

# Belle II Update

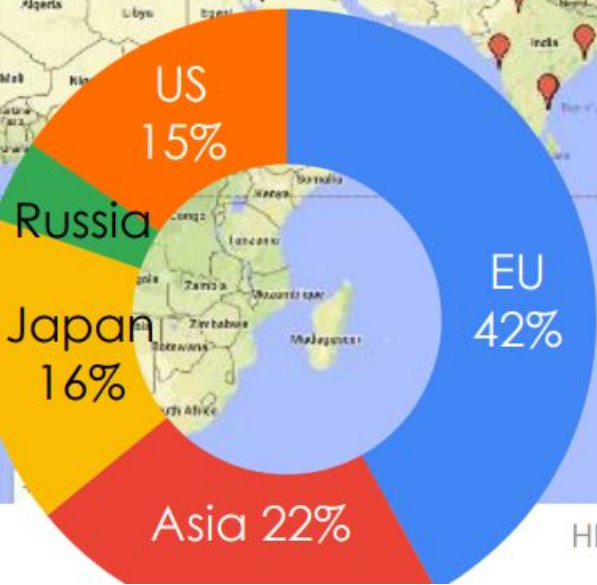
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*INFN-Napoli*  
March 2022



# Belle II Collaboration

*A Global Collaboration  
as wide as an LHC experiment*



26 countries/regions  
123 institutes  
1,075 researchers

# Belle II Status and Plan

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Currently in data taking: around 2.8PB of RAW Data collected since 2019

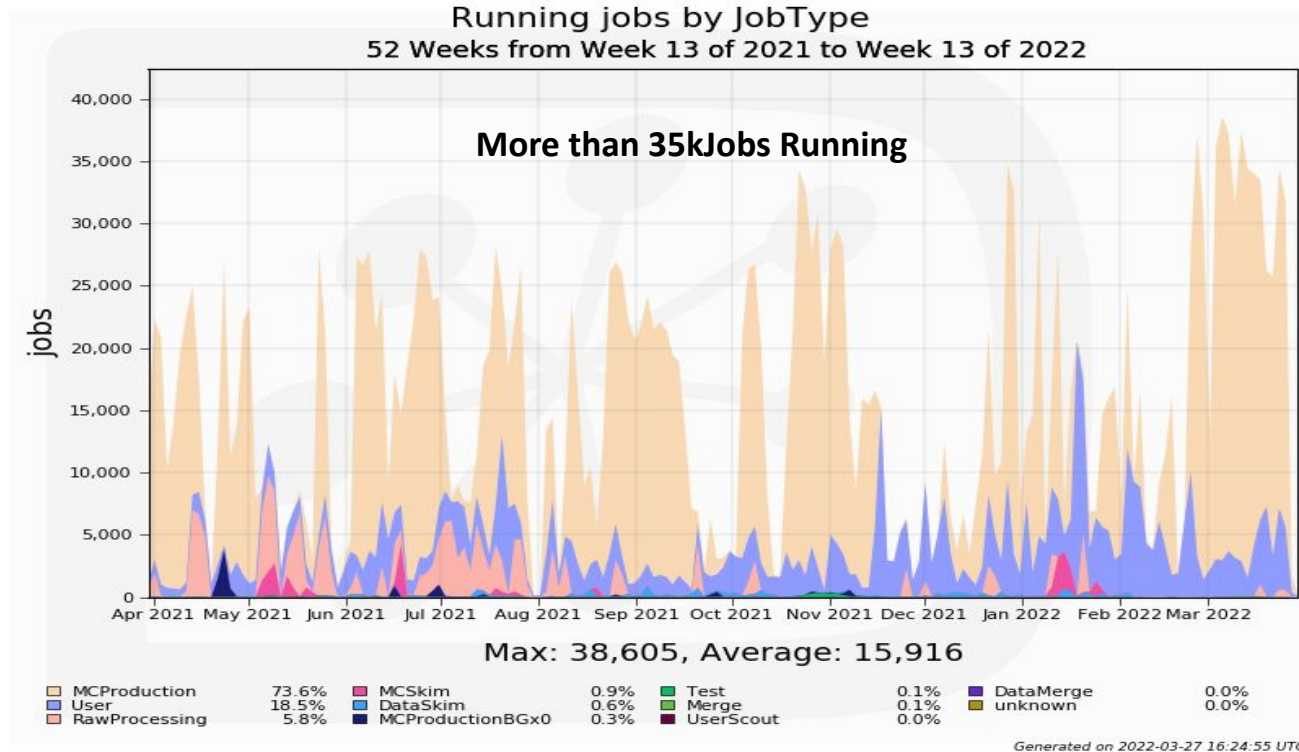
A full copy of RAW Data is stored at KEK Tier0

Secondary copy is distributed over the following RAW Data Centers

- BNL 30%
- CNAF 20%
- DESY 10%
- KIT 10%
- IN2P3CC 15%
- UVic (sonno aviabile) 15%

In 2022 a Long Shutdown scheduled

# Belle II Status and Plan

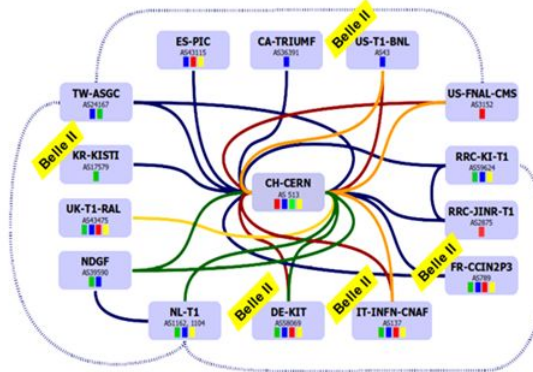


# Belle II Network

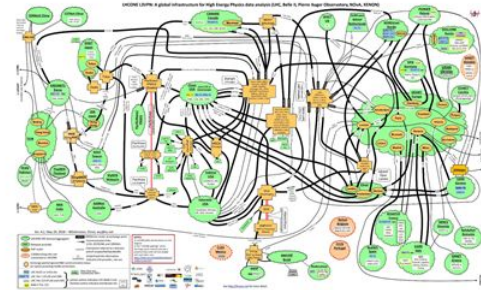
## 100G Global Ring via SINET



## LHCOPN Optical infrastructure that can be used without jeopardizing resources



## LHCONE L3 VPN Connecting all the major Data Centres



# Site Report October 2021

Network	#Sites
LHCONE	47%
GeneralIP	53%

83% of kHS06 Running on LHCONE  
92% of Storage on LHCONE

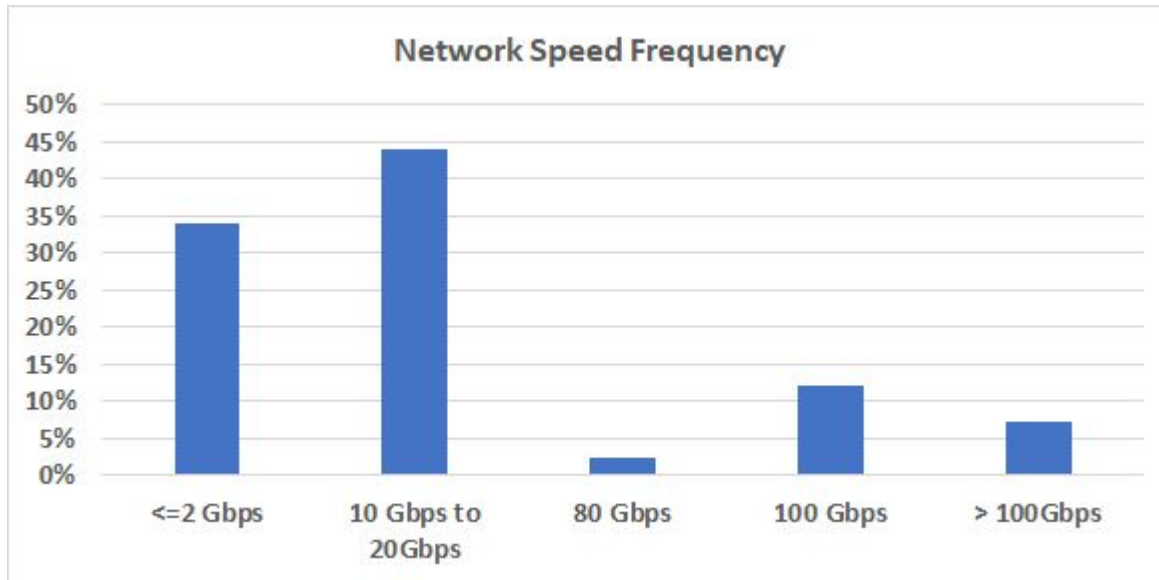
Previous check only 30% of sites was in LHCONE.

IPv6 deployment	#Sites
Storage Dual Stack	32%
WorkerNode Dual Stack	10%

8.2 PB reachable via IPv6 over of 13.8 PB

# Network Speed

Note: 14 Sites with Network access < than 2Gbps  
Some of them <1Gbps



## Highlight

- KEK 80Gbps on LHCONE
- BNL going to 400 Gbps and will increase up to 800 Gbps and 1.2Tbps
- CNAF, and KIT 200Gbps

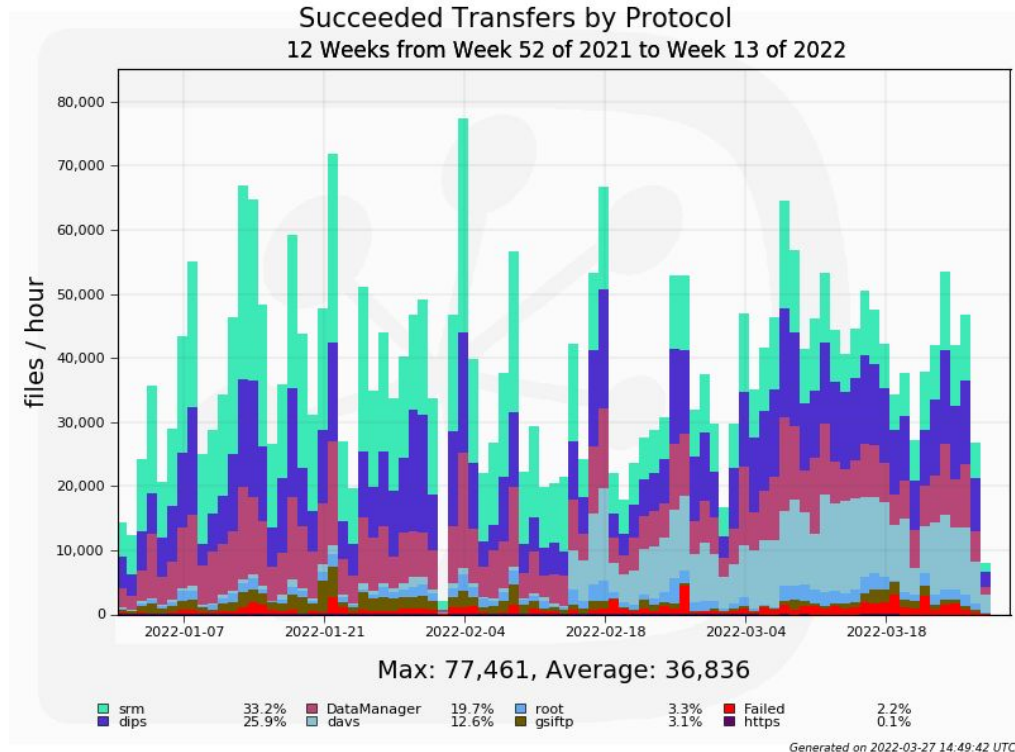


# DAVS migration

Large effort in configuring DAVS as main protocol for data access and data transfer.

Davs active as file access protocol for most of the storages.

Third-Party-Copy under verification storage by storage.



Generated on 2022-03-27 14:49:42 UTC



# Token Based Authentication

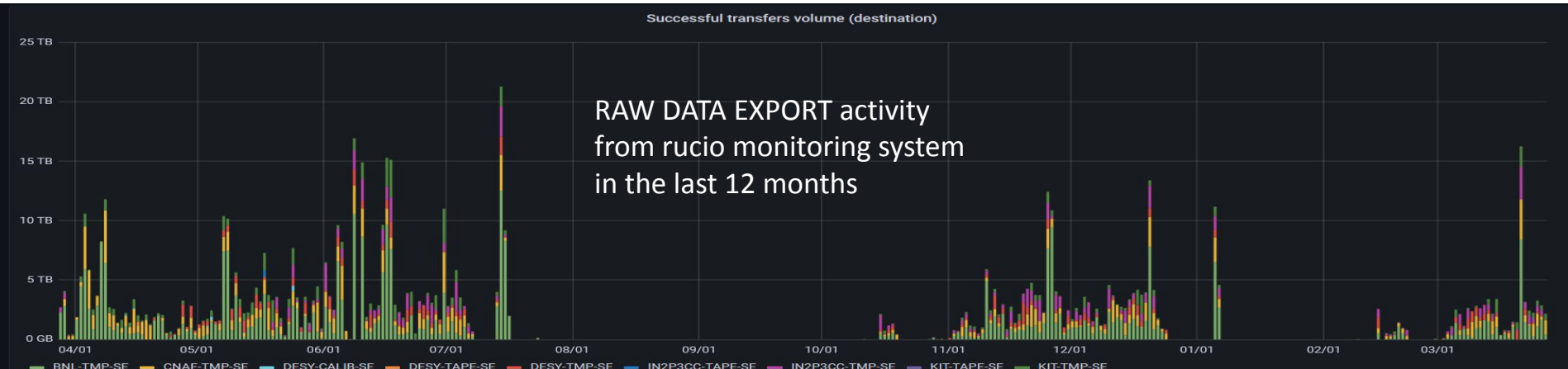
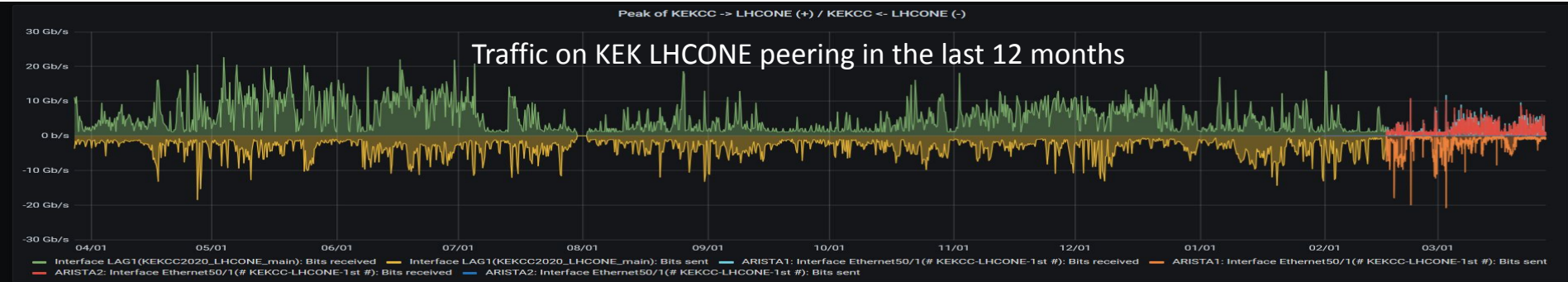
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Test for Computing and Storage resources with Token Based Authentication are ongoing.

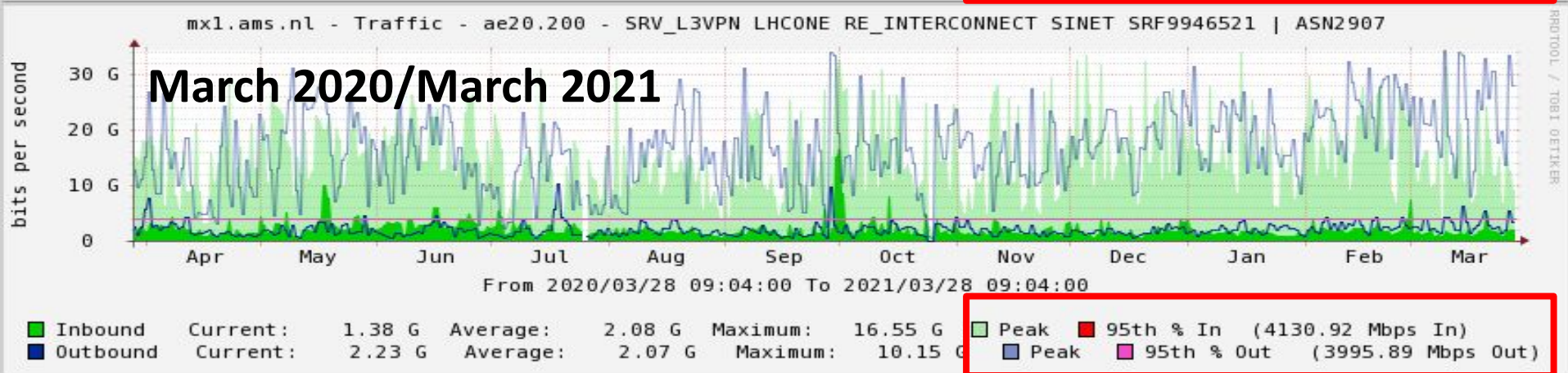
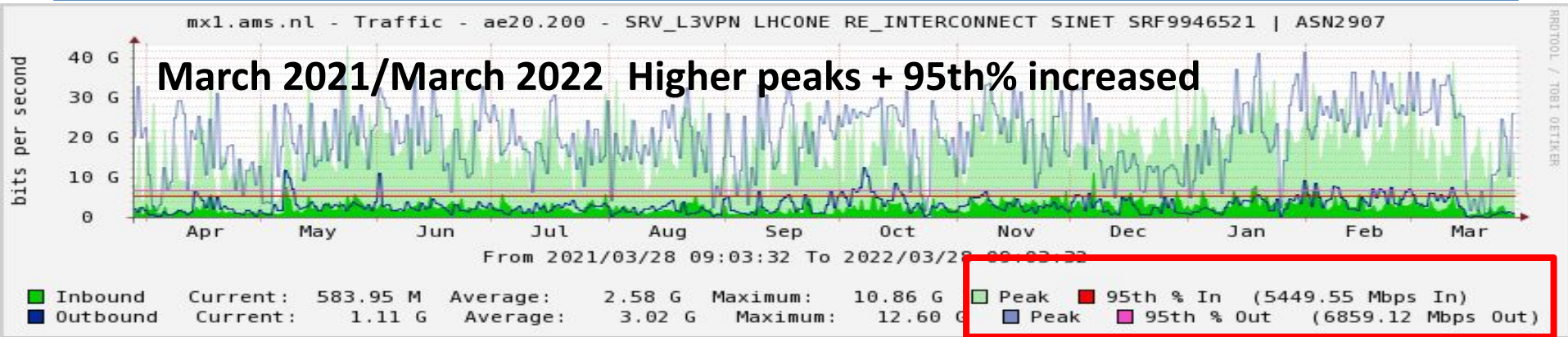
A testing indigo-IAM server at CNAF is now available, while the production service will run at KEK

To be check the traffic on this service, in principle higher that vs a VOMS server.

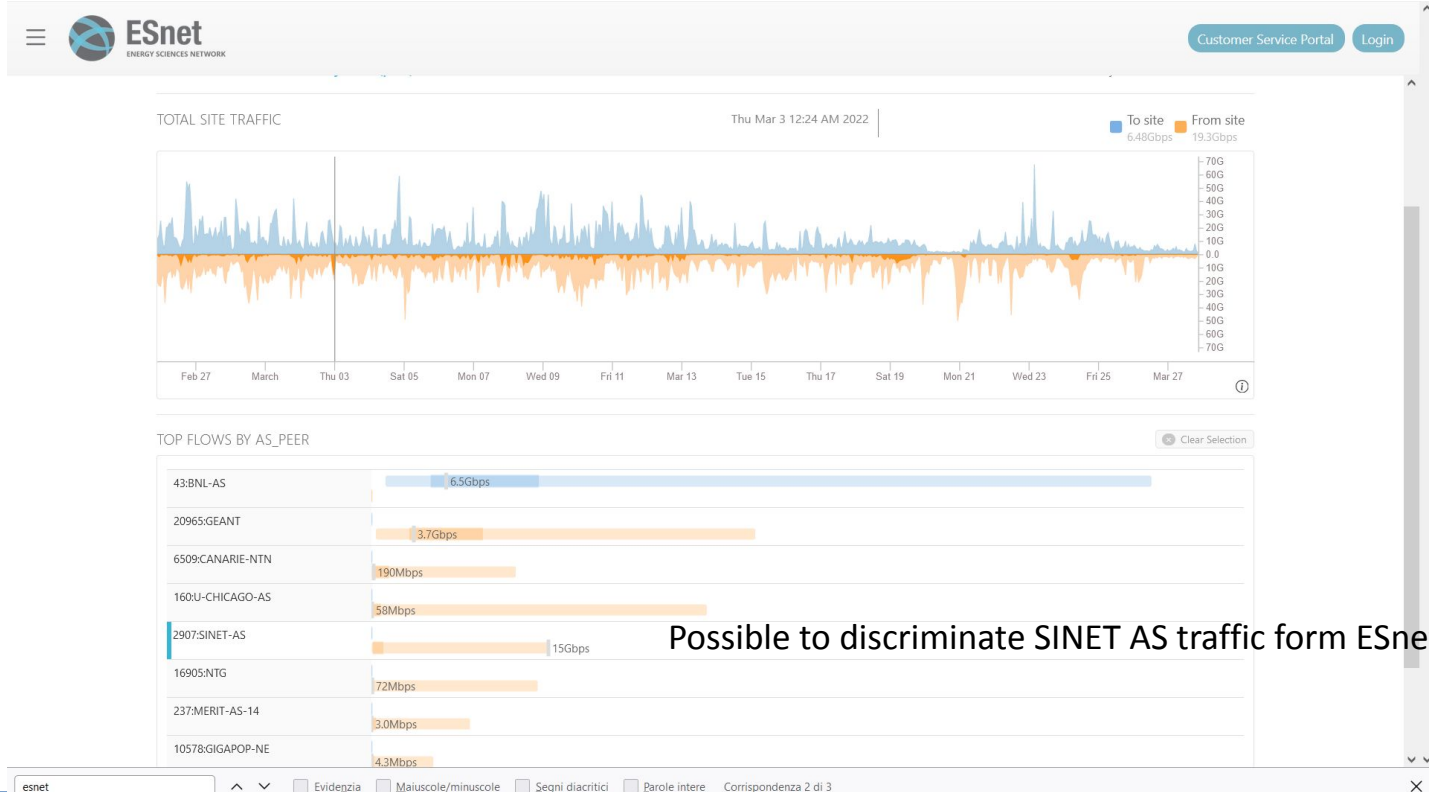
# LHCONE Traffic at (KEK)



# SINET - GEANT Peering - 2021 vs 2022



# BNL Interface From ESnet Monitoring



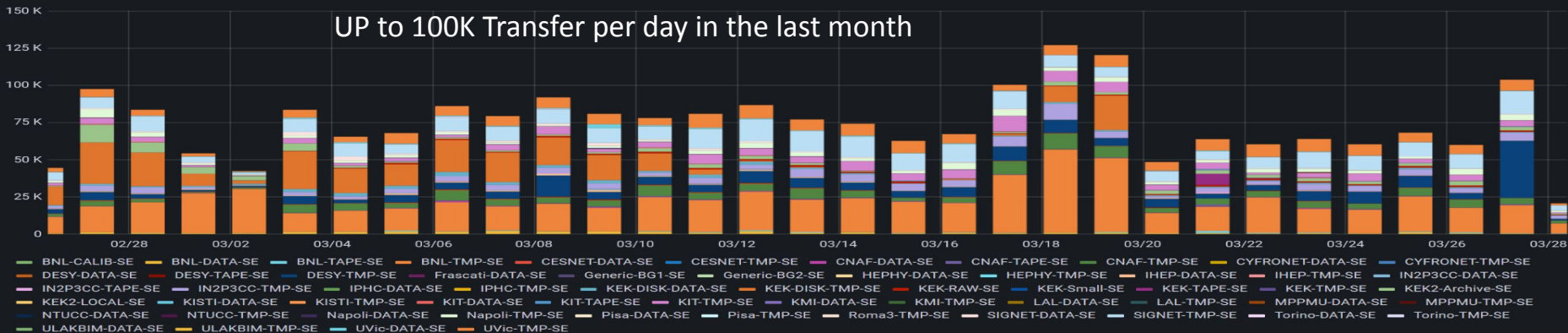
Possible to discriminate SINET AS traffic from ESnet Monitoring

# Rucio monitoring system



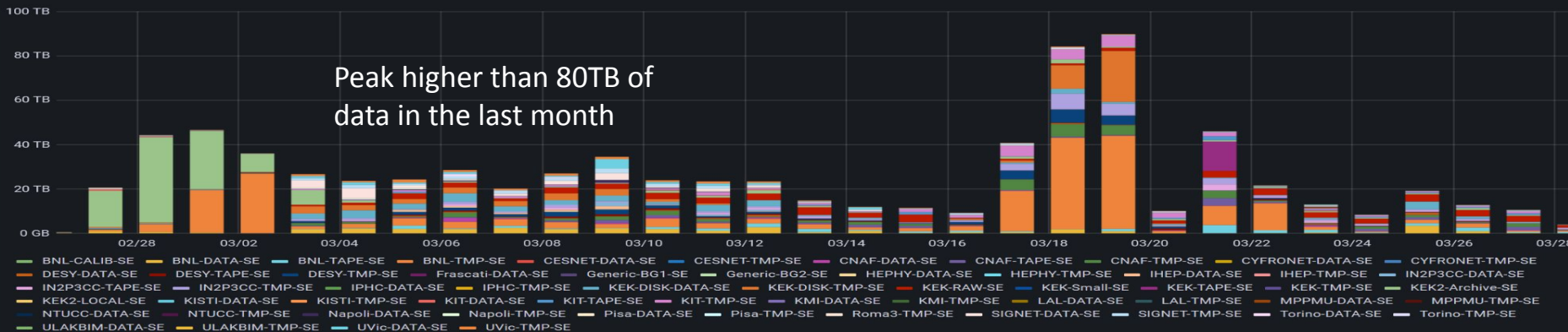
Successful transfers (destination)

UP to 100K Transfer per day in the last month



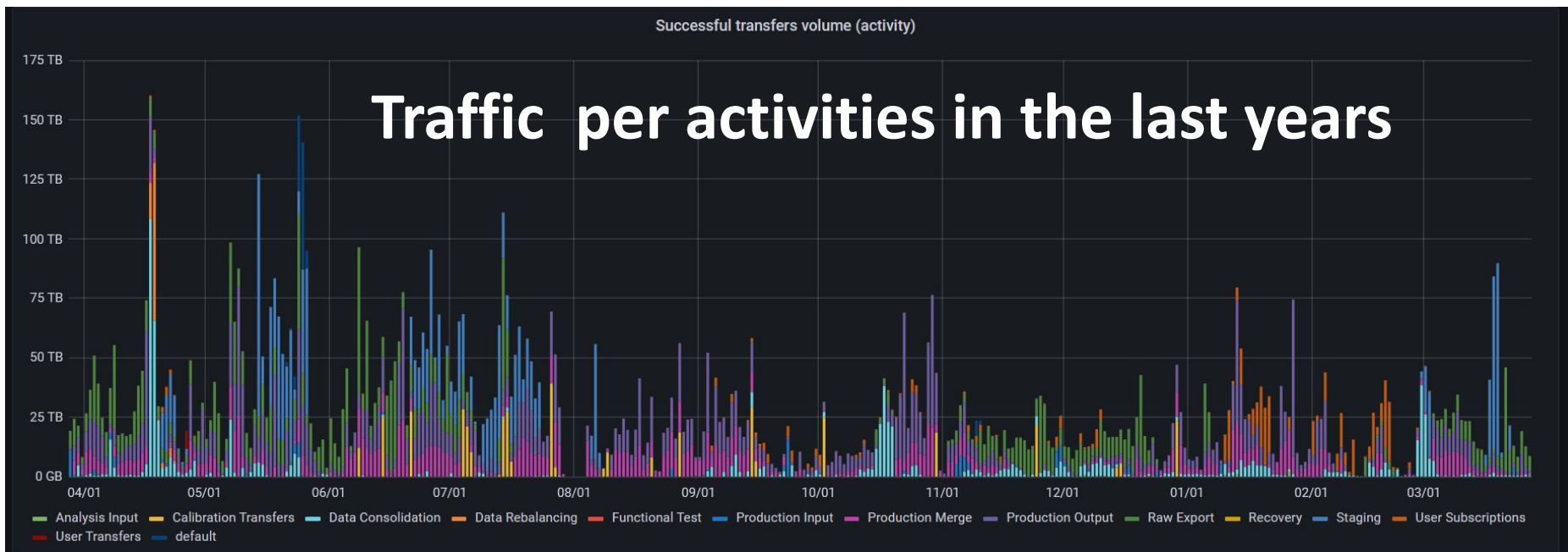
Successful transfers volume (destination)

Peak higher than 80TB of data in the last month





# Rucio monitoring system



<https://monitoring.sdcc.bnl.gov/pub/grafana/d/belle2xfers/belle-ii-transfers-and-deletions?orgId=1>

# Belle II Activities for packet marking

xx101000000x001000xx	Bellell	Data Consolidation
xx101000000x001001xx	Bellell	Data Rebalancing
xx101000000x001010xx	Bellell	Functional Test
xx101000000x001011xx	Bellell	Functional Test WebDAV
xx101000000x001100xx	Bellell	Recovery
xx101000000x001101xx	Bellell	Production Input
xx101000000x001110xx	Bellell	Production Output
xx101000000x001111xx	Bellell	Production Merge
xx101000000x010000xx	Bellell	Analysis Input
xx101000000x010001xx	Bellell	Analysis Output
xx101000000x010010xx	Bellell	Staging
xx101000000x010011xx	Bellell	Raw Export
xx101000000x010100xx	Bellell	Upload/Download (Job)
xx101000000x010101xx	Bellell	Upload/Download (User)
xx101000000x010110xx	Bellell	User Merge
xx101000000x010111xx	Bellell	User Transfers
xx101000000x011000xx	Bellell	User Subscription
xx101000000x011001xx	Bellell	T0 Tape
xx101000000x011010xx	Bellell	T0 Export

We are interested to participate at packet marking activities (some of them used for test) activities.

Preliminary set of activities collected in the Draft of packet marking.

- Analysis Input
- Calibration Transfers
- Data Consolidation
- Data Rebalancing
- Functional Test
- Production Input
- Production Merge
- Production Output
- Raw Export
- Recovery
- Staging
- T0 Export
- T0 Tape
- User Merge
- User Subscriptions
- User Transfers
- default



# Conclusion

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Belle II activities are going smoothly through the LHCONE and General-IP network.

Davs implementation is ongoing and token based authentication in testing, Network related issue must be taken in account (firewall and performance).

Grafana Monitoring system allow a fine grain analysis of data flow.

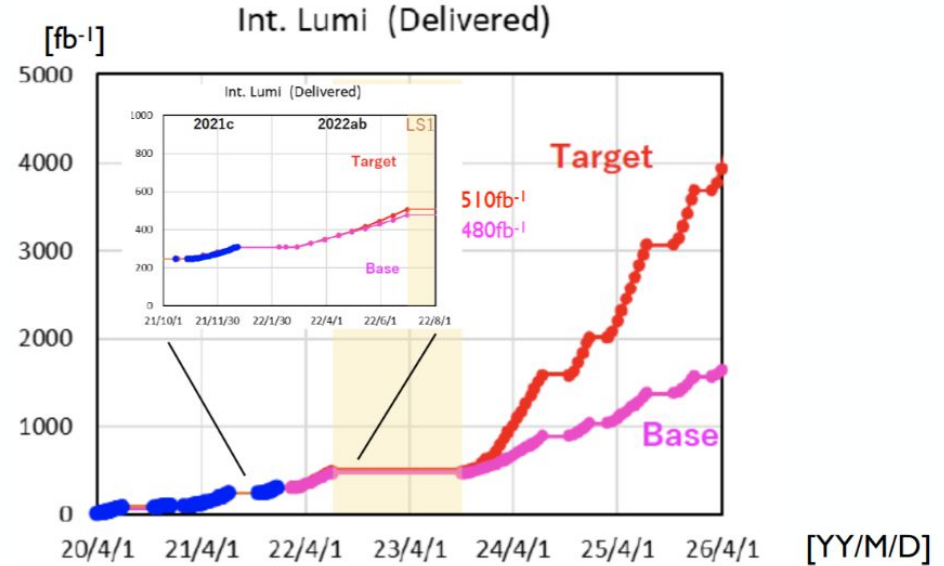
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## BACKUP SLIDES

# Projection of integrated luminosity delivered by SuperKEKB to Belle II

Target scenario: extrapolation from 2021 run including expected improvements.

Base scenario: conservative extrapolation of SuperKEKB parameters from 2021 run



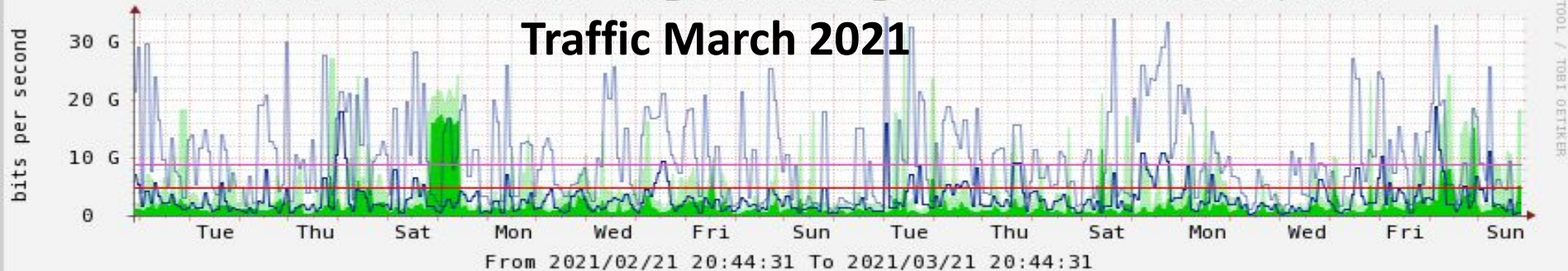
- We start long shutdown I (LS1) from summer 2022 for 15 months to replace VXD. There will be other maintenance/improvement works of machine and detector.
- We resume physics running from Fall 2023.
- A SuperKEKB International Taskforce (aiming to conclude in summer 2022) is discussing additional improvements.
- An LS2 for machine improvements could happen on the time frame of 2026-2027

# SINET - GEANT Peering - Last month 2021vs 2022



mx1.ams.nl - Traffic - ae20.200 - SRV\_L3VPN LHCONE RE\_INTERCONNECT SINET SRF9946521 | ASN2907

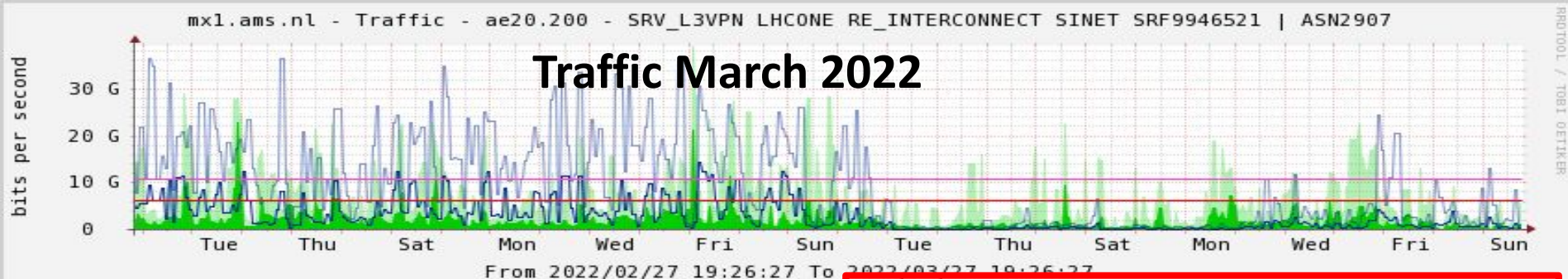
## Traffic March 2021



<span style="color: green;">■</span> Inbound	Current: 4.98 G	Average: 1.85 G	Maximum: 17.31 G	<span style="color: green;">■</span> Peak	<span style="color: red;">■</span> 95th % In (4984.48 Mbps In)
<span style="color: blue;">■</span> Outbound	Current: 564.56 M	Average: 2.94 G	Maximum: 18.73 G	<span style="color: blue;">■</span> Peak	<span style="color: magenta;">■</span> 95th % Out (8738.35 Mbps Out)

mx1.ams.nl - Traffic - ae20.200 - SRV\_L3VPN LHCONE RE\_INTERCONNECT SINET SRF9946521 | ASN2907

## Traffic March 2022



<span style="color: green;">■</span> Inbound	Current: 936.25 M	Average: 2.12 G	Maximum: 22.61 G	<span style="color: green;">■</span> Peak	<span style="color: red;">■</span> 95th % In (6078.35 Mbps In)
<span style="color: blue;">■</span> Outbound	Current: 257.95 M	Average: 2.86 G	Maximum: 14.23 G	<span style="color: blue;">■</span> Peak	<span style="color: magenta;">■</span> 95th % Out (10632.36 Mbps Out)