LHCONE L3VPN

Status update

Mian Usman, <u>Vincenzo Capone</u>

LHCOPN-LHCONE meeting

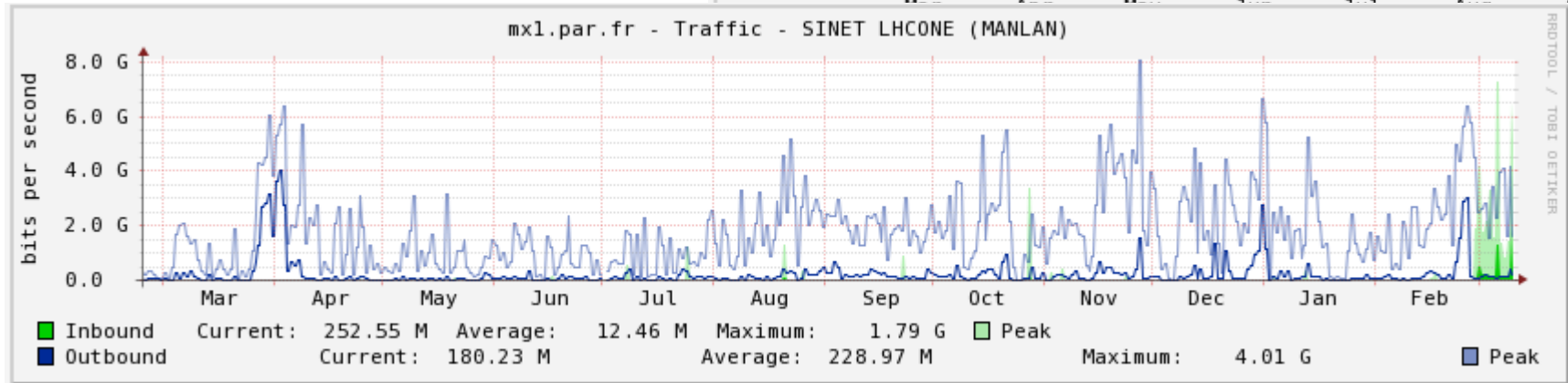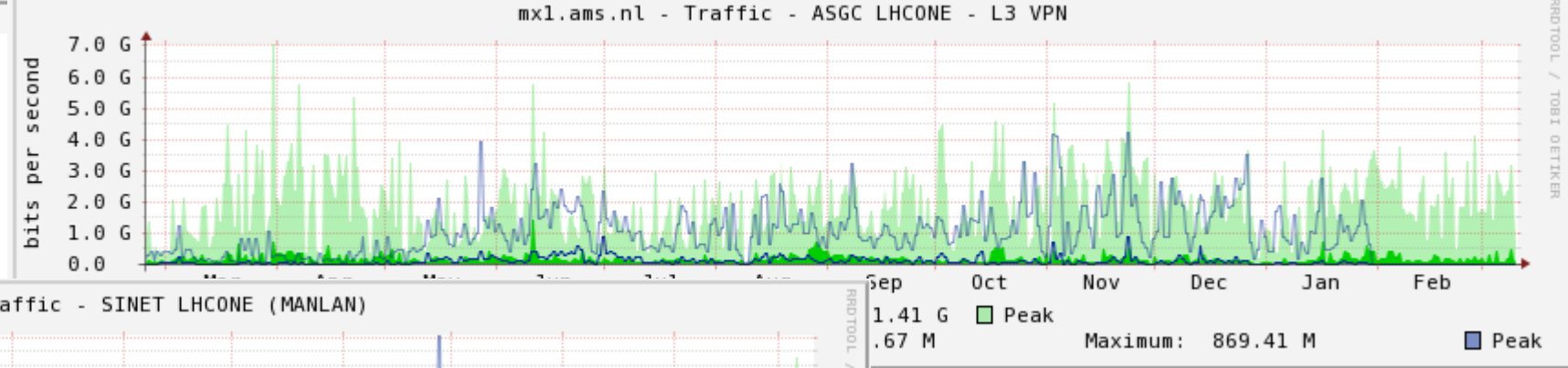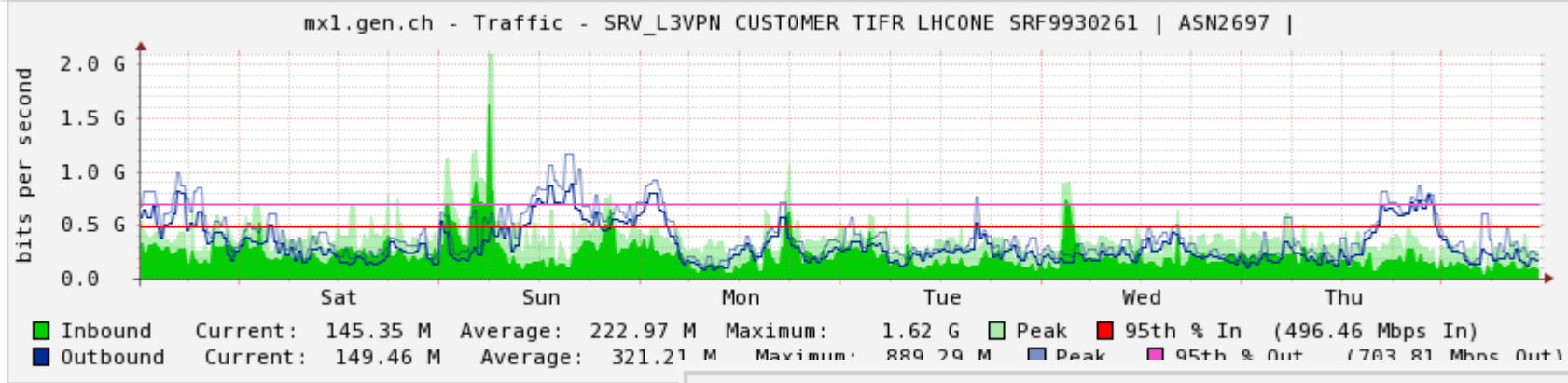Taipei, 13 March 2016

World regions

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

IPv6 : IPv6 enabled

Asia-Pacific

mx1.gen.ch - Traffic - SRV_L3VPN CUSTOMER TIFR LHCONE SRF9930261 | ASN2697 |

■ Inbound	Current: 145.35 M	Average: 222.97 M	Maximum: 1.62 G	■ Peak	■ 95th % In	(496.46 Mbps In)
■ Outbound	Current: 149.46 M	Average: 321.21 M	Maximum: 889.29 M	■ Peak	■ 95th % Out	(703.81 Mbps Out)

mx1.ams.nl - Traffic - ASGC LHCONE - L3 VPN

1.41 G □ Peak

.67 M   Maximum: 869.41 M   ■ Peak

mx1.par.fr - Traffic - SINET LHCONE (MANLAN)

■ Inbound	Current: 252.55 M	Average: 12.46 M	Maximum: 1.79 G	□ Peak
■ Outbound	Current: 180.23 M	Average: 228.97 M	Maximum: 4.01 G	■ Peak

Yearly (1 Day Average)

Asia-Pacific

- SINET about to migrate to the new 2x10G to London

- TIFR Peering with GÉANT LHCONE VRF

- LHCONE VRF now setup in TEIN and peering with GÉANT LHCONE VRF

- No routes being advertised by TEIN currently

- THAIREN and TEIN have established BGP peering however no site connected yet

- KISTI-TEIN connected to 1G (later upgrade to 10G) – LHCONE implementation expected in march

- PERN likely to join LHCONE as well

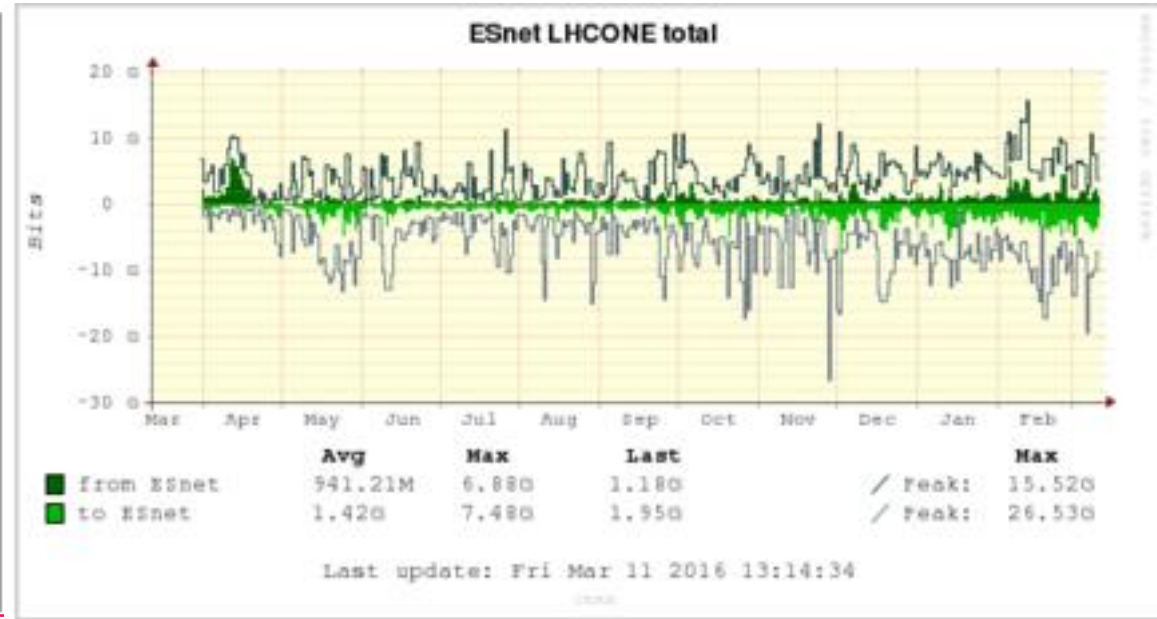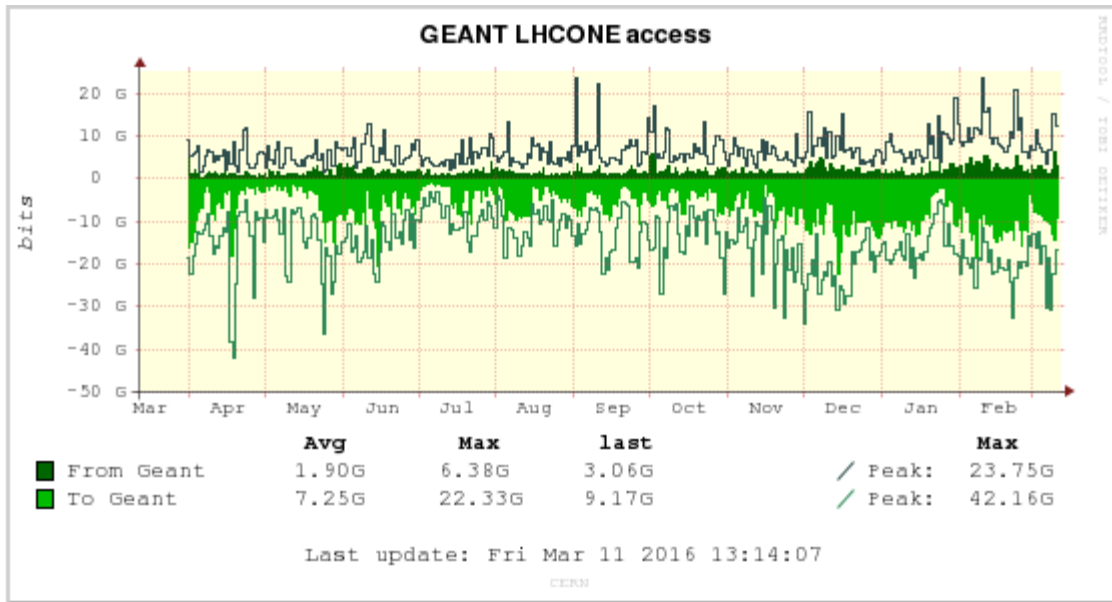- ASGC peering in AMS
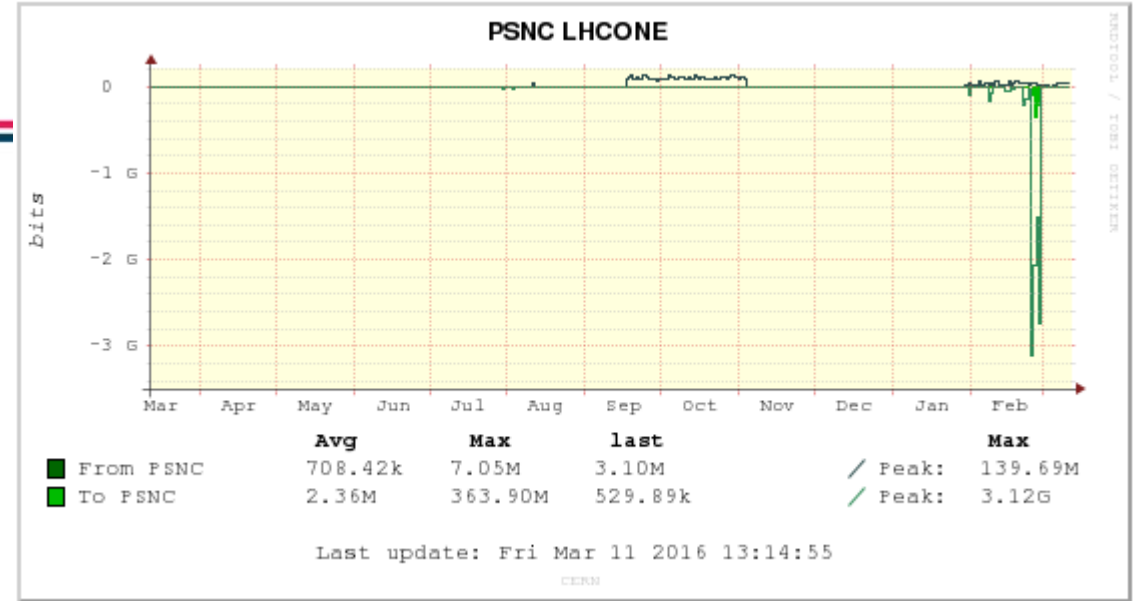
LHCONE in Europe

- LHCONE IP Service in Europe is deployed in:
  - ARNES (Slovenia)
  - CERN/CERNLight (Switzerland)
  - CESnet (Czech Republic)
  - DFN (Germany)
  - GARR (Italy)
  - GÉANT
  - JISC (UK)
  - NORDUnet
  - RENATER (France)
  - RoEduNet (Romania)
  - 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)

CERN   IPv6

- 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
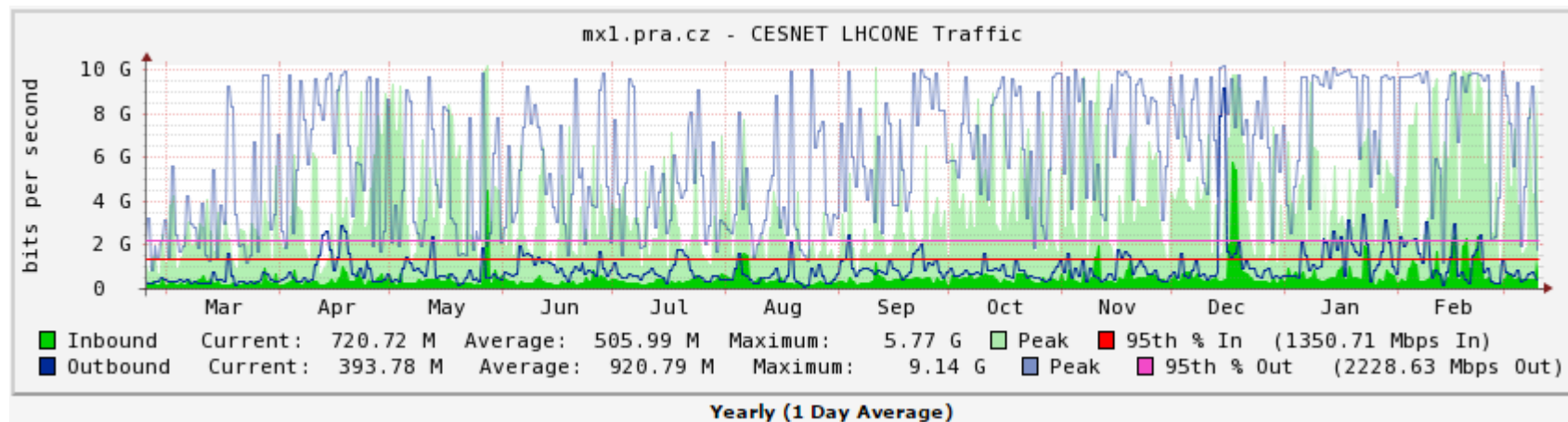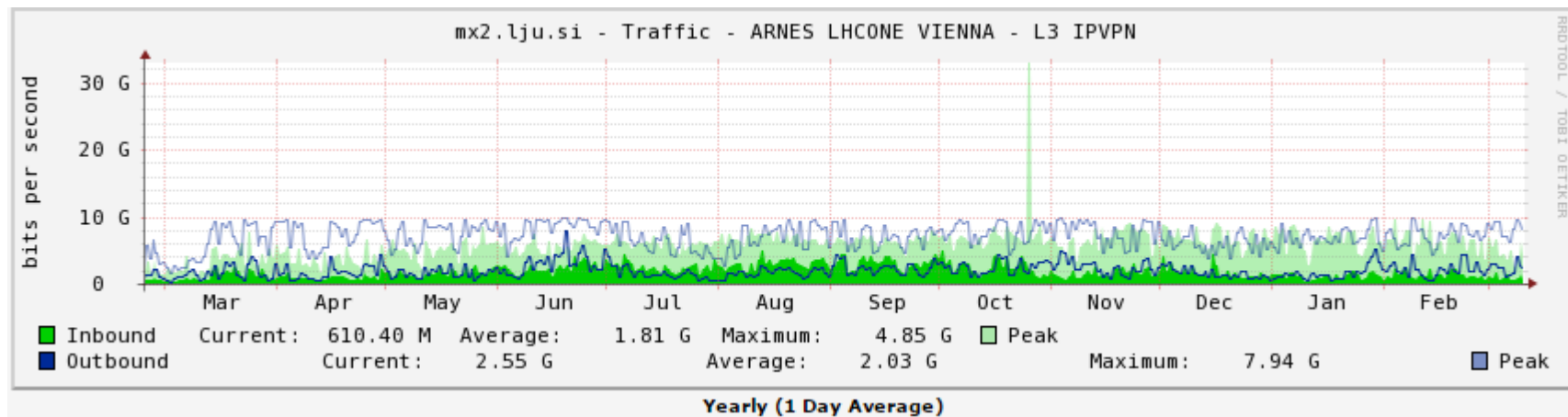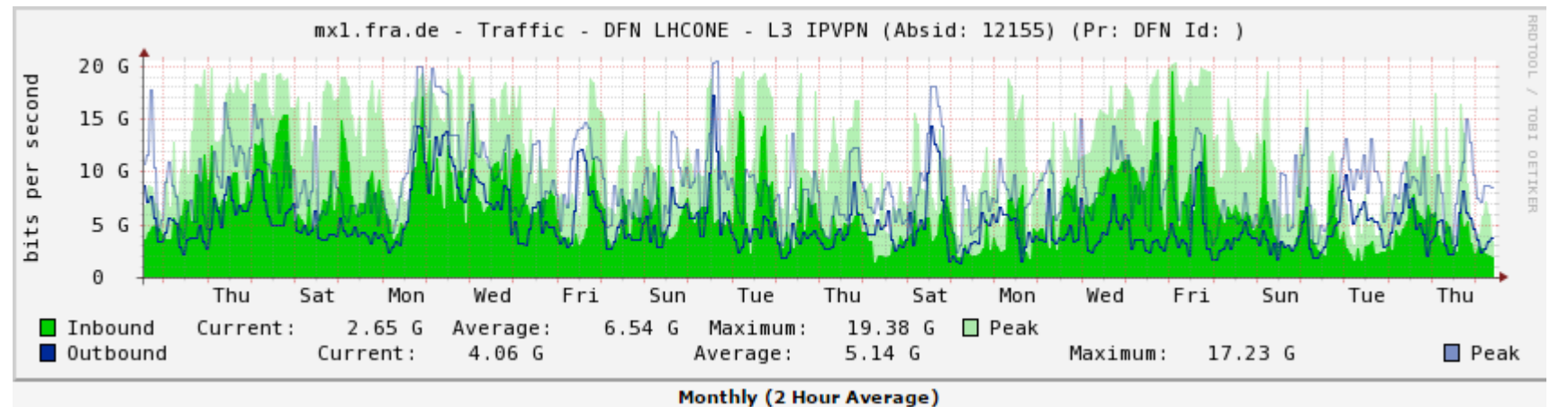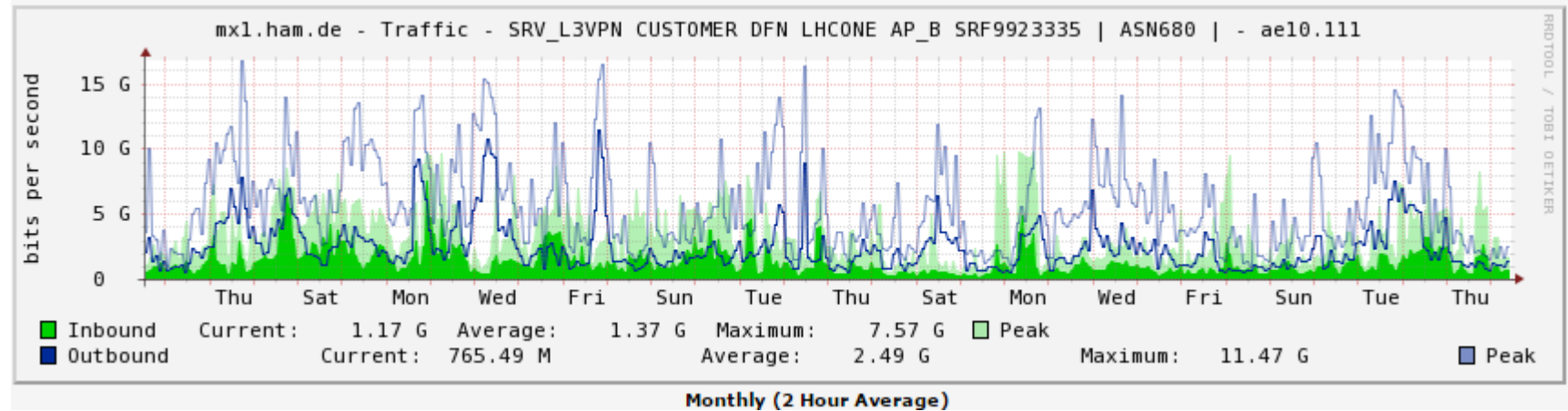- CERNLight now peers with PSNC (Polish NREN)

PSNC LHCONE

	Avg	Max	last		Max
From PSNC	708.42k	7.05M	3.10M	Peak:	139.69M
To PSNC	2.36M	363.90M	529.89k	Peak:	3.12G

Last update: Fri Mar 11 2016 13:14:55

GEANT LHCONE access

	Avg	Max	last		Max
From Geant	1.90G	6.38G	3.06G	Peak:	23.75G
To Geant	7.25G	22.33G	9.17G	Peak:	42.16G

Last update: Fri Mar 11 2016 13:14:07

ESnet LHCONE total

	Avg	Max	Last		Max
from ESnet	941.21M	6.88G	1.18G	Peak:	15.52G
to ESnet	1.42G	7.48G	1.95G	Peak:	26.53G

Last update: Fri Mar 11 2016 13:14:34

IPv6

IPv6

DFN

Consortium
GARR

IPv6

mx1.gen.ch - GARR LHCONE Backup Traffic

Inbound	Current: 3.84 G	Average: 4.11 G	Maximum: 10.63 G — Peak
Outbound	Current: 4.19 G	Average: 4.86 G	Maximum: 13.37 G — Peak

Yearly (1 Day Average)

mx1.gen.ch - GARR LHCONE Backup Traffic

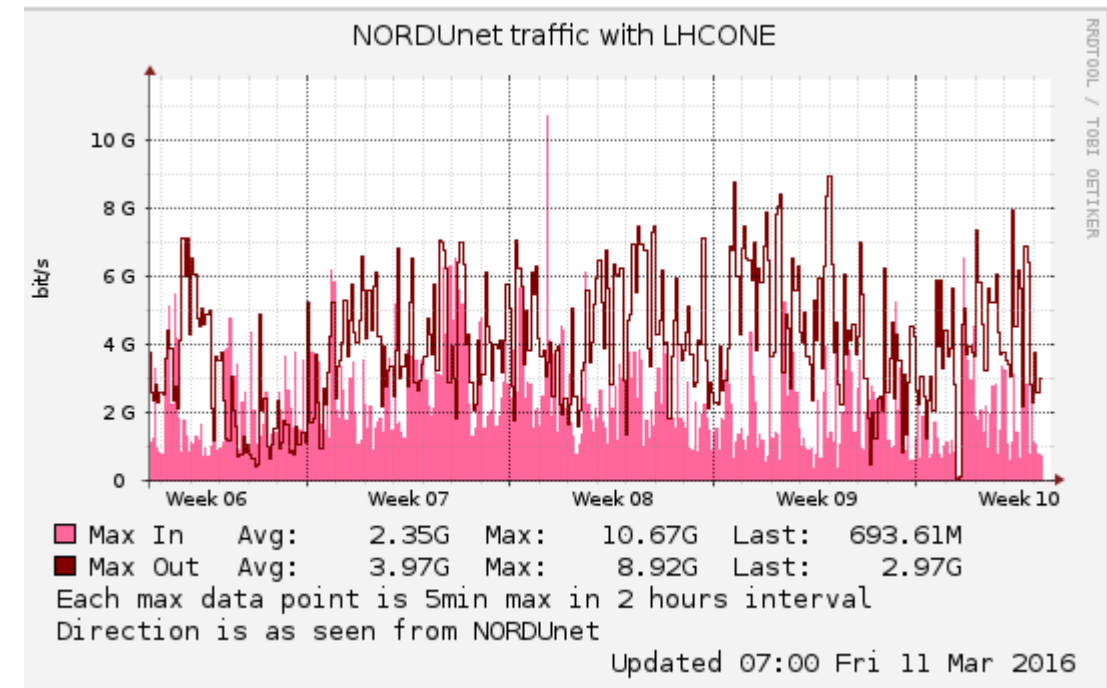|			
Inbound	Current: 4.28 G	Average: 2.35 G	Maximum: 8.31 G — Peak
Outbound	Current: 6.10 G	Average: 2.82 G	Maximum: 9.28 G — Peak

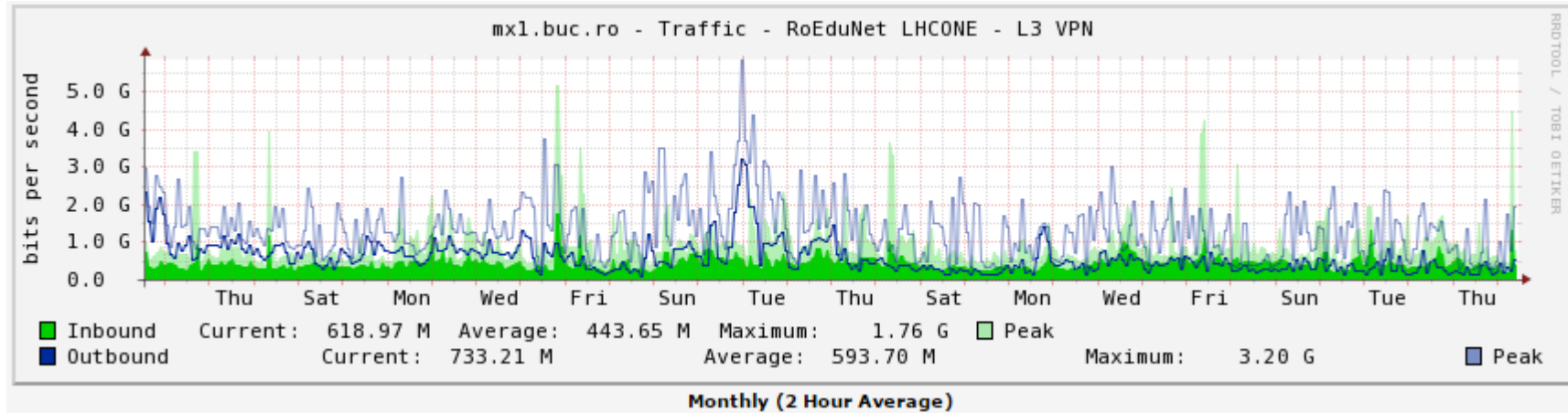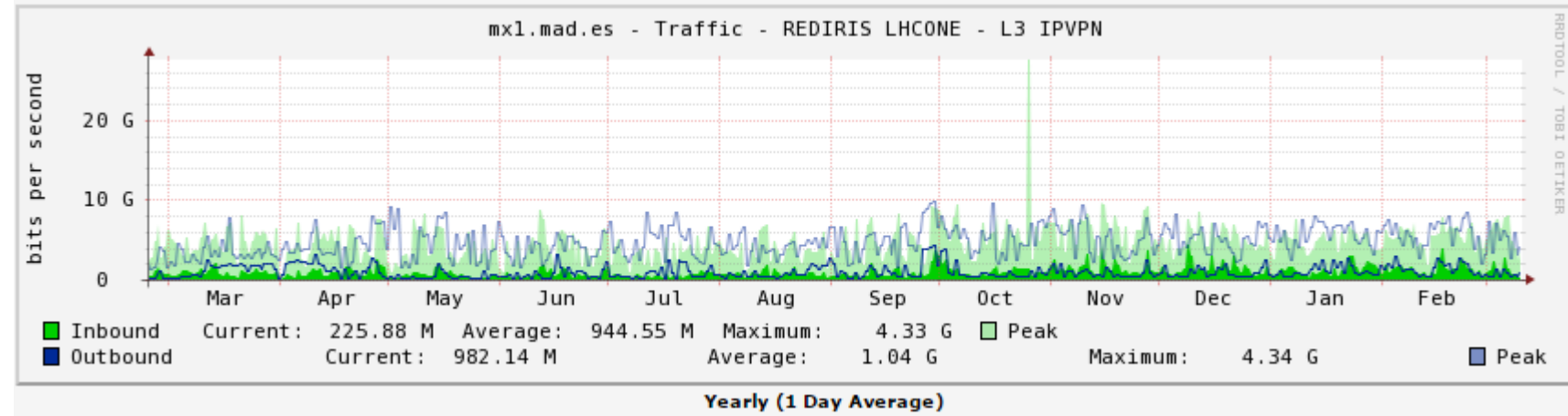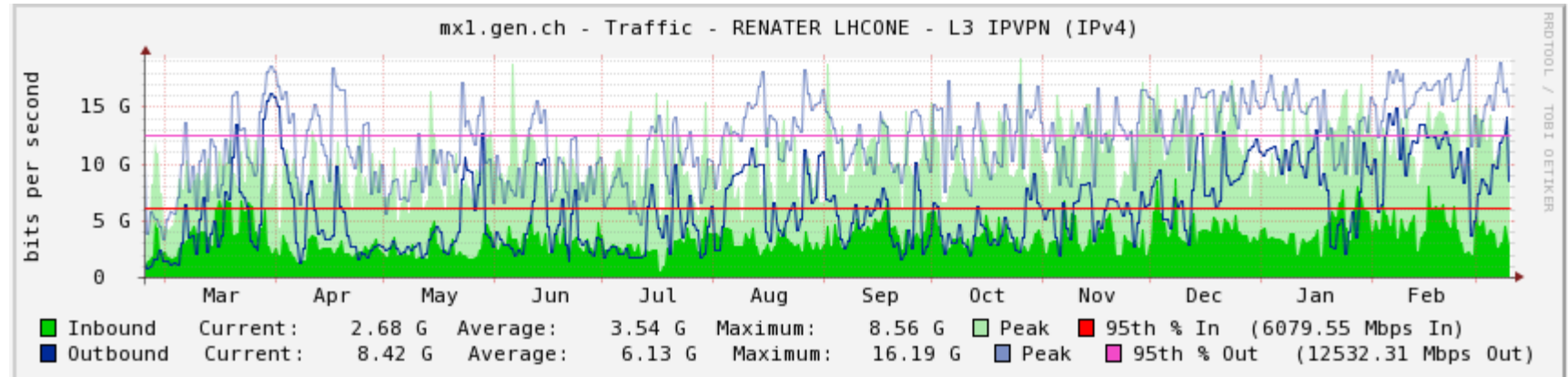**Decadely (3 Days Average)**

- VRF established on the JANET network

- Configuration completed during April/May '15

- Imperial College is the first site to connect
  - Currently in production
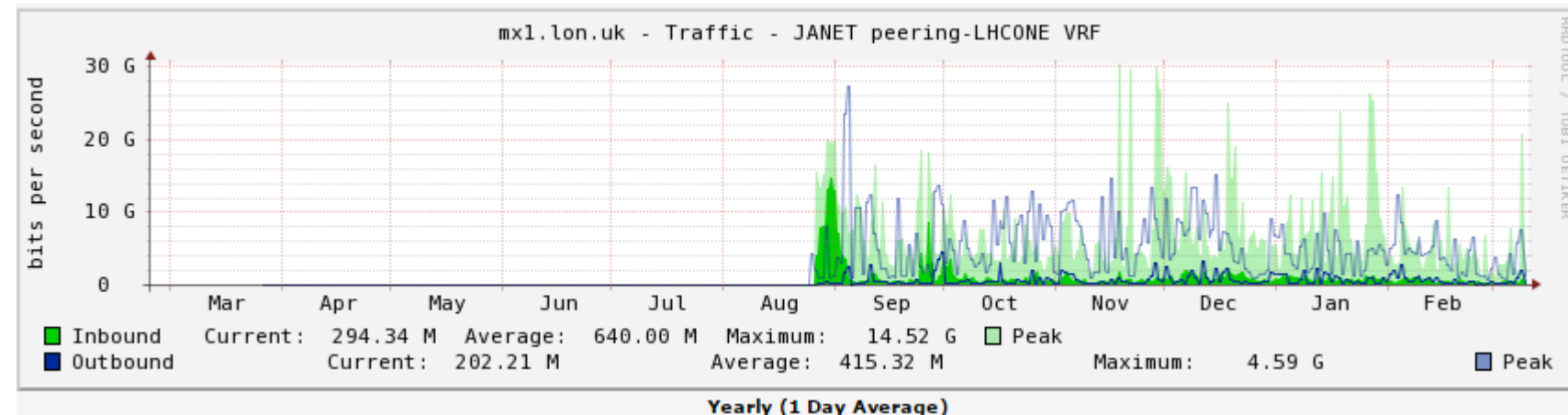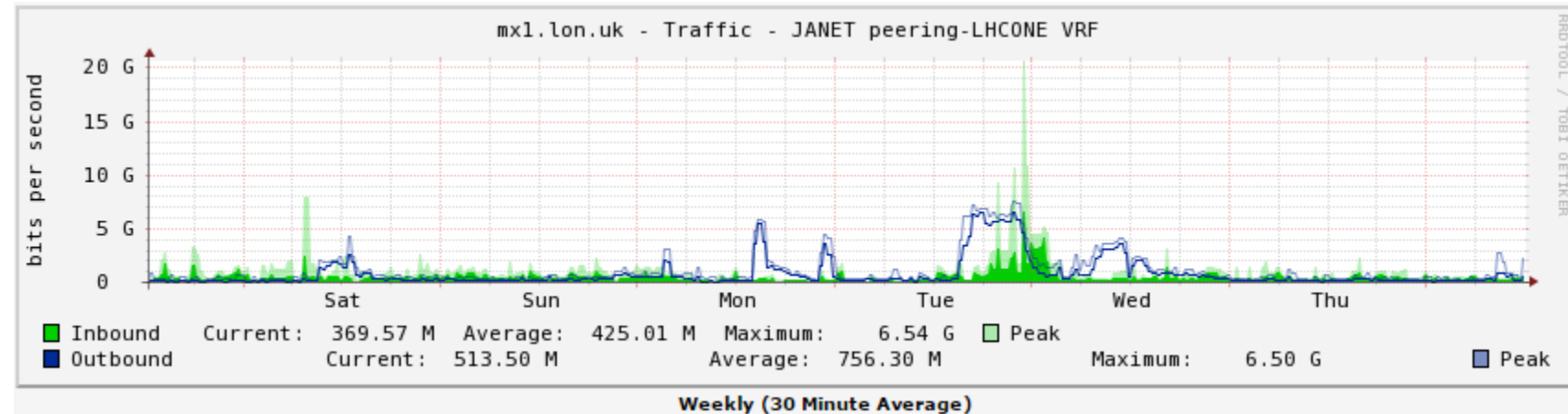
NORDUNet

- Moved the LHCONE connection to GÉANT from Copenhagen to London on 100G port

- The LHCONE connection to ESNet and Internet2 is at MANLAN via ANA-200G
  - The peering is on the NORDUNet router in MANLAN

RedIRIS - RoEduNet

mxl.mad.es - Traffic - REDIRIS LHCONE - L3 IPVPN

		Current:	Average:	Maximum:	
Inbound		225.88 M	944.55 M	4.33 G	Peak
Outbound		982.14 M	1.04 G	4.34 G	Peak

Yearly (1 Day Average)

mxl.buc.ro - Traffic - RoEduNet LHCONE - L3 VPN

		Current:	Average:	Maximum:	
Inbound		618.97 M	443.65 M	1.76 G	Peak
Outbound		733.21 M	593.70 M	3.20 G	Peak

Monthly (2 Hour Average)

mx1.gen.ch - Traffic - RENATER LHCONE - L3 IPVPN (IPv4)

☐ Inbound	Current:	2.68 G	Average:	3.54 G	Maximum:	8.56 G	☐ Peak ☐ 95th % In (6079.55 Mbps In)
☐ Outbound	Current:	8.42 G	Average:	6.13 G	Maximum:	16.19 G	☐ Peak ☐ 95th % Out (12532.31 Mbps Out)

Yearly (1 Day Average)

mx1.par.fr - Traffic - RENATER LHCONE - L3 IPVPN (IPv4)

☐ Inbound	Current:	2.16 G	Average:	1.37 G	Maximum:	3.93 G	☐ Peak ☐ 95th % In (2693.7 Mbps In)
☐ Outbound	Current:	1.13 G	Average:	1.48 G	Maximum:	6.61 G	☐ Peak ☐ 95th % Out (3019.88 Mbps Out)

Yearly (1 Day Average)

mx1.ams.nl - Traffic - SURFNET LHCONE - L3 IPVPN

From 2016/01/01 15:34:00 To 2016/02/01 15:34:00

Inbound   Current: 2.31 G   Average: 755.81 M   Maximum: 6.40 G   Peak
Outbound   Current: 403.36 M   Average: 369.60 M   Maximum: 3.82 G   Peak
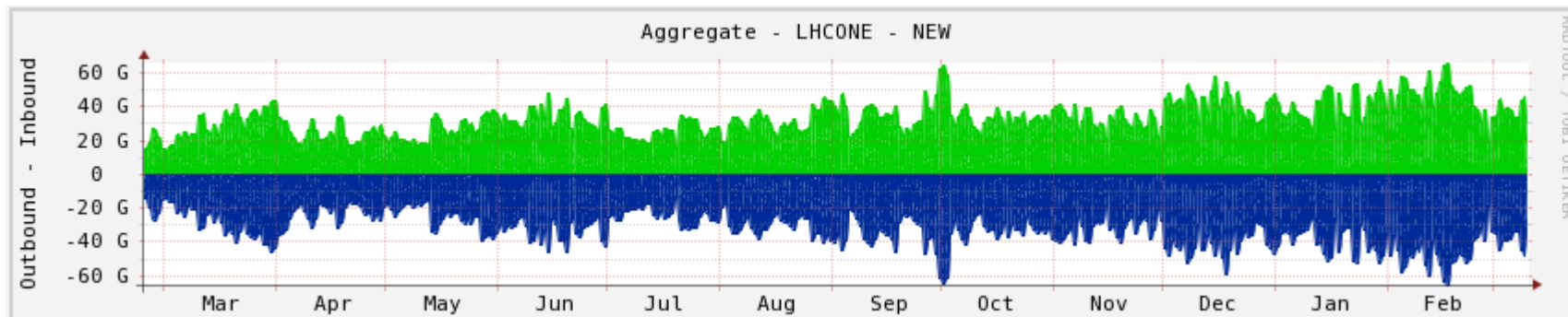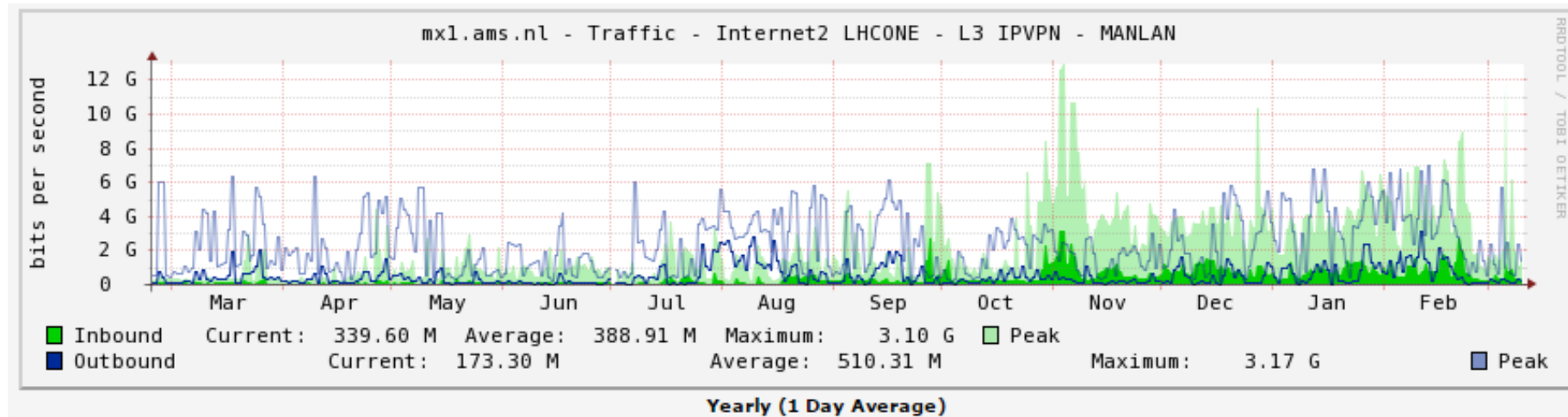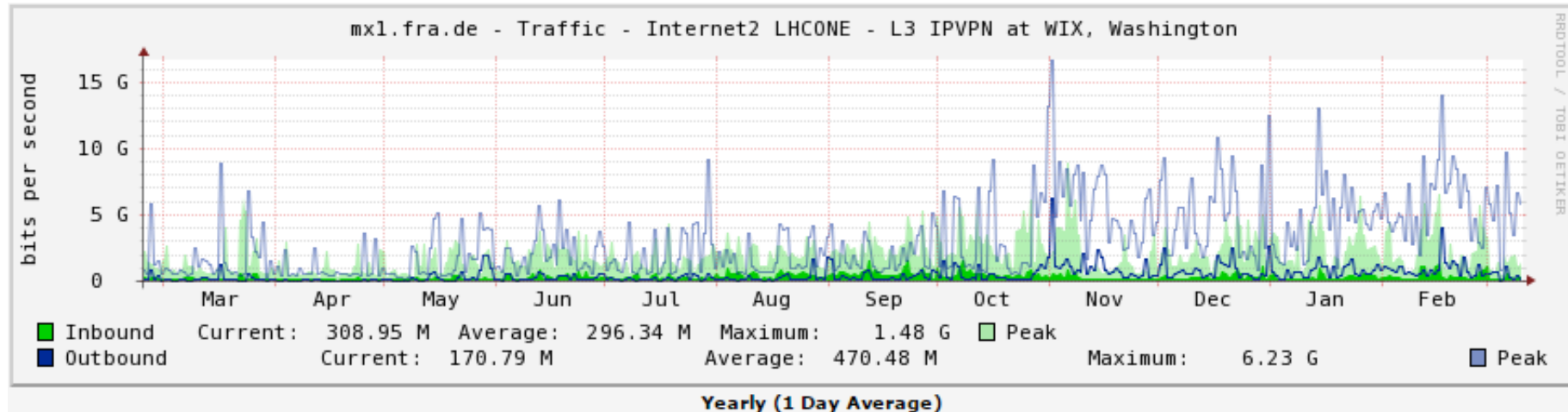
GÉANT overall

Weekly

Yearly

- 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)
  - Purdue CMS T2(17)

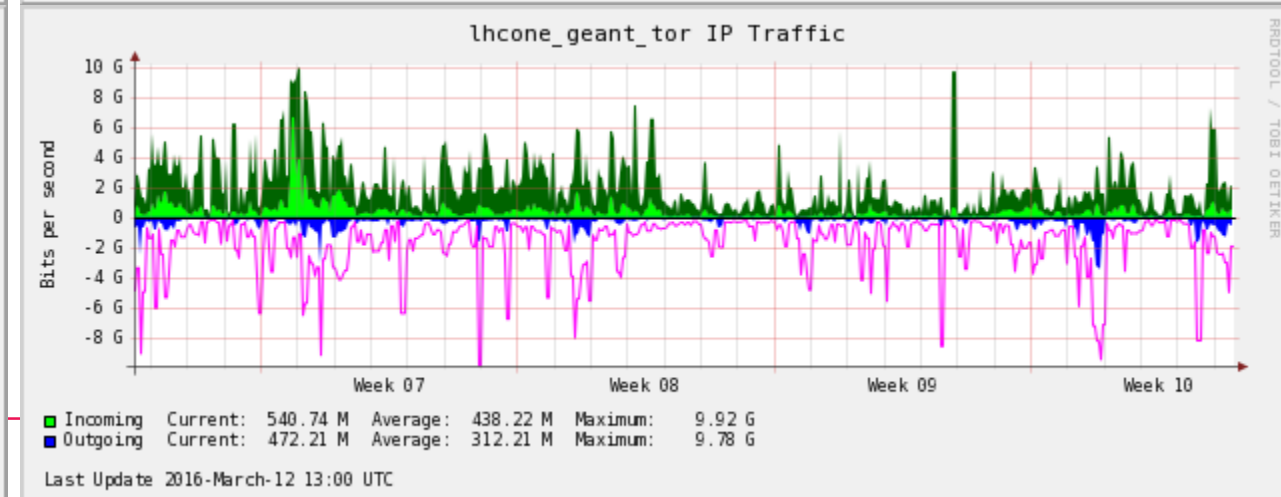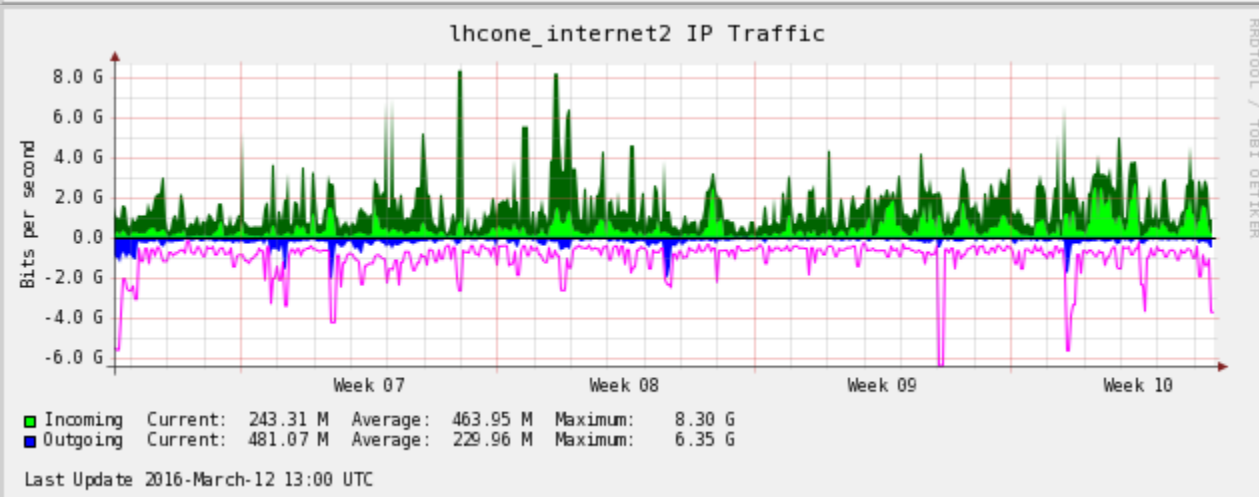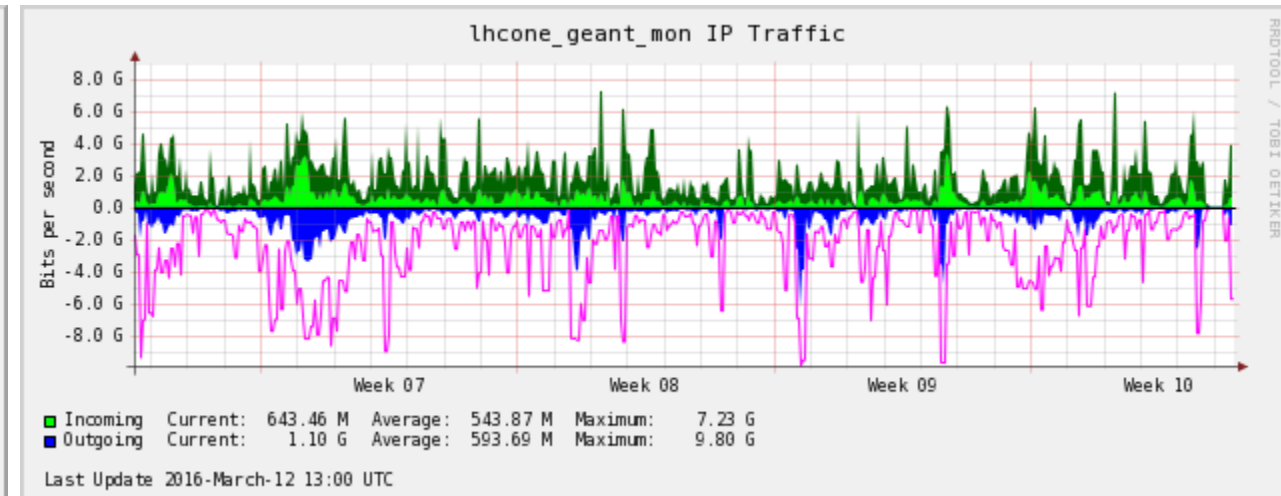|	Bytes	Percent of Total	One Month Change	One Year Change
OSCARS	10.46 PB	25.2%	+0.0147%	+59.7%
LHCONE	11.22 PB	27.0%	+3.76%	+88.5%
Normal traffic	19.82 PB	47.8%	+8.67%	+43.7%
Total	41.49 PB		+5.16%	+59.8%

Traffic between Internet2 and GÉANT LHCONE VRFs

mx1.fra.de - Traffic - Internet2 LHCONE - L3 IPVPN at WIX, Washington

Inbound	Current:	308.95 M	Average:	296.34 M	Maximum:	1.48 G	Peak
Outbound	Current:	170.79 M	Average:	470.48 M	Maximum:	6.23 G	Peak

Yearly (1 Day Average)

mx1.ams.nl - Traffic - Internet2 LHCONE - L3 IPVPN - MANLAN

Inbound	Current:	339.60 M	Average:	388.91 M	Maximum:	3.10 G	Peak
Outbound	Current:	173.30 M	Average:	510.31 M	Maximum:	3.17 G	Peak

Yearly (1 Day Average)

CANARIE

- 100G to PacificWave Seattle and to MANLAN

- http://weathermap.canarie.ca/lhcone/index.html

lhcone_esnet IP Traffic

Incoming   Current: 470.39 M   Average: 890.79 M   Maximum: 9.89 G
Outgoing   Current: 1.19 G   Average: 710.05 M   Maximum: 9.73 G

Last Update 2016-March-12 13:00 UTC

lhcone_geant_mon IP Traffic

Incoming   Current: 643.46 M   Average: 543.87 M   Maximum: 7.23 G
Outgoing   Current: 1.10 G   Average: 593.69 M   Maximum: 9.80 G

Last Update 2016-March-12 13:00 UTC

lhcone_internet2 IP Traffic

Incoming   Current: 243.31 M   Average: 463.95 M   Maximum: 8.30 G
Outgoing   Current: 481.07 M   Average: 229.96 M   Maximum: 6.35 G

Last Update 2016-March-12 13:00 UTC

lhcone_geant_tor IP Traffic

Incoming   Current: 540.74 M   Average: 438.22 M   Maximum: 9.92 G
Outgoing   Current: 472.21 M   Average: 312.21 M   Maximum: 9.78 G

Last Update 2016-March-12 13:00 UTC

Latin America

- 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

Summary
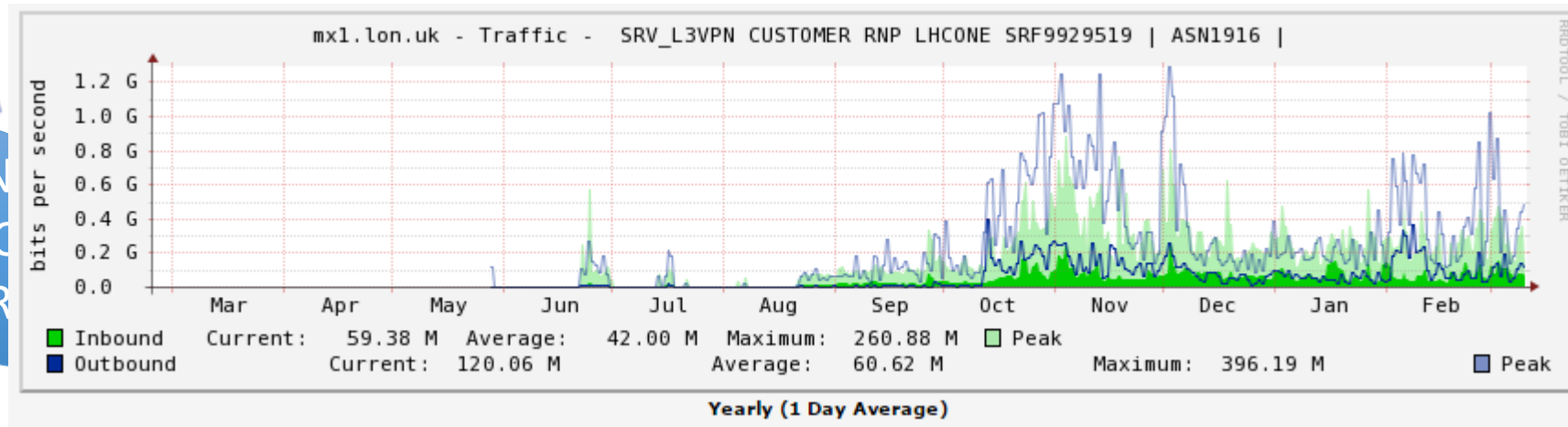
- The LHCONE network is expanding
  - South America is now a stable partner, Chile is interested to join
  - Also growing in Asia (SINET, ASGC already present – TEIN is ready to start)
  - Belgium and Portugal are working to join in Europe
  - First contacts with South Africa
- Traffic within LHCONE is steadily growing
- Some NRENs and sites need to upgrade their connection
  - GÉANT is already working with the NRENs for the upgrades
  - In some cases it's just a re-configuration of the existing access ports
- We expect to see further increases after the upgrades
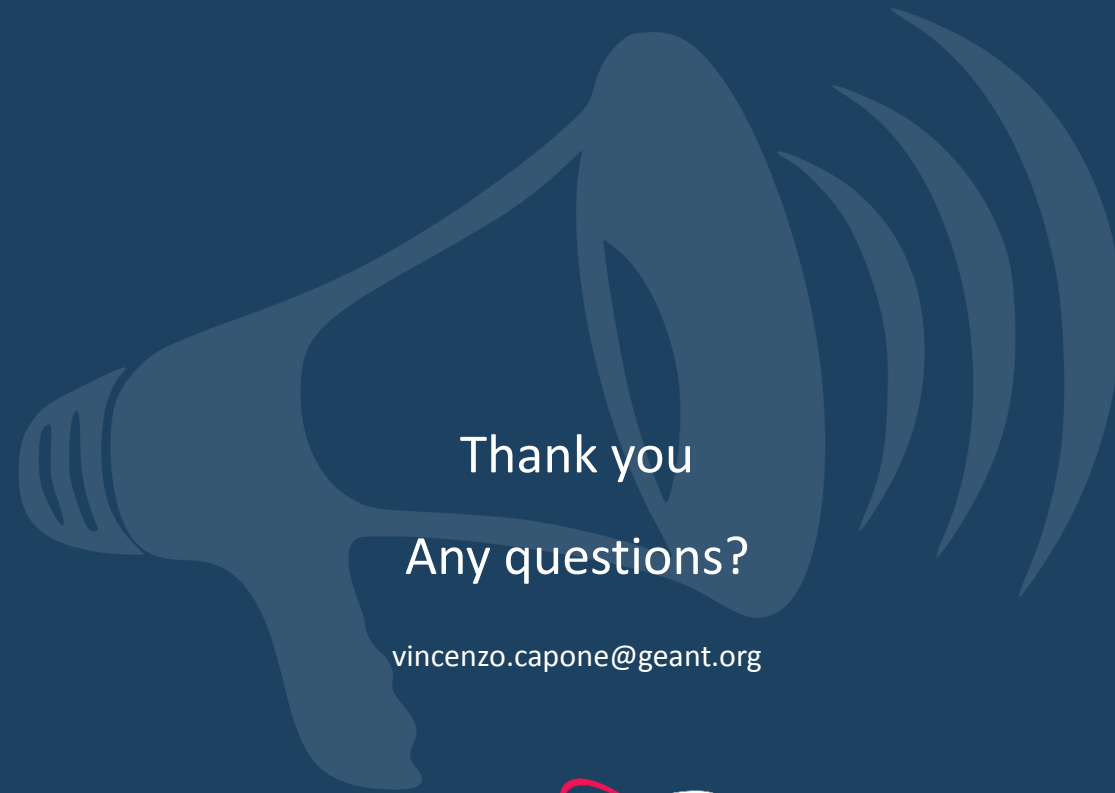
Thank you

Any questions?

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DFN LHCONE Update

- DE-KIT now has 40G (over 100G) to Frankfurt

- 2 x 10G to Erlangen with another 2 x 10G coming