

Telepresence and Expanded Bandwidth Cruises 2016

Lessons Learned (or reminded of)

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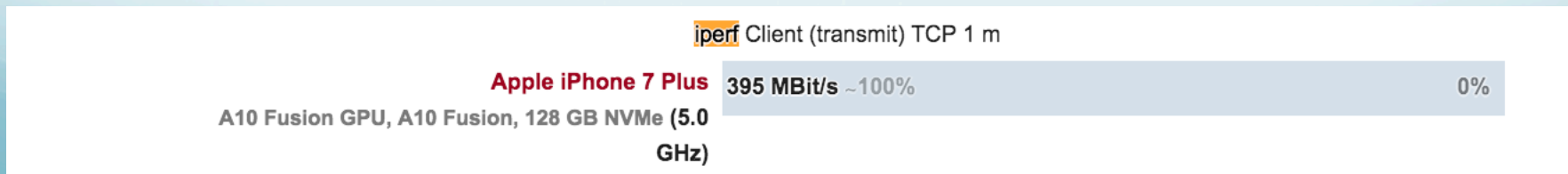
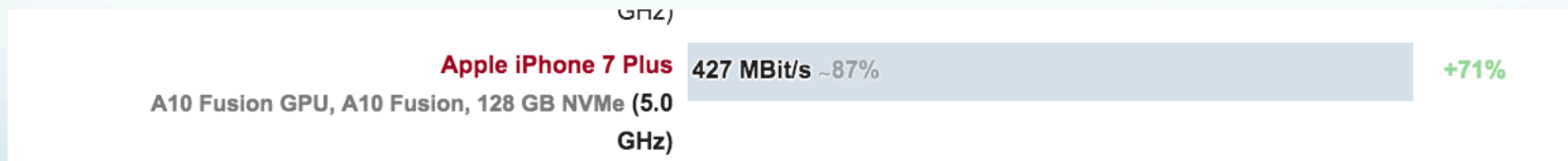
Got Bandwidth?

Bandwidth is defined as the amount of data that can be transmitted in a fixed amount of time or range within a band of frequencies or wavelengths.

HiSeasNet current baseline is 2 Mbit shore to ship shared, 256K ship to shore.

HiSeasNet C band capable of 30 Mbit bi-directional, depending on your data plan.

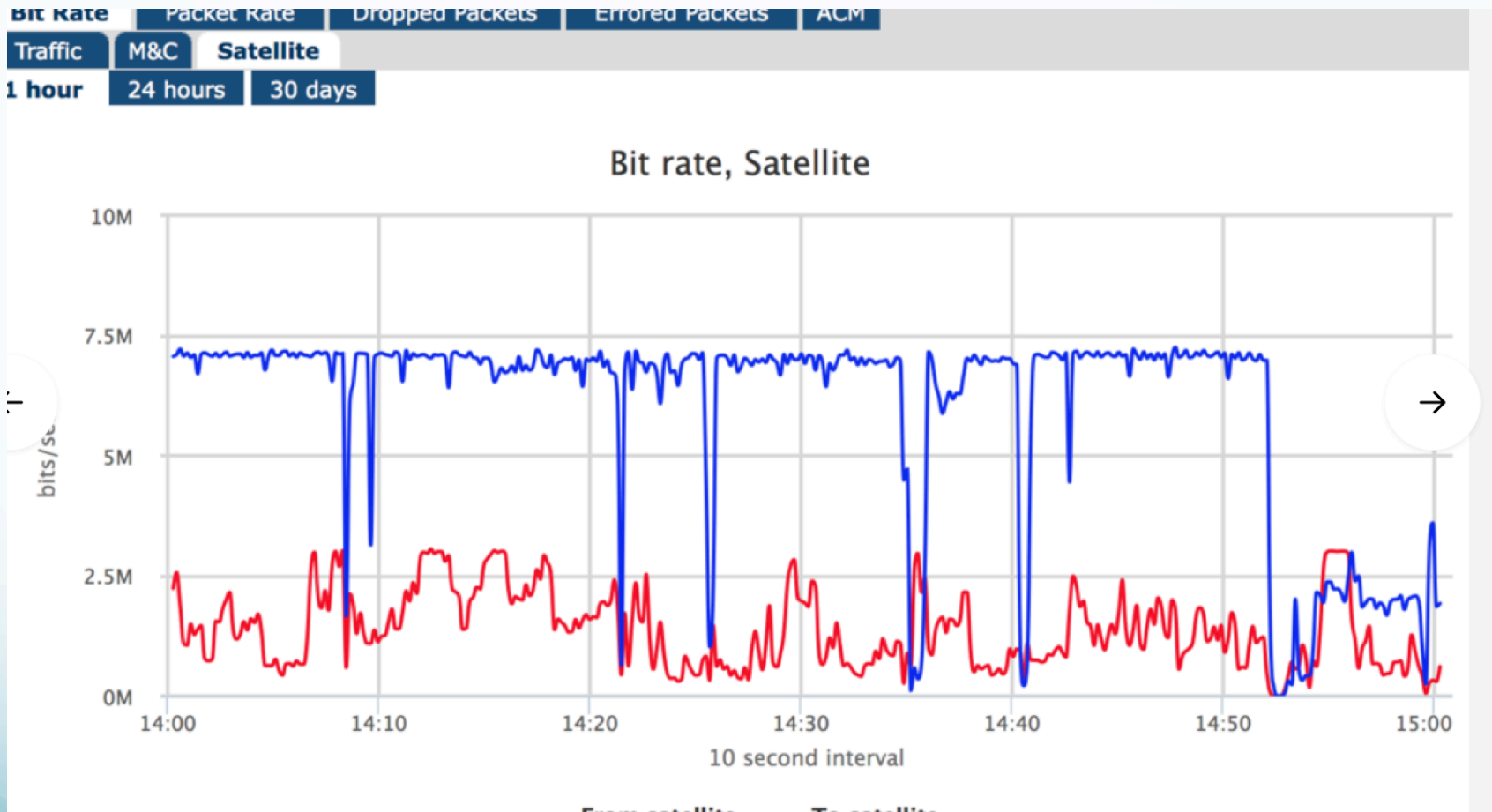
Meanwhile in 2016, your iPhone can do 400+ Mbit.



Bandwidth Expansions 2016

Date	Ship	Bandwidth
HSN Expansions		
July- Aug	Atlantis (Van Dover)	7 x 3 Mbit
June	Sikuliaq (Kulin)	3 x 2 Mbit
July	Sikuliaq (McGuire)	3 x 2 Mbit
August	Sikuliaq (Ittig)	3 x 2 Mbit
Nov- Dec	Sally Ride (Applegate [Jason])	10 x 5 Mbit
Non-HSN expansions		
April	Atlantis (NTSB)	7 x 4 Mbit
June	Endeavor	5 x 5 Mbit

7 x 3 on the Atlantis



HiSeasNet Way Forward (modulo SATNAG guidance)

- Systems-of-Systems approach
- End-end-path test
- Application ports and protocols defined in advance
- End points defined in advance
- Bi-directional application QoS parameters defined and tested in advance – inside skin of ship and shore to ship

Telepresence Testing

- Check connectivity and bandwidth over satellite, modem to modem
- Check connectivity and/or bandwidth from point to point
- Things change between Telepresence events. Just because it worked a month ago don't assume it will work as needed now.
- Telepresence needs the bandwidth when they need it. Be able to prioritize telepresence traffic, or limit/suspend non-telepresence traffic when needed.

Connection Testing Tools

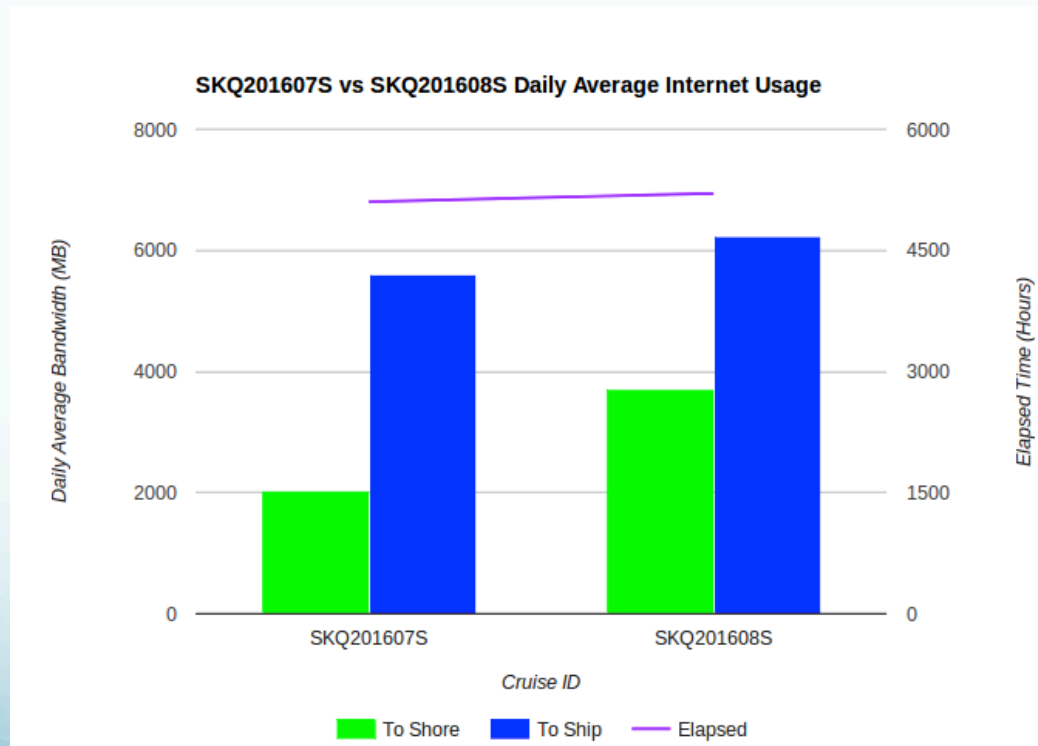
- ping – verify connectivity and latency
- traceroute/tracert – verify network pathway
- mtr/pathping – combination of ping and traceroute
- iperf – network performance testing
 - Run as server on one side, client on other side
 - Pushes a given size of data across via either TCP or UDP for a given amount of time. Reports actuals.
- iftop - display bandwidth usage by host

Issues on R/V Atlantis

- NTSB found routing issues between Internet2 and the rest of the world
- WHOI had an old router w/10Mbps ports in line which was too slow for the satellite link (imagine that 😊)

Sikuliaq Telepresence Lessons Learned

- HiSeasNet Bandwidth Bump
 - FROM To Ship 2 Mbps / To Shore 0.5 Mbps
 - TO: To Ship 2 Mbps / To Shore 3 Mbps



Sikuliaq Telepresence Lessons Learned

- First Cruise (Following Upgrade)
 - Successfully Sustained 2 simultaneous video streams to shore over a 2-3 week period.
- Second Cruise
 - Successful Video Streaming to shore
- Third Cruise
 - Science party wanted to use a 4 line VOIP system.
 - Installed 2 days prior to cruise with shoreline
 - Was Unable to test adequately with HSN prior to cruise
 - HSN Upgrade only upgraded to shore throughput not to ship. VOIP is bidirectional.