

LHCONE L3VPN

Status update

Mian Usman

LHCOPN/ONE meeting – Amsterdam

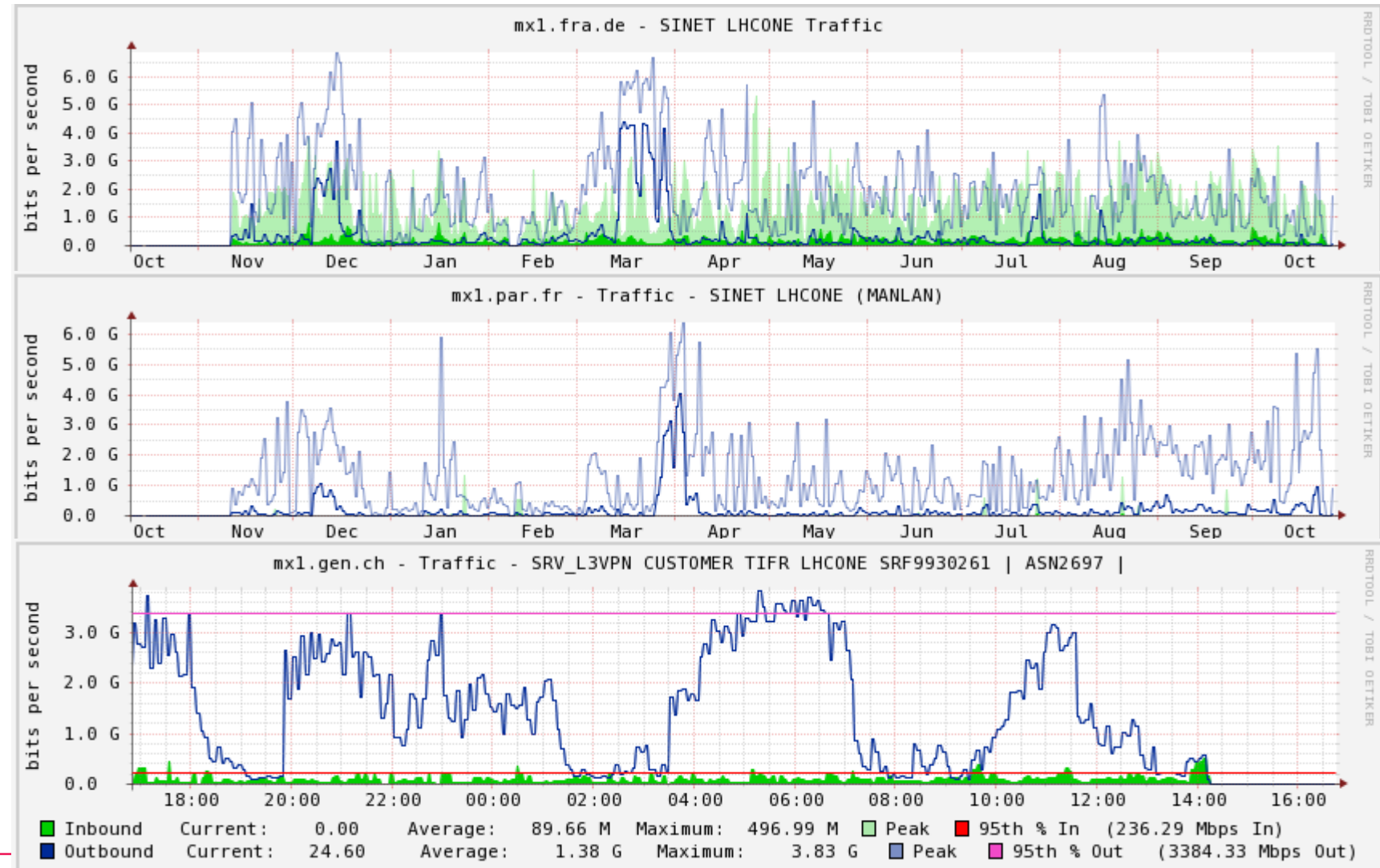
28th – 29th Oct 2015

World regions

- Asia
- Europe
- North America
- Latin America
- GÉANT LHCONE NetFlow Data

 : IPv6 enabled

- TIFR Peering with GÉANT LHCONE VRF
- LHCONE VRF now setup in TEIN and peering with GÉANT LHCONE vrf
- No routes being advertised by TEIN
- THAIEN likely to be the first NREN to peer with TEIN LHCONE
- PERN likely to join LHCONE as well



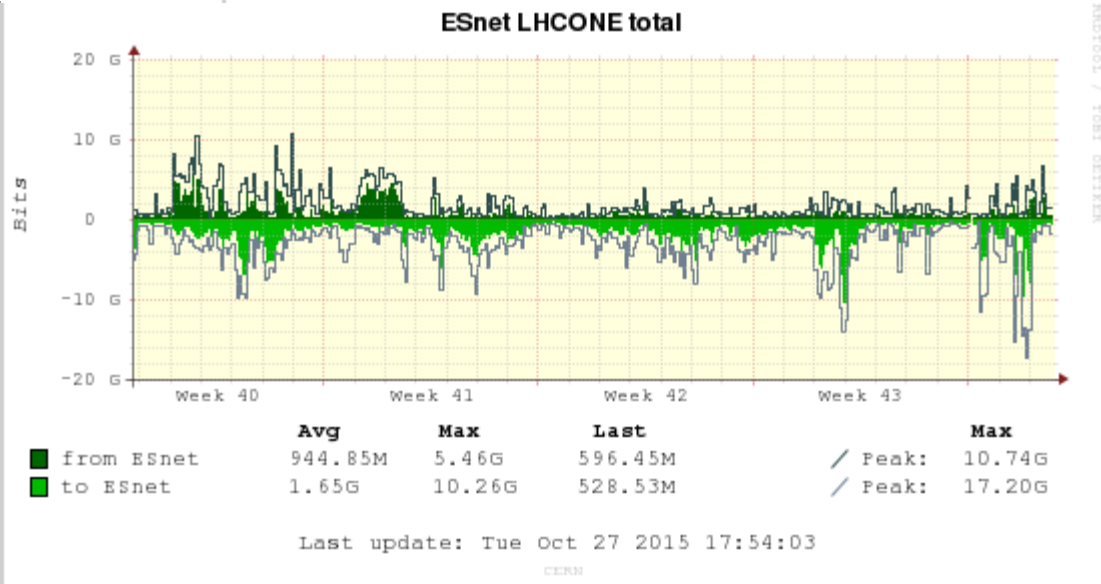
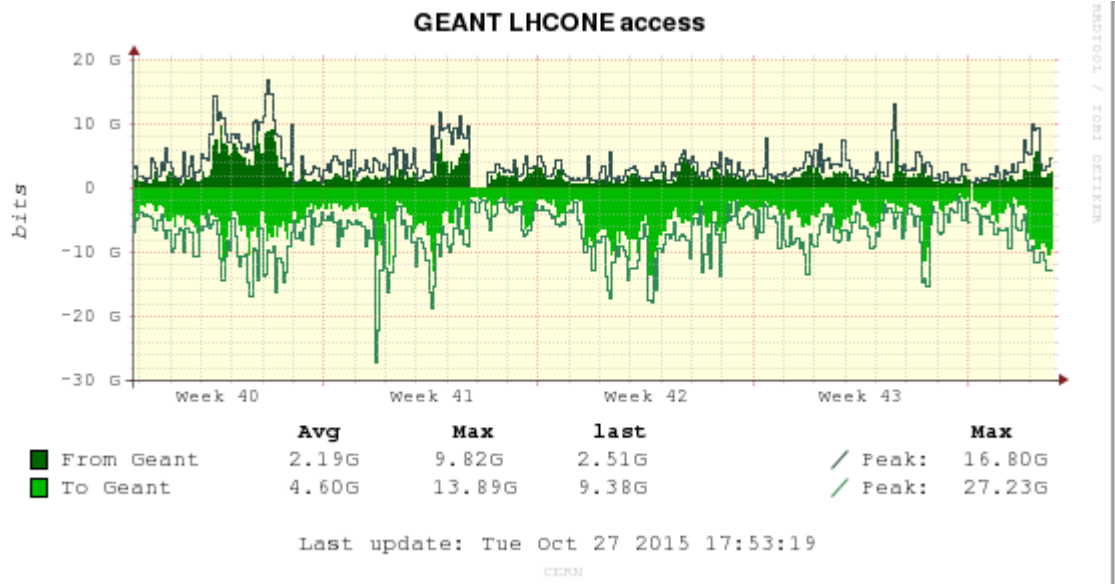
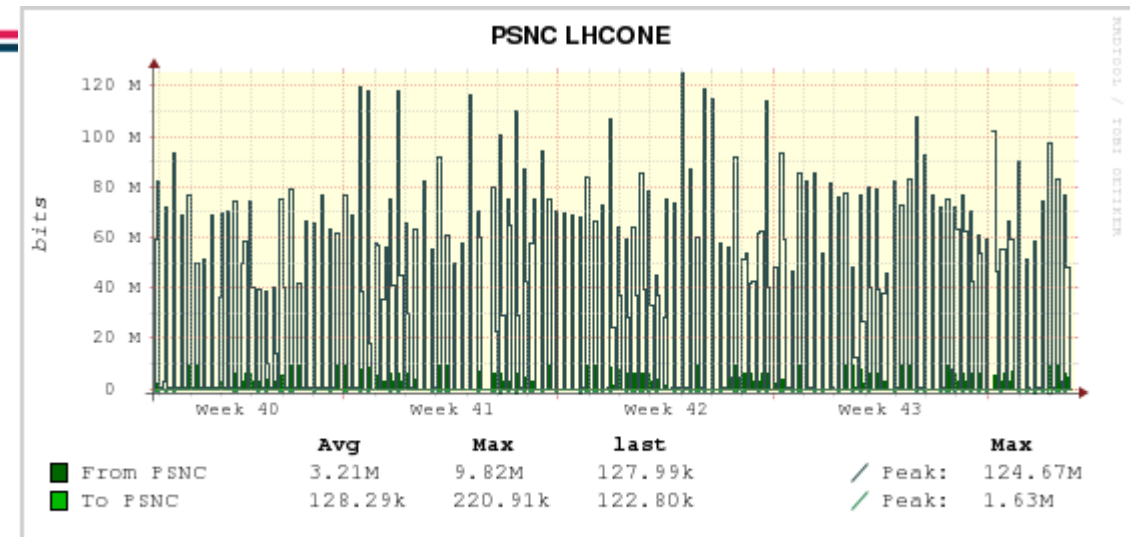
- LHCONE IP Service in Europe is deployed in:

- ARNES (Slovenia)
- CERN/CERNLight (Switzerland)
- CESnet (Czech Republic)
- DFN (Germany)
- GARR (Italy)
- GÉANT
- ~~NORDUNet~~
- ~~NORDUNet~~ (France)
- ~~RENATER~~ (Romania)
- ~~RENATER~~ (Romania)
- ~~BRFnet~~ (Bulgaria)
- SURFnet (Netherlands)

- RENs in these countries connect:

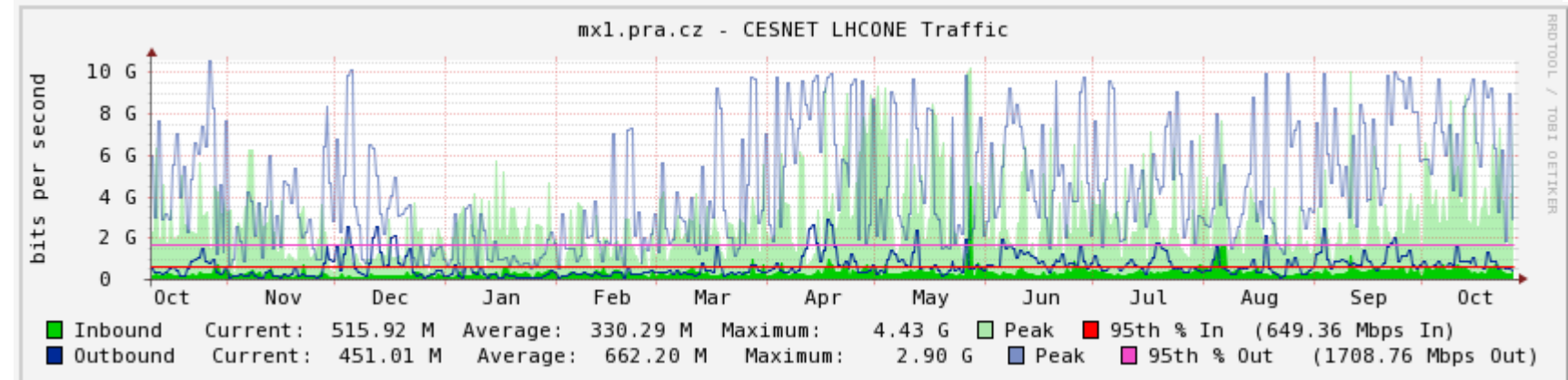
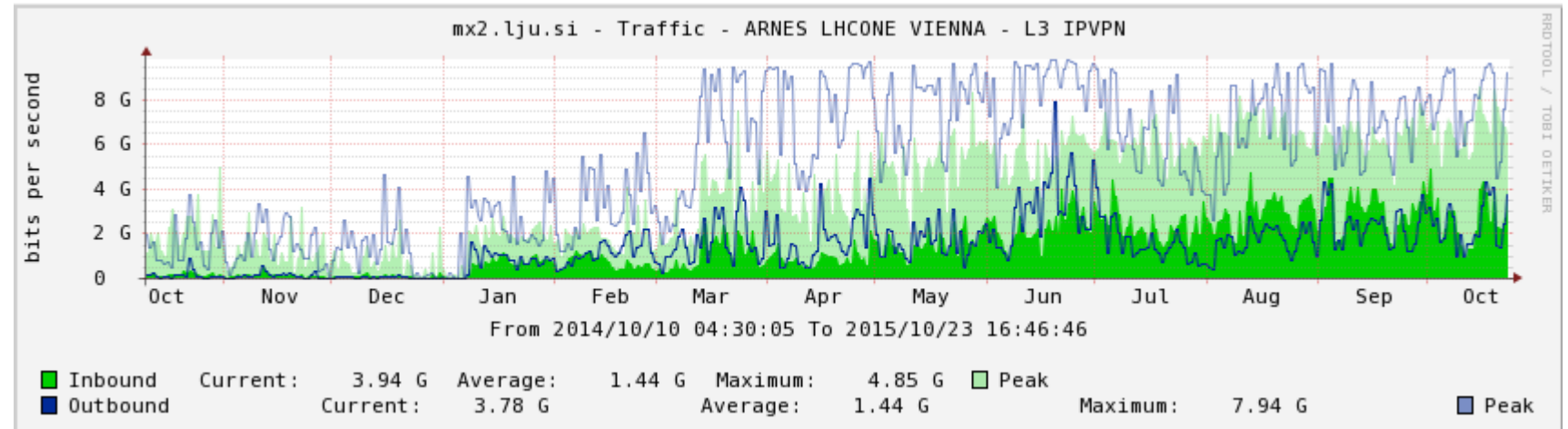
- Six Tier 1s in Europe to LHCONE
- 30 Tier 2s in Europe to LHCONE
- Indian T2
- Russian T2s (only to NORDUNet/CERN)

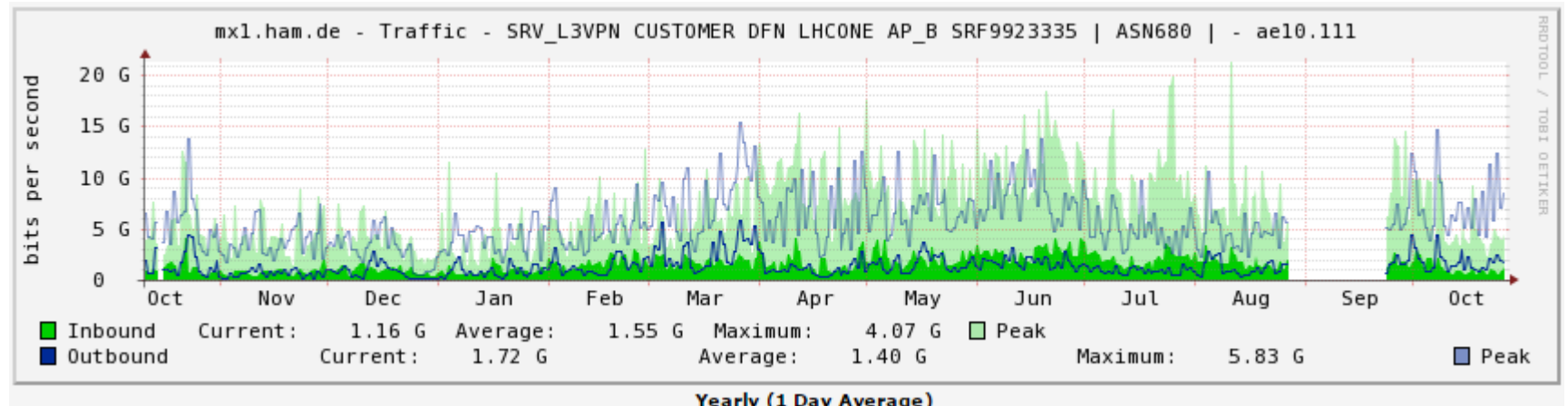
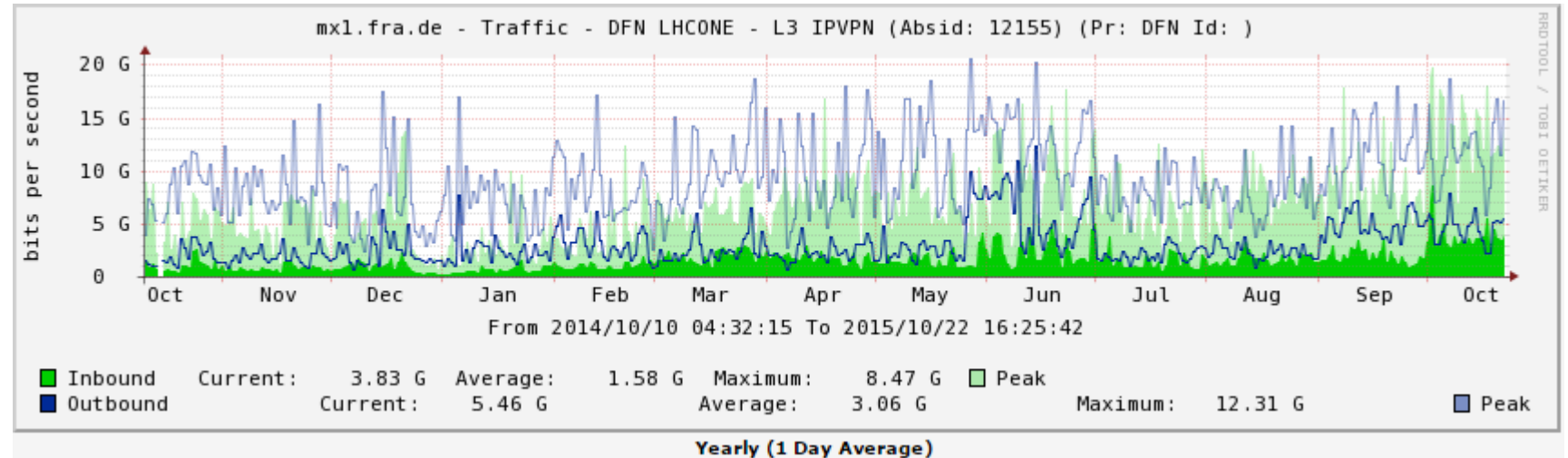
- Tier1 is now directly connected to GÉANT and ESnet with 100G interfaces
 - 1 x 100G GEANT
 - 2 x 100G ESnet
- The peering with GÉANT is now direct, not through CERNLight
- CERNLight now peers with PSNC (Polish NREN)

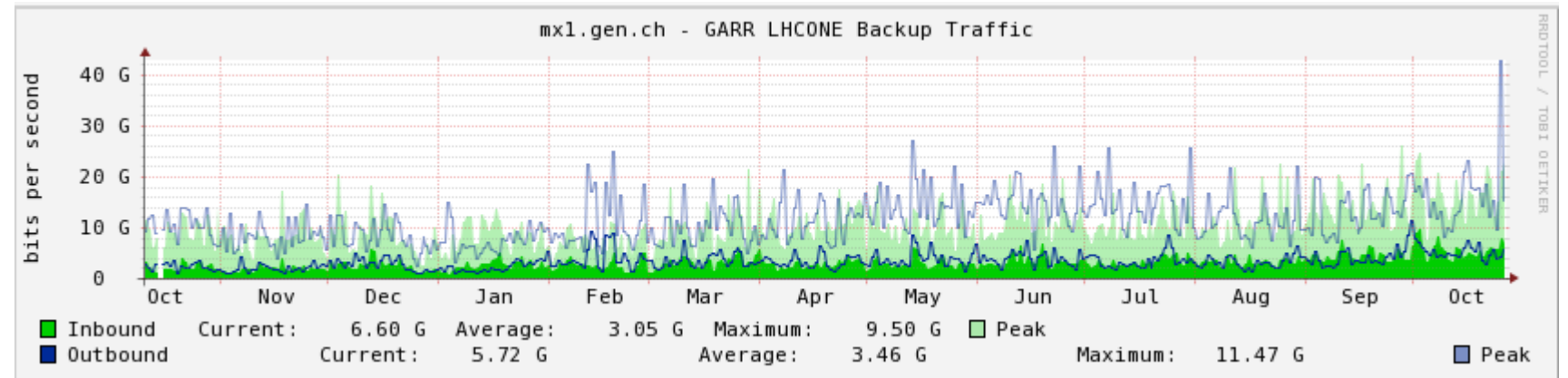
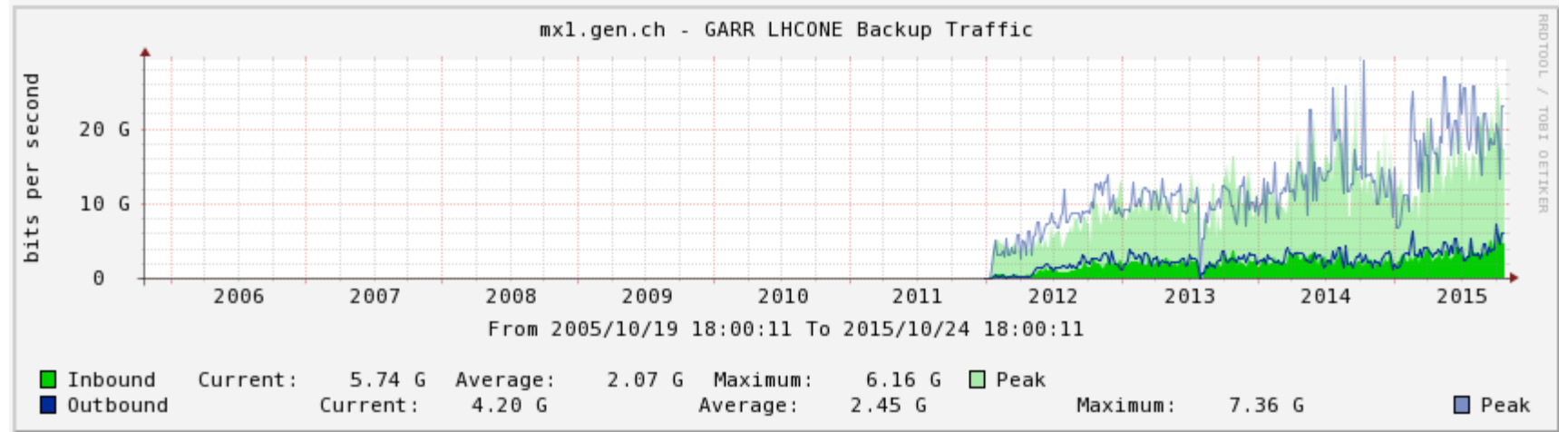


arnes 

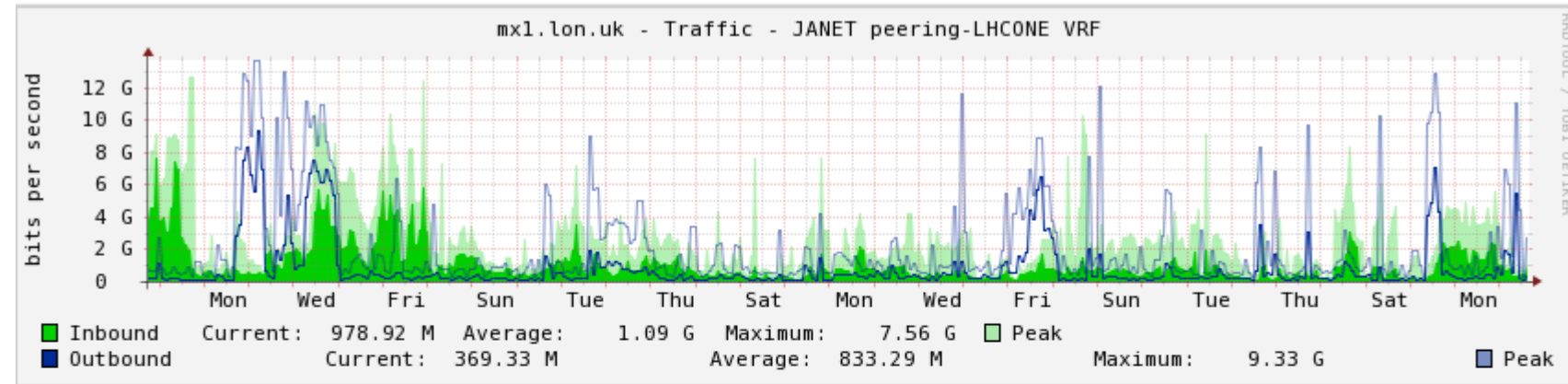
IPv6



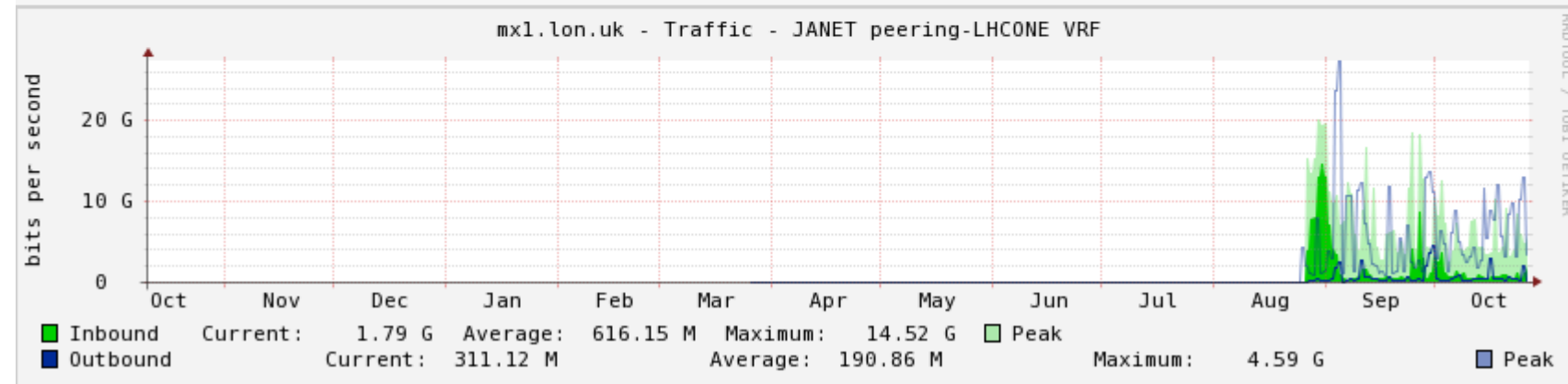




- VRF established on the JANET network
- Configuration completed during April/May '15
- Imperial College is the first site to connect
 - Currently in production



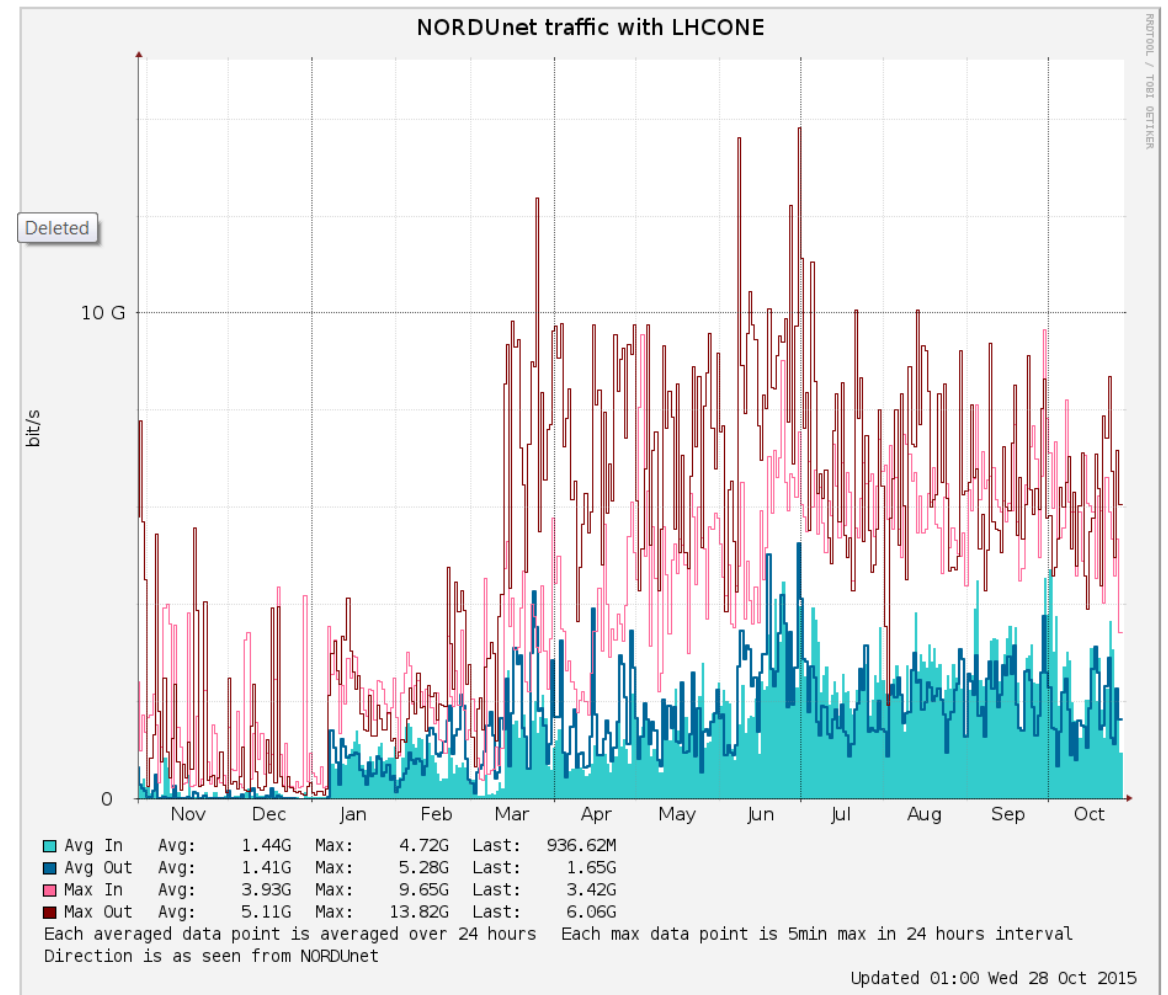
Monthly (2 Hour Average)



Yearly (1 Day Average)

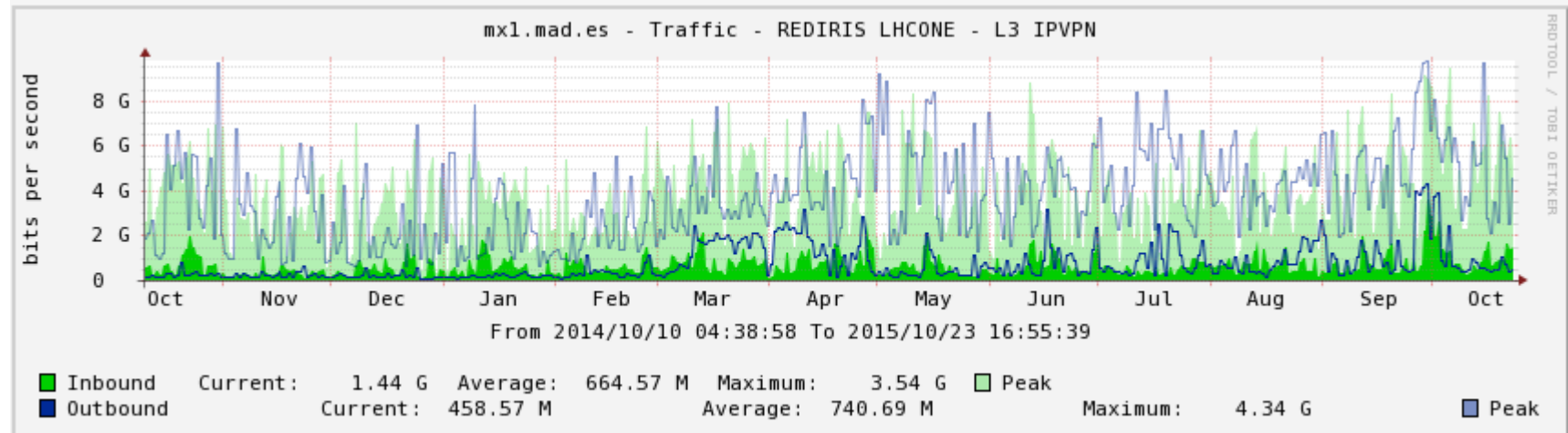


- Moved the LHCONE connection to GÉANT from Copenhagen to London on 100G port
- The LHCONE connection to ESNNet and Internet2 is at MANLAN via ANA-200G
 - The peering is on the NORDUNet router in MANLAN

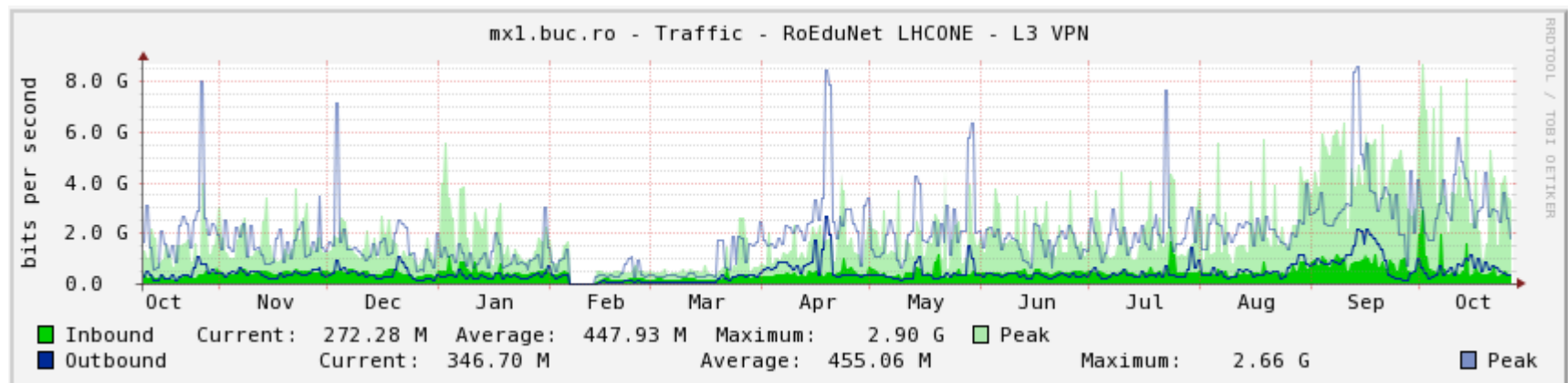


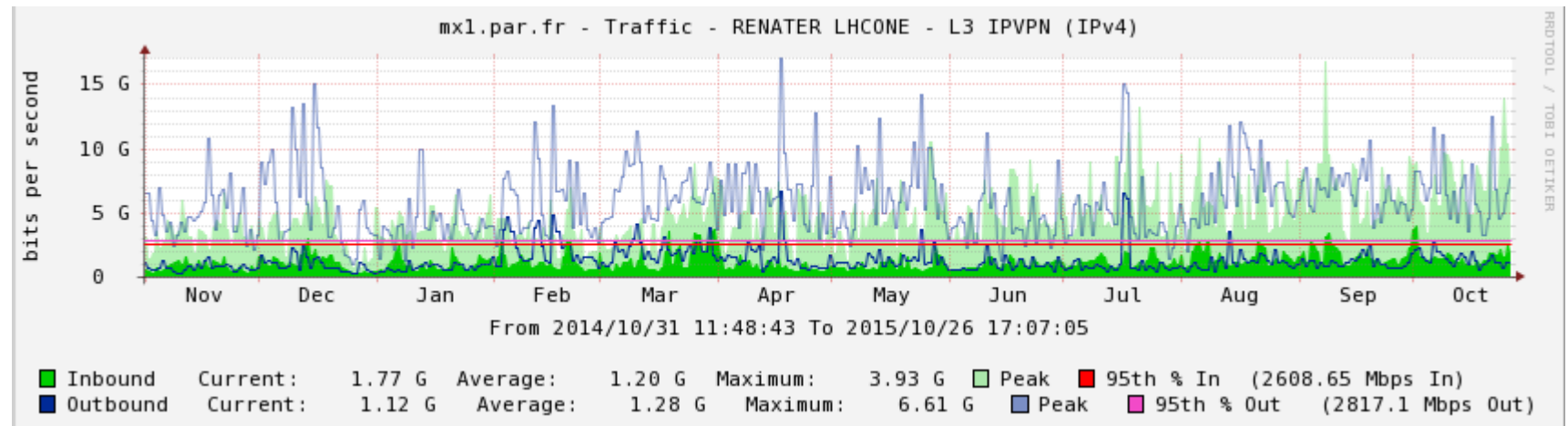
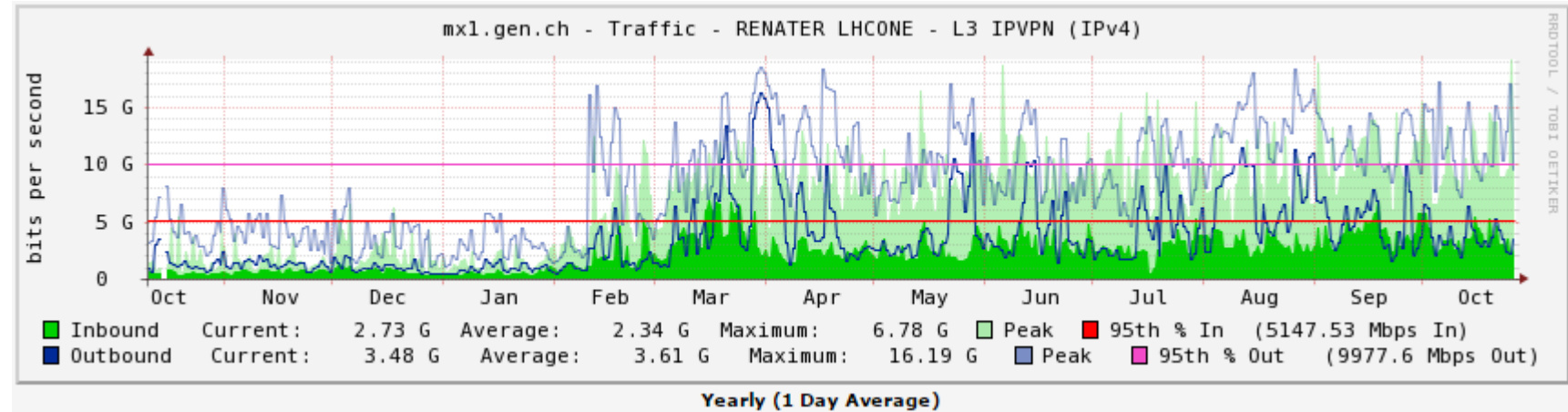


RedIRIS

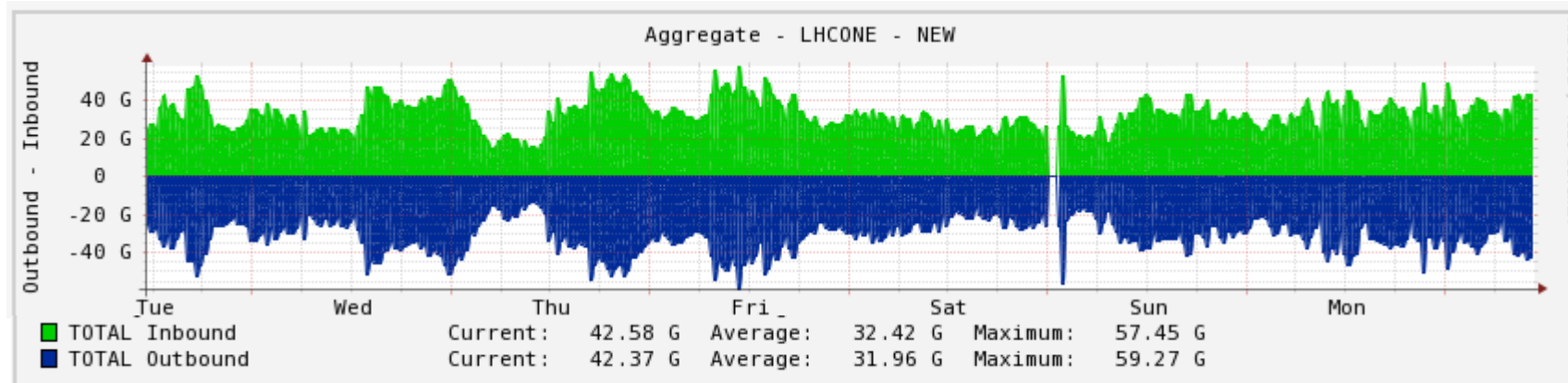


Yearly (1 Day Average)

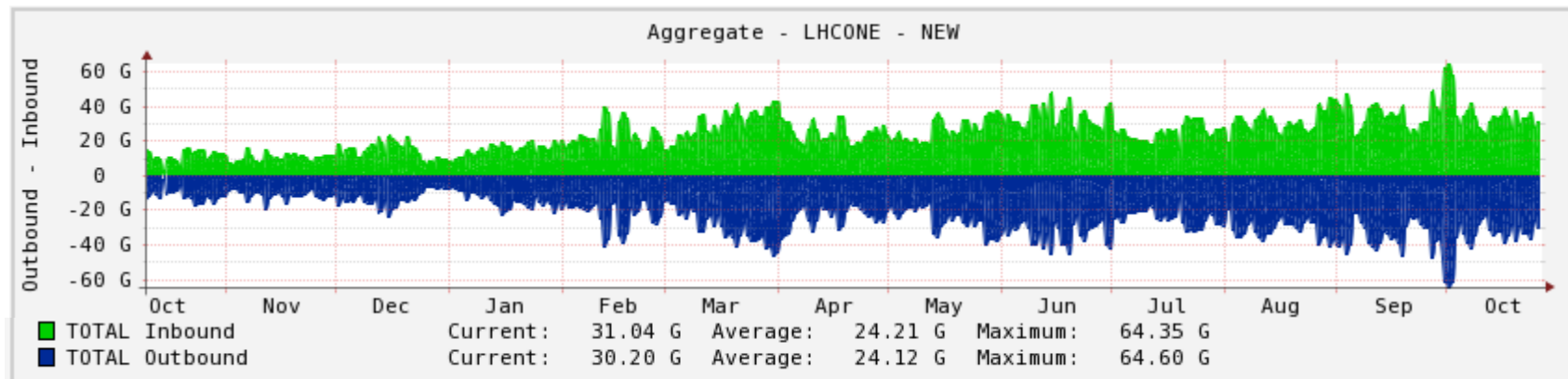




Weekly



Yearly



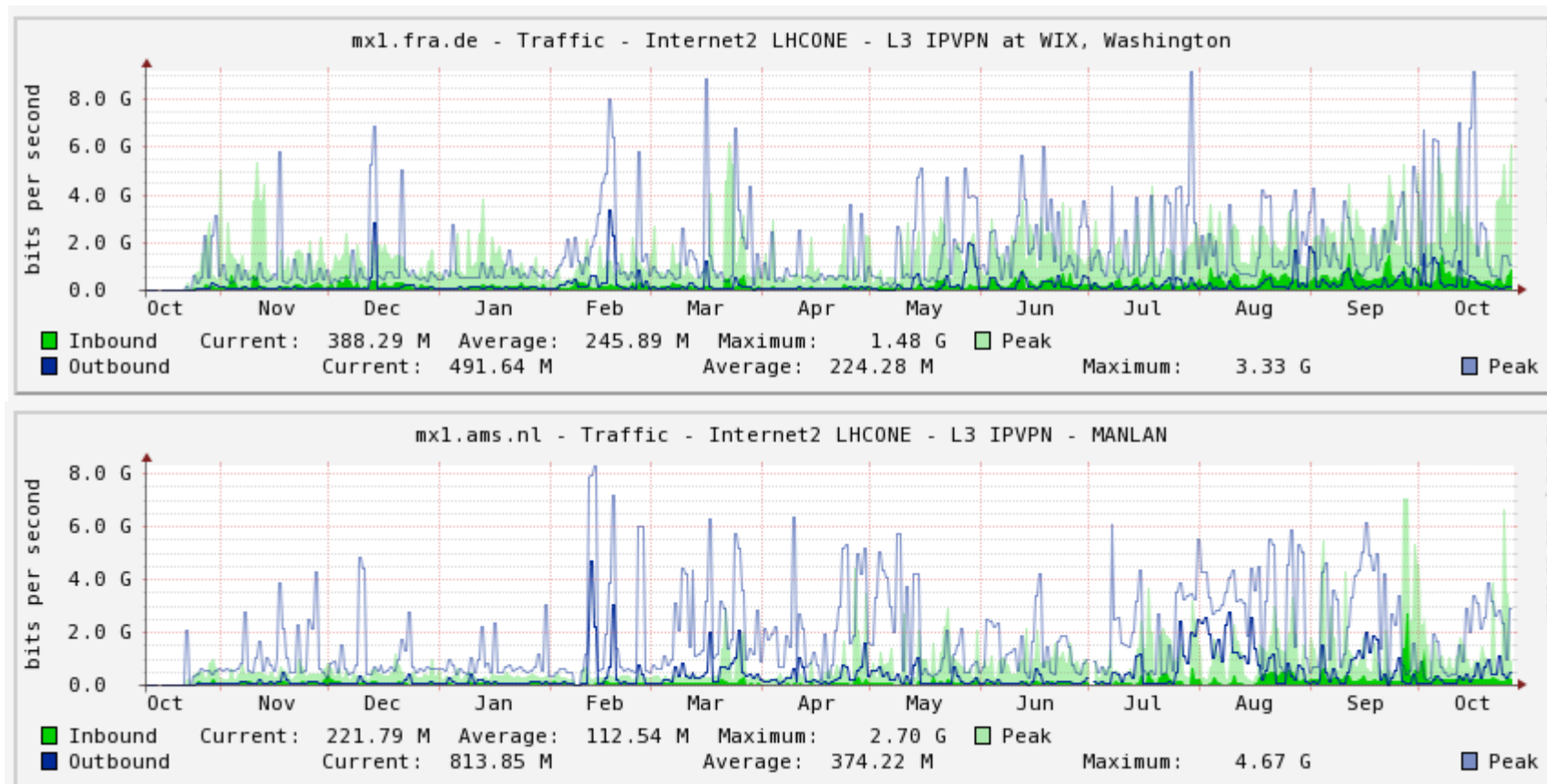


- Now peering with GÉANT in the new ESnet PoPs in Europe
 - LON, AMS, GVA
 - 3 x 100G
- Peering with CERN in GVA
 - 2 x 100G
- Sites connected
 - ARLINGTON(18515)
 - BNL(43)
 - FNAL(3152)
 - SLAC(3671)
 - UIUC(38)
 - UNL(7896)
 - OPTIPUTER(26397)
 - AGLT2(229)
- DNIC-(798) - Headquarters, USAISC,US
- IHEP-SU(2643) AS,RU
- ERX-ERNET(2697) Education and Research Network,IN
- JINR(2875) JINR/HEPNET,RU
- RUNNET(3267) State Institute of Information Technologies and,RU
- NERDCNET(6356) - Northeast Regional Data Center,US
- OPTIPUTER(26397) - The Regents of the University of California - University of California, San Diego.,US
- GRIDPNI(29493) Federal State Budget Institution Petersburg Institute of Nuclear Physics of B.P. Konstantinov,RU
- RWTH(47610) RWTH Aachen University,DE
- NKN-CORE-NW(55824) NKN Core Network,IN



	Bytes	Percent of Total	One Month Change	One Year Change
OSCARS	11.81 PB	35.0%	+20.7%	+67.7%
LHCONE	8 PB	23.7%	+21.3%	-
Normal traffic	13.97 PB	41.3%	+3.58%	+10.0%
Total	33.78 PB		+13.8%	+51.5%

- Traffic between Internet2 and GÉANT LHCONE VRFs



- Upgraded to 100G to PacificWave Seattle
- Upgraded to 100G to MANLAN
- Sites news:
 - T2 at University of Victoria upgraded to 100G
 - T2 at University of Alberta decommissioned
 - Resources absorbed by Univ. Victoria and SFU
- <http://weathermap.canarie.ca/lhcone/index.html>

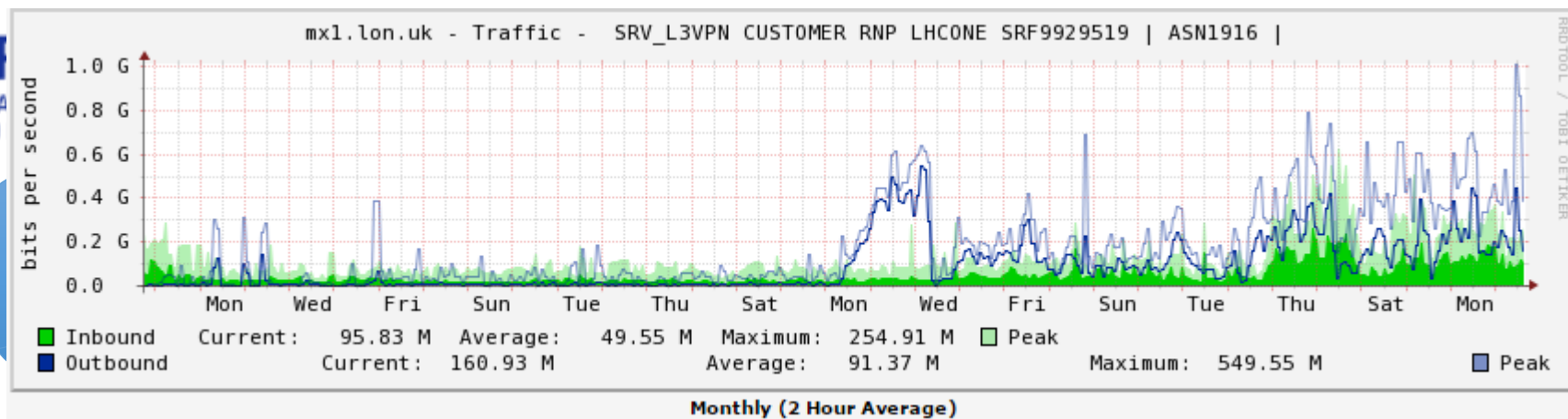
canarie



- Configuration of the peering from GÉANT VRF to RNP VRF completed
 - Peering point in London, both IPv4 and IPv6
- No VRF in RedCLARA for the time being
 - Just delivering the L2 circuit from GÉANT to RNP
 - VRF creation will be investigated if more NRENs in L.A. request to connect
- Circuit and BGP peering established in May '15
 - CBPF and GRIPER/SAMPA Brazil now connected to RNP's VRF



IPv6



GÉANT LHCONE Overall



BANDWIDTH

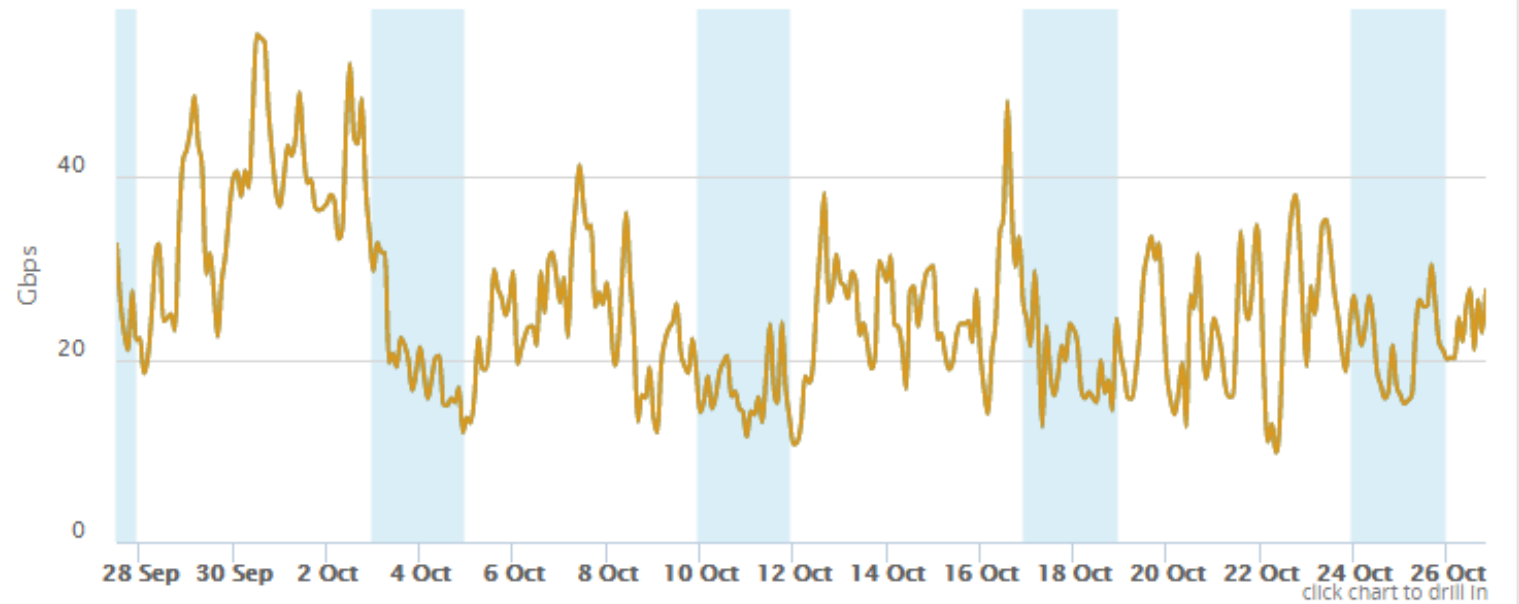
PEAK
130.8 Gbps

95TH PCTL. RECV
40.9 Gbps

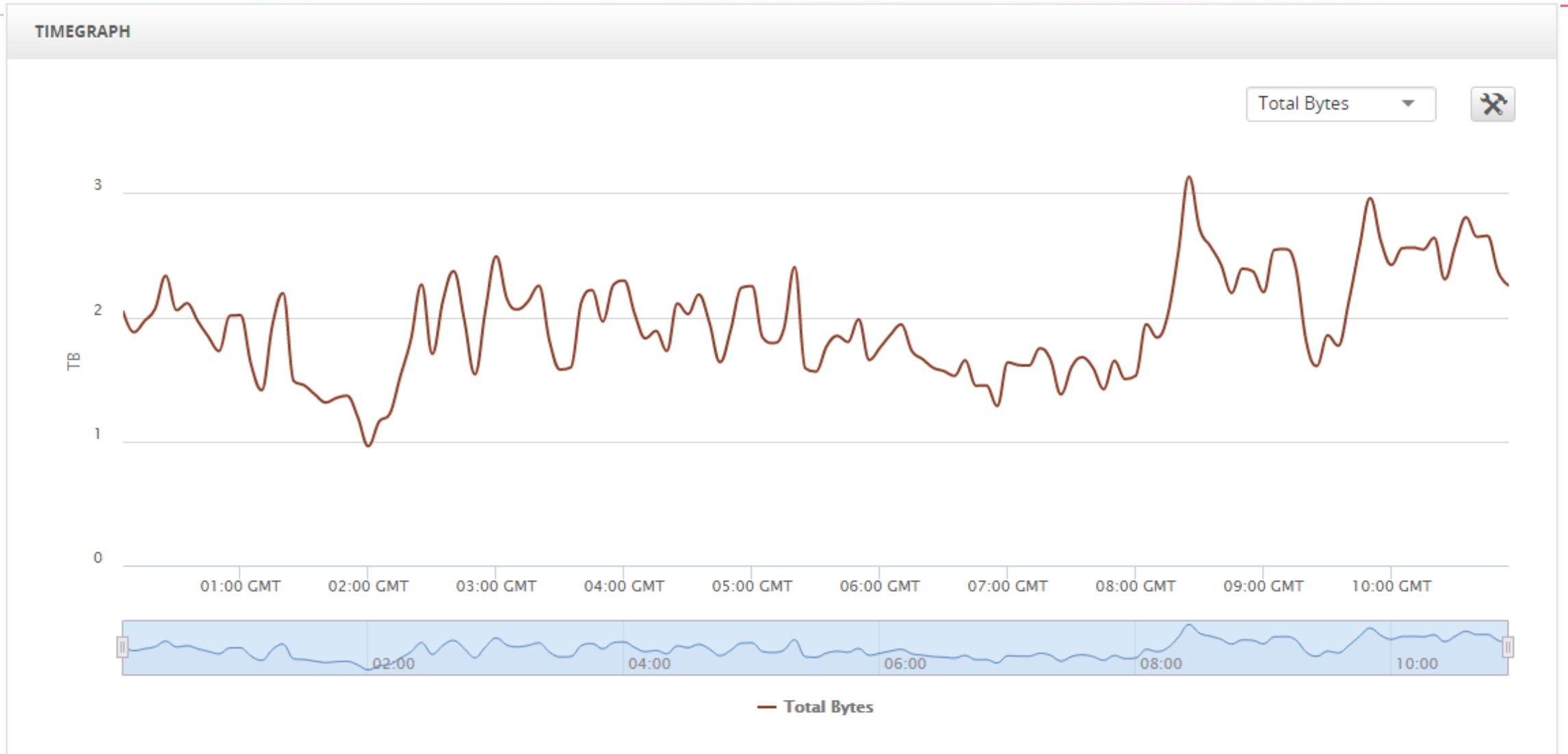
PEAK RECV
65.4 Gbps

95TH PCTL. SENT
40.9 Gbps

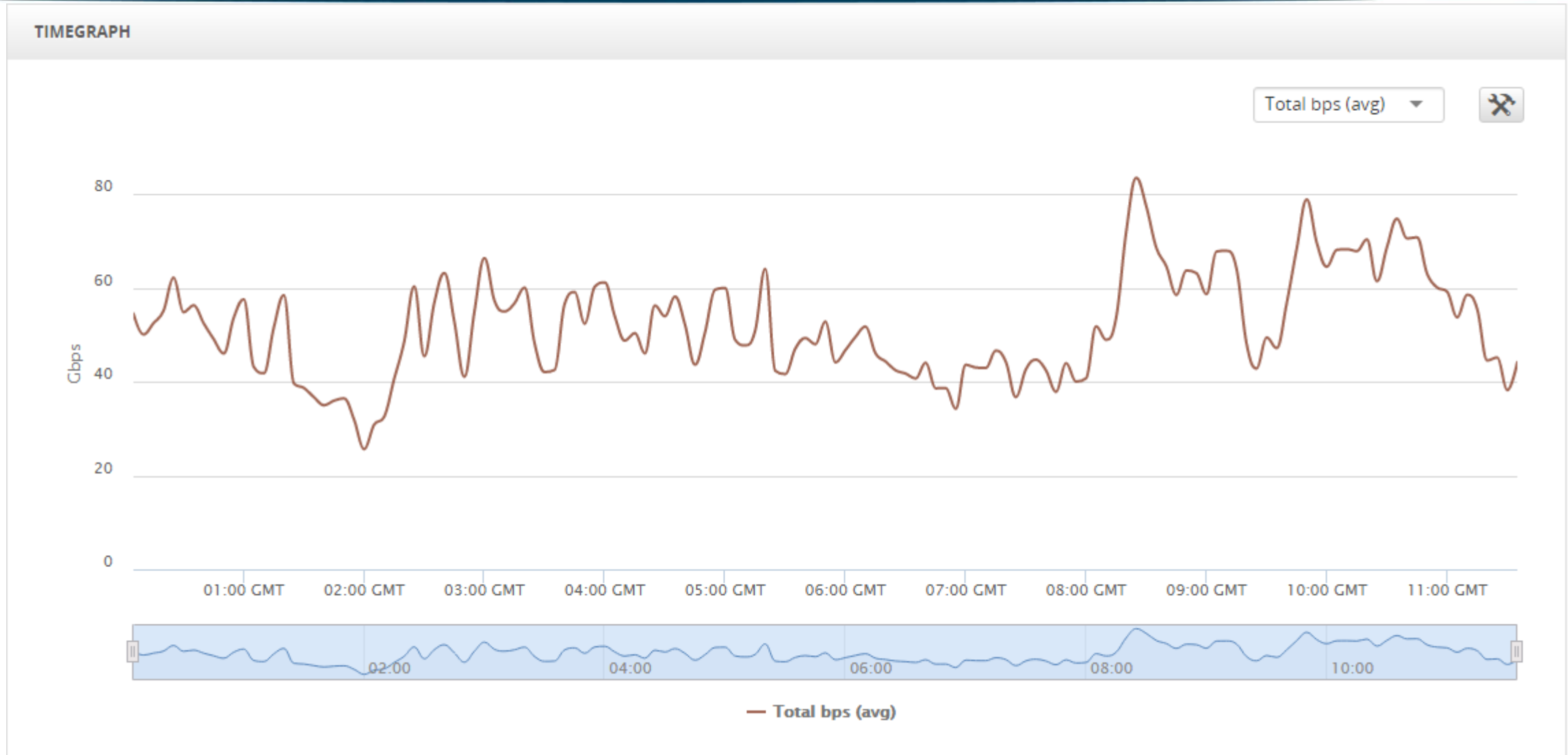
PEAK SENT
65.4 Gbps



GÉANT Terabytes Transferred



GÉANT Total LHCONE Gbps



GÉANT LHCONE Traffic Between Peers



Peer [L]

Renater-2200

GARR-137

CERN-513

Internet2-11537 DFN-680

ESNet-293

JANe...

ER...

Re...

Peer [R]

Renater-2200

GARR-137

DFN-680

ER... JANe...

Internet2-11537 ...

CERN-513

ESNet-293

Re...

GÉANT All LHCONE Traffic Flows



Origin ASN [L]

alpha » size »

Fermi... GARR-137

ER... IN2P3-789

CERN-513

KIT-34878

Univer...

Cal...

JANe...

N...

U...

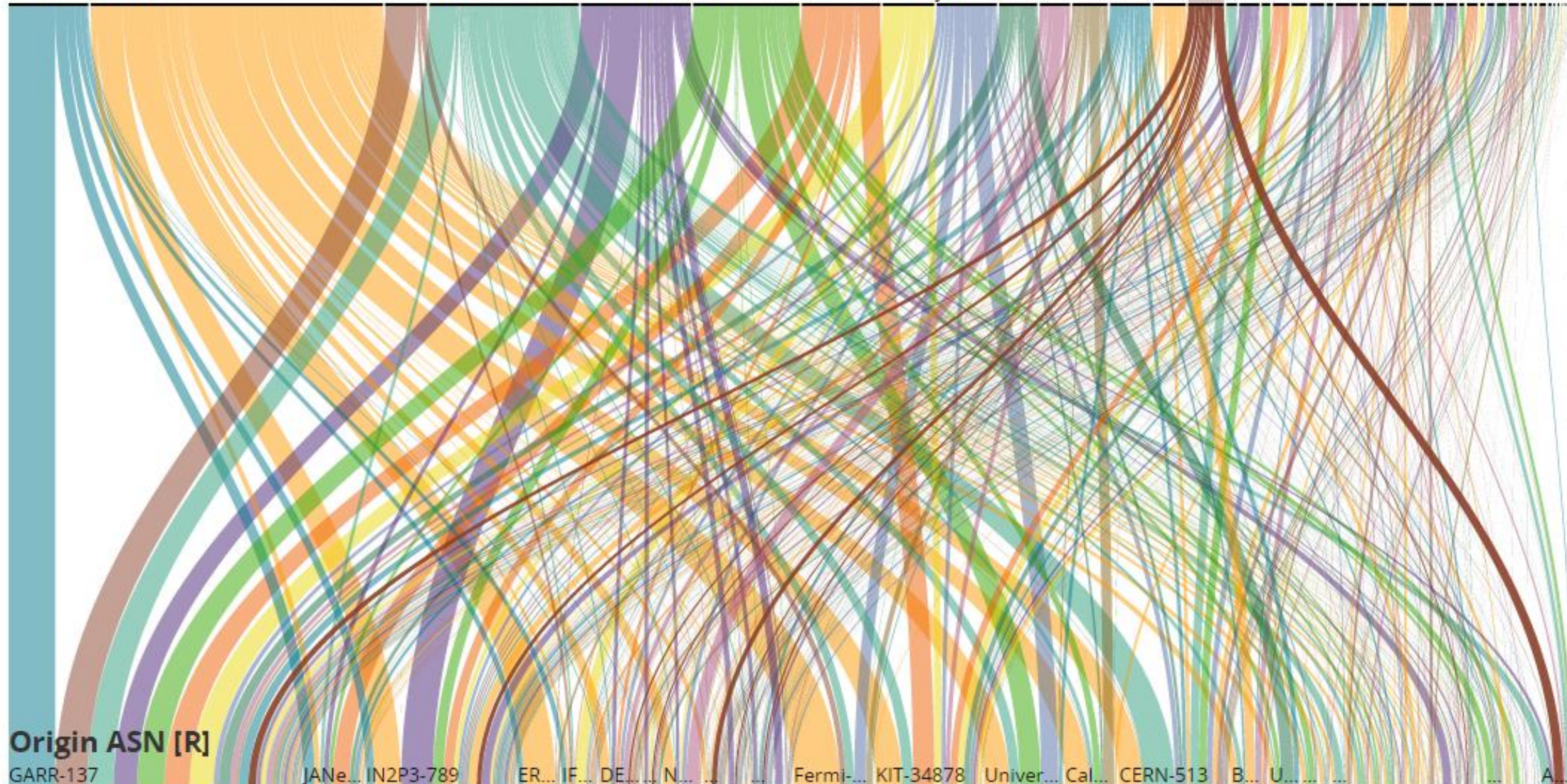
IF...

DE...

A...

B...

BNL-43
1.2 Gbps, 2%



Origin ASN [R]

GARR-137

JANe... IN2P3-789

ER... IF... DE...

N...

Fermi...

KIT-34878

Univer...

Cal...

CERN-513

B...

U...

A...

GÉANT LHCONE Traffic Flows (Top 10%)



Origin ASN [L]

alpha » size »

Fermi-3152 GARR-137

ERX... IN2P3-789

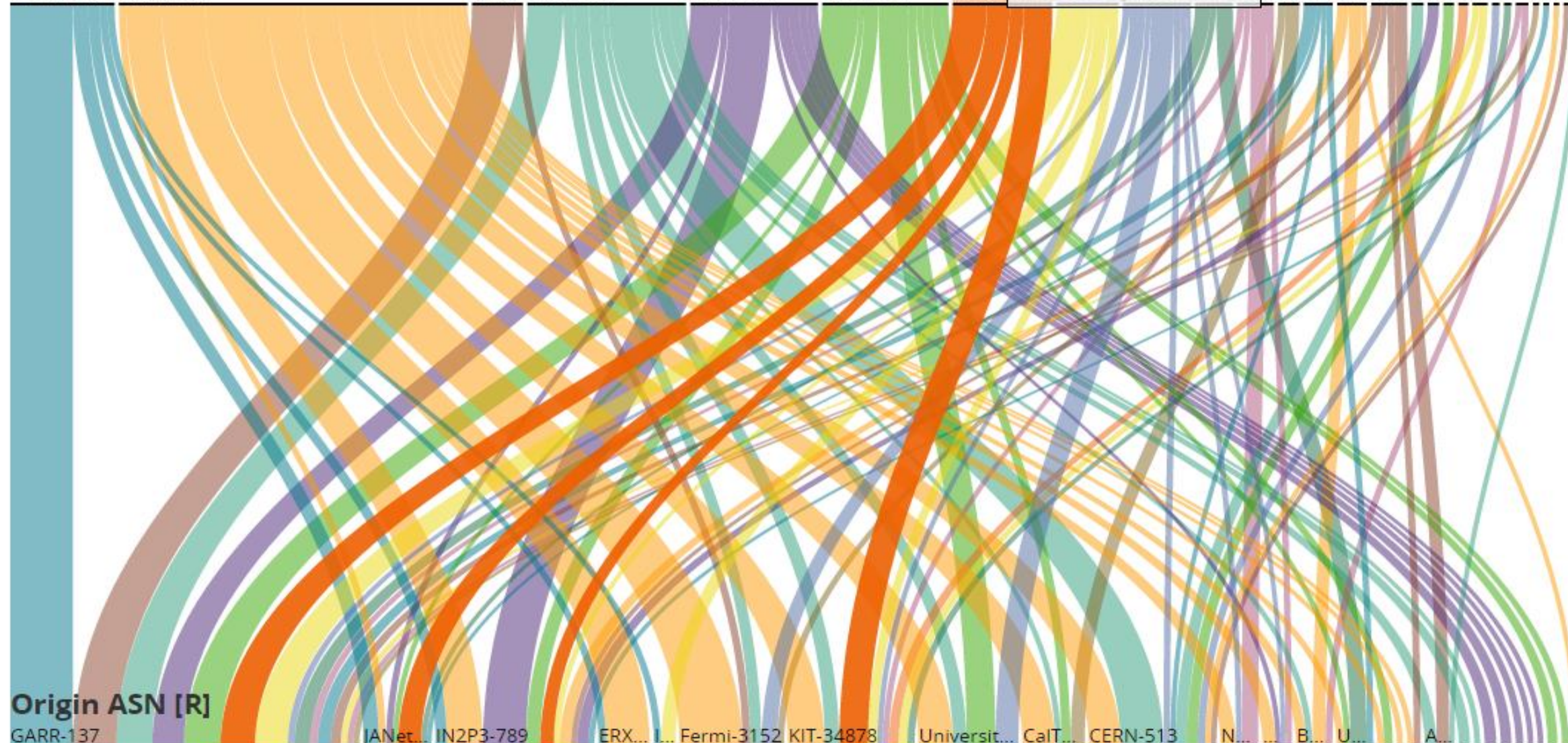
CERN-513

KIT-34878

Unive

University of Wisconsin-59
2.4 Gbps, 7%

ANet... N... U... I... A... B...



Origin ASN [R]

GARR-137

JANet... IN2P3-789

ERX... I...

Fermi-3152

KIT-34878

Universit...

CalT...

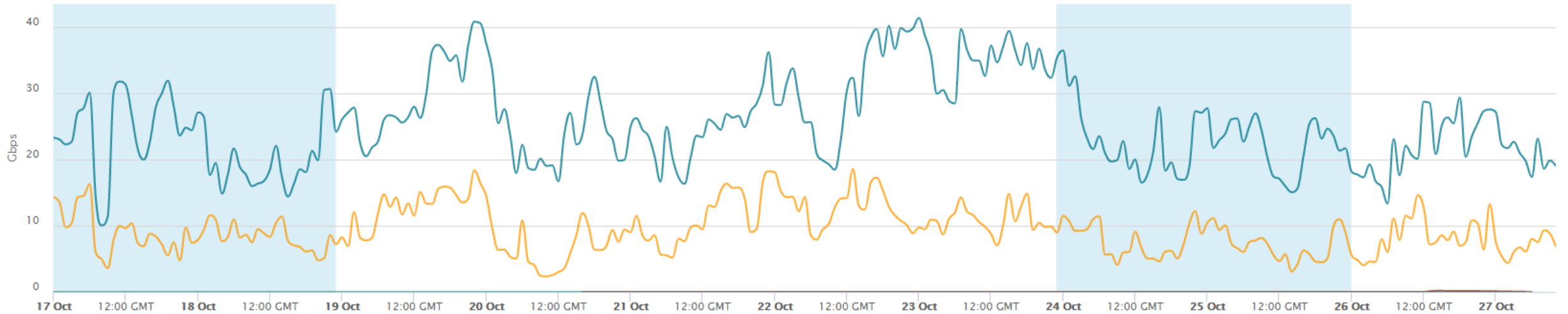
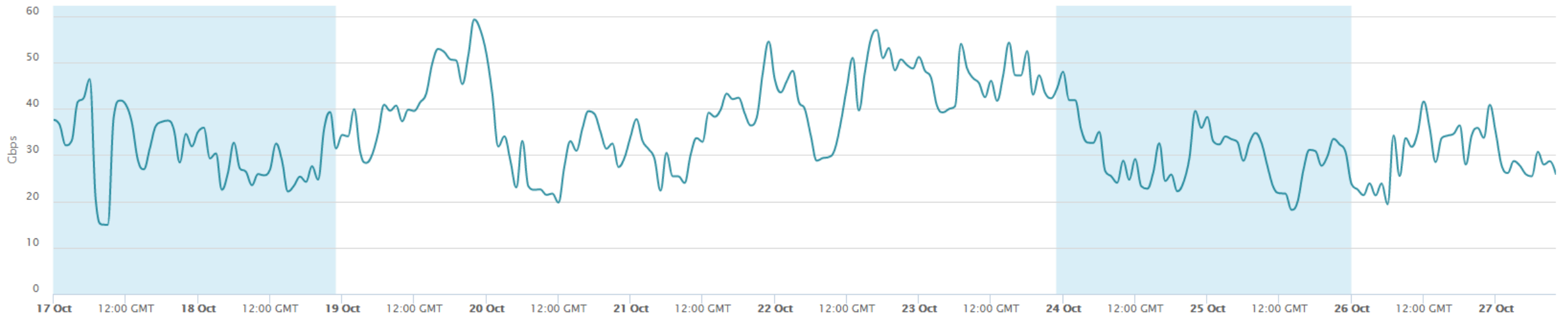
CERN-513

N... ..

B... U...

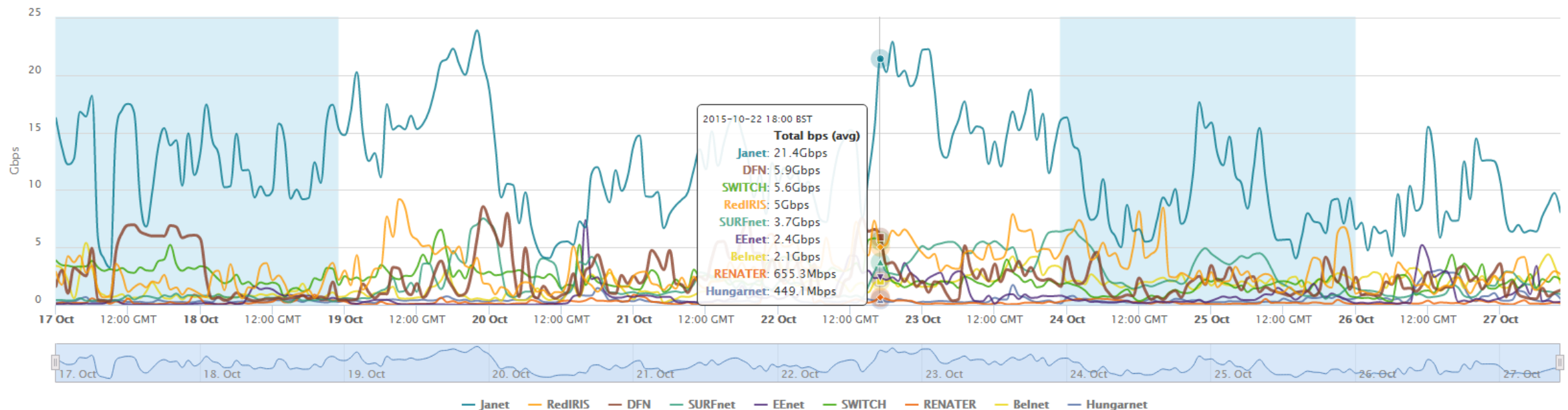
A...

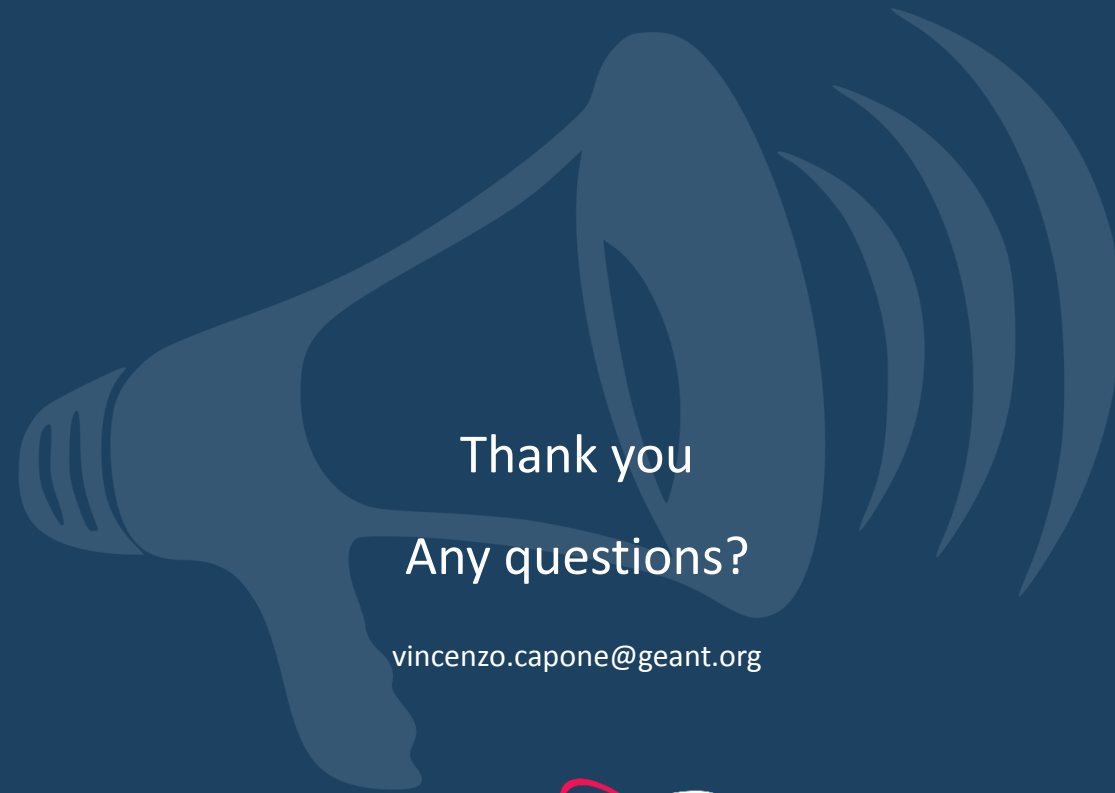
LHC Traffic in General Purpose IP



LHC Traffic in General Purpose IP

- Traffic to or from LHC prefixes with in GÉANT general purpose IP
- Most LHC traffic to/from JISC in general purpose IP





Thank you
Any questions?

vincenzo.capone@geant.org



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