The race to 100Gbps in Asia Pacific

A golden age for the APAN R&E communities
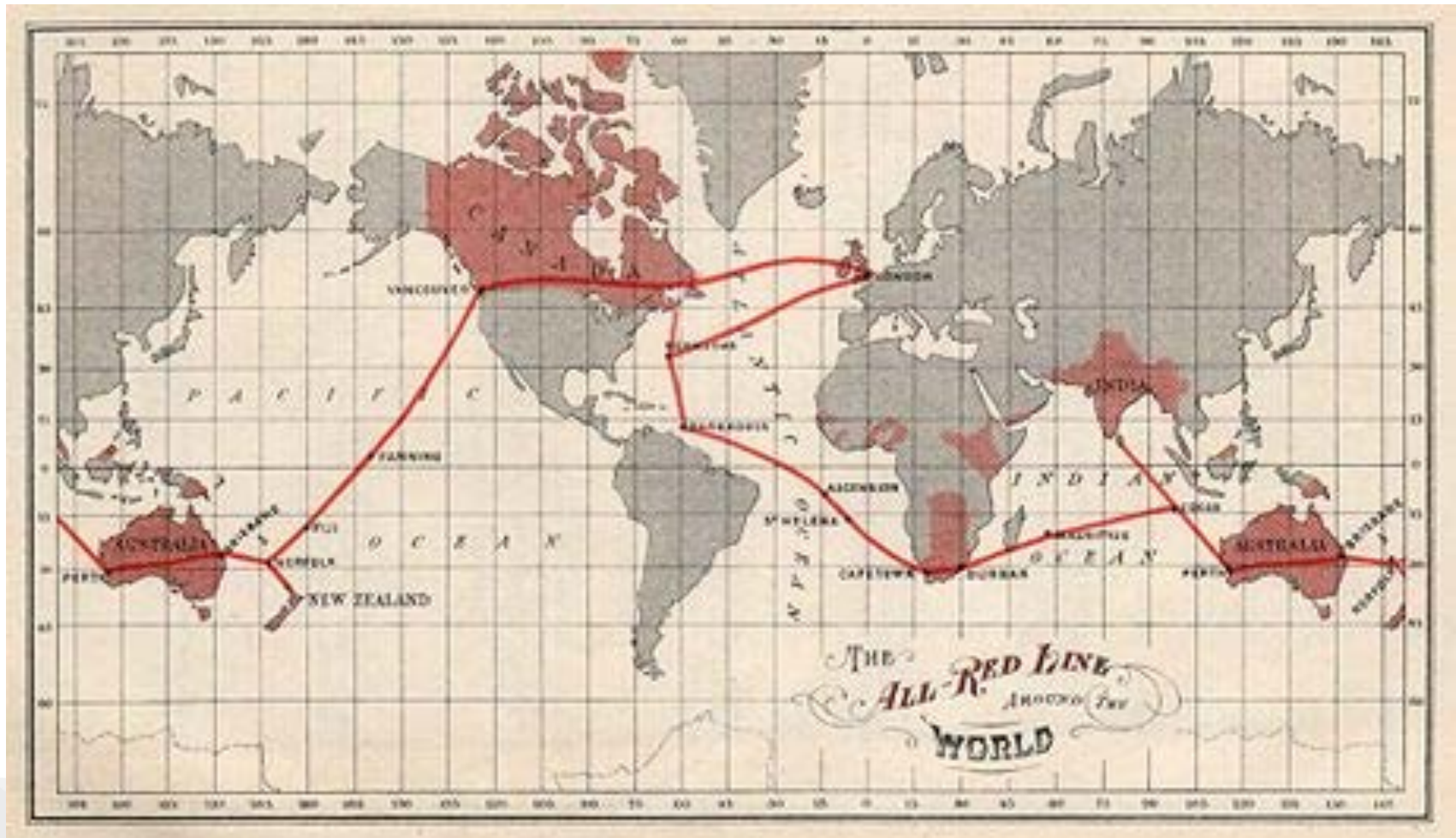
Yves Poppe

Chair APAN Backbone Committee (BBC)
GLIF meeting
September 17th 2018, Helsingør, Denmark

NSCC.SG

All Red Line

Singapore was connected to India in 1870 via Penang
The transpacific section was completed in 1902.

NREN's start owning subsea cable capacity

1. **REANNZ proud anchor tenant on Hawaiki (Australia – NZ – Hawaii – Continental USA)**

2. **AARnet co-owner on Indigo (Australia-Singapore) and JGA (Japan-Guam- Australia).**

3. **Geant co-owner with RedClara on Ellalink (Portugal-Brazil).**

4. **SANReN (South Africa) owns a right-of-use of 7.3% on the full design capacity of WACS (West Africa Cable System) running from Capetown to the UK. In addition SANReN has also IRU's on SEAcom (East Africa cable system)**

The 100Gbps R&E ring around the Globe on the verge of becoming a reality

- Professor Tan Tin Wee's vision of a 100Gbps R&E ring around the Globe, first expressed in 2014 will become a reality fin 2019. Four years ago, in 2014, we had the first transpacific 100Gbps R&E experiment at GLIF in Queenstown and the first applications with 100Gbps transmission between Singapore and New Orleans at SC14.

- At the TNC18 Conference in Trondheim, Norway, in june, Japan announced a 100gbs connection to Europe via the Trans Siberian railway plus a 100Gbps connection from Europe to the USA, RFS Q1 2019.

- Also at TNC18 a consortium of R&E partners including Nordunet, Geant and TEIN*CC, Surfnet, SingAREN and AARNet announced co-funding of a 100Gbps 15 year IRU linking Europe to Singapore with a planned RFS date of end Q1 2019.

- This will bring the ultimate objective of GLIF closer to reality while the R&E GNA (Global Network Architecture) with the partners providing each other mutual back-up, transit and overflow capabilities will expand to global reality.

APR: Asia-Pacific Ring MoU signatories

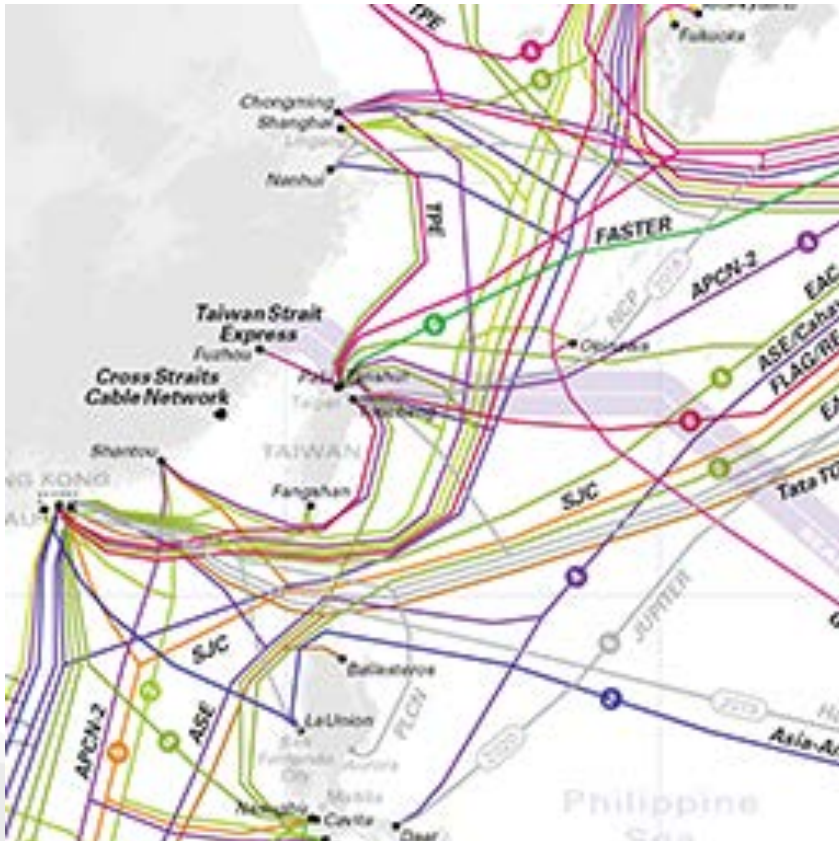**MoU signed at APAN 45 in Singapore in March 2018**
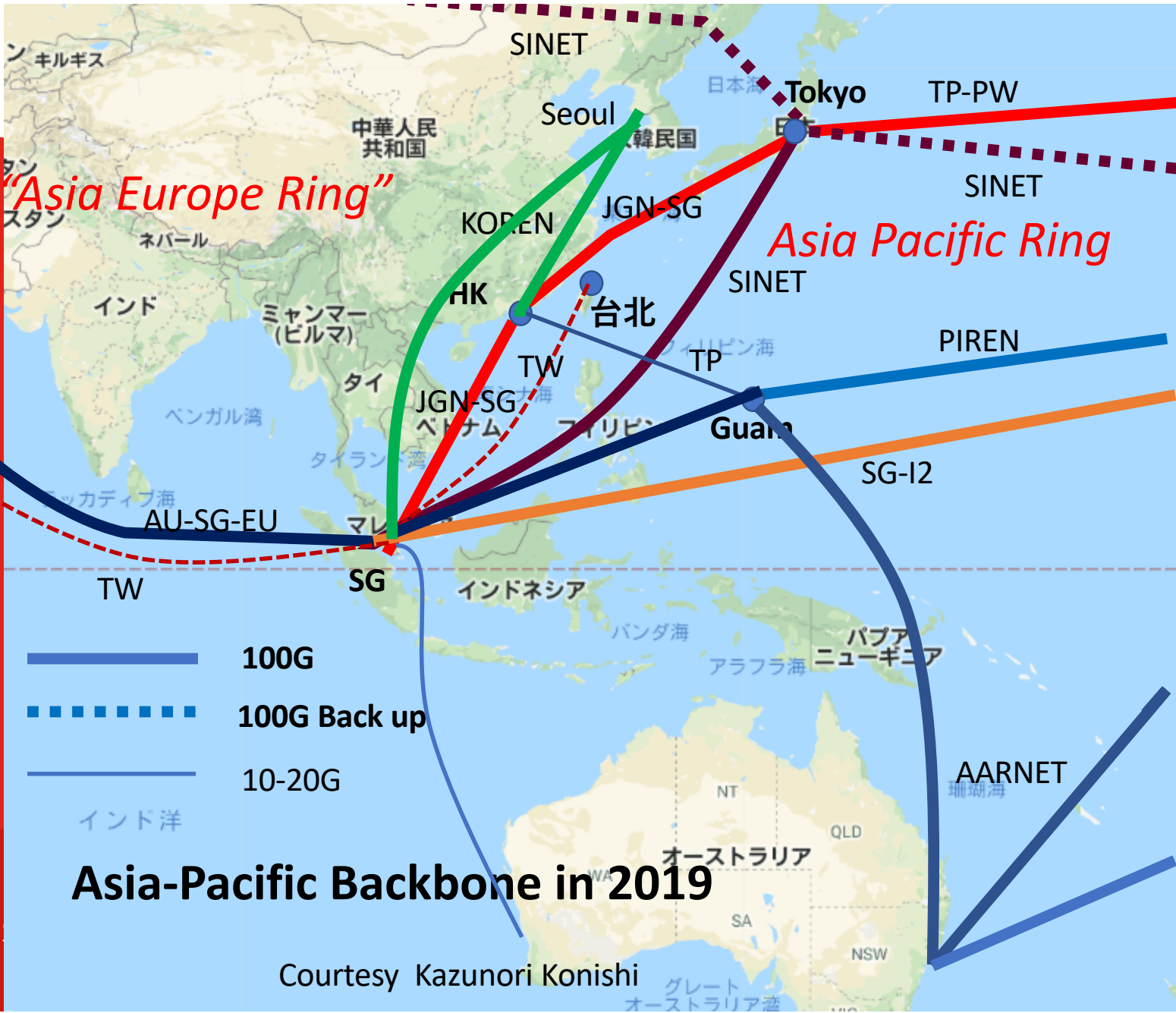
Asia-Pacific Backbone in 2019

Courtesy Kazunori Konishi

Subsea Capacity Evolution
Plenty of terabit action continues in AsiaPac

2016: FASTER, BBG, APG, SEAMEWE-5
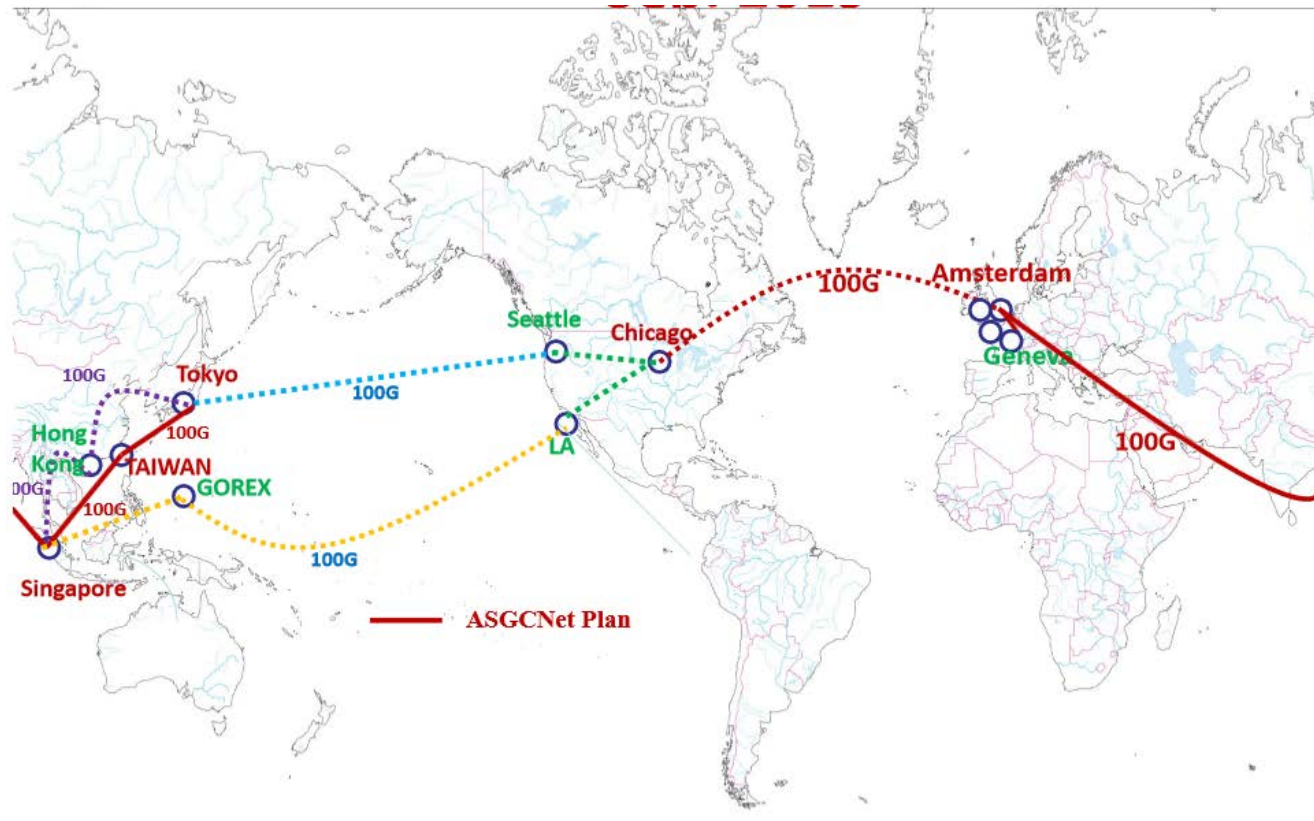
2017: AAE-1, SEA-US

2018: NCP, Hawaiki , ASC

2019: JGA, PLCN, HKG

2020: HKA, Jupiter, BtoBE

See telegeography interactive map:

https://submarine-cable-map-2018.telegeography.com/
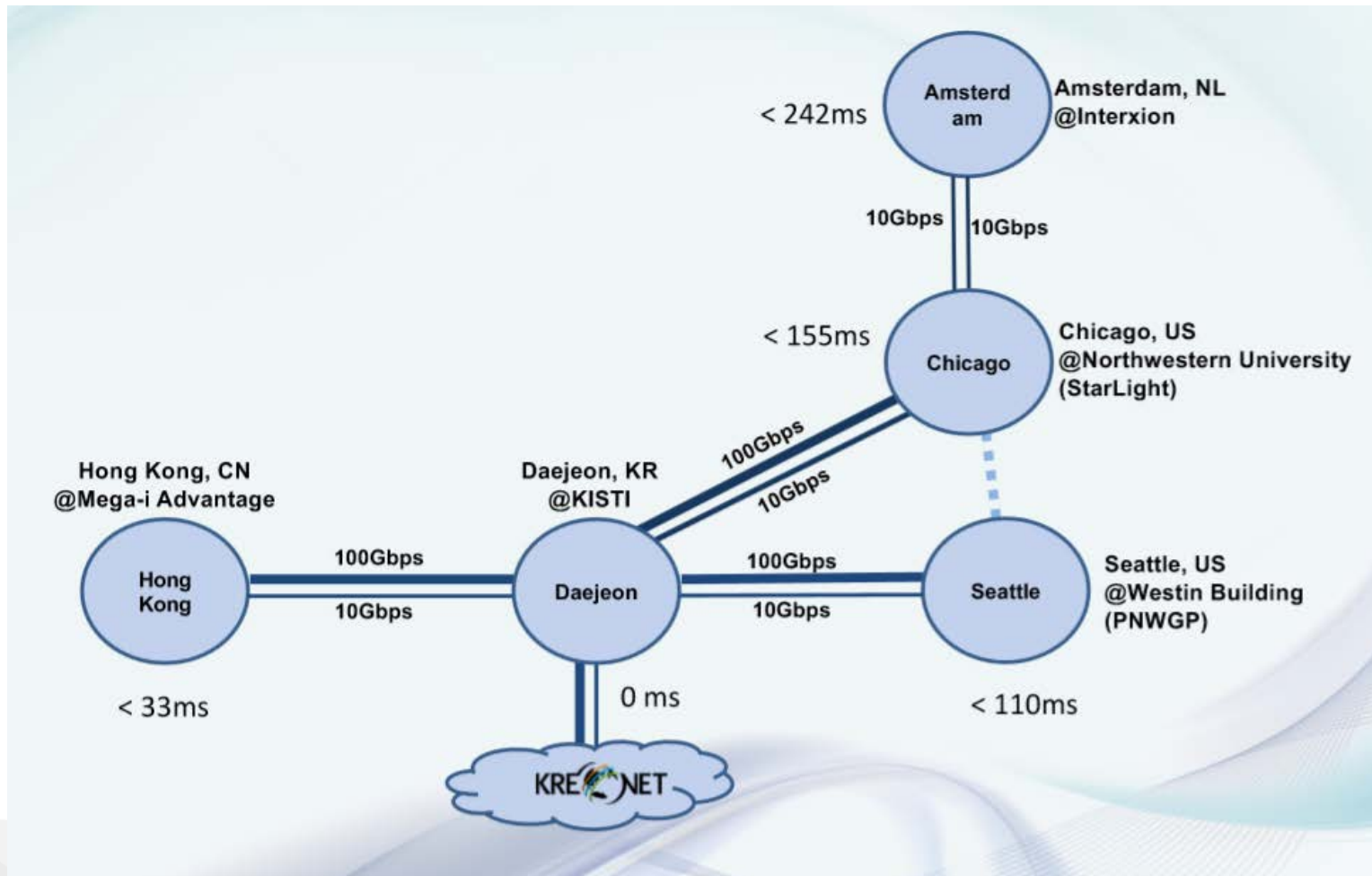
Taiwan : planned configuration sept 2019

Presented at APAN46 in Auckland aug 2018

Rep of Korea : planned configuration 2019

Global 100Gbps R&E connectivity by mid 2019

400Gbps
ANA-400G
Internet2,NORDUnet/GEANT/SURFnet

100Gbps
SINET

100Gbps
KRLight

100Gbps
SINET

100Gbps
TransPAC/Pacific Wave/WIDE

Slough, EU

South Korea

100 Gbps
NICT/SingAREN

Tokyo, JP

Los Angeles, USA

100Gbps
SingAREN/Internet2

Singapore

100Gbps
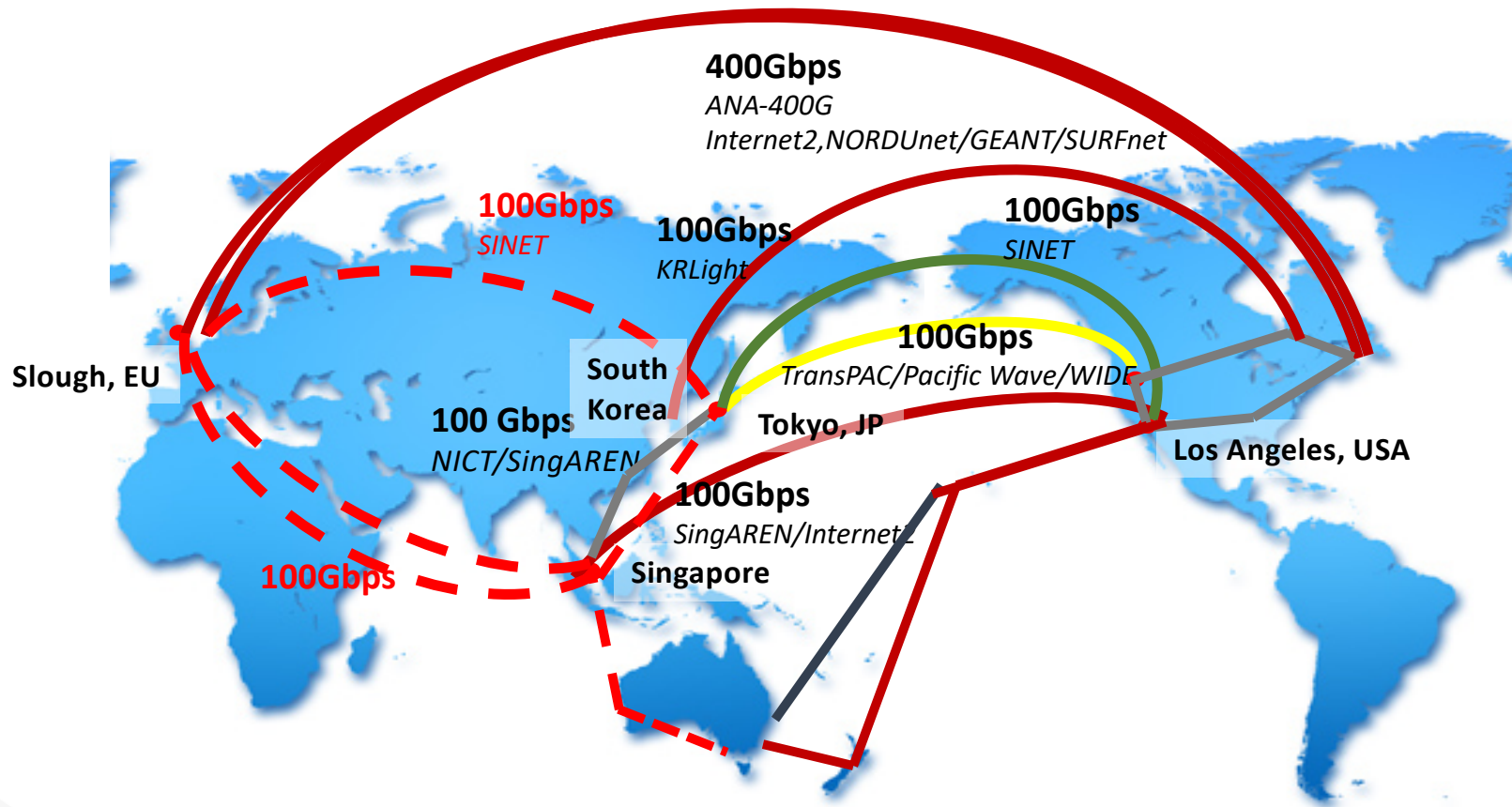
Beyond Networking: Research Platforms
PRP, NRP, APRP, ERP, GRP

- The vast majority of Researchers are not ad hoc communications specialists and do not care about VLAN's or fine tuning GridFTP or Globus to improve throughput rates. They want an easy API to access compute, data or instruments securely and efficiently, wherever they are located.

- The various disciplines will enjoy the benefits of their private network environments running over the shared infrastructure. Science DMZ's and data transfer nodes (DTNs) with Performance measurement, network testing and solid Security Policies and enforcement mechanisms.

- Operational RP's are increasingly used by high compute, high storage and high speed science environments i.a meteorology, genomics, AI, HEP, astronomy .

- An APRP WG has been formed within APAN with Jeonghoon Moon (KISTI Korea) as Chair and Andrew Howard (ANU Australia) as co-Chair.

- The final objective: Research at the speed of thought

Convergence of Compute, Storage and Communications Collaboration is crucial for Economic Prosperity

- **AI, Deep Learning, machine learning with associated simulations and analysis have become a source of discovery. Areas such as Genomics and personalized medicine require ultra high security and reliability, fast data replication and disaster recovery.**

- **Exascale computing is seen as the next Frontier with the USA, Europe, Japan and China allocating each in excess of one billion US$ to be the first to reach this milestone by the early 2020's. The july 2018 TOP500 list now has 272 petaflop level machines up from 181 in November 2017 and 2 back in nov 2008. The list now includes sixteen 10 Petaflop level machines.**

- **To remain relevant facing the exascale challenge, Singapore would like to invite APAN members and in particular ASEAN members to build shared HPC resources and the associated network infrastructure based on APRP to support our researchers in Government and Industry Research Labs and Academia as all research areas are becoming data and compute intensive.**

A prediction?
The world will see
Exascale Computing in 2022 and
the first Petabit level
transcontinental data
transmission cable in 2024

Creativity requires the courage to let go of certainties.
Erich Fromm