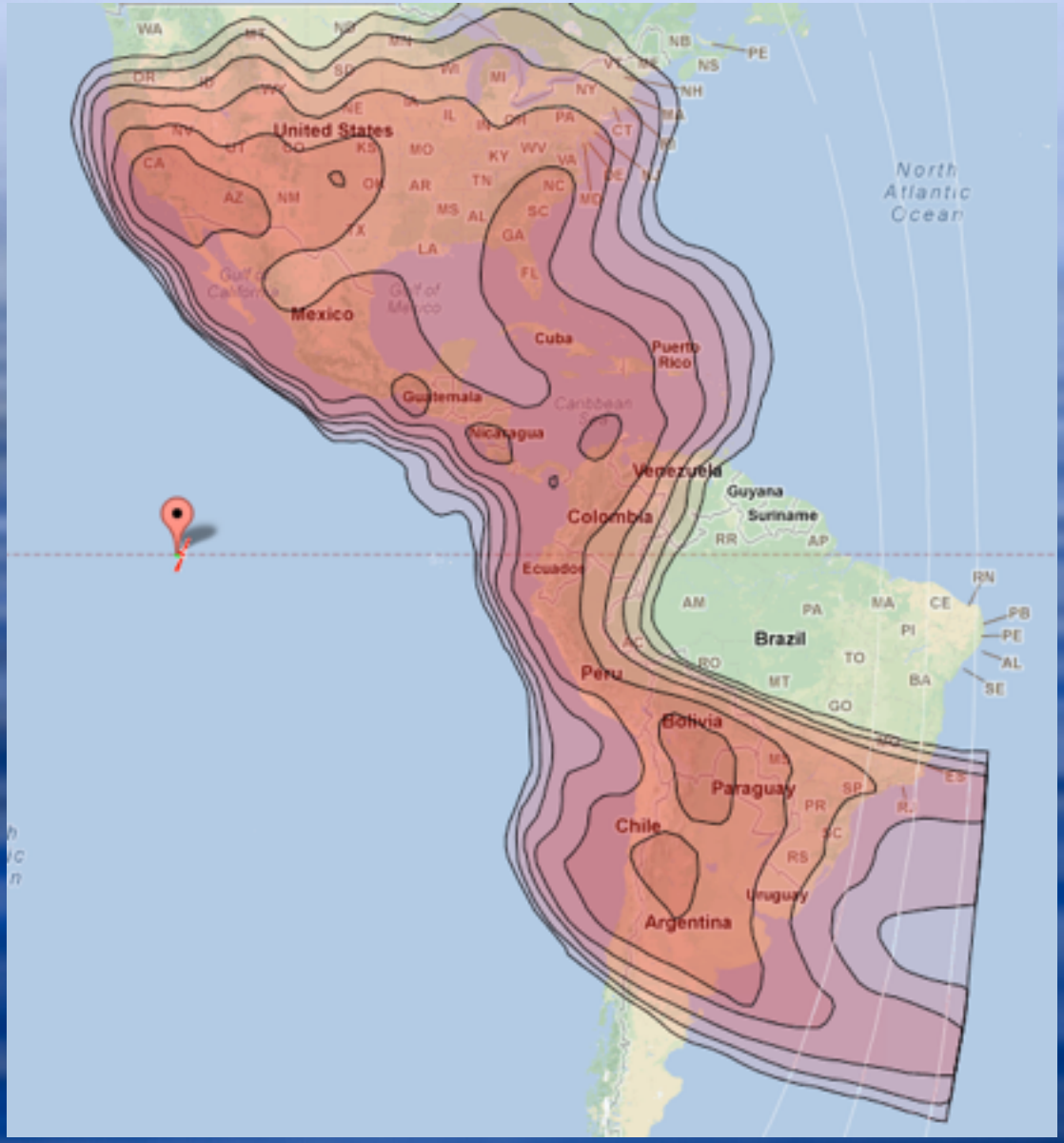


IS-23 (AOR)

SatMex8 Beam 1 (Ku-band)



SatMex8 Beam 2 (Ku-band)



IS-906 vs NSS-12