

# KEK Site Report

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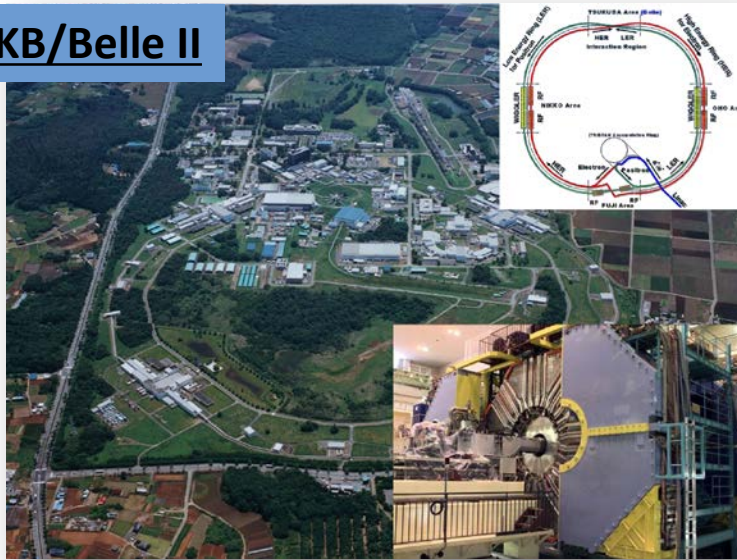
Computing Research Center  
Applied Research Laboratory  
HIGH ENERGY ACCELERATOR RESEARCH ORGANIZATION, KEK





# KEK beam schedule

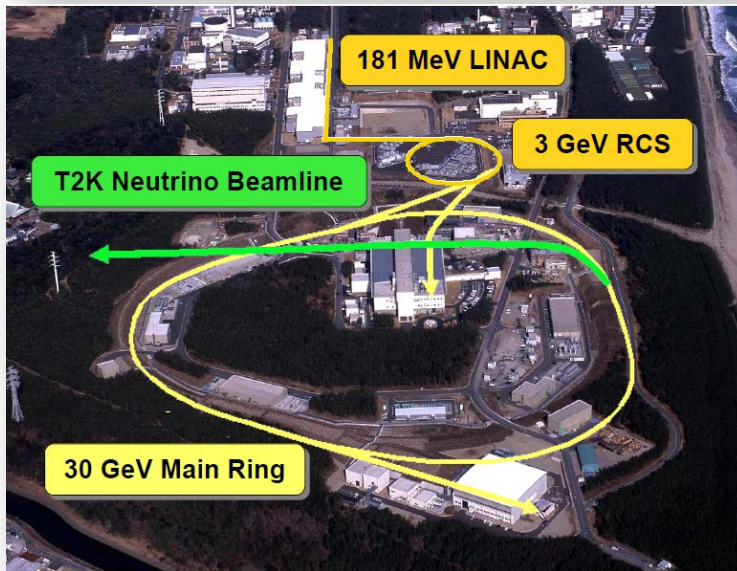
## SuperKEKB/Belle II



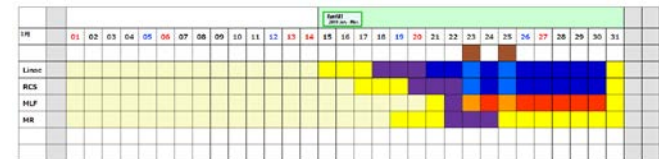
The phase 2 operation was over on Jul. 18th, 2018.  
The beam operation has been re-started with full Belle II detector (silicon VTX) as phase 3 run on Mar. 11, 2019.

<https://www.kek.jp/en/newsroom/2019/03/11/1600/>

## J-PARC



Jan.



Feb.



Mar.



Legend:  
Yellow: 保守 (Maintenance)  
Purple: Tuning&Study  
Red: MLF利用 (MLF utilization)  
Pink: MR利用 (MR utilization)  
Blue: 供給運転 (Supply operation)  
Brown: 半日メンテ (Half-day maintenance)  
Light Yellow: 長期停止 (Long-term stop)  
Light Purple: Linac, RCS 半日 Study (Half-day study for Linac, RCS)  
Orange: MLF半日利用 (Half-day MLF utilization)  
Light Pink: MR半日利用 (Half-day MR utilization)  
Dark Blue: 半日供給 (Half-day supply)

[https://j-parc.jp/ja/Operation/Operation-j18\\_1003S.html](https://j-parc.jp/ja/Operation/Operation-j18_1003S.html)



# Breakdown of CPU consumption

## Compute node

CPU: Intel Xeon E5-2697v3 (2.6GHz, 14cores) x 2  
 358 nodes, 10,024 cores, 236kHS06/site

Memory: 4GB/core (8,000 cores)  
 8GB/core (2,000 cores)

## Storage

Disk: 10PB (GPFS, IBM ESS x8 racks)  
 3PB (HSM cache)

Interconnect: InfiniBand 4xFDR (56 Gbps)

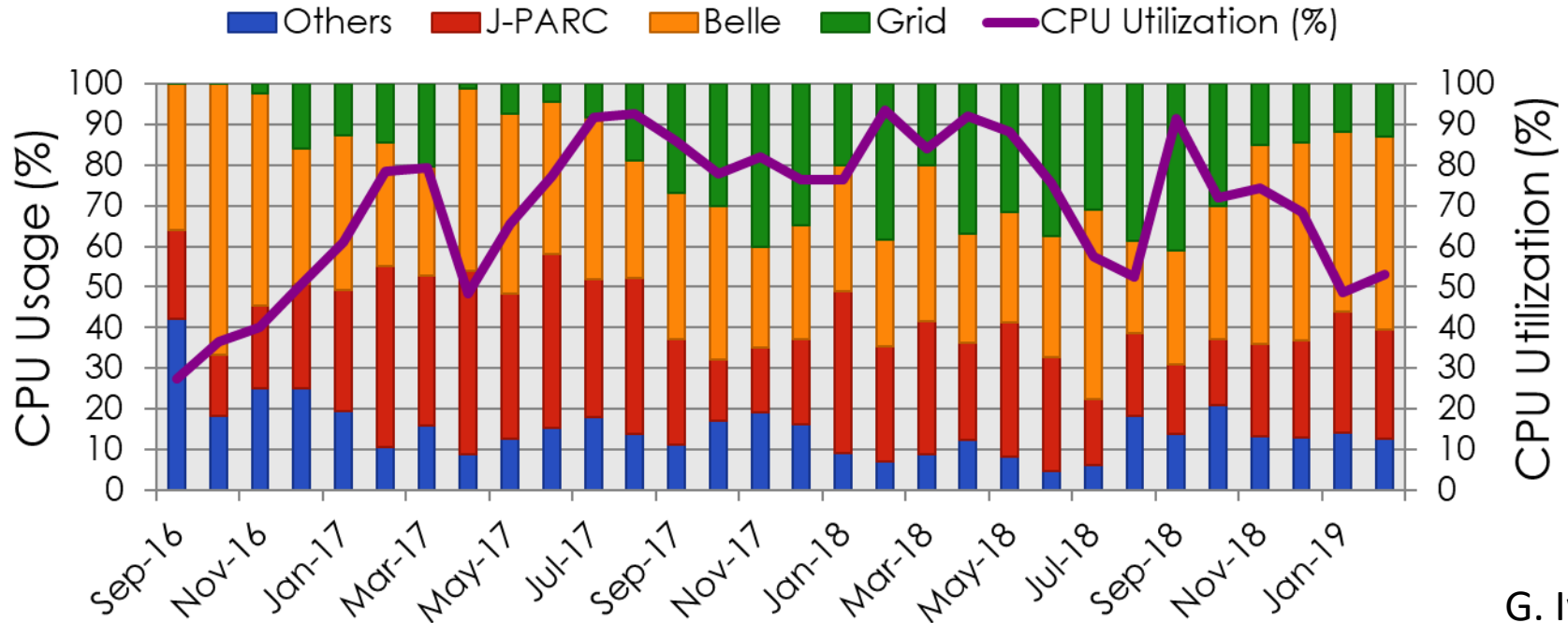
Tape: 70 PB (max cap.)

CPU usage: breakdown by groups,  
 normalized by the total CPU usage per month

CPU usage has been reached **80 - 90 %** of total resource

## Throughput

100 GB/s (Disk, GPFS), 50 GB/s (HSM, GHI)



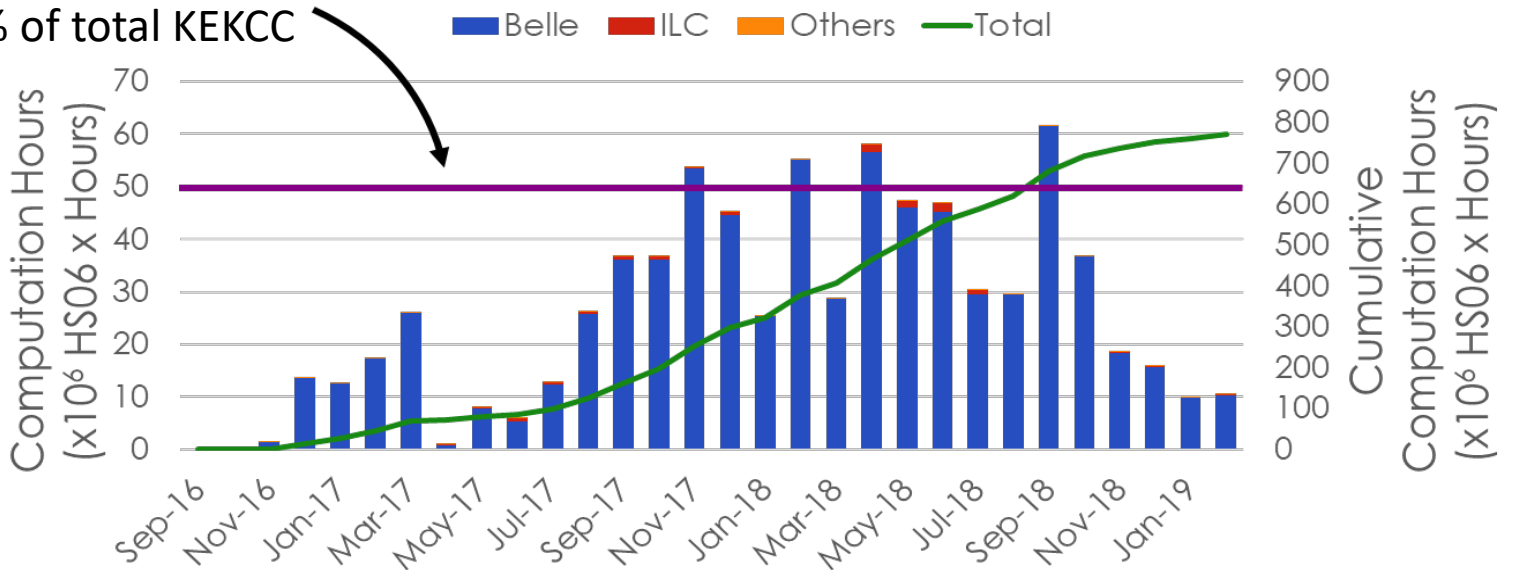
G. Iwai



# Grid Jobs and Data



30% of total KEKCC

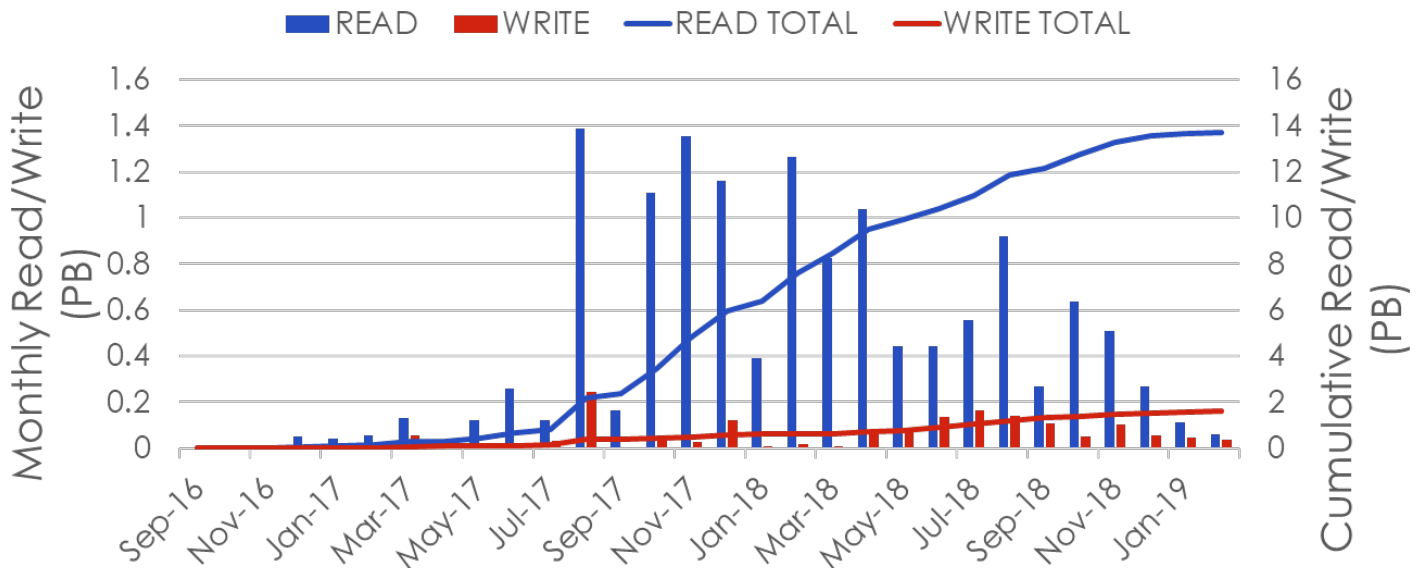


## Grid Jobs

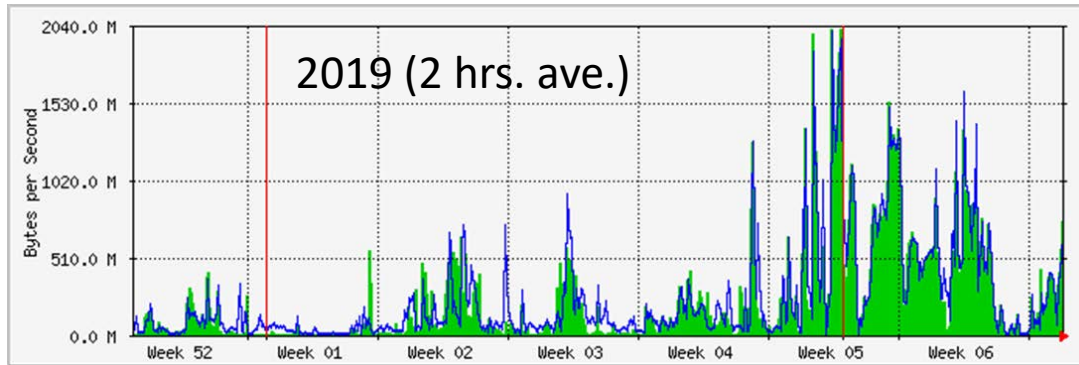
168M HS06 hour/month  
(23.5 HS06/core)

## Grid storage read/write

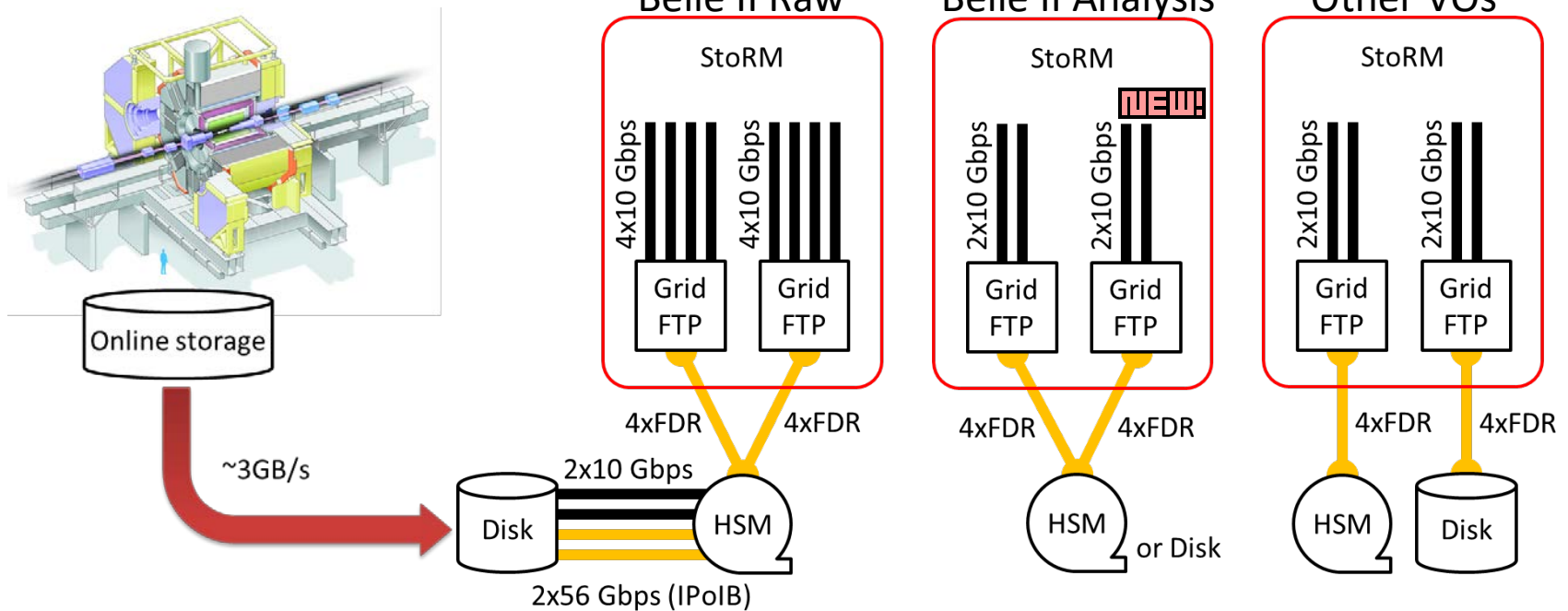
external data transfer



G. Iwai



IB traffic between Storm and HSM/WNs  
 Belle II StoRM → KEKCC-internal servers  
 KEKCC-internal servers → Belle II StoRM



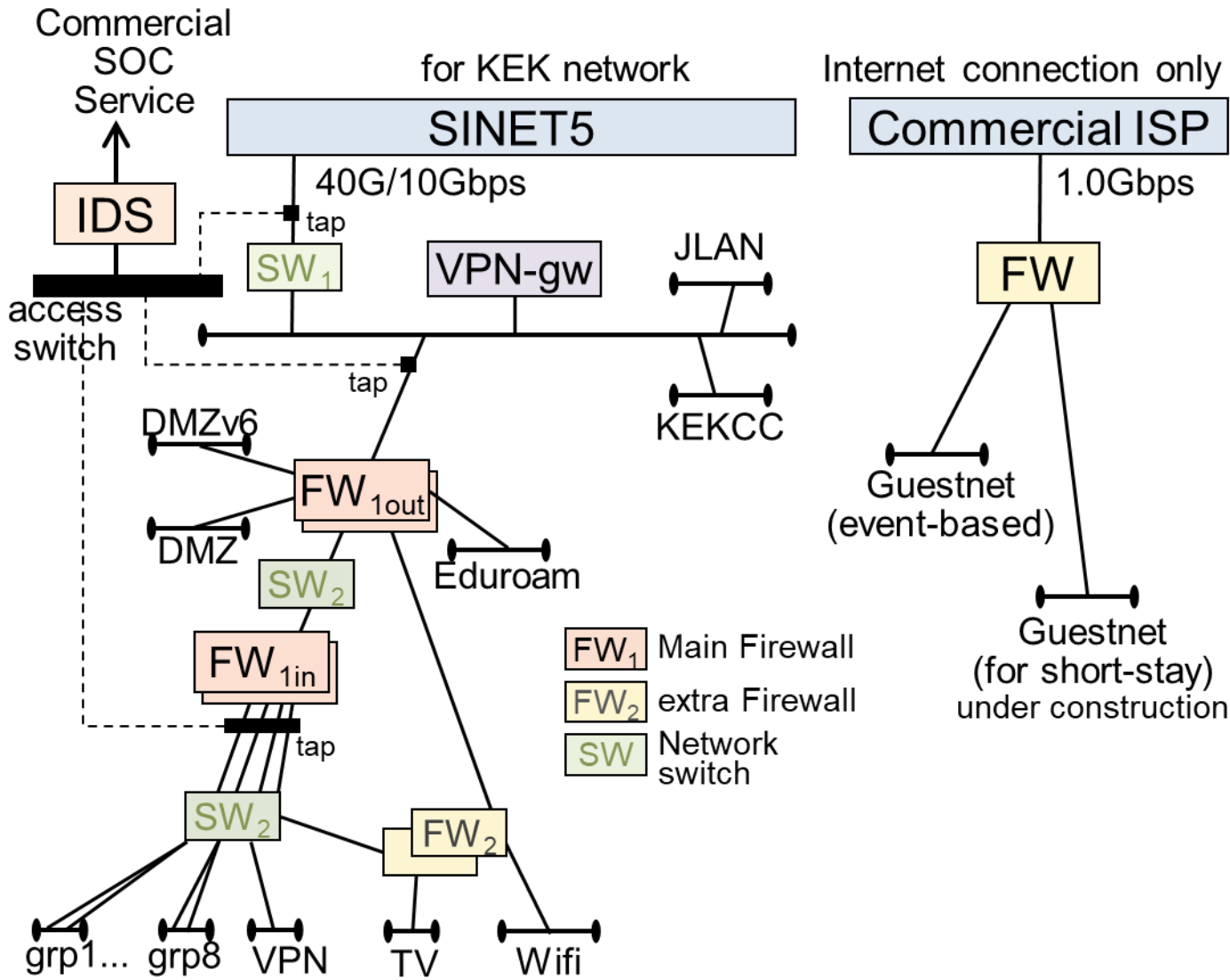
Complete separation of Belle II raw data transferring path from analysis and the other VOs activity.

### Total throughput

HSM: 50GB/s (IBM GPFS+HPSS on DDN SFA12K)  
 Disk: 100GB/s (IBM GPFS on IBM ESS)



# Upgrade of campus network



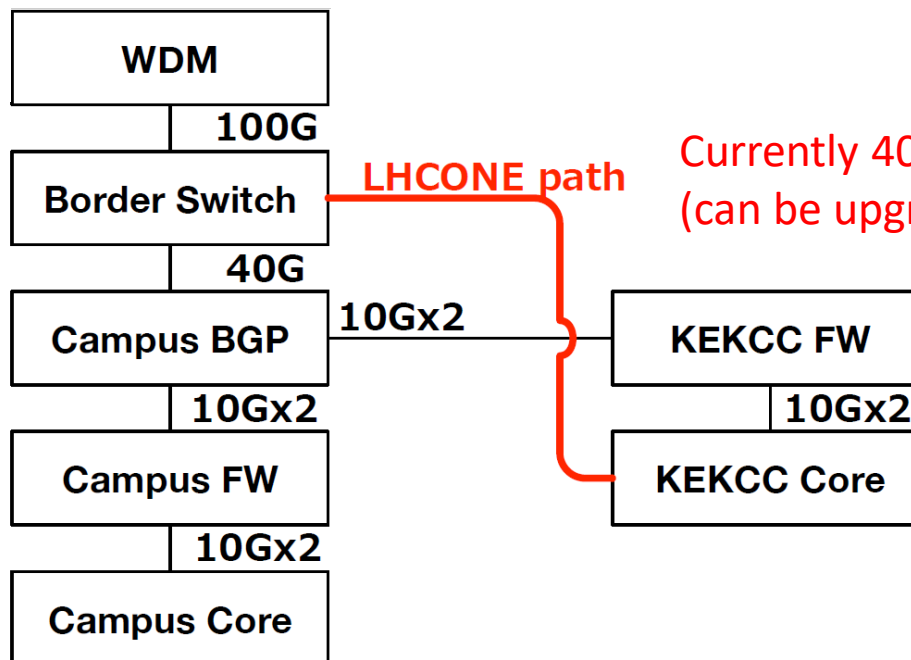
T. Murakami

Upgrade in Sep. 2018  
 Routers, Hubs,  
 Firewalls, IDS, VPN,  
 Vulnerability scanner,  
 Network servers (DNS,  
 RADIUS, DHCP, NTP),  
 Device regist. system,  
 WiFi system,  
 Video conference system



# History of the network upgrade

	topic	Border SW	KEKCC FW	KEKCC Core	Campus BGP	Campus FW	Campus Core	LHCONE-path
~2016.3	SINET4		SRX 10Gx2	Nexus 5K 10G/1G	Catalyst 6506E 40G/10G/1G	PaloAlto 5060 10G/1G	Catalyst 6509E 10G/1G	10G (PNNL+CANARIE)
2016.3~2016.9	SINET5 100G installation	MLXe4 100G(up)/40G(down)	SRX 10Gx2	Nexus 5K 10G/1G	Catalyst 6506E 40G/10G/1G	PaloAlto 5060 10G/1G	Catalyst 6509E 10G/1G	10G (PNNL+CANARIE)
2016.9~2018.9	KEKCC renewal	//	SRX 10Gx2	Nexus 7K 40G/10G	Catalyst 6506E 40G/10G/1G	PaloAlto 5060 10G/1G	Catalyst 6509E 10G/1G	40G (Full LHCONE)
2018.9~	Campus LAN renewal	//	SRX 10Gx2	Nexus 7K 40G/10G	ARISTA 7280SR 100G/10G/1G	PaloAlto 5250 40G/10G/1G	Nexus 9500 40G/10G/1G	40G (Full LHCONE)

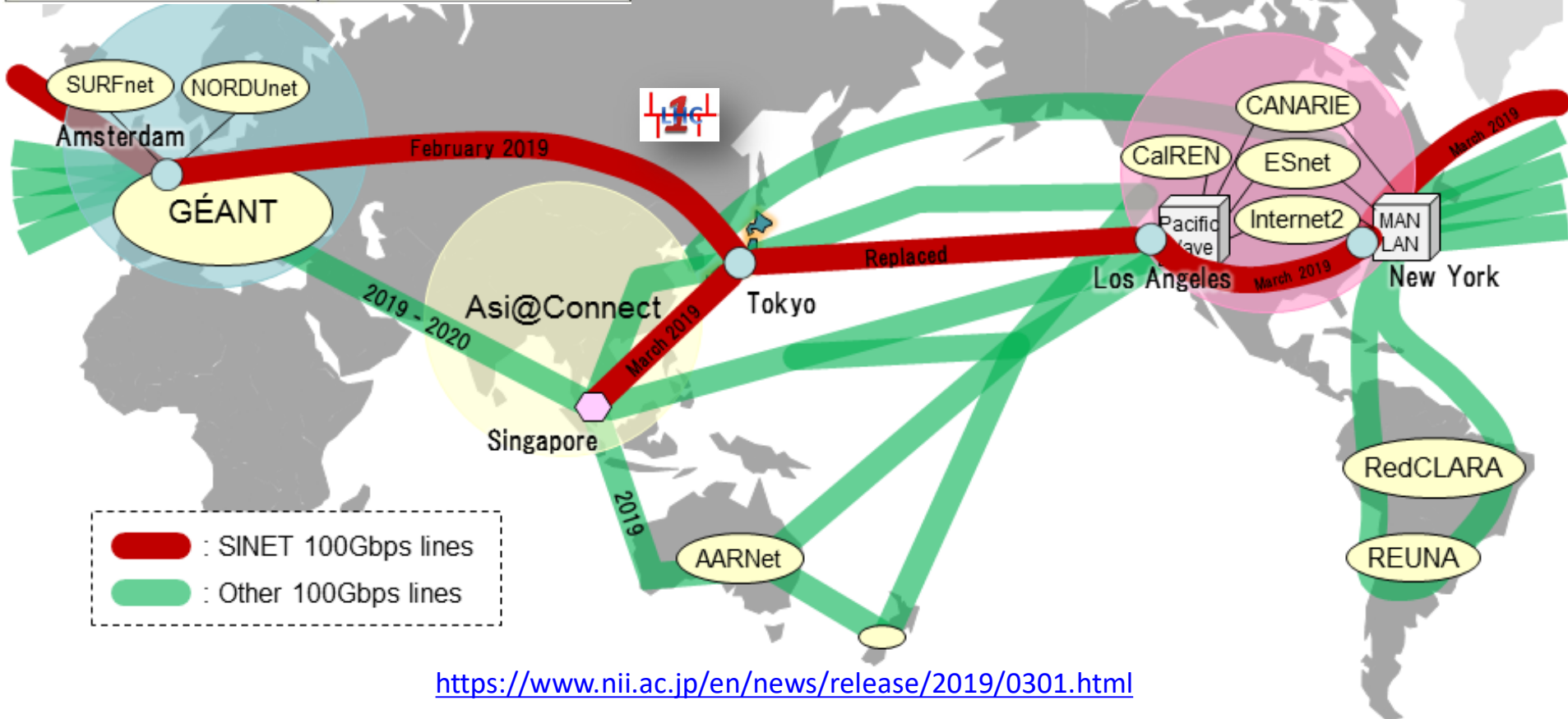


Currently 40 Gbps is assigned  
(can be upgraded up to 80 Gbps easily)

S. Suzuki



Feb. 2019: 20 Gbps to 100 Gbps to Amsterdam  
 Mar. 2019: 100 Gbps to New York via Los Angeles  
 Mar. 2019: 100 Gbps New York to Amsterdam



<https://www.nii.ac.jp/en/news/release/2019/0301.html>

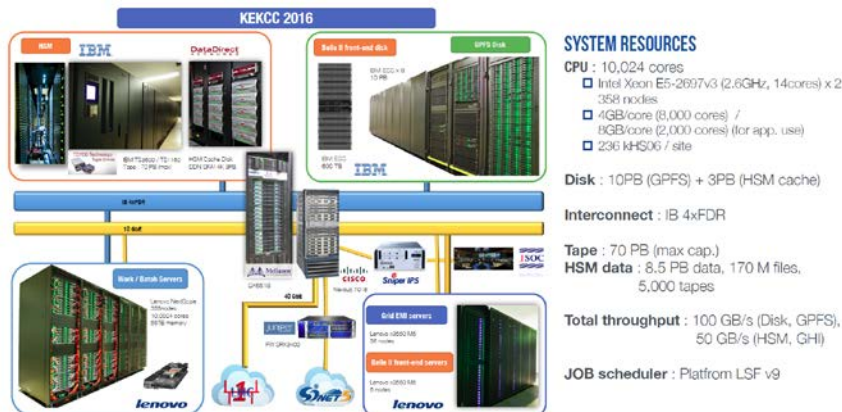


The KEK central computer system (KEKCC) has already become the third year operation. Actually, it is in the quite stable phase by a lot of fixes and improvements.

Details will be presented by Go. Iwai on Friday;

- Deployment of additional GridFTP server to increase bandwidth
- Introducing tape-order staging and request interface
- Providing on-demand service for data staging request
- Manual file pinning at the HSM cache and optimizing purge policy
- Alert system for the low efficiency user/gird jobs

The renewal of KEK campus network was completed in Sep. 2018 after the upgrade of WAN connectivity in 2016. The network connectivity was improved for the users and visitors in the Tsukuba campus not only for the KEKCC users. This configuration will be kept for 6 years (until 2024). The international network for Japanese institute have been drastically improved thanks to the SINET.



The Current KEKCC was launched at Sep. 2016. We have started the survey to collect the requirement and estimation of the computing resources from each experiment/project.