

LHC Networking in Asia

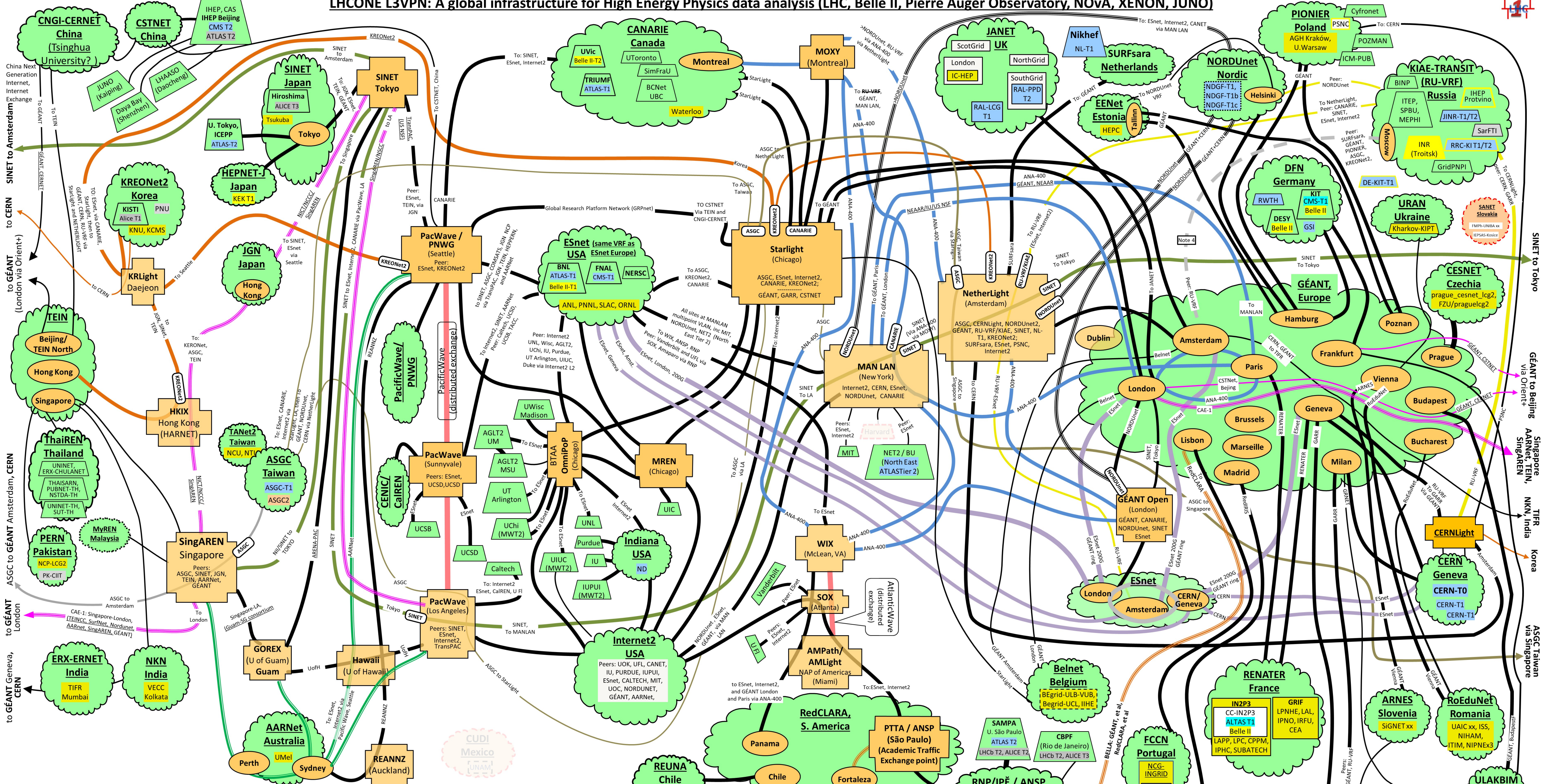
WLCG GDB

22 March 2023



Ahn Sang-Un

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



LHCONE Map Ver. 5.9, 2022-10-20 – WEJohnston, ESnet, wej@es.net

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- 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
- 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

International infrastructure by provider/collaboration

- AARNet
- GÉANT
- SINET, Japan, global ring
- ASGC, Taiwan
- ESnet transatlantic, USA
- NICT/NCCC/ SingAREN
- SINET
- NORDUnet
- KIAE, Russia
- KREONet2, Korea
- BELLA: GÉANT, et al, RedCLARA, et al
- ANA-300/400 - Various links provided by CANARIE, ESnet, GÉANT, Internet2, NORDUnet, SURFnet, SINET, IU/NSF
- UNL Sites that are standalone VRFs

Site Legend:

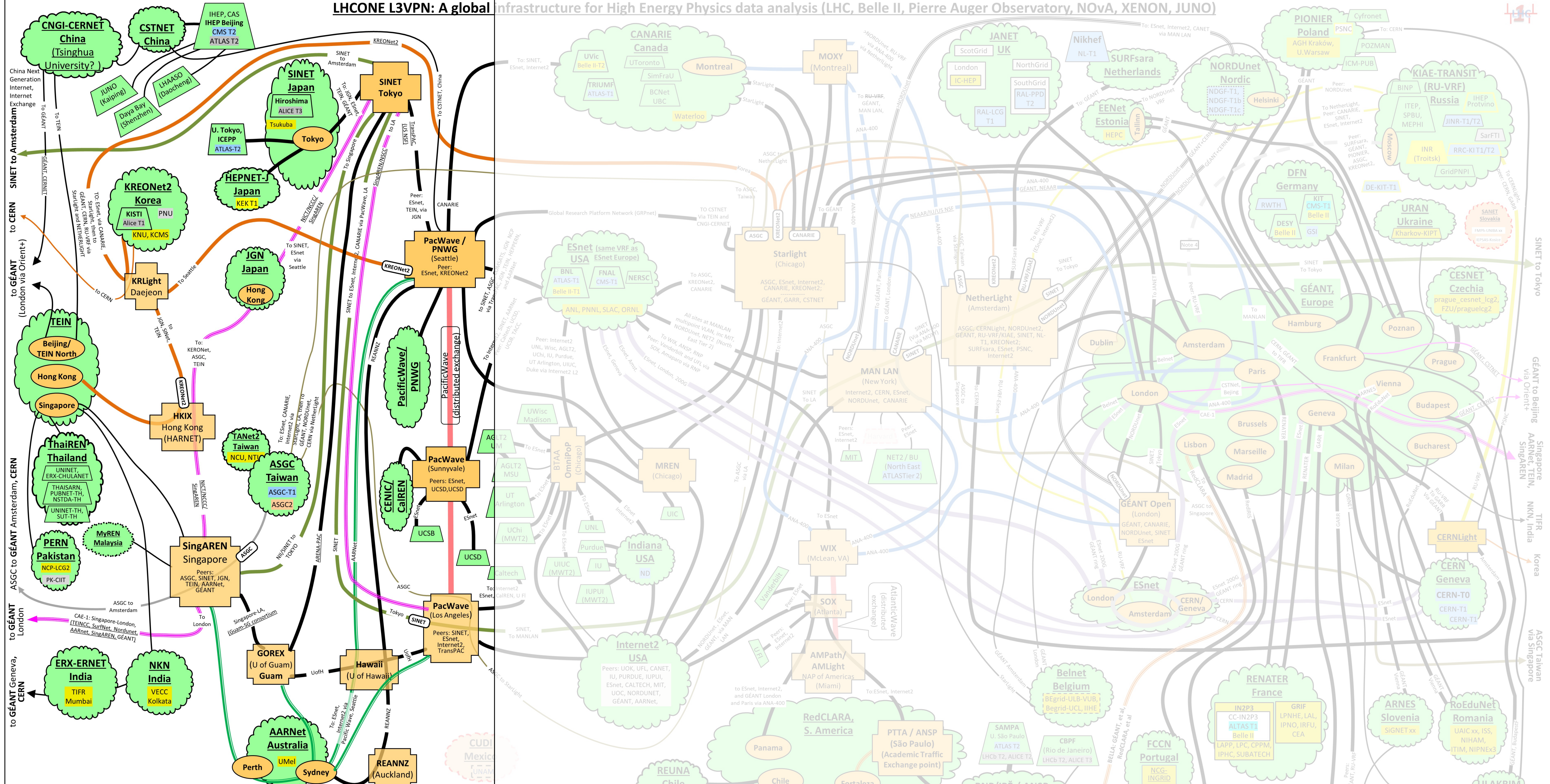
- PNU LHC ALICE or LHCb site
- CNAF-T1 LHC Tier 1 ATLAS and CMS
- UChi LHC Tier 2/3 ATLAS and CMS
- KEK Belle II Tier 1/2
- JUNO JUNO

NOTES

- ONLY links involved in LHCONE are shown
- LHCOPN links are not shown on this diagram
- For map explanation see "Interpreting the LHCONE Map" at <https://www.dropbox.com/sh/padxf058j013ra7/AADsB5K8I5H9FfhCjA4eCtea?dl=0>
- GÉANT and CANARIE have shutdown the peering between their VRF and KIAE, as a result of the Ukraine war.

KAUST Saudi Arabia
 DTN1

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Notes and Site Information

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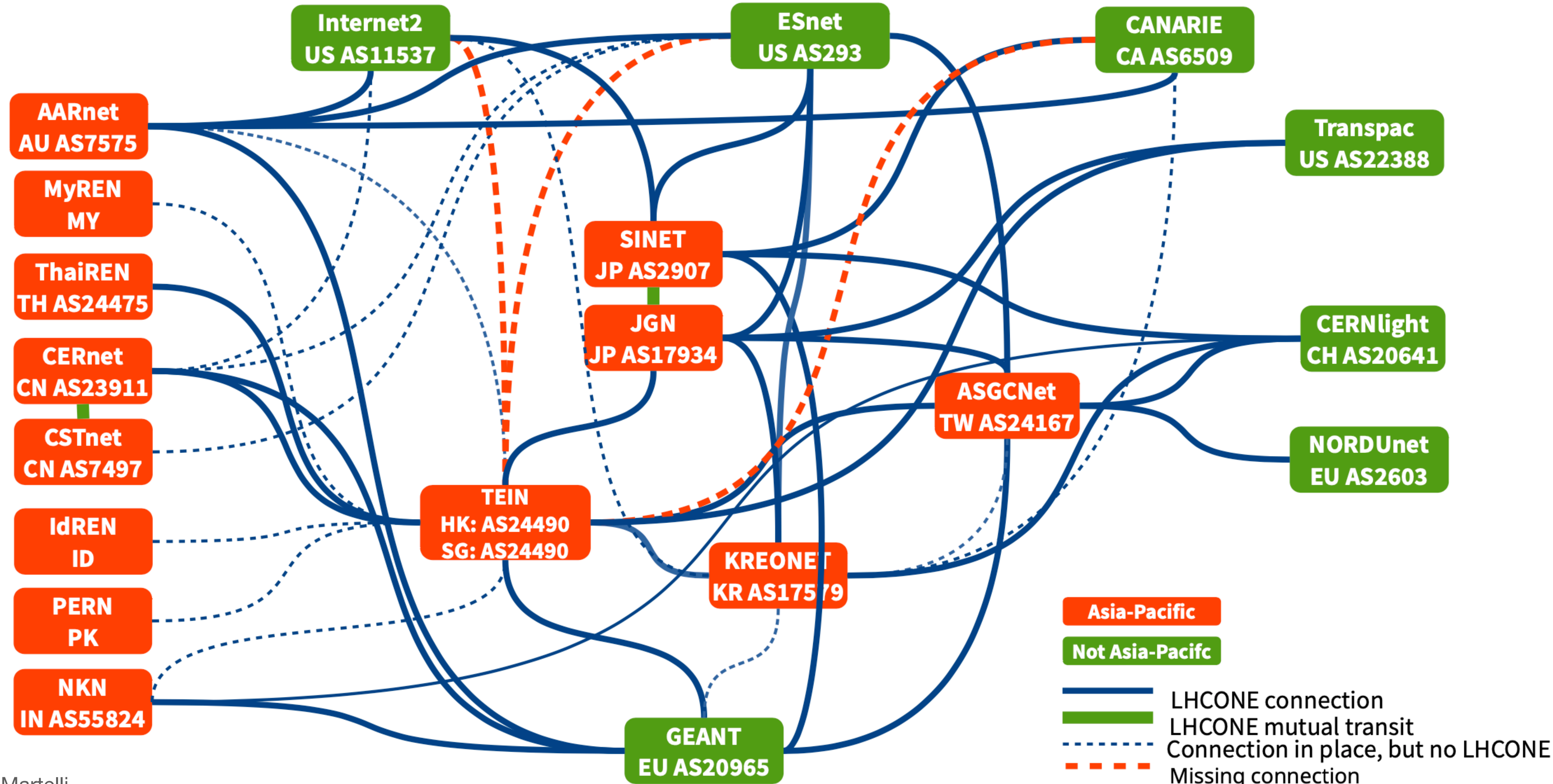
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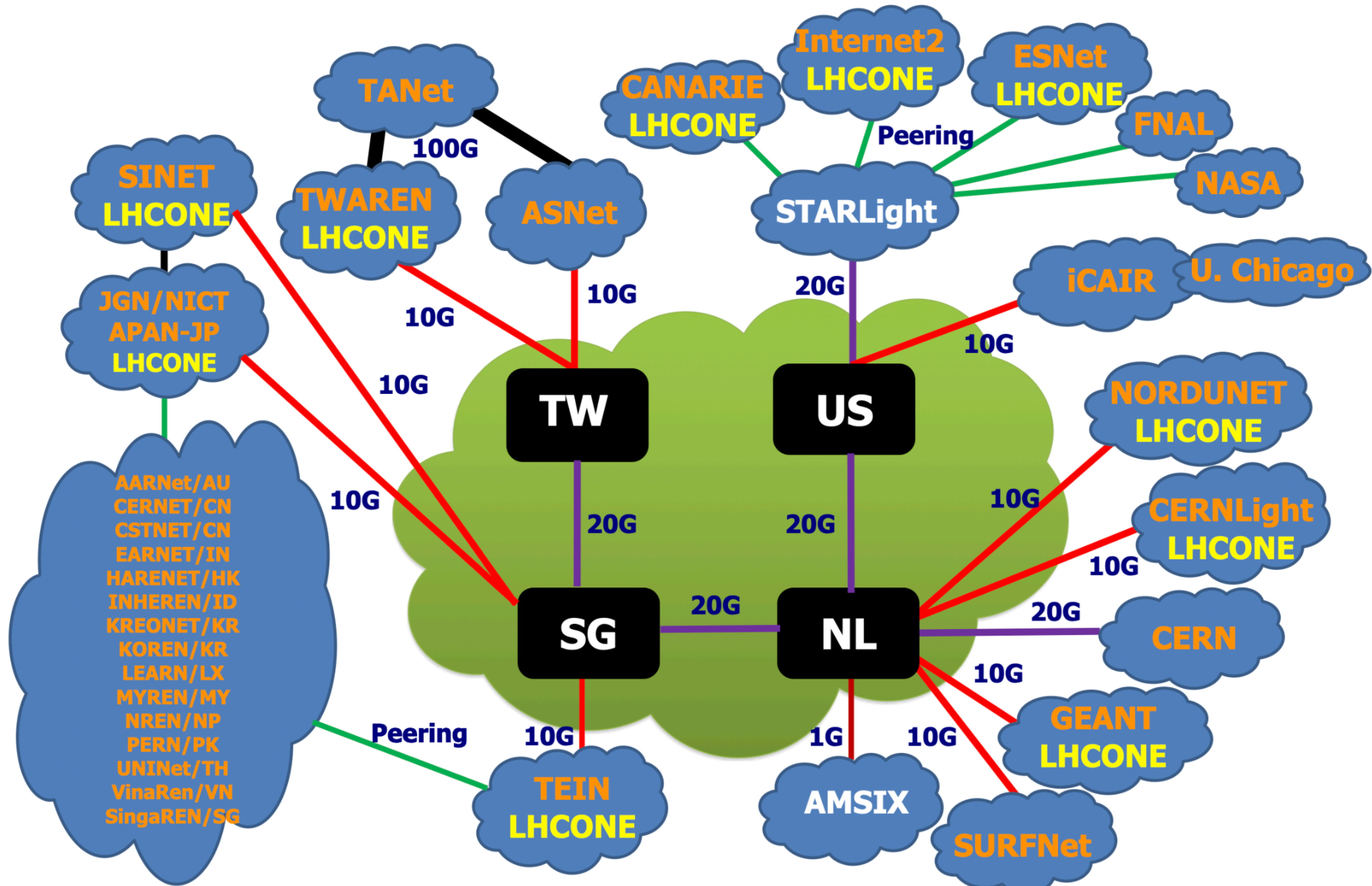
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Additional Site Information

- KAUST** Saudi Arabia
- DTN1**

Asia-Pacific VRFs – Current Status

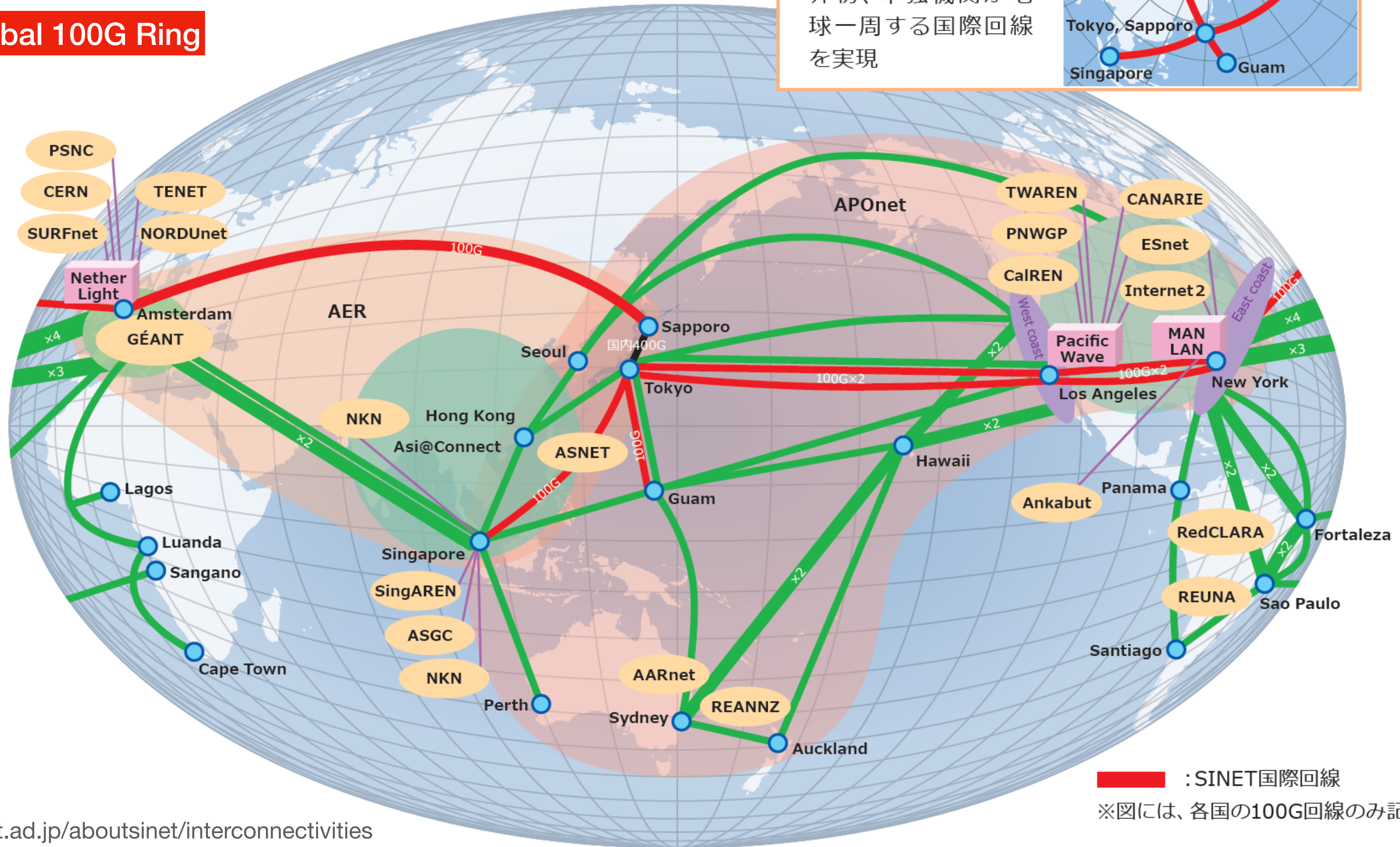




SINET

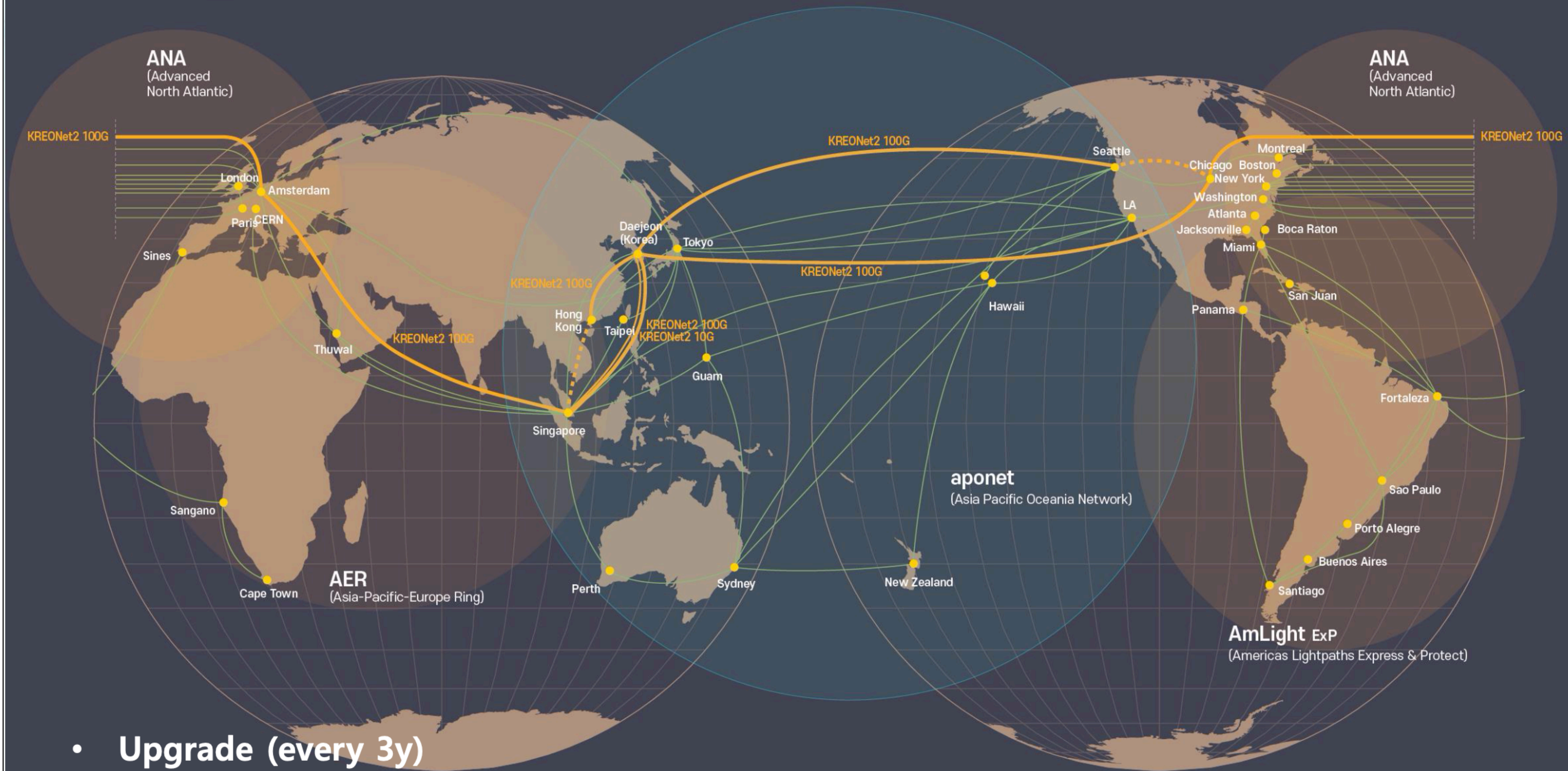
Global 100G Ring

日本、米国、欧州をリング状に接続し、国の研究教育ネットワーク（NREN）としては、世界初、単独機関が地球一周する国際回線を実現



■ : SINET国際回線
※図には、各国の100G回線のみ記載

Map of KREONET2 2023

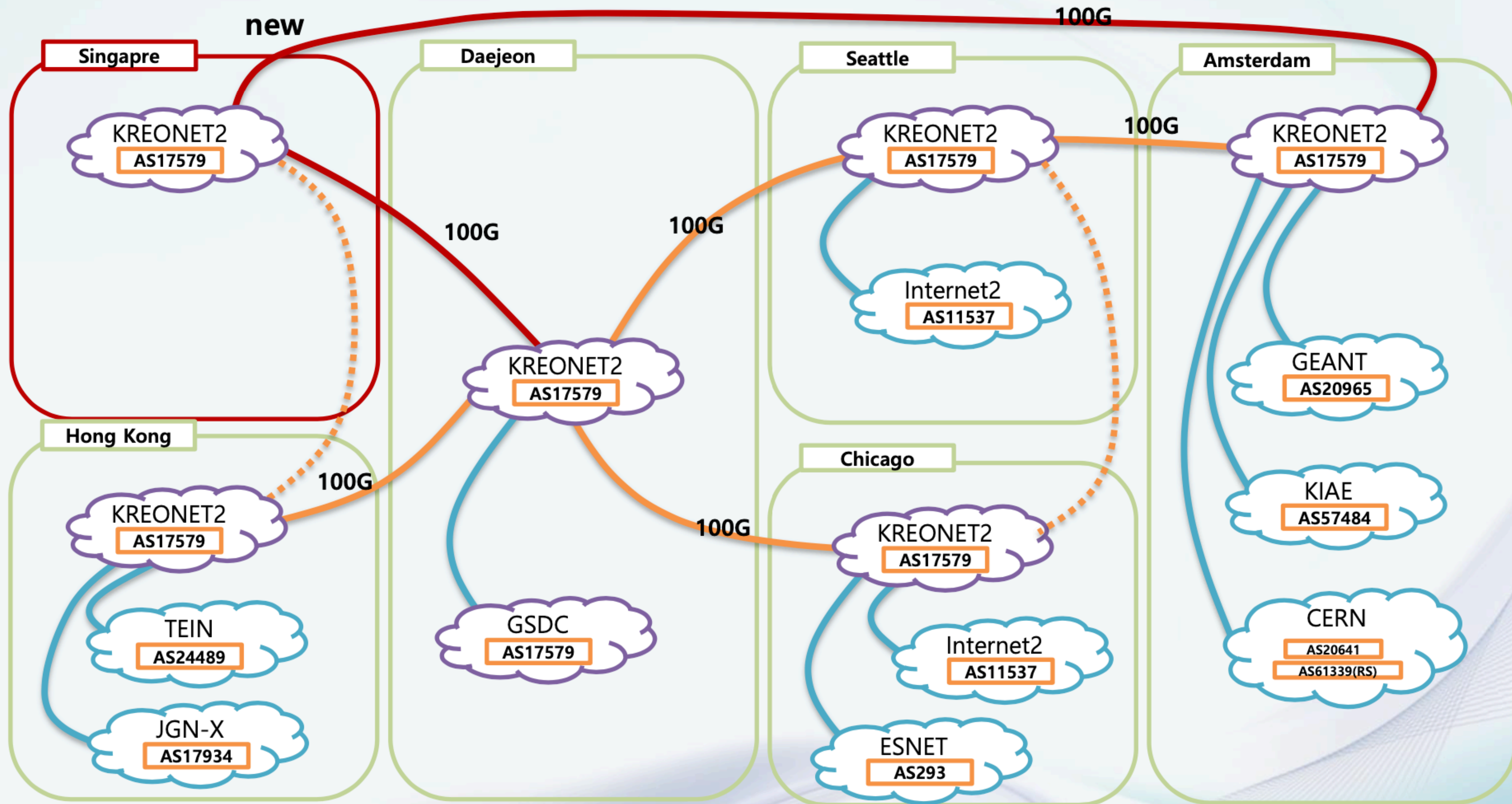


- Upgrade (every 3y)
 - ✓ complete on next JUNE
 - ✓ Bandwidth : 350Gbps to 510Gbps
 - ✓ New Singapore PoP
 - ✓ Global 100G ring

— KREONET2/GLORIAD-KR
Global Ring Network for Advanced Applications Development

— Global R&E 100Gbps Network

LHCONE on KREOENT2(2023)



- **Our Policy : allow transit** → Policy that resolves partly missing connections in Asia-Pacific region

Remarks

- The connectivity in terms of LHCONE networking in Asia has enriched
 - TEIN, SINET (& JGN), KREONet and ASGCNet are Big 4
- TEIN is an Asian backbone that most of all Asian countries is connected
 - No connection to North America; KREONet's transit policy could resolve this
- No direct connection is placed between SINET (KR) and KREONet (JP)
- Singapore is the emerging hub in Asia
 - HK was used to be; ASGCNet cut the fibre before pandemic, KREONet reaches SG with 100G