KREONET & KREONet2 Update (ATCF8)

September 02, 2024

ChanJin Park (pcj0722@kisti.re.kr)
KREONET Center
Korea Institute of Science and Technology Information (KISTI)

KREONET/KREONet2
: Korea Research Environment Open NETwork

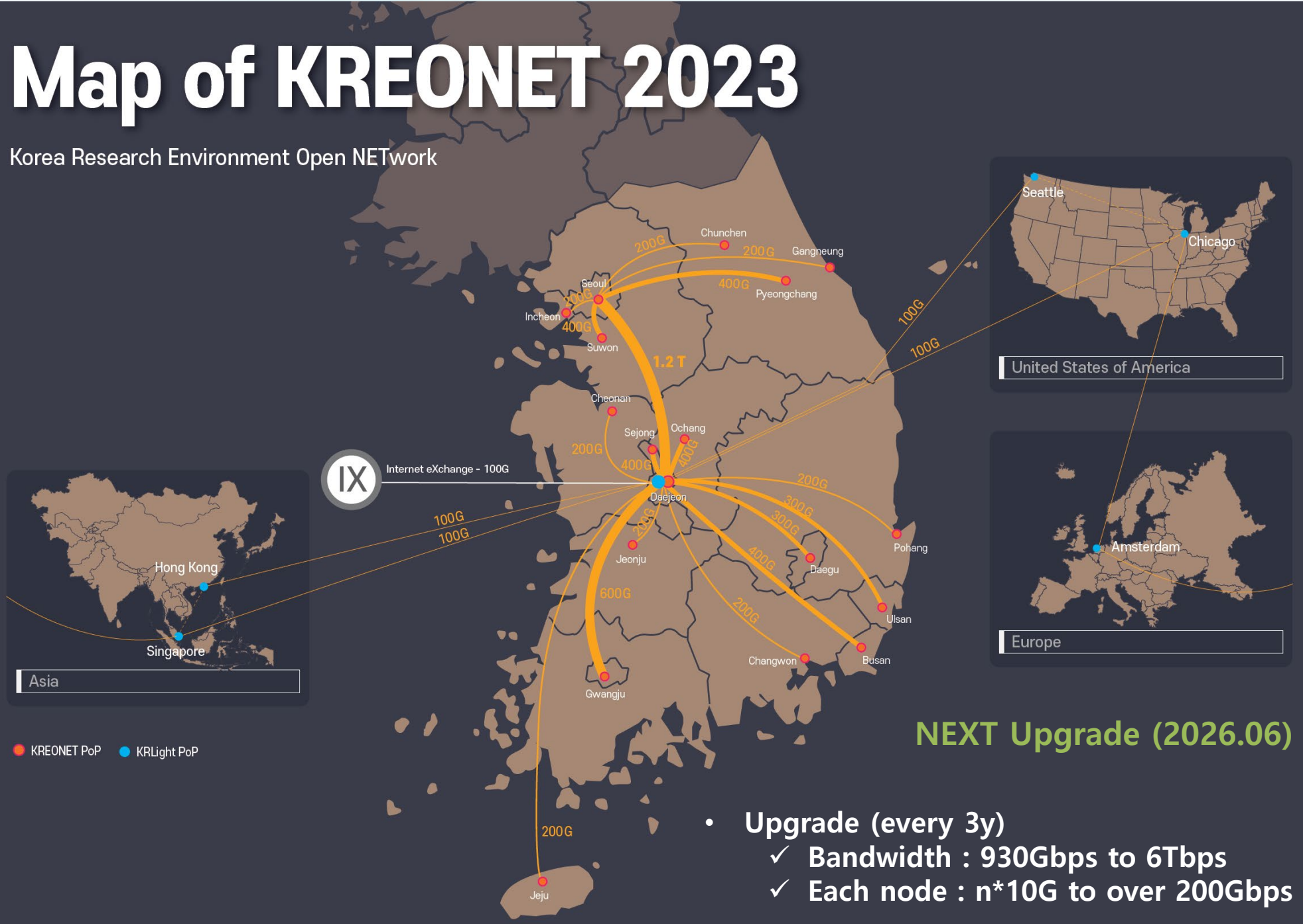
KiSTi 한국과학기술정보연구원 Korea Institute of Science and Technology Information

KREONET/KREONet2(AS1237/AS17579)

- (1988) started with Korean National Science & Research Network.
- (2005) As a Core Member of GLORIAD project,
  Started international research network service
- (2023) 6Tbps backbone with 18 Domestic Regional GigaPoPs
  (Seoul, Deajeon, Gwangju, Busan, Changwon and so on)
- (2023) 600Gbps backbone with 6 International GigaPoPs
  (Daejeon, Chicago, HongKong, Seattle, Amsterdam, Singapore)
- Support about 200 R&E organizations :
  Government Research Institutes, Universities, Libraries and so on.
- Provide 365*24 NOC (Network Operation Center) Service
- Connected with Internet exchanges (KT, Sejong Telecom, Cogent, SG.GS, AMSIX)
  and L2 direct peering with some Clouds(Google, Amazon, Microsoft)
- Provides L1 LightPath service, L2 MPLS-TP, L3 IP service, VPN using Segment routing.

Map of KREONET 2023

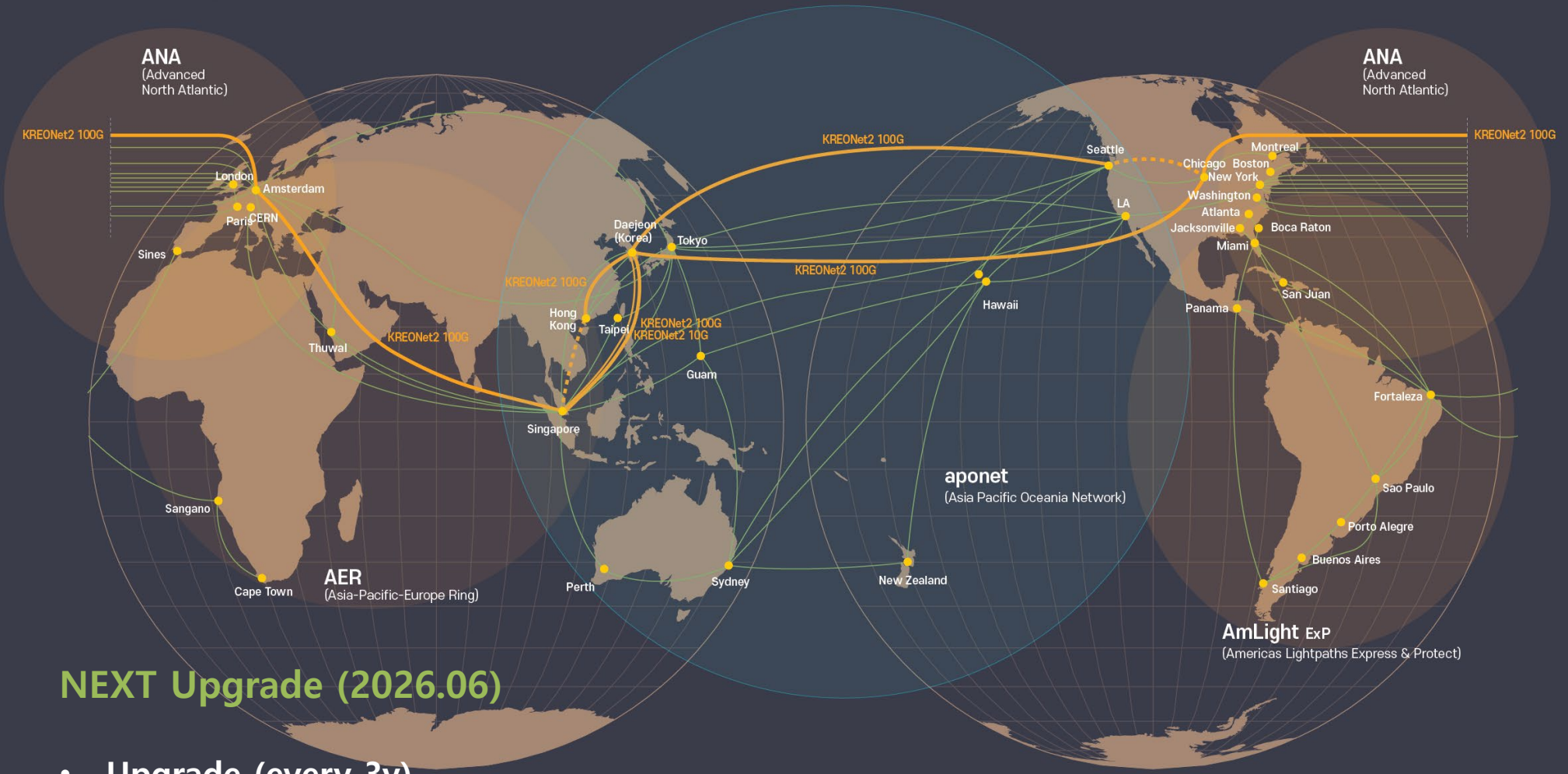
Korea Research Environment Open NETwork



NEXT Upgrade (2026.06)

- **Upgrade (every 3y)**
  - ✓ **Bandwidth : 930Gbps to 6Tbps**
  - ✓ **Each node : n*10G to over 200Gbps**

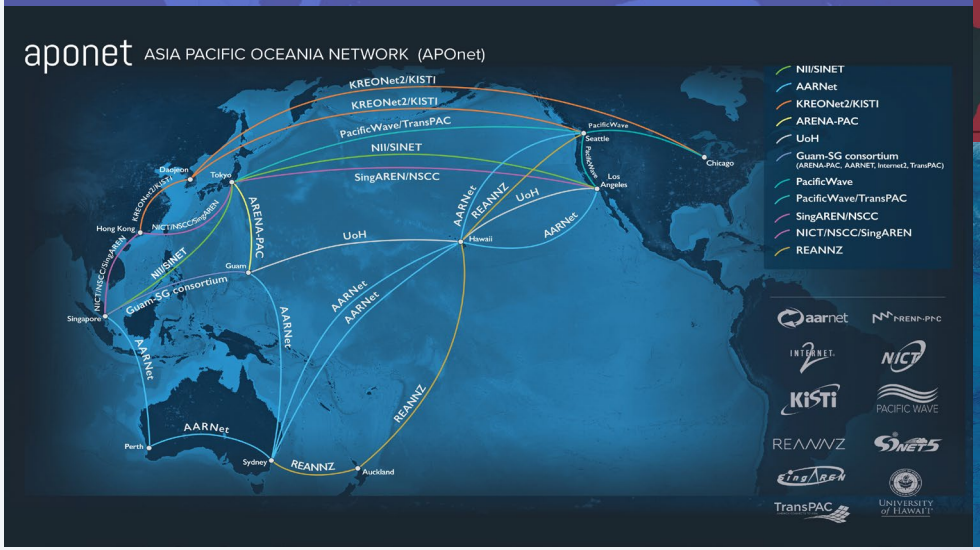
Map of KREONET2 2023



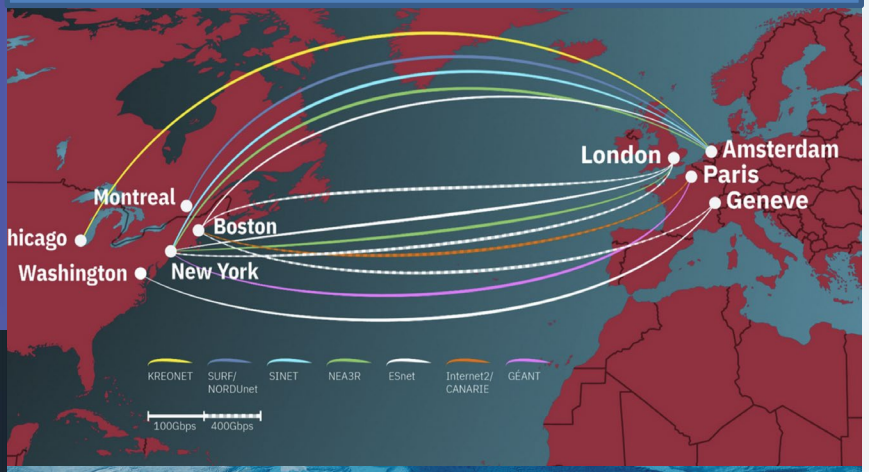
NEXT Upgrade (2026.06)

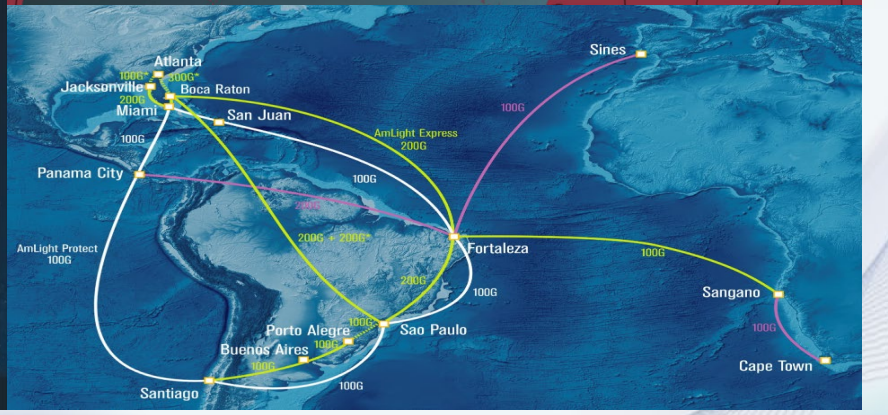
- Upgrade (every 3y)
  - ✓ Bandwidth : 350Gbps to 600Gbps
  - ✓ New Global 100G ring
  - ✓ New Singapore PoP and 100G*2 links

Global Research Network Consortium

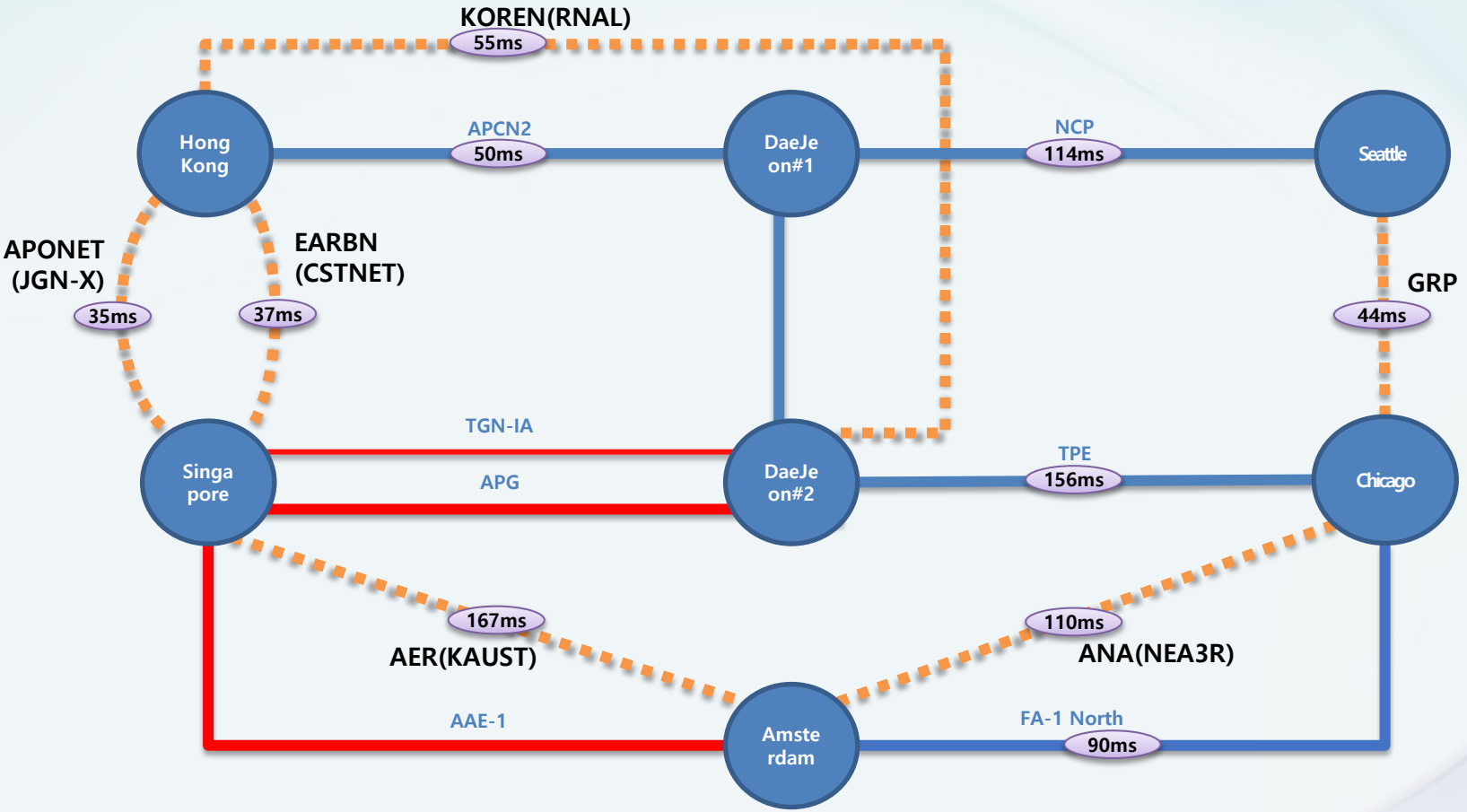


ANA(Advanced North Atlantic)





Backup Path and Submarine cable failure

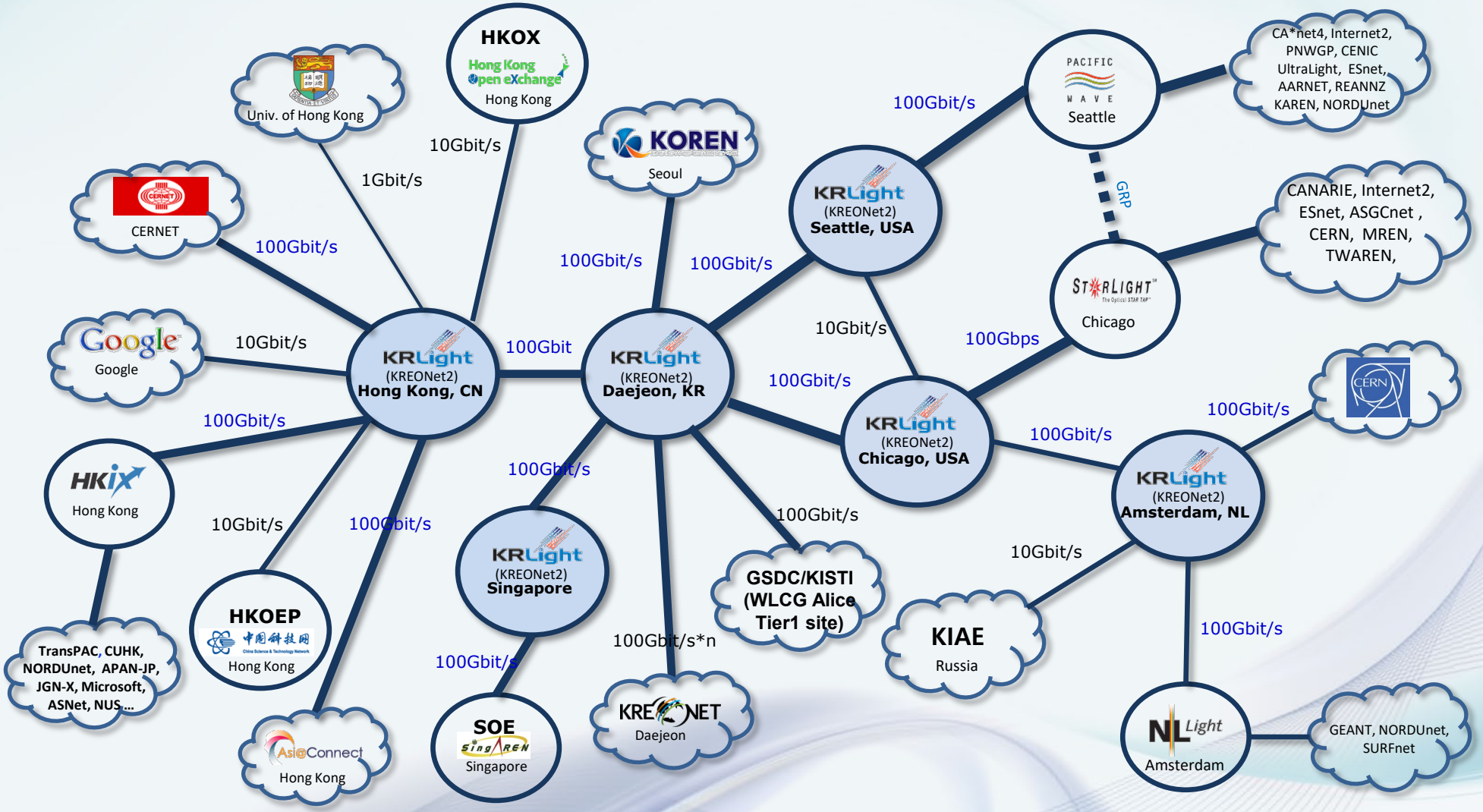


AAE-1 (Singapore-Amsterdam)	
Event	Cable Break
Occurred	2024.02.24
Repair Schedule	10.07 ~ 10.12

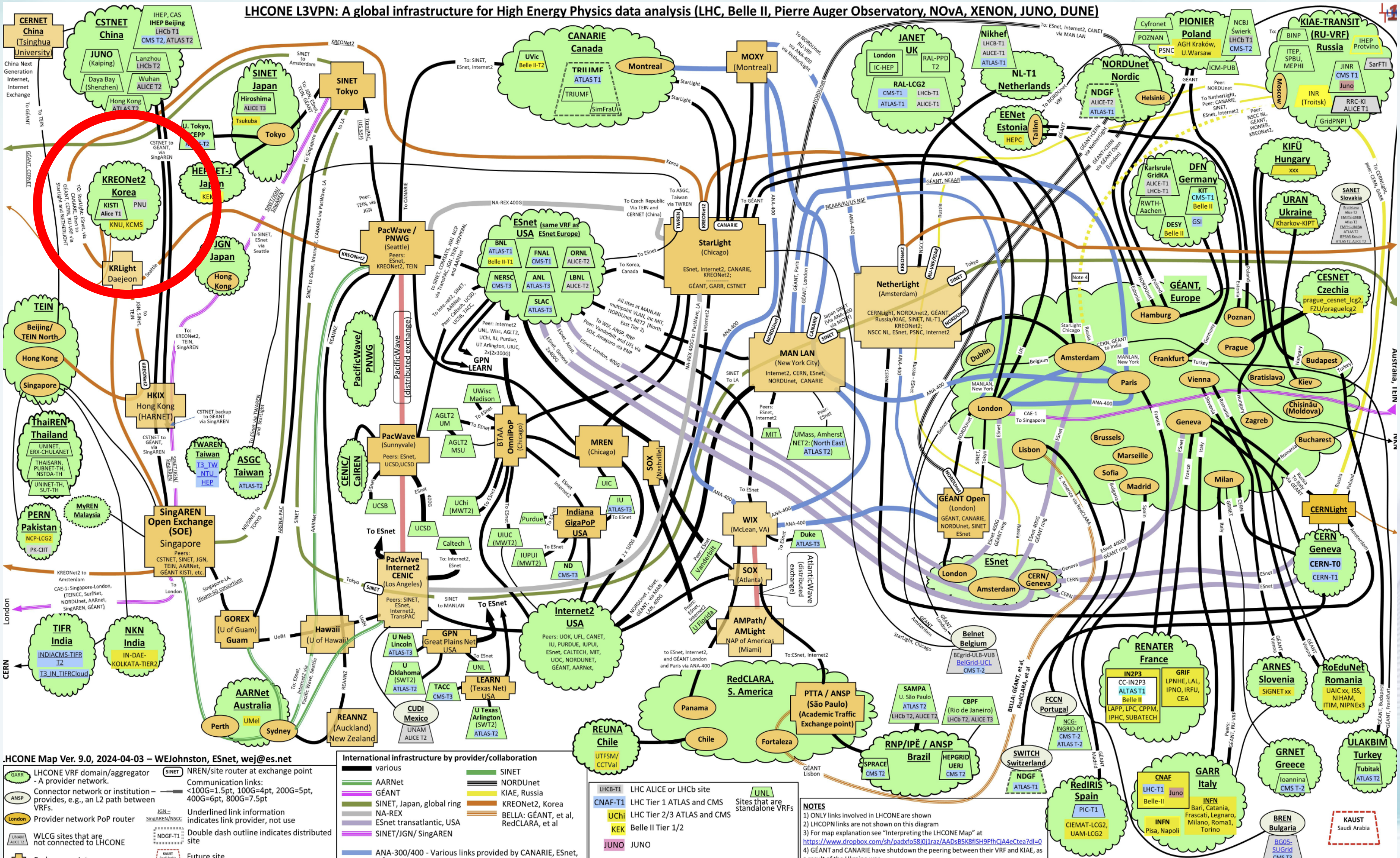
APG (DJ-Singapore)	
Event	Cable Break
Occurred	2024.03.10
Repair Schedule	09.30 ~ 10.04

TGN-IA (DJ-Singapore)	
Event	Cable Break
Occurred	2024.08.11
Repair Schedule	09.20 ~ 10.01

KREONet2 public Peers

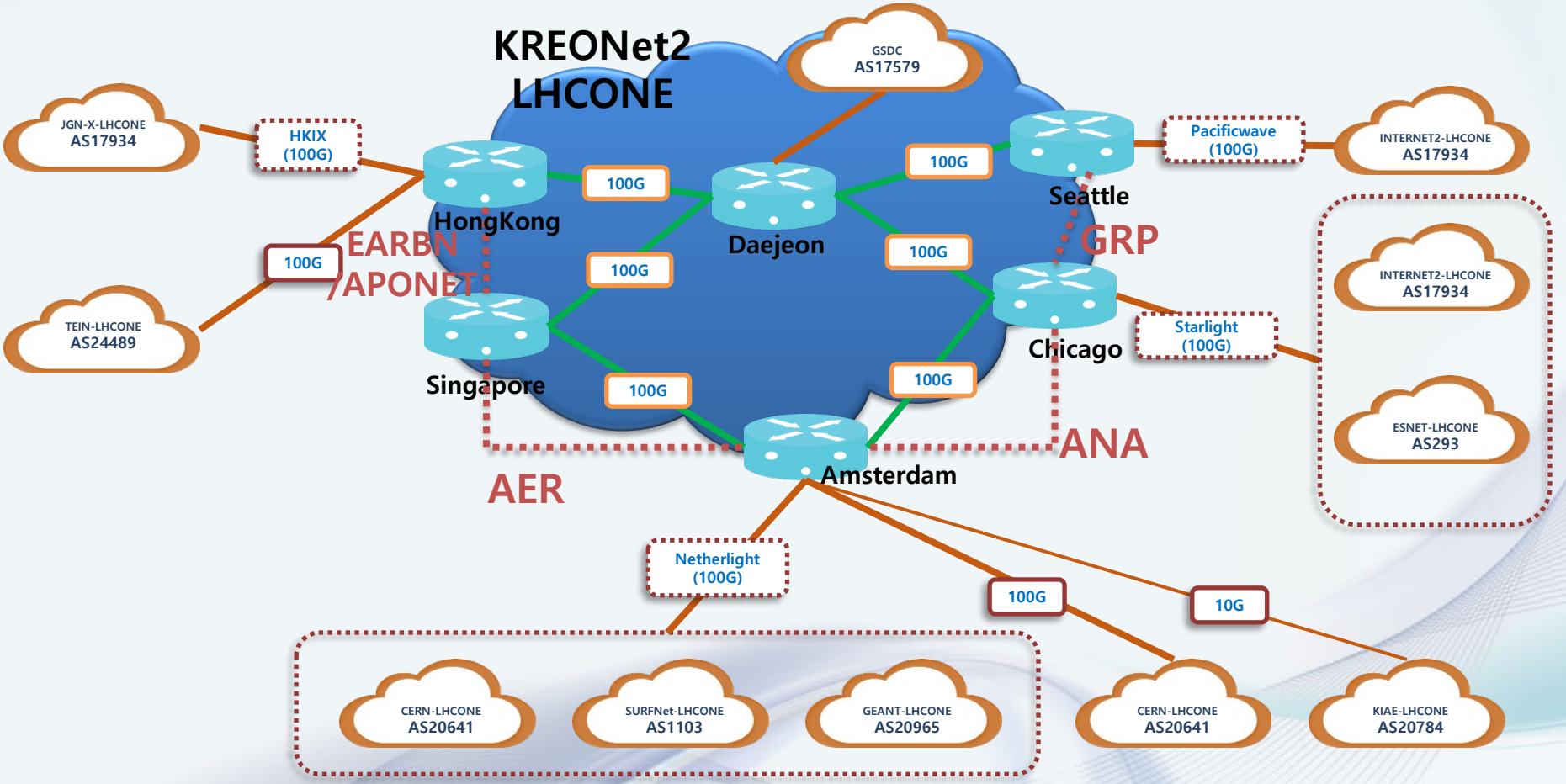


LHCONE Map


LHCONE L3VPN: A global infrastructure for High Energy Physics data analysis (LHC, Belle II, Pierre Auger Observatory, NOvA, XENON, JUNO, DUNE)
LHCONE Map Ver. 9.0, 2024-04-03 – WEJohnston, ESnet, wej@es.net
LHCONE VRF domain/aggregator - A provider network.
Connector network or institution – provides, e.g., an L2 path between VRFs.
Provider network PoP router
WLCG sites that are not connected to LHCONE
Exchange point
NREN/site router at exchange point
Communication links: <100G=1.5pt, 100G=4pt, 200G=5pt, 400G=6pt, 800G=7.5pt
Underlined link information indicates link provider, not use
Double dash outline indicates distributed site
Future site
International infrastructure by provider/collaboration
various
AARNet
GÉANT
SINET, Japan, global ring
NA-REX
ESnet transatlantic, USA
SINET/JGN/ 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
LHC ALICE or LHCb site
LHC Tier 1 ATLAS and CMS
LHC Tier 2/3 ATLAS and CMS
Belle II Tier 1/2
JUNO
Sites that are standalone VRFs
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/sh/padxfo58j0j1raz/AADsB5K8fiSH9FfhCjA4eCtea?dl=0
4) GÉANT and CANARIE have shutdown the peering between their VRF and KIAE, as a result of the Ukraine war.

LHCONE on KREONet2(2024)

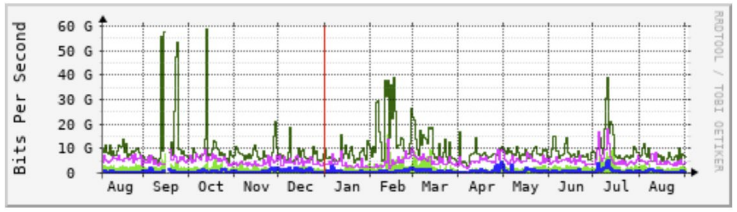
- Expanding backup path for LHCONE network
- We are ready to provide network transit service.



Traffic on KREONET2 links

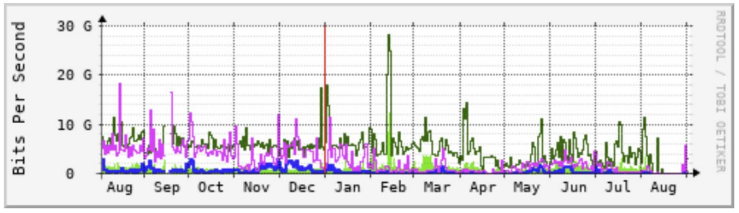
- We have spare bandwidth to transit LHCONE traffic from Asia.

✓ Daejeon-Seattle



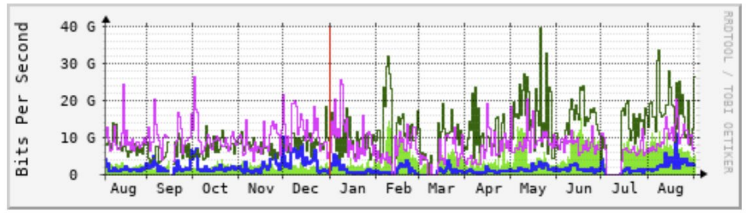
Max In: 16.3 Gb/s (16.3%) Average In: 2776.4 Mb/s (2.8%) Current In: 2036.0 Mb/s (2.0%)
Max Out: 5548.3 Mb/s (5.5%) Average Out: 1046.3 Mb/s (1.0%) Current Out: 793.4 Mb/s (0.8%)

✓ Chicage-Amsterdam



Max In: 12.5 Gb/s (12.5%) Average In: 1232.0 Mb/s (1.2%) Current In: 579.3 Mb/s (0.6%)
Max Out: 3092.0 Mb/s (3.1%) Average Out: 569.0 Mb/s (0.6%) Current Out: 29.7 Mb/s (0.0%)

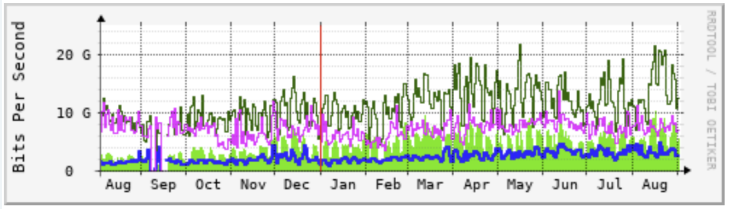
✓ Daejeon-Chicage



Max In: 15.4 Gb/s (15.4%) Average In: 4000.1 Mb/s (4.0%) Current In: 5331.4 Mb/s (5.3%)
Max Out: 11.3 Gb/s (11.3%) Average Out: 1971.0 Mb/s (2.0%) Current Out: 2635.8 Mb/s (2.6%)

✓ Singapore-Amsterdam

`Yearly' Graph (1 Day Average)



Max In: 10.2 Gb/s (10.2%) Average In: 4470.7 Mb/s (4.5%) Current In: 5614.8 Mb/s (5.6%)
Max Out: 4945.1 Mb/s (4.9%) Average Out: 2518.2 Mb/s (2.5%) Current Out: 2847.9 Mb/s (2.8%)

MANRS(Mutually Agreed Norms for Routing Security)

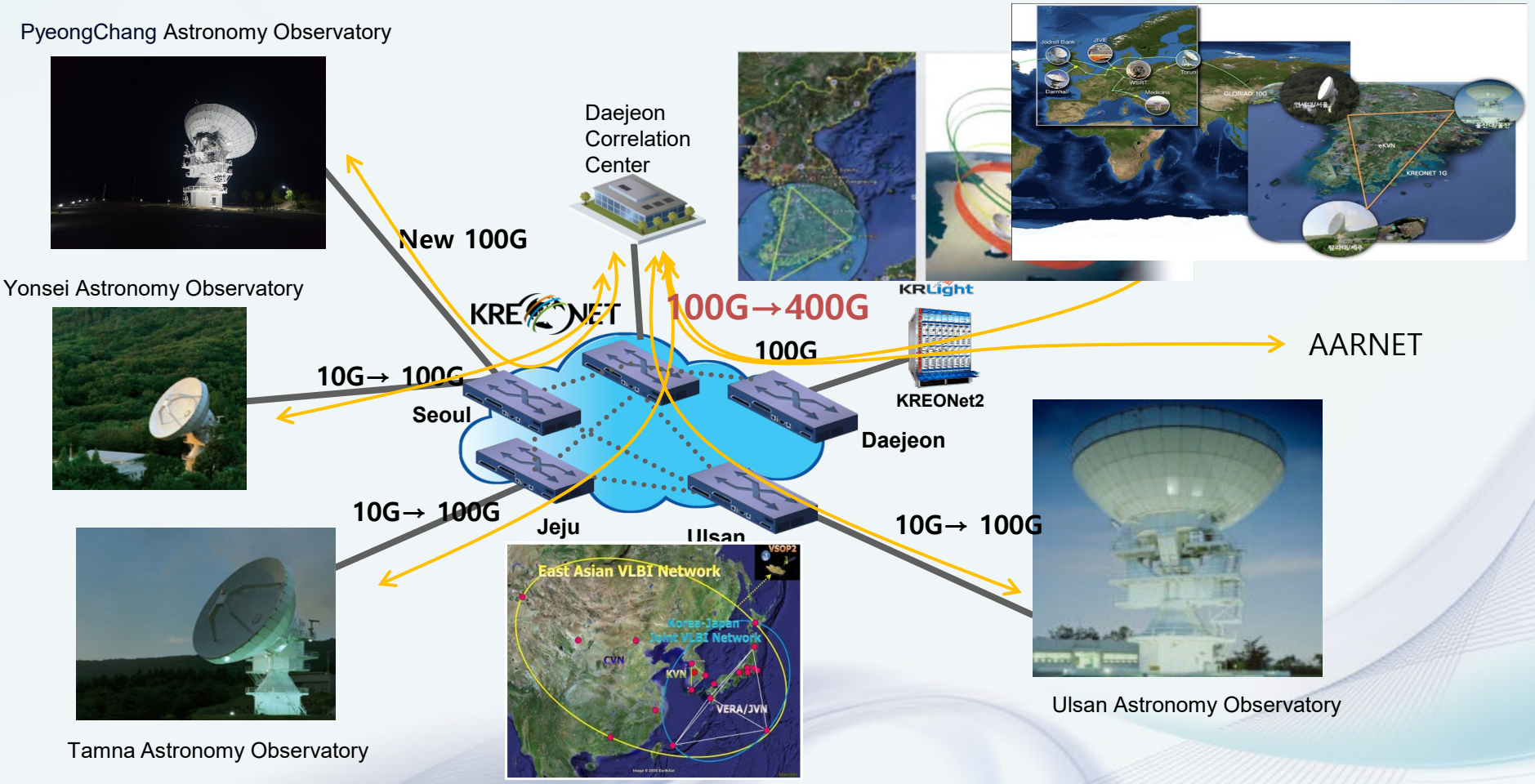
- **MANRS is a global initiative to reduce the most common routing threats.**
  - ✓ More than 1000 network/contents providers are joined
  - ✓ There are no joining networks in KOREA. We start it now.

- **MANRS provides four specific guidelines.**

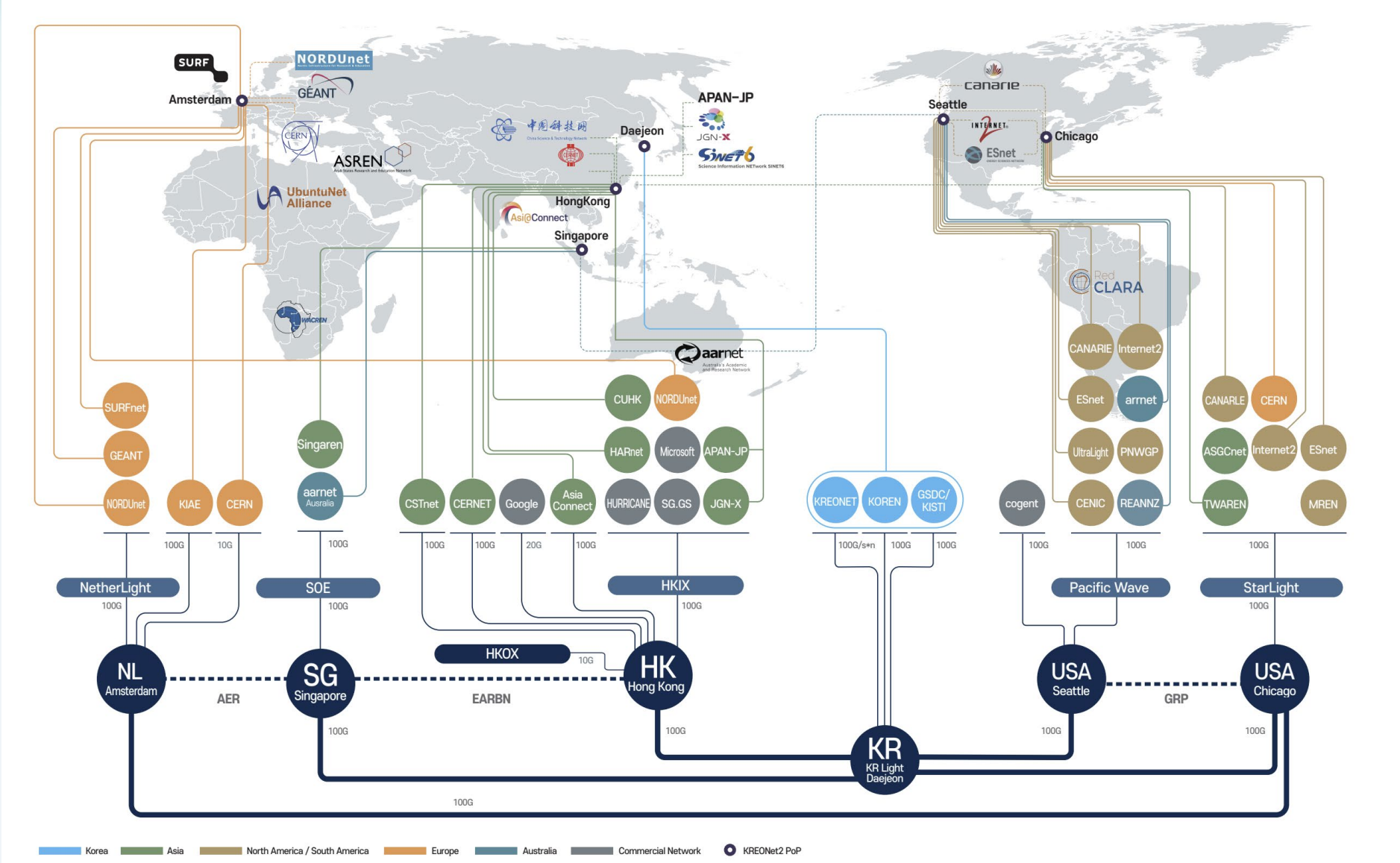
1. **(Validation)** to facilitate routing information for validation
   - ✓ (LHCONE) Disclose routing information on CRIC webpage
2. **(Filtering)** to prevent propagation of incorrect routing information
   - ✓ (LHCONE) BGP Filter based on CRIC information
3. **(Anti-Spoofing)** to prevent traffic with spoofed source IP addresses
   - ✓ (LHCONE) Packet Filter(IP ACL) from Tier1, Tier2 … site
4. **(Coordination)** to facilitate operational communication between network operators
   - ✓ (LHCONE) Long Standing LHCOPN/LHCONE meeting

e-VLBI Network in Korea : First 400Gbps User

- e-KVN: Korean e-VLBI(electronic Very Long Baseline Interferometry) Network
- **Real-time e-VLBI observation with real-time correlation between observatory**



KREONet2 Connectivity map



Thanks for listening.

(pcj0722@kisti.re.kr)