HiSeasNet

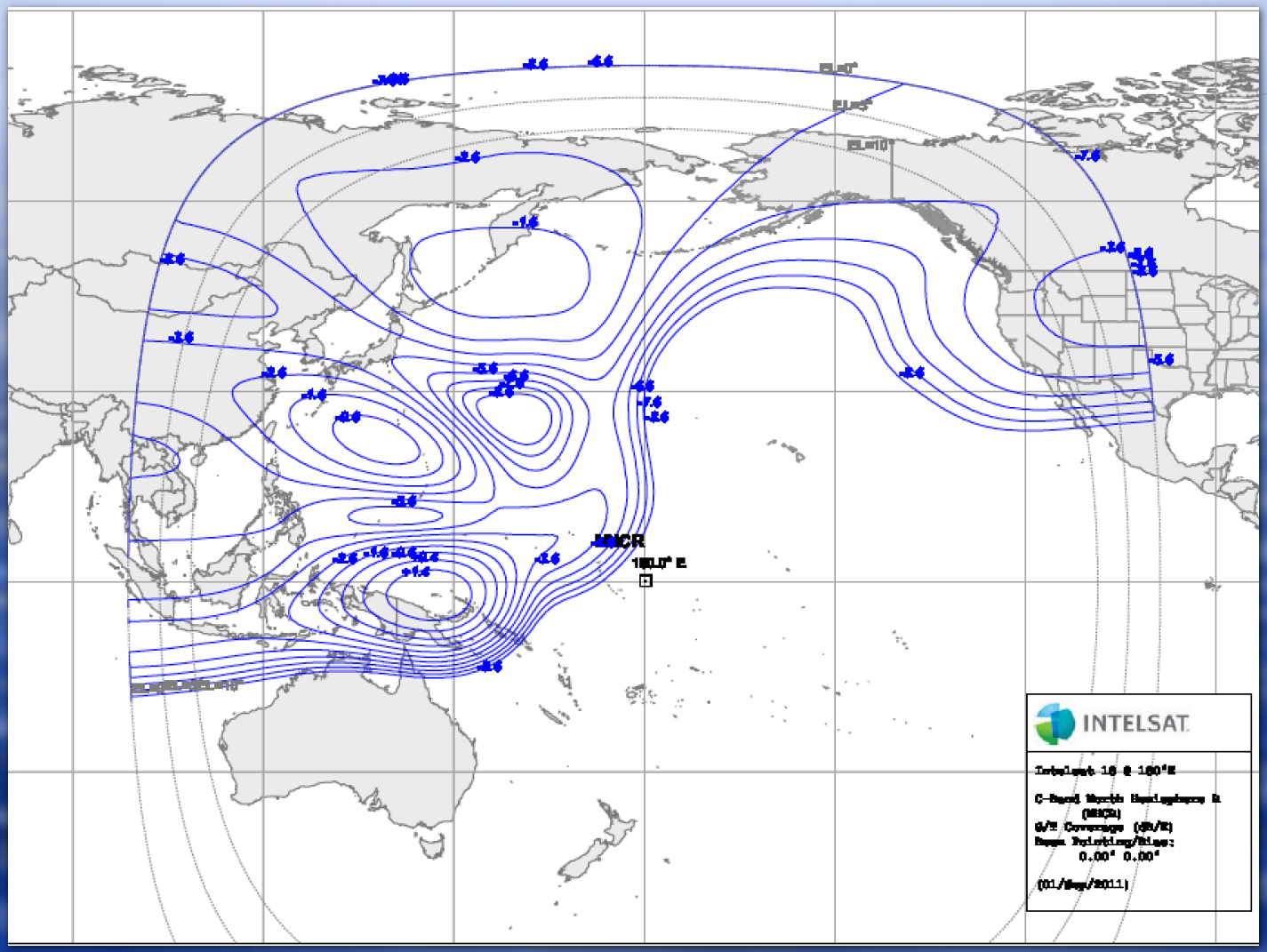
18 MHz Prototype on IS-18 NH

Kevin Walsh
Scripps Institution of Oceanography
kwalsh@ucsd.edu

RVTEC 2017

18 MHz Prototype

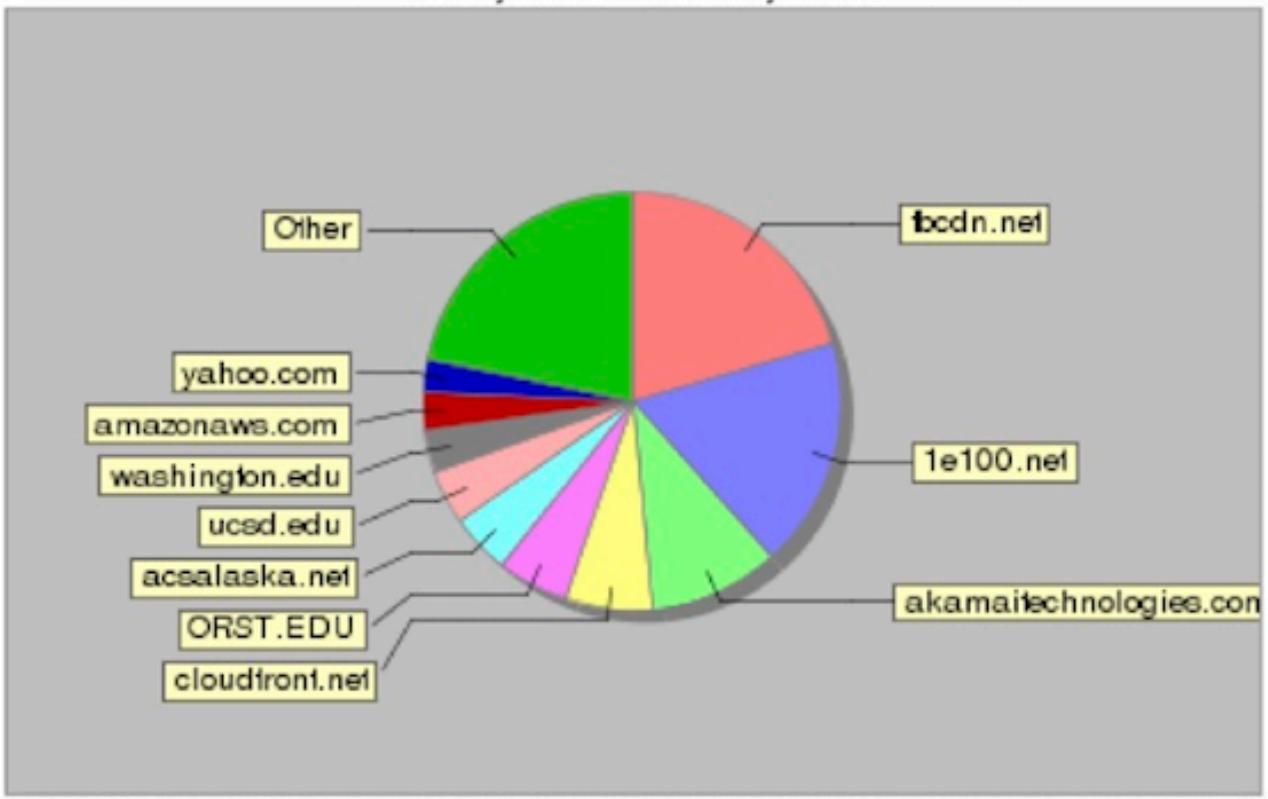
- 18 MHz on IS-18 North Hemi beam in North East Pacific
- RV Sally Ride, RV Sikuliaq, and RV Roger Revelle
- Multiple back-to-back Jason cruises on Revelle
- Several use cases to divide up the 18 MHz:
  - Shared 21.5 Mbit shore to ships with 1 Mbit to 1.5 Mbit ship to shore
  - 11.4 Mbit shore to ships with 10.5 Mbit ship to shore for Revelle and 1 Mbit ship to shore for Sally Ride and Sikuliaq
  - 11.4 Mbit shore to ships with 10.5 Mbit ship to shore for Sally Ride and 1 Mbit ship to shore for Revelle and Sikuliaq

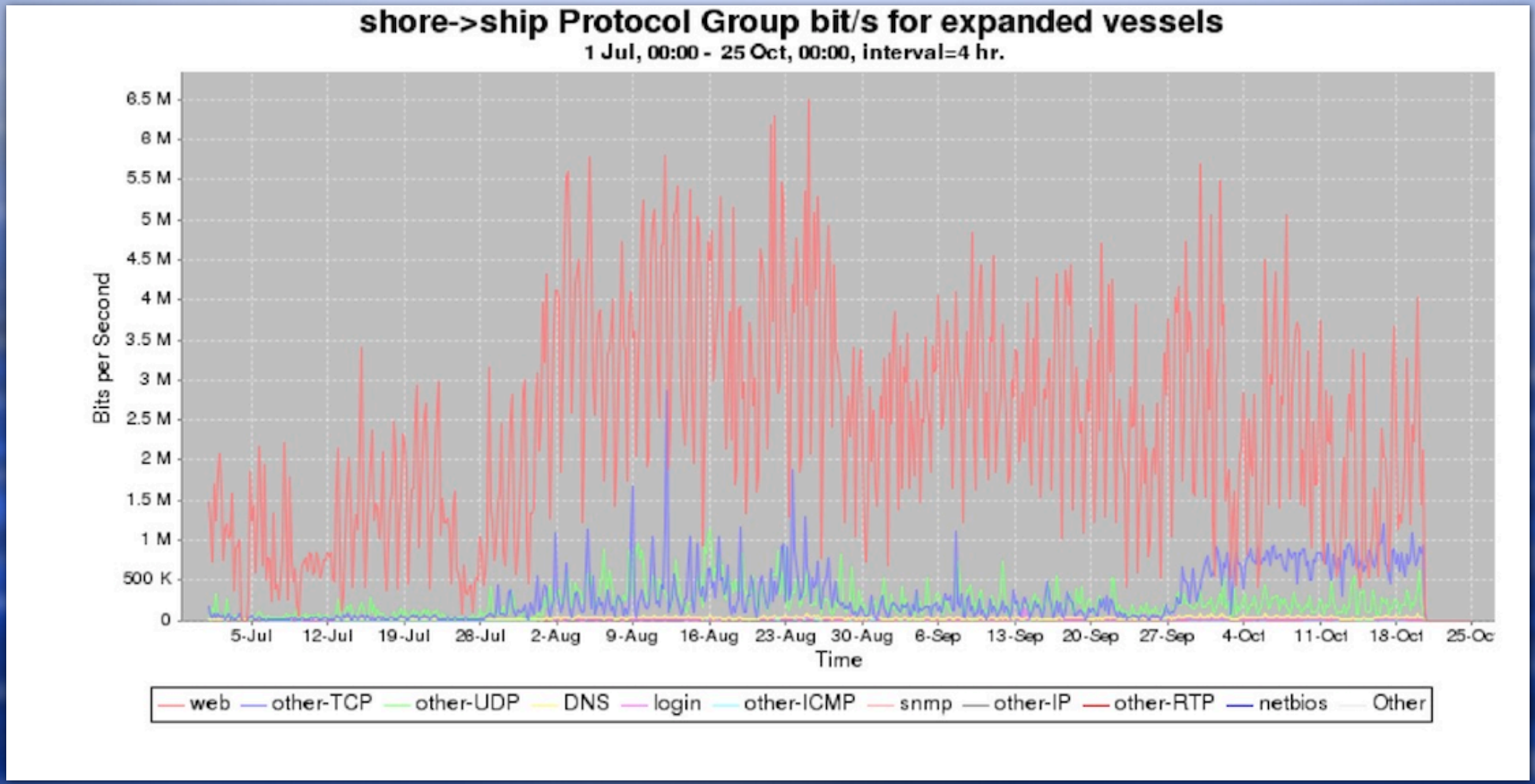


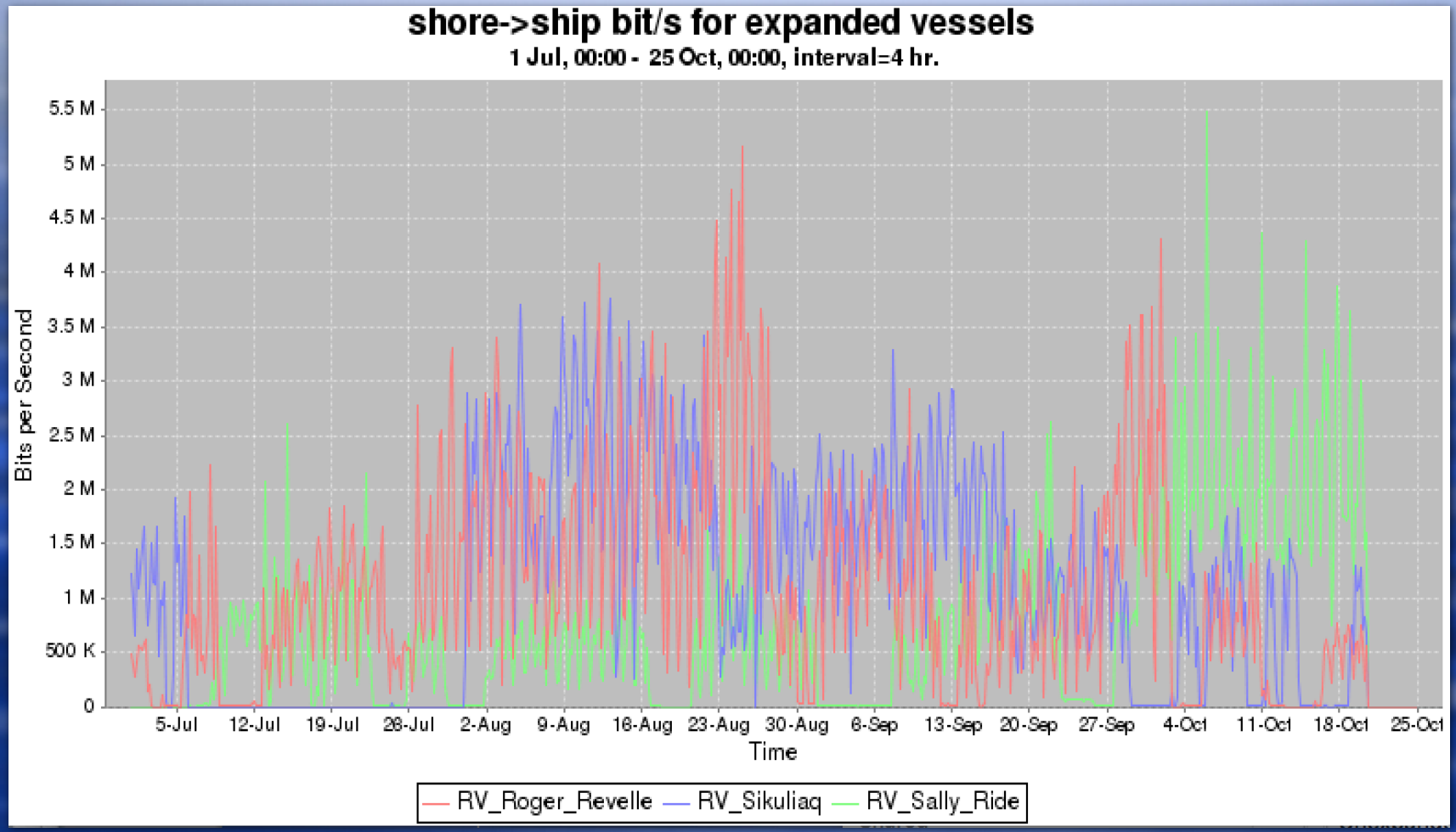
IS-18 North Hemi C-Band

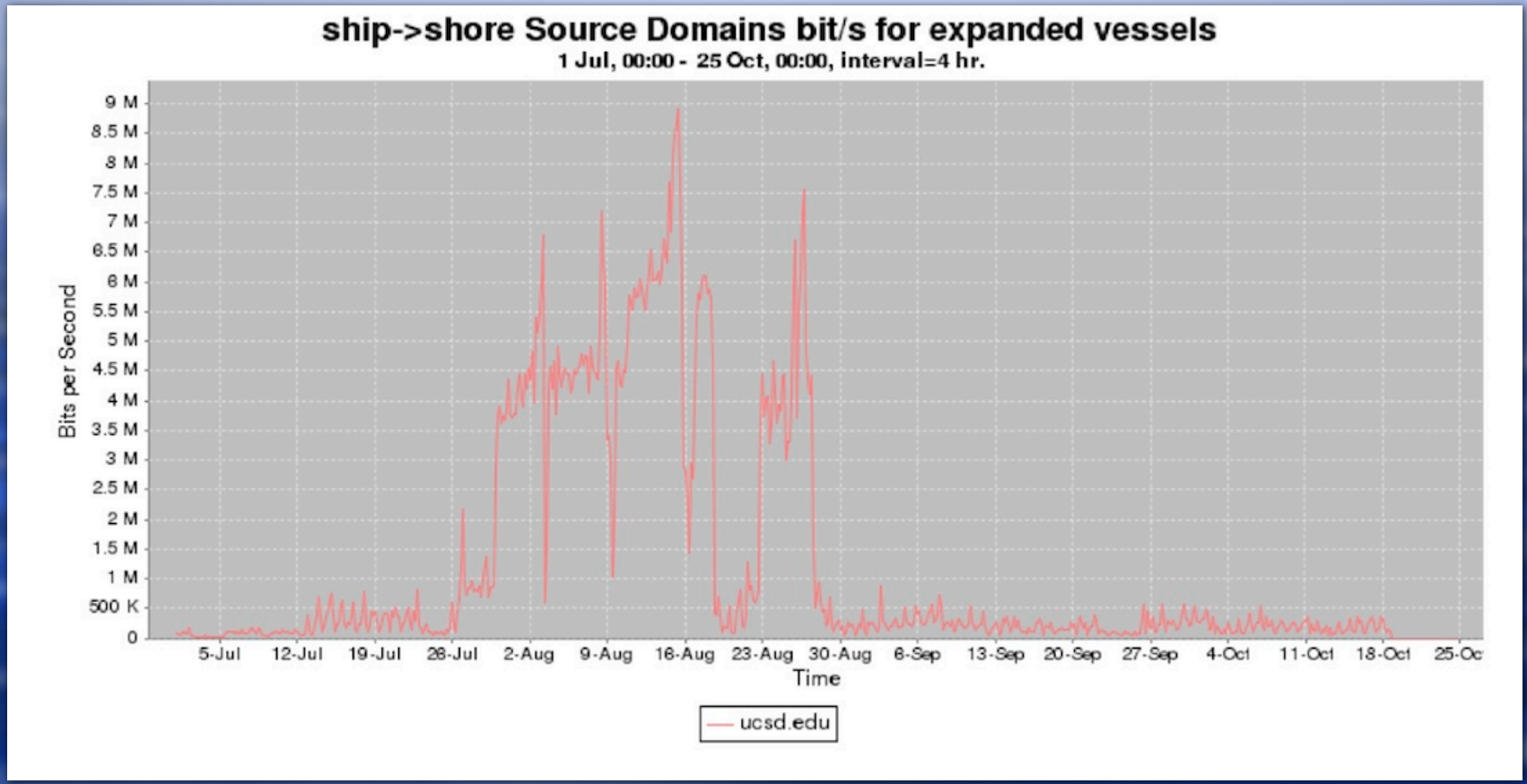
shore->ship Source Domains bit/s for expanded vessels

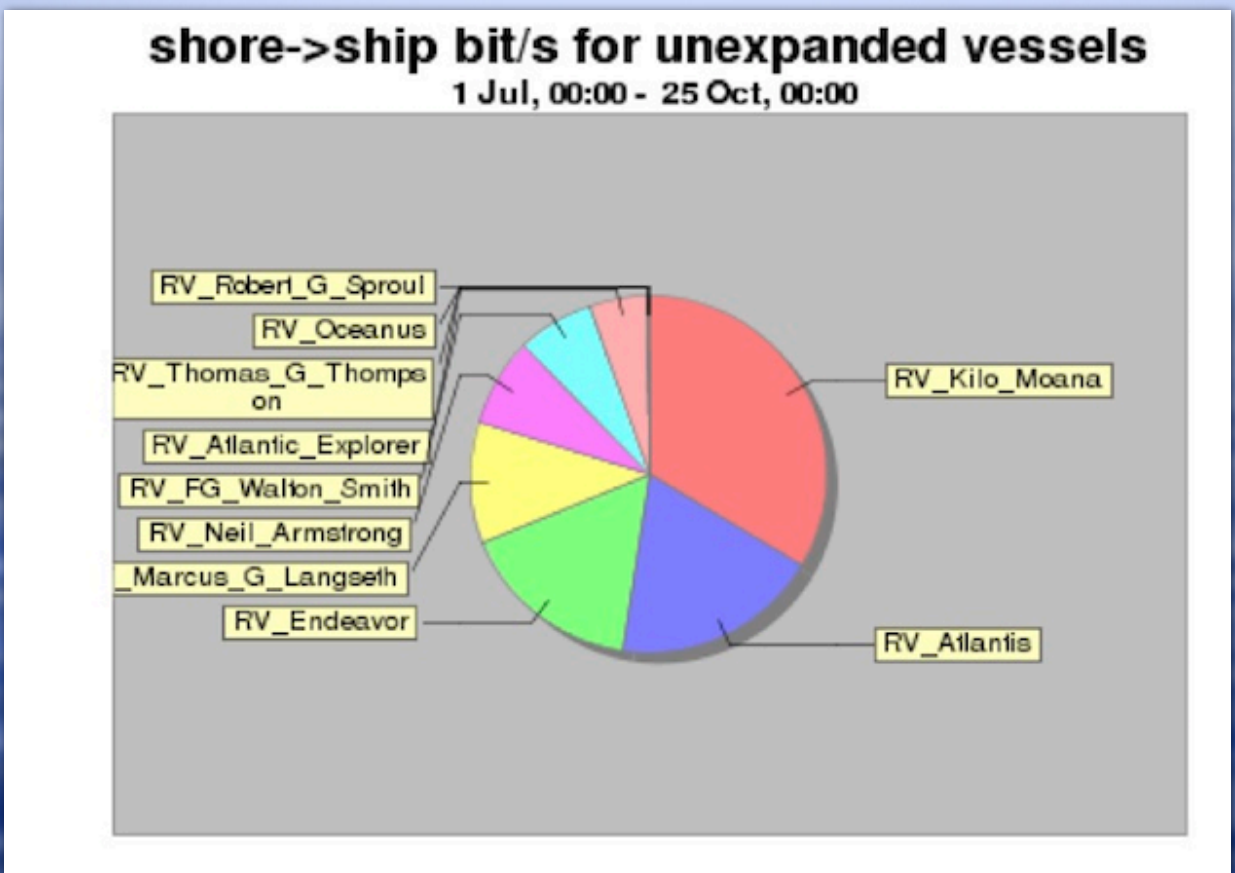
1 Jul, 00:00 - 25 Oct, 00:00

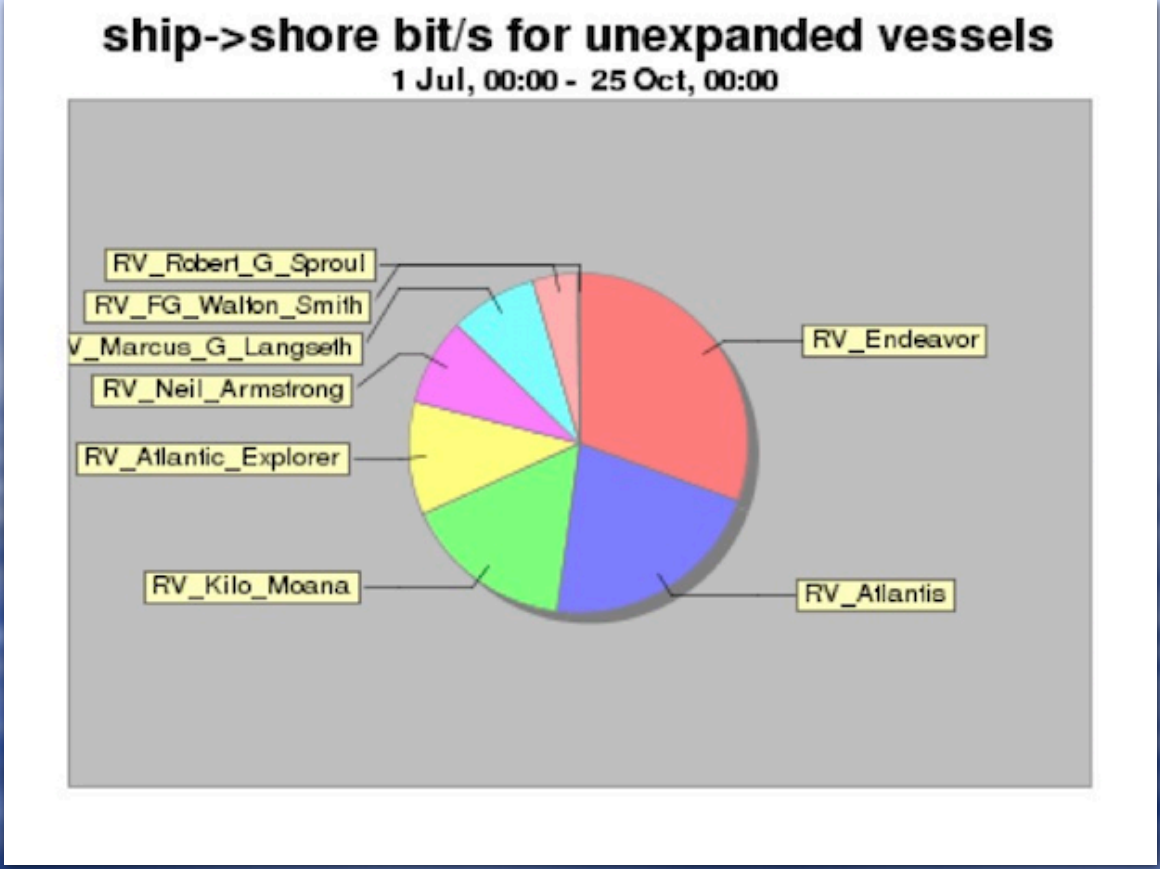


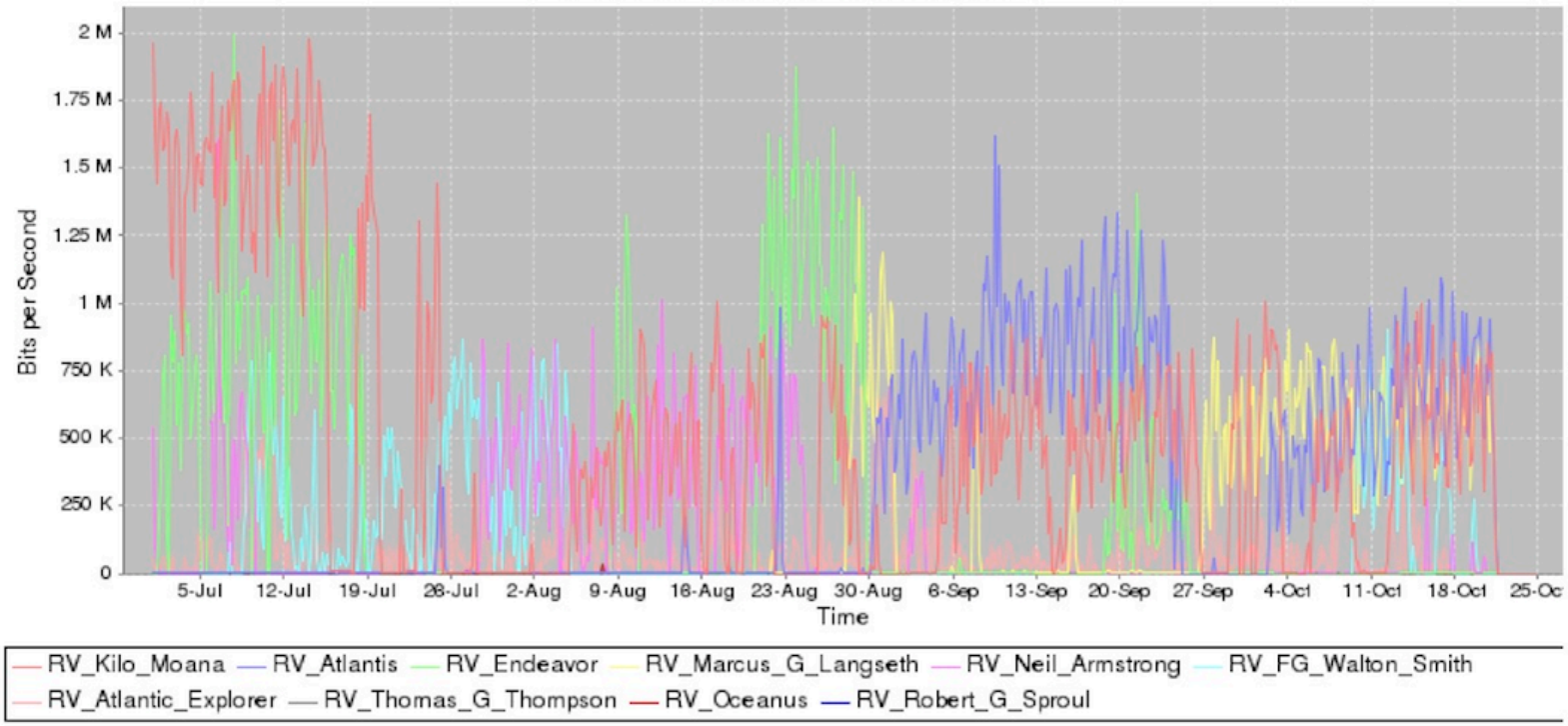

shore->ship Protocol Group bit/s for expanded vessels
1 Jul, 00:00 - 25 Oct, 00:00, interval=4 hr.
Bits per Second
6.5 M
6 M
5.5 M
5 M
4.5 M
4 M
3.5 M
3 M
2.5 M
2 M
1.5 M
1 M
500 K
0
5-Jul
12-Jul
19-Jul
28-Jul
2-Aug
9-Aug
16-Aug
23-Aug
30-Aug
6-Sep
13-Sep
20-Sep
27-Sep
4-Oct
11-Oct
18-Oct
25-Oc
Time
web
other-TCP
other-UDP
DNS
login
other-ICMP
snmp
other-IP
other-RTP
netbios
Other

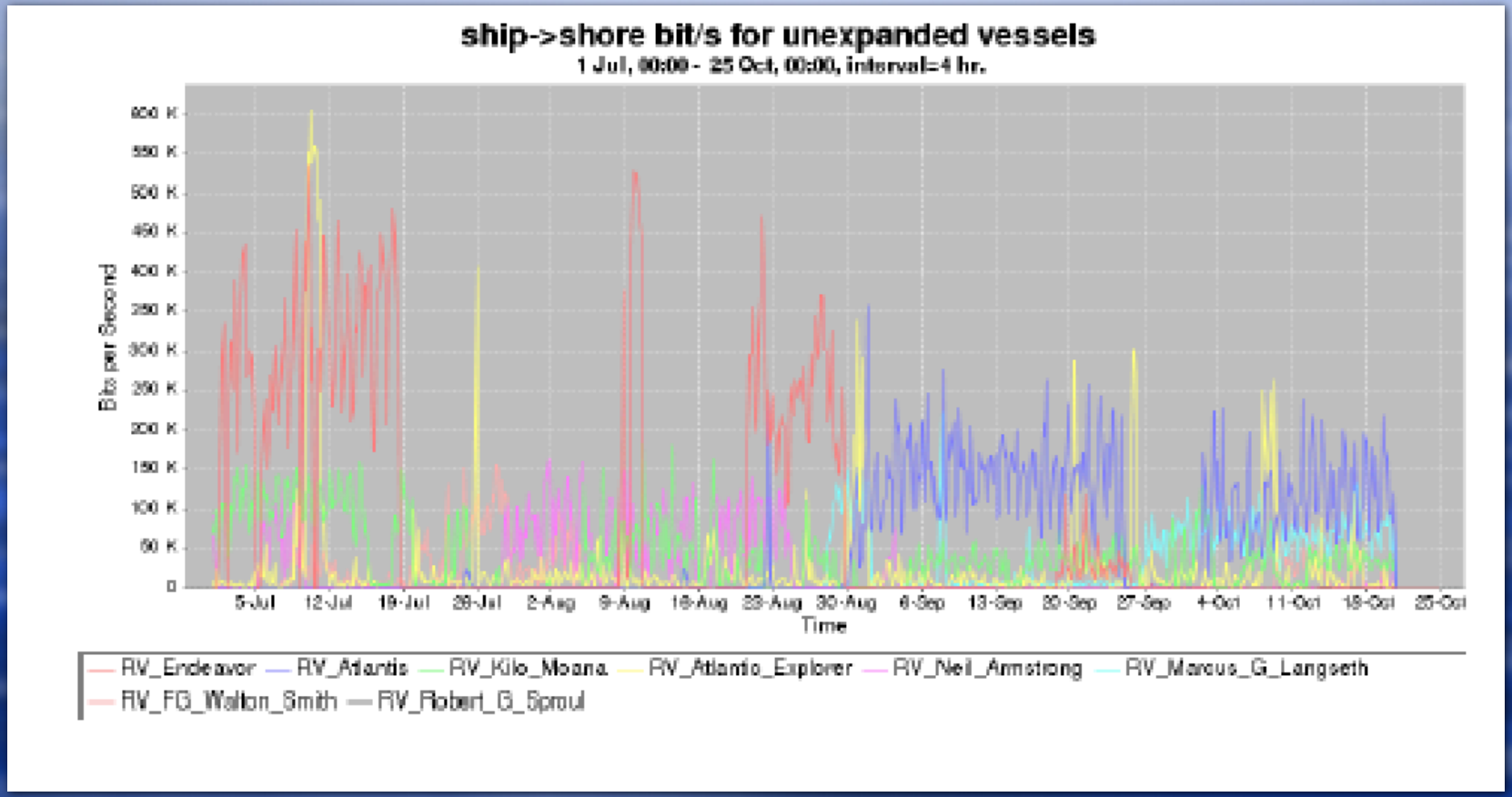

shore->ship bit/s for expanded vessels
1 Jul, 00:00 - 25 Oct, 00:00, interval=4 hr.
Bits per Second
5.5 M
5 M
4.5 M
4 M
3.5 M
3 M
2.5 M
2 M
1.5 M
1 M
500 K
0
5-Jul
12-Jul
19-Jul
26-Jul
2-Aug
9-Aug
16-Aug
23-Aug
30-Aug
6-Sep
13-Sep
20-Sep
27-Sep
4-Oct
11-Oct
18-Oct
25-Oct
Time
RV_Roger_Revelle
RV_Sikuliaq
RV_Sally_Ride

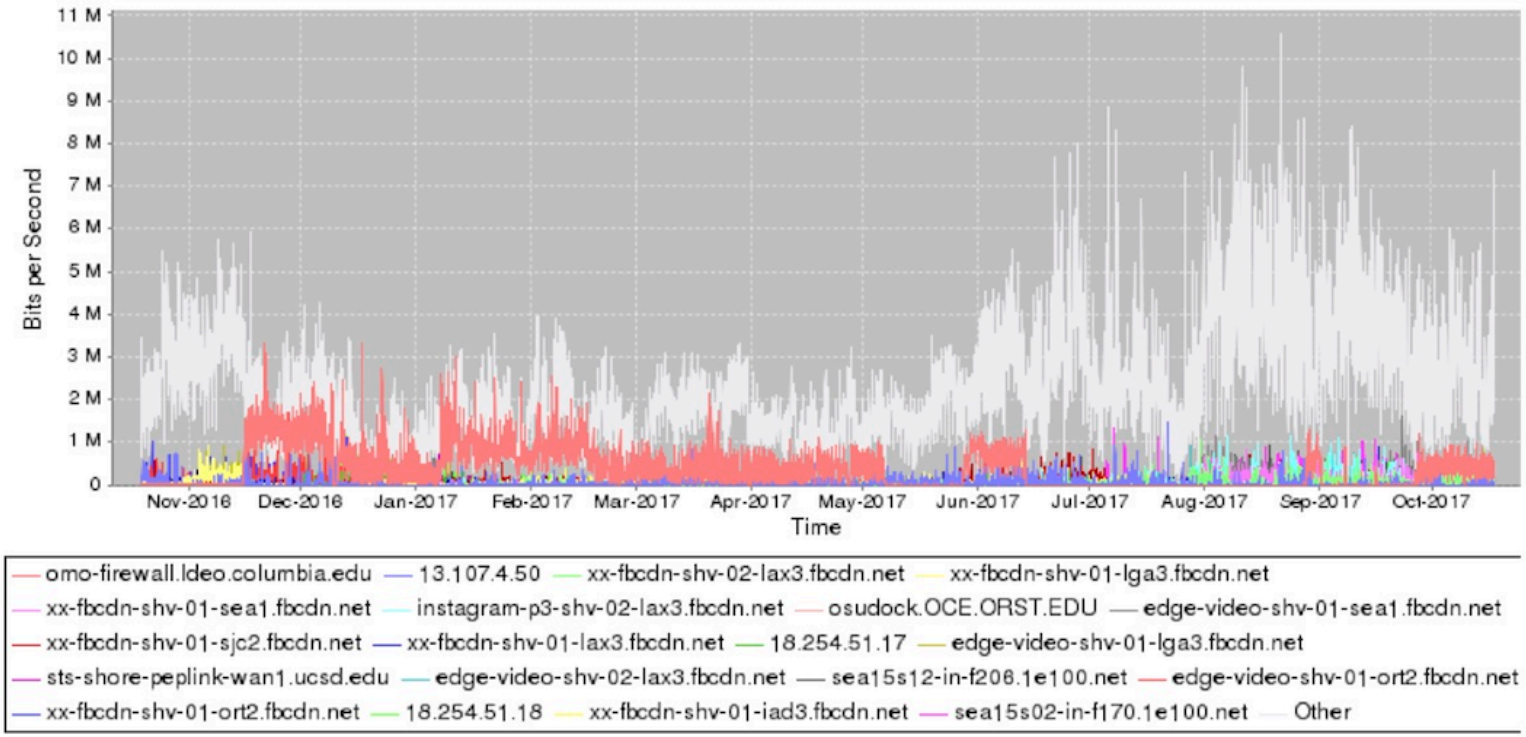

ship->shore Source Domains bit/s for expanded vessels
1 Jul, 00:00 - 25 Oct, 00:00, interval=4 hr.
Bits per Second
9 M
8.5 M
8 M
7.5 M
7 M
6.5 M
6 M
5.5 M
5 M
4.5 M
4 M
3.5 M
3 M
2.5 M
2 M
1.5 M
1 M
500 K
0
5-Jul
12-Jul
19-Jul
28-Jul
2-Aug
9-Aug
16-Aug
23-Aug
30-Aug
6-Sep
13-Sep
20-Sep
27-Sep
4-Oct
11-Oct
18-Oct
25-Oc
Time
ucsd.edu

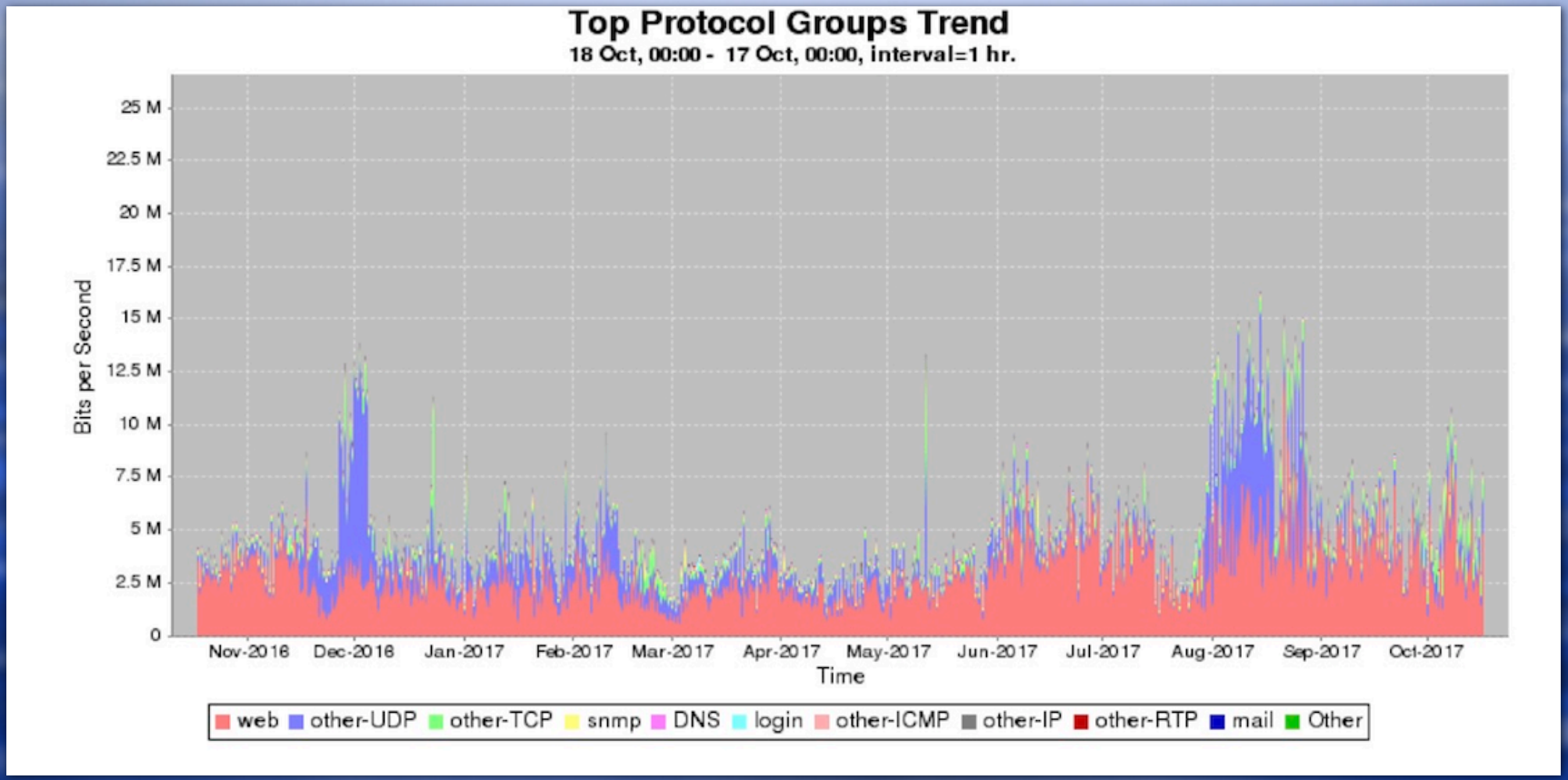

shore->ship bit/s for unexpanded vessels
1 Jul, 00:00 - 25 Oct, 00:00
RV_Robert_G_Sproul
RV_Oceanus
RV_Thomas_G_Thompson
RV_Atlantic_Explorer
RV_FG_Walton_Smith
RV_Neil_Armstrong
_Marcus_G_Langseth
RV_Endeavor
RV_Kilo_Moana
RV_Atlantis

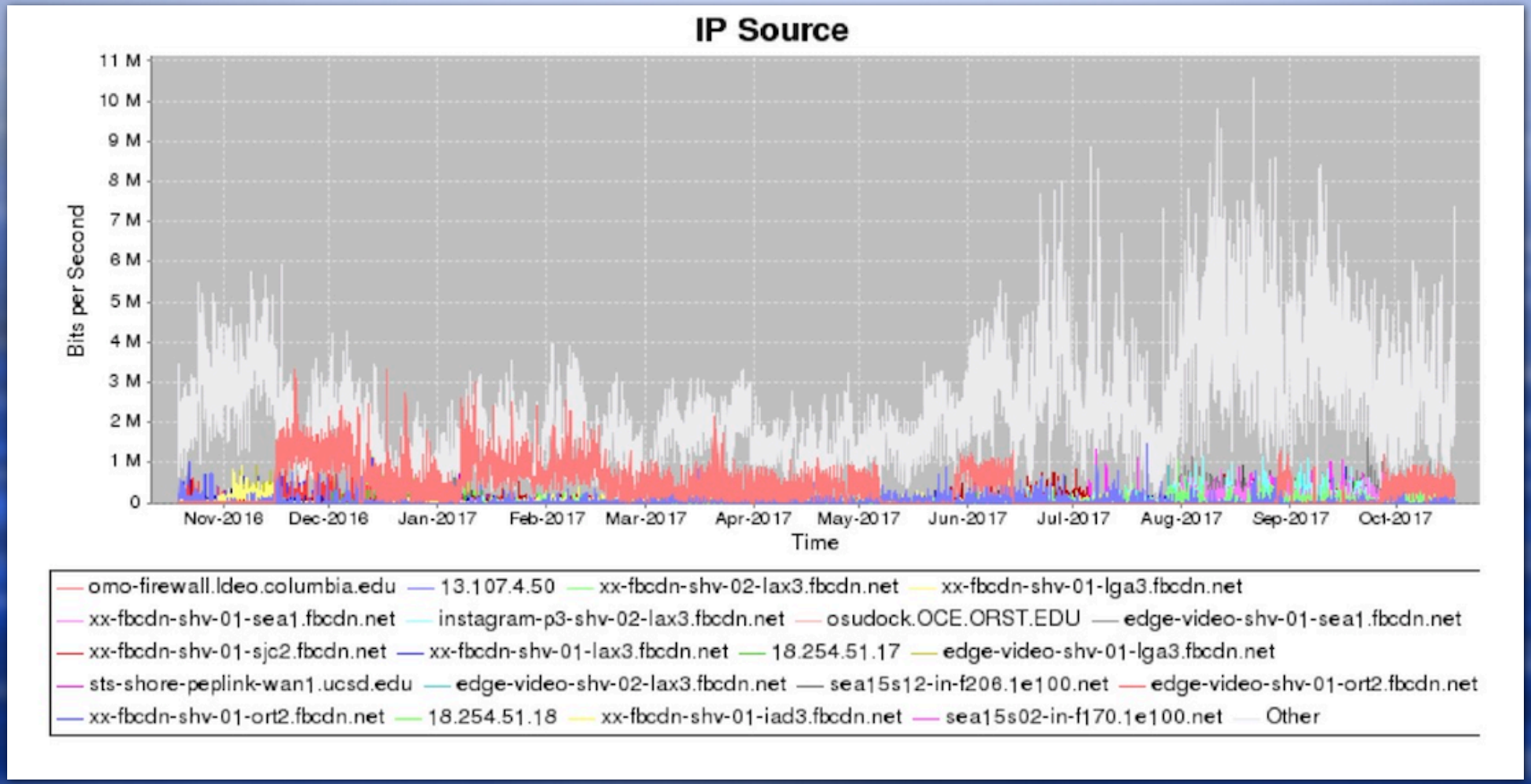

ship->shore bit/s for unexpanded vessels
1 Jul, 00:00 - 25 Oct, 00:00
RV_Robert_G_Sproul
RV_FG_Walton_Smith
V_Marcus_G_Langseth
RV_Neil_Armstrong
RV_Atlantic_Explorer
RV_Kilo_Moana
RV_Endeavor
RV_Atlantis

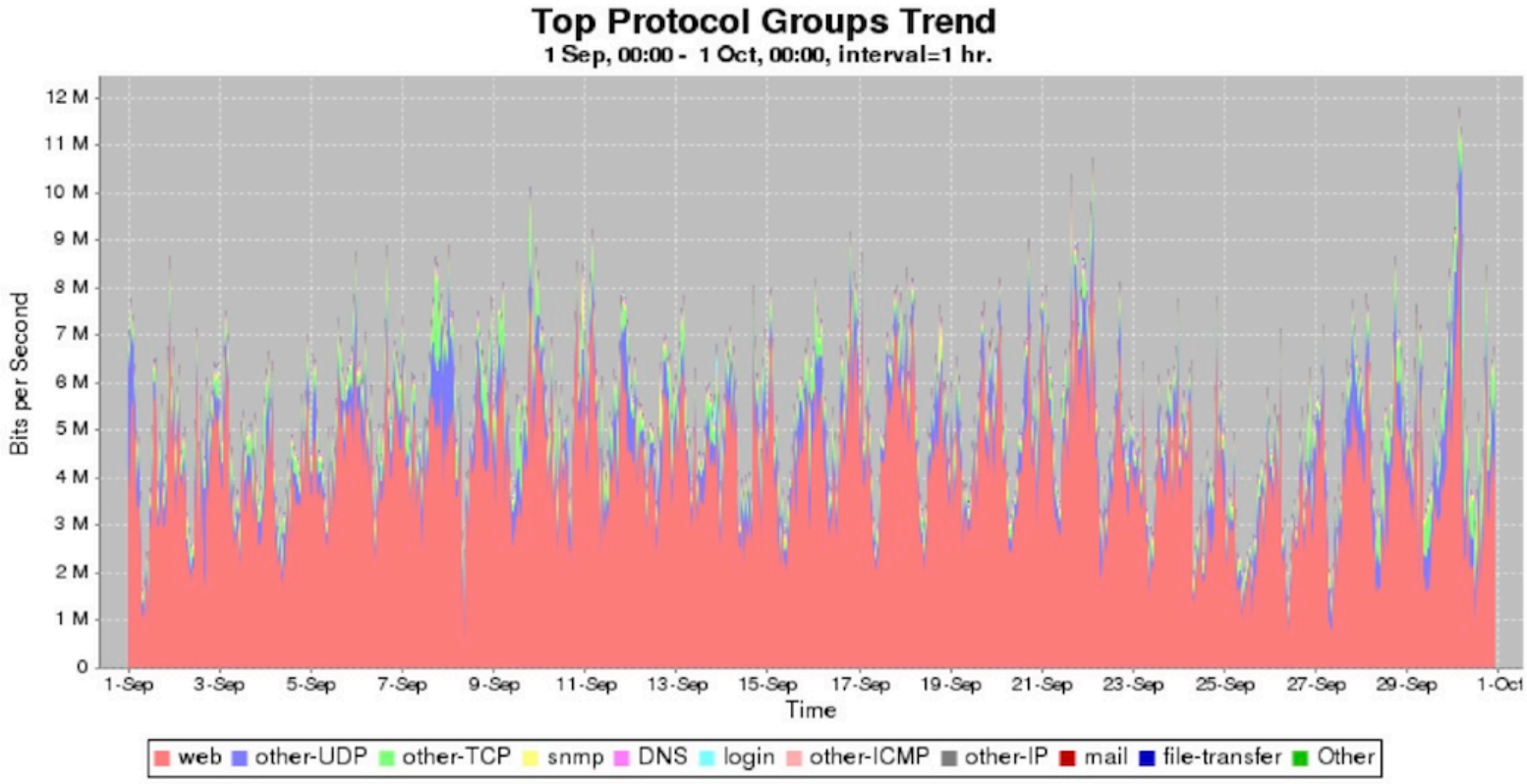

shore->ship bit/s for unexpanded vessels
1 Jul, 00:00 - 25 Oct, 00:00, interval=4 hr.
Bits per Second
2 M
1.75 M
1.5 M
1.25 M
1 M
750 K
500 K
250 K
0
5-Jul
12-Jul
19-Jul
28-Jul
2-Aug
9-Aug
16-Aug
23-Aug
30-Aug
6-Sep
13-Sep
20-Sep
27-Sep
4-Oct
11-Oct
18-Oct
25-Oc
Time
RV_Kilo_Moana
RV_Atlantis
RV_Endeavor
RV_Marcus_G_Langseth
RV_Neil_Armstrong
RV_FG_Walton_Smith
RV_Atlantic_Explorer
RV_Thomas_G_Thompson
RV_Oceanus
RV_Robert_G_Sproul


ship->shore bit/s for unexpanded vessels
1 Jul, 00:00 - 25 Oct, 00:00, interval=4 hr.
Bits per Second
600 K
550 K
500 K
450 K
400 K
350 K
300 K
250 K
200 K
150 K
100 K
50 K
0
5-Jul
12-Jul
19-Jul
26-Jul
2-Aug
9-Aug
16-Aug
23-Aug
30-Aug
6-Sep
13-Sep
20-Sep
27-Sep
4-Oct
11-Oct
18-Oct
25-Oct
Time
RV_Endeavor
RV_Atlantis
RV_Kilo_Moana
RV_Atlantic_Explorer
RV_Neil_Armstrong
RV_Marcus_G_Langseth
RV_FG_Walton_Smith
RV_Robert_G_Sproul


IP Source
11 M
10 M
9 M
8 M
7 M
6 M
5 M
4 M
3 M
2 M
1 M
0
Bits per Second
Nov-2016
Dec-2016
Jan-2017
Feb-2017
Mar-2017
Apr-2017
May-2017
Jun-2017
Jul-2017
Aug-2017
Sep-2017
Oct-2017
Time
omo-firewall.ldeo.columbia.edu
13.107.4.50
xx-fbcdn-shv-02-lax3.fbcdn.net
xx-fbcdn-shv-01-lga3.fbcdn.net
xx-fbcdn-shv-01-sea1.fbcdn.net
instagram-p3-shv-02-lax3.fbcdn.net
osudock.OCE.ORST.EDU
edge-video-shv-01-sea1.fbcdn.net
xx-fbcdn-shv-01-sjc2.fbcdn.net
xx-fbcdn-shv-01-lax3.fbcdn.net
18.254.51.17
edge-video-shv-01-lga3.fbcdn.net
sts-shore-peplink-wan1.ucsd.edu
edge-video-shv-02-lax3.fbcdn.net
sea15s12-in-f206.1e100.net
edge-video-shv-01-ort2.fbcdn.net
xx-fbcdn-shv-01-ort2.fbcdn.net
18.254.51.18
xx-fbcdn-shv-01-iad3.fbcdn.net
sea15s02-in-f170.1e100.net
Other


Top Protocol Groups Trend
18 Oct, 00:00 - 17 Oct, 00:00, interval=1 hr.
Bits per Second
25 M
22.5 M
20 M
17.5 M
15 M
12.5 M
10 M
7.5 M
5 M
2.5 M
0
Nov-2016
Dec-2016
Jan-2017
Feb-2017
Mar-2017
Apr-2017
May-2017
Jun-2017
Jul-2017
Aug-2017
Sep-2017
Oct-2017
Time
web
other-UDP
other-TCP
snmp
DNS
login
other-ICMP
other-IP
other-RTP
mail
Other


IP Source
11 M
10 M
9 M
8 M
7 M
6 M
5 M
4 M
3 M
2 M
1 M
0
Bits per Second
Nov-2016
Dec-2016
Jan-2017
Feb-2017
Mar-2017
Apr-2017
May-2017
Jun-2017
Jul-2017
Aug-2017
Sep-2017
Oct-2017
Time
omo-firewall.ldeo.columbia.edu
13.107.4.50
xx-fbcdn-shv-02-lax3.fbcdn.net
xx-fbcdn-shv-01-lga3.fbcdn.net
xx-fbcdn-shv-01-sea1.fbcdn.net
instagram-p3-shv-02-lax3.fbcdn.net
osudock.OCE.ORST.EDU
edge-video-shv-01-sea1.fbcdn.net
xx-fbcdn-shv-01-sjc2.fbcdn.net
xx-fbcdn-shv-01-lax3.fbcdn.net
18.254.51.17
edge-video-shv-01-lga3.fbcdn.net
sts-shore-peplink-wan1.ucsd.edu
edge-video-shv-02-lax3.fbcdn.net
sea15s12-in-f206.1e100.net
edge-video-shv-01-ort2.fbcdn.net
xx-fbcdn-shv-01-ort2.fbcdn.net
18.254.51.18
xx-fbcdn-shv-01-iad3.fbcdn.net
sea15s02-in-f170.1e100.net
Other


Top Protocol Groups Trend
1 Sep, 00:00 - 1 Oct, 00:00, interval=1 hr.
Bits per Second
12 M
11 M
10 M
9 M
8 M
7 M
6 M
5 M
4 M
3 M
2 M
1 M
0
1-Sep
3-Sep
5-Sep
7-Sep
9-Sep
11-Sep
13-Sep
15-Sep
17-Sep
19-Sep
21-Sep
23-Sep
25-Sep
27-Sep
29-Sep
1-Oct
Time
web
other-UDP
other-TCP
snmp
DNS
login
other-ICMP
other-IP
mail
file-transfer
Other

18 MHz Lessons Learned

- Increased bandwidth enhances science mission success
- Improves scientific party and crew morale and welfare
- Reduces burden on shipboard computer resource staff
- Enables shore based management of shipboard networking equipment and other shipboard systems
- Increases “goodput” Lowers retransmissions.
- HSN scalable architecture verified and tailored per use case (JASON on Revelle, CASPER on Sally Ride)

“Captain – The crew were given the choice of better food or better Internet.

All but the cook chose better Internet.”

-Chief Mate Quicksort, RV Petasail

Thank you for your attention.