Singapore Advanced Research and Education Network

www.singaren.net.sg

ipv6.singaren.net.sg

By

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Background

- **SingAREN** is Singapore's research and education network.

  → Incorporated in 2003 as a non-profit society

  → Funded by members' subscriptions & NRF (National Research Foundation) project funding

- SingAREN advocates and champions advanced network applications and technology in Singapore

- Provides dedicated local & international networks for Singapore's research and education community

SingAREN Members

Government, Institutes, Industries

Universities

Polytechnics & International Schools

SingAREN Partners:
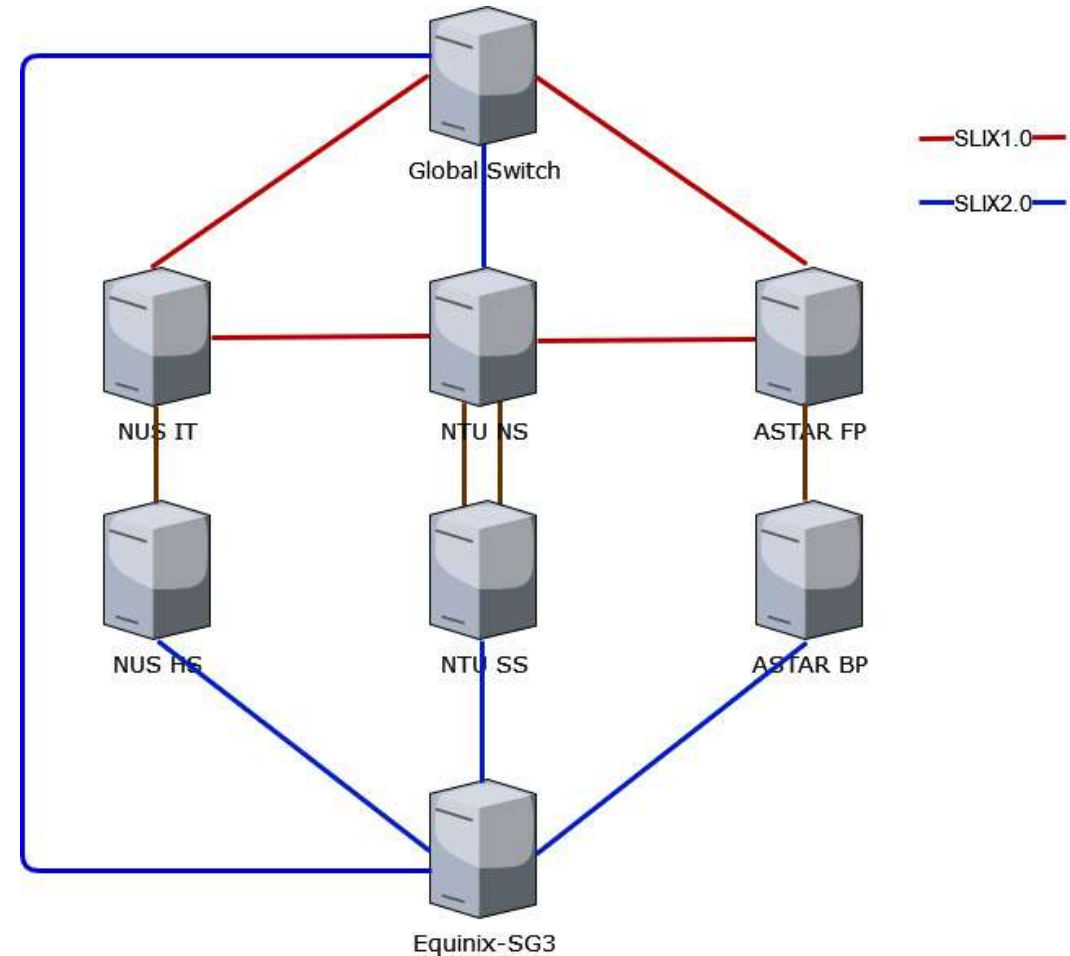
SingAREN Lightwave Internet Exchange Topology

- SLIX1.0: 2013
- SLIX 2.0: 2019
- Dual Points-of-Presence (PoPs):
  - GlobalSwitch(SOE-1)
  - Equinix (SOE-2)
- Dual homing from SLIX partner nodes to SLIX PoPs
- Secondary DC at SLIX partner campus for intra-campus resilience
- Automatic failover arising from
  - PoP disruption
  - Link breakage

SingAREN Open Exchange – *physical topology*
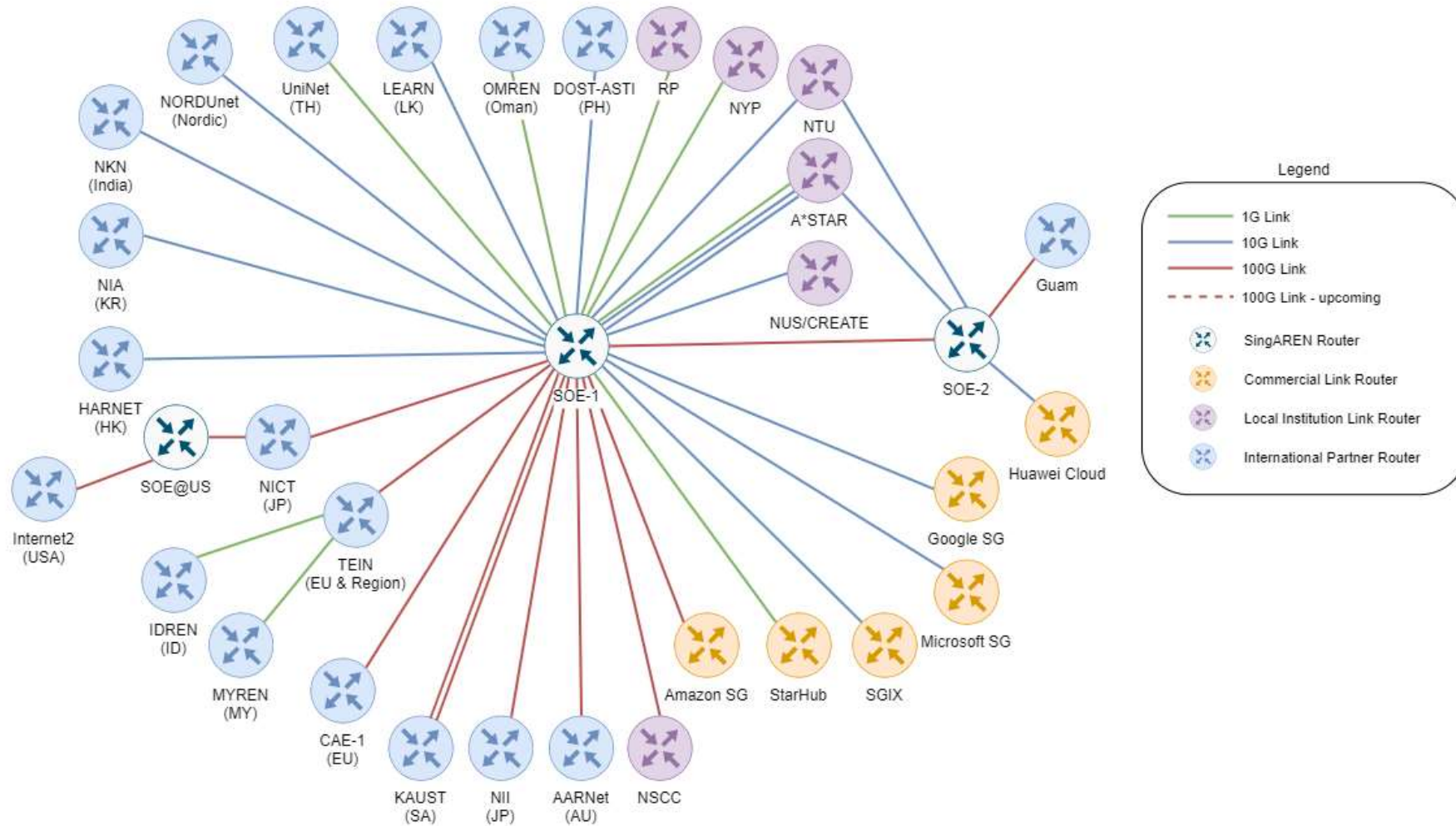
International Connectivity

- **Asia-Pacific-Oceania Network (APOnet):**
  - An MoU was signed on 15 Jun 21 with the 11-partner consortium for network resilience.
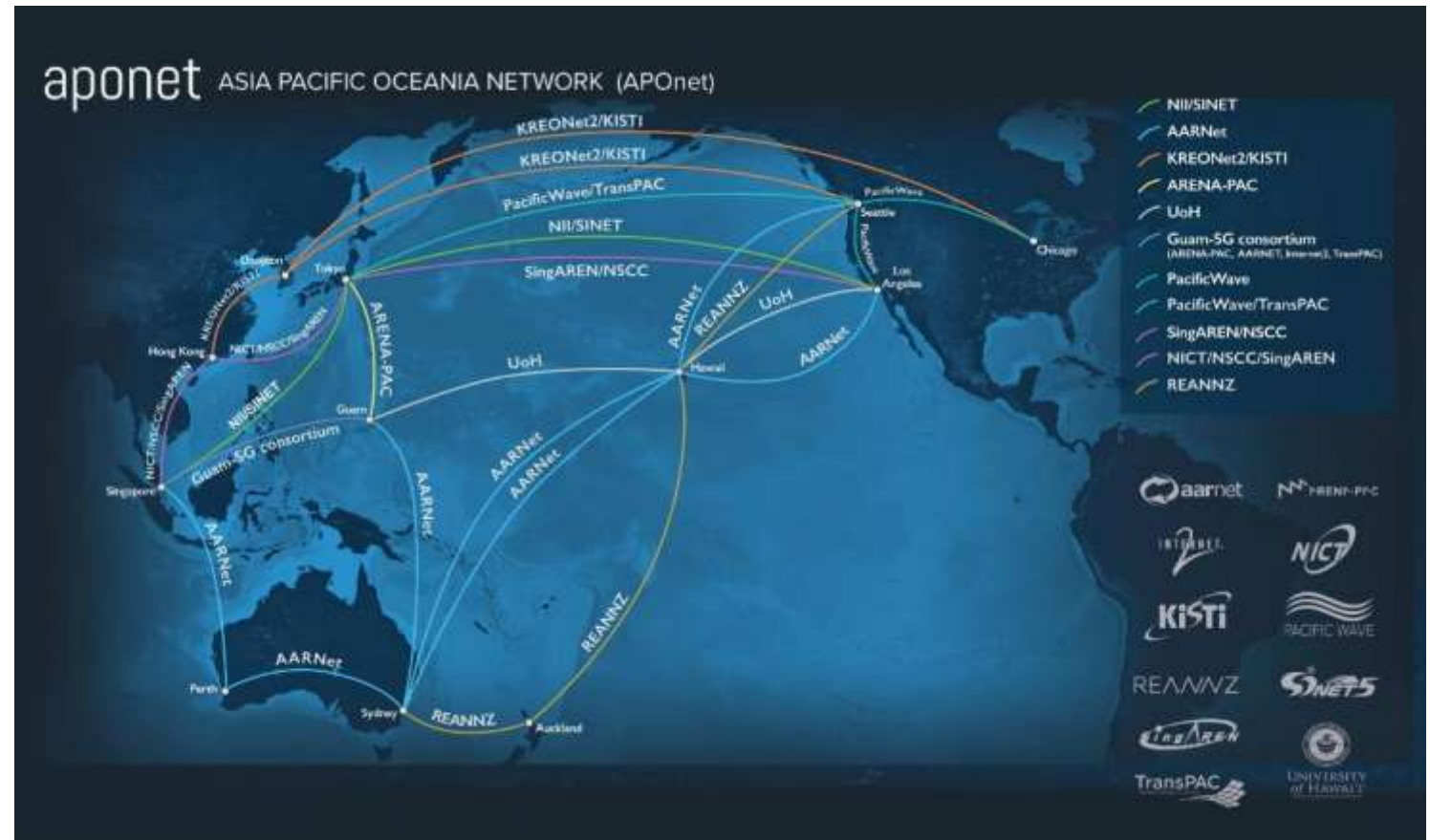
International Connectivity

- Extension of MoU for **Asia-Pacific Europe Ring (AER)**
  - 10-partner consortium for network resilience, consisting of **100G network ring** between Europe and Asia
  - New partners: HARNET(Hong Kong) and KAUST (Saudi Arabia)

2022

100Gbps *SINET*

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

100Gbps
SINET

100Gbps
KRLight

100Gbps
SINET

100Gbps
TransPAC/Pacific Wave/WIDE

Netherlight, EU

Slough,UK

South Korea

KAUST, SA

100 Gbps
NICT/HARNET/
NSCC/ SingAREN

Tokyo, JP

Los Angeles, USA

100Gbps
CAE 1

ARENA-PAC/AARnet/
Internet2/TransPAC

Guam

Honolulu

Singapore

AARnet

REANZZ
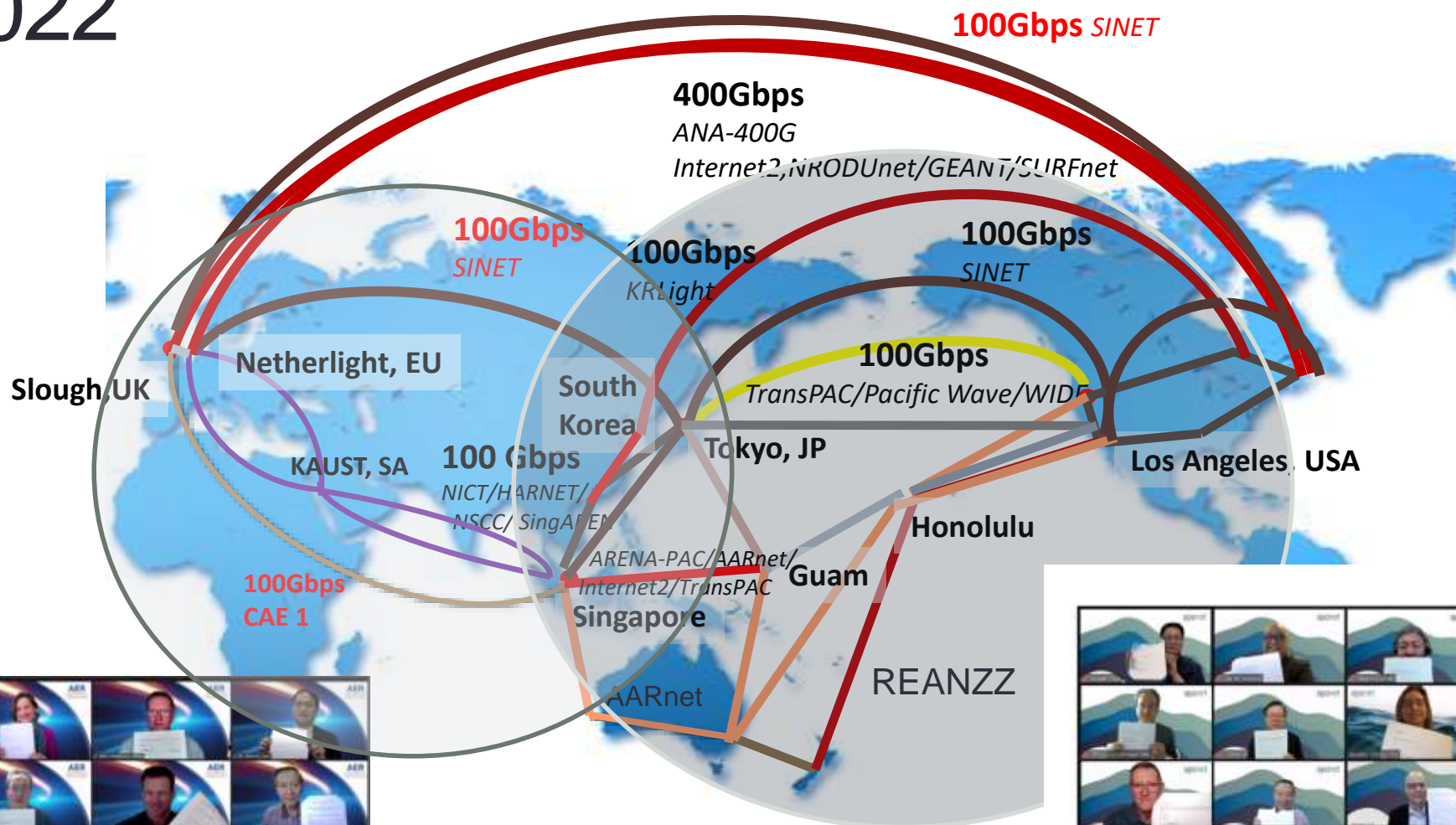
AER (2022)

APOnet (2021)

Asi@Connect

The EU co-funded Asi@Connect project provides a dedicated regional high capacity and high quality internet network, Trans Eurasia Informati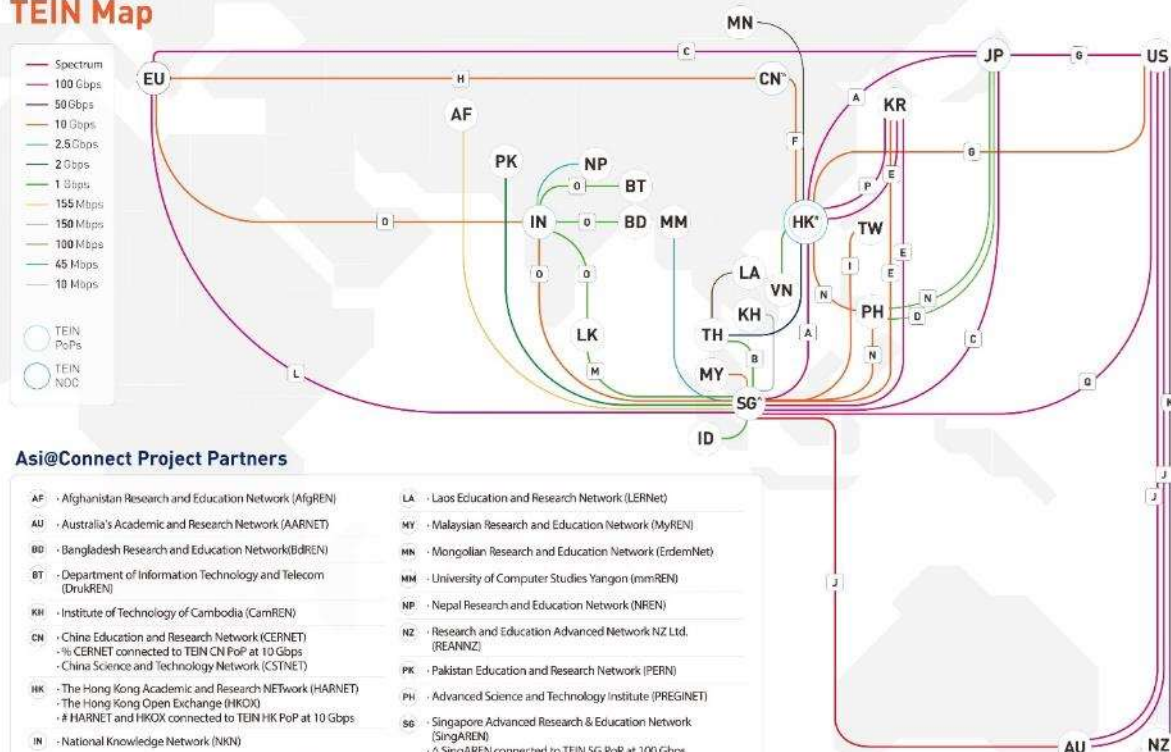on Network(TEIN), for Research and Education (R&E) communities across Asia-Pacific and Europe, and leverages e-infrastructures developed for public service projects.

TEIN Map

Legend:
- Spectrum
- 100 Gbps
- 50 Gbps
- 10 Gbps
- 2.5 Gbps
- 2 Gbps
- 1 Gbps
- 155 Mbps
- 150 Mbps
- 100 Mbps
- 45 Mbps
- 10 Mbps

- TEIN PoPs
- TEIN NOC

The following links are fully financed/co-financed by the link owners whose support is gratefully acknowledged

A	National Institute of Information and Communications Technology / National Supercomputing Centre / Singapore Advanced Research & Education Network
B	National Institute of Information and Communications Technology / Thailand Research and Education Network
C	National Institute of Informatics
D	Ministry of Agriculture, Forestry and Fisheries Research Network
E	National Information Society Agency
F	China Education and Research Network / TEIN Cooperation Center
G	TransPAC/Pacific Wave
H	Co-funded by China and EU
I	Academia Sinica Grid Computing
J	Australia's Academic and Research Network
K	Research and Education Advanced Network New Zealand
L	aarnet / GÉANT / NORDUnet / SingAREN / SURFnet / TEIN
M	LEARN — Lanka Education and Research Network
N	Advanced Science and Technology Institute
O	National Knowledge Network
P	Korea Research Environment Open NETwork
Q	National Supercomputing Centre / Internet2 / Singapore Advanced Research & Education Network

Asi@Connect Project Partners

- AF · Afghanistan Research and Education Network (AfgREN)
- AU · Australia's Academic and Research Network (AARNET)
- BD · Bangladesh Research and Education Network(BdREN)
- BT · Department of Information Technology and Telecom (DrukREN)
- KH · Institute of Technology of Cambodia (CamREN)
- CN · China Education and Research Network (CERNET) - % CERNET connected to TEIN CN PoP at 10 Gbps · China Science and Technology Network (CSTNET)
- HK · The Hong Kong Academic and Research NETwork (HARNET) · The Hong Kong Open Exchange (HKOX) · # HARNET and HKOX connected to TEIN HK PoP at 10 Gbps
- IN · National Knowledge Network (NKN)
- ID · Indonesia Research and Education Network (IDREN)
- JP · Ministry of Agriculture, Forestry and Fisheries Research Network (MAFFIN) · National Institute of Information and Communications Technology (NICT) · National Institute of Informatics (NII)
- KR · National Information Society Agency (KOREN) · Korea Institute of Science and Technology Information (KREONET)
- LA · Laos Education and Research Network (LERNet)
- MY · Malaysian Research and Education Network (MyREN)
- MN · Mongolian Research and Education Network (ErdemNet)
- MM · University of Computer Studies Yangon (mmREN)
- NP · Nepal Research and Education Network (NREN)
- NZ · Research and Education Advanced Network NZ Ltd. (REANNZ)
- PK · Pakistan Education and Research Network (PERN)
- PH · Advanced Science and Technology Institute (PREGINET)
- SG · Singapore Advanced Research & Education Network (SingAREN) · ^ SingAREN connected to TEIN SG PoP at 100 Gbps
- LK · Lanka Education and Research Network (LEARN)
- TW · Academia Sinica Grid Computing (ASGC)
- TH · Thailand Research Education Network Association (ThaiREN)
- VN · National Agency for Science and Technology Information (VinaREN)

* As of December 2020.
** Other regions (Central Asia, Africa and Latin America) can be connected via global R&E networks such as EU(GÉANT) and US(Internet2)

Telemedicine · Earth Observation · Food Security · e-Science · e-learning · e-Culture · Advanced ICT Technology · Capacity Building Programs

Possibilities with Asi@Connect

(Map as at Dec 2020)
Source:
Asi@Connect website
https://www.tein.asia

SingAREN Services

- **Global wireless service** for secure internet connectivity across eduroam-participating institutes, through the user's home institution account and password

- Worldwide federation of RADIUS servers that facilitates network access for roaming users - available in over 100 territories and 25,000 locations worldwide

- Service is available in institutes of higher learning and research institutes in Singapore

- https://www.singaren.net.sg/eduroam.php

SingAREN Services

Singapore Access Federation (SGAF)

- **Federated Identity Management** authentication and authorisation system based on SAML (Security Assertion Markup Language)
- Facilitates **Single Sign-On** for online services and applications
- Convenience of using user's home organization credentials
- Institutions connected to SGAF:
  - Agency for Science, Technology and Research (A*STAR)
  - National University of Singapore (NUS)
  - Nanyang Technological University (NTU)
  - Singapore Management University (SMU)
  - Singapore University of Technology and Design (SUTD)
  - Singapore Polytechnic (SP)
  - Temasek Polytechnic (TP)
- https://www.singaren.net.sg/SGAF-services.php

SingAREN Services

Singapore Access Federation (SGAF)

FileSender SG	National Supercomputing Centre
Powered by: 	

- Allows users to send large file attachments
- Up to 50GB per file
- Secure authenticated service

- Single sign-on to NSCC facilities

SingAREN Services

Database Mirroring Service

- Enables high speed downloads of major scientific databases for Singapore's R&E community

- Relevant for users with frequent access to large overseas databases

- Examples of mirrored databases:
  - National Center for Biotechnology Information (NCBI), U.S.
  - UCSC Human Genome Browser, U.S.
  - European Bioinformatics Institute (EBI)
  - GenomeNet, Japan

- For more information, please visit https://www.singaren.net.sg/network-services/database-mirroring/
- To access the service, please visit ftp://dbmirror.singaren.net.sg/

SINGAREN EVENTS

Inaugural SingAREN Virtual Roadshow: 21 May 2021

- Objectives
  - To engage the Research and Education community
  - Share case studies of benefits of connecting to SingAREN Open Exchange
  - To seek community inputs how SingAREN can enhance value to IHL/RIC institutional members in these areas:
    - Technology network infrastructure
    - Value-added services
    - Awareness building

- Keynote Speech by NUS Chief IT Officer, Ms. Tan Shui-Min
- Launch + Overview of SLIX 2.0
- Kickoff of Engagement Series with IHLs/RICs
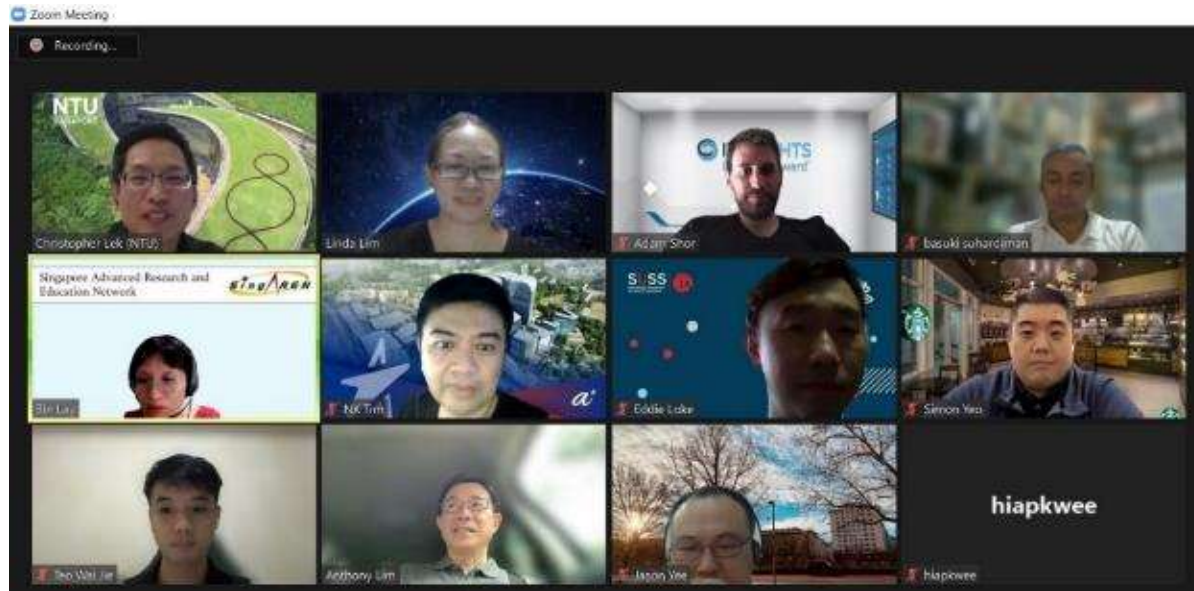- Over 40 participants from the community

Asi@Connect DTN Project:
Training Workshops: APAN51 Meeting, 3 Feb 2021

- Organised as part of the "Large Data Transfer Infrastructure and Training for Asi@Connect" project, funded by EU and managed by TEIN*CC

- **"Setting Up and Running a Globus DTN and perfSONAR Node"** by Prannoy Sablok (SingAREN):
  - 42 attendees

- **"Building a Computational Platform with Kubernetes"** jointly conducted by Jordan Tan, Alex Neo, Chalermpol Charnsripinyo, Ridnarong Promya, and Napat Chuangchunsong (NTU, SingAREN and NECTEC, Thailand):
  - 58 attendees
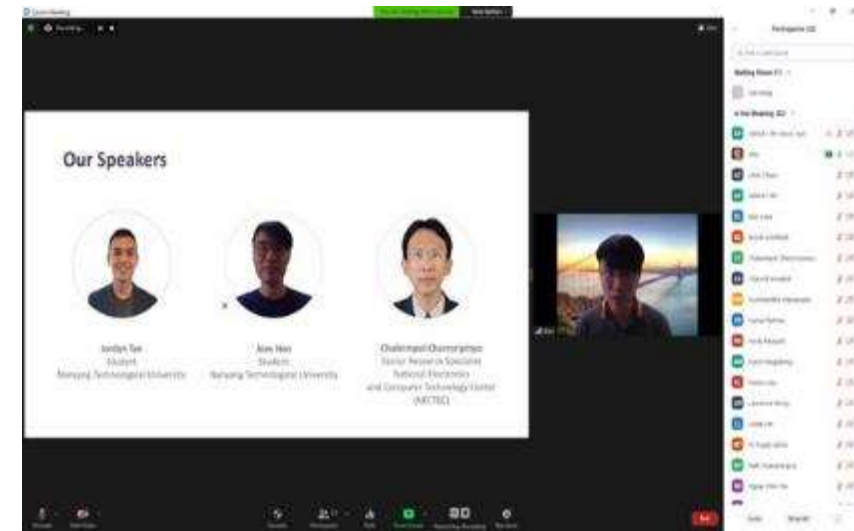
Cybersecurity Webinar: Leveraging on Threat Intelligence to Protect Your Research and Proprietary Data, 20 Aug 2021

- Objective: To help participants gain a better understanding of how threat intelligence can be a tool in helping to safeguard their organisations' data

- Over 20 participants from the community

- Positive feedback:
  - Participants gained a better understanding of the importance of threat intelligence
  - Raised awareness levels on cyber threats

Cybersecurity Workshop: Safeguarding Your Networks Against Modern DDoS Attacks With Award-Winning Technology, 30 June 2022
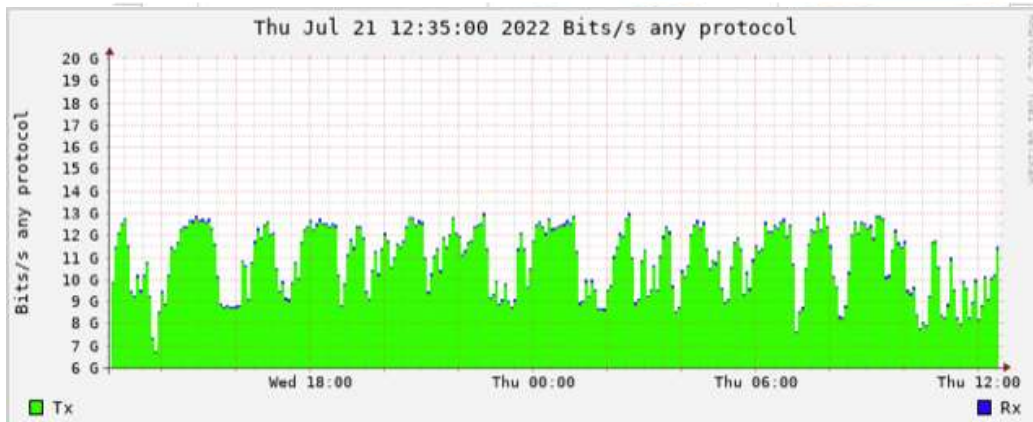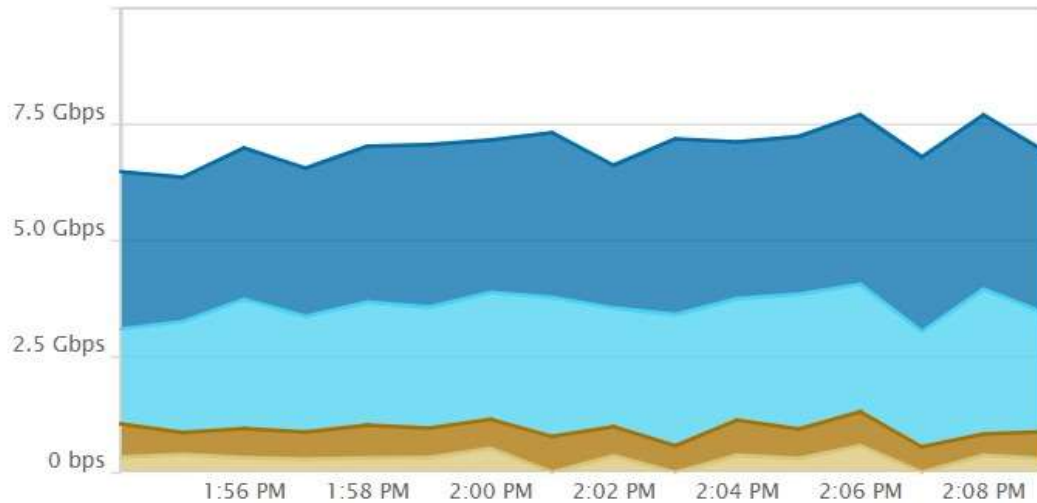
SINGAREN ACTIVITIES WORKING WITH NSCC
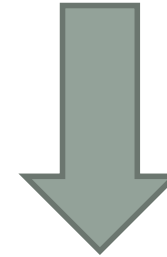
High Speed Data Transfer

Top 20 Conversations
BOTH, LAST 15 MINUTES, RATE (KBPS)

Gadi supercomputer
NCI(AUS)

ASPIRE 2A
Singapore

Access to Fugaku

- Users in Singapore, have access to 2nd TOP500 supercomputer.
- The path from Singapore to Fugaku supercomputer, at RIKEN in Japan, is via the international links set-up by SingAREN and its partners.

©RIKEN

Data Mover Challenge 2021 – Organised by NSCC

- SingAREN is a supporting partner for the Data Mover Challenge 2021 (DMC21) event, together with other international R&E network partners.
  - Objective: challenge international teams to come up with the most advanced and innovative solutions for data transfer across servers located in various countries, connected by 100Gbps international research and education networks.

Image credit: https://www.nscc.sg/data-mover-challenge-2021/

NSCC and SingAREN

- SingAREN work closely with NSCC to support its network needs.

  - Local connectivity: Dark fiber support for NTU, NUS, A*STAR, etc
  - International connectivity: USA, Europe, Oceania, Asia.
  - PoC: QKD testing, Science DMZ, etc..

NSCC + SingAREN

THANK YOU

Q&A