Satellite Network Advisory Group (SatNAG)

Bandwidth Needs and Policy for the Future

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INMARTEC Meeting 2018-Oct

SatNAG - Satellite Network Advisory Group

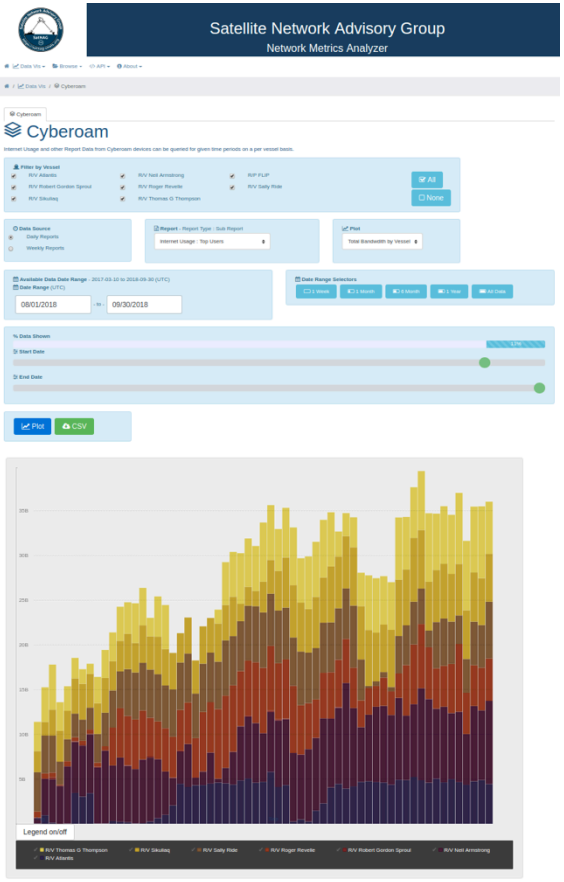
- Who We are
  - Laura Stolp / Woods Hole Oceanographic Institution
  - Ken Feldman / University Of Washington
  - Jon C. Meyer / Scripps Institution of Oceanography
  - John Haverlack / University of Alaska
- When/Why we formed
  - Formed October 2016
  - Appointed by Jim Holik to address issues related to ship/shore communication
- Mission Statement
  - To steward the objective, effective and efficient use of ship to shore network resources and optimize positive customer experiences for the UNOLS fleet
- We will pilot each of our recommendations at our home institutions

SatNAG - Year One: Fact Finding

- Assessed fleetwide status
- Created timeline for pilot and implementation
- Produced some documentation
- Drafted an *Internet Use Policy*
- Tested high bandwidth seagoing use
- Assisted our program with an RFI

SatNAG - Year Two Summary

- Published an Internet Use Policy
  satnag.unols.org/internet-use-policy
- Engaging our user communities at key meetings
- Conducting a Pilot Program between committee members operating institutions (SIO, UAF, UW, WHOI), May 2018-Oct 2018
  - Gathering of consistent metrics for analysis of participants' usage
  - Working on visualization for exploration of these data (in development)
- SatNAG wiki
  - Testing new software for improved user experience
  - Working on community documentation for Bandwidth Limiters



Internet Use Policy, at a glance

satnag.unols.org/internet-use-policy/

- Primary purpose: **funded science** and **vessel operations**
- 150 MB per user per day Internet Usage Quota
- Filtering with web and application filters to catch broadly disruptive traffic (e.g DropBox)
- All users behind authenticated Captive Portal,
- Only one device per-user online at a time
- Up to 6 kiosks per vessel

Challenges

1. Achieving coherent configuration across multiple environments (ships), across multiple institution in available time windows (port calls, etc) is difficult!
2. Lack of meaningful sandbox/testing environment(s).
3. Different network topologies make apples/apples comparisons challenging.
4. WAN topologies differences make quota allocation consistency problematic. E.G. a ship with aggregated Fx and HiSeasNet behaves much differently than others.
5. Collaborating between operators while also collaborating with institutional partners can create conflicting interests.
6. Operators within UNOLS have diverse operational needs. Wider scale deployment of an Internet management system throughout UNOLS will involve increased challenges.
7. Lifecycle maintenance plans are complex to develop within the context of addressing these problems.

Successes

1. Cyberoam configurations are exportable in XML (a step in the right direction toward configuration management).
2. Committee discussion led to enabling licensed features consistently, notably *Application Filtering* for traffic massaging and reporting.
3. Certain firewalls are best used at scale with consistent firmware and hardware in order to normalize performance analysis.
4. Cross-institution collaboration results in better configurations per ship and therefore better, more consistent setups for the UNOLS fleet.
5. Presentations to entities such as UNOLS Council and RVOC help increase awareness of our efforts to resolve these issues and keep us honest about communicating complex ideas to an array of audiences.
6. A recent review by an NSF Committee Of Visitors recognized SatNAG's efforts, and have recommended that our program pursue the means to increase bandwidth coupled with continued management efforts!

Discussion

1. What do other operators have for baseline bandwidth?
    a. UNOLS baseline bandwidth is 2Mbit/s MIR, 512kbit/s CIR shore->ship
    b. UNOLS baseline bandwidth is 256kbit/s ship->shore
2. Ship infrastructure logistics
    a. How many days a year do various operators' vessels spend at sea?
    b. How many berths on board?
3. Do other operators have Internet Use Policies in place? At what scope?
4. What WAN aggregation solutions are people using?
5. How many WAN solutions are available per vessel, generally?
6. Bandwidth Management
    a. Are other operators using Captive Portals?
    b. What bandwidth limiting solutions in place?
    c. What firewall solution do operators prefer?

SatNAG Internet Use Policy

Bandwidth

Internet resources are provided primarily in support of **funded science** and **vessel operations**. Use for purposes outside of the primary purpose is permitted on a non-interference basis.

- Ships have very little bandwidth compared to what people are used to on land
- Usage must be managed to ensure availability for science / ops
- Historically policies have been set on a per institution basis
- Expanded bandwidth is arranged, on a per cruise basis, at additional cost

Internet Usage Policy Objective

- Maintain **functional, equitable and fair use** of this limited resource
- Provide consistent user **Internet access experiences** across the fleet

Implement Policy through Captive Portal

- Consistent Policies
- Individual Use
- Functional Use
- Consistent Measuring and Reporting Across Ships

Individual Use

- **150 MB Up** / **150 MB Down** Quota per user per day
- Accounts Allocated on a per-user basis.
  - Sharing accounts prohibited.
  - One device per user at a time connected to the internet.
  - Measure per-user internet usage
- Exceptions and Quota Resets
  - Must be documented, justified, and communicated.

Functional Use

- Some Servers may be granted unlimited access
  - For science or business purposes only
- Kiosks may be available for larger operational uses
  - Typically available on a first come first served basis for a limited period of time.
- Certain services may be blocked or throttled fleet-wide
  - Possible examples: DropBox, iCloud, off-ship network printers, software updates

Metrics and Reporting

- Automated and regular report generation
- Routine traffic monitoring
- Analyze for trending metrics
- Compare usage patterns between vessels
- Provide Specific Measurable Results to NSF

Cyberoam Facts

- Reports only give the top 20 results
- If a VPN is used, the application and web filters are bypassed
- XML files can be exported and imported, but it is very important to be using the same firmware of the system will reset to ‘almost’ factory default
- The CLI is not very useful
- SNMP access
- The licenses need to be purchased through a third party, this can get confusing

Timeline for Implementation

- May-Oct 2018 - Proof of Concept
  - Test on 8 vessels operated by participating SatNAG member institutions
- Oct 2018 - Report on PoC to RVTEC
  - Create guidance documents for implementation
  - Invite rest of fleet to participate
- Oct 2019 - Next Generation Lifecycle Updates
  - New solutions evaluated every 3 years

More details can be found in the RVTEC presentation at:
https://www.unols.org/sites/default/files/201717rvt_breakout3_InternetPolicy.pdf

Complete draft available as a Google Doc:
https://docs.google.com/document/d/1jOidbvs71uEqINVOE2fkoOhOhslwzAOz7G83ENttvQU/edit?usp=sharing