NOAA VSAT Implementation

Gene Nelson

NOAA

Office of Marine and Aviation Operations

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An update of the 2006 presentation by Doug Perry,

www.unols.org/meetings/2006/200610rvt/200610rvtmi.html

Project Goals

- Provide secure 24/7 WAN connection between deployed ship networks & NOAA Trusted Campus Network
- Enhance safety, operational efficiency and crew morale
- Leverage new construction & conversion funding sources, PAC funds, etc. to fund initial outlays
- Multiple FY07 & FY08 funding sources to complete most ships by next spring
- Develop in-house expertise to reduce installation & maintenance costs

VSAT Service Notes

- T1 WAN connection from the Earth-station/Gateway to NOAA Network Operations Center, Silver Spring
- Each ship operates within the NOAA Trusted Campus Network via iDirect network and is protected by the NOAA Firewall
- Bandwidth 512 kbps up/ 1024 kbps down shared for 10 Ku-band vessels, dedicated 128 kbps up/down for C-band
- Voice over IP phone service TBD for each ship & connected to the NMAO VoIP server in Silver Spring

Cost / Benefit

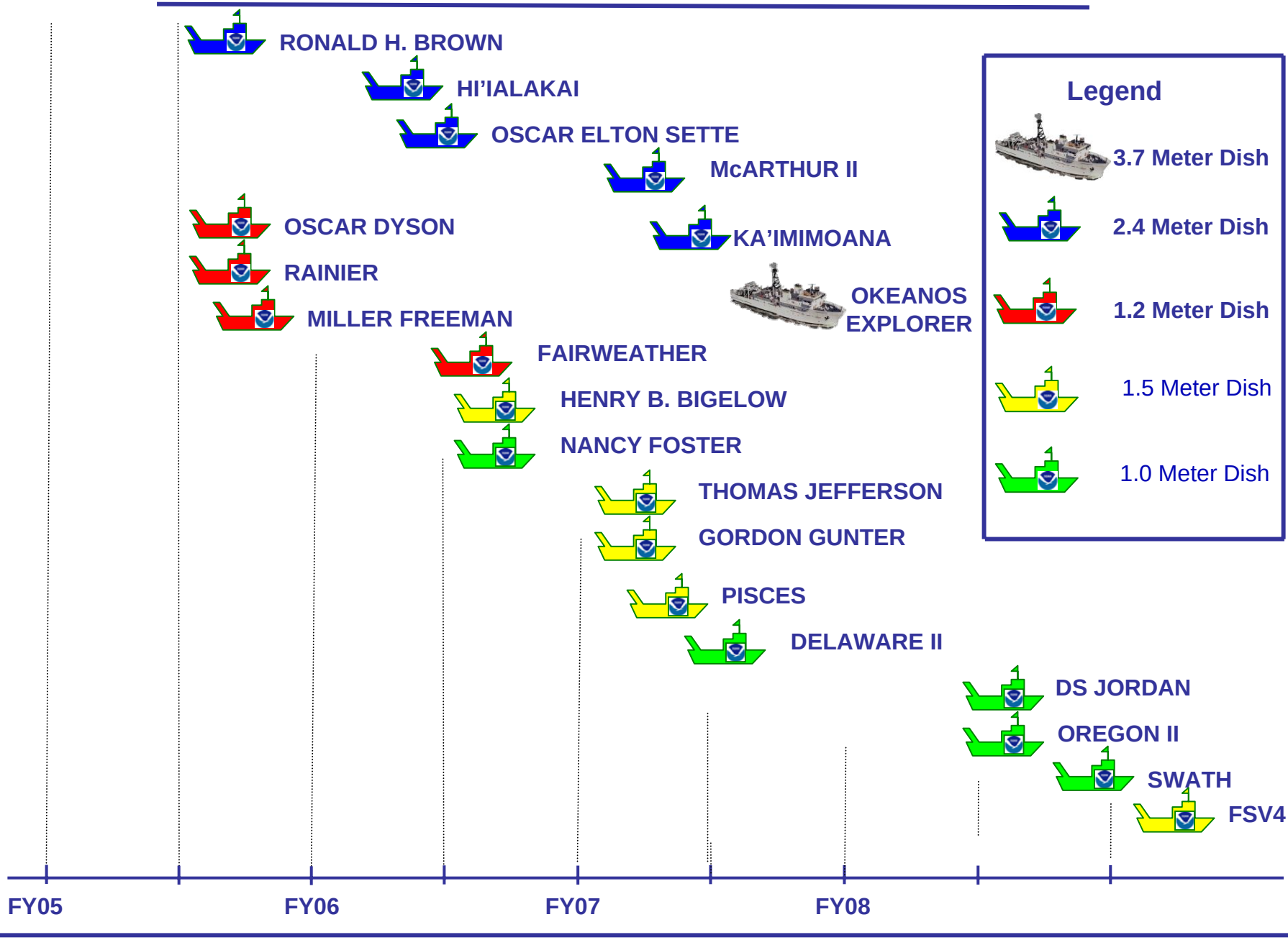
- Costs:
  - FY04 Fleetwide Inmarsat: $330K
  - VSAT Acquisition/Implementation: $80K - $250K per vessel (FY07)
  - Bandwidth/vessel/month : <$3K/Ku- , $4K/C-band
  - Annual maintenance/vessel: $2K + travel
- Benefits:
  - “Always connected” ships at sea
  - Safer & more effective ops; improved morale
  - Better value

Cost Estimate* FY05-08

Year	FY 2005	FY 2006	FY 2007	FY 2008 (FY07 est)
Equipment	$988,000	$830,000	$370,000	$250,000
Bandwidth	$0	$125,000	$400,000	$360,000 Est 600,000
Year Total	$988,000	$955,000	$770,000	$850,000

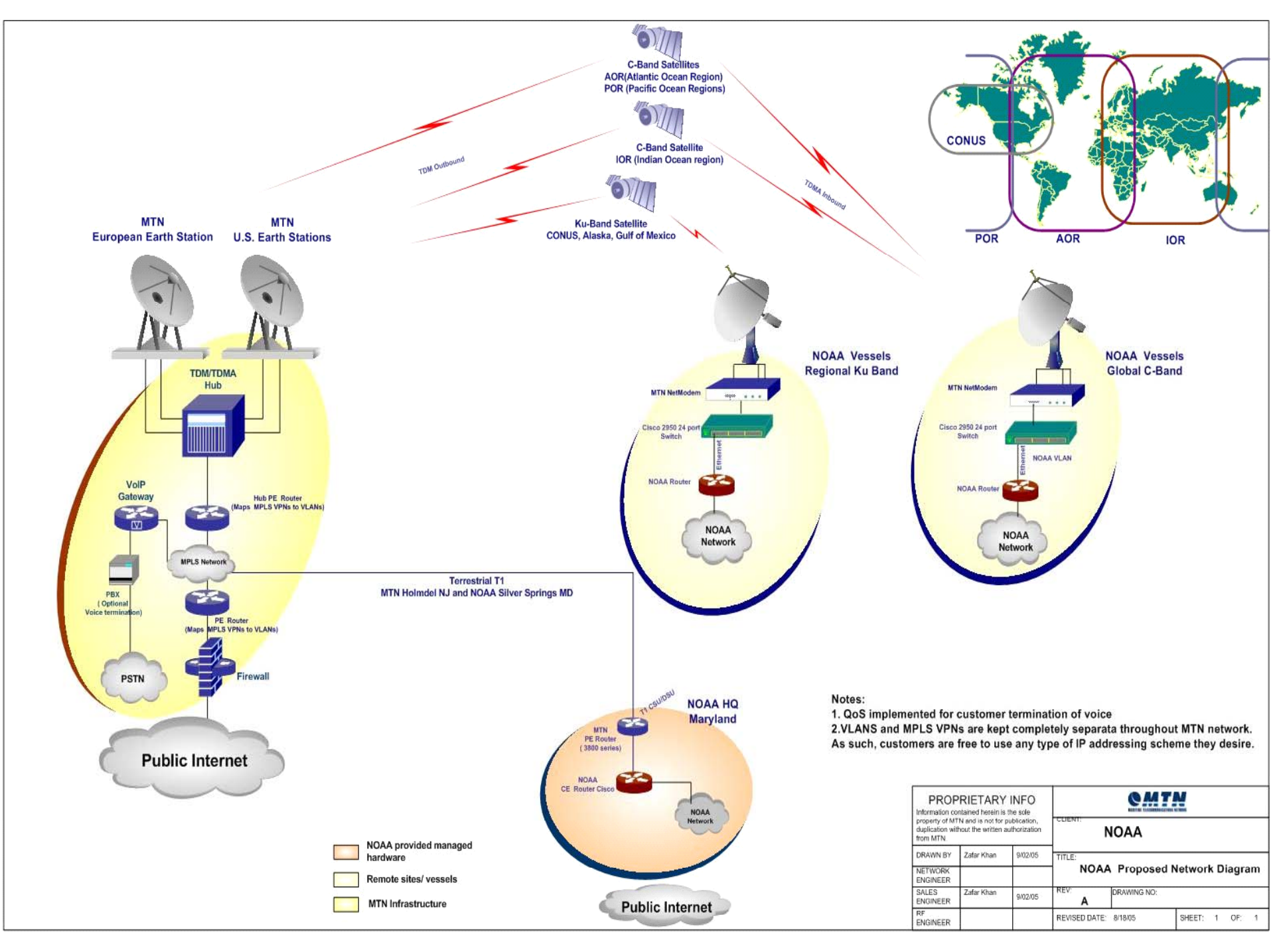
* Funding assumed from all sources: NMAO, MOC, Programs

NMAO VSAT Activation FY 2005 – FY 2008



Fleet Configuration

- Coastal ships in the Ku-band footprint utilize 1.0, 1.2 & 1.5 meter dish
- Global & Deep ocean ships utilize 2.4 meter C-band dish
- *Okeanos Explorer* will utilize 3.7 meter dish for live television broadcast



Notes:

1. QoS implemented for customer termination of voice
2. VLANS and MPLS VPNs are kept completely separata throughout MTN network. As such, customers are free to use any type of IP addressing scheme they desire.

PROPRIETARY INFO

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DRAWN BY	Zafar Khan	9/02/05
NETWORK ENGINEER		
SALES ENGINEER	Zafar Khan	9/02/05
RF ENGINEER		

CLIENT: NOAA

TITLE: NOAA Proposed Network Diagram

REV: A

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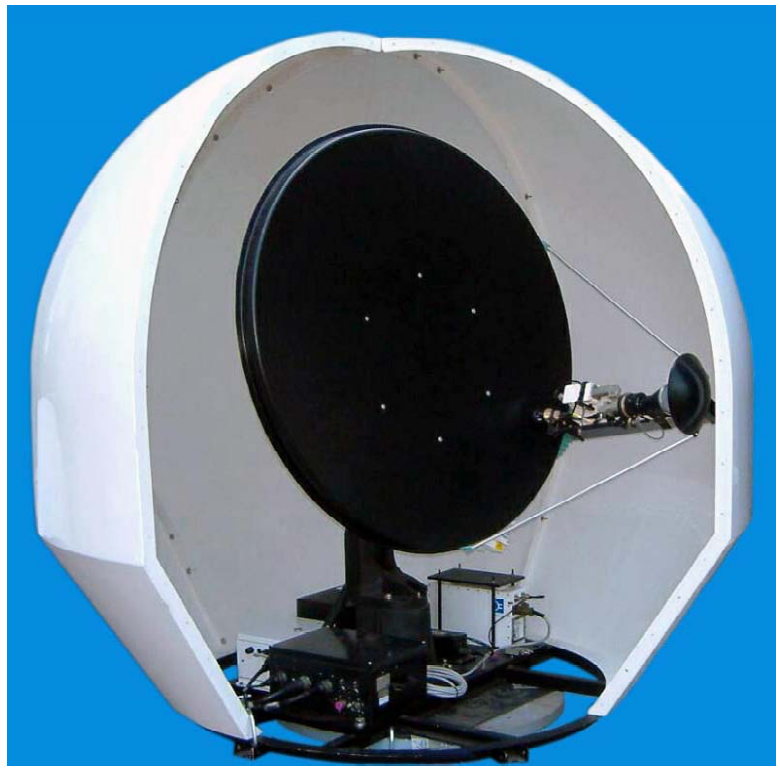
SHEET: 1 OF: 1

Ku-Band System Selection

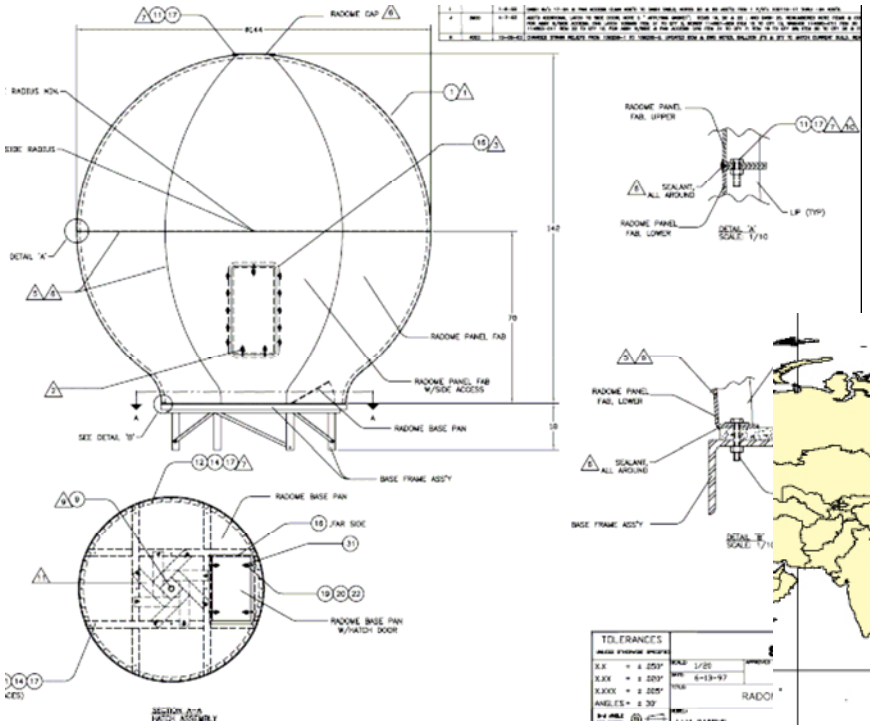
- Orbit AL-7104 or SeaTel 4996 1.2 m antenna
- Considerations: Size, weight, performance, support, cost
- Orbit AL-7104 1.2 m antenna w/ Codan 8W BUC selected first four ships (OD, RA, MF, FA)
- SeaTel 4006 and 6006 on subsequent ships



Operating Area

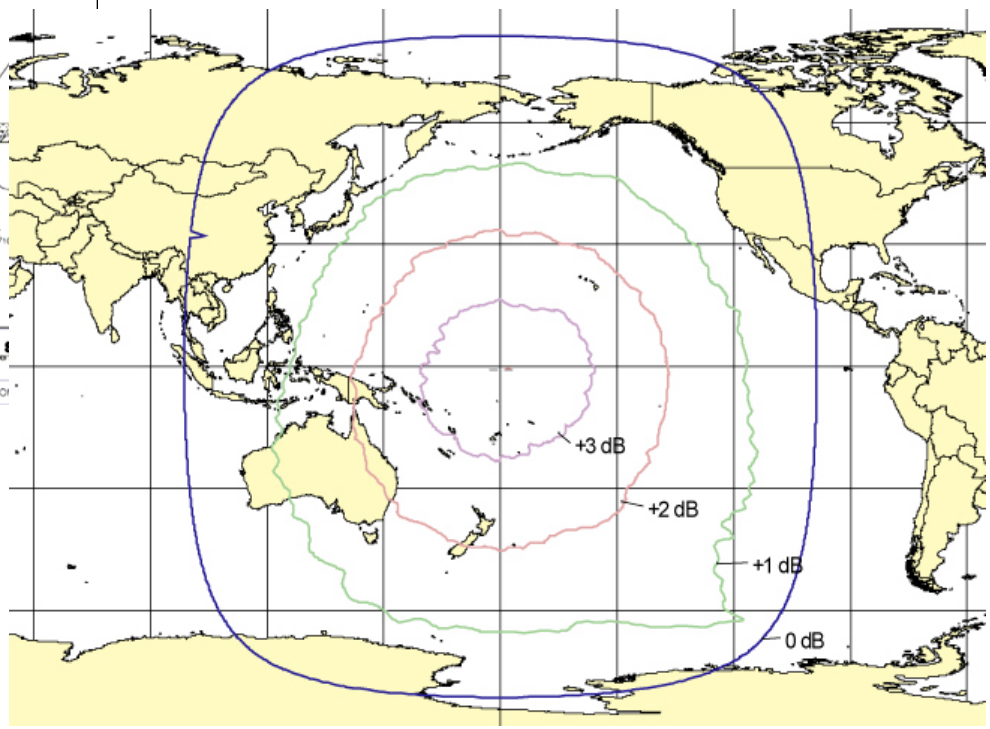
FOOTPRINT: IA-7 Ku-Band Coverage

C-band System Selection



SeaTel 9797, 2.4 m Antenna

Intelsat 701 Satellite



VSAT Systems

- C-Band:
  - SeaTel 9797 2.4 m dish w/Advantech 20W BUC
  - SeaTel 14600 3.7 m dish w/dual phase combined 400W BUCs
- Ku-Band:
  - SeaTel 6006 1.5 m dish w/ Codan 16 W BUC
  - Orbit AL-7104 1.2 m dish w/ Codan 8W BUC
  - SeaTel 4006 1.0 m dish w/ Codan 8 W BUC
- BDE:
  - iDirect Netmodem, laptop PC, spectrum analyzer

Implementation

- VSAT Acquisition
- Ship check
- Weight & Stability study
- Ship modification design
- Bandwidth acquisition
- VSAT installation by vendor
- Onboard training & testing
- Service Level Agreement or in house support

Oscar Elton Sette
Installation

Navy 3.7 m Installation

(Similar for ***Okeanos Explorer***)

Operational Notes

- Orbit reliability:
  - 2 of 3 failed out of the box or soon after installation
  - Six field service trips to *Miller Freeman* & *Oscar Dyson* in five months
  - Spares availability an issue
- SeaTel 9797: rock solid
- Bandwidth usage:
  - Adequate for ship use
  - NOAA Programs interested in increased data rates

Satellite Throughput

per Ship

A hypothesis based on current use