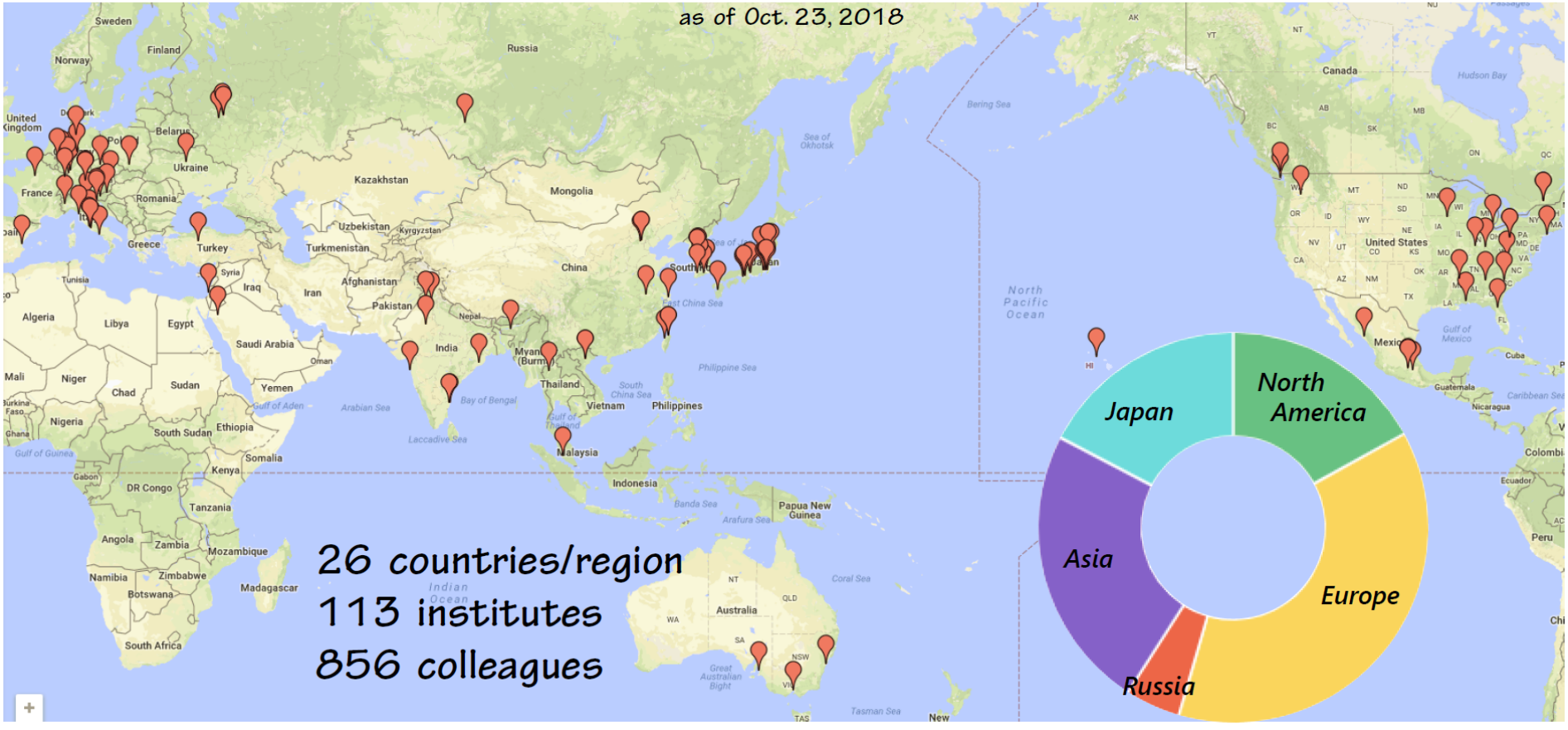
Belle II Update

Dr. Silvio Pardi
INFN
LHCONE Meeting
Umeå (SE) 4 June 2019

Belle II Collaboration



Phase3 beam run has started on 3/11 !

INTERACTIONS.ORG
PARTICLE PHYSICS NEWS AND RESOURCES

https://www.interactions.org/

Home | About | Particle People | News | Physics Hubs

A communication resource from the **world's particle physics laboratories.**

SuperKEKB Phase 3 (Belle II Physics Run) Starts

Belle II and SuperKEKB are poised to become the world's first Super B factory facility. Belle II aims to accumulate 50 times more data than its predecessor, Belle, and to seek out new physics hidden in subatomic particles that could shed light on mysteries of the early universe.

Read the Release

https://www.kek.jp/en/newsroom/2019/03/11/1600/#!

KEK 大学共同利用機関法人 高エネルギー加速器研究機構

HOME | ABOUT | NEWS | FACILITY | RESEARCH

KEK > News > SuperKEKB Phase 3 (Belle II Physics Run

SuperKEKB Phase 3 (Belle II Physics Run) Start

2019/03/11 Pressrelease ACC IPNS

On March 11th, 2019, Phase 3 operation of the SuperKEKB project begar
marking a major milestone in the development of Japan's leading particl
phase will be the physics run of the project, in which the Belle II experim
taking data with a fully instrumented detector.

The KEKB accelerator, operated from 1999 to 2010, currently holds the w

physicsworld

Magazine | Latest | People | Impact

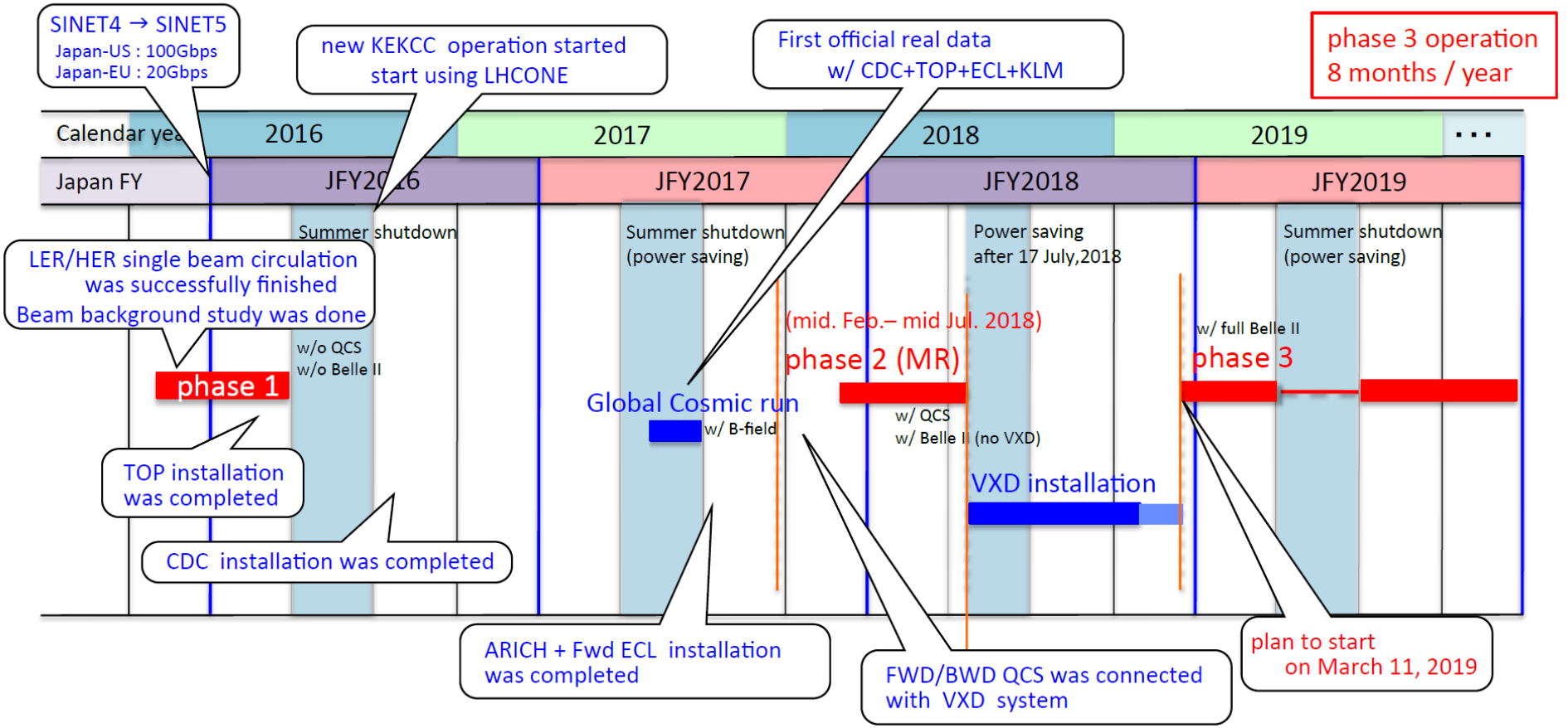
https://physicsworld.com/a/major-revamp-complete-at-superkekb-particle-physics-facility/

projects and facilities

PROJECTS AND FACILITIES | NEWS

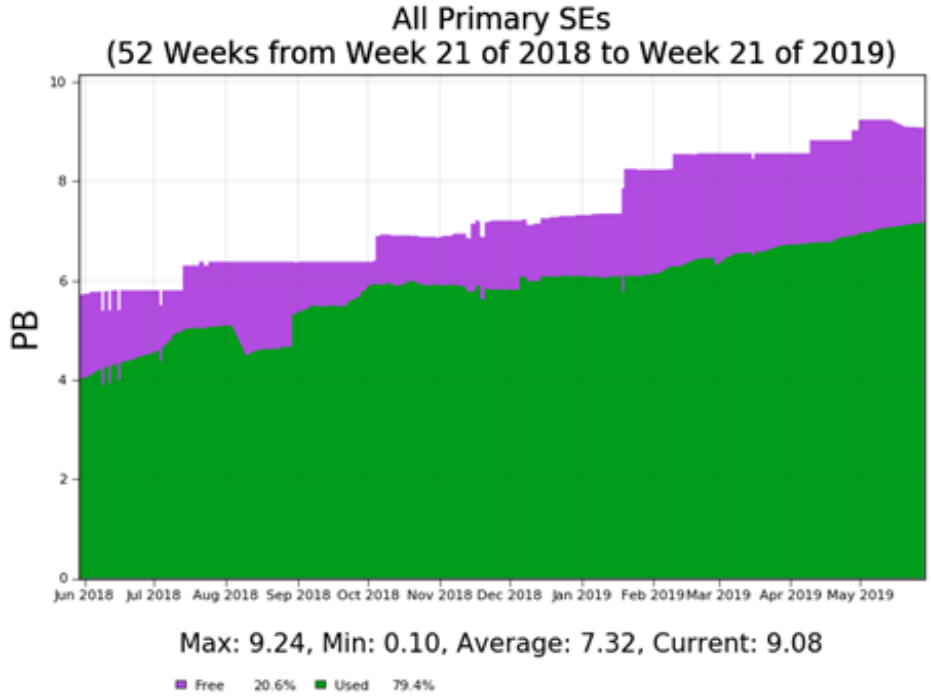
Major revamp complete at SuperKEKB particle-physics facility

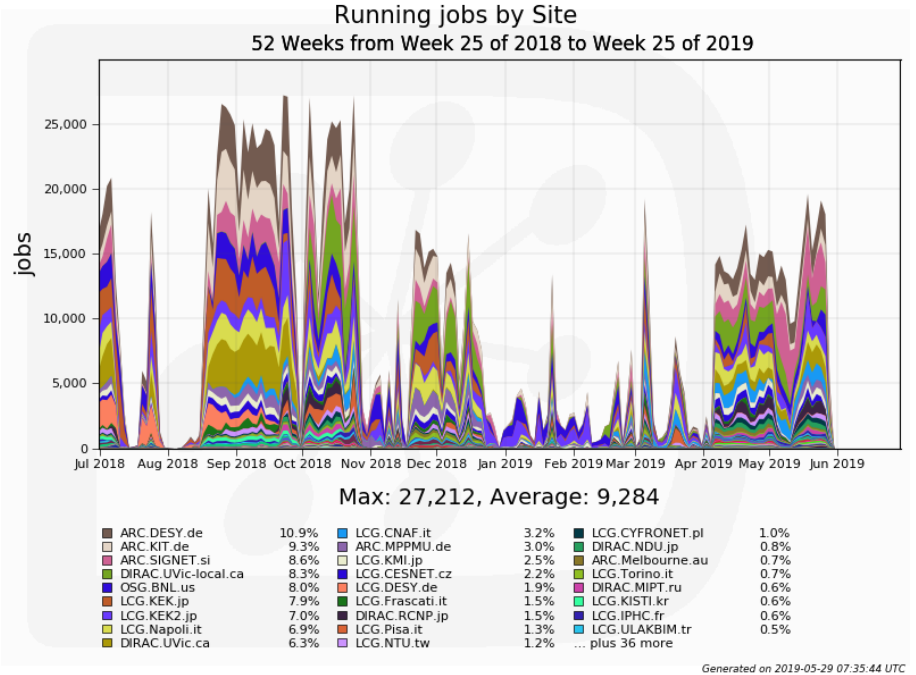
Belle II Experiment : Global Schedule



CURRENT RESOURCE USAGE

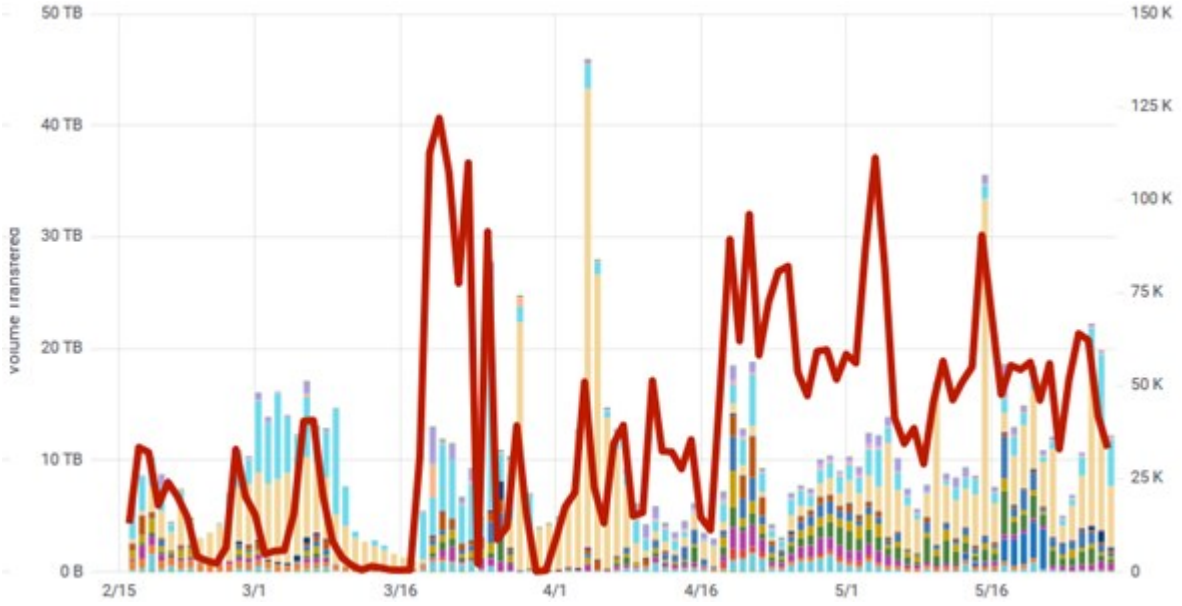
- **9PB available on the main Storage Elements (7 PB used)**
- **62 Sites used in the last 12 Months**
- **Up to 27k Running jobs**





Volume Transferred / Number of Transfers

Up to 125k FTS Transfer managed in a day



Accounting

Reports:
Accounting

Category:
Data Operation

Plot To Generate:
Throughput

Group By:
Destination

Time Span
By Quarter
2019 Q2 2019 Q1 2018 Q4 2018 Q3 2018 Q2 2018 Q1 2017 Q4 2017 Q3

Selection Conditions
Destination SE:
BNL-TAPE-SE

Execution Site:

Final Transfer Status:

Operation Type:

Protocol:

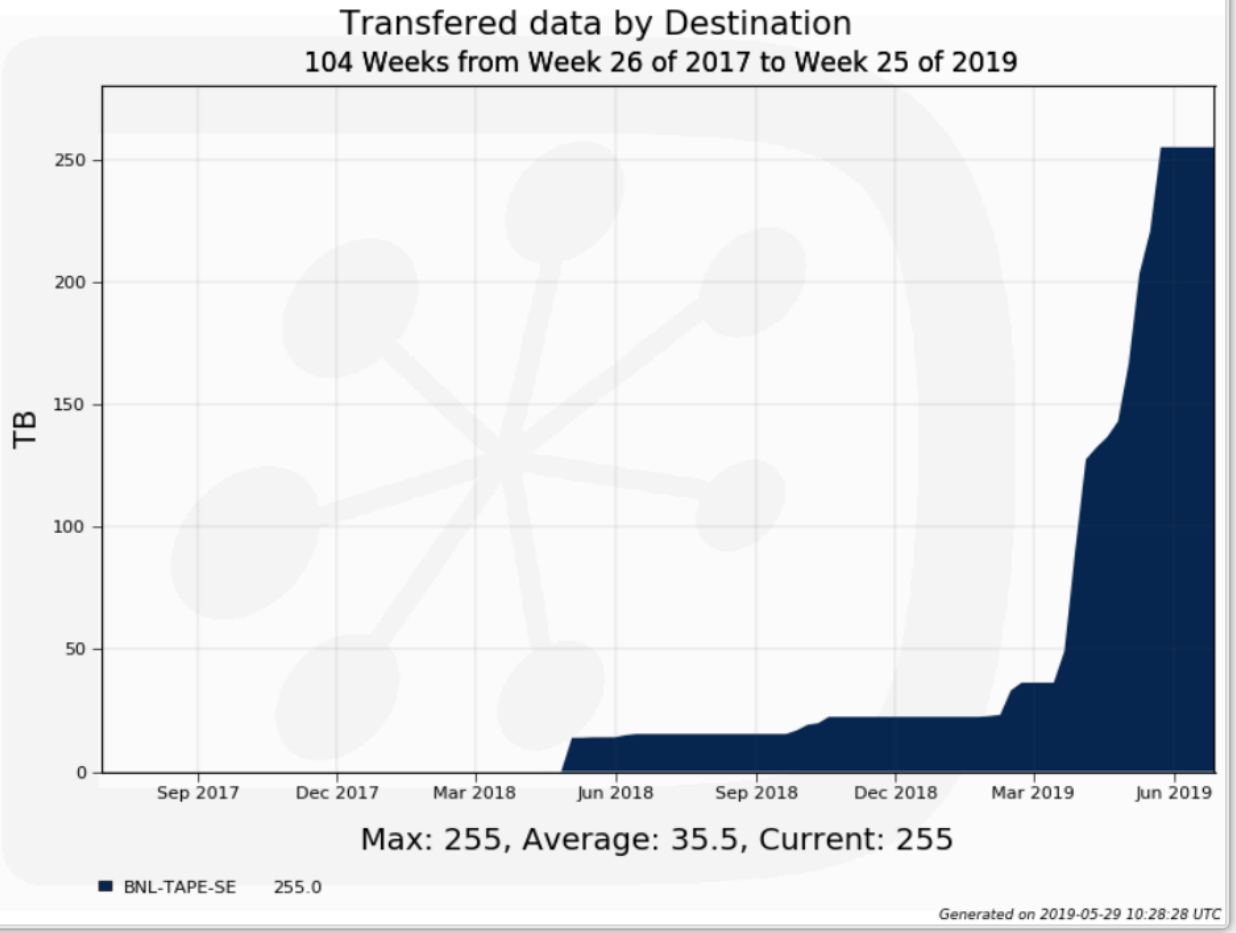
Source SE:

User:

New Apply Reset Refresh ApplyAll

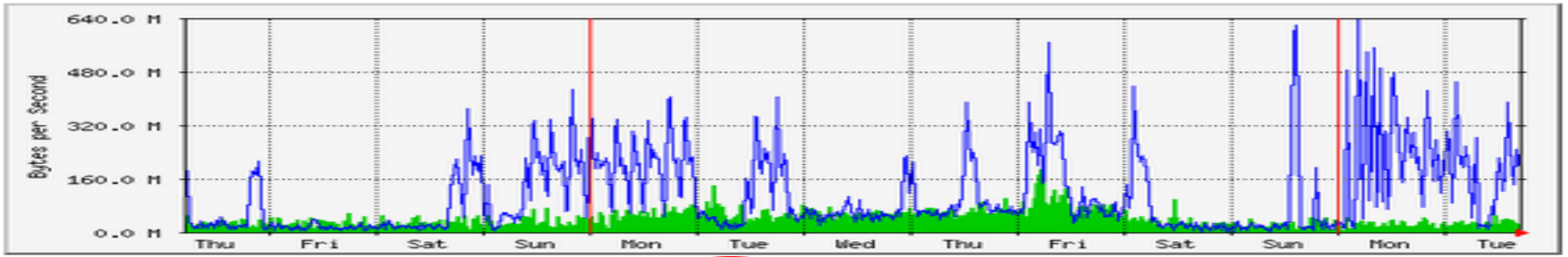
Updated:Tue, 28 May 2019 15:14:22 [UTC]

DataOperation::undefined



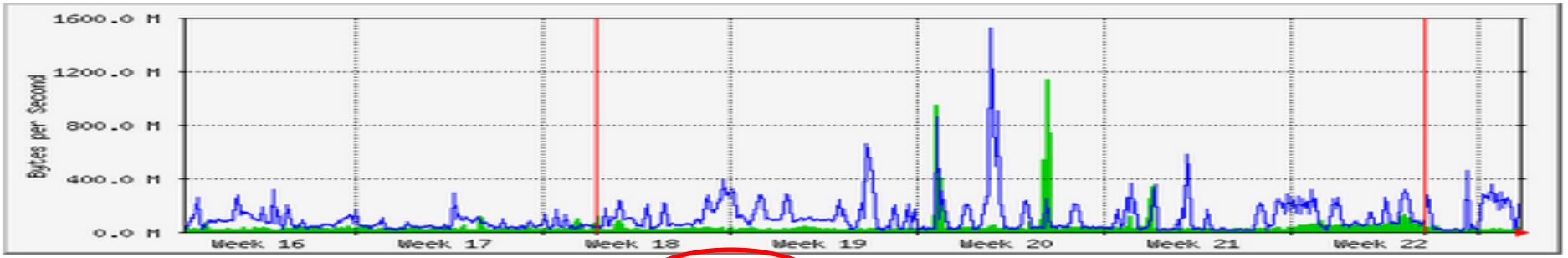
CURRENT LHCONE USAGE AT KEKCC (40 Gbps)

`Weekly' Graph (30 Minute Average)



	Max	Average	Current
In (LHCONE→KEKCC)	187.7 MB/s (3.8%)	35.9 MB/s (0.7%)	19.5 MB/s (0.4%)
Out (KEKCC→LHCONE)	633.7 MB/s (12.7%)	106.7 MB/s (2.1%)	176.3 MB/s (3.5%)

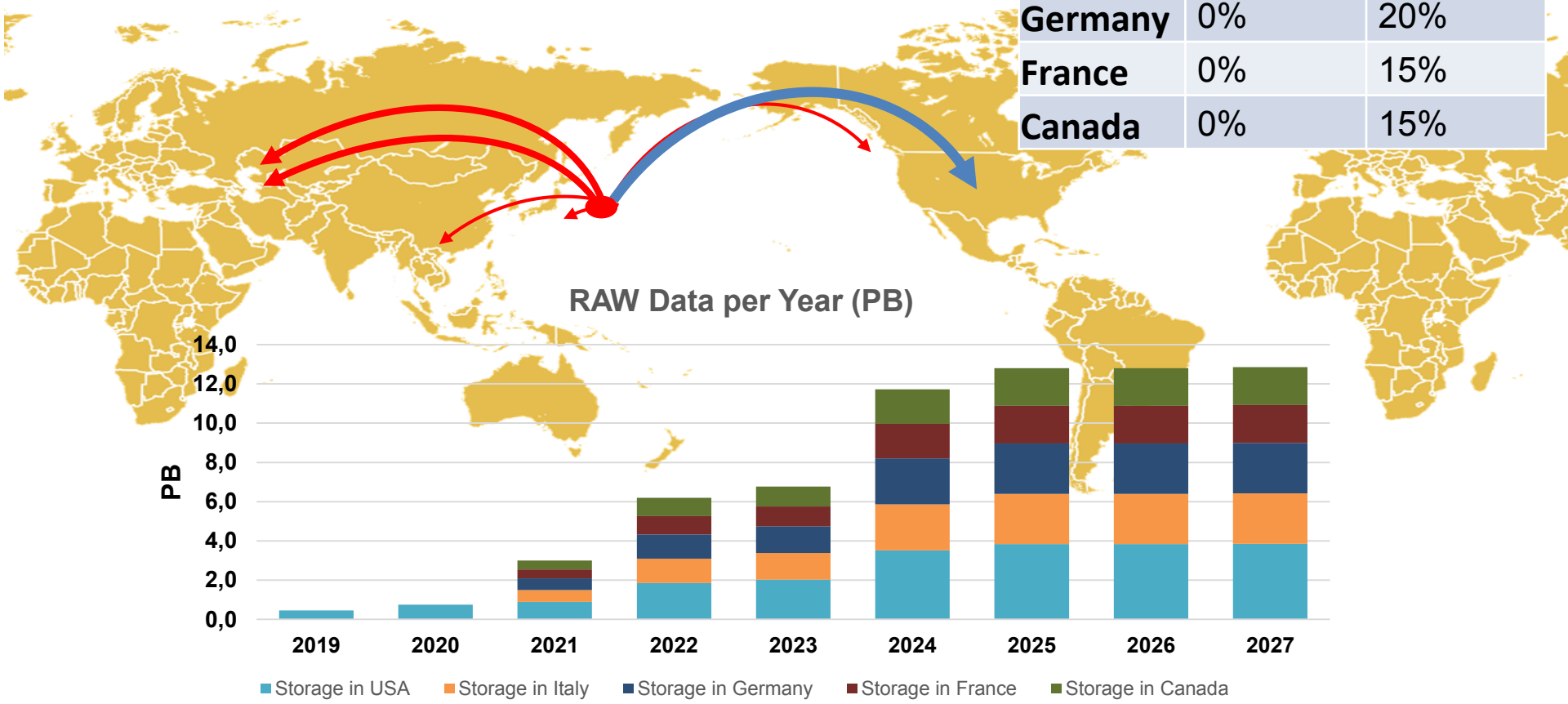
`Monthly' Graph (2 Hour Average)



	Max	Average	Current
In (LHCONE→KEKCC)	1137.7 MB/s (22.8%)	36.7 MB/s (0.7%)	22.6 MB/s (0.5%)
Out (KEKCC→LHCONE)	1518.1 MB/s (30.4%)	100.1 MB/s (2.0%)	254.5 MB/s (5.1%)

2° RAW Data Copy Replication Strategy

Year	2018- 2020	2021-2024
USA	100%	30%
Italy	0%	20%
Germany	0%	20%
France	0%	15%
Canada	0%	15%



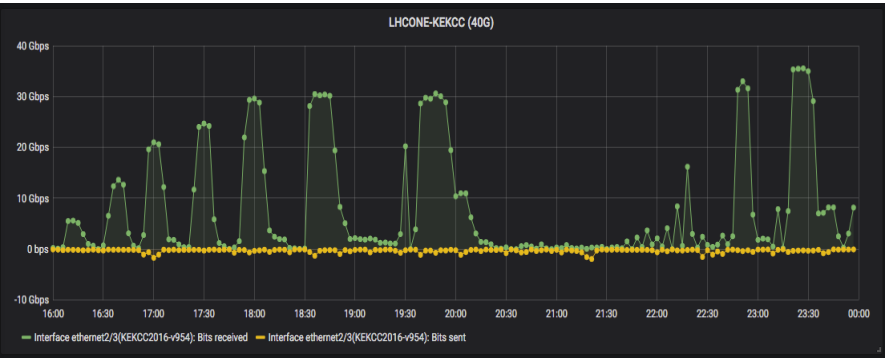
Data Challenge 2019

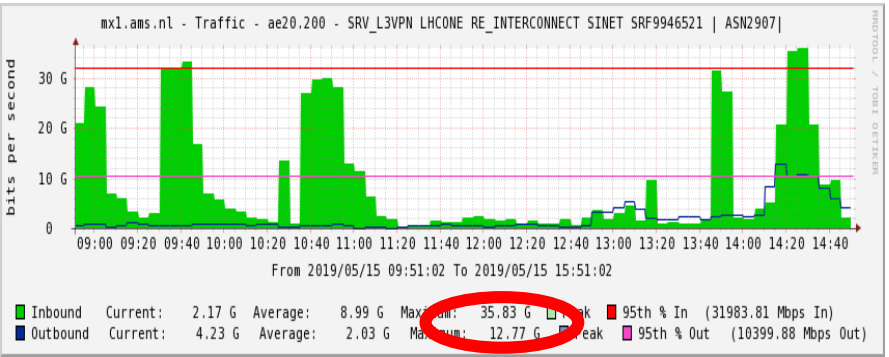
TEST MAY 2019
Test the connection between KEK and EU Raw Data Center through the new 100G link Tokyo-Amsterdam.
Test the connection between KEK and IN2P3 through the new 40Gb peering RENATER-GEANT.
Complete the test KEK vs UVIc.
Test KEK connection vs EU through GEANT DTN

INVOLVED SITES: CNAF, DESY, IN2P3, KIT, KEK, UVIc, NAPOLI, SIGNET, GEANT DTN Service

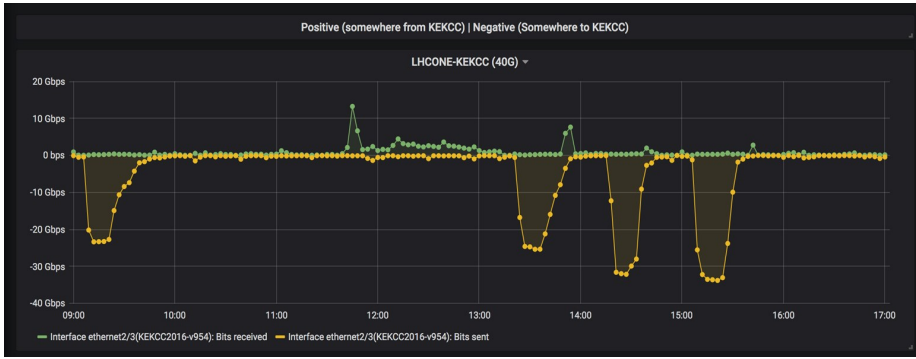
KEK vs EU

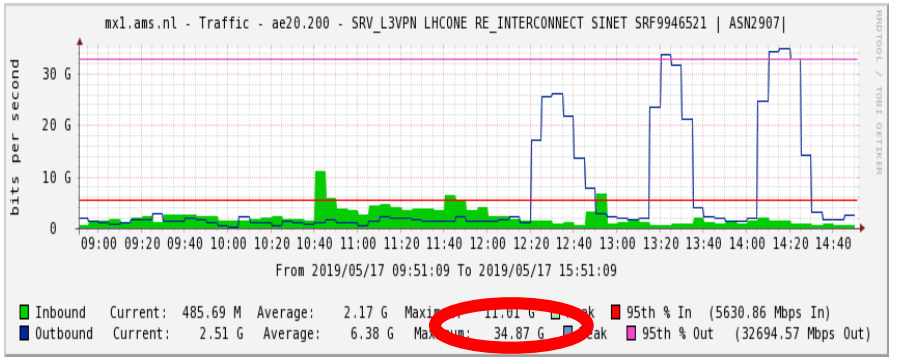
KEK-> EU (FTS job with multiple destinations CNAF,DESY, KIT, IN2P3, Napoli and SIGNET)
Max 35.83 Gbps with 16 streams
Average 13.5 Gbps





EU->KEK (FTS job with multiple source CNAF,DESY, KIT, IN2P3, Napoli and SIGNET)
Max 34.87 Gbps with 16 streams
Average 11.8 Gbps

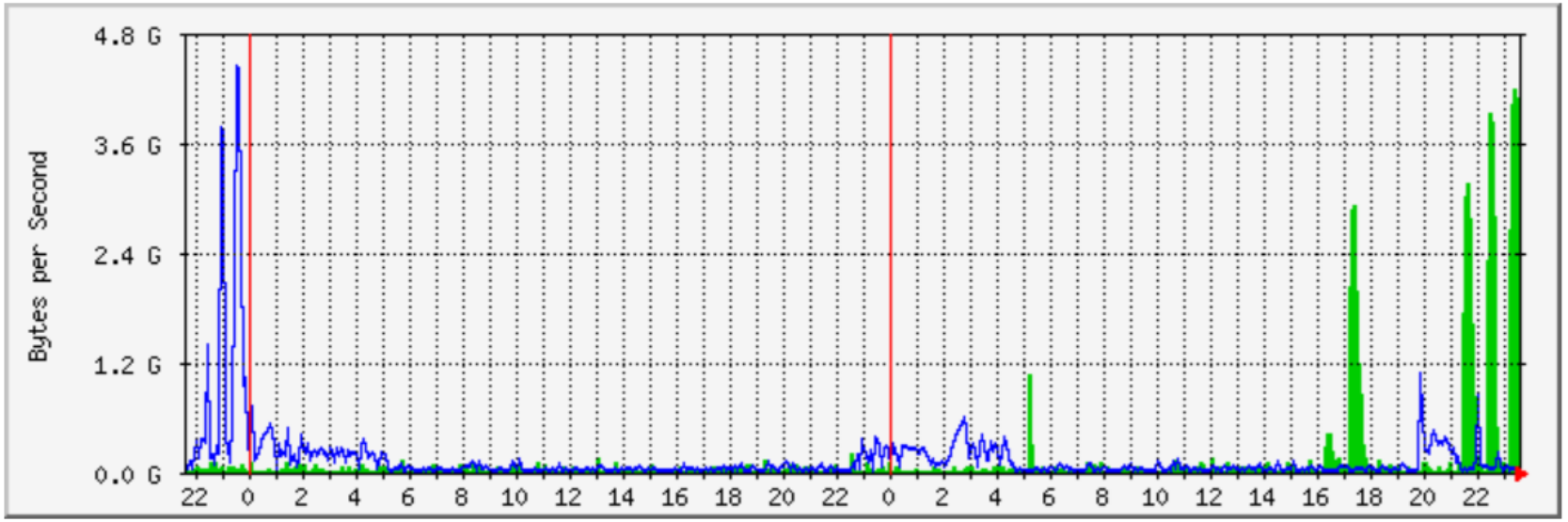




KEKCC - LHCONE 40G

The statistics were last updated **Friday, 17 May 2019 at 23:35**

`Daily' Graph (5 Minute Average)



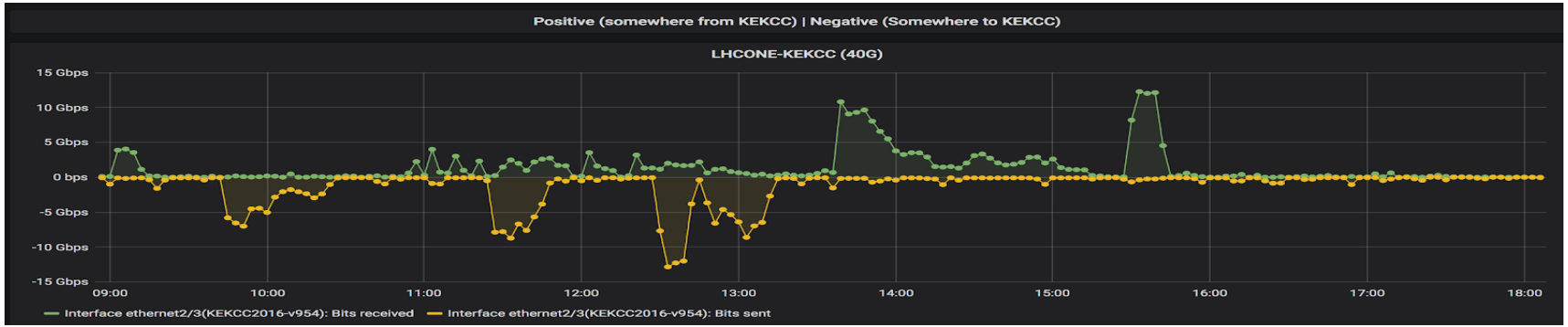
	Max	Average	Current
In (LHCONE→KEKCC)	4199.4 MB/s (84.0%)	12[illegible].1 MB/s (2.5%)	1901.3 MB/s (38.0%)
Out (KEKCC→LHCONE)	4438.1 MB/s (88.8%)	13[illegible].0 MB/s (2.6%)	52.0 MB/s (1.0%)

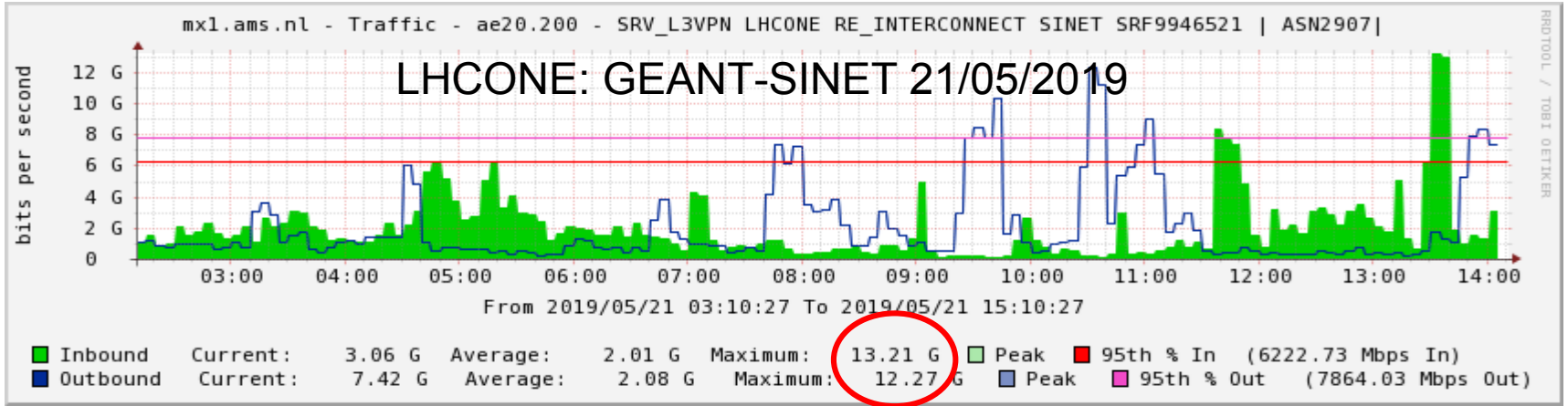
UP to 88% of the Bandwidth

KEK vs IN2P3

KEK-> IN2P3 - **max 12.4 Gbps** with 96 file and 16 streams
Average **4.1Gbps**
IN2P3->KEK – **max 12.4 Gbps** with 97 file and 16 streams
Average **6.6Gbps**

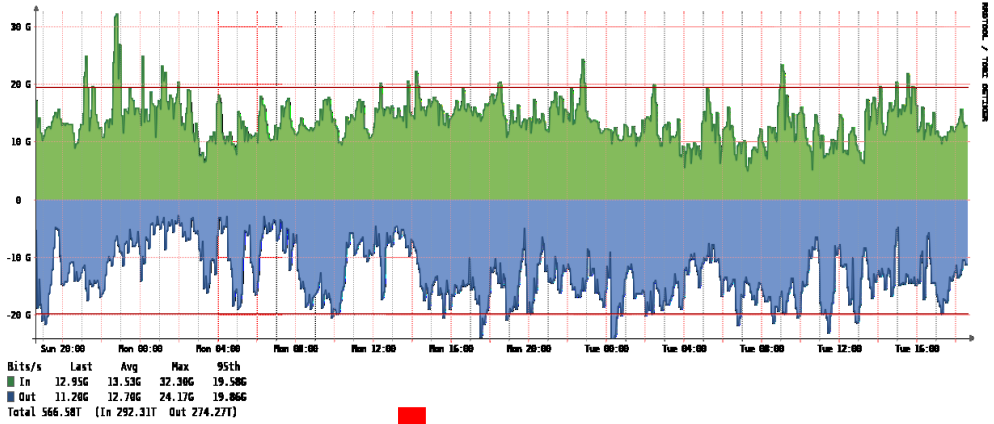
New results improve the previous tests done in October 2018





IN2P3 Peering and Storage

KEK – SINET5
100 Gbps



dCache Pool

dCache Fileserver

dCache Fileserver

GEANT

RENATER Router

ccpn-inter

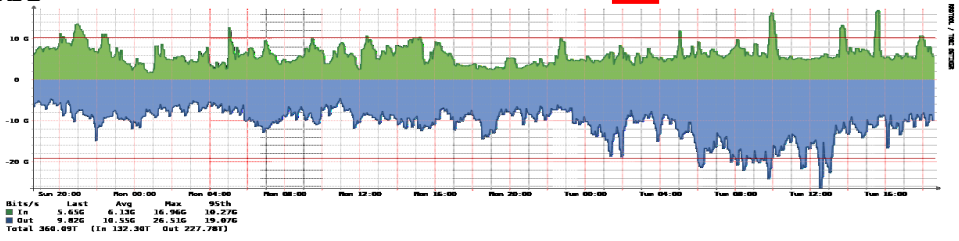
ccpn-coreb

LHCONE 40Gbps

4x10Gbps

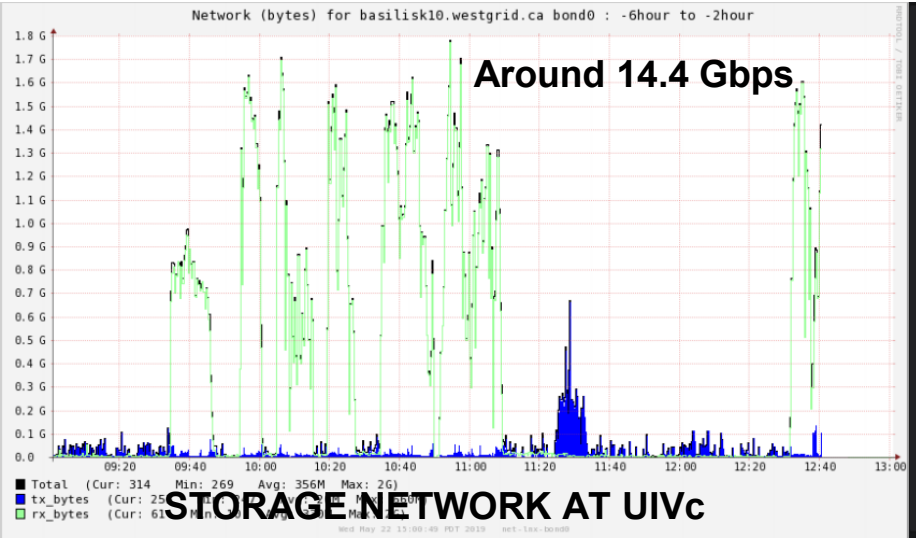
2x100G

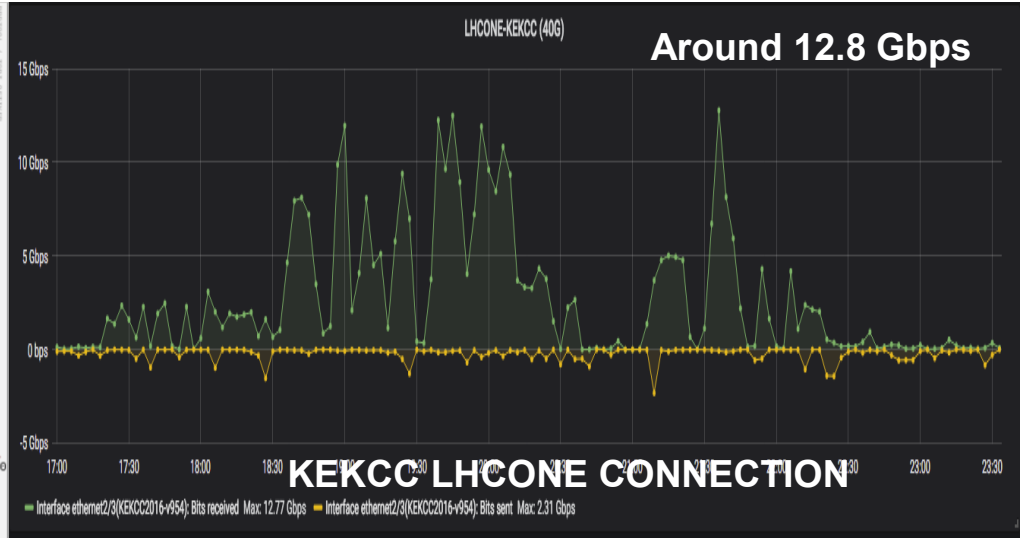
10Gbps



KEK vs UVIc

Involved sites KEK, UVIc
KEK-> UVIC - **max 13.5 Gbps** with 43 files and 16 streams
Average of the day **5.6Gbps**



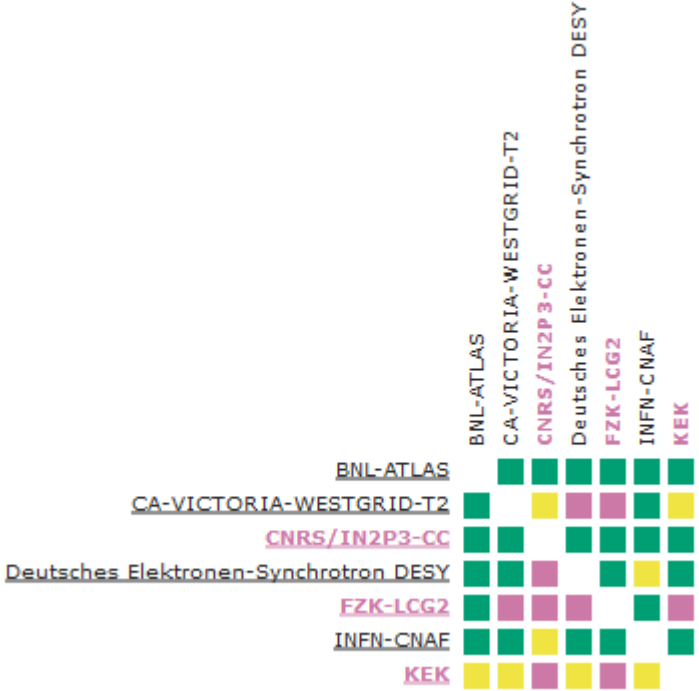


Current Results vs Estimated Requirements for RAW DATA Movement (Gbps)

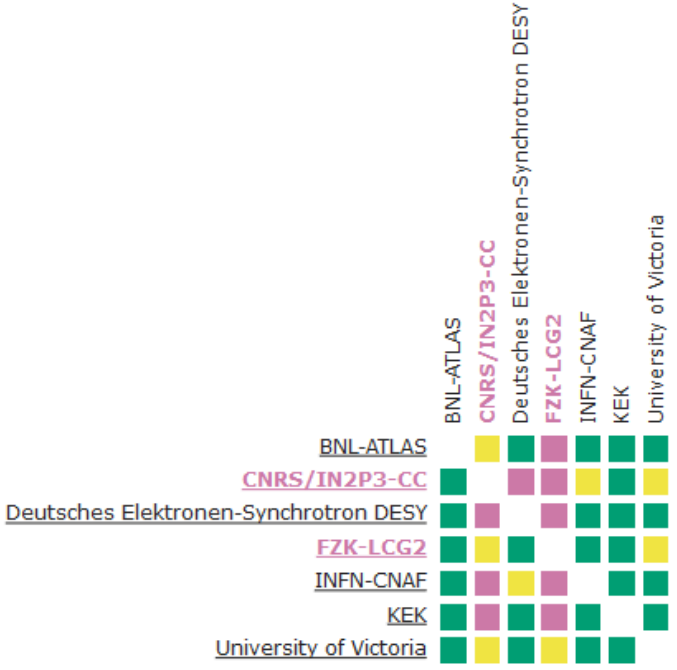
	FROM KEK		
	DC 2018/19 Peak (Gbps)	Requirement for RAW Data (Average Throughput) Gbps	Goal: 5 X Average Throughput (Gbps)
ITALY (CNAF)	20.8	1.2	6
GERMANY (KIT/DESY)	21	1.2	6
FRANCE (IN2P3)	12.4	1	5
USA (BNL)	35.5	1.8	9
CANADA (UVIC)	13.5	1	5
KEK to EU	35.8	**3.4**	**17**
Max KEK in Outbound	**35.8**	**6.2**	**31**

Perfsonar MADDASH of RAW Data Centers

Belle II RAW Data Centers IPv4 Throughput



Belle II RAW Data Centers IPv4 Latency

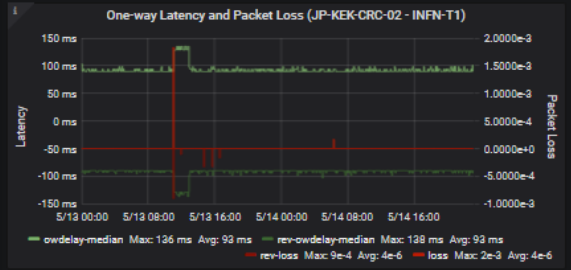


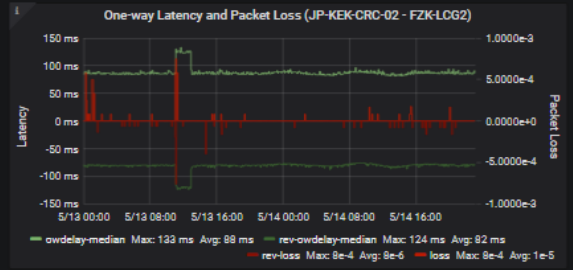
perfSONAR E2E Performance

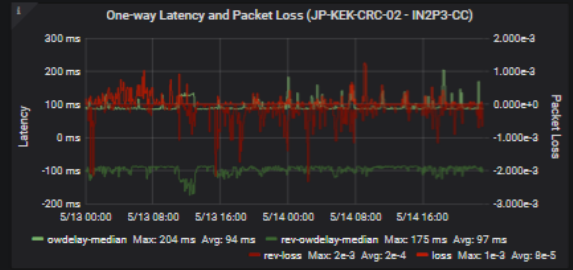
This week so far

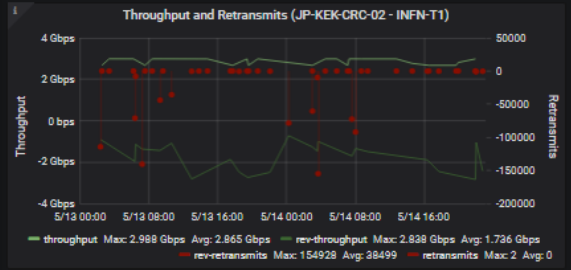
Source: JP-KEK-CRC-02 | Destination1: INFN-T1 | Destination2: FZK-LCG2 | Destination3: IN2P3-CC

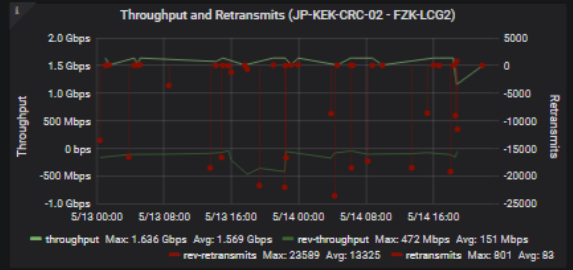
Network Throughput WG | OSG Networking

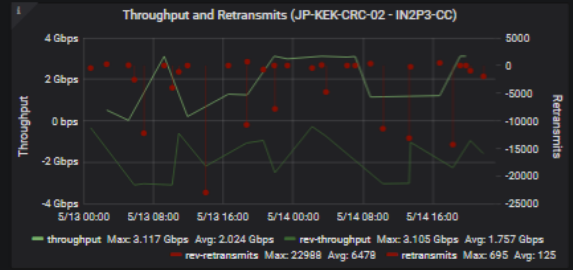


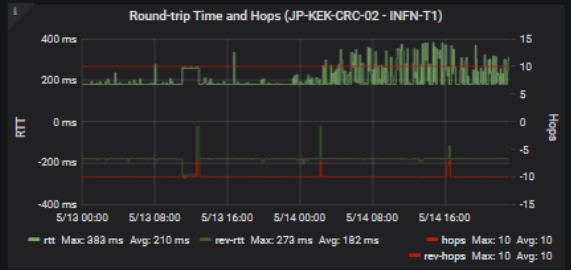


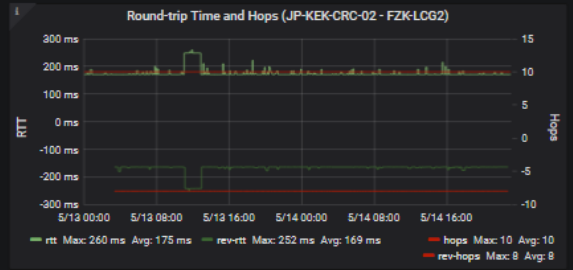


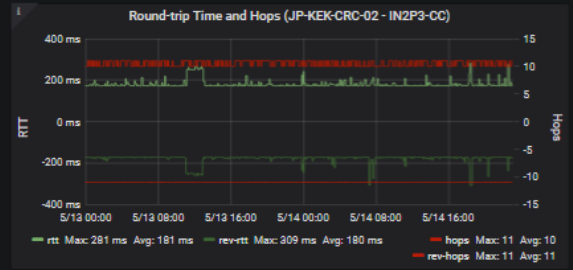












Sources: perfSONAR measurements are provided by Open Science Grid (OSG) and University of Chicago. Contacts: If you suspect a network problem and wish to follow up on it, please open a ticket with the appropriate support unit: For OSG sites please open a ticket with GOC; For WLCG sites please open a GGUS ticket to WLCG Network Throughput support

Some of the people involved in different aspects of Network Data Challenge 2019 and support for the Network aspects

BNL (Hiro Ito)

CNAF (Lucia Morganti, Stefano Zani, Vladimir Sapunenko)

DESY (Andreas Gellrich)

GARR (Marco Marletta)

GEANT (Domenico Vicinanza)

IN2P3 (Jerome Bernier, Laurent Caillat, Ghita Rahal, Karim Trabelsi)

KEK (Soh Suzuki, Go Iwai)

KIT (Bruno Hoeft, James Kahn)

RENATER (Laurent Gydé)

SIGNET (Marco Bracko)

UIVc (Marcus Ebert, Robert Taylor, Rolf Seuster)

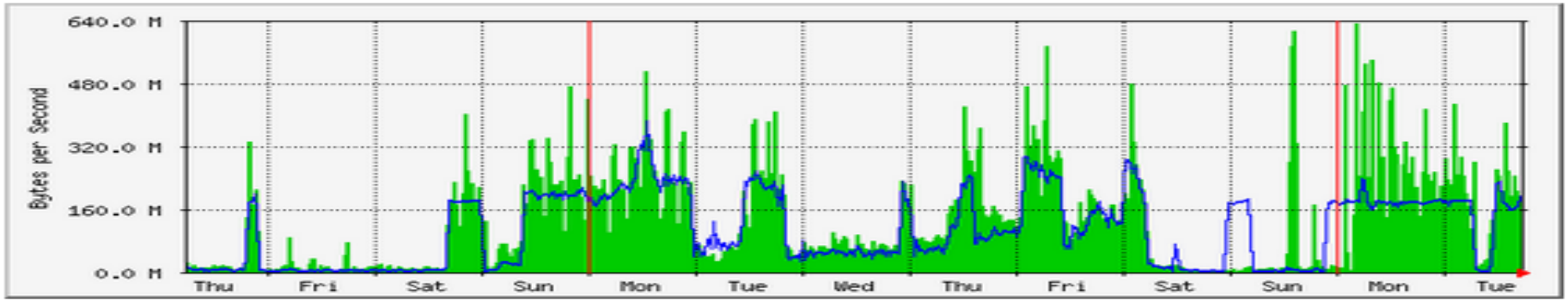
Perfsonar Team (Shawn McKee, Marian Babik)

Several other people

mailing list **belle2-wan-networking@belle2.org** **(57 members)** **THANK YOU TO ALL THE PARTICIPANTS**

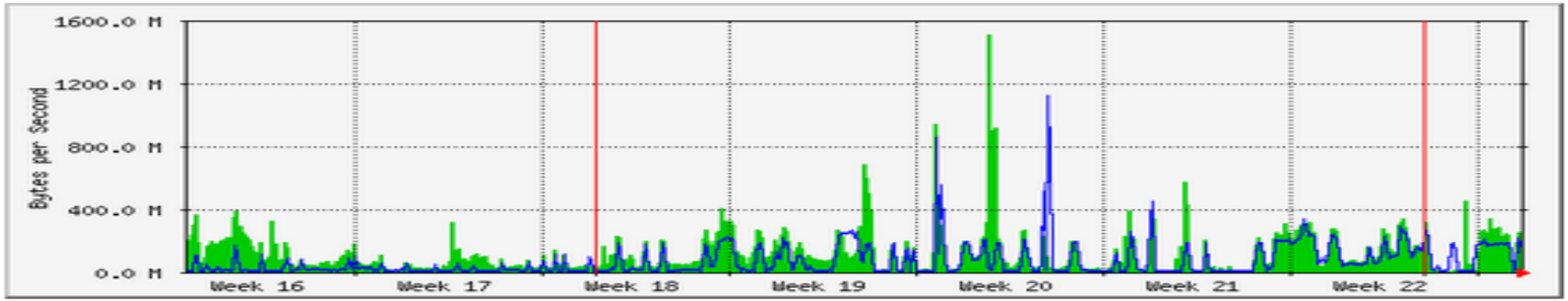
BACKUP SLIDES

`Weekly' Graph (30 Minute Average)



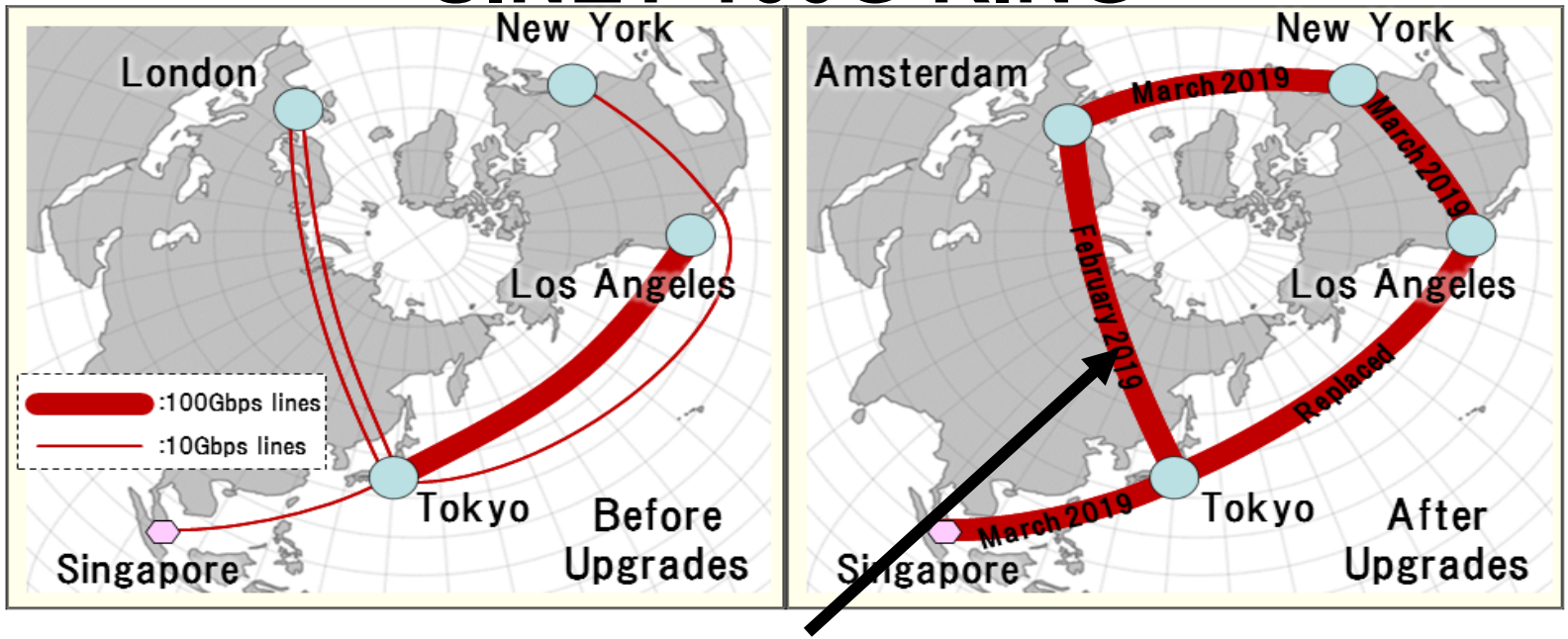
	Max	Average	Current
In (KEKCC→Outside)	630.7 MB/s (4.2%)	121.2 MB/s (0.8%)	161.6 MB/s (1.1%)
Out (Outside→KEKCC)	383.7 MB/s (2.6%)	103.8 MB/s (0.7%)	194.2 MB/s (1.3%)

`Monthly' Graph (2 Hour Average)

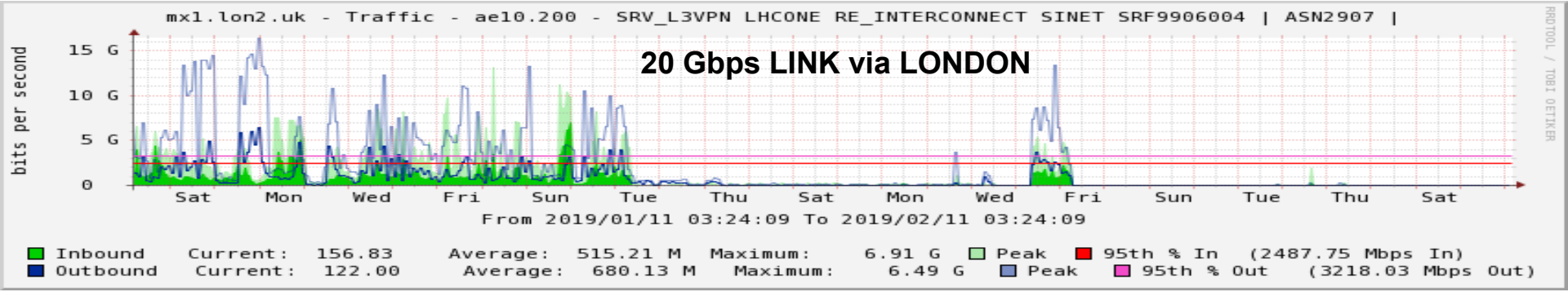


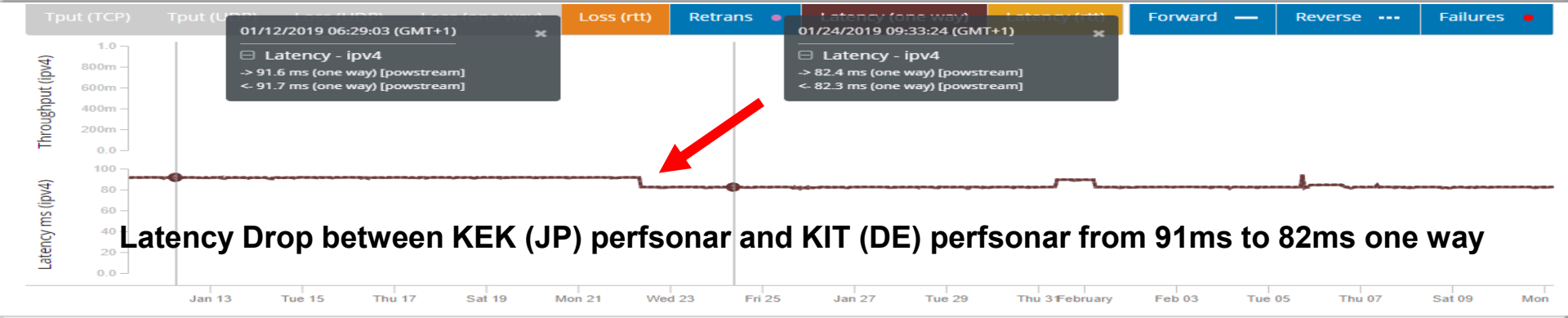
	Max	Average	Current
In (KEKCC→Outside)	1507.4 MB/s (10.0%)	110.6 MB/s (0.7%)	192.4 MB/s (1.3%)
Out (Outside→KEKCC)	1117.2 MB/s (7.4%)	65.0 MB/s (0.4%)	169.0 MB/s (1.1%)

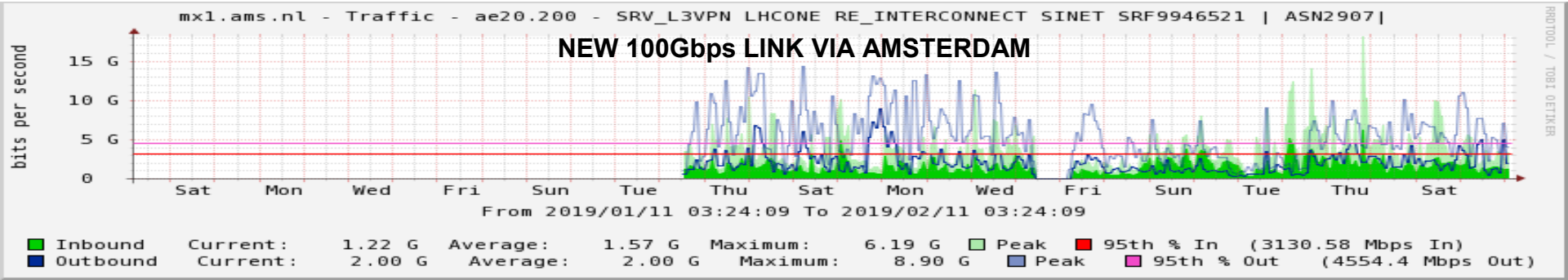
SINET 100G RING



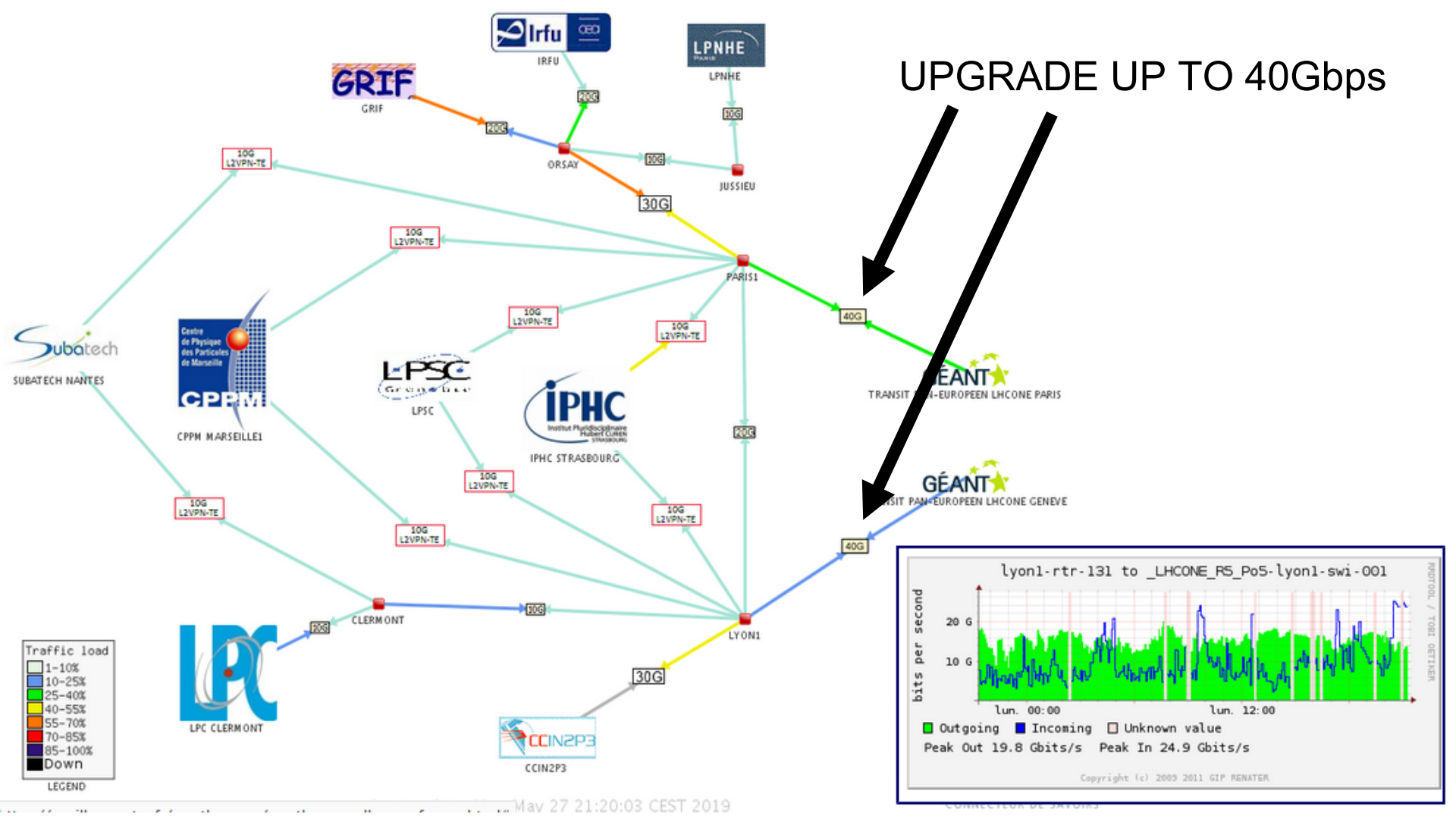
- **JP-EU link upgrade from 2x10G to 1x100G -Feb. 2019 (Tokyo to Amsterdam on NetherLight + L3 Peering GEANT-SINET)**
- **JP-NY link replaced by LA-NY 100G link . March 2019**
- **New Trans-Atlantic NY-EU 100G March 2019**
- https://www.nii.ac.jp/news/release/2019/0301.html
- meetings.internet2.edu/media/medialibrary/2019/03/07/20190307-nakamura-SINET.pdf
- https://www.geant.org/News_and_Events/Pages/100Gbps-ring-connection-around-the-globe-supercharges.aspx


mx1.lon2.uk - Traffic - ae10.200 - SRV_L3VPN LHCONE RE_INTERCONNECT SINET SRF9906004 | ASN2907 |
20 Gbps LINK via LONDON
bits per second
15 G
10 G
5 G
0
Sat Mon Wed Fri Sun Tue Thu Sat Mon Wed Fri Sun Tue Thu Sat
From 2019/01/11 03:24:09 To 2019/02/11 03:24:09
Inbound Current: 156.83 Average: 515.21 M Maximum: 6.91 G Peak 95th % In (2487.75 Mbps In)
Outbound Current: 122.00 Average: 680.13 M Maximum: 6.49 G Peak 95th % Out (3218.03 Mbps Out)

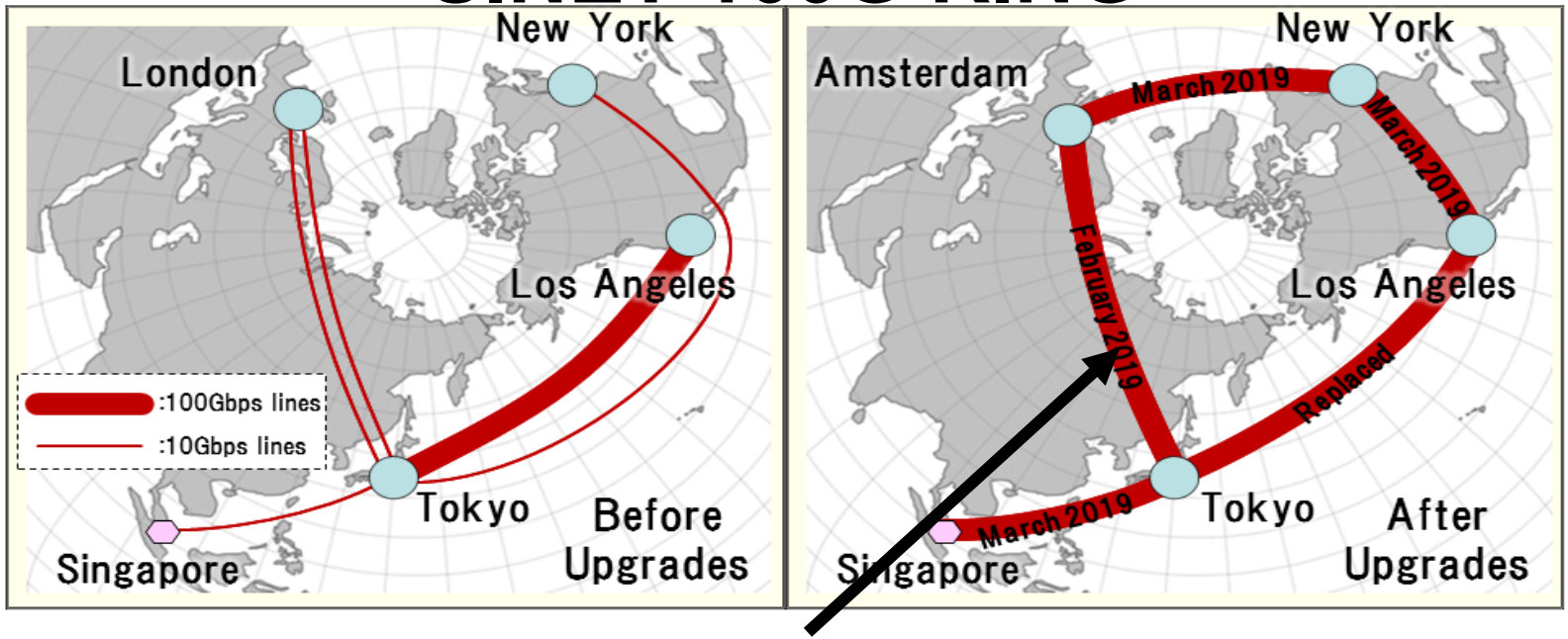

Tput (TCP)
Loss (rtt)
Retrans
Forward
Reverse
Failures
01/12/2019 06:29:03 (GMT+1)
Latency - ipv4
-> 91.6 ms (one way) [powstream]
<- 91.7 ms (one way) [powstream]
01/24/2019 09:33:24 (GMT+1)
Latency - ipv4
-> 82.4 ms (one way) [powstream]
<- 82.3 ms (one way) [powstream]
Throughput (ipv4)
Latency ms (ipv4)
Jan 13 Tue 15 Thu 17 Sat 19 Mon 21 Wed 23 Fri 25 Jan 27 Tue 29 Thu 31 February Feb 03 Tue 05 Thu 07 Sat 09 Mon
Latency Drop between KEK (JP) perfsonar and KIT (DE) perfsonar from 91ms to 82ms one way


mx1.ams.nl - Traffic - ae20.200 - SRV_L3VPN LHCONE RE_INTERCONNECT SINET SRF9946521 | ASN2907|
NEW 100Gbps LINK VIA AMSTERDAM
bits per second
15 G
10 G
5 G
0
Sat Mon Wed Fri Sun Tue Thu Sat Mon Wed Fri Sun Tue Thu Sat
From 2019/01/11 03:24:09 To 2019/02/11 03:24:09
Inbound Current: 1.22 G Average: 1.57 G Maximum: 6.19 G Peak 95th % In (3130.58 Mbps In)
Outbound Current: 2.00 G Average: 2.00 G Maximum: 8.90 G Peak 95th % Out (4554.4 Mbps Out)

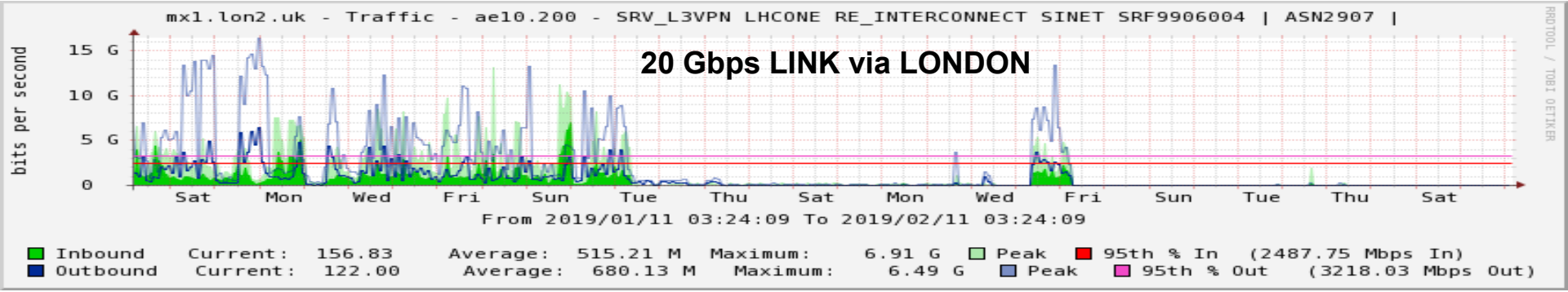
UPGRADE UP TO 40Gbps

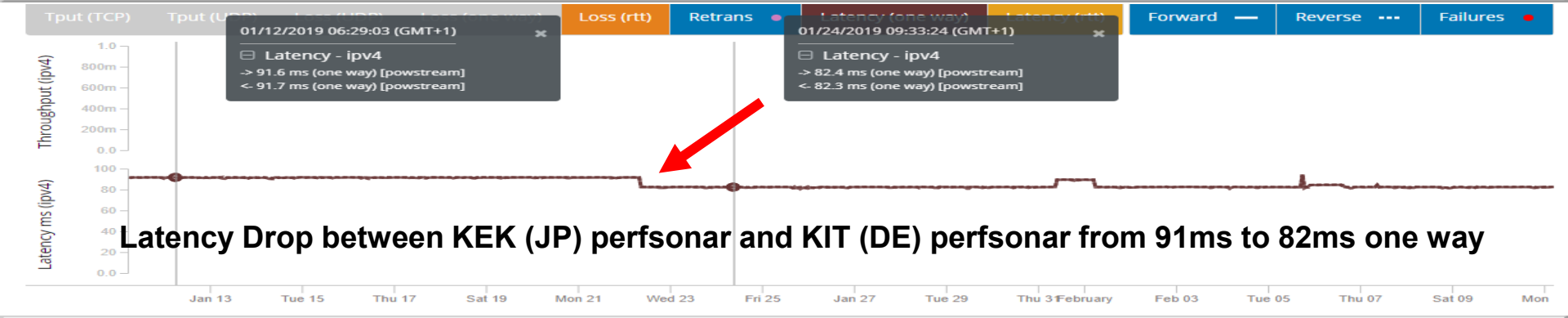


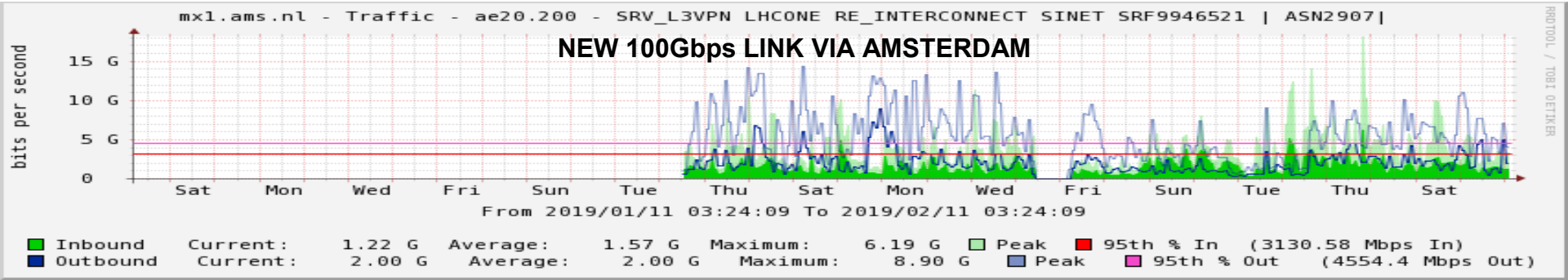
SINET 100G RING



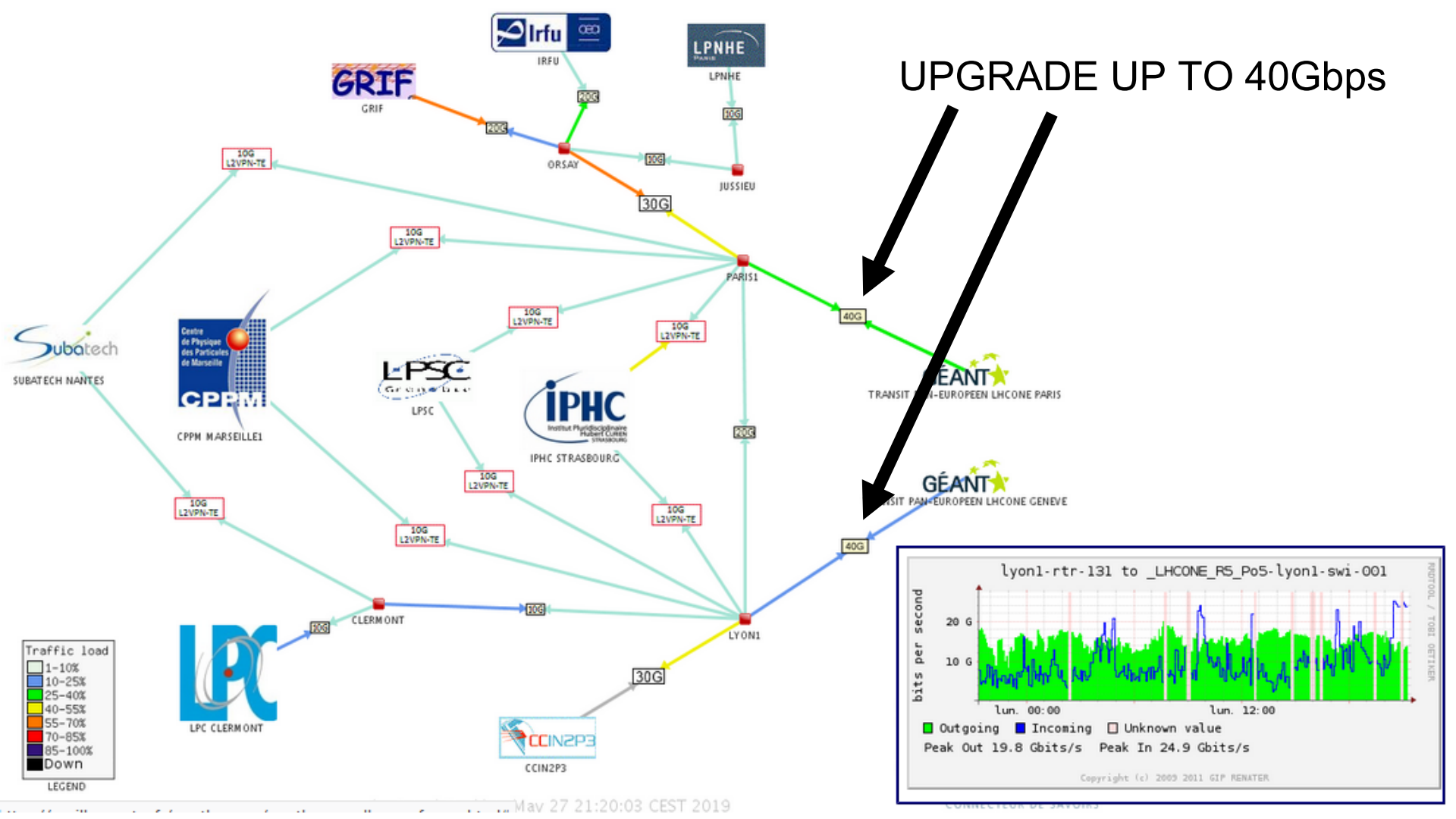
- **JP-EU link upgrade from 2x10G to 1x100G -Feb. 2019 (Tokyo to Amsterdam on NetherLight + L3 Peering GEANT-SINET)**
- **JP-NY link replaced by LA-NY 100G link . March 2019**
- **New Trans-Atlantic NY-EU 100G March 2019**
- https://www.nii.ac.jp/news/release/2019/0301.html
- meetings.internet2.edu/media/medialibrary/2019/03/07/20190307-nakamura-SINET.pdf
- https://www.geant.org/News_and_Events/Pages/100Gbps-ring-connection-around-the-globe-supercharges.aspx


mx1.lon2.uk - Traffic - ae10.200 - SRV_L3VPN LHCONE RE_INTERCONNECT SINET SRF9906004 | ASN2907 |
20 Gbps LINK via LONDON
bits per second
15 G
10 G
5 G
0
Sat Mon Wed Fri Sun Tue Thu Sat Mon Wed Fri Sun Tue Thu Sat
From 2019/01/11 03:24:09 To 2019/02/11 03:24:09
Inbound Current: 156.83 Average: 515.21 M Maximum: 6.91 G Peak 95th % In (2487.75 Mbps In)
Outbound Current: 122.00 Average: 680.13 M Maximum: 6.49 G Peak 95th % Out (3218.03 Mbps Out)


Tput (TCP)
Loss (rtt)
Retrans
Forward
Reverse
Failures
01/12/2019 06:29:03 (GMT+1)
Latency - ipv4
-> 91.6 ms (one way) [powstream]
<- 91.7 ms (one way) [powstream]
01/24/2019 09:33:24 (GMT+1)
Latency - ipv4
-> 82.4 ms (one way) [powstream]
<- 82.3 ms (one way) [powstream]
Throughput (ipv4)
Latency ms (ipv4)
Jan 13 Tue 15 Thu 17 Sat 19 Mon 21 Wed 23 Fri 25 Jan 27 Tue 29 Thu 31 February Feb 03 Tue 05 Thu 07 Sat 09 Mon
Latency Drop between KEK (JP) perfsonar and KIT (DE) perfsonar from 91ms to 82ms one way


mx1.ams.nl - Traffic - ae20.200 - SRV_L3VPN LHCONE RE_INTERCONNECT SINET SRF9946521 | ASN2907|
NEW 100Gbps LINK VIA AMSTERDAM
bits per second
15 G
10 G
5 G
0
Sat Mon Wed Fri Sun Tue Thu Sat Mon Wed Fri Sun Tue Thu Sat
From 2019/01/11 03:24:09 To 2019/02/11 03:24:09
Inbound Current: 1.22 G Average: 1.57 G Maximum: 6.19 G Peak 95th % In (3130.58 Mbps In)
Outbound Current: 2.00 G Average: 2.00 G Maximum: 8.90 G Peak 95th % Out (4554.4 Mbps Out)

UPGRADE UP TO 40Gbps



EXPECTED THROUGHPUT PER YEAR (In) Gbit/s

	2019	2020	2021	2022	2023	2024	2025	2026	2027
Australia	0,0	0,0	0,1	0,1	0,2	0,2	0,3	0,4	0,5
Austria	0,0	0,0	0,0	0,1	0,1	0,1	0,1	0,2	0,2
Canada	0,0	0,1	0,3	0,5	0,5	0,9	1,0	1,1	1,0
China	0,0	0,1	0,1	0,2	0,3	0,4	0,6	0,7	1,0
Czech	0,0	0,0	0,0	0,0	0,1	0,1	0,1	0,1	0,2
France	0,0	0,0	0,2	0,5	0,6	0,9	1,1	1,1	1,3
Germany	0,1	0,2	0,6	1,1	1,3	2,0	2,5	2,8	3,1
India	0,0	0,0	0,1	0,2	0,2	0,3	0,4	0,5	0,7
Israel	0,0	0,0	0,0	0,0	0,0	0,1	0,1	0,1	0,1
Italy	0,1	0,2	0,6	1,2	1,4	2,2	2,8	3,2	3,5
KEK	0,1	0,3	0,5	0,8	1,1	1,3	2,0	2,6	3,8
Korea	0,0	0,1	0,1	0,2	0,3	0,4	0,5	0,6	0,8
Malaysia	0,0	0,0	0,0	0,0	0,0	0,1	0,1	0,1	0,1
Mexico	0,0	0,0	0,1	0,1	0,1	0,2	0,3	0,3	0,4
USA	0,2	0,5	0,8	1,5	1,6	2,6	3,1	3,5	3,7
Poland	0,0	0,0	0,1	0,1	0,1	0,2	0,3	0,3	0,4
Russia	0,0	0,1	0,2	0,4	0,6	0,8	1,0	1,3	1,7
Saudi Ara	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,1
Slovenia	0,0	0,0	0,1	0,1	0,2	0,2	0,3	0,4	0,5
Spain	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,1
Taiwan	0,0	0,0	0,1	0,1	0,2	0,2	0,3	0,4	0,5
Thailand	0,0	0,0	0,0	0,0	0,0	0,1	0,1	0,1	0,1
Turkey	0,0	0,0	0,0	0,0	0,0	0,1	0,1	0,1	0,1
Ukraine	0,0	0,0	0,0	0,0	0,0	0,1	0,1	0,1	0,1
Vietnam	0,0	0,0	0,0	0,0	0,1	0,1	0,1	0,1	0,2
TOTAL	0,6	1,8	3,9	7,5	9,2	13,6	17,3	20,2	24,2

EXPECTED THROUGHPUT PER YEAR (Out) Gbit/s

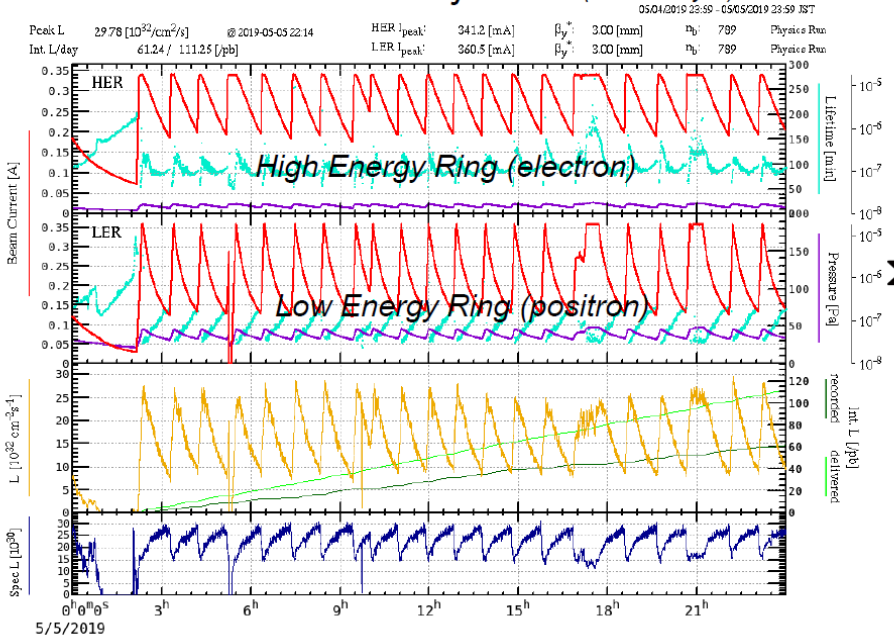
	2019	2020	2021	2022	2023	2024	2025	2026	2027
Australia	0,0	0,0	0,1	0,1	0,1	0,2	0,2	0,3	0,4
Austria	0,0	0,0	0,0	0,0	0,1	0,1	0,1	0,1	0,2
Canada	0,0	0,0	0,1	0,2	0,2	0,3	0,4	0,5	0,7
China	0,0	0,1	0,1	0,2	0,2	0,3	0,4	0,6	0,7
Czech	0,0	0,0	0,0	0,0	0,0	0,1	0,1	0,1	0,1
France	0,0	0,0	0,1	0,1	0,1	0,2	0,3	0,3	0,5
Germany	0,1	0,2	0,3	0,6	0,7	1,0	1,4	1,7	2,3
India	0,0	0,0	0,1	0,1	0,2	0,2	0,3	0,4	0,5
Israel	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,1	0,1
Italy	0,1	0,2	0,3	0,6	0,8	1,1	1,6	2,0	2,6
KEK	0,3	0,7	2,0	4,0	4,5	7,3	8,5	9,1	9,9
Korea	0,0	0,0	0,1	0,2	0,2	0,3	0,4	0,5	0,6
Malaysia	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,1	0,1
Mexico	0,0	0,0	0,0	0,1	0,1	0,1	0,2	0,2	0,3
USA	0,1	0,3	0,4	0,7	0,9	1,2	1,6	2,0	2,7
Poland	0,0	0,0	0,0	0,1	0,1	0,1	0,2	0,2	0,3
Russia	0,0	0,1	0,2	0,3	0,4	0,5	0,8	1,0	1,2
Saudi Ara	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Slovenia	0,0	0,0	0,0	0,1	0,1	0,2	0,2	0,3	0,3
Spain	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Taiwan	0,0	0,0	0,0	0,1	0,1	0,2	0,2	0,3	0,3
Thailand	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,1	0,1
Turkey	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,1	0,1
Ukraine	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,1	0,1
Vietnam	0,0	0,0	0,0	0,0	0,0	0,1	0,1	0,1	0,1
TOTAL	0,6	1,8	3,9	7,5	9,2	13,6	17,3	20,2	24,2

Accelerator operaion has started !

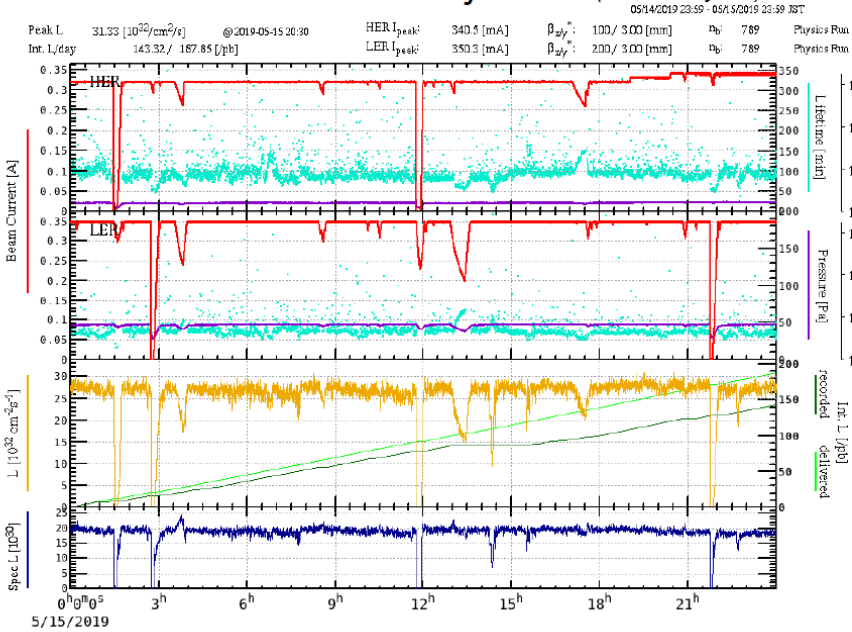
http://www-linac.kek.jp/skekb/snapshot/ring/

Accelerator Daily snapshot

Normal beam injection (as of May 6)



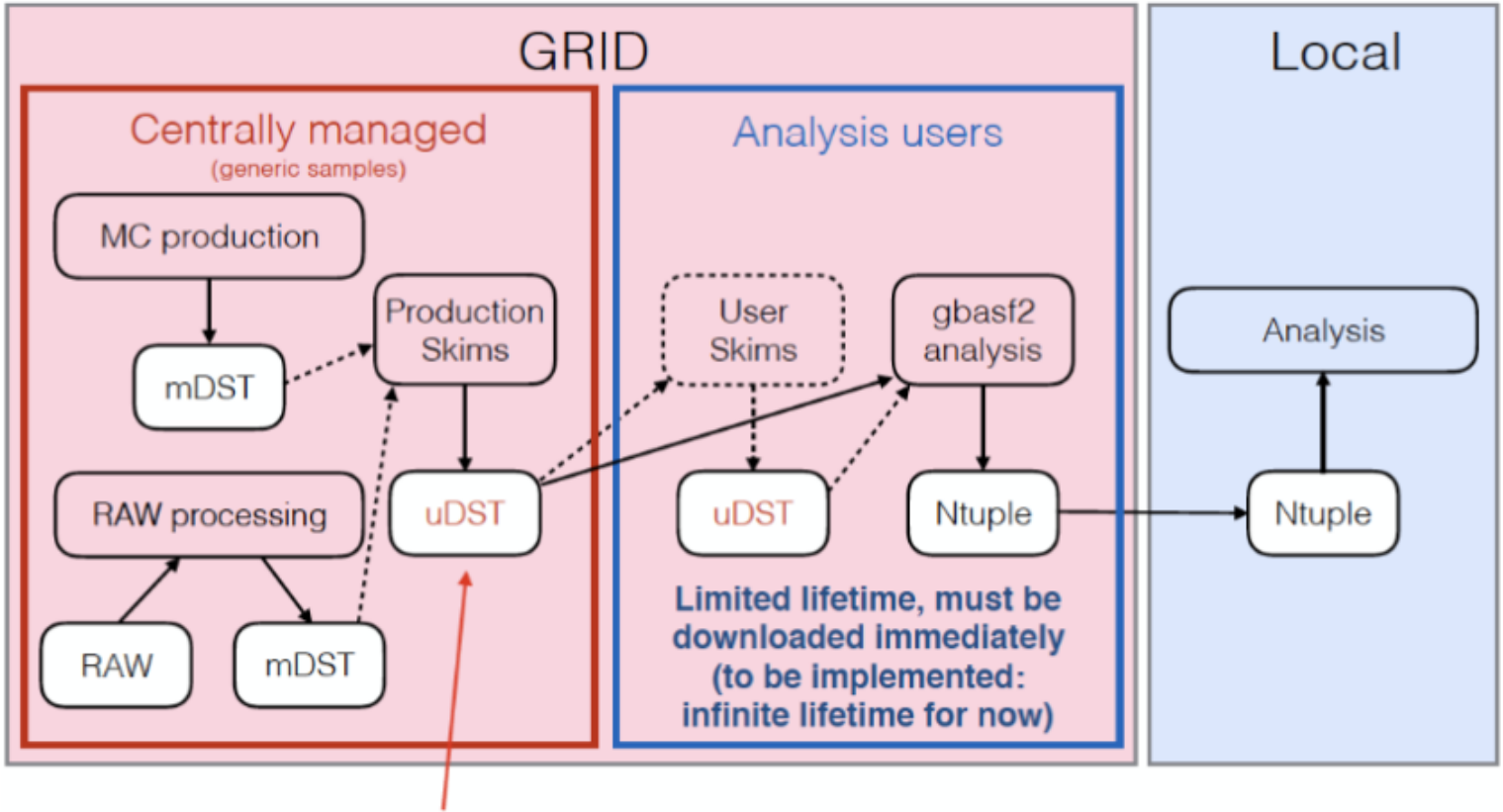
Continuous beam injection (as of May 16)



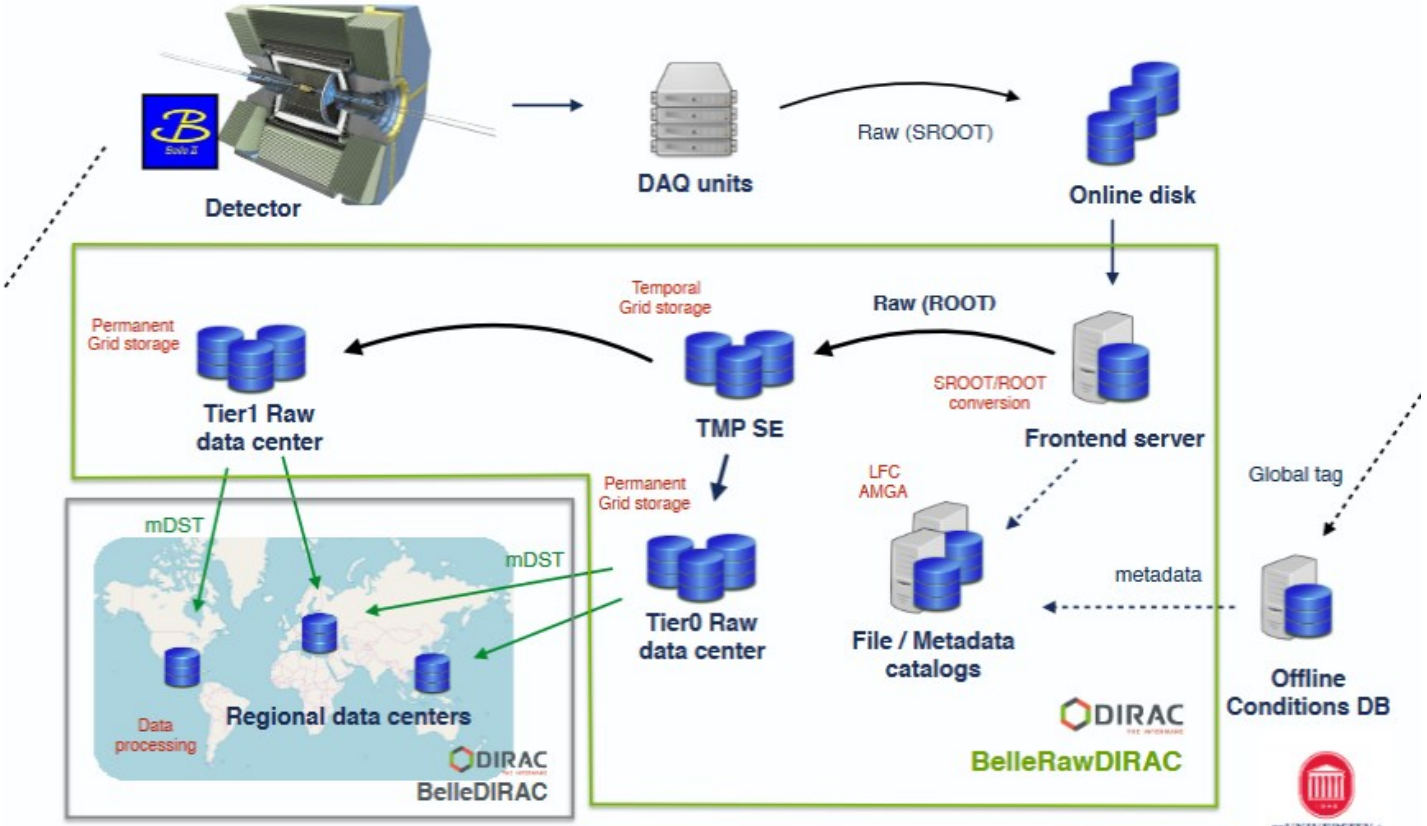
Still under tuning and optimizing many parameters of the SuperKEKB accelerator

peak luminosity ~5 x 10^{33}/cm^2/sec (as of May 31)

DP/Analysis scheme



Online – Offline - Grid



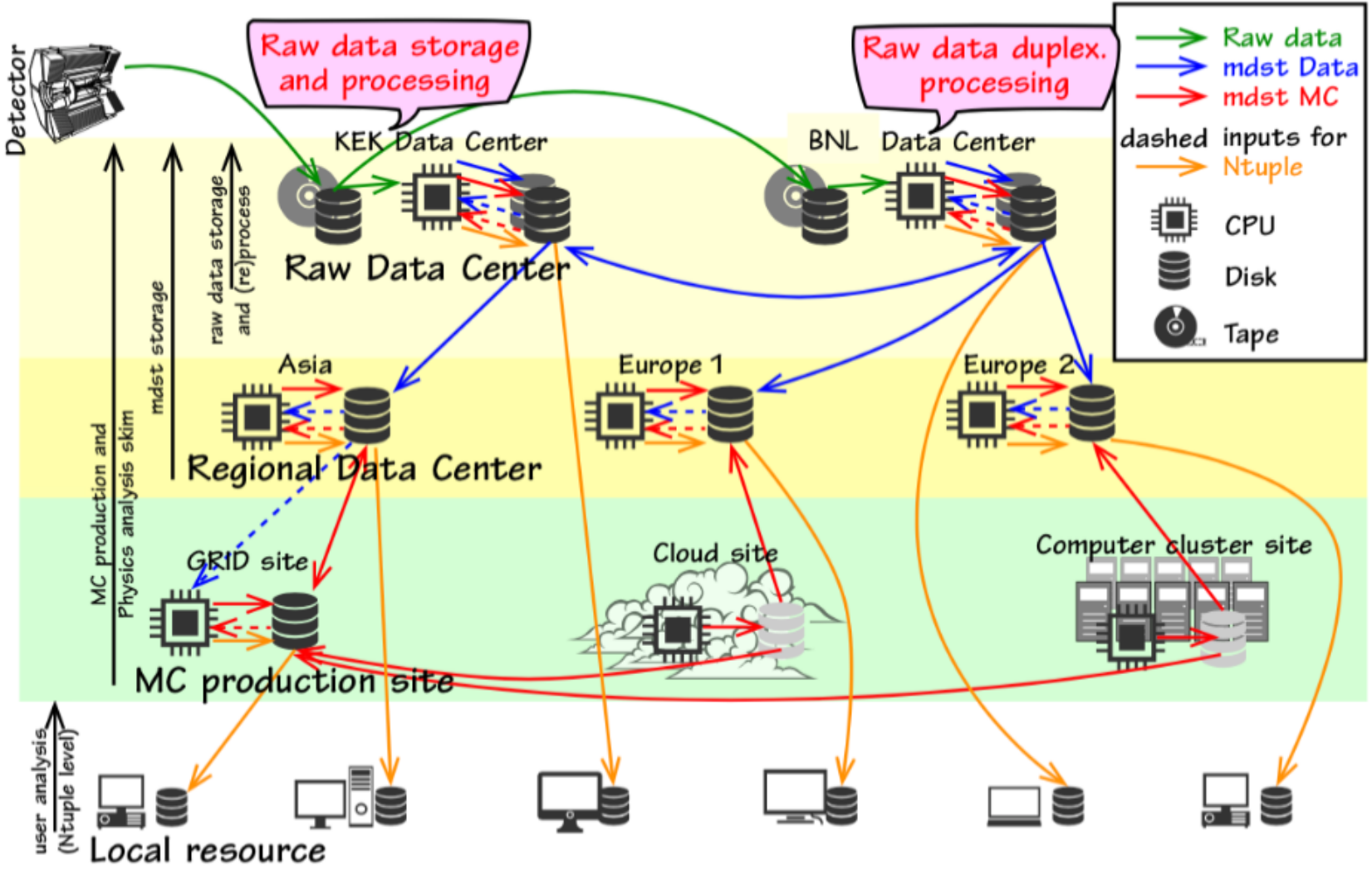
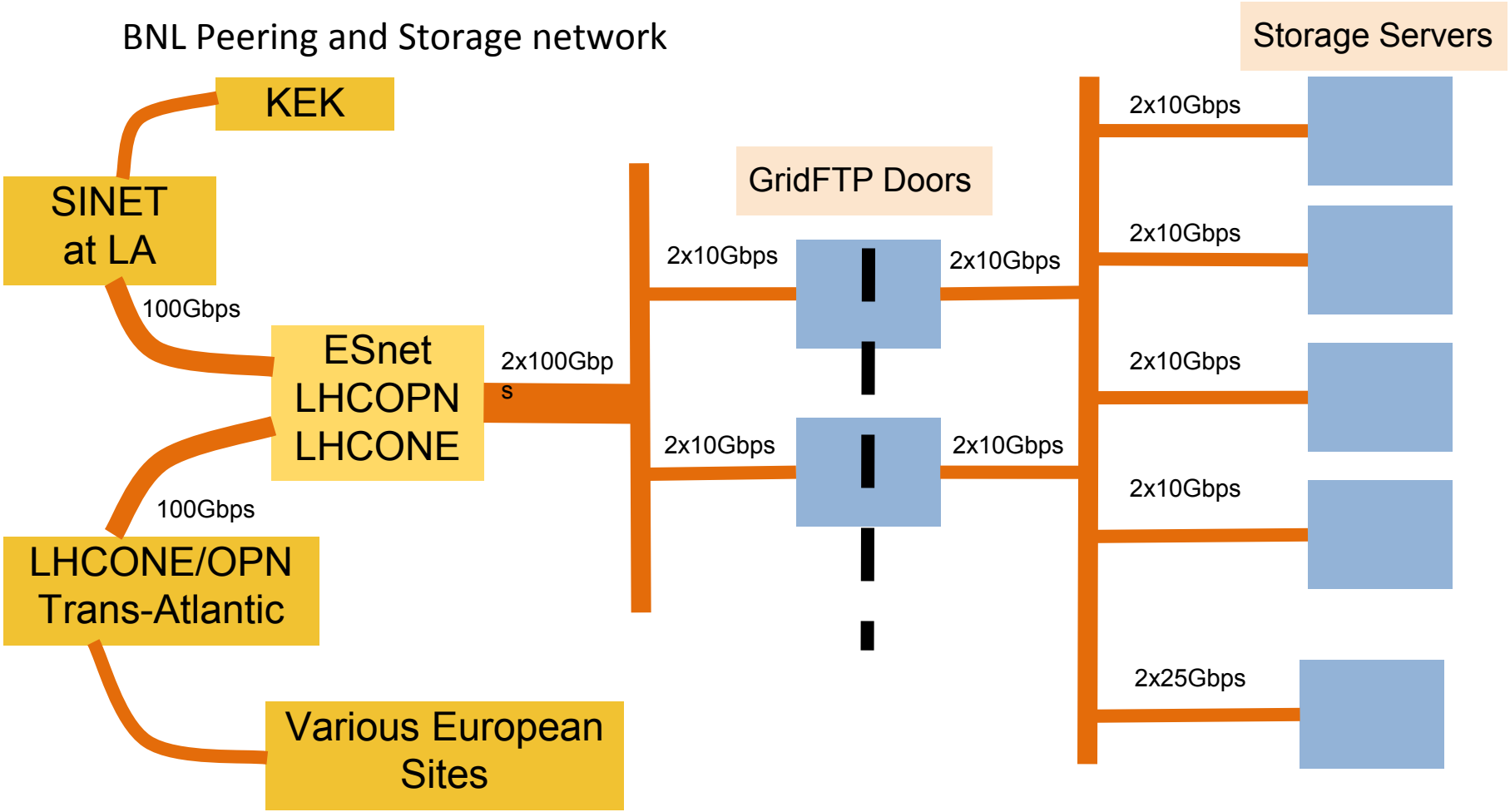
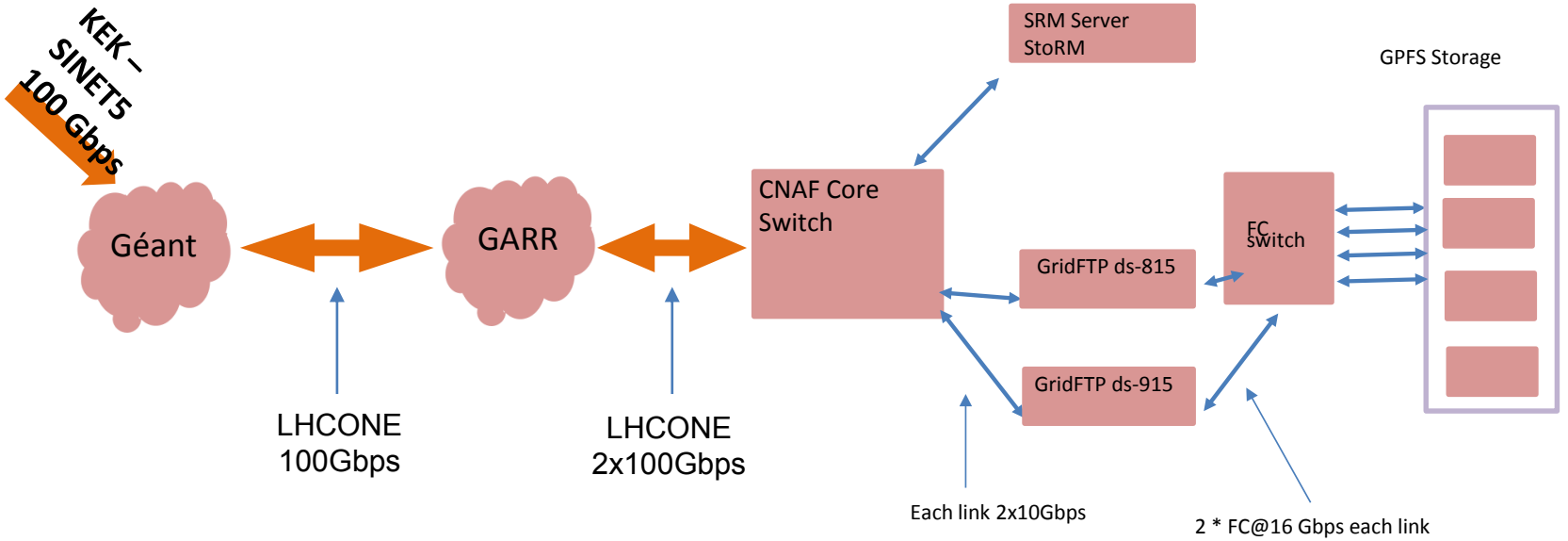

Detector
Raw data storage and processing
Raw data duplex. processing
Raw data
mdst Data
mdst MC
dashed inputs for
Ntuple
CPU
Disk
Tape
KEK Data Center
BNL Data Center
Raw Data Center
raw data storage and (re)process
mdst storage
MC production and Physics analysis skim
Asia
Europe 1
Europe 2
Regional Data Center
GRID site
Cloud site
Computer cluster site
MC production site
user analysis (Ntuple level)
Local resource

Table 1. Nominal value: (please fill/fix with relative data)

	Storage host name	Storage Network per Disk Node	Number of Disk Nodes	Estimate/Known Storage performance	WAN Connection	Link vs KEK	Note (bottleneck etc..)	Local Monitoring of Storage/network Available? Specific procedure to access/collect data?
BNL	dcblsrm.sdcc.bnl.gov	2x10Gbps 2x25Gbps	4 (for 2x10) 1 (for 2x25)	~5 GB/s	2x2x10 Gbps to OPN/LHCONE	2x2x10 Gbps LHCOPN		grafana (public and internal) ganglia
CNAF	storm-fe-archive.cr.cnaf.infn.it	2x10Gbps	2	>10 GB/s	100 Gbps to GARR POP	100Gbps SINET5 - LHCONE	all resources are shared with other VOs	grafana (internal)
DESY	dcache-se-desy.desy.de	1x10Gbps	36	>1Gbps max 32x1Gbps	2x50Gbps to DFN POP	100Gbps SINET5 - LHCONE		internal; plots can be provided periodically
IN2P3	ccsrm02.in2p3.fr	1x10Gbps	2x24		30 Gbps to CC-IN2P3 PoP	40Gbps vs SINET5 - LHCONE	30 Gbps Lyon to Geneve shared with all lab connected to Lyon	internal; and https://pasillo.renater.fr/weathermap/weathermap_lhcone_france.html
KEK	kek2-se02.cc.kek.jp	4x10Gbps	2		40Gbps to SINET POP			
KIT	gridka-dcache.fzk.de	2x40Gbps	2	>20 Gbps	100Gbps to DFN POP 2x10Gbps CERN	100Gbps SINET5 - LHCONE 2x10Gbps vs BNL LHCOPN		Storage Mon public
UVIC	charon01.westgrid.ca	2x10Gbps	2	estimated 1...2GB/s	100Gbps to BCNet/ Canarie	100Gpbs TransPAC/ Canarie	transfer performance depends a lot on the I/O pattern and file size; latency depends on parallel access from others	internal monitoring only; we can provide plots for specific periods (which statistics are interesting?)
SIGNET	dcache.ijs.si	1*10Gbps	2	estimated	2x10 Gbps to	wednesday 15 may		Internal monitoring; we

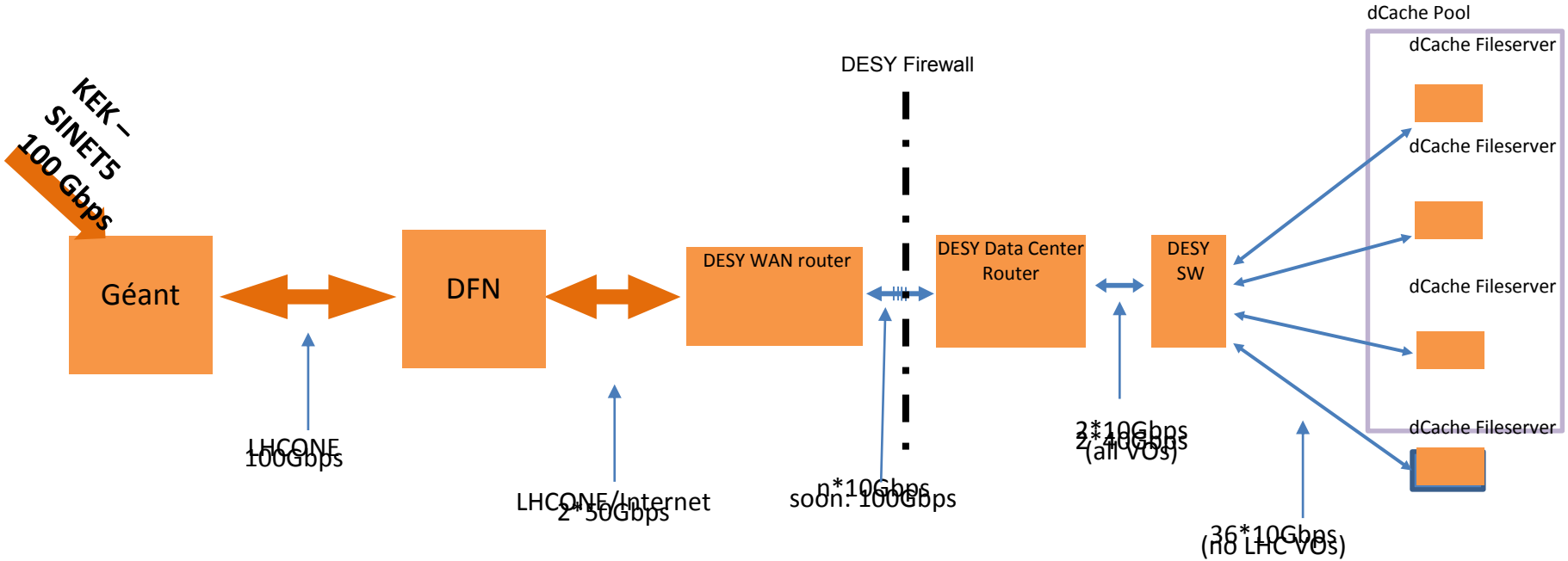

BNL Peering and Storage network
KEK
SINET at LA
100Gbps
ESnet LHCOPN LHCONE
2x100Gbps
100Gbps
LHCONE/OPN Trans-Atlantic
Various European Sites
GridFTP Doors
2x10Gbps
2x10Gbps
2x10Gbps
2x10Gbps
Storage Servers
2x10Gbps
2x10Gbps
2x10Gbps
2x10Gbps
2x25Gbps

CNAF Peering and Storage (please check)
Slide From
https://kds.kek.jp/indico/event/25343/session/3/material/1/0.pdf

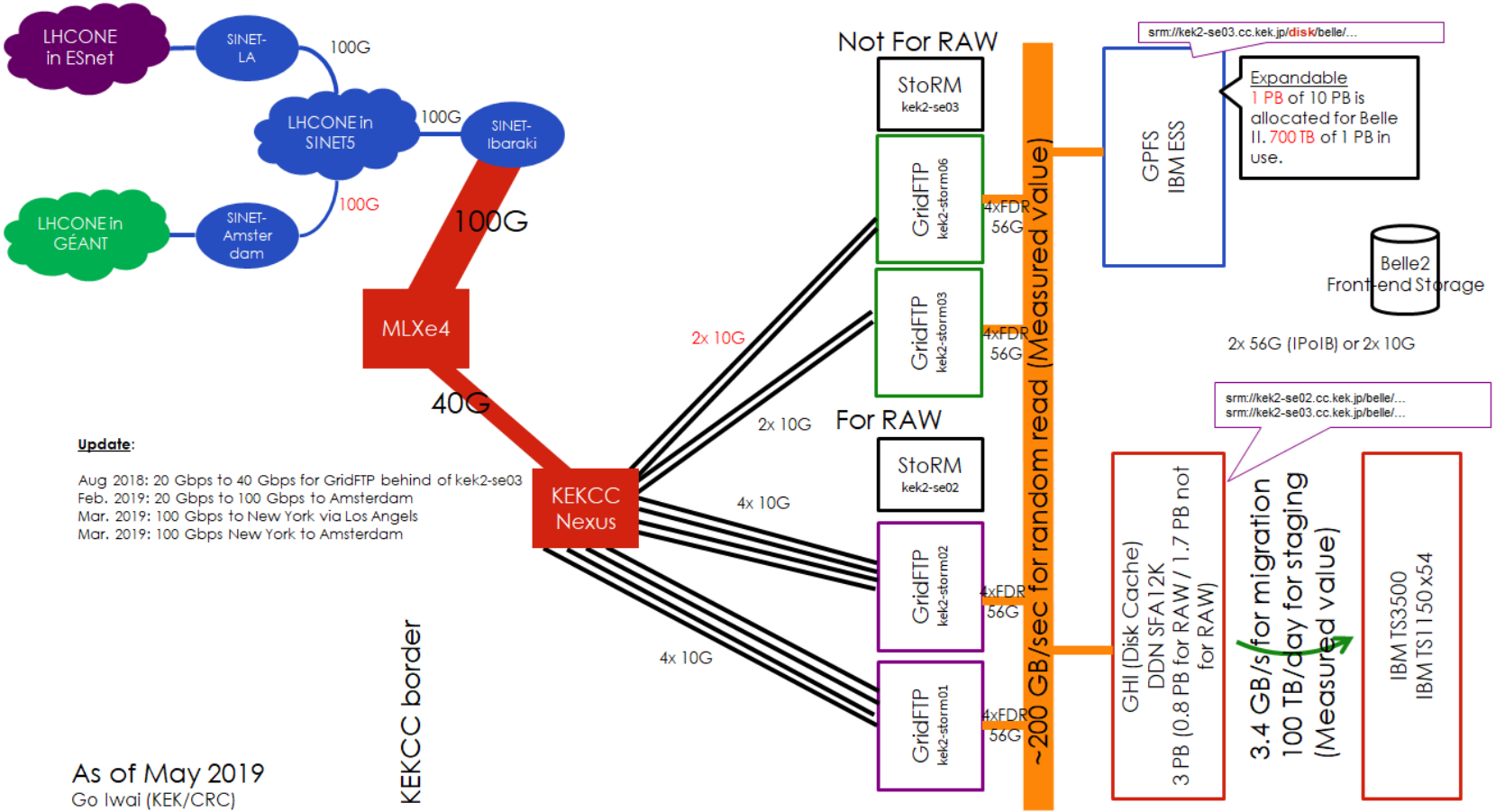


Note: The entire system is shared with non LHC VOs

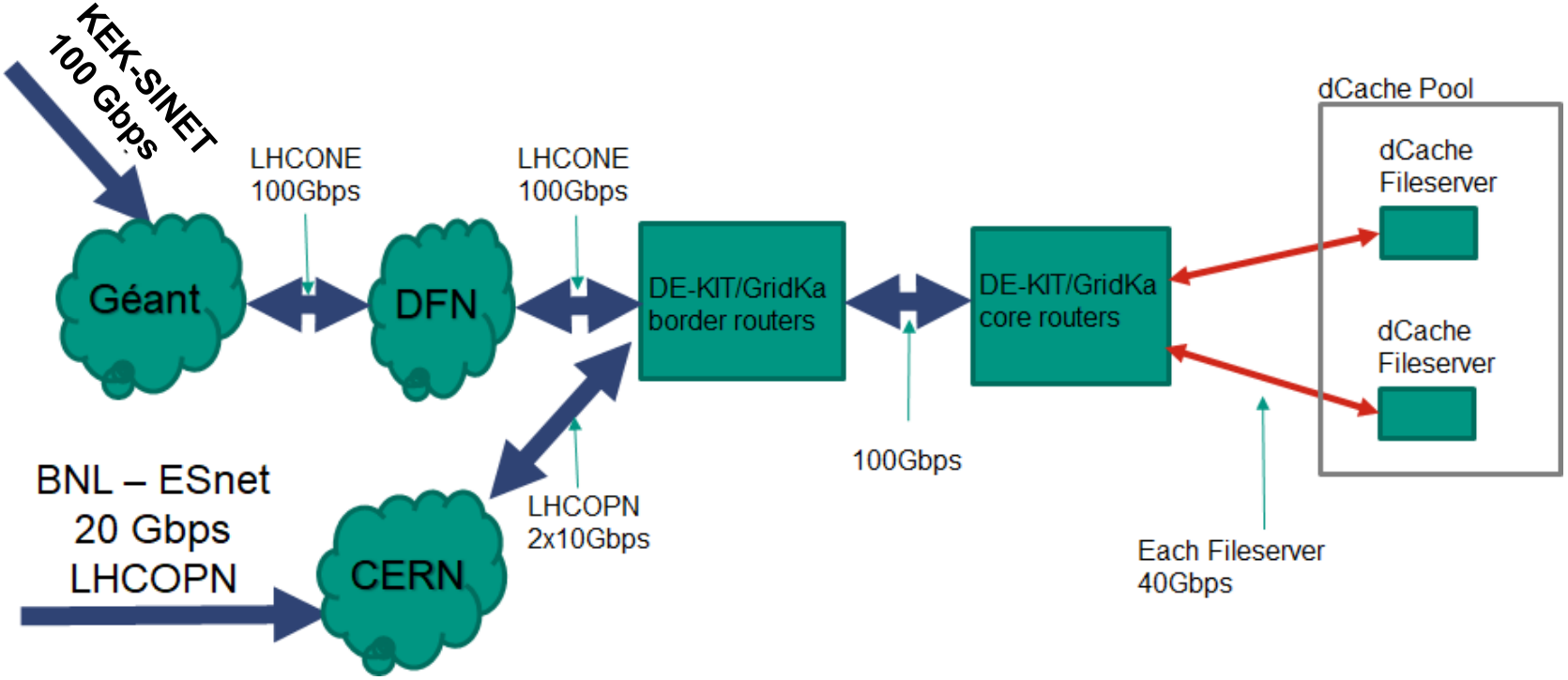
DESY Peering and Storage



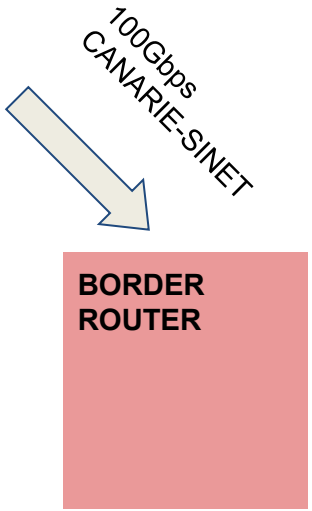
KEK Peering and Storage (please check)



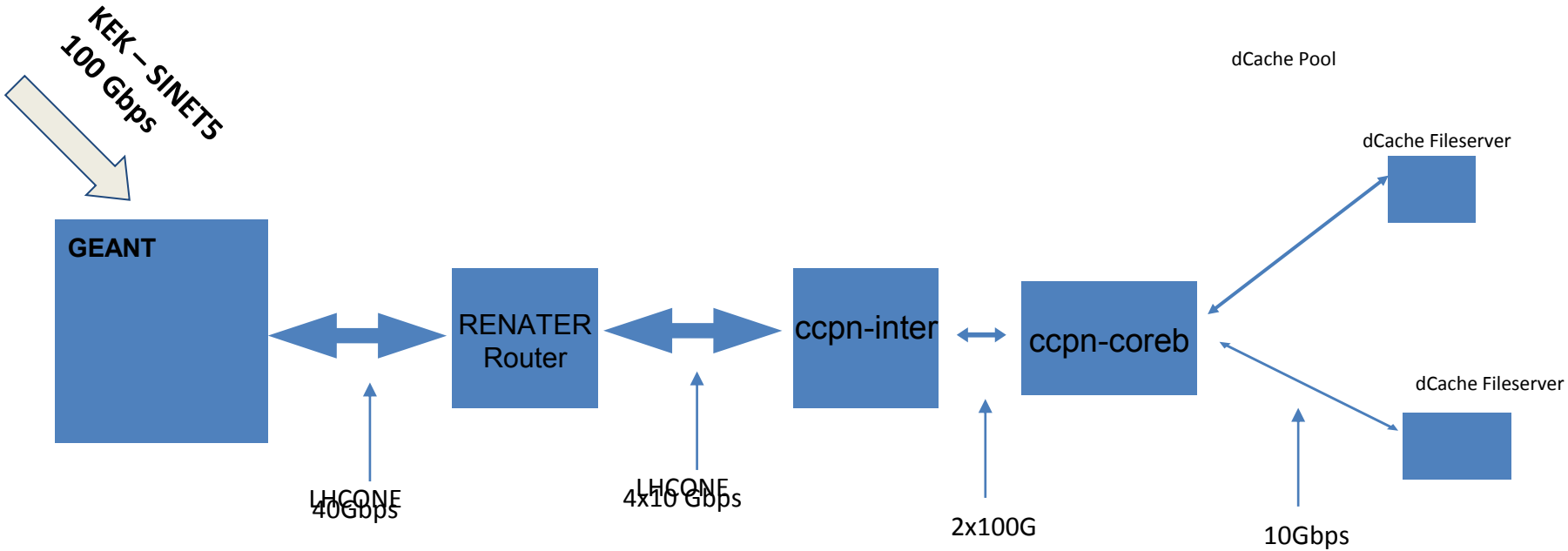
KIT Peering and Storage (please check)
Slide From
https://kds.kek.jp/indico/event/25343/session/3/material/1/0.pdf



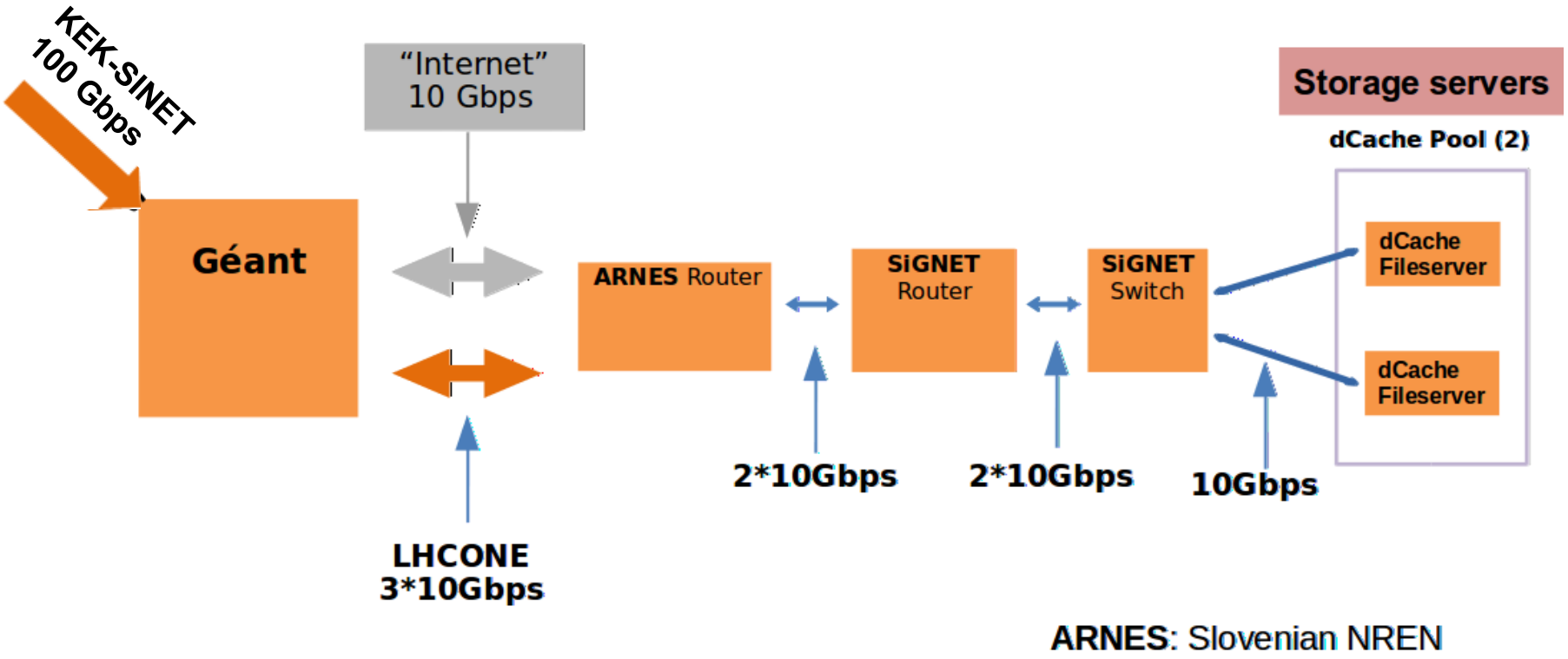
UVIc Peering and Storage



IN2P3 Peering and Storage

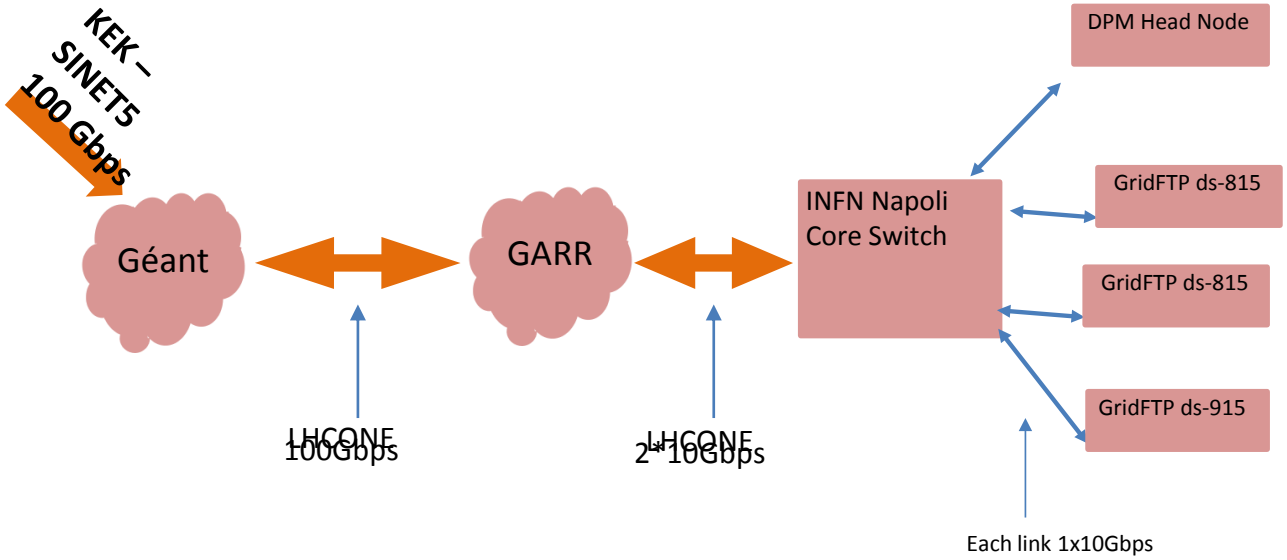


SIGNET Peering and Storage



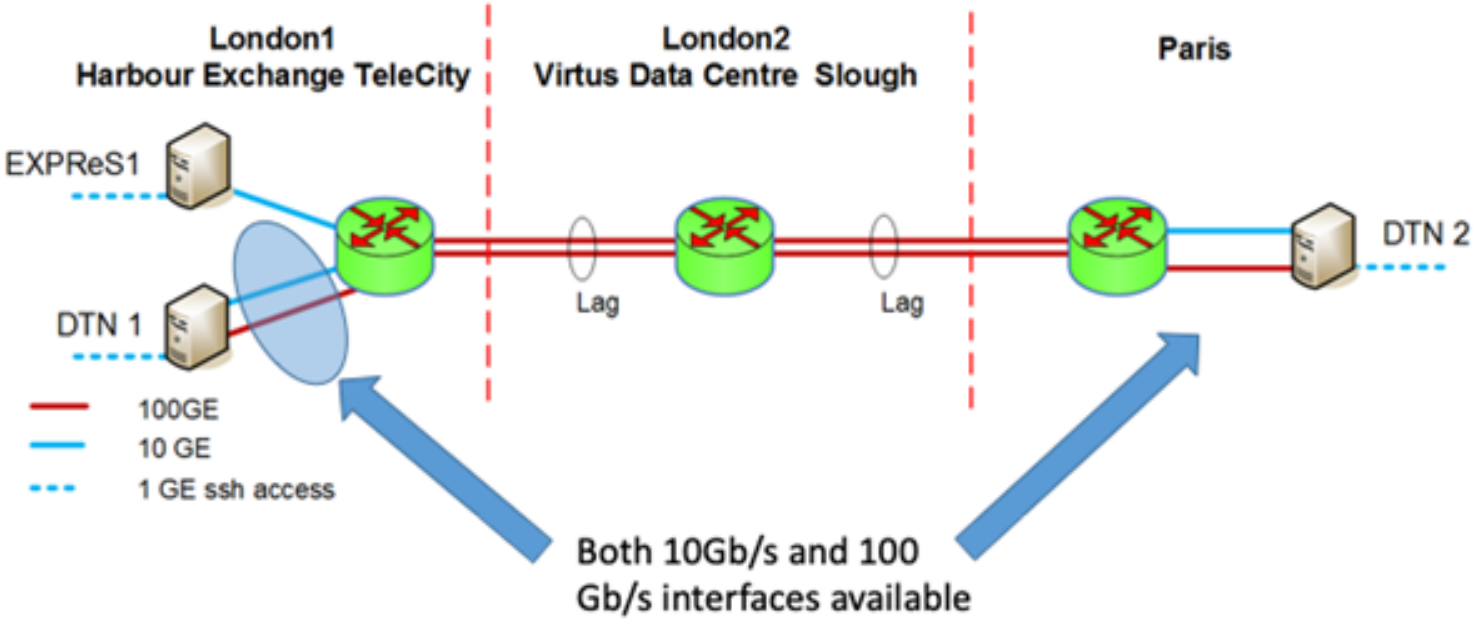
ARNES: Slovenian NREN

NAPOLI Peering and Storage



Note: The entire system is shared with non LHC VOs

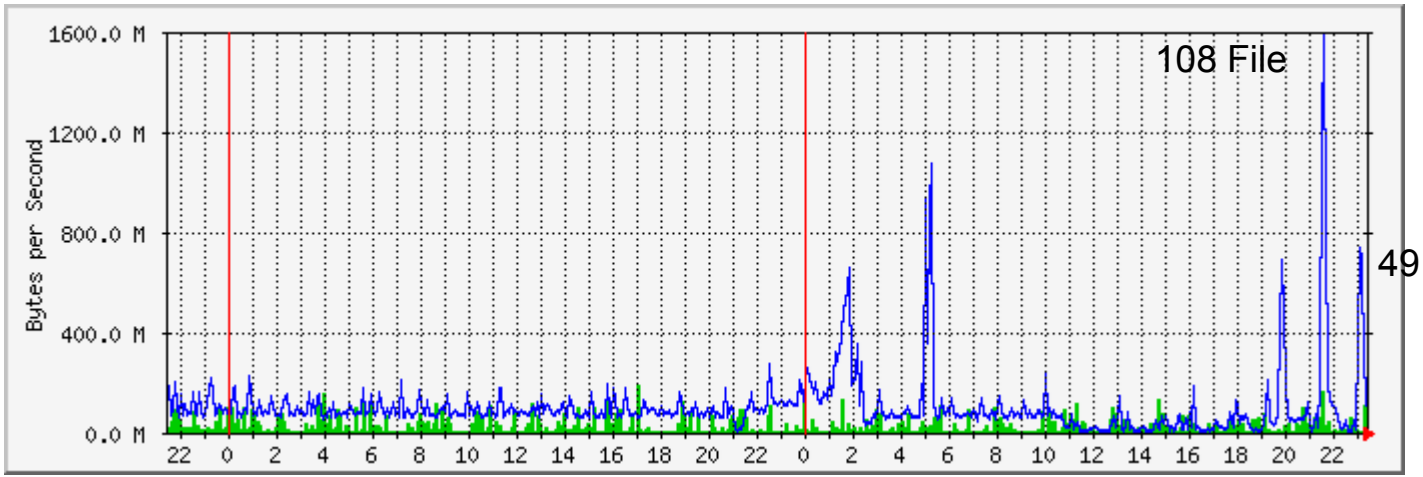
GEANT DTN


London1
Harbour Exchange TeleCity
London2
Virtus Data Centre Slough
Paris
EXPReS1
DTN 1
DTN 2
Lag
Lag
100GE
10 GE
1 GE ssh access
Both 10Gb/s and 100 Gb/s interfaces available

ONGOING TEST

https://docs.google.com/spreadsheets/d/1OcsE2nqvYb9ulsgVHOkNwXPx5-t5Co08_g2edadXf3U/edit#gid=0

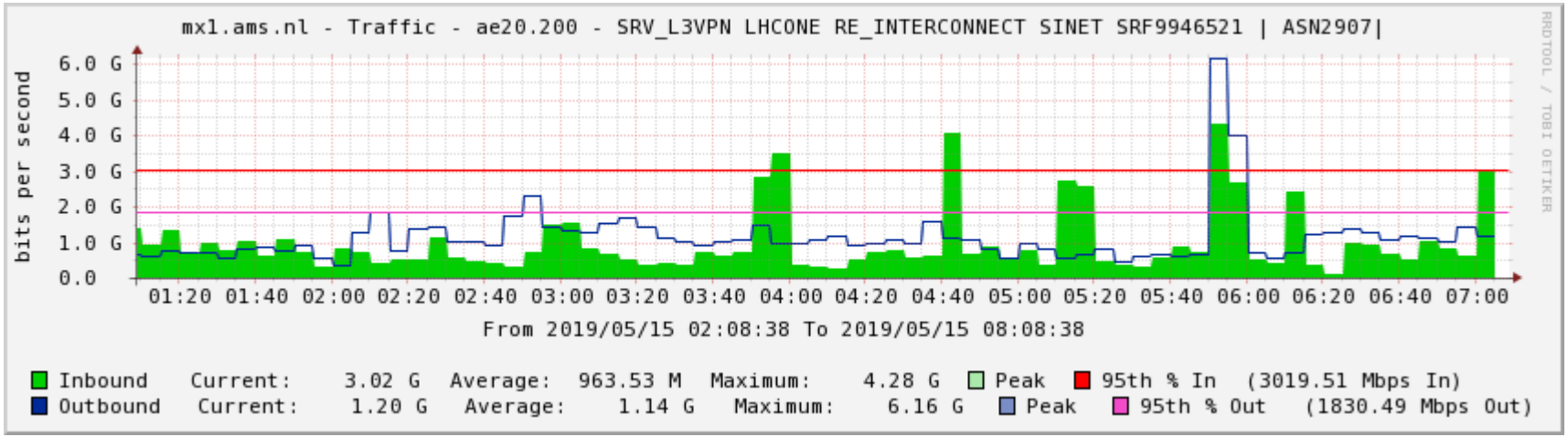
Preliminary test 10/05/2019

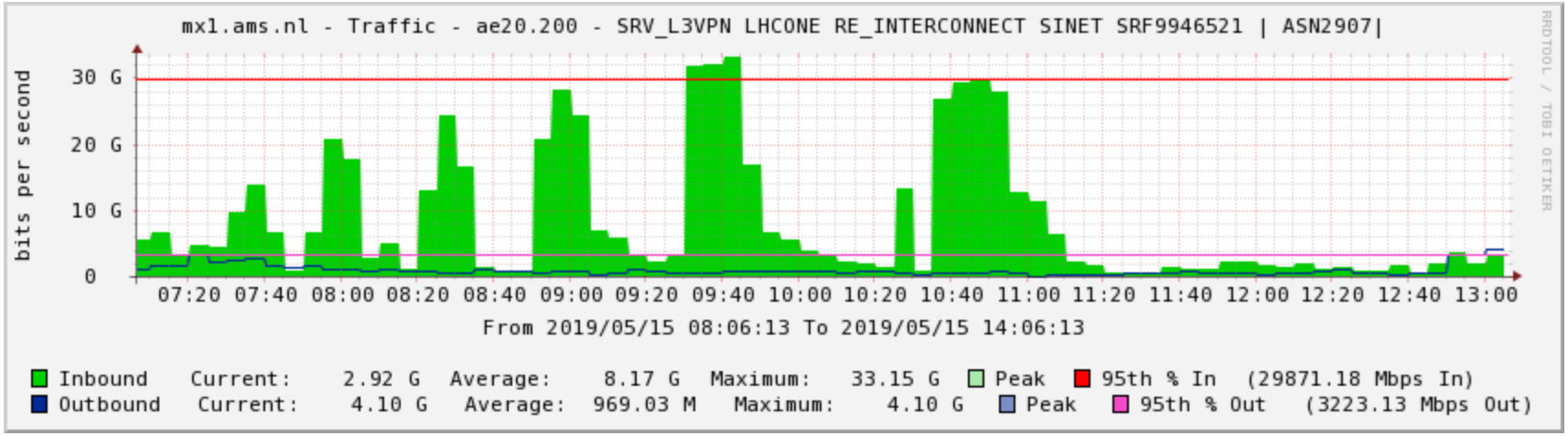


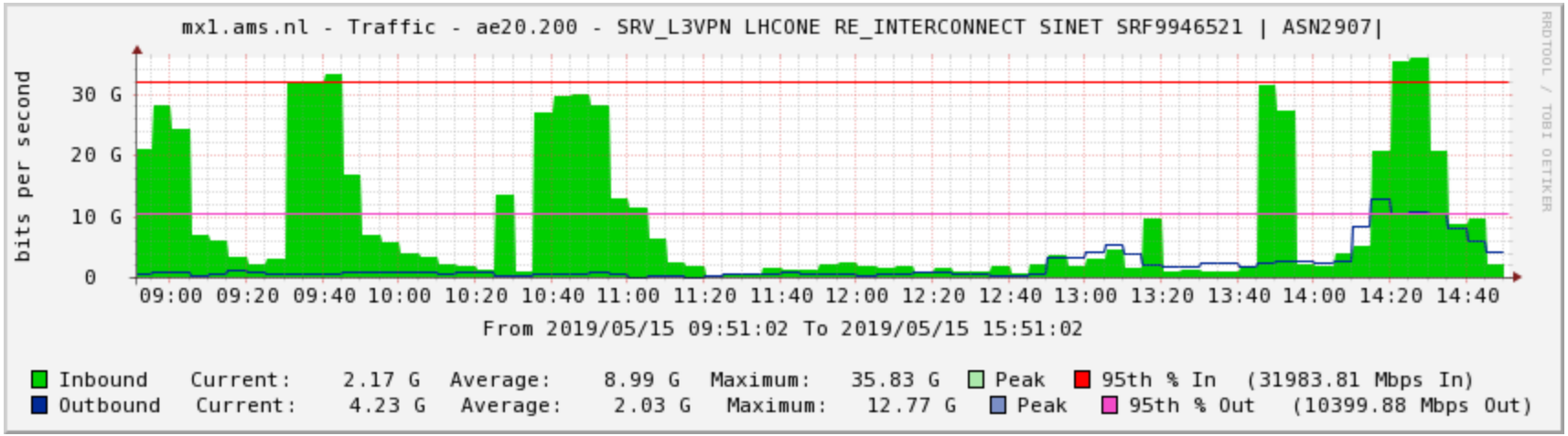
STORAGE PATH

KEK srm://kek2-se02.cc.kek.jp:8444/srm/managerv2?SFN=/belle/DATA/belle/DC/in/
CNAF srm://storm-fe-archive.cr.cnaf.infn.it:8444/srm/managerv2?SFN=/belle/TMP/belle/DC/out/KEK/
DESY srm://dcache-se-desy.desy.de:8443/srm/managerv2?SFN=/pnfs/desy.de/belle/belle2/TMP/belle/DC/out/KEK/
KIT srm://dcachesrm-kit.gridka.de:8443/srm/managerv2?SFN=/pnfs/gridka.de/belle/disk-only/TMP/belle/DC/out/KEK/
IN2P3 srm://ccsrm02.in2p3.fr/srm/managerv2?SFN=/pnfs/in2p3.fr/data/belle/TMP/belle/DC/out/KEK/
SIGNET srm://dcache.ijs.si:8443/srm/managerv2?SFN=/pnfs/ijs.si/belle/TMP/belle/DC/out/KEK/
NAPOLI srm://belle-dpm-01.na.infn.it:8446/dpm/na.infn.it/home/belle/TMP/belle/DC/out/KEK/

Started at 9:05 CEST 15 May 2019- LHCONE link at that time was



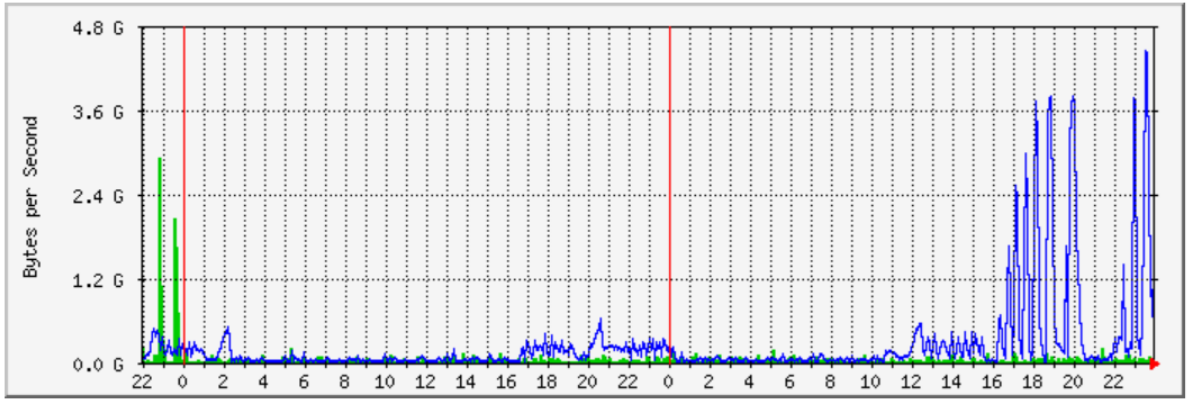

mx1.ams.nl - Traffic - ae20.200 - SRV_L3VPN LHCONE RE_INTERCONNECT SINET SRF9946521 | ASN2907|
bits per second
30 G
20 G
10 G
0
07:20 07:40 08:00 08:20 08:40 09:00 09:20 09:40 10:00 10:20 10:40 11:00 11:20 11:40 12:00 12:20 12:40 13:00
From 2019/05/15 08:06:13 To 2019/05/15 14:06:13
Inbound Current: 2.92 G Average: 8.17 G Maximum: 33.15 G Peak 95th % In (29871.18 Mbps In)
Outbound Current: 4.10 G Average: 969.03 M Maximum: 4.10 G Peak 95th % Out (3223.13 Mbps Out)
RRDTOOL / TOBI OETIKER


mx1.ams.nl - Traffic - ae20.200 - SRV_L3VPN LHCONE RE_INTERCONNECT SINET SRF9946521 | ASN2907|
bits per second
30 G
20 G
10 G
0
09:00 09:20 09:40 10:00 10:20 10:40 11:00 11:20 11:40 12:00 12:20 12:40 13:00 13:20 13:40 14:00 14:20 14:40
From 2019/05/15 09:51:02 To 2019/05/15 15:51:02
Inbound Current: 2.17 G Average: 8.99 G Maximum: 35.83 G Peak 95th % In (31983.81 Mbps In)
Outbound Current: 4.23 G Average: 2.03 G Maximum: 12.77 G Peak 95th % Out (10399.88 Mbps Out)
RRDTOOL / TOBI OETIKER

LHCONE [LHCONE Primary] 40G

The statistics were last updated **Wednesday, 15 May 2019 at 23:55**

`Daily' Graph (5 Minute Average)

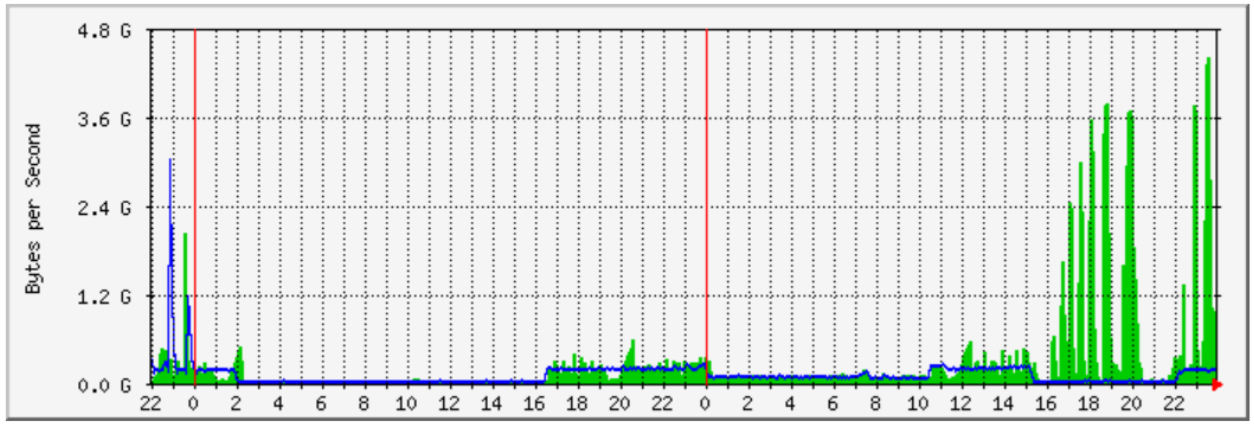


	Max	Average	Current
In (LHCONE→KEKCC)	2913.4 MB/s (58.3%)	46.1 MB/s (0.9%)	9986.7 kB/s (0.2%)
Out (KEKCC→LHCONE)	4438.1 MB/s (88.8%)	234.3 MB/s (4.7%)	249.6 MB/s (5.0%)

kek2-storm01+kek2-storm02+kek2-storm03+kek2-storm06 [GridFTPs (Belle II RAW Analysis)] 120G

The statistics were last updated **Wednesday, 15 May 2019 at 23:55**

`Daily' Graph (5 Minute Average)

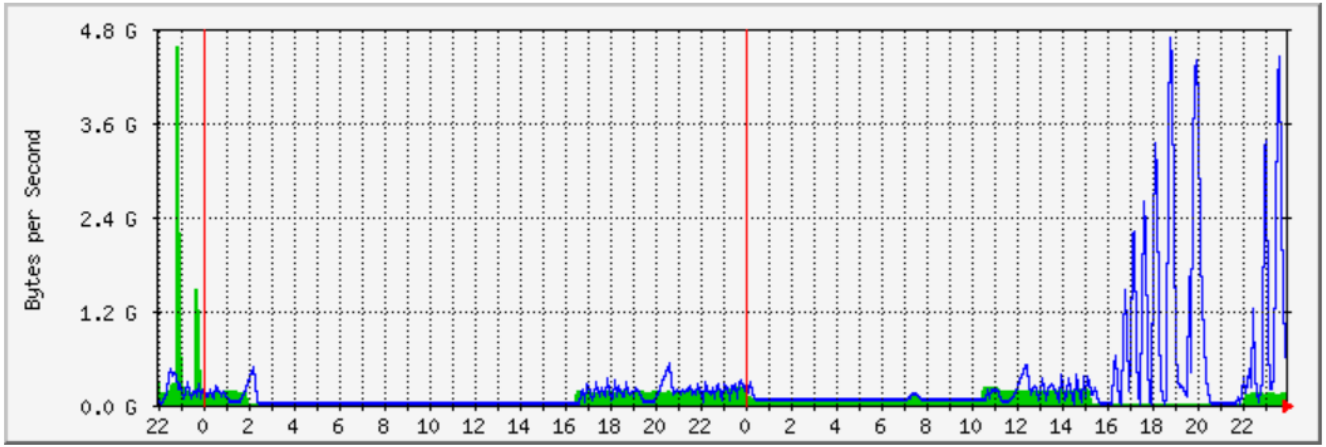


	Max	Average	Current
In (KEKCC→Outside)	4401.9 MB/s (29.3%)	249.4 MB/s (1.7%)	286.4 MB/s (1.9%)
Out (Outside→KEKCC)	3007.3 MB/s (20.0%)	98.9 MB/s (0.7%)	190.7 MB/s (1.3%)

kek2-storm01+kek2-storm02 [GridFTPs behind of kek2-se02 (Belle II RAW)] 112G

The statistics were last updated **Wednesday, 15 May 2019 at 23:56**

`Daily' Graph (5 Minute Average)

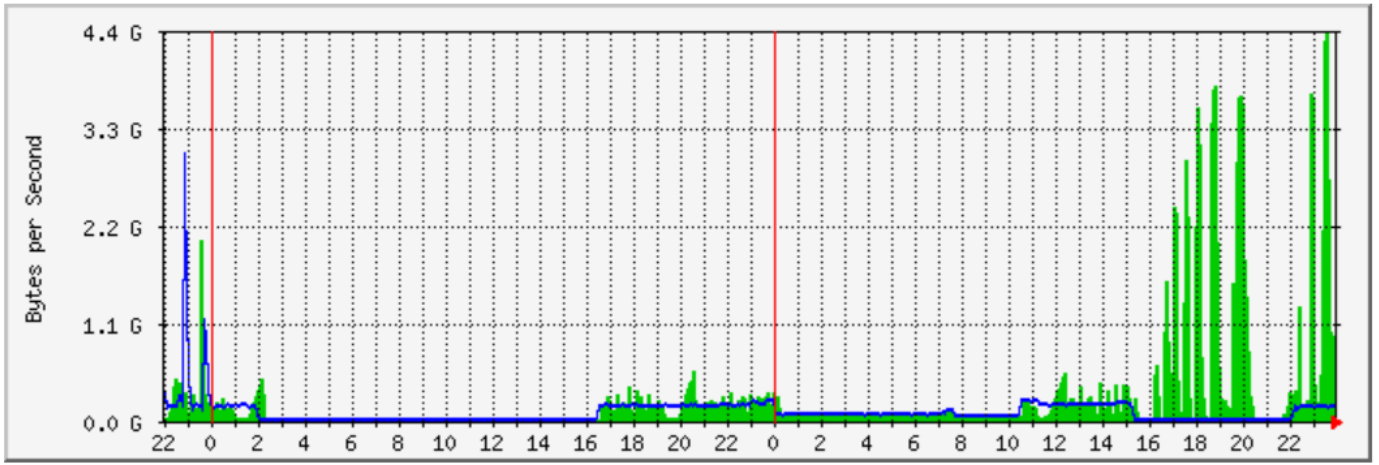


	Max	Average	Current
In (This server→KEKCC-internal servers)	4568.6 MB/s (32.6%)	93.3 MB/s (0.7%)	159.7 MB/s (1.1%)
Out (KEKCC-internal servers→This server)	4671.2 MB/s (33.4%)	228.4 MB/s (1.6%)	309.0 MB/s (2.2%)

kek2-storm01+kek2-storm02 [GridFTPs behind of kek2-se02 (Belle II RAW)] 80G

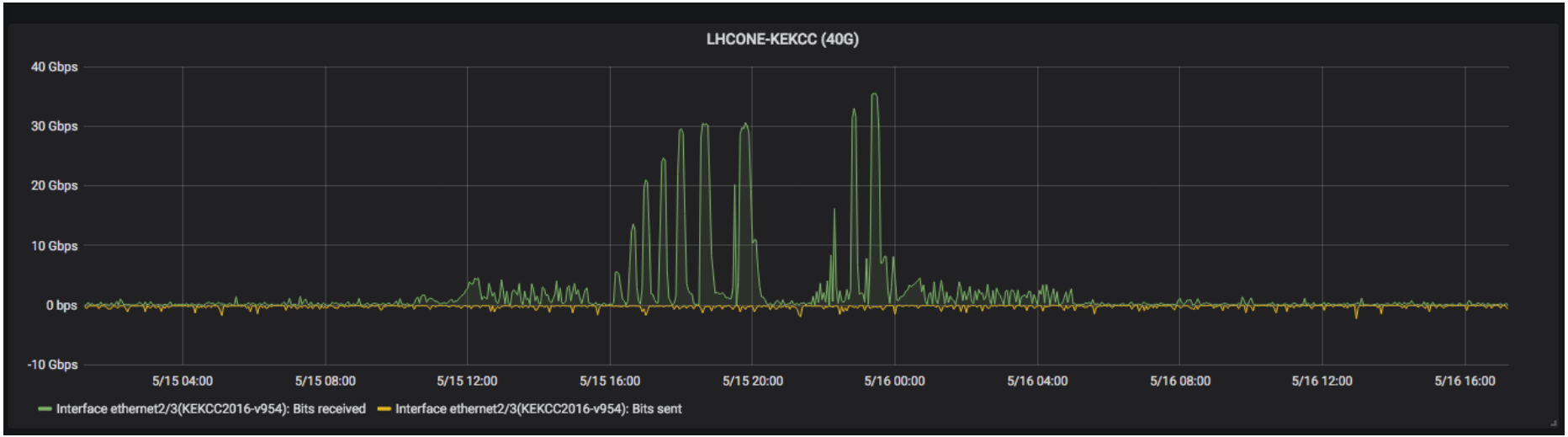
The statistics were last updated **Wednesday, 15 May 2019 at 23:55**

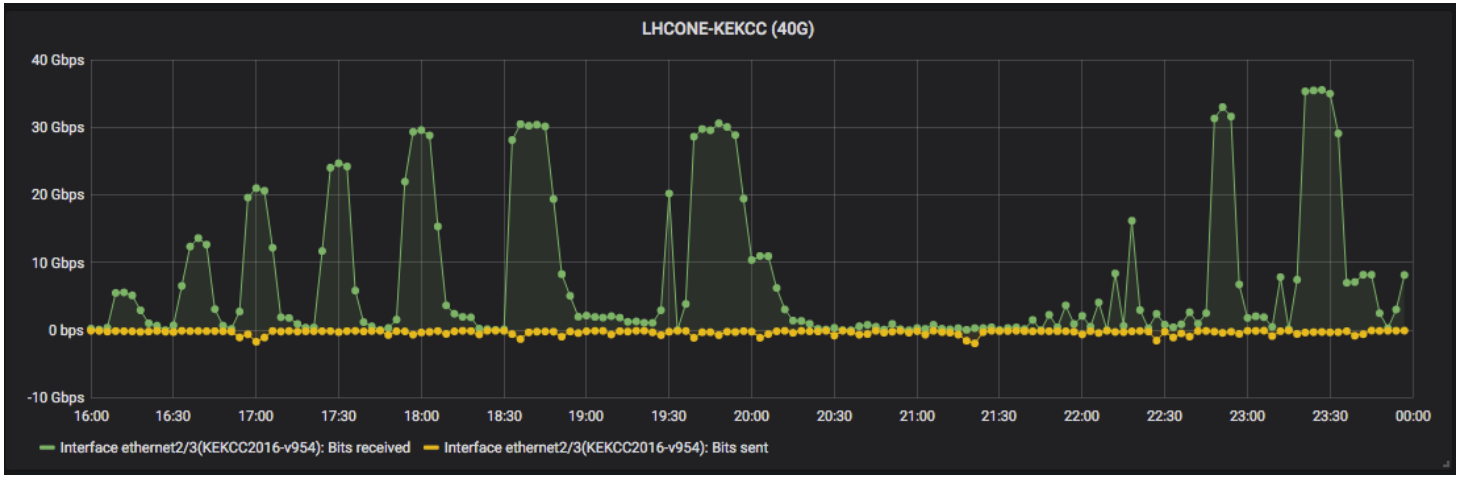
`Daily' Graph (5 Minute Average)

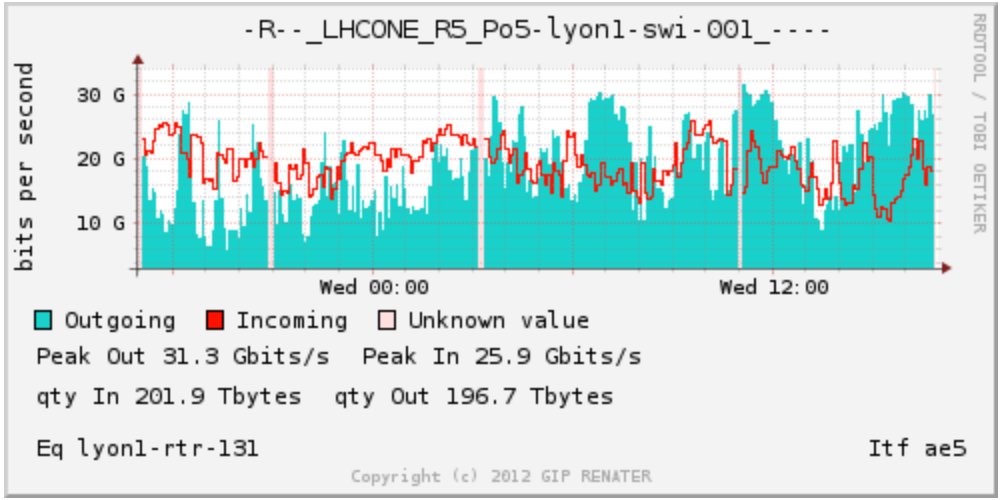


	Max	Average	Current
In (KEKCC→Outside)	4373.7 MB/s (43.7%)	229.2 MB/s (2.3%)	248.6 MB/s (2.5%)
Out (Outside→KEKCC)	3007.0 MB/s (30.1%)	90.4 MB/s (0.9%)	172.1 MB/s (1.7%)

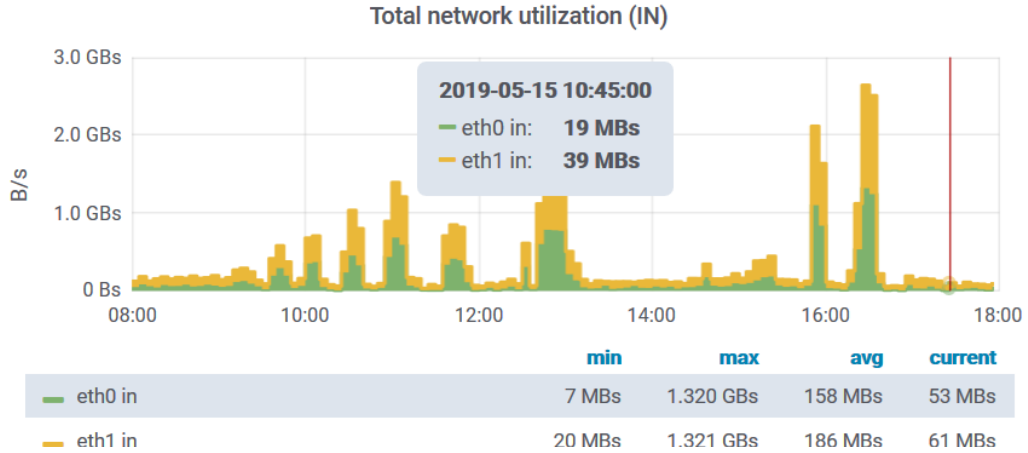
KEKCC NETWORK MON 15/10/2019

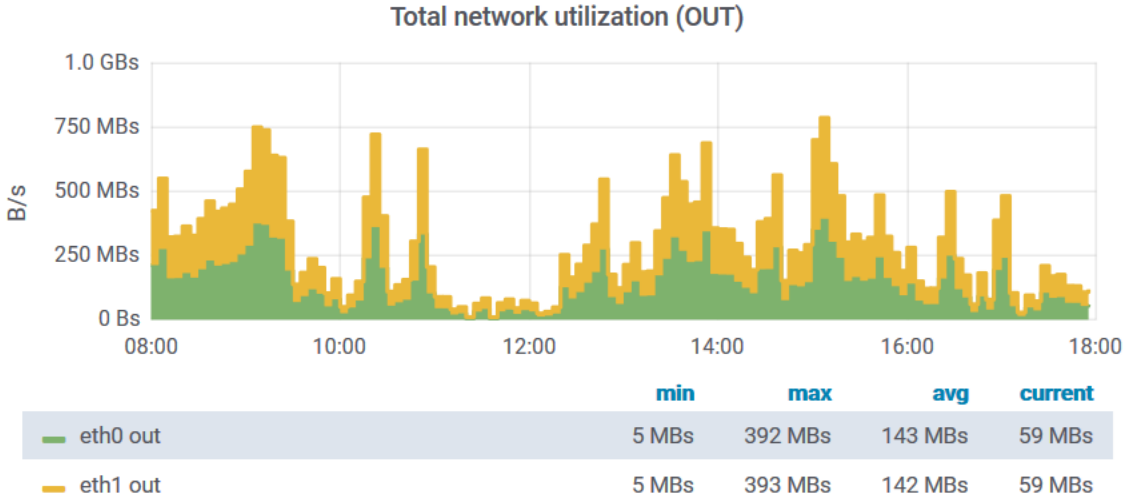




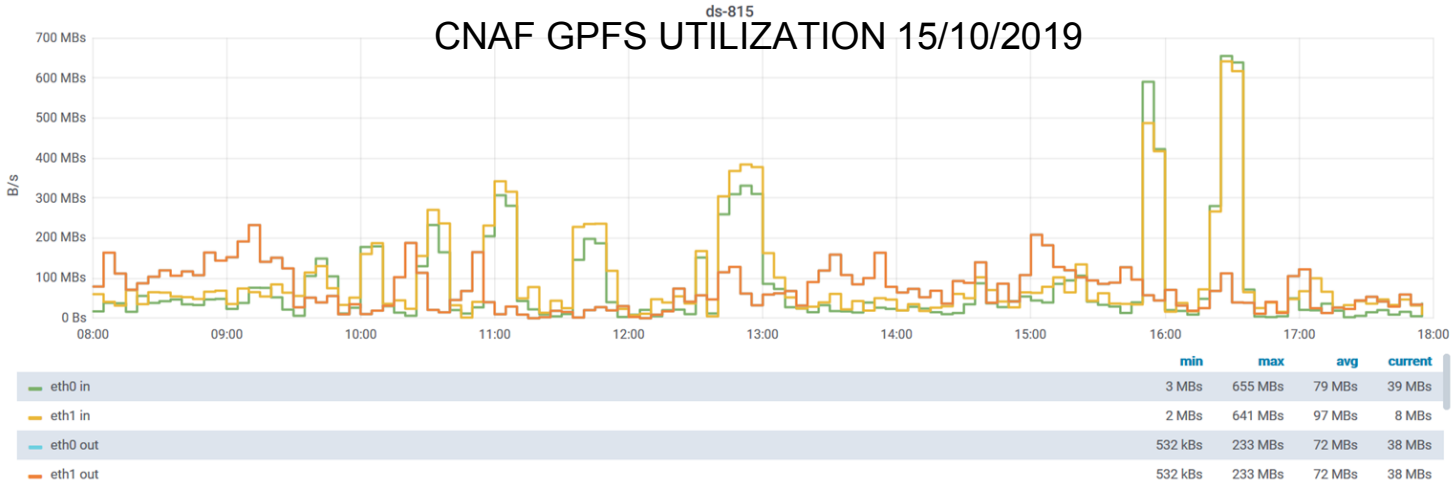

-R--_LHCONE_R5_Po5-lyon1-swi-001_----
bits per second
30 G
20 G
10 G
Wed 00:00
Wed 12:00
RRDTOOL / TOBI OETIKER
Outgoing
Incoming
Unknown value
Peak Out 31.3 Gbits/s
Peak In 25.9 Gbits/s
qty In 201.9 Tbytes
qty Out 196.7 Tbytes
Eq lyon1-rtr-131
Itf ae5
Copyright (c) 2012 GIP RENATER

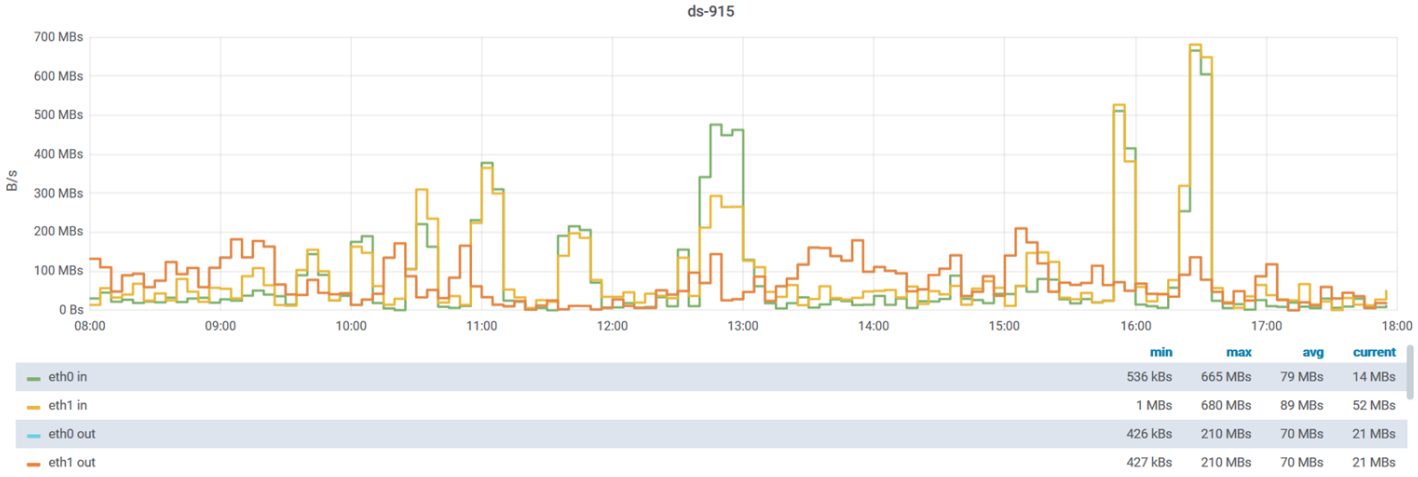
CNAF NETWORK UTILIZATION 15/10/2019



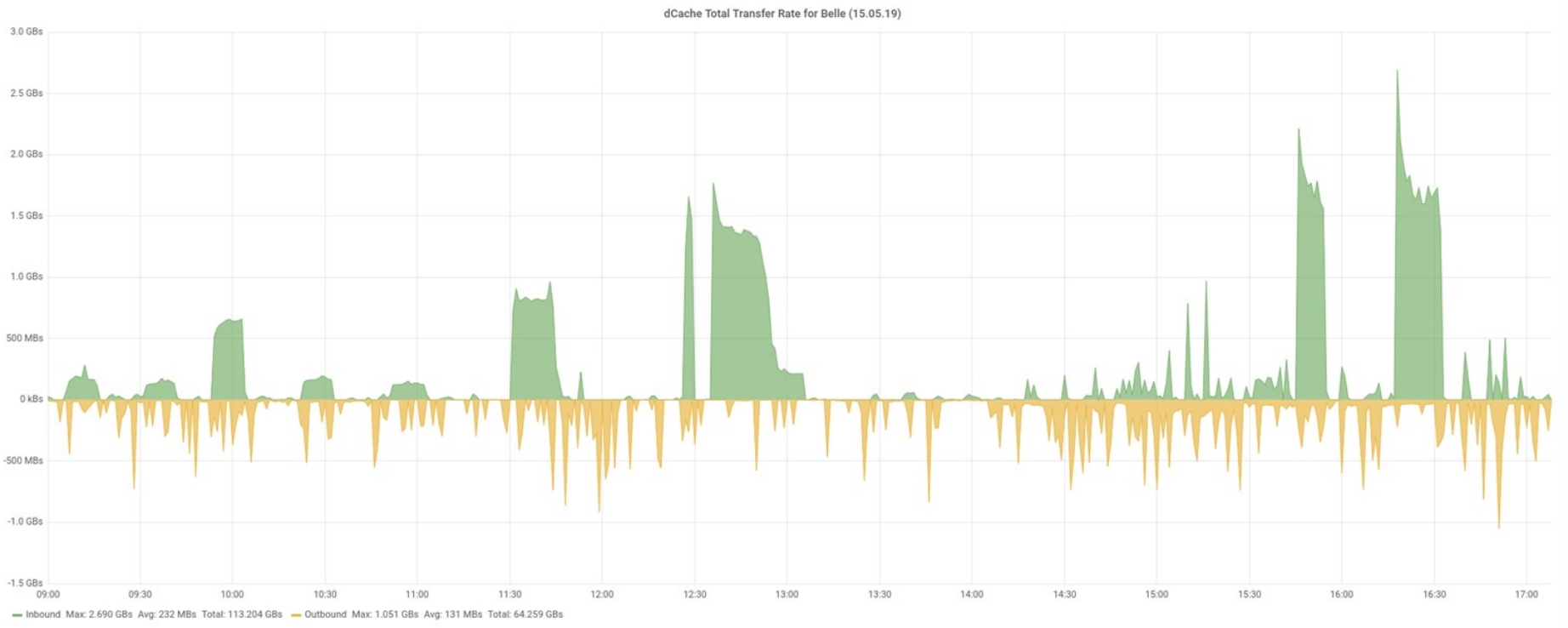


CNAF GPFS UTILIZATION 15/10/2019

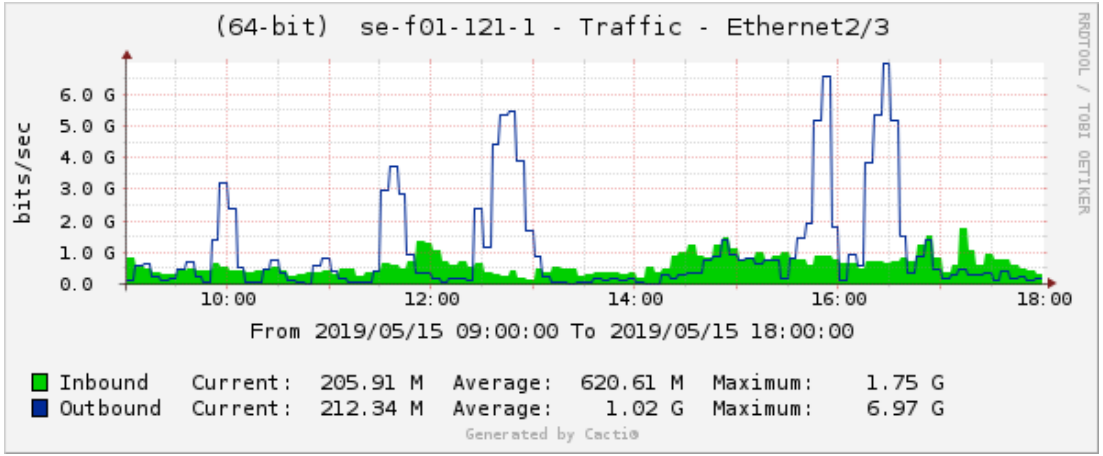


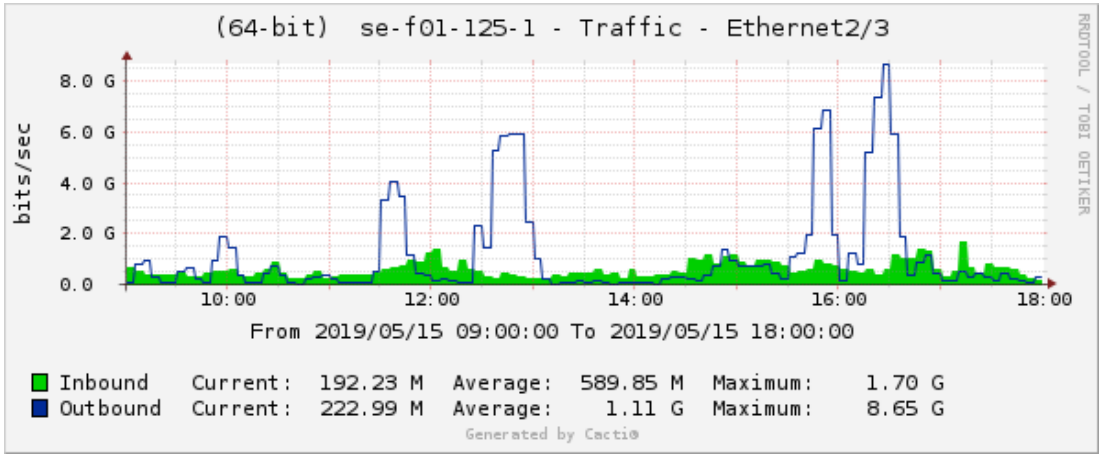


KIT dCache transfer rates (15.05.19)



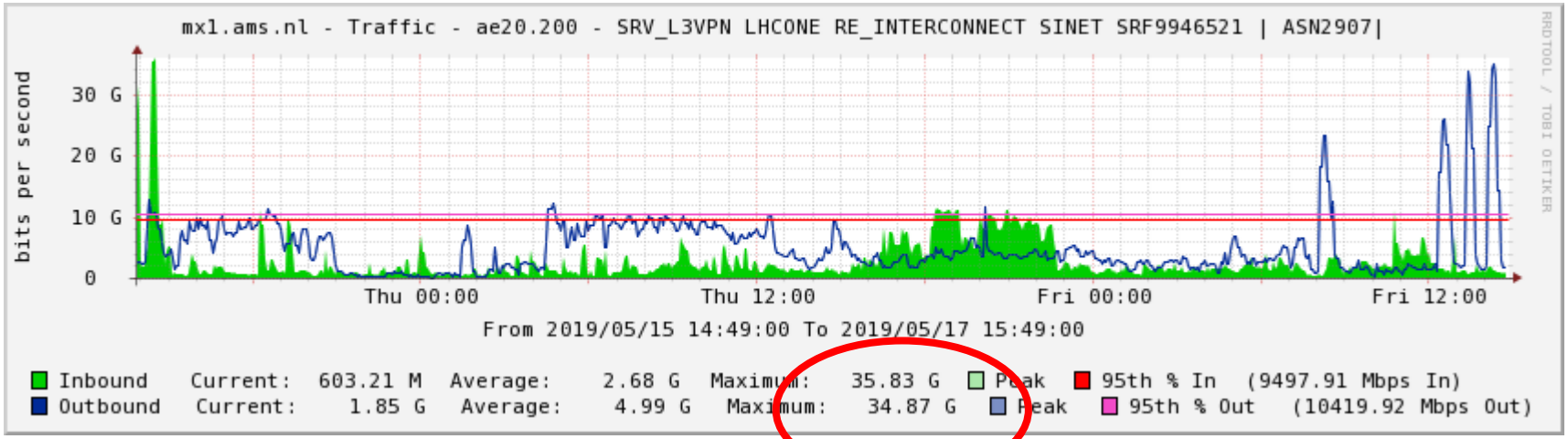
KIT network utilisation (15.05.19)

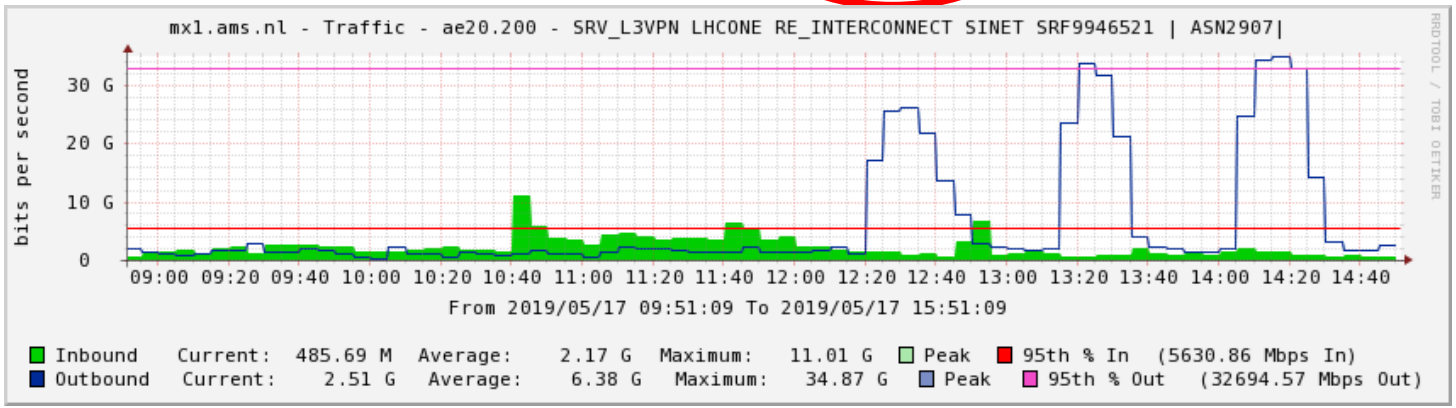




Network DC EU to KEK
17/05/2019

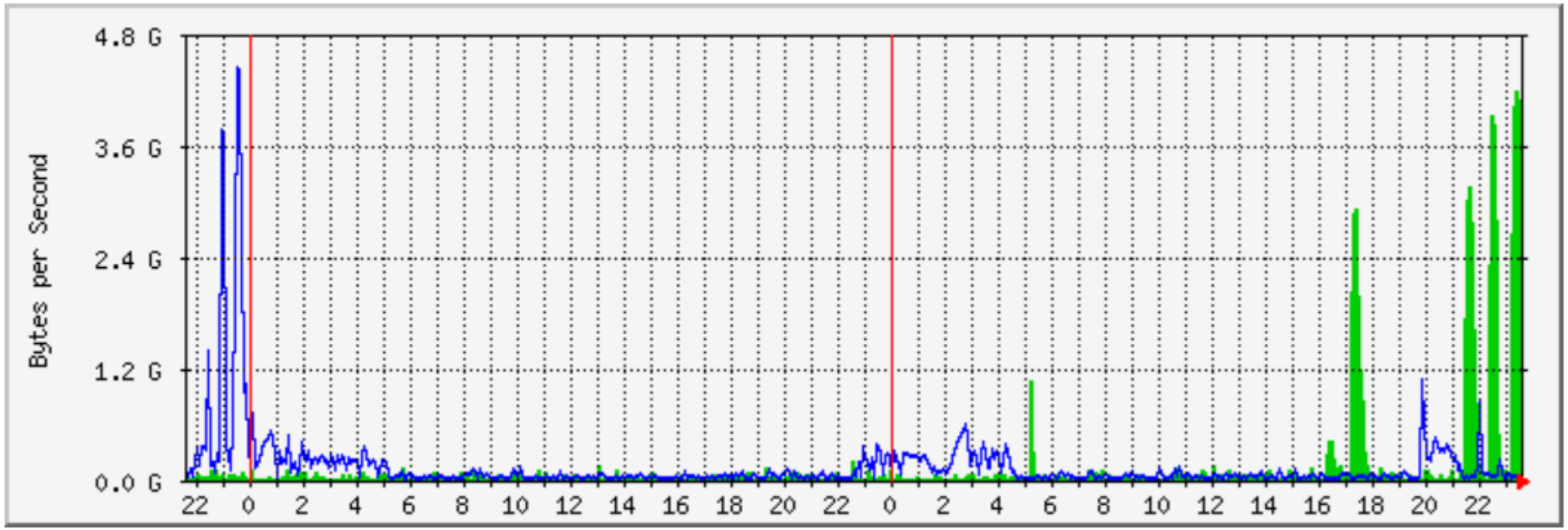
LHCONE: GEANT-SINET 17/05/2019





The statistics were last updated **Friday, 17 May 2019 at 23:35**

`Daily' Graph (5 Minute Average)

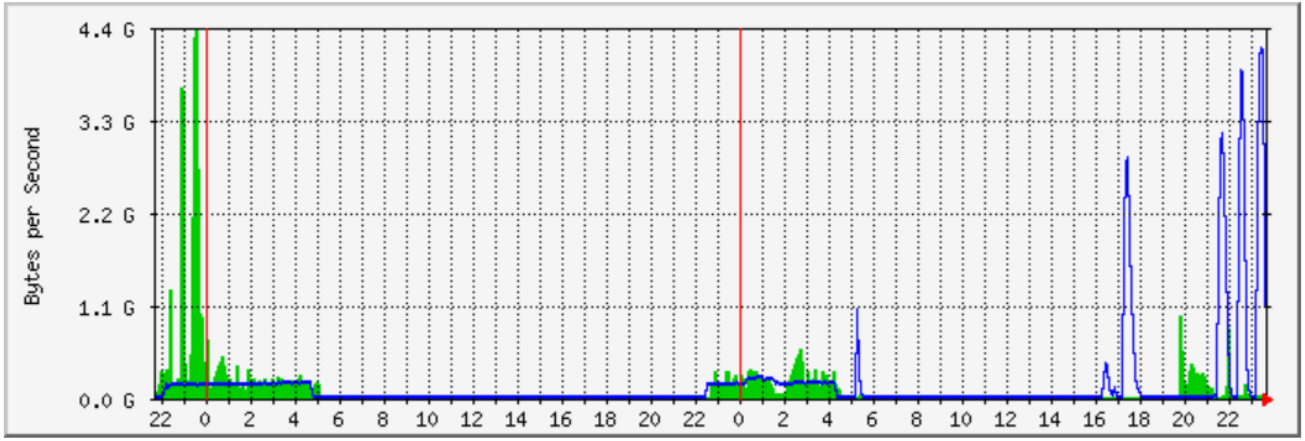


	Max	Average	Current
In (LHCONE→KEKCC)	4199.4 MB/s (84.0%)	125.1 MB/s (2.5%)	1901.3 MB/s (38.0%)
Out (KEKCC→LHCONE)	4438.1 MB/s (88.8%)	130.0 MB/s (2.6%)	52.0 MB/s (1.0%)

kek2-storm01+kek2-storm02 [GridFTPs behind of kek2-se02 (Belle II RAW)] 80G

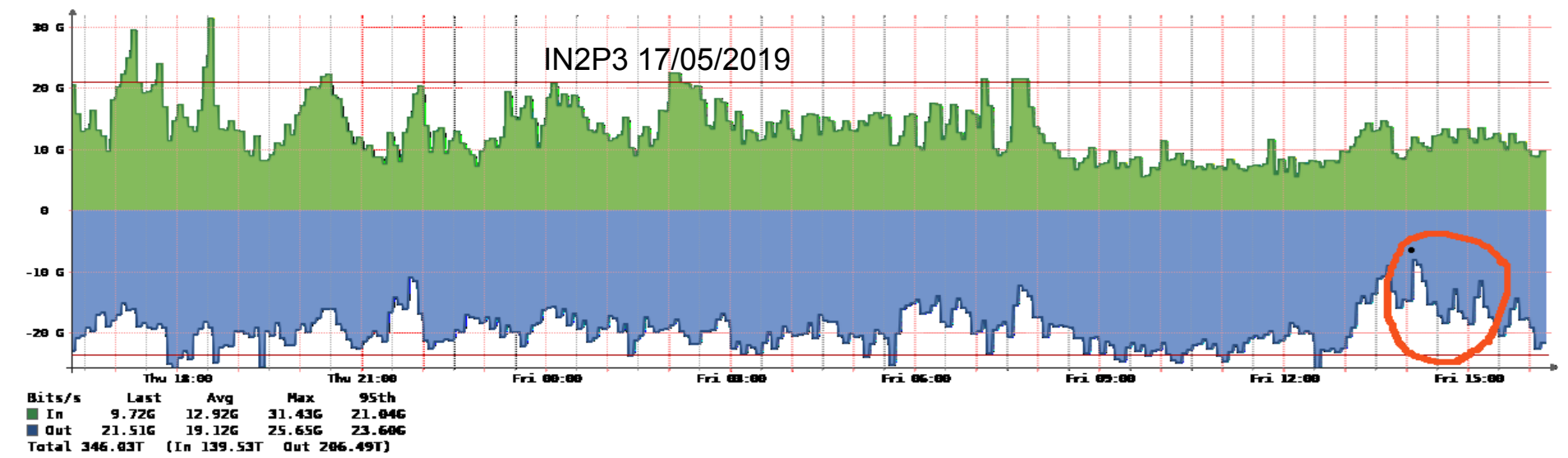
The statistics were last updated **Friday, 17 May 2019 at 23:40**

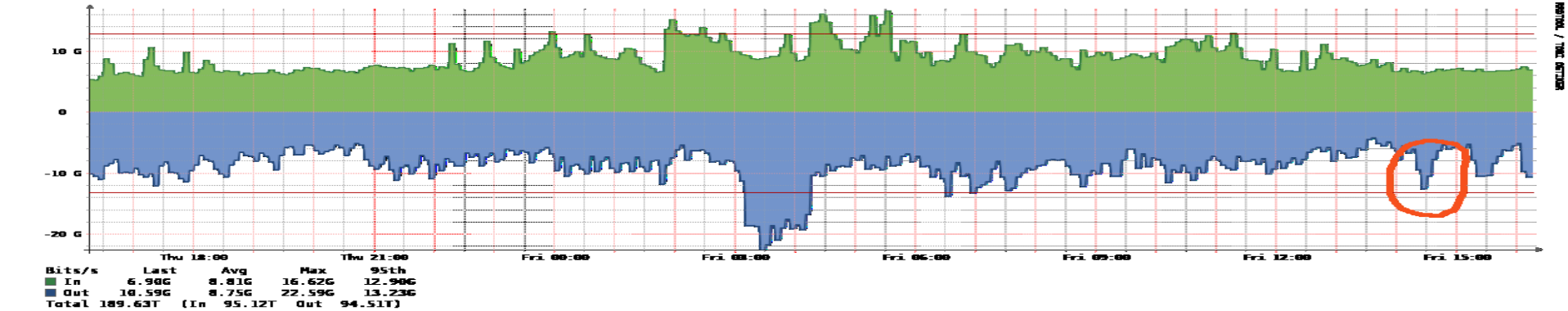
`Daily' Graph (5 Minute Average)



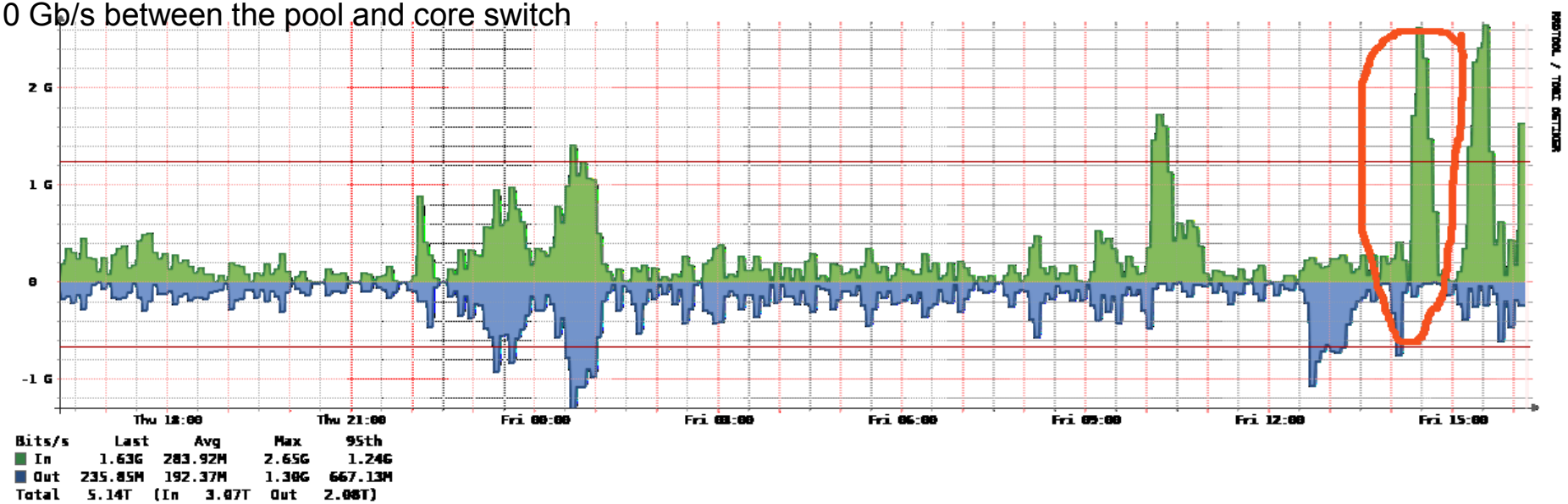
	Max	Average	Current
In (KEKCC→Outside)	4373.7 MB/s (43.7%)	103.8 MB/s (1.0%)	2239.9 kB/s (0.0%)
Out (Outside→KEKCC)	4142.9 MB/s (41.4%)	141.6 MB/s (1.4%)	294.2 MB/s (2.9%)

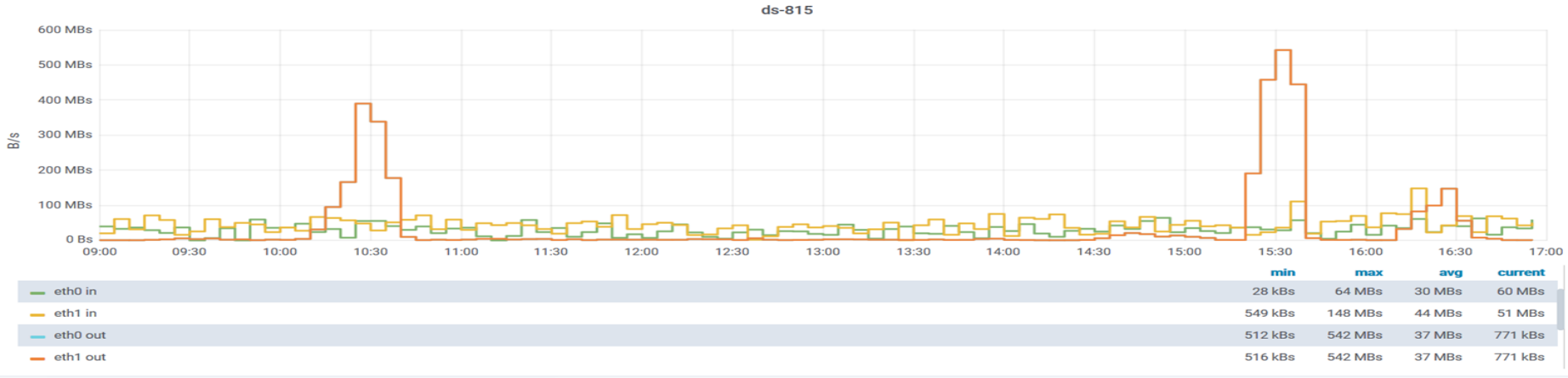
IN2P3 17/05/2019



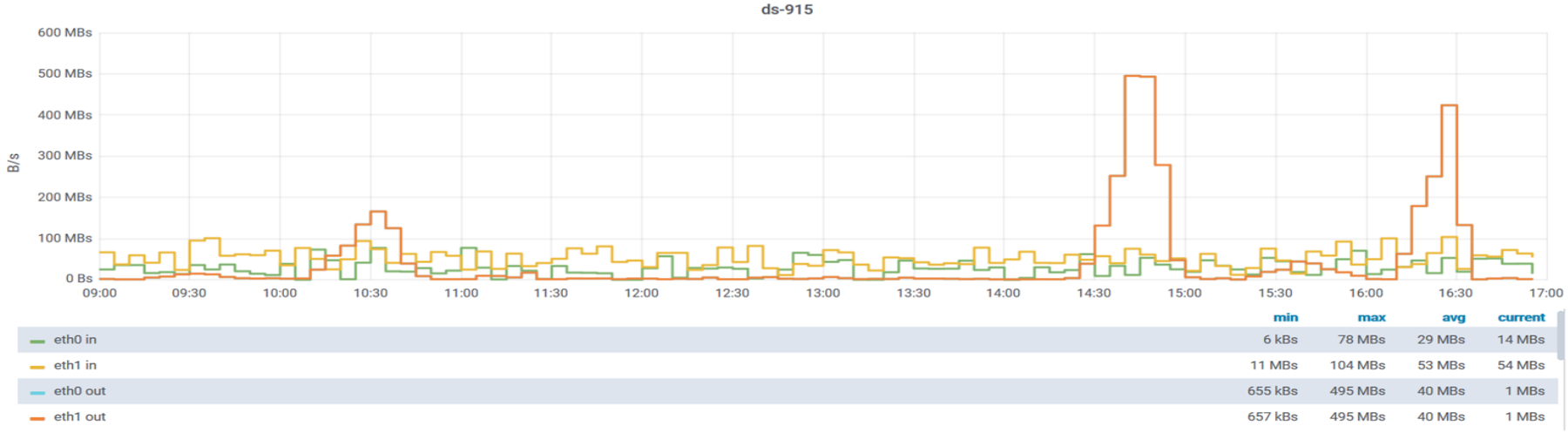


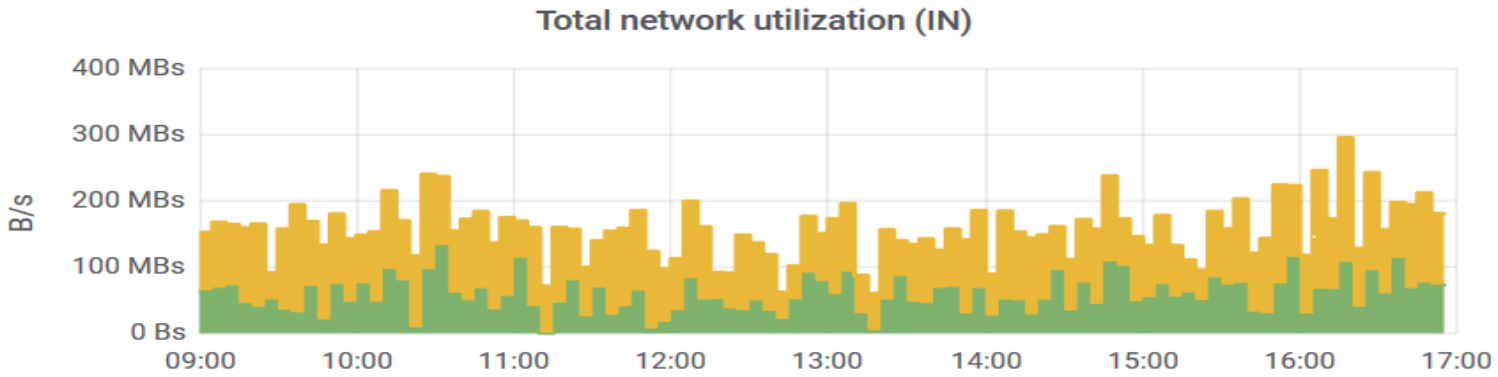
10 Gb/s between the pool and core switch





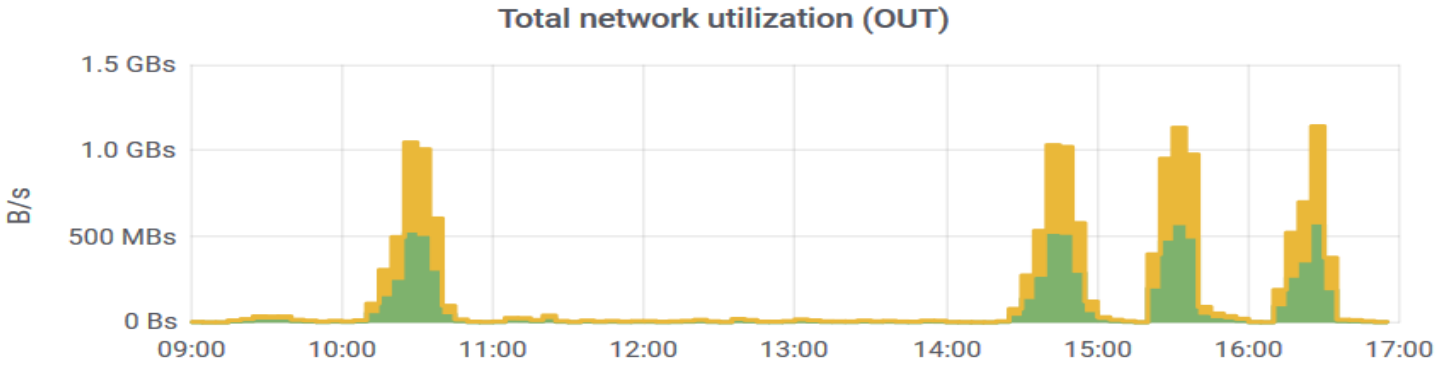
STORAGE CNAF 17/05/2019





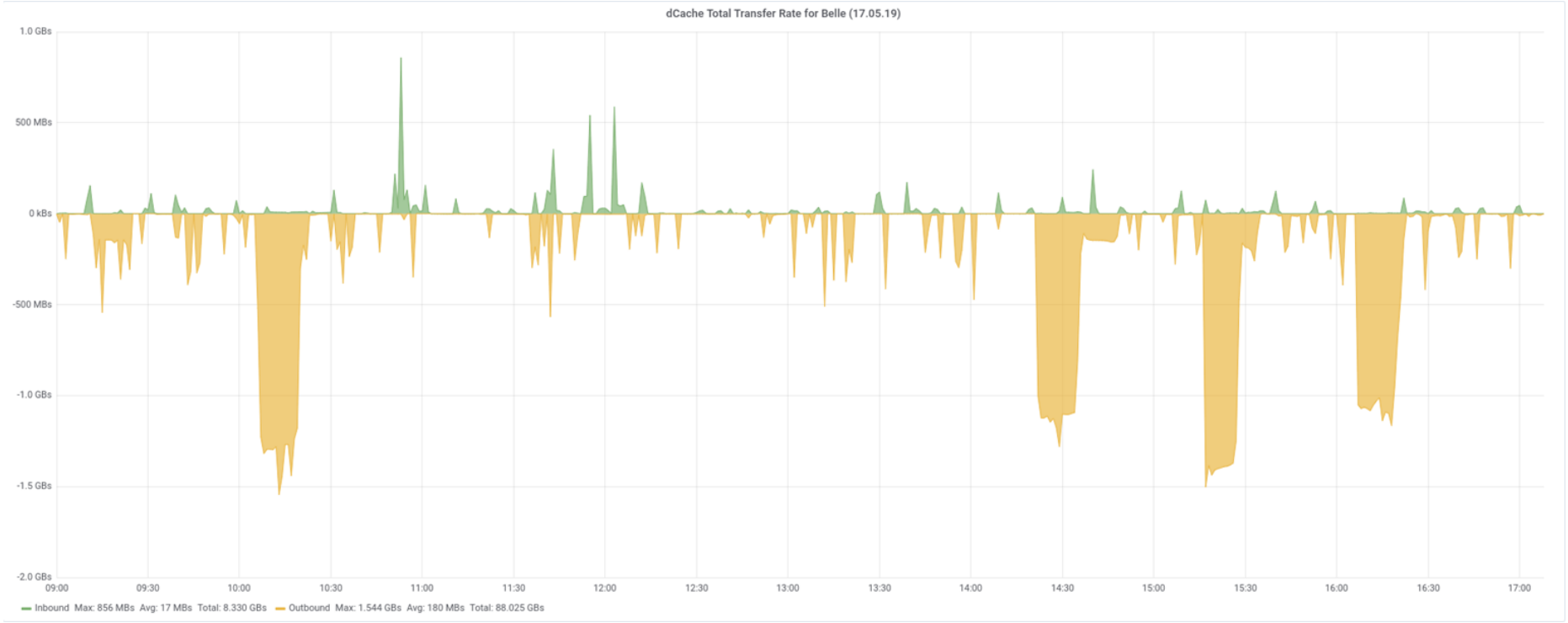
	min	max	avg	current
eth0 in	870 kBs	133.0 MBs	58.5 MBs	74.0 MBs
eth1 in	39.5 MBs	186.4 MBs	97.1 MBs	105.0 MBs

NETWORK CNAF 17/05/2019

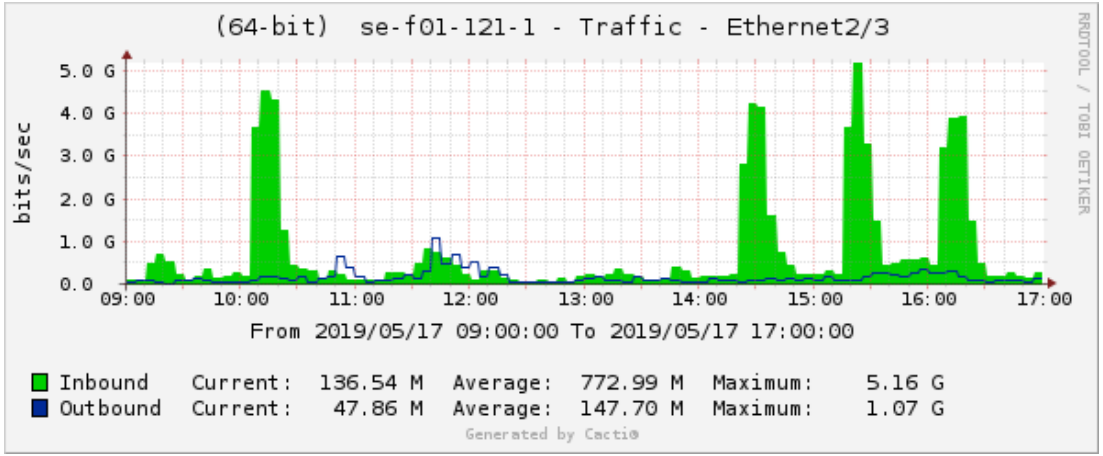


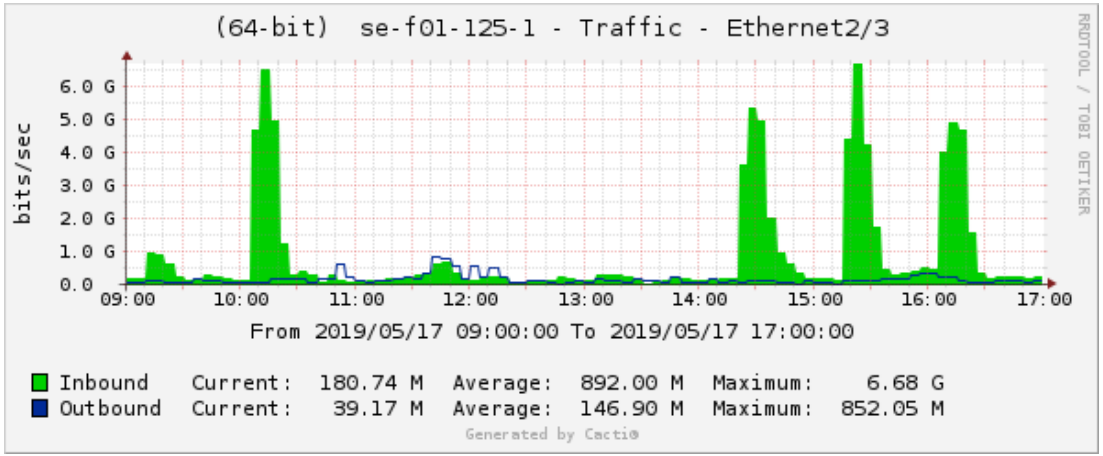
	min	max	avg	current
eth0 out	2 MBs	571 MBs	77 MBs	2 MBs
eth1 out	2 MBs	571 MBs	77 MBs	2 MBs

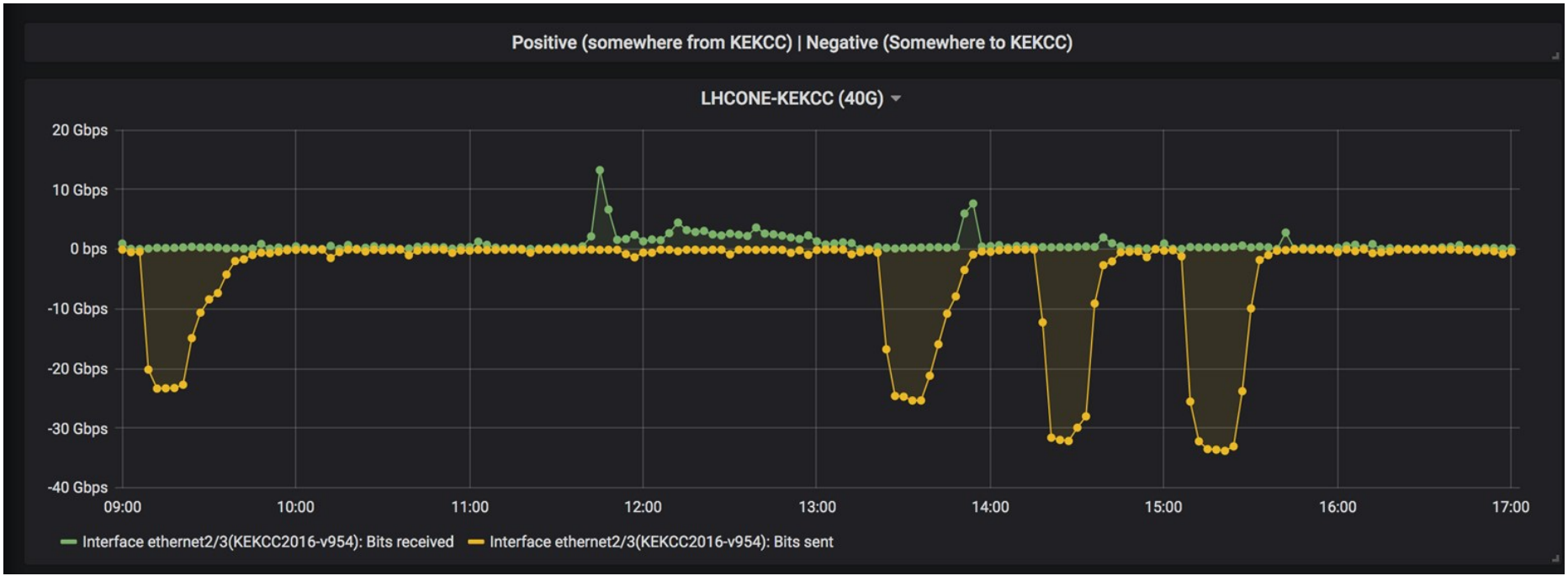
KIT dCache transfer rates (17.05.19)



KIT network utilisation (17.05.19)

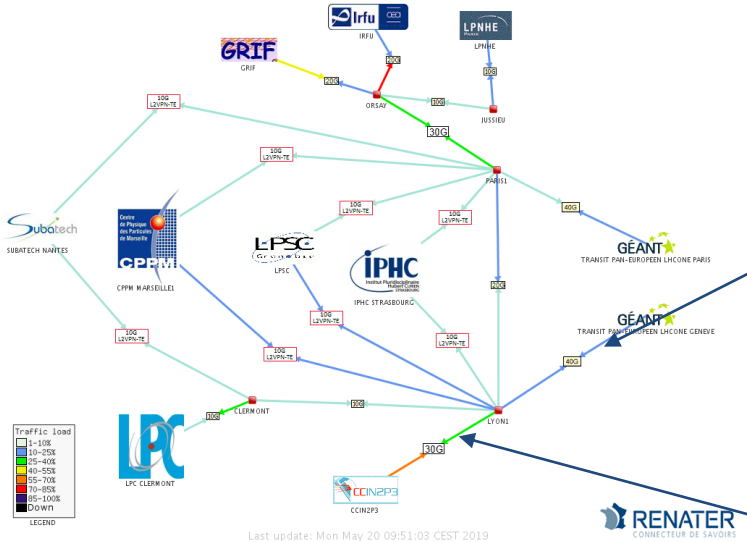


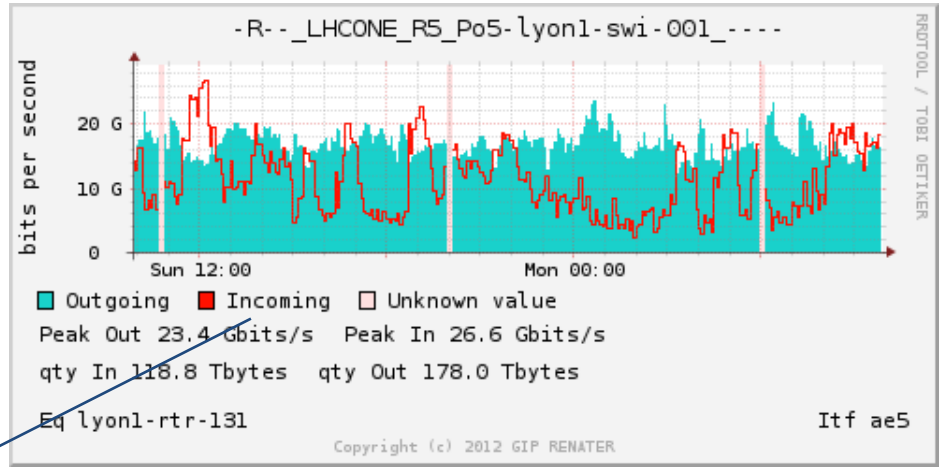


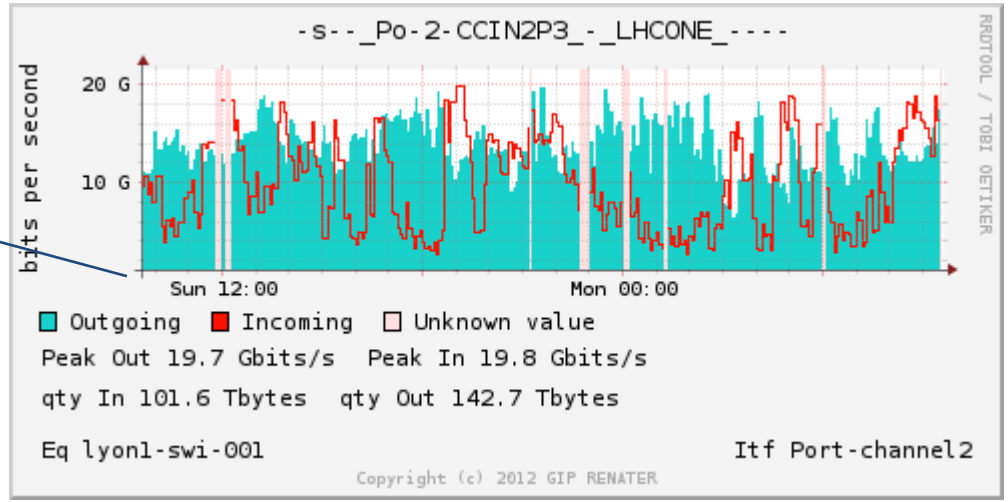

Positive (somewhere from KEKCC) | Negative (Somewhere to KEKCC)
LHCONE-KEKCC (40G)
20 Gbps
10 Gbps
0 bps
-10 Gbps
-20 Gbps
-30 Gbps
-40 Gbps
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
Interface ethernet2/3(KEKCC2016-v954): Bits received
Interface ethernet2/3(KEKCC2016-v954): Bits sent

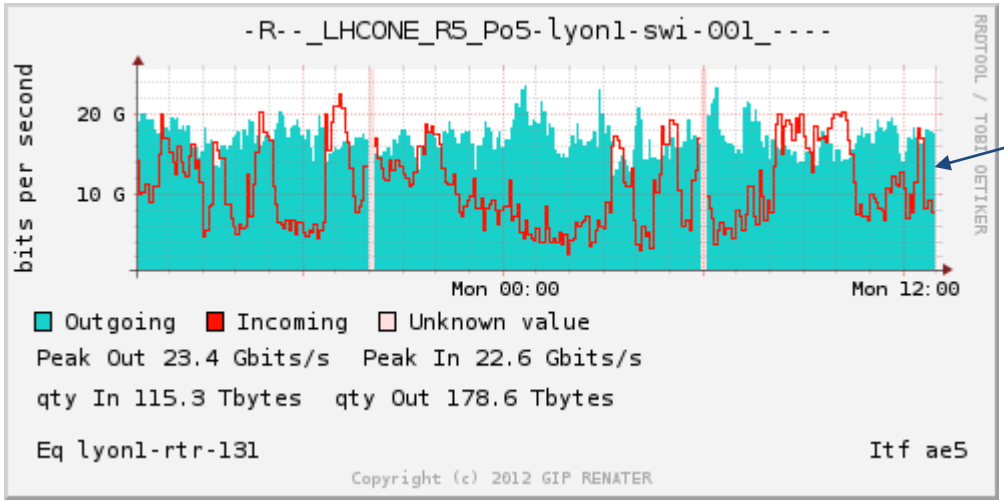
KEK vs IN2P3
20/05/2019

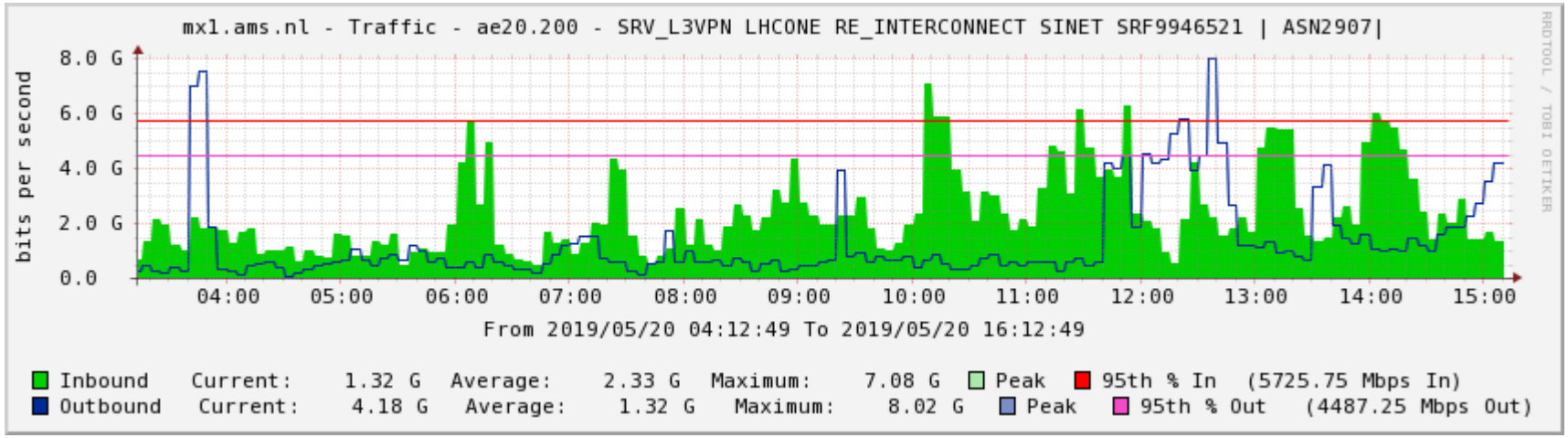
20/05/2019 9:52 CEST







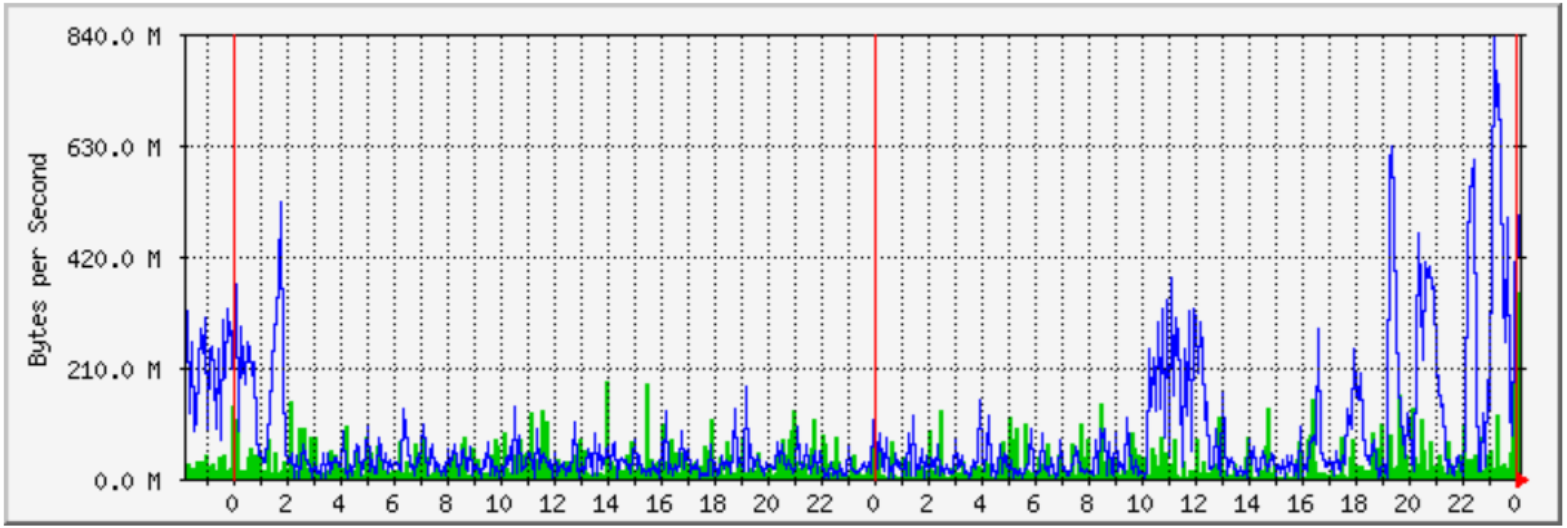

-R--_LHCONE_R5_Po5-lyon1-swi-001_----
bits per second
20 G
10 G
Mon 00:00
Mon 12:00
RRDTOOL / TOBI OETIKER
Outgoing
Incoming
Unknown value
Peak Out 23.4 Gbits/s
Peak In 22.6 Gbits/s
qty In 115.3 Tbytes
qty Out 178.6 Tbytes
Eq lyon1-rtr-131
Itf ae5
Copyright (c) 2012 GIP RENATER


mx1.ams.nl - Traffic - ae20.200 - SRV_L3VPN LHCONE RE_INTERCONNECT SINET SRF9946521 | ASN2907|
bits per second
8.0 G
6.0 G
4.0 G
2.0 G
0.0
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
From 2019/05/20 04:12:49 To 2019/05/20 16:12:49
Inbound Current: 1.32 G Average: 2.33 G Maximum: 7.08 G Peak 95th % In (5725.75 Mbps In)
Outbound Current: 4.18 G Average: 1.32 G Maximum: 8.02 G Peak 95th % Out (4487.25 Mbps Out)
RRDTOOL / TOBI OETIKER

LHCONE [LHCONE Primary] 40G

The statistics were last updated **Tuesday, 21 May 2019 at 0:10**

`Daily' Graph (5 Minute Average)

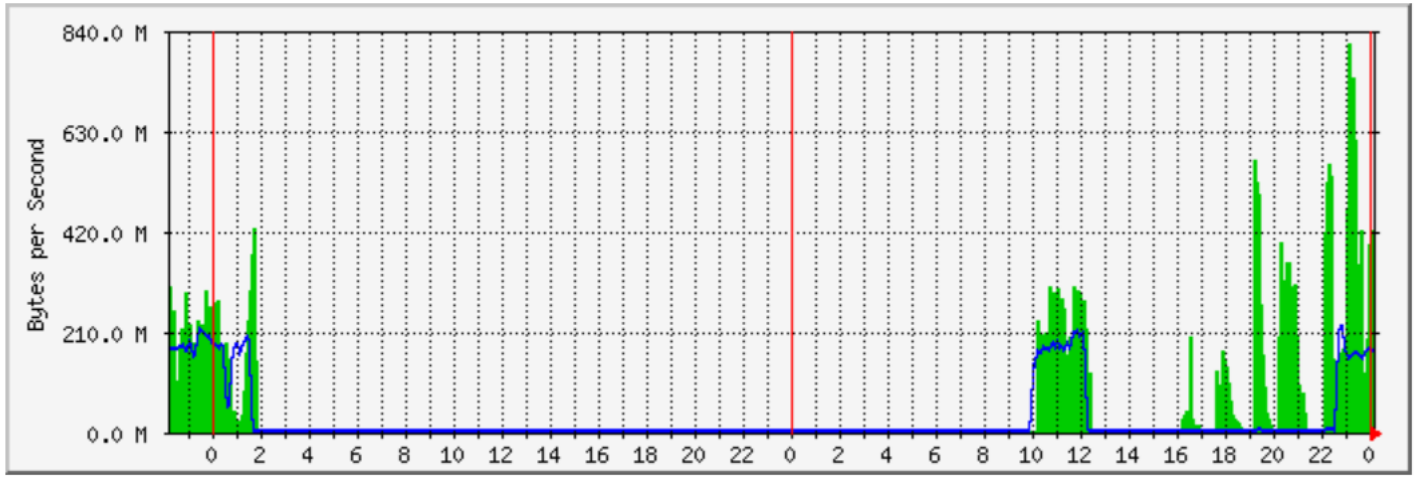


	Max	Average	Current
In (LHCONE→KEKCC)	350.9 MB/s (7.0%)	29.6 MB/s (0.6%)	350.9 MB/s (7.0%)
Out (KEKCC→LHCONE)	834.6 MB/s (16.7%)	75.9 MB/s (1.5%)	386.1 MB/s (7.7%)

kek2-storm01+kek2-storm02 [GridFTPs behind of kek2-se02 (Belle II RAW)] 80G

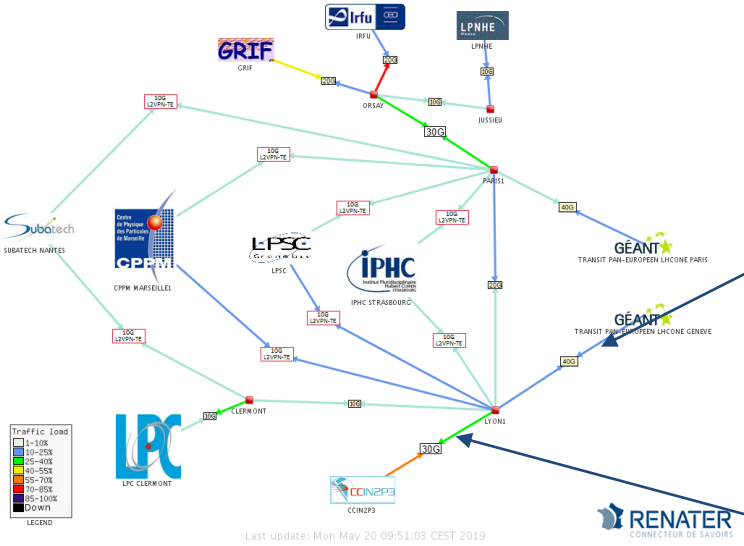
The statistics were last updated **Tuesday, 21 May 2019 at 0:10**

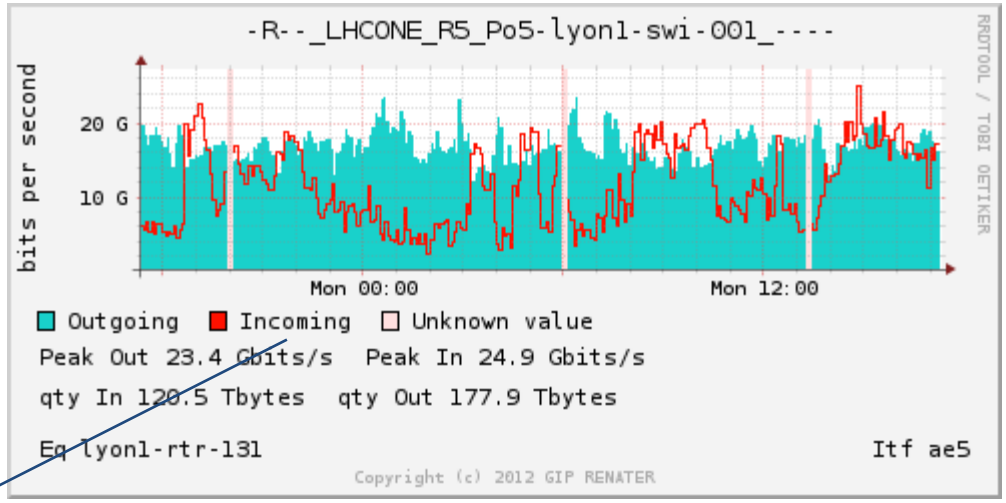
`Daily' Graph (5 Minute Average)

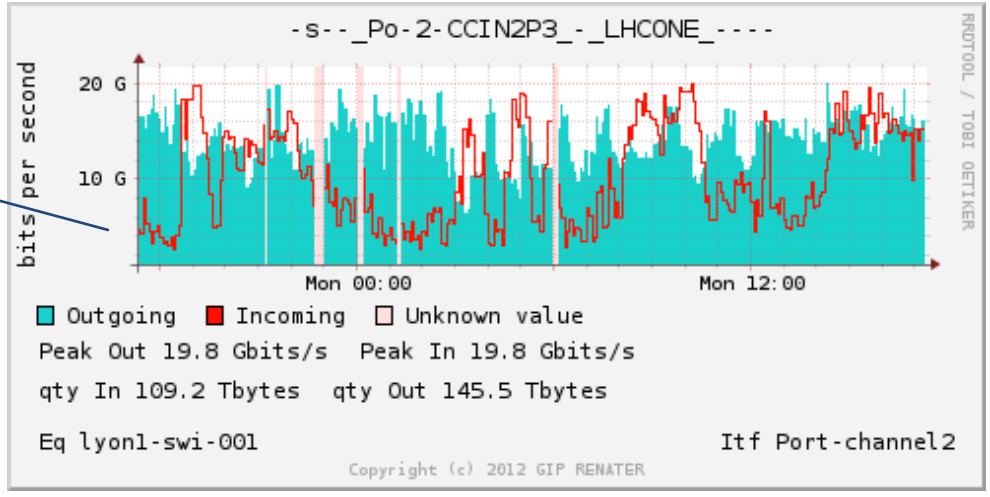


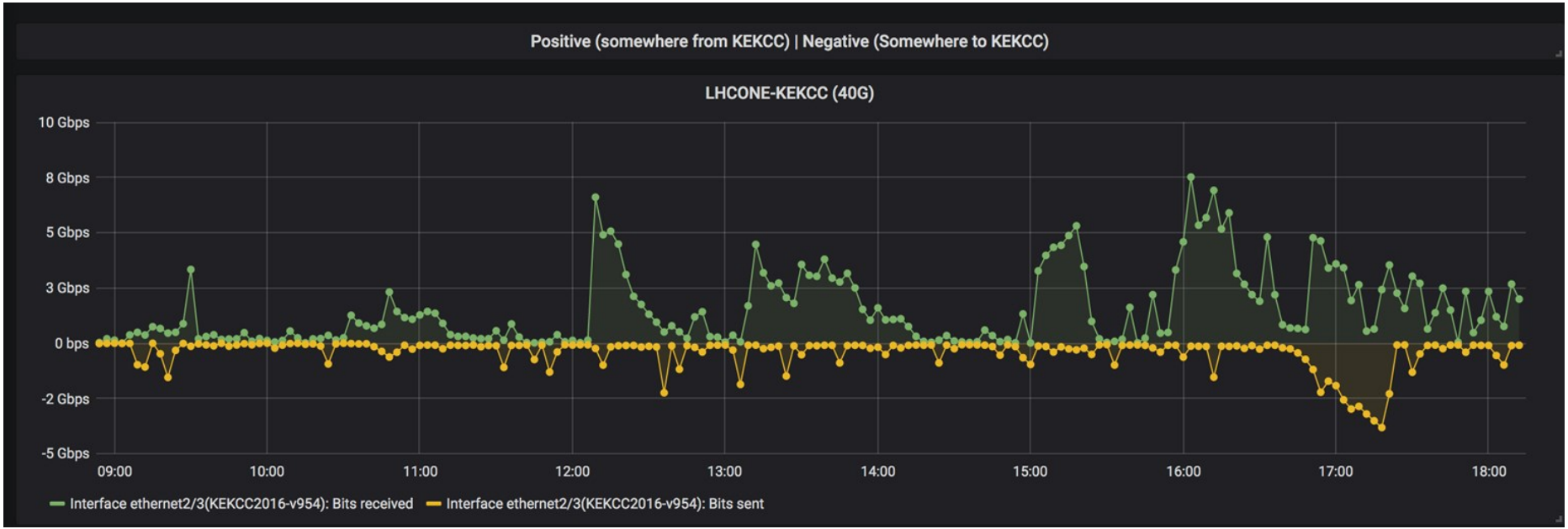
	Max	Average	Current
In (KEKCC→Outside)	812.7 MB/s (8.1%)	46.8 MB/s (0.5%)	388.4 MB/s (3.9%)
Out (Outside→KEKCC)	222.3 MB/s (2.2%)	25.5 MB/s (0.3%)	176.4 MB/s (1.8%)

20/05/2019 17:18 CEST







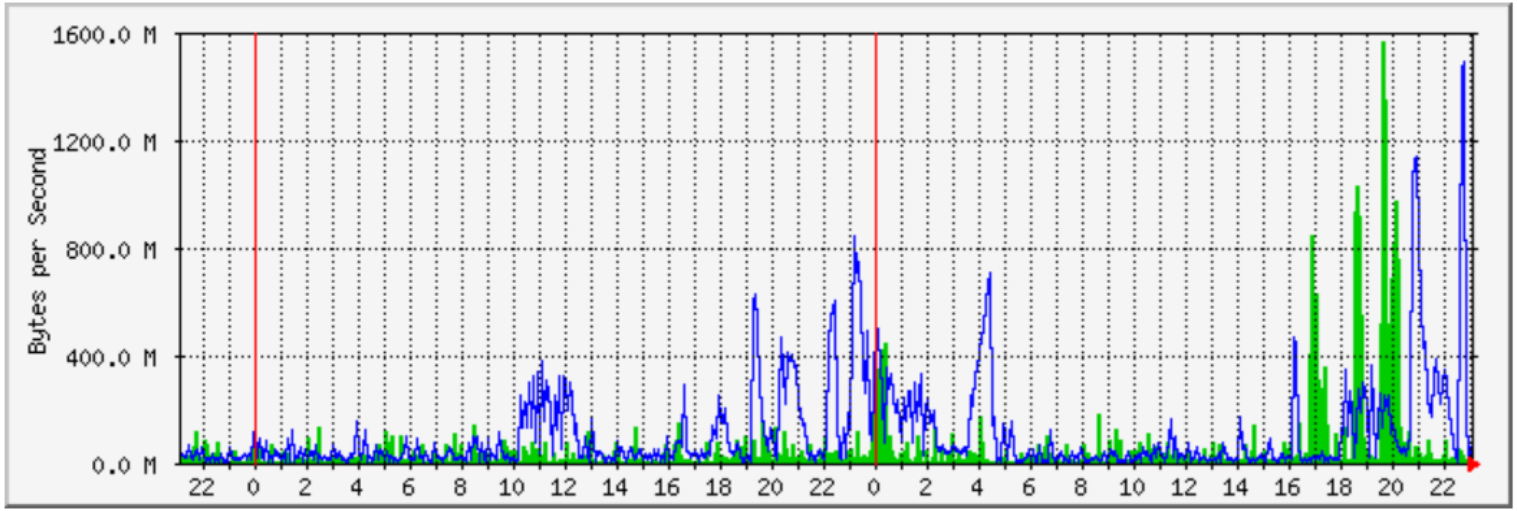

Positive (somewhere from KEKCC) | Negative (Somewhere to KEKCC)
LHCONE-KEKCC (40G)
10 Gbps
8 Gbps
5 Gbps
3 Gbps
0 bps
-2 Gbps
-5 Gbps
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Interface ethernet2/3(KEKCC2016-v954): Bits received
Interface ethernet2/3(KEKCC2016-v954): Bits sent

KEK vs IN2P3
21/05/2019

LHCONE [LHCONE Primary] 40G

The statistics were last updated **Tuesday, 21 May 2019 at 23:05**

`Daily' Graph (5 Minute Average)

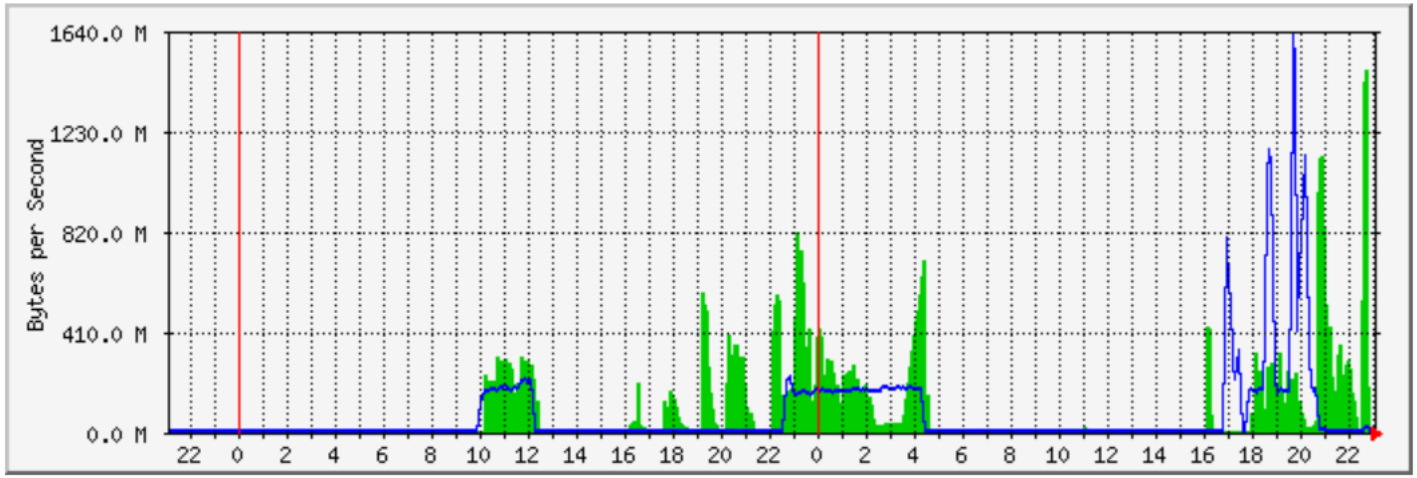


	Max	Average	Current
In (LHCONE→KEKCC)	1566.8 MB/s (31.3%)	55.3 MB/s (1.1%)	35.6 MB/s (0.7%)
Out (KEKCC→LHCONE)	1483.4 MB/s (29.7%)	103.6 MB/s (2.1%)	8446.7 kB/s (0.2%)

kek2-storm01+kek2-storm02 [GridFTPs behind of kek2-se02 (Belle II RAW)] 80G

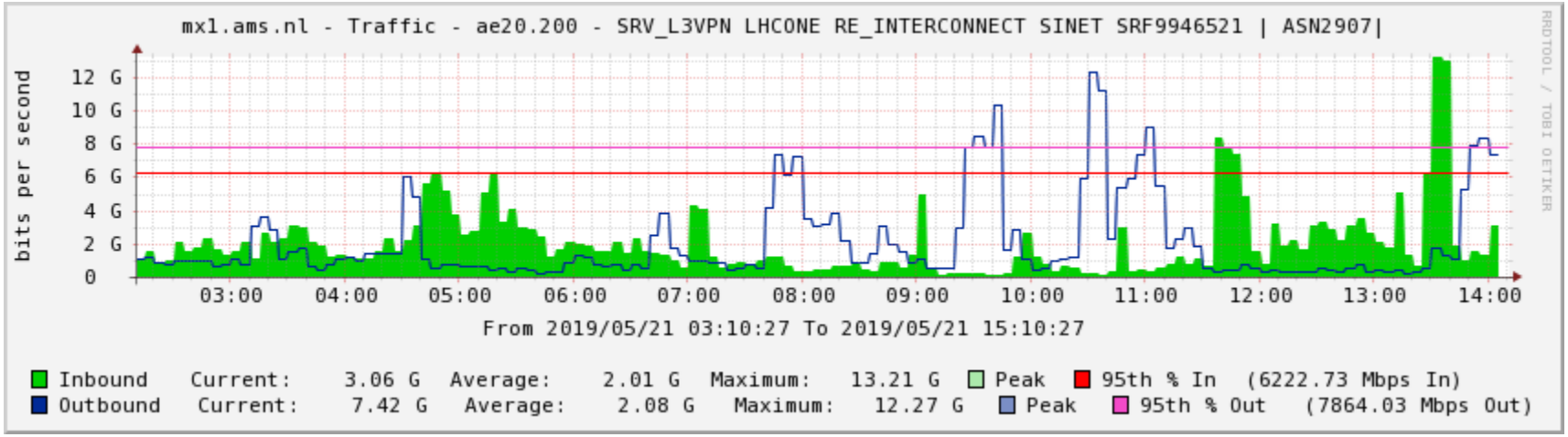
The statistics were last updated **Tuesday, 21 May 2019 at 23:05**

`Daily' Graph (5 Minute Average)

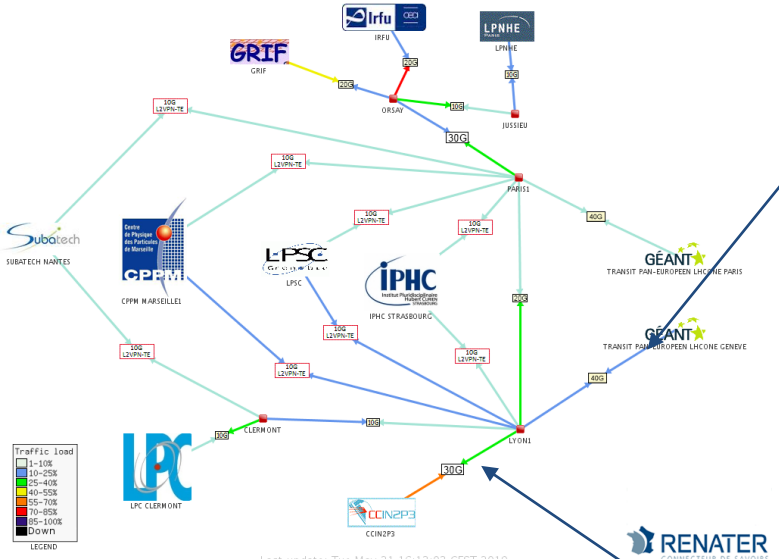


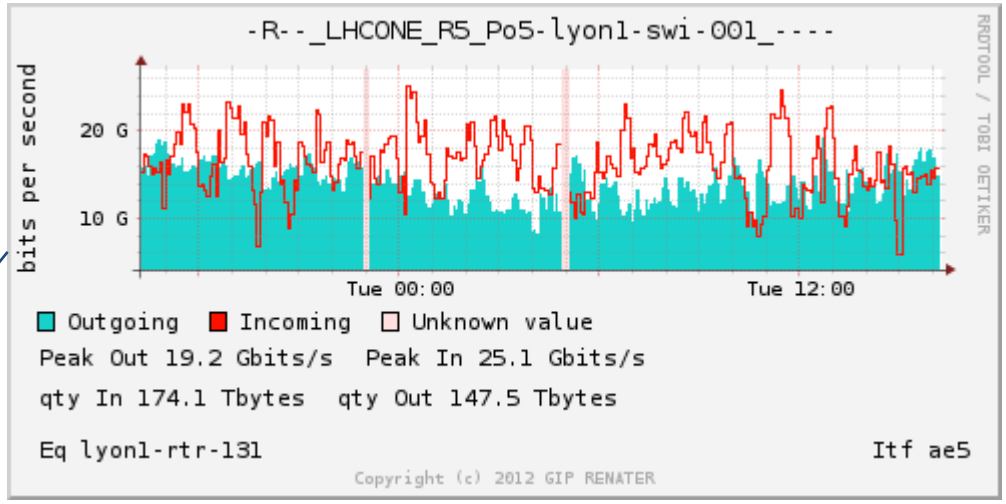
	Max	Average	Current
In (KEKCC→Outside)	1477.6 MB/s (14.8%)	78.9 MB/s (0.8%)	518.0 B/s (0.0%)
Out (Outside→KEKCC)	1617.4 MB/s (16.2%)	62.2 MB/s (0.6%)	8195.0 B/s (0.0%)

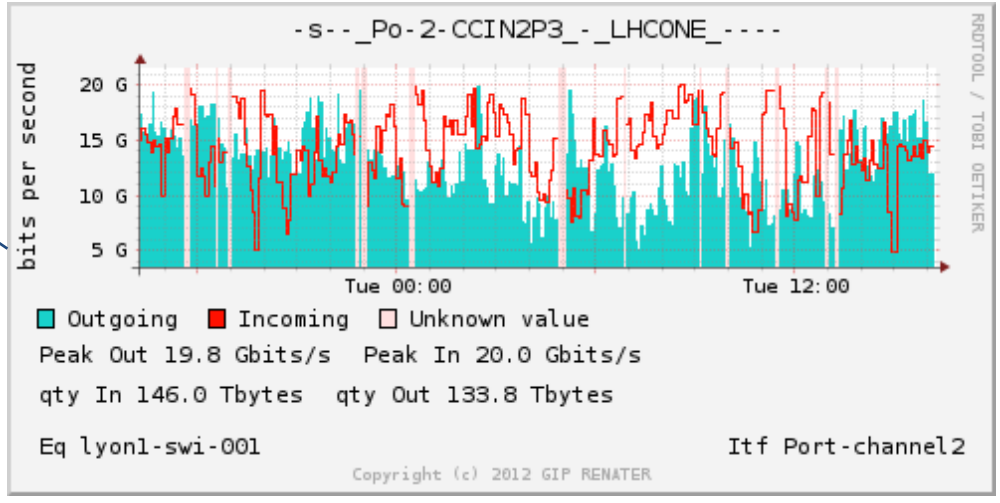
LHCONE: GEANT-SINET 21/05/2019



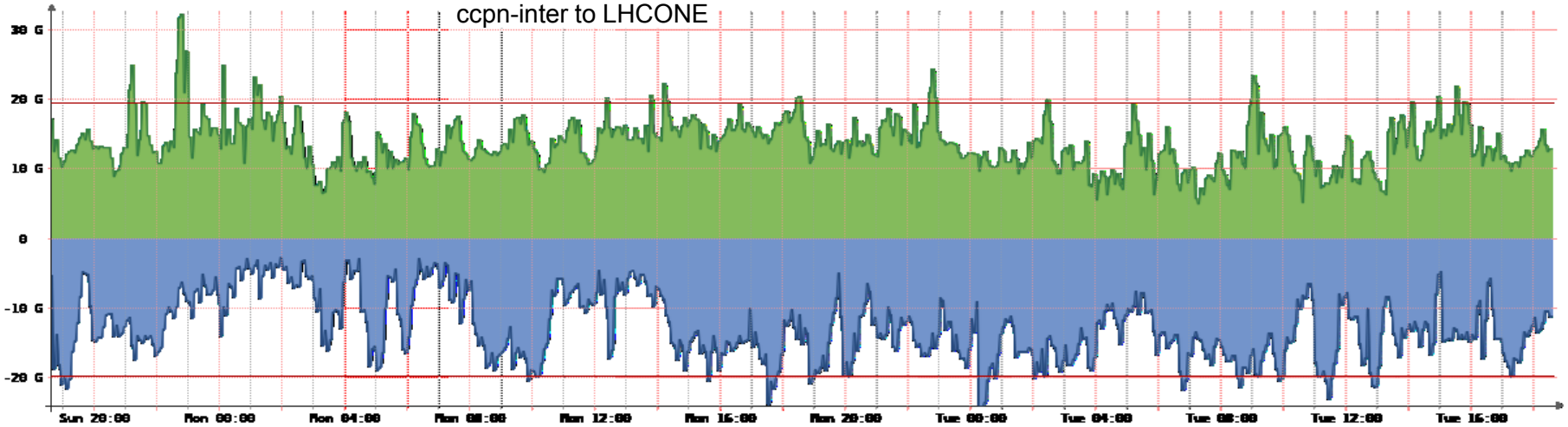
LHCONE: GEANT-RENATER 21/05/2019







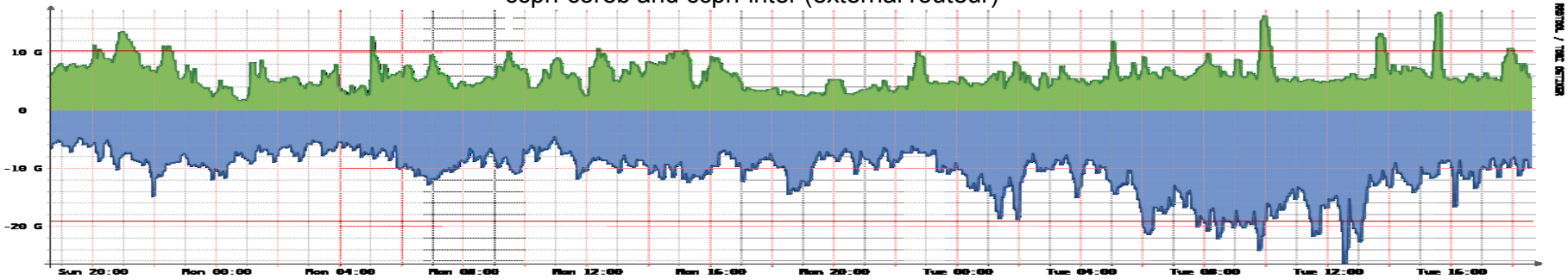
ccpn-inter to LHCONE



Bits/s	Last	Avg	Max	95th
In	12.95G	13.53G	32.30G	19.58G
Out	11.20G	12.70G	24.17G	19.86G

Total 566.58T (In 292.31T Out 274.27T)

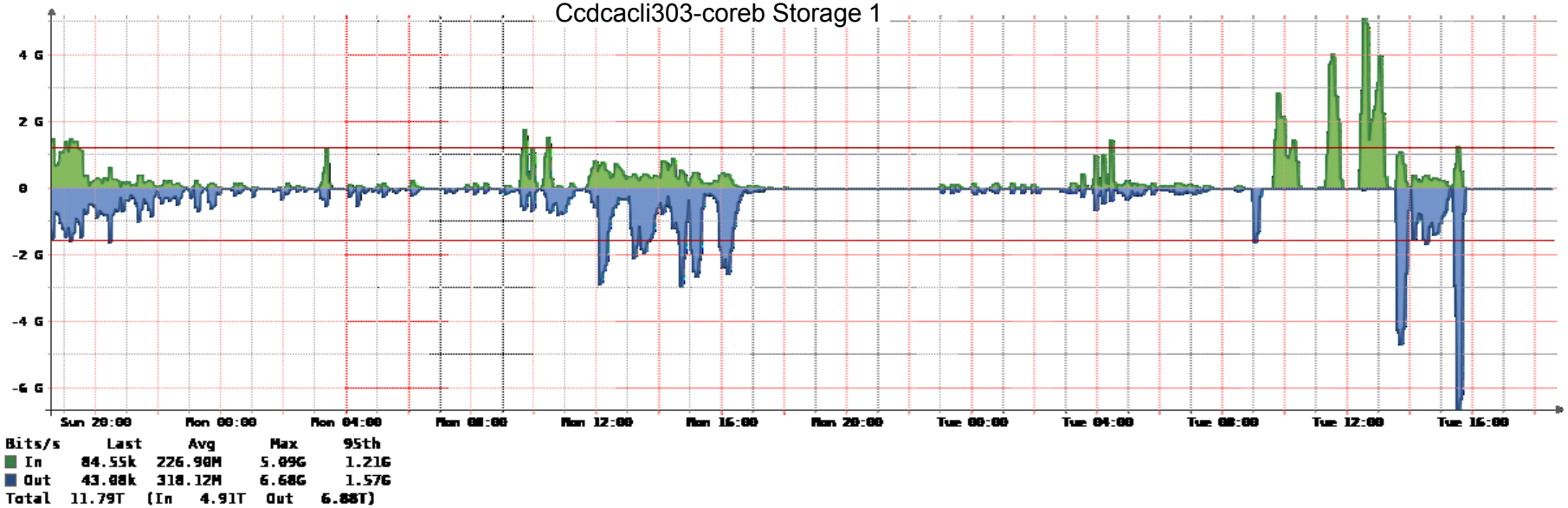
ccpn-coreb and ccpn-inter (external routeur)



Bits/s	Last	Avg	Max	95th
In	5.65G	6.13G	16.96G	10.27G
Out	9.82G	10.55G	26.51G	19.07G

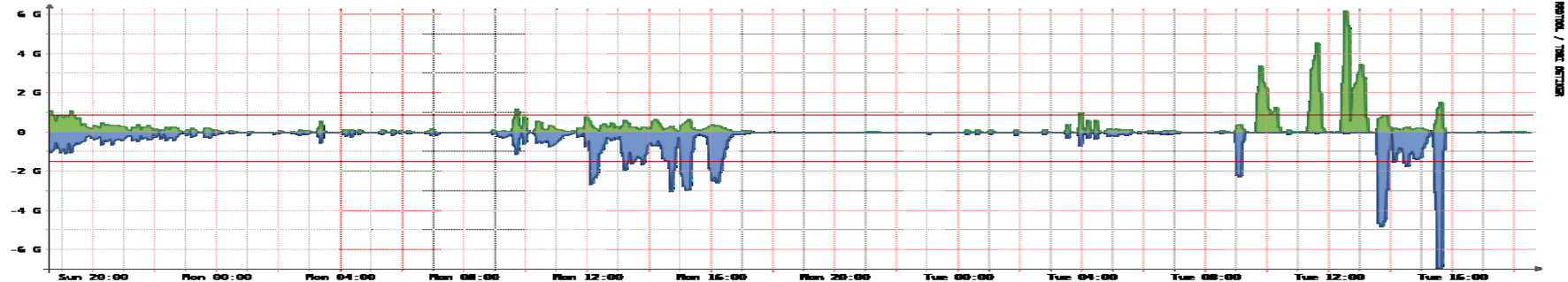
Total 360.09T (In 132.30T Out 227.78T)

Ccdcacli303-coreb Storage 1

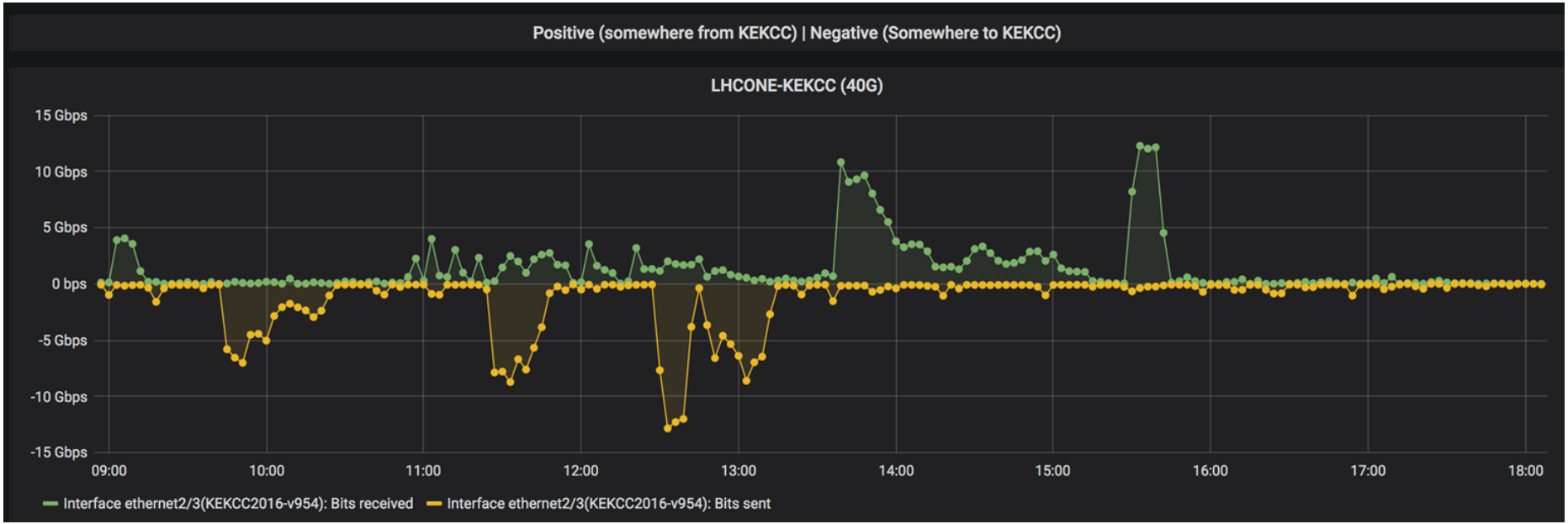


Bits/s	Last	Avg	Max	95th
In	84.55k	226.90M	5.09G	1.21G
Out	43.08k	318.12M	6.68G	1.57G
Total	11.79T	(In 4.91T	Out 6.88T)	

Ccdcacli222-coreb Storage 2



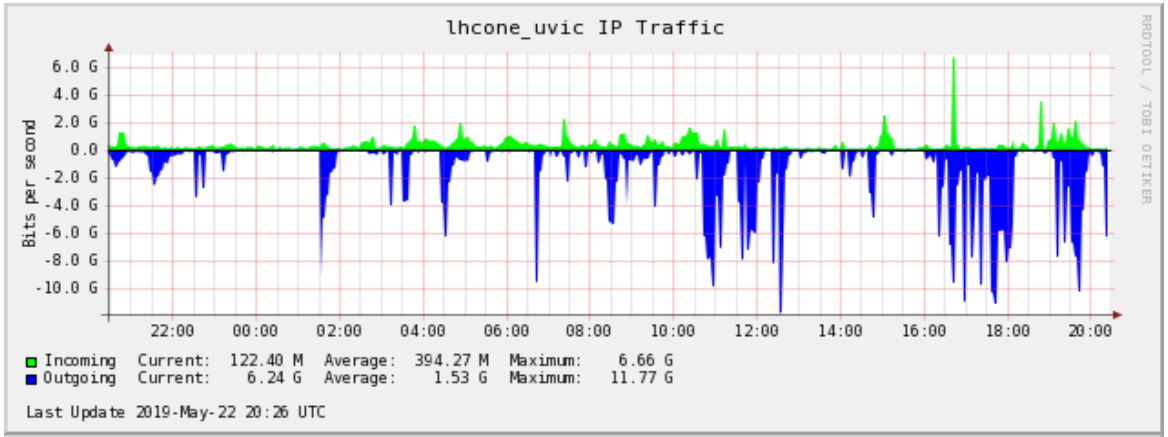
Bits/s	Last	Avg	Max	95th
In	97.49k	210.73M	6.18G	849.76M
Out	11.22k	293.45M	7.00G	1.50G
Total	10.91T	(In 4.56T	Out 6.35T)	

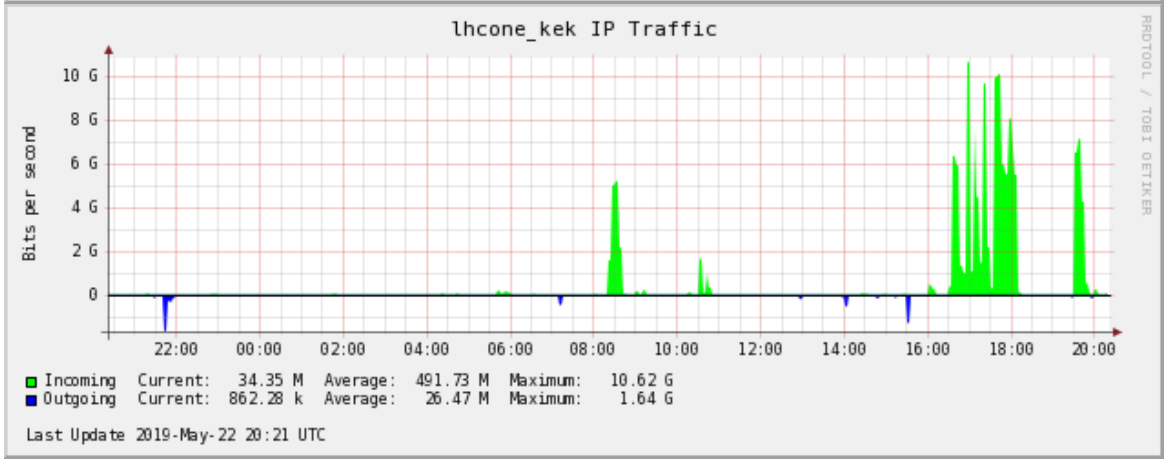

Positive (somewhere from KEKCC) | Negative (Somewhere to KEKCC)
LHCONE-KEKCC (40G)
15 Gbps
10 Gbps
5 Gbps
0 bps
-5 Gbps
-10 Gbps
-15 Gbps
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Interface ethernet2/3(KEKCC2016-v954): Bits received
Interface ethernet2/3(KEKCC2016-v954): Bits sent

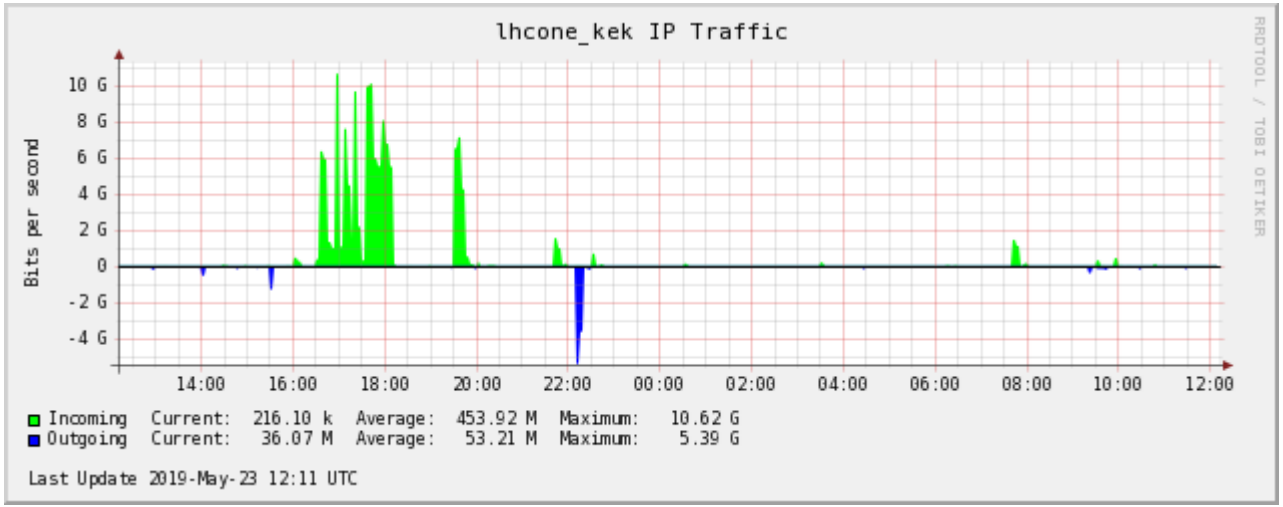
KEK vs UVIC
22/05/2019

https://weathermap.canarie.ca/ntn/lhcone_kek.png

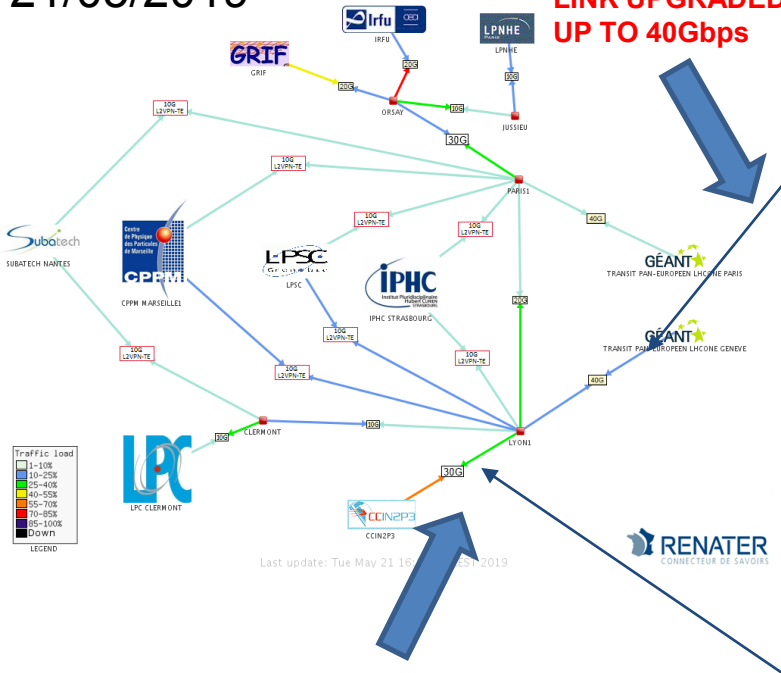
https://weathermap.canarie.ca/ntn/lhcone_uvic.png

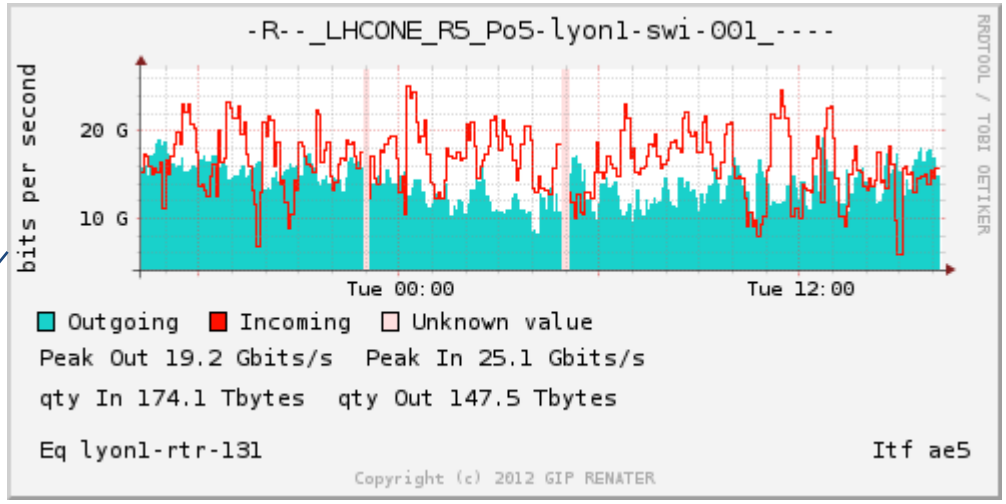


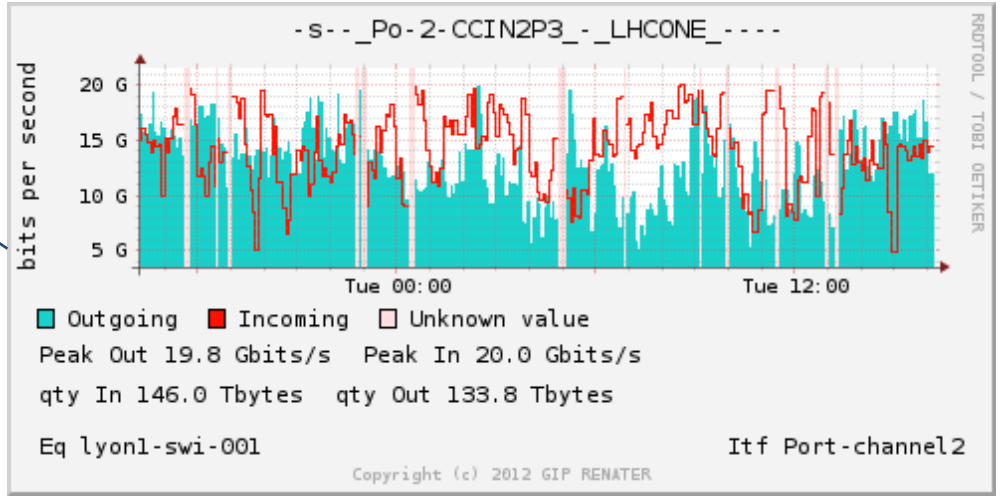



lhcone_kek IP Traffic
Bits per second
10 G
8 G
6 G
4 G
2 G
0
-2 G
-4 G
14:00
16:00
18:00
20:00
22:00
00:00
02:00
04:00
06:00
08:00
10:00
12:00
Incoming Current: 216.10 k Average: 453.92 M Maximum: 10.62 G
Outgoing Current: 36.07 M Average: 53.21 M Maximum: 5.39 G
Last Update 2019-May-23 12:11 UTC
RRDTOOL / TOBI OETIKER

LHCONE: GEANT-RENATER
21/05/2019







4x10 Gb/s between ccpn-inter and LHCONE (but it looks like there is a limitation at 20 Gb/s here; a ticket is opened with RENATER, the french NREN providing the LHCONE

link, they are investigating).

INVOLVED SITES

- CNAF RAW DC
- DESY RAW DC
- IN2P3 RAW DC
- KIT RAW DC
- KEK Tier0
- UVIc RAW DC
- NAPOLI Regional DC
- SIGNET Regional DC
- GEANT DTN Service

FTS3 Server in BNL

Many people involved in different sites

KEK vs EU Sites

Involved sites KEK, CNAF, DESY, IN2P3, KIT, NAPOLI, SIGENT
15 May 24TB sent in ~4h - from KEK to EU
17 May 16TB sent in ~ 3h - from EU to KEK

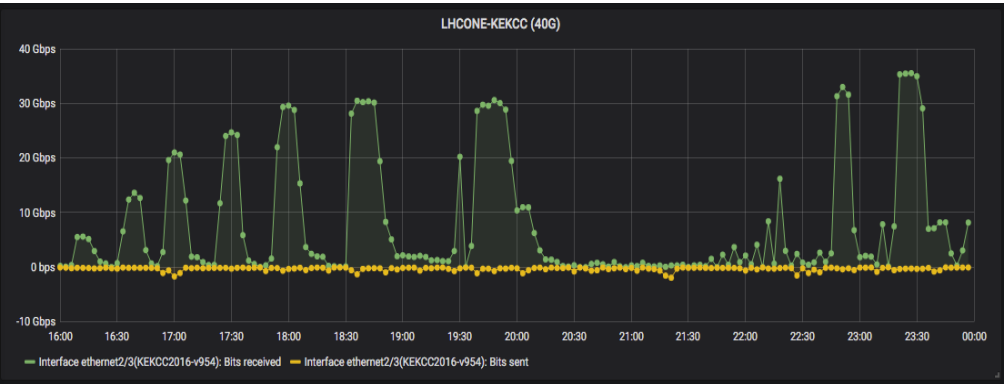
KEK-> EU Used a single job with multiple destinations **- max 35.83 Gbps** with 16 streams
Average 13.5 Gbps

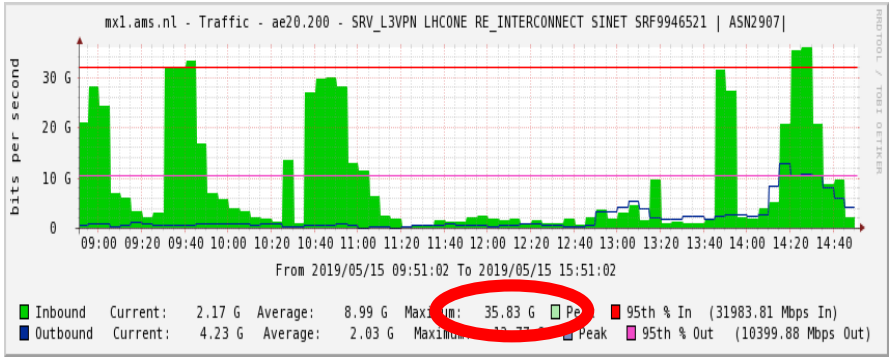
EU->KEK Used a single job with multiple sources **- max 34.87 Gbps** with 16 streams
Average 11.8 Gbps

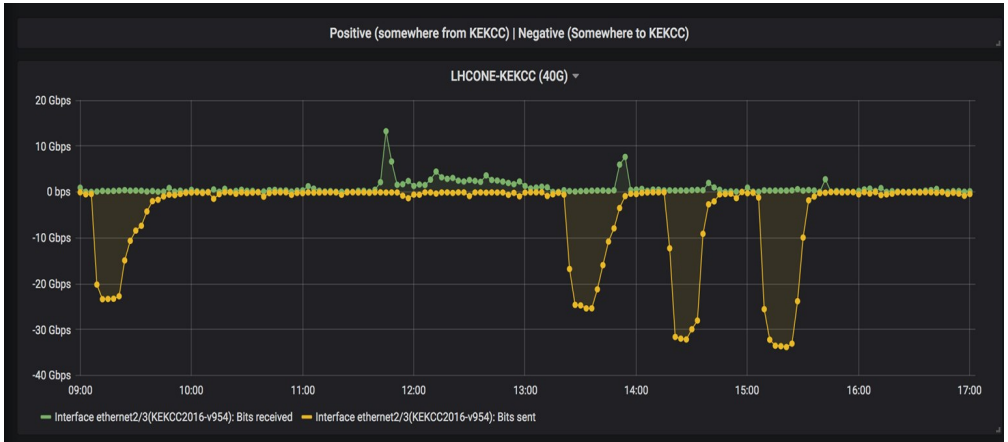
Several tests done. Up to 5TB for single job

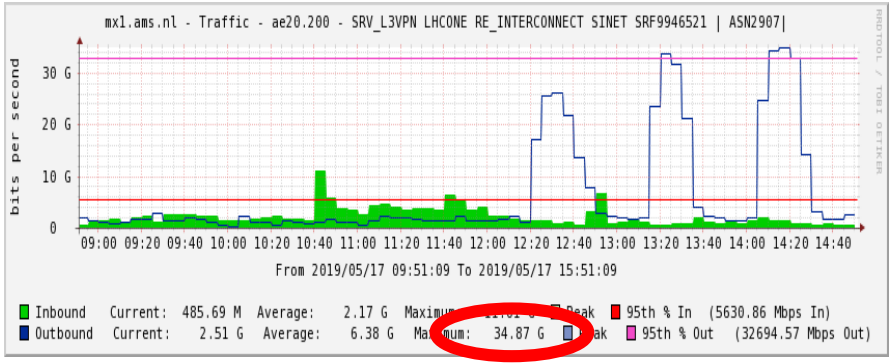
KEKCC NETWORK

LHCONEMONITOR





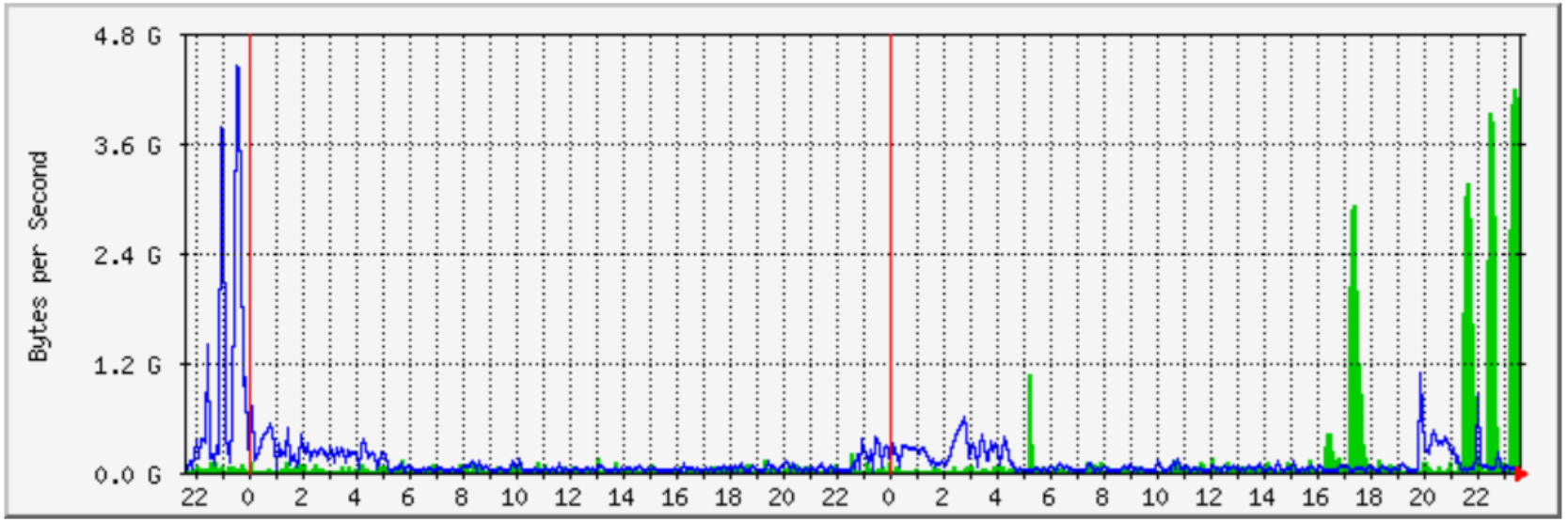




KEKCC - LHCONE 40G

The statistics were last updated **Friday, 17 May 2019 at 23:35**

`Daily' Graph (5 Minute Average)



	Max	Average	Current
In (LHCONE→KEKCC)	4199.4 MB/s (84.0%)	12[illegible].1 MB/s (2.5%)	1901.3 MB/s (38.0%)
Out (KEKCC→LHCONE)	4438.1 MB/s (88.8%)	13[illegible].0 MB/s (2.6%)	52.0 MB/s (1.0%)

UP to 88% of the Bandwidth

KEK vs IN2P3

Involved sites KEK, IN2P3

20 May 3.4TB sent in ~ 5h:40 - from KEK to IN2P3
21 May 3TB sent in ~ 1h:42 - from KEK to IN2P3
21 May 3TB sent in ~ 1h:02 - from IN2P3 to KEK

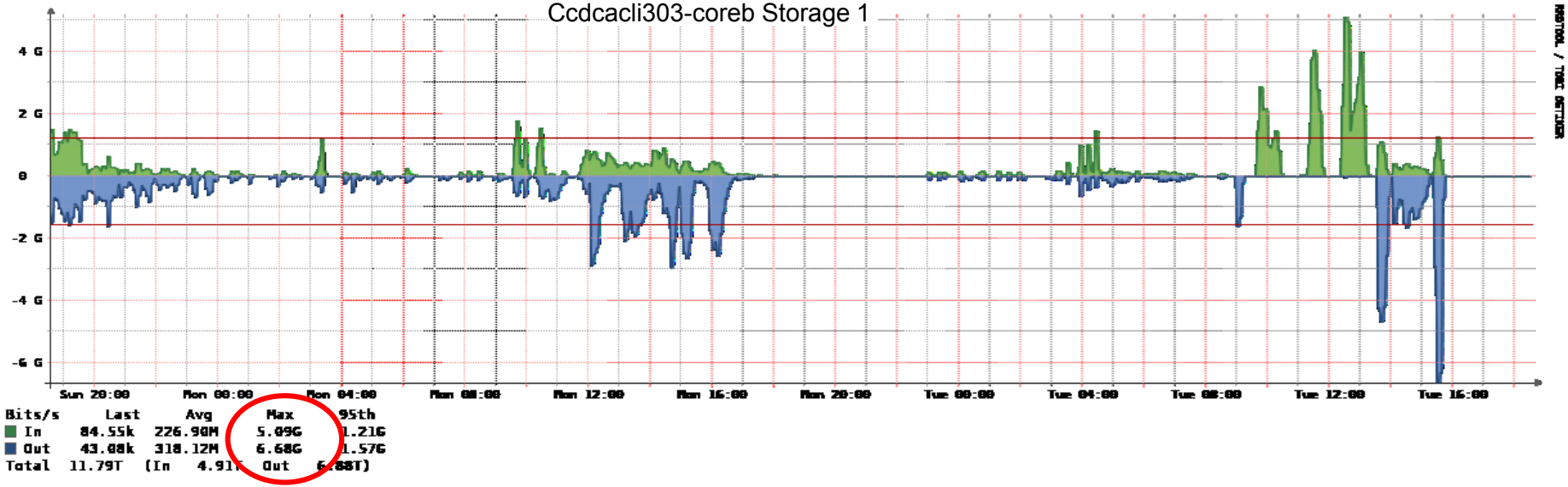
Several tests done UP to 1TB for single job. 10GB x file

KEK-> IN2P3 - **max 12.4 Gbps** with 96 file and 16 streams
Average **4.1Gbps**

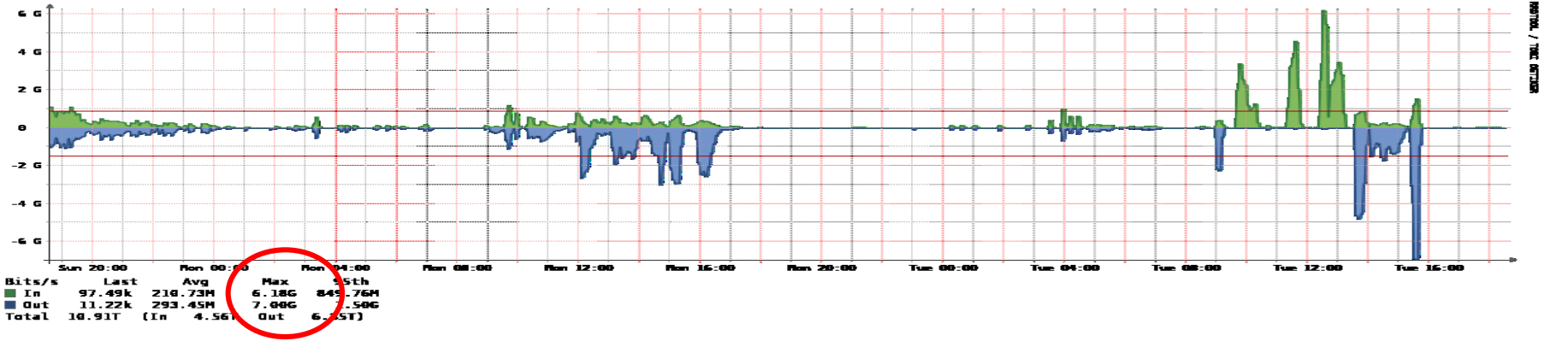
IN2P3->KEK – max **12.4 Gbps** with 97 file and 16 streams
Average **6.6Gbps**

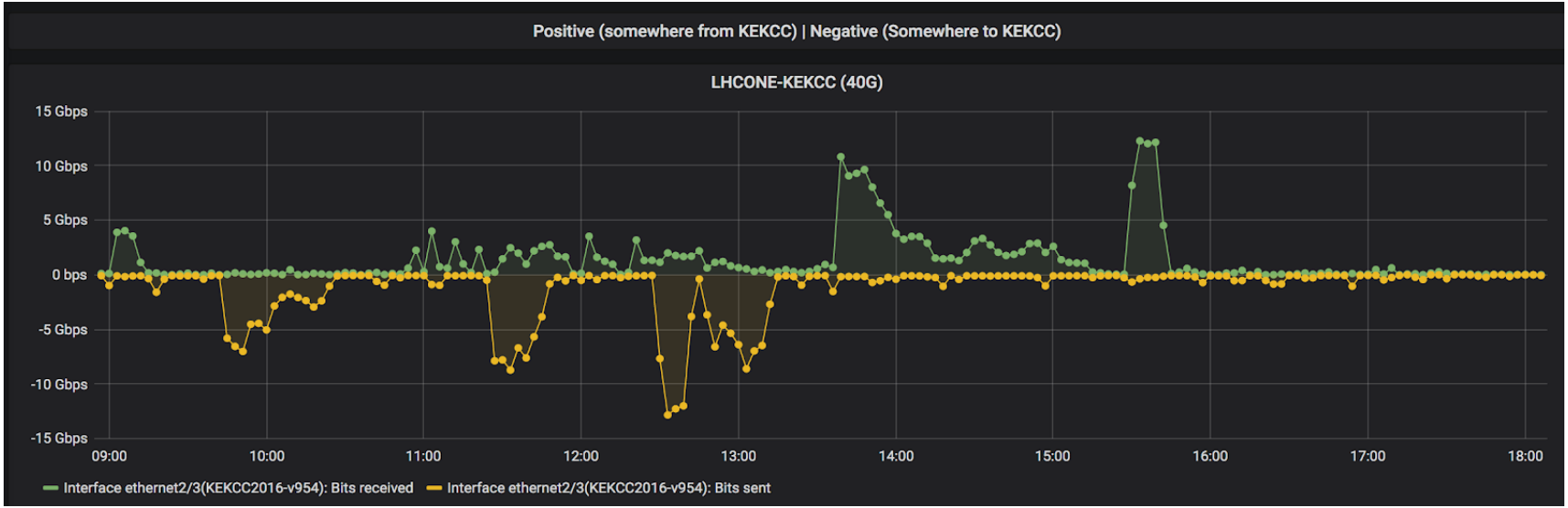
Results improve the previous tests done in October

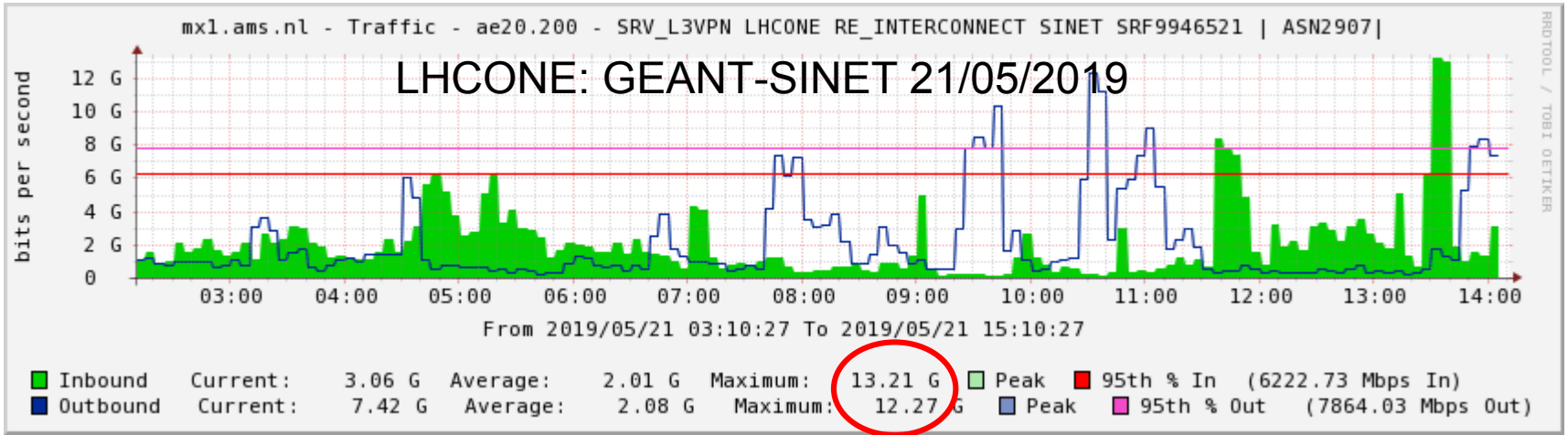
Ccdcacli303-coreb Storage 1



Ccdcacli222-coreb Storage 2



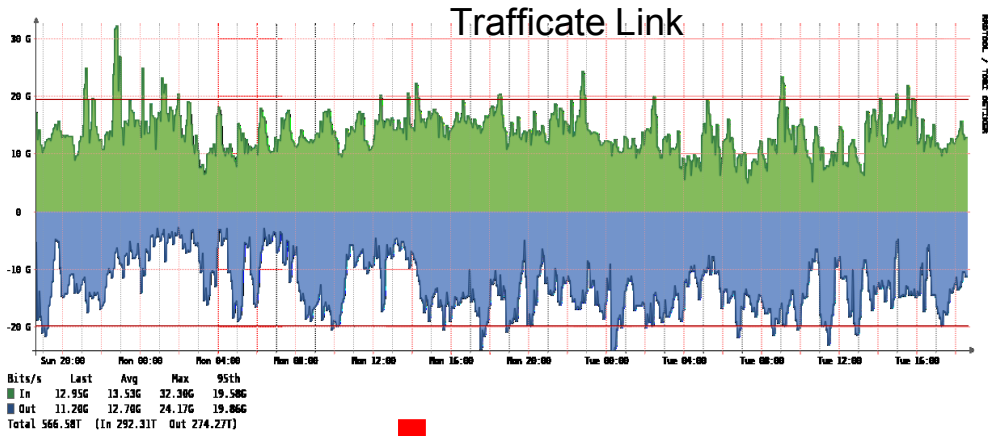

Positive (somewhere from KEKCC) | Negative (Somewhere to KEKCC)
LHCONE-KEKCC (40G)
15 Gbps
10 Gbps
5 Gbps
0 bps
-5 Gbps
-10 Gbps
-15 Gbps
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
Interface ethernet2/3(KEKCC2016-v954): Bits received
Interface ethernet2/3(KEKCC2016-v954): Bits sent


mx1.ams.nl - Traffic - ae20.200 - SRV_L3VPN LHCONE RE_INTERCONNECT SINET SRF9946521 | ASN2907|
LHCONE: GEANT-SINET 21/05/2019
bits per second
12 G
10 G
8 G
6 G
4 G
2 G
0
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
From 2019/05/21 03:10:27 To 2019/05/21 15:10:27
Inbound Current: 3.06 G Average: 2.01 G Maximum: 13.21 G Peak 95th % In (6222.73 Mbps In)
Outbound Current: 7.42 G Average: 2.08 G Maximum: 12.27 G Peak 95th % Out (7864.03 Mbps Out)
RRDTOOL / TOBI OETIKER

IN2P3 Peering and Storage

KEK – SINET5

100 Gbps



dCache Pool

dCache Fileserver

dCache Fileserver

GEANT

RENATER Router

ccpn-inter

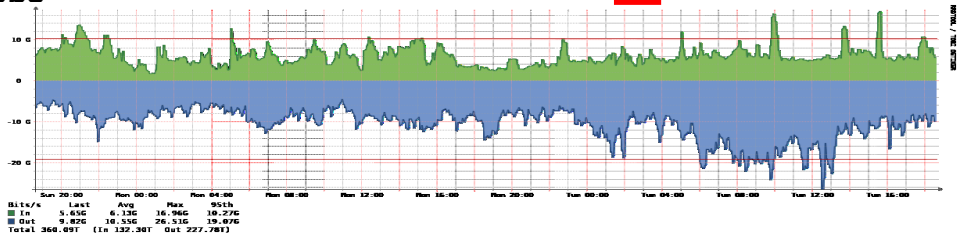
ccpn-coreb

LHCONE 40Gbps

4x10Gbps

2x100G

10Gbps



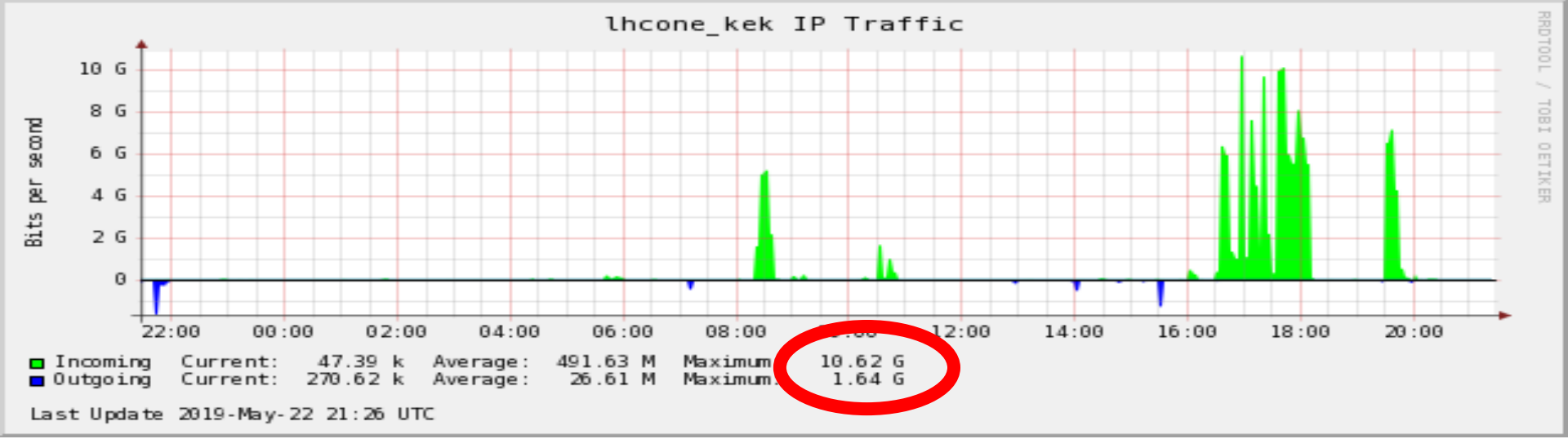
KEK vs UVIc

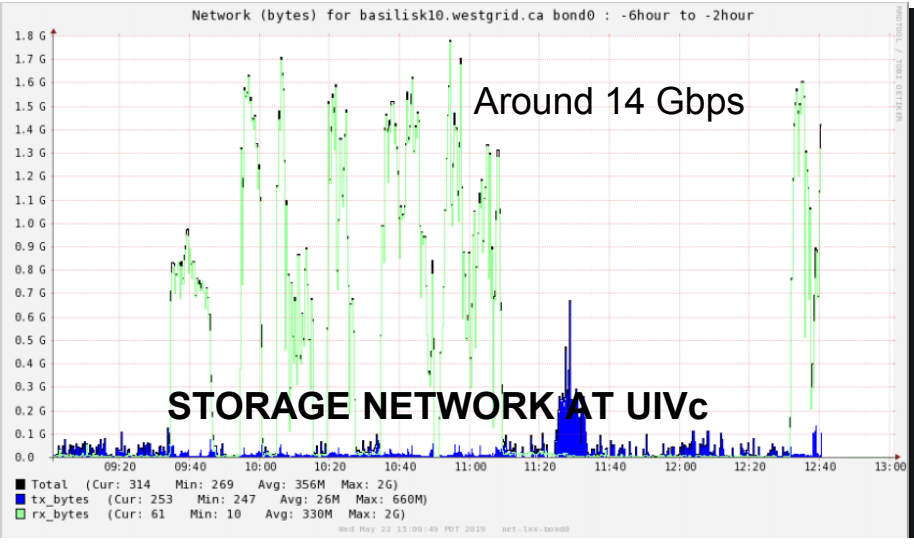
Involved sites KEK, UVIc

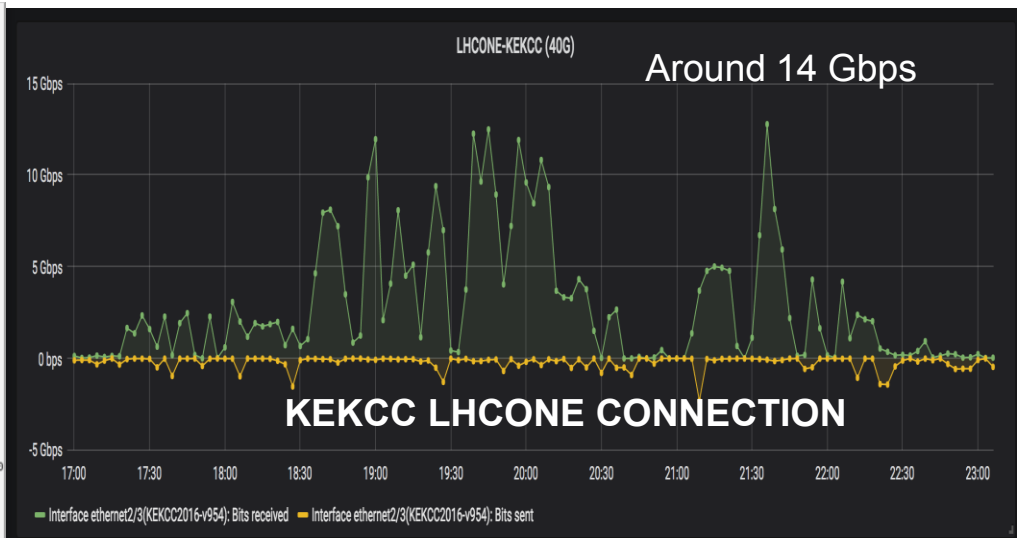
22 May 4.6TB sent in 1:49min effective – from KEK to IN2P3

Several tests done UP to 1.8TB for single job. 10GB x file
KEK-> UVIC - **max 14 Gbps** with 43 files and 16 streams
Average of the day **5.6Gbps**

In the current configuration UVIc storage has a limit of 48 concurrent transfer.
Single file goes very fast.


lhcone_kek IP Traffic
Bits per second
10 G
8 G
6 G
4 G
2 G
0
22:00
00:00
02:00
04:00
06:00
08:00
12:00
14:00
16:00
18:00
20:00
Incoming Current: 47.39 k Average: 491.63 M Maximum 10.62 G
Outgoing Current: 270.62 k Average: 26.61 M Maximum 1.64 G
Last Update 2019-May-22 21:26 UTC
RRDTOOL / TOBI OETIKER


Network (bytes) for basilisk10.westgrid.ca bond0 : -6hour to -2hour
Around 14 Gbps
STORAGE NETWORK AT UIVc
Total (Cur: 314 Min: 269 Avg: 356M Max: 2G)
tx_bytes (Cur: 253 Min: 247 Avg: 26M Max: 660M)
rx_bytes (Cur: 61 Min: 10 Avg: 330M Max: 2G)


LHCONE-KEKCC (40G)
Around 14 Gbps
15 Gbps
10 Gbps
5 Gbps
0 bps
-5 Gbps
17:00
17:30
18:00
18:30
19:00
19:30
20:00
20:30
21:00
21:30
22:00
22:30
23:00
KEKCC LHCONE CONNECTION
Interface ethernet2/3(KEKCC2016-v954): Bits received
Interface ethernet2/3(KEKCC2016-v954): Bits sent

Data Tranfer Node (DTN) by GEANT

DTN Paris 100G

DTN London 100G

- Account activated
- Working for software installation and configuration
- Preliminary check ongoing (Routing, Iperf3 test)