

LHCONE L3VPN service overview

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LHC Experiments Network Workshop
CERN, 13-14 January 2020

Where were we?

Summary



- LHCONE backbone supported by
 - Over 15 national and international RENS
 - Several Open Exchange Points including NetherLight, StarLight, MANLAN and others
 - Trans-Atlantic connectivity provided by ACE, GEANT, NORDUNET and USLHCNET
- Over 50 end sites connected to LHCONE
 - 45 Tier 2s
 - 10 Tier 1s

https://twiki.cern.ch/twiki/bin/view/LHCONE/LhcOneVRF#Connected_sites

Connected Research Computing Centers

#	Site	AS number	Announce v4	Announce v6	NOC	Access VRF	Access Point	Bandwidth	Active	AUP ack
1	AGLT2	229	192.41.230.0/23 192.41.236.0/23 192.41.238.0/28	2001:48A8:68F7::/48	aglt2-noc@umichNOSPAMPLEASE.edu	ESnet	Starlight, Chicago	100G	Y	Y
2	Alberta Univ (T2)		142.244.83.0/27 142.244.105.64/27			Canarie	Vancouver		Y	
3	ANL	683	140.221.68.0/24 140.221.69.0/24 140.221.96.0/24	2620:0:dc0:4800::/59	noc@anlNOSPAMPLEASE.gov	ESnet	Starlight, Chicago	100G	Y	Y
4	ASGC (T1+T2)	24167	117.103.96.0/20 200.120.100.0/20 200.120.100.0/20	2400:4500::/64	noc@twgridNOSPAMPLEASE.org	ASGC	ASGC(Taipei)	10G	Y	Y
103	Vanderbilt University (T2)	7212	129.59.177.96/27 129.59.197.0/24 192.111.108.0/24	2607:8a00:17:736::/64		ESnet				
104	Wuppertal Univ. (T2)	680	132.195.124.0/23			GEANT	DFN HEPPI (Frankfurt)	na	Y	
105	Cyfronet AGH (T2)	8267	149.156.5.192/27		noc@cyfronetNOSPAMPLEASE.pl	PIONIER	PIONIER (Cracov)	na	Y	
106	University of Warsaw ICM (T2)	8664	213.135.54.0/26		info@netNOSPAMPLEASE.icm.edu.pl	PIONIER	PIONIER (Warsaw)	na	Y	

106!



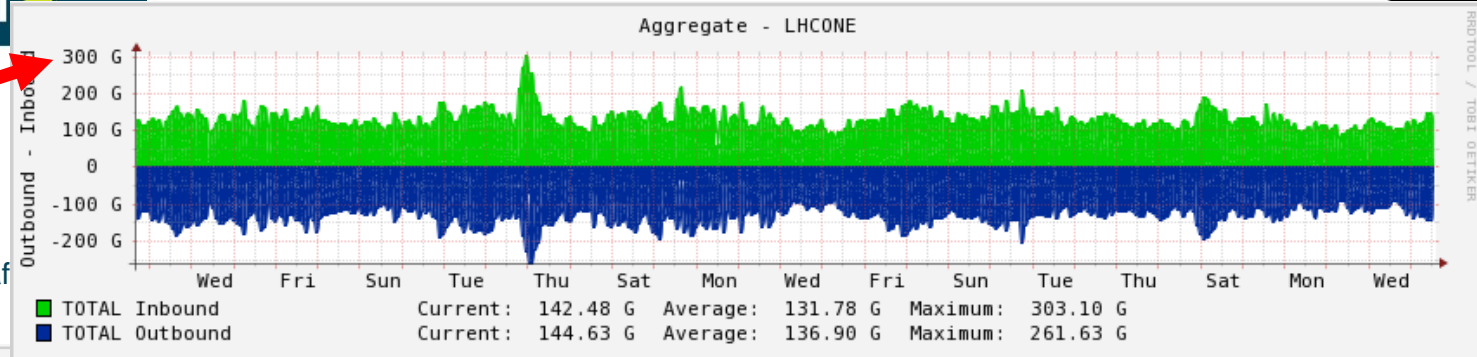
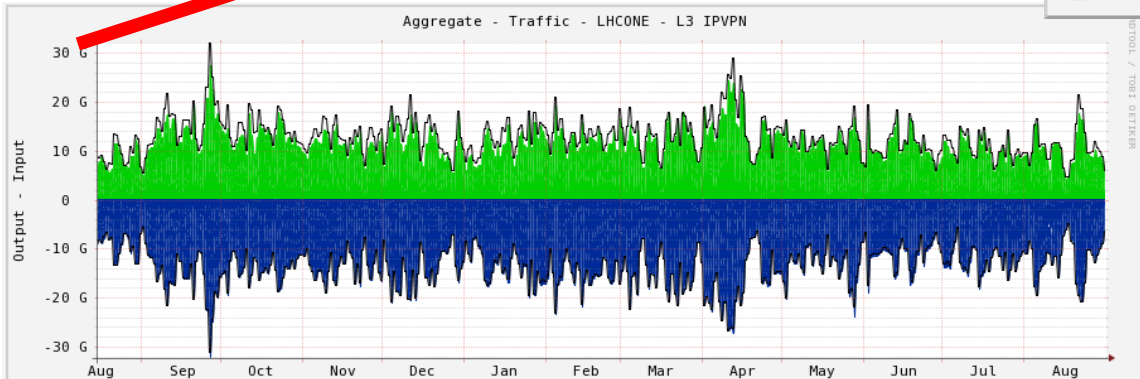
Where were we?

LHCONE in Europe GEANT

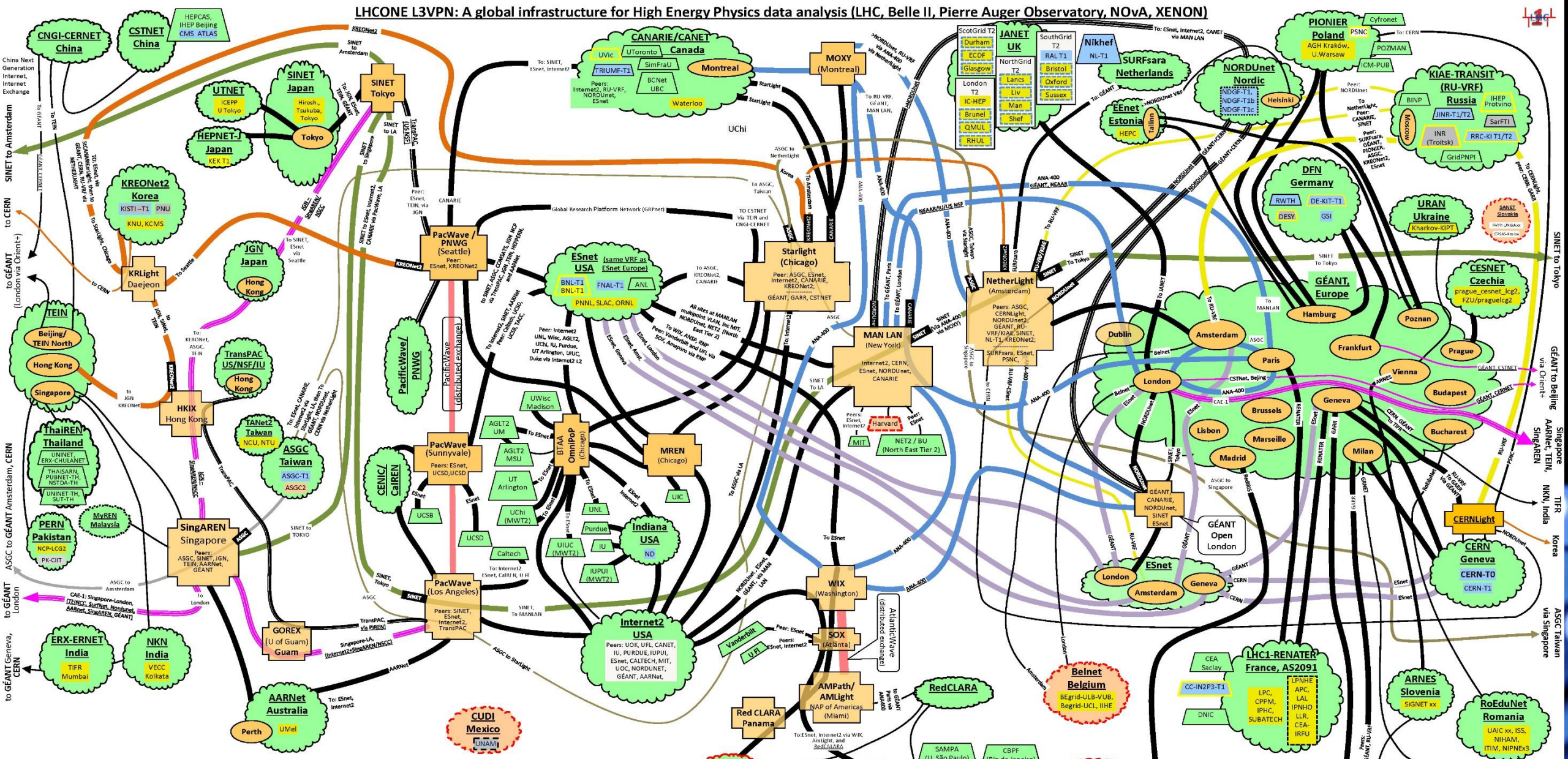


- Aggregate LHCONE traffic from all the NRENs and Peers
 - Average traffic ~25Gbps
 - Sustained Peaks ~35Gbps
 - Trans-Atlantic Traffic ~ 20Gbps (Peak)
- Graphs shows 1 day average traffic over last 12 months the peak traf is much higher

10x



LHCONE L3VPN: A global infrastructure for High Energy Physics data analysis (LHC, Belle II, Pierre Auger Observatory, NOvA, XENON)



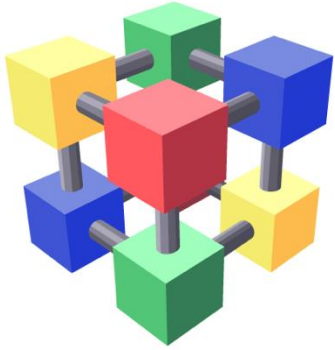
LHCONE Map Ver. 5.3, January 2020 – WEJohnston, ESnet, wej@es.net

<ul style="list-style-type: none"> LHCONE VRF domain/aggregator - A provider network. Connector network – provides, e.g., an L2 path between VRFs. Provider network PoP router Not currently connected to LHCONE Exchange point 	<ul style="list-style-type: none"> NREN/site router at exchange point Communication links: 1/10, 20/30/40, and 100Gb/s or N x 100G Underlined link information indicates link provider, not use Dotted outline indicates distributed site Blue dashed outline indicating a WLCG federation site not currently on LHCONE 	<p>International infrastructure by provider/collaboration</p> <ul style="list-style-type: none"> various GÉANT SINET, Japan ASGC, Taiwan NORDUnet KIAE, Russia KREONet2, Korea 	<p>Various sites and networks</p> <ul style="list-style-type: none"> LHC ALICE or LHCb site LHC Tier 1 ATLAS and CMS LHC Tier 2/3 ATLAS and CMS Belle II Tier 1/2 Yellow outline indicates LHC+ Belle II site Sites that are standalone VRFs
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NOTES

- 1) ONLY links involved in LHCONE are shown
- 2) LHCOPN links are not shown on this diagram
- 3) For map explanation see "Interpreting the LHCONE Map" at <https://www.dropbox.com/s/padfo58j0j1raz/AADsB5K8fSH9fthCjA4eCtea?dl=0>

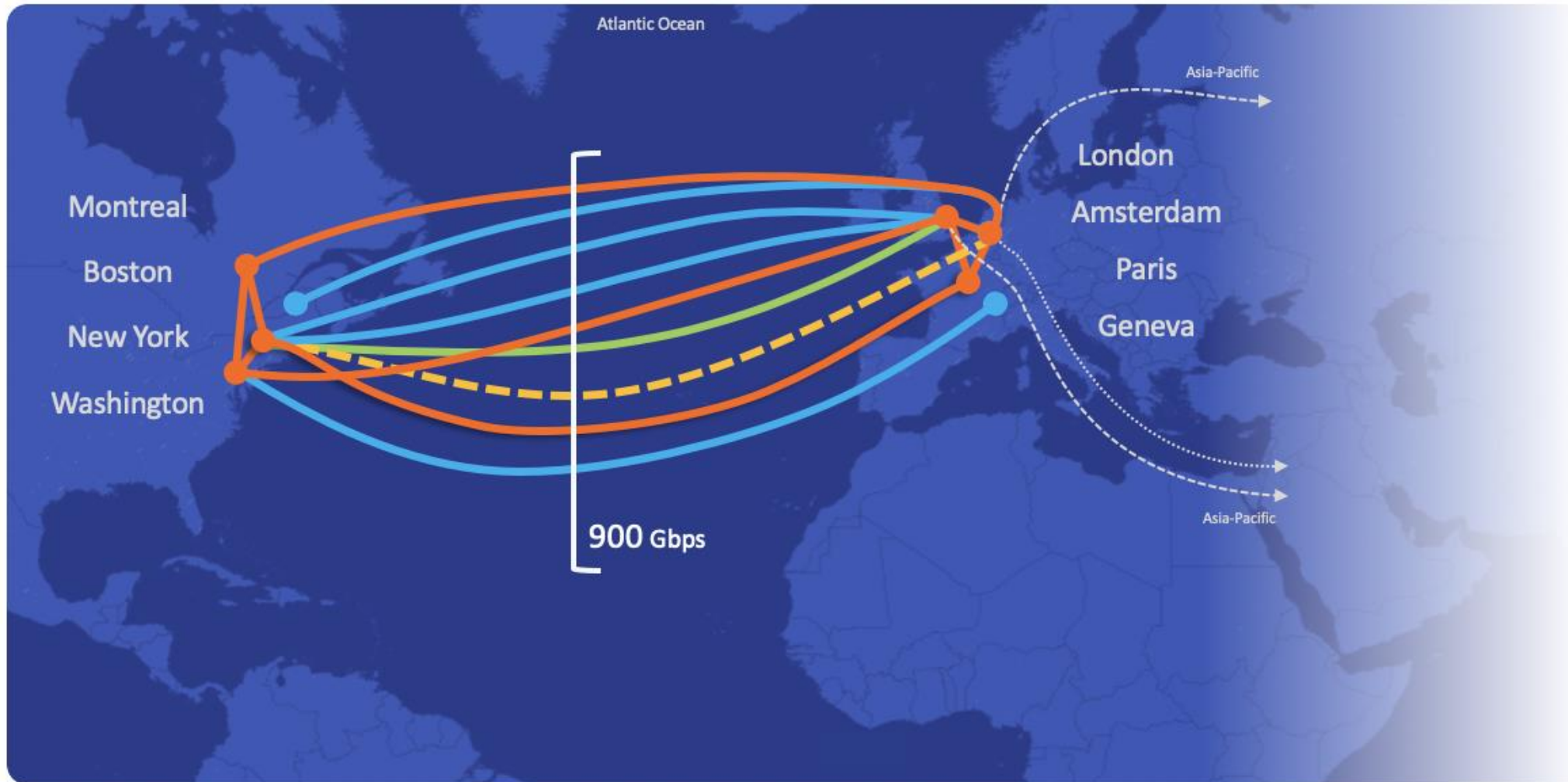
New experiments



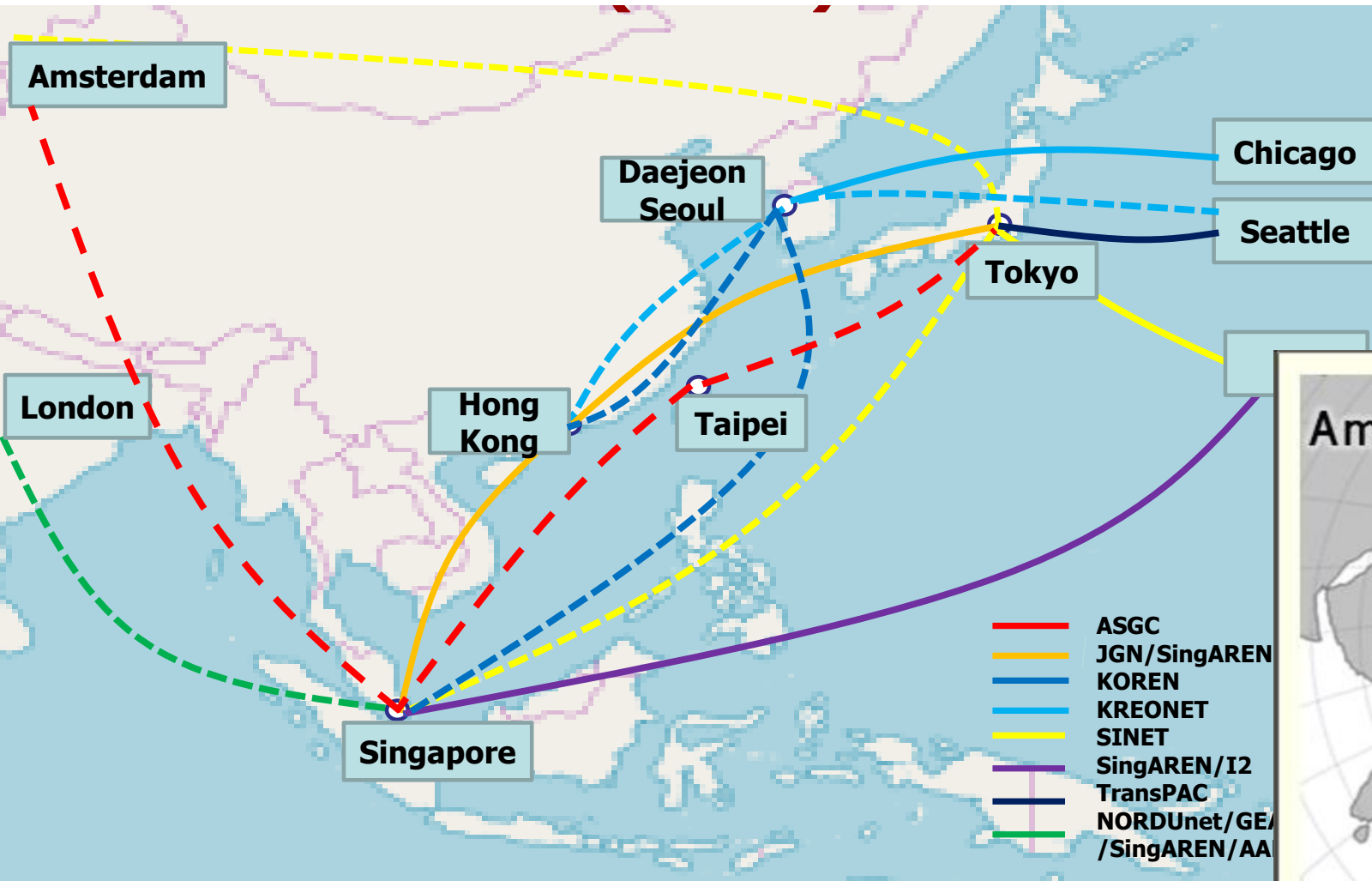
WLCG
Worldwide LHC Computing Grid



ANA-n00

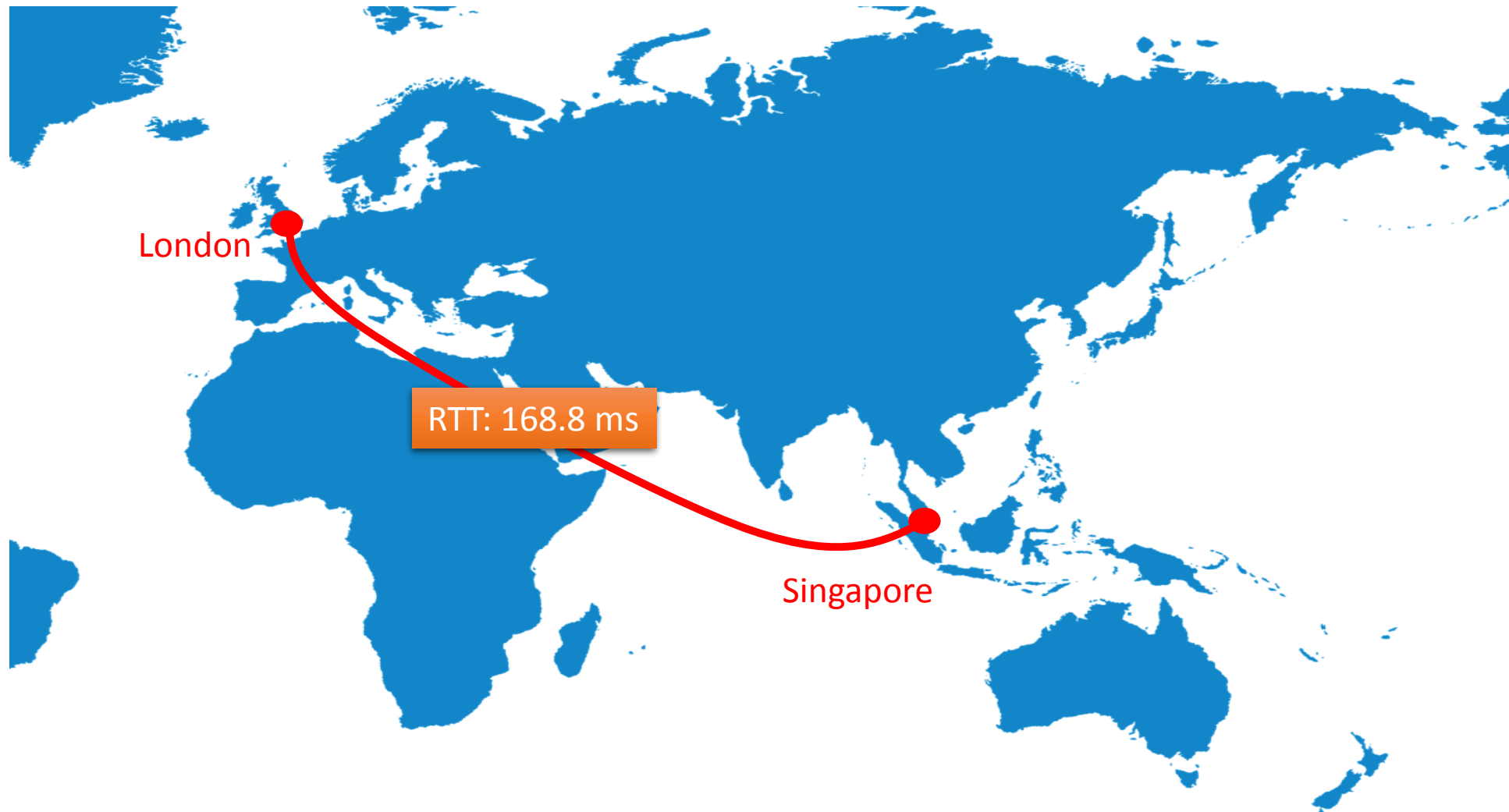


Asia-Pacific 100G links

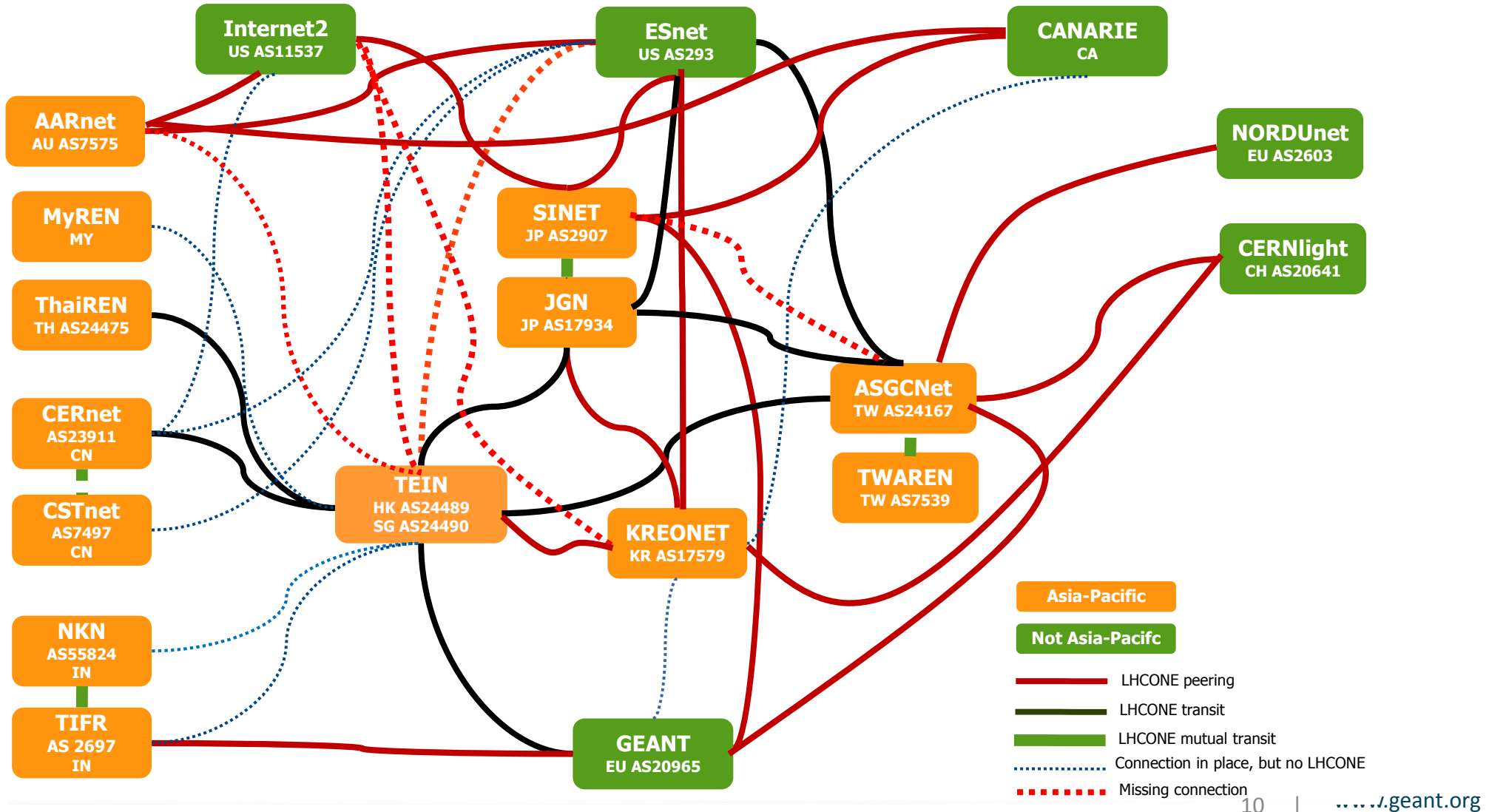


SINET5

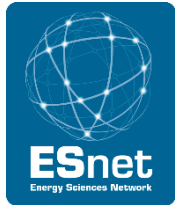
CAE-1



LHCONE VRFs in Asia



RENs that support LHCONE





Thank you!

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