

The Summary of WG6: Network & Computing

Kihyeon Cho (KISTI)

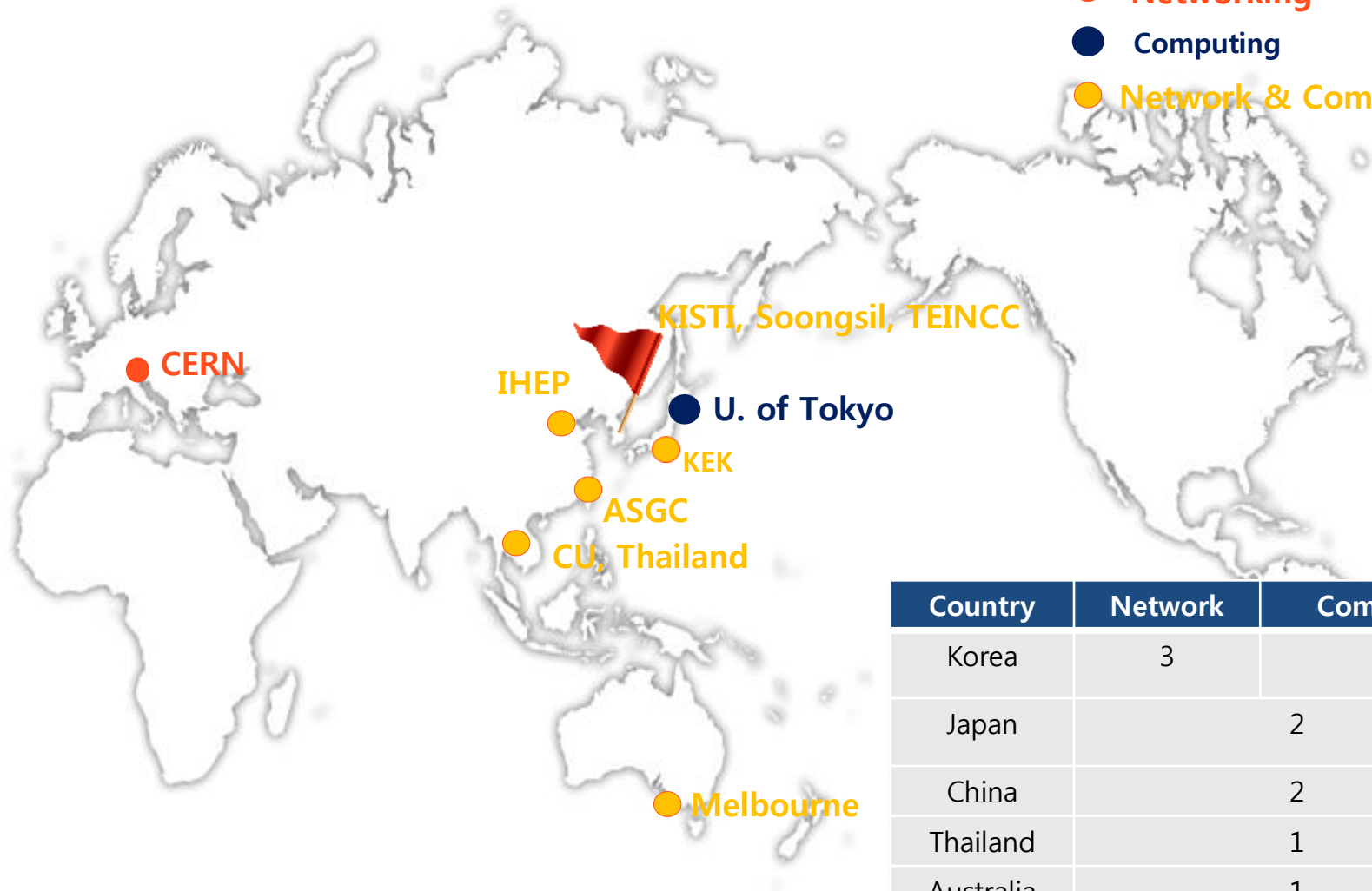
WG6: Network & Computing. Room 106

13 talks

January 29			
Session 1 Chair: Tomoaki Nakamura			
Time	Title	Speaker	Affiliation
13:30-13:50	Networking and Computing Status in IHEP/China	Fazhi QI	IHEP, China
13:50-14:10	Grid Deployment at KEK: Status and Plan	Go Iwai	KEK, Japan
14:10-14:30	KREONET: Research Networking in Korea	Buseung Cho	KISTI, Korea
14:30-14:50	Computing in Korea	Kihyeon Cho	KISTI, Korea
14:50-15:10	Status report from Tokyo Tier2 at ICEPP	Tomoe Kishimoto	ICEPP, Utokyo, Japan
15:10~15:40	Coffee break		
Session 2 Chair: Kihyeon Cho (KISTI)			
15:40-16:00	Research infrastructure development in Academia Sinica (Taiwan)	Eric Yen	ASGC, Taiwan
16:00-16:20	Networking and Computing in Thailand	Burin Asavapibhop	Chulalongkorn University, Thailand
16:20-16:40	Belle II Computing System	Doris Kim	Soongsil U., Korea
16:40-17:00	CMS Tier-2	Dongchul Son	KNU, Korea
17:00-17:20	GSDC@KISTI	Seo-Young Noh	KISTI, Korea
17:20~17:50	Networks for High Energy Physics: LHCOPN and LHCONE	Edoardo Martelli	CERN, Switzerland
January 30			
Session 3 Chair: Buseung Cho (KISTI)			
9:00~9:30	Status report in TEIN	ByungKyu Kim	TEIN*CC, Korea
9:30~10:00	NDN for Large-scale Scientific Data and Its Status on HEP	Huhnkuk Lim	KISTI, Korea
10:00~10:30	CoEPP Tier 2 in Melbourne	Sean Crosby and Lucien Boland	U. of Melbourne, Austrailia
10:30~11:00	Coffee break		
	Session 4 Chair: Gang Chen		
11:00~12:00	Discussion		Gang Chen

WG6: Network & Computing

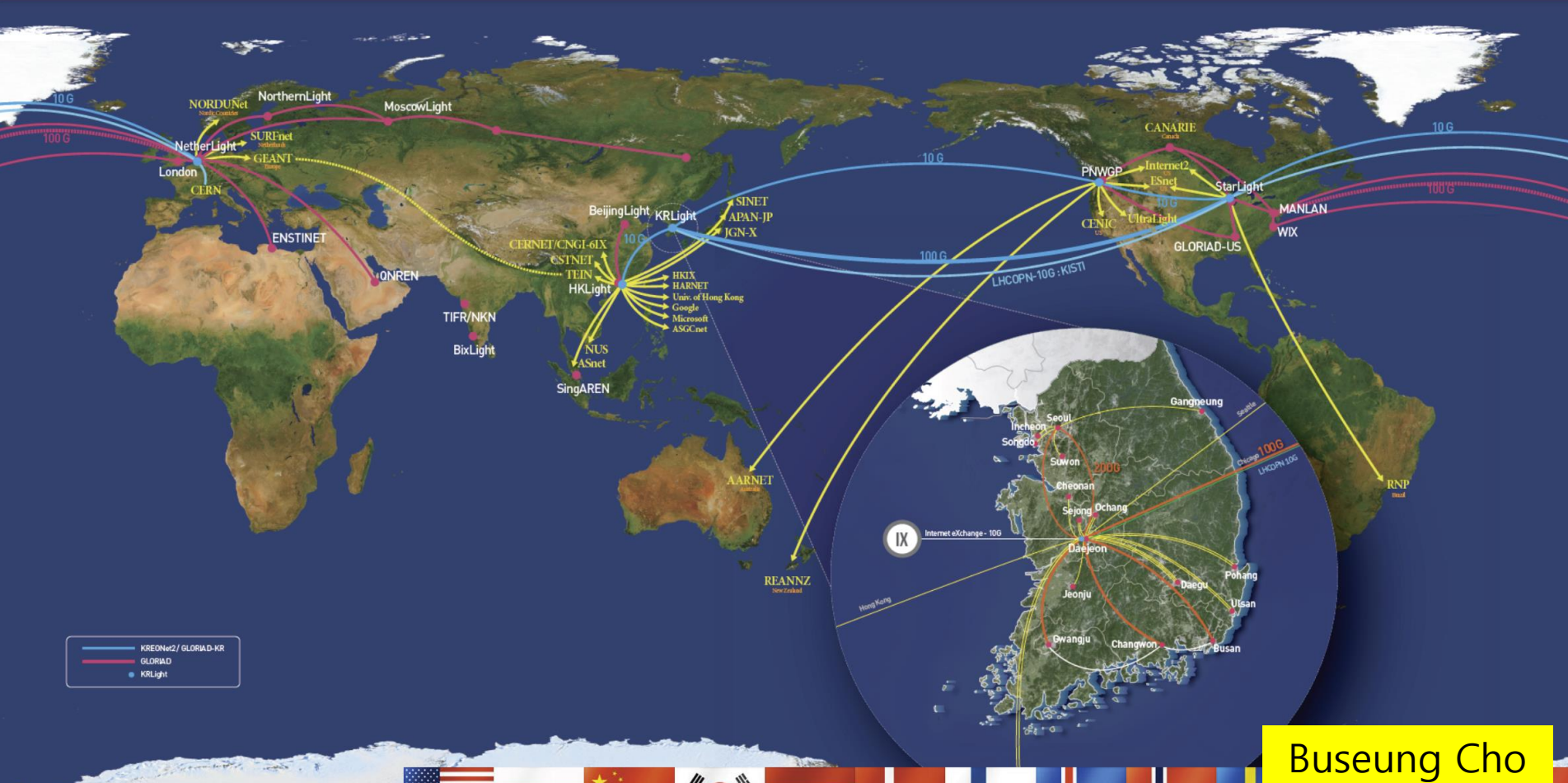
- Networking
- Computing
- Network & Computing



Country	Network	Computing
Korea	3	3
Japan	2	
China	2	
Thailand	1	
Australia	1	
Switzerland	1	0

Korea – KREONET

**GLORIAD (GLObal RIng network for Advanced Application Development)
: KREONet2, International Network of KREONET**



Korea - TEIN

Asi@Connect

TEIN Network Topology (as of Jan. 2018)

❖ TEIN Backbones

- SG-MB-EU 2Gbps
- SG-EU 10Gbps
- BJ-EU 10Gbps
- JP-HK 10Gbps, JP-SG 10Gbps
- HK-SG 10Gbps

❖ 4 TEIN PoPs and an associate

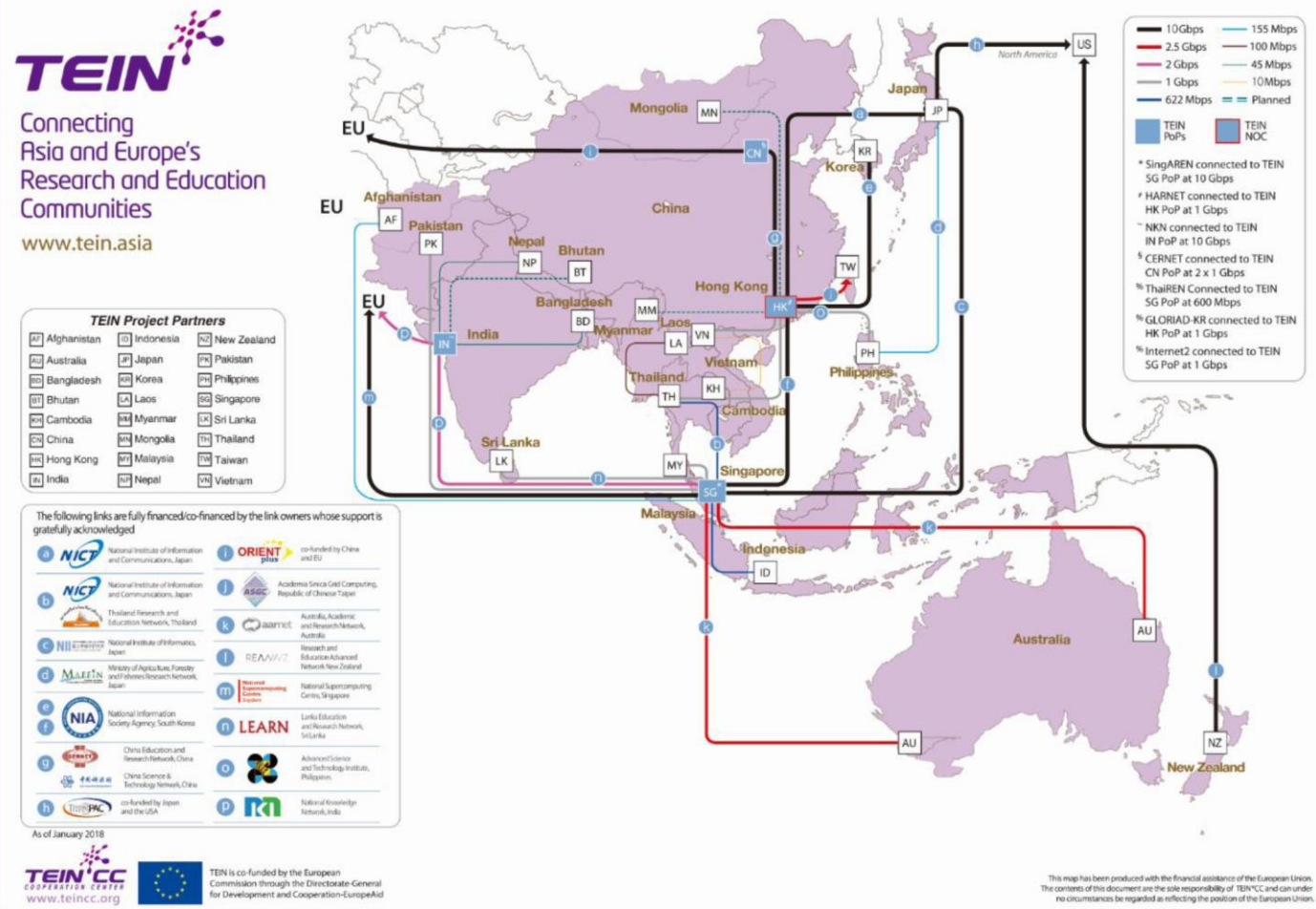
- BJ, HK, SG, MB, (Tokyo)

❖ 24 Partners

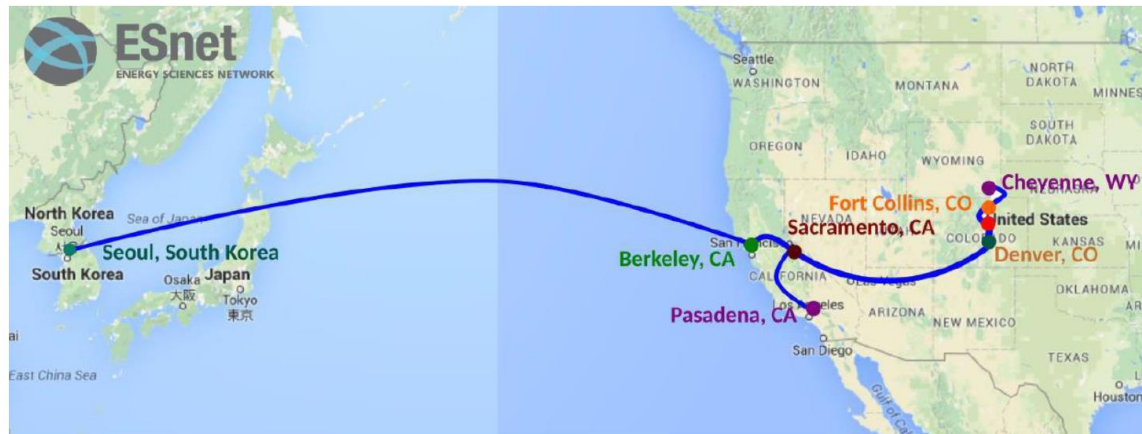
- 21 connected and upgraded bandwidths
- 3 not yet connected (BT, MM, MN)
- Still need many helps in LDCs

❖ Users

- More than 55 M users

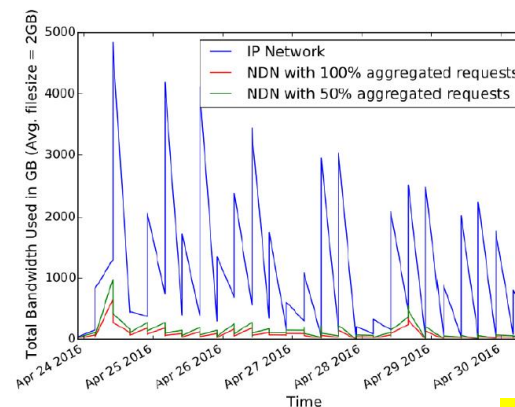


Global NDN Testbed Established by KISTI and CSU for Large-scale Scientific Data

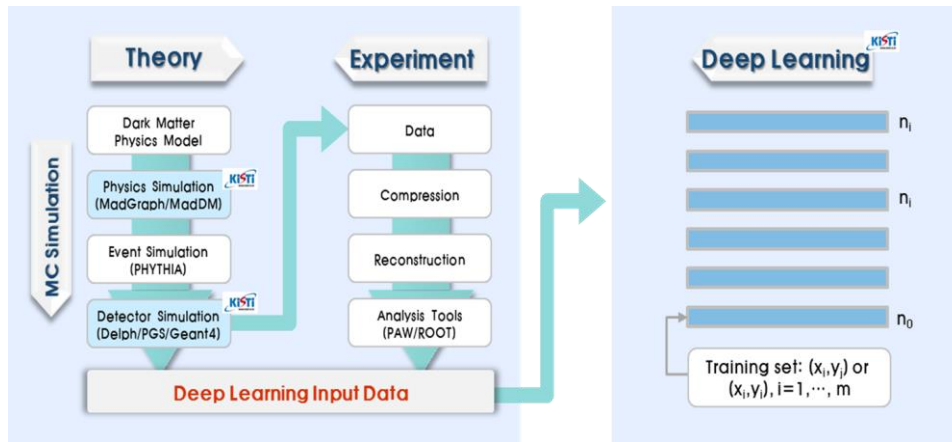


- 10G testbed (courtesy of ESnet, UCAR and CSU, and KISTI)
- Currently ~50TB of climate data, ~20TB of HEP data

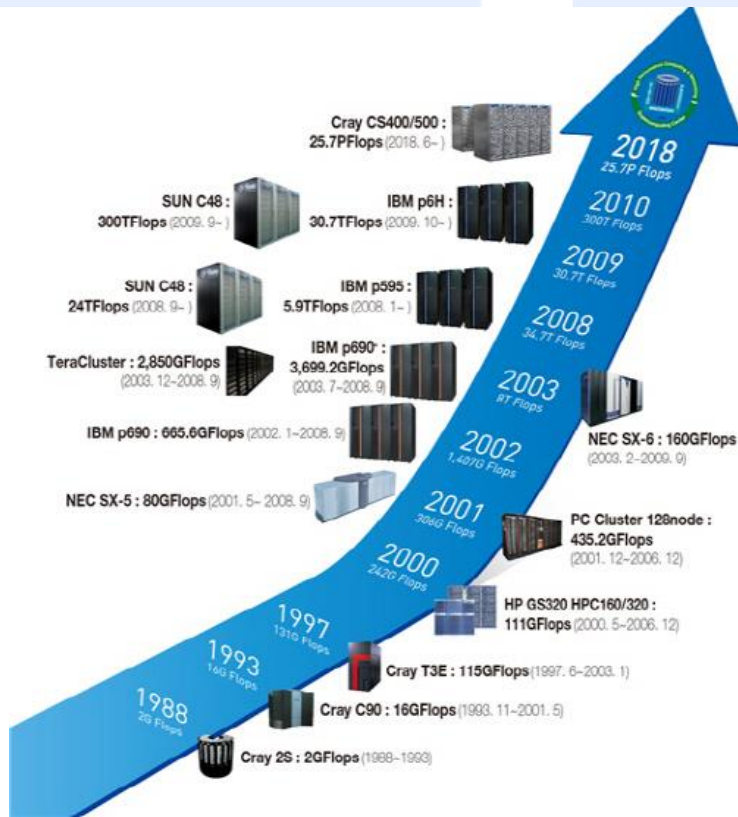
- Bandwidth peaks 5000GB/10minutes (64Gbps)
- With 100% aggregation bandwidth drops to 8.2Gbps
- With 50 % aggregation bandwidth drops to 13.2Gbps



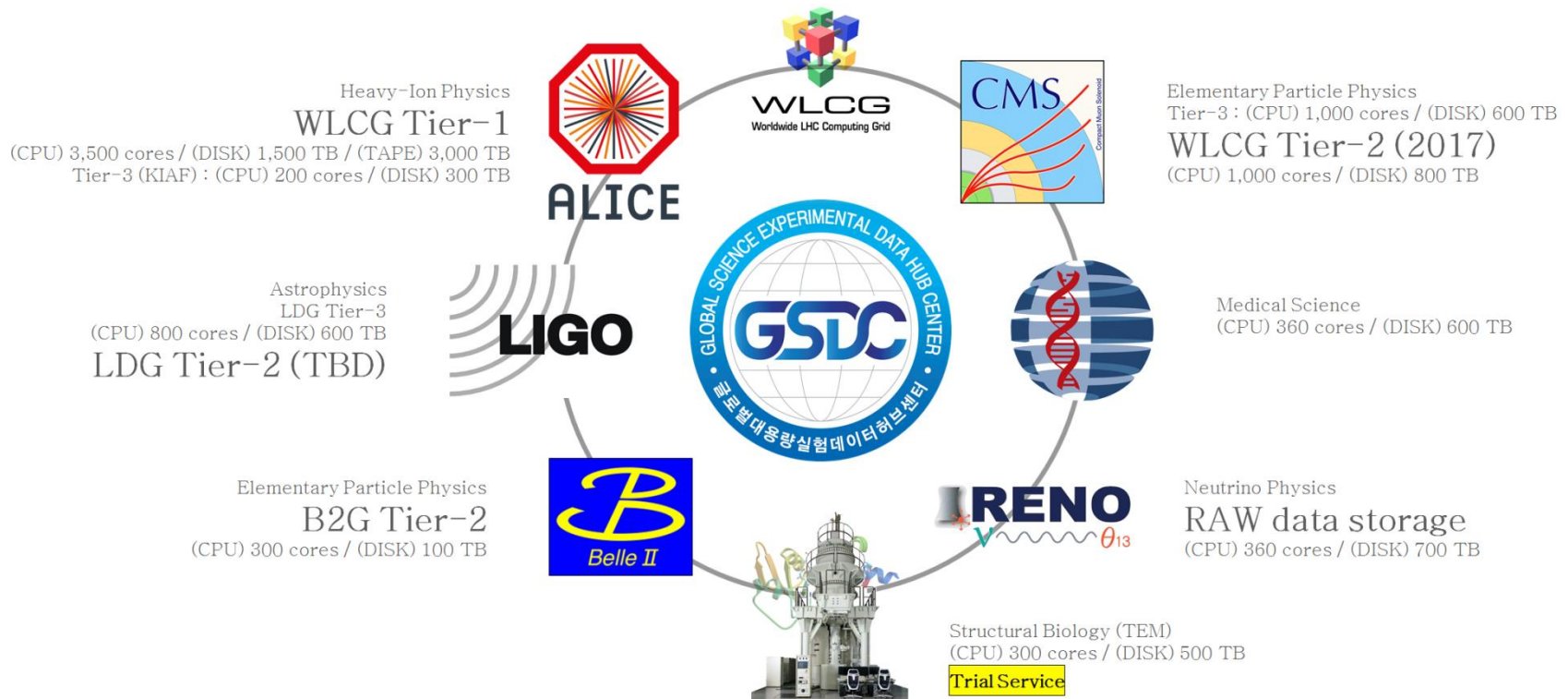
Korea – KISTI supercomputing



- 5th Supercomputer
 - Processing: 25.7PF
 - Heterogonous: 25.3PF CS400 w/KNL
 - CPU: 0.4PF CS500 w/SKL
 - Storage
 - 20PB SPS
 - 10PB Archive
 - Schedule
 - Installing now
 - Service (2Q, 2018)



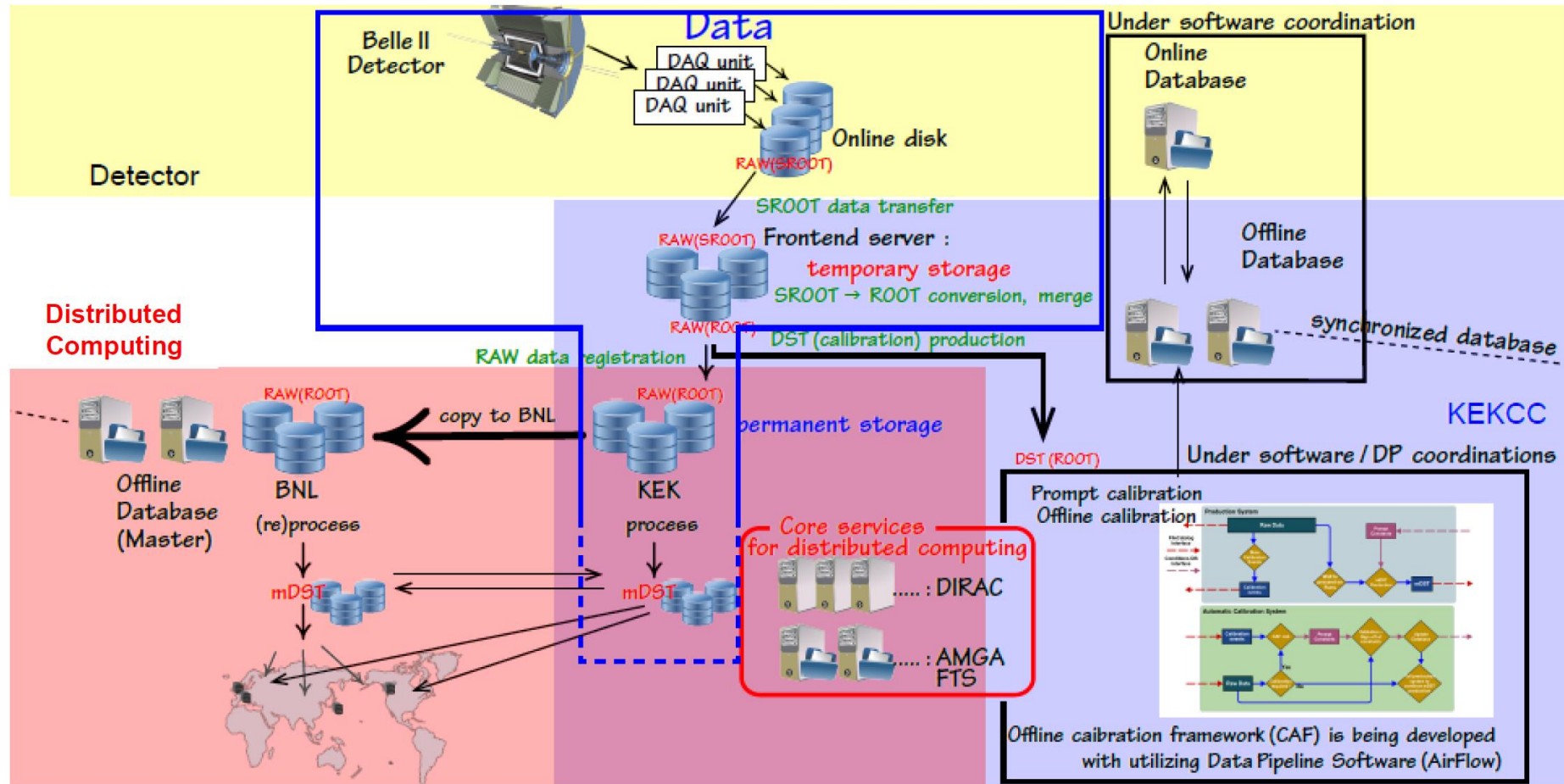
Experience on WLCG Tier-1 operation and service has given **many benefits** to expand its service availability to **other scientific domains in Korea**



and it is still expanding to many other research areas.

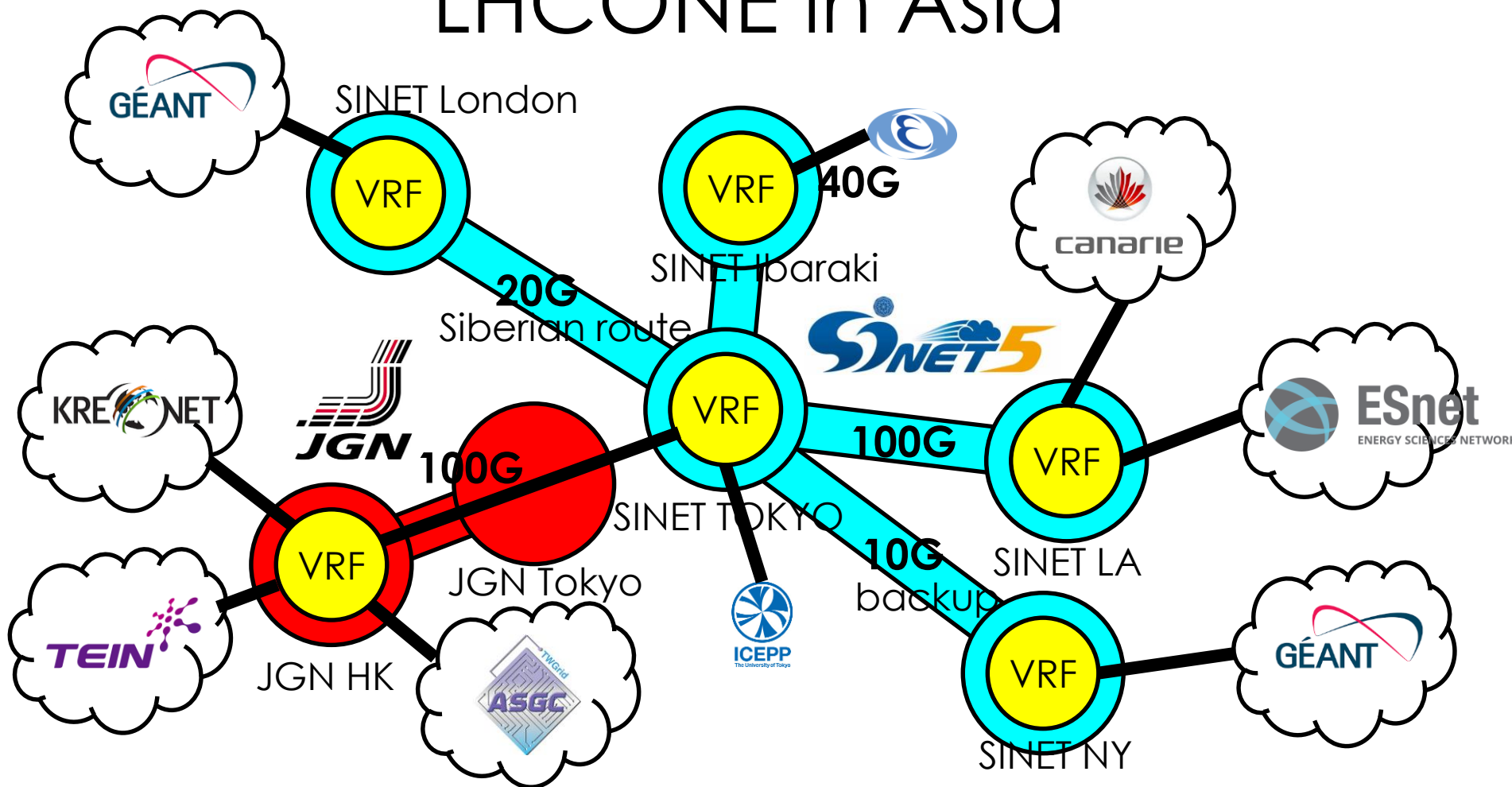
Service for additional domestic experiments is under preparation.

In Reality, More Details

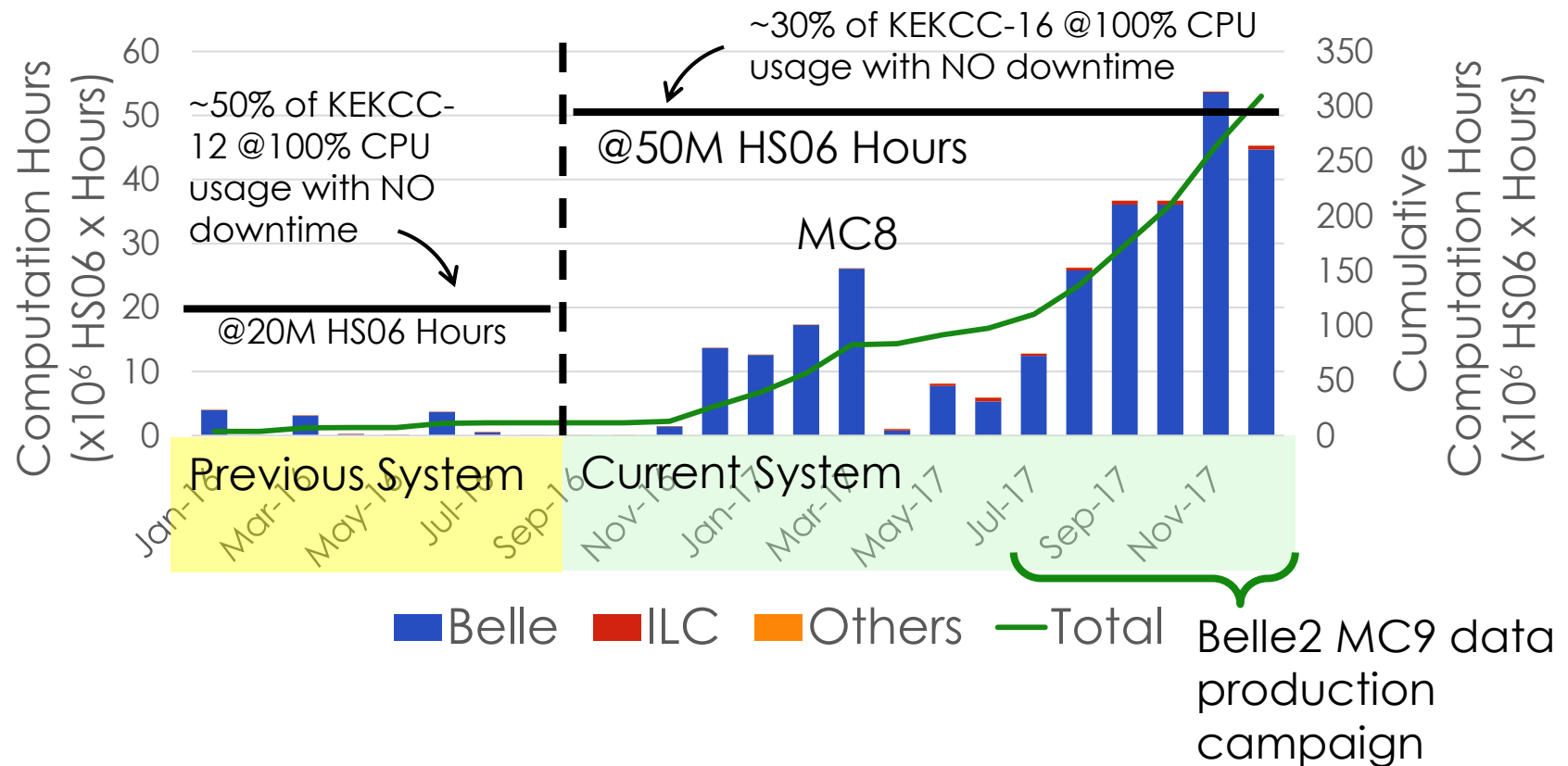


As of Oct 2017

LHCONE in Asia



CPU Consumption

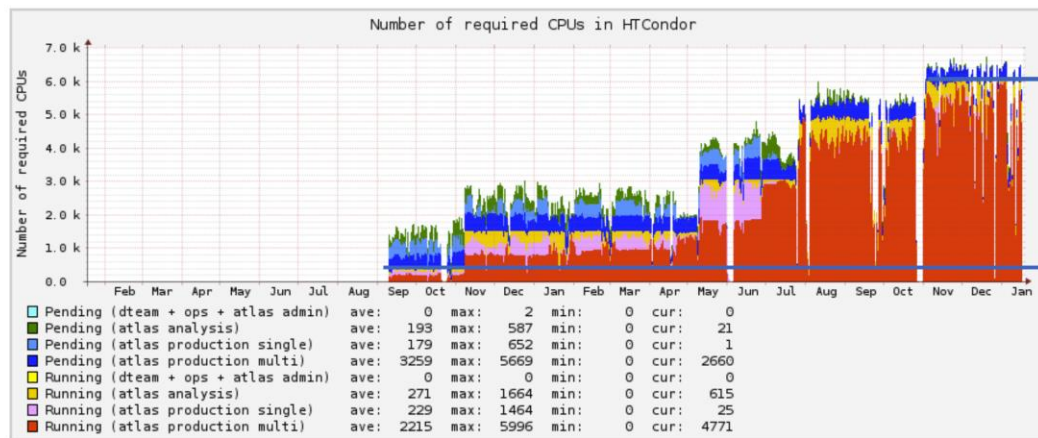


CE and batch system update

- ✓ Migration from “CREAM+Torque/Maui” to “ARC+HTCondor” has been completed



HTCondor pool occupancy



6144 CPU cores
deployed

384 CPU cores
deployed

- ✓ Introduced dynamic partitioning for single- and multi-core jobs
 - Improvement of CPU utilization was observed
 - (Reported at AFAD2017, see backup)

International and domestic links

❖ Dedicated Links for three other IHEP sites (other three in the future)

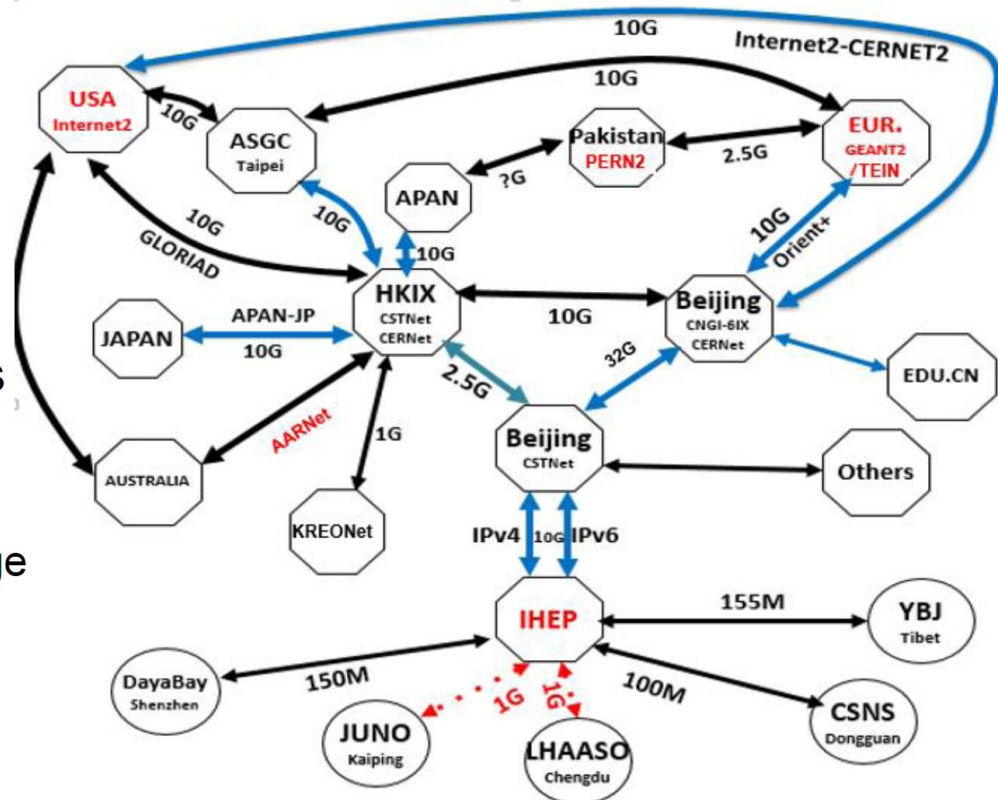
- Shenzhen (Dayabay)
- Dongguan (CSNS)
- Tibet (YBJ/ARGO)
- Kaiping (JUNO)
- Chengdu (LHAASO)
- Huairou(HEPS)

❖ Good Internet connections

- IHEP-Europe: 10 Gbps
- IHEP-USA: 10 Gbps
- ~4 PB/year data exchange

❖ Network for R&E in China

- CSTNet
- CERNet/CERNet2



Computing resources in IHEP

❖ Clusters in Beijing

- ~13,500 CPU cores
- 8 GPU cards
- Scheduler:
 - PBS-2.5.5 with Maui-3.3.1
 - HTCondor 8.2.5

❖ Clusters in Dongguan(CSNS)

- ~3,000 CPU cores
- Scheduler:
 - PBS-2.5.5 with Maui-3.3.1
 - Slurm

❖ Grid site (WLCG)

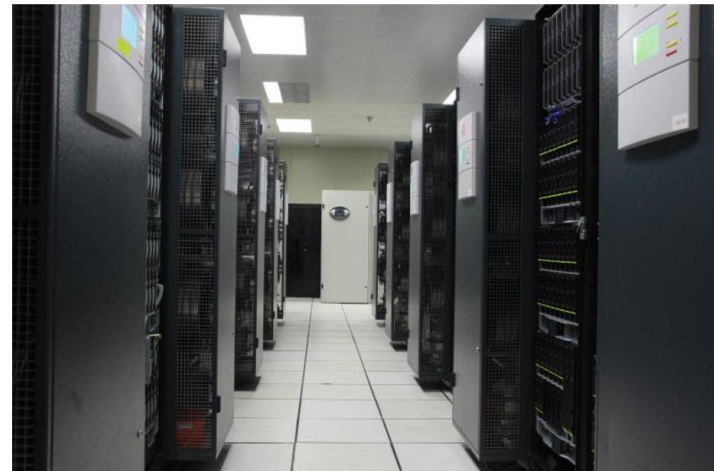
- 1,200 CPU Cores
- CreamCE (PBS-2.5.5 with Maui-3.3.4)

❖ The BESIII DIRAC-based distributed computing system

- ~ 2,000 CPU cores

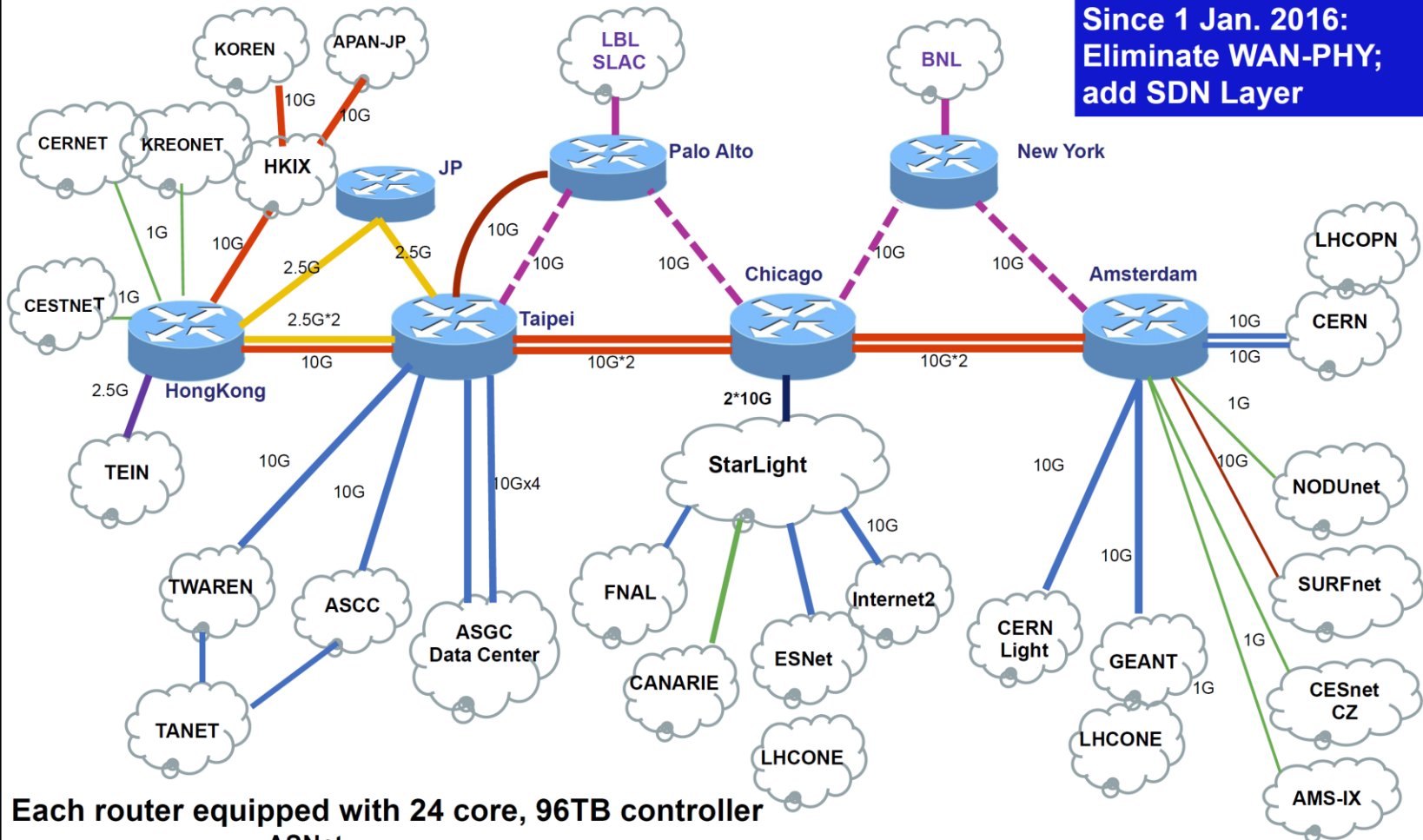
❖ IHEPCloud based on Openstack

- ~ 1000 CPU cores



ASGCNet: Plan to Upgrade to 100G in 2018

Since 1 Jan. 2016:
Eliminate WAN-PHY;
add SDN Layer



Each router equipped with 24 core, 96TB controller

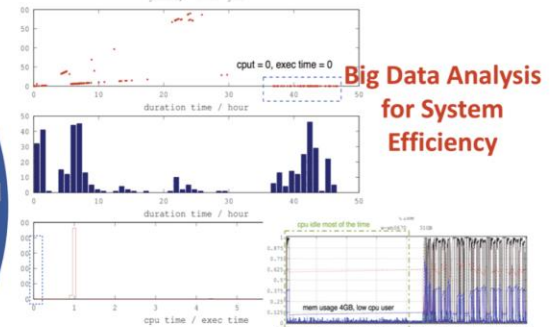
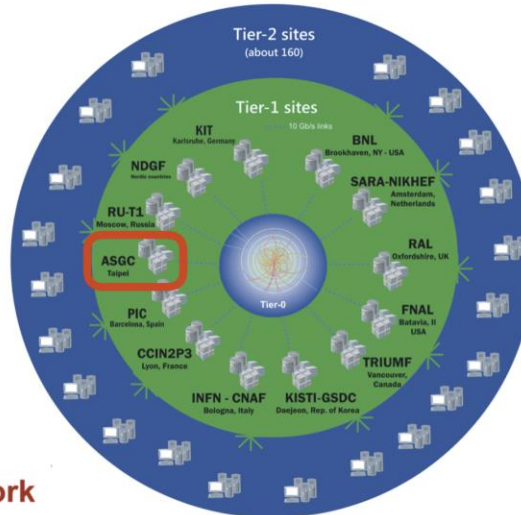
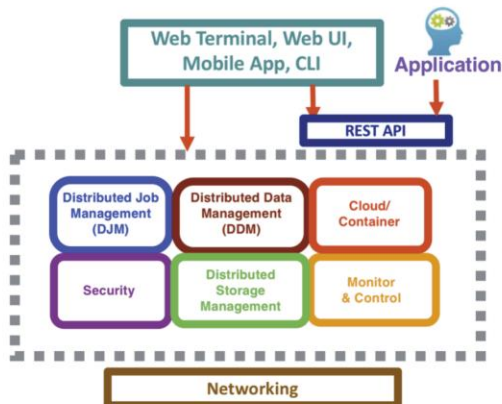
ASNet:

Connection to New PoP :

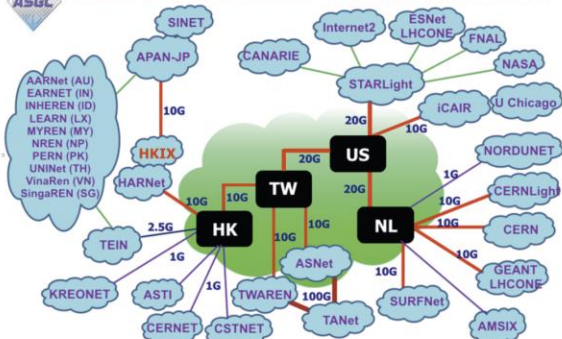
Academia Sinica Grid Computing Centre



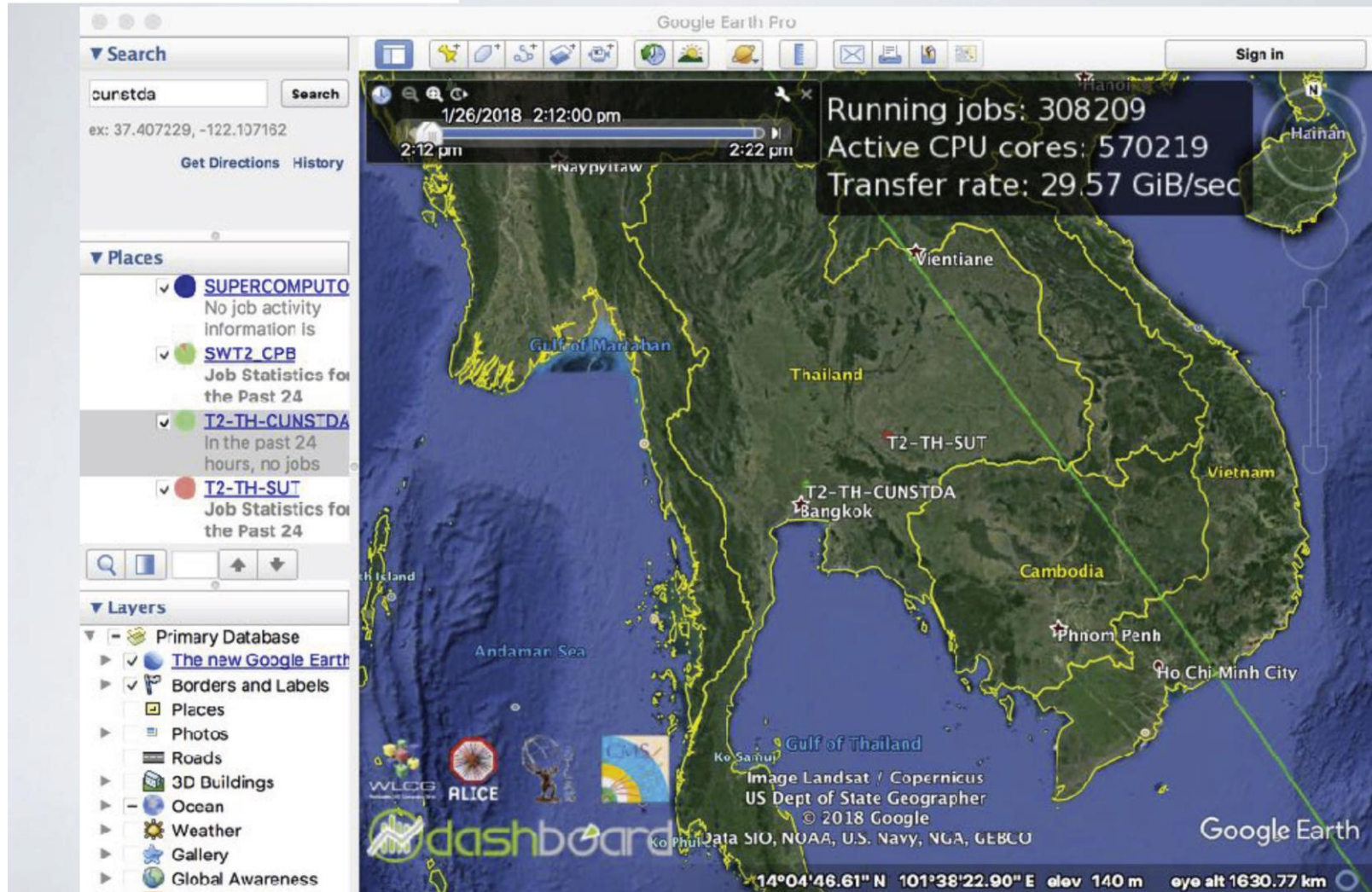
DiCOS Software Stack



ASGC e-Science Global Network

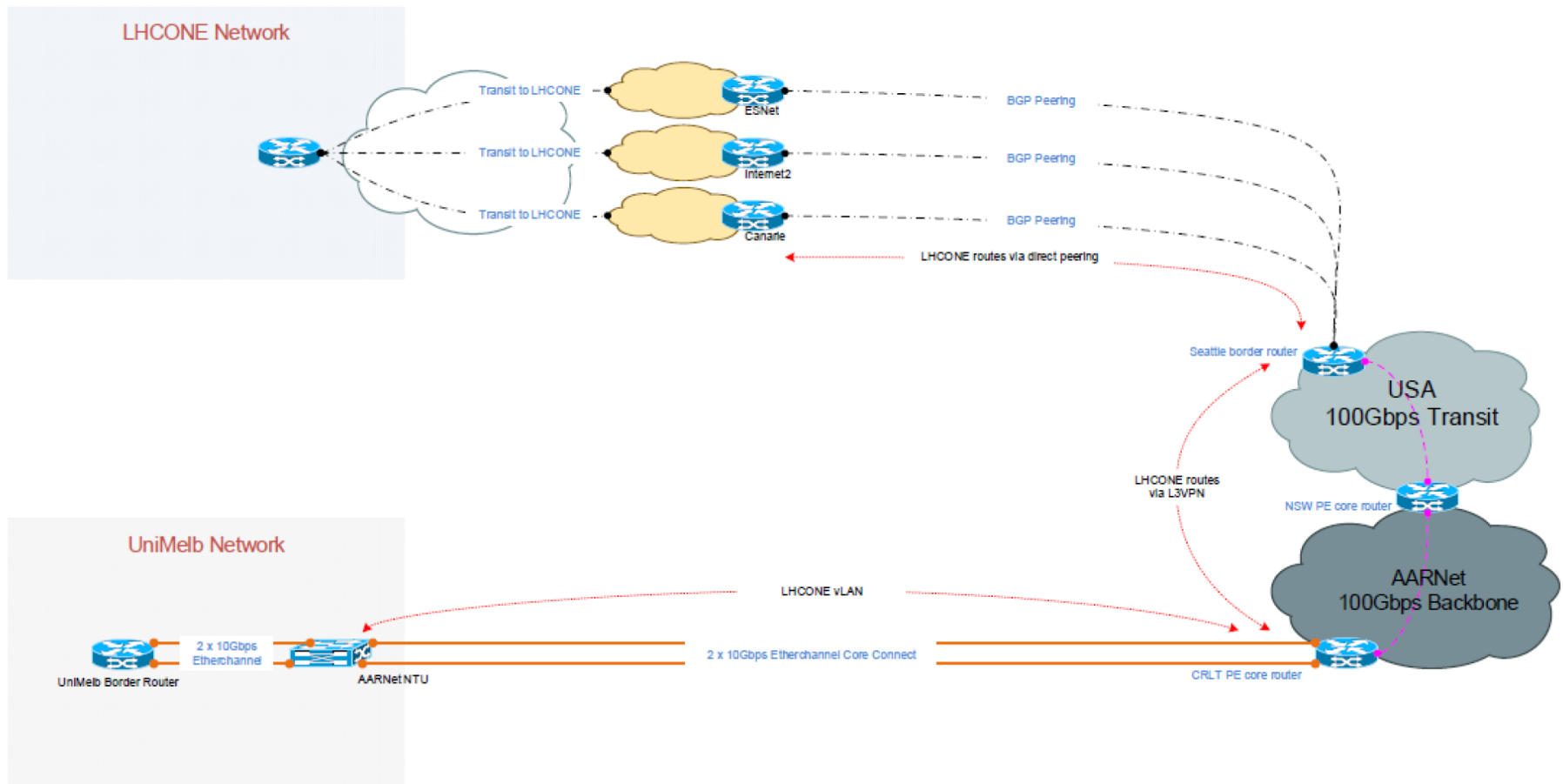


Thailand – ALICE Tier2 & CMS Tier2



Australia – LHCONE

LHCONE



Australia – ATLAS Tier2 @ CoEPP, Melbourne

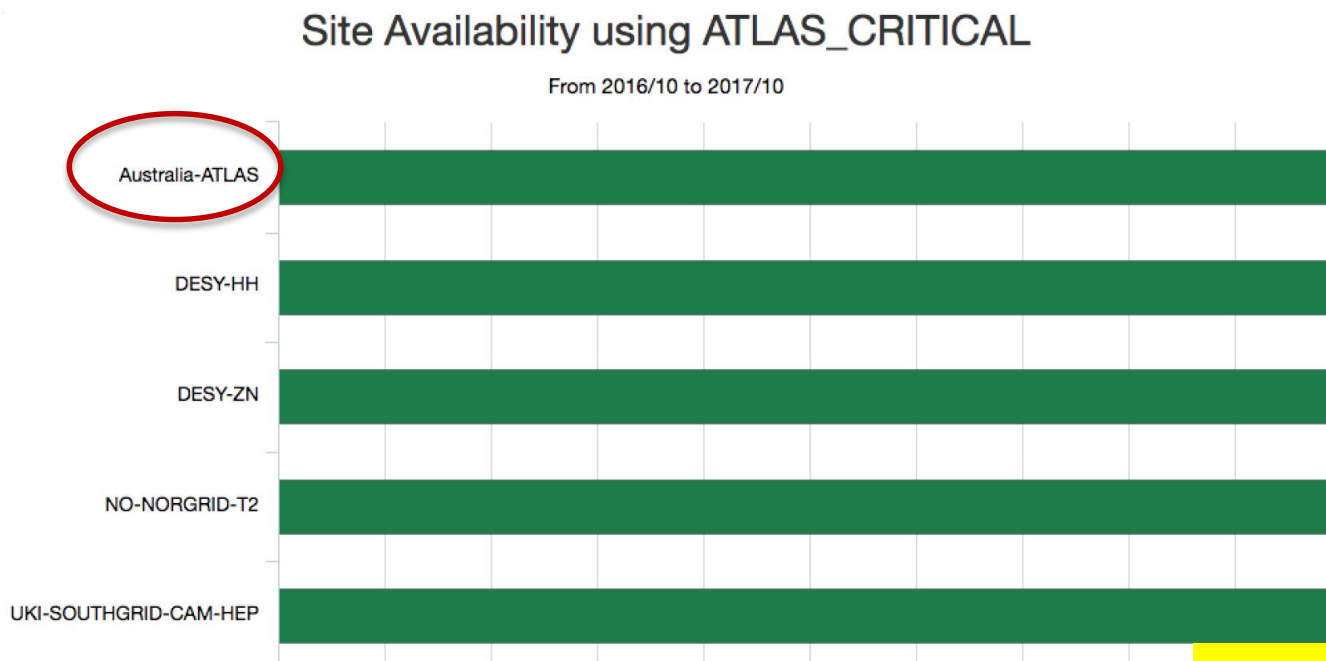
T2 Availability/Reliability

Still #1 ATLAS Tier 2 site (a repeat of 2016)

Improved percentages slightly

99.88% Availability (2016 - 99.64%)

99.93% Reliability (2016 - 99.64%)

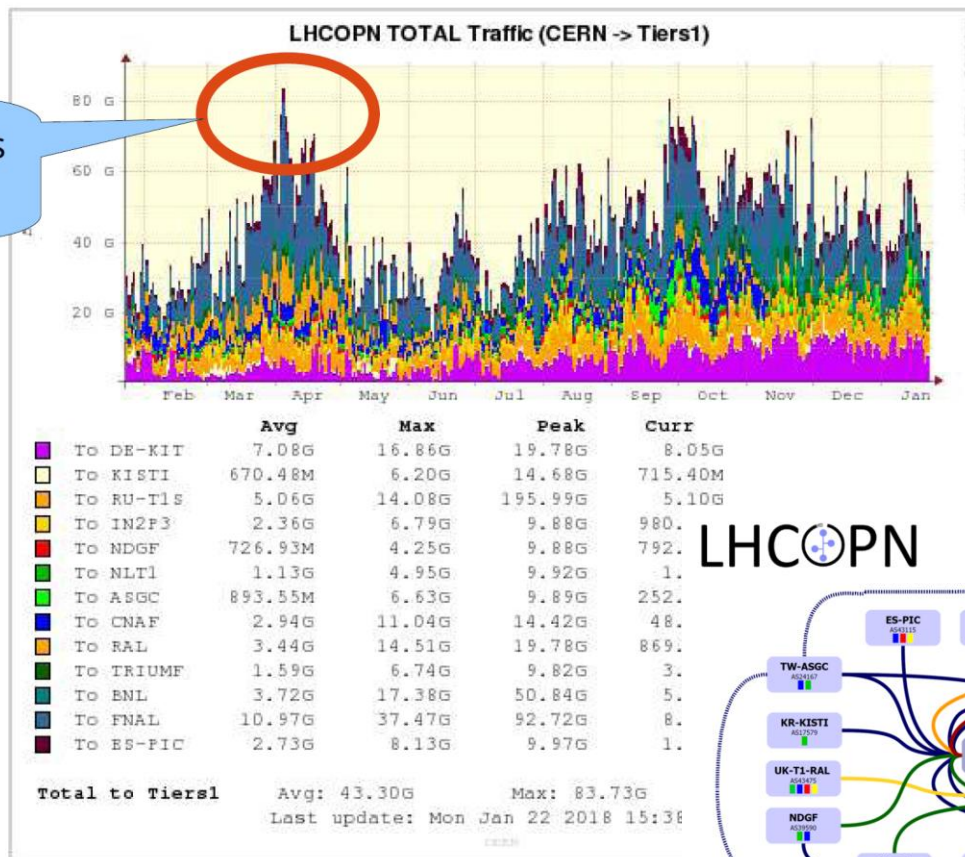


Sean Crosby/
Lucien Boland

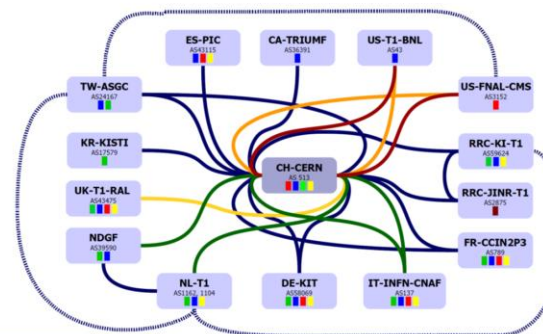
Switzerland – LHCOPN (T0-T1)

LHCOPN Traffic (last 12 months)

Peaking at 80Gbps
Average 43Gbps



LHCOPN



Numbers

- 14 Tier1s + 1 Tier0
- 12 countries in 3 continents
- Dual stack IPv4-IPv6
- 440 Gbps to the Tier0
- Moved ~160 PB in the last year

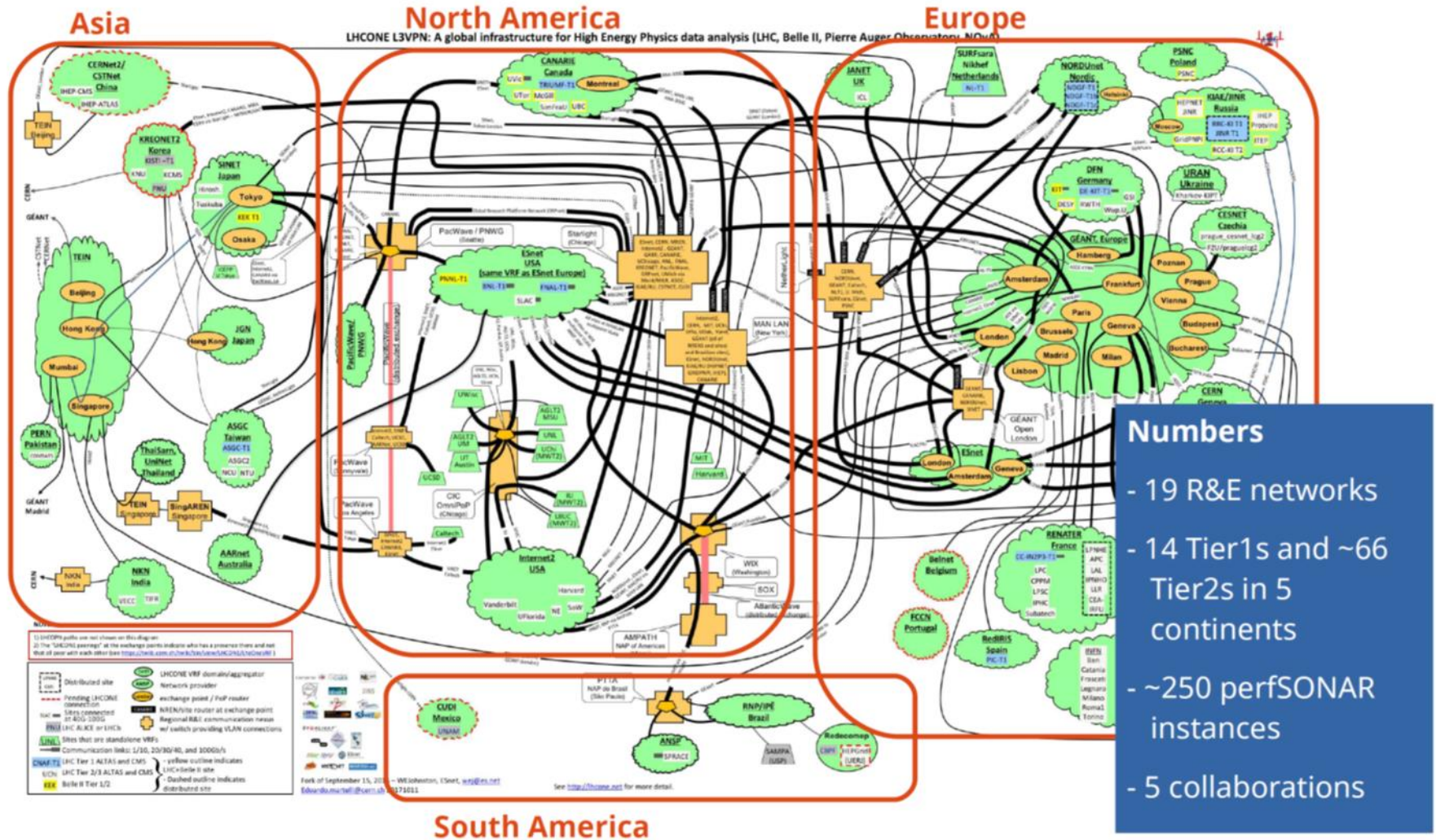
Source: <https://netstat.cern.ch/monitoring/network-statistics/ext?q=LHCOPN&p=LHCOPN&>

<https://twiki.cern.ch/twiki/bin/view/LHCOPN/OverallNetworkMaps>

Switzerland – LHCONe (T1-T2)

L3VPN Current topology

VPN(Virtual Private Network)



Edoardo Martelli

Summary

- For networking, LHCONE is open to other HEP collaborations:
 - WLCG, Belle II, etc.
 - For computing, the number of sites are increasing and stable.
- ⇒ Lots of efforts to collaborate network and computing in Asia-Pacific area.