

High-speed networks to enable SG-JP collaboration

By

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Collaboration layers

Domain specific software

Tools: Data Management, workflow, orchestrators, identity management, etc.

Research Infrastructure: Network, Storage, Compute, etc..



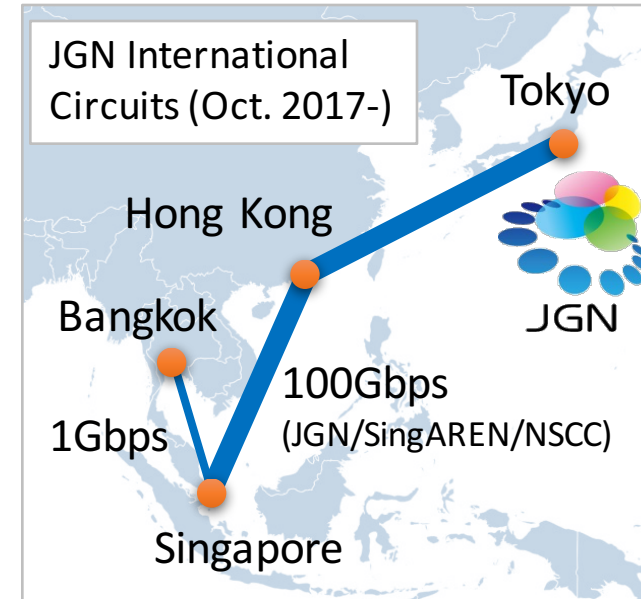
History

- 1998 – 2 Mbps link sg-jp under the All program
- 2005 – 155 Mbps link
- 2008 – 1 Gbps
- 2009 – 2.4 Gbps
- 2011 – 10Gbps
- 2017 – 100 Gbps
- 2019 – 2x100 Gbps

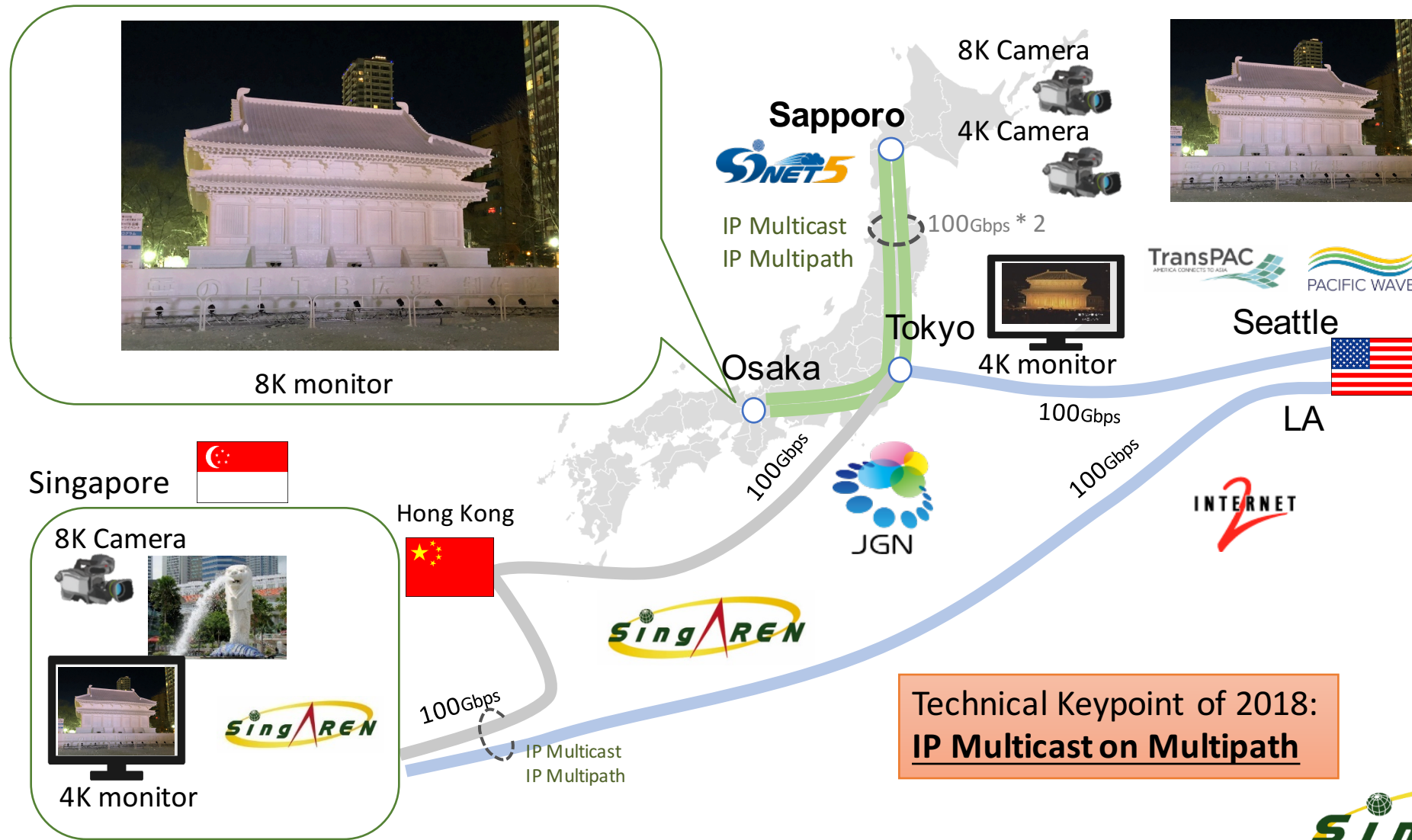


About JGN

- JGN is a **network testbed** operated by NICT
 - NICT is a national research and development agency in Japan
 - JGN started in 1999
- JGN has international circuits (and domestic circuits, of course)
 - 100G: Tokyo-Hong Kong-Singapore (JGN/SingAREN/NSCC)
 - A member of Asia Pacific Ring (APR)
 - 1G: Singapore-Bangkok
- JGN supports cutting-edge network experiments
 - High-speed app: uncompressed 8K video transmission
 - Time-sensitive app: next-generation ICT-supported surgery, etc.
- We have been collaborating with SINET to extend network reachability in Japan



Uncompressed 8K Video Transmission at Sapporo Snow Festival (2018 Feb.)



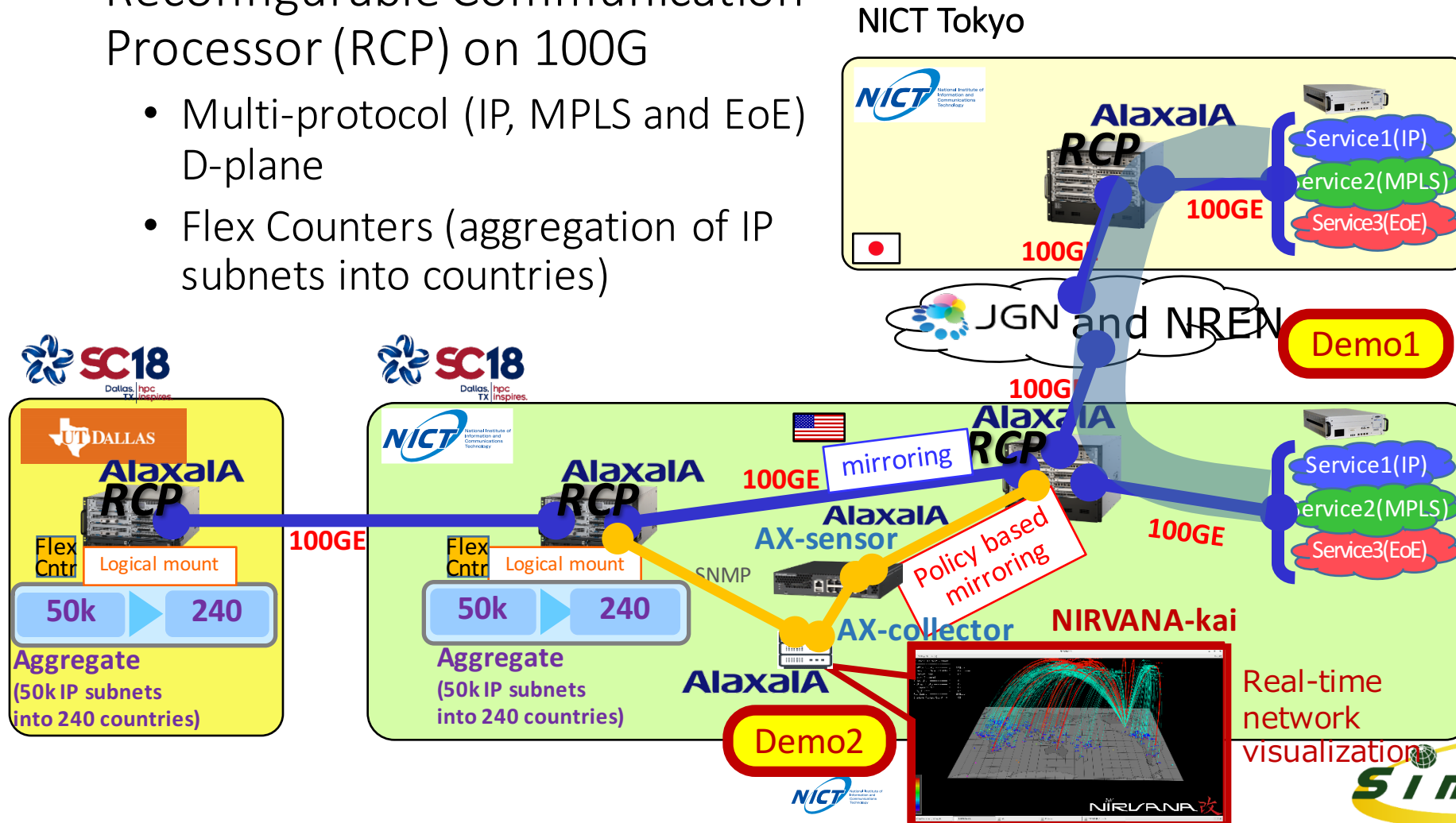
Technical Keypoint of 2018:
IP Multicast on Multipath



SC18 Demonstration

(Joint work with Keio Univ. and Alaxala)

- Reconfigurable Communication Processor (RCP) on 100G
 - Multi-protocol (IP, MPLS and EoE) D-plane
 - Flex Counters (aggregation of IP subnets into countries)

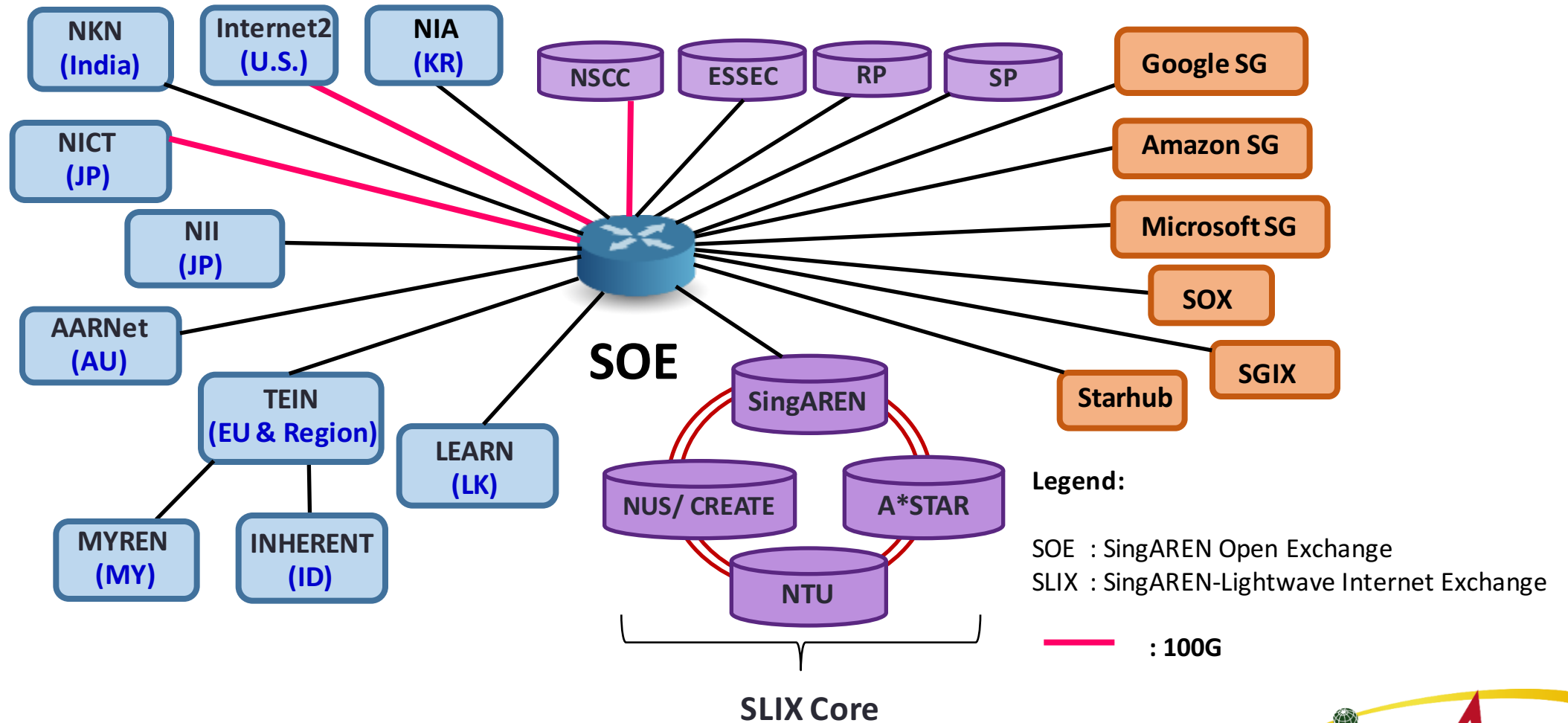


Why the increase in bandwidth

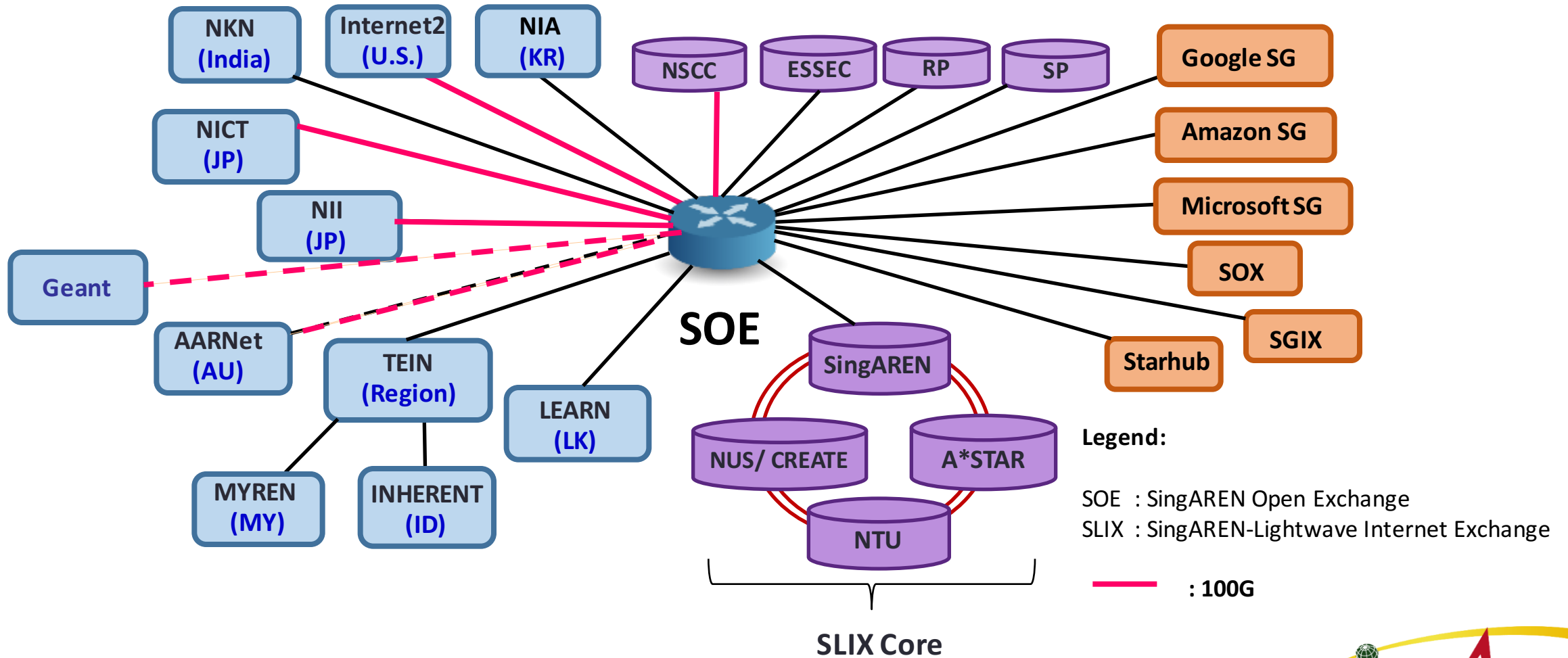
- It is an important backbone for the whole community.
- Japan linking the north asia, Singapore taking care of south-east asia.
- SG-JP link plays the resilient part of the ring across the pacific as well as to europe.



SingAREN Network Infrastructure(2018)



SingAREN Network Infrastructure(2019)





Connecting
Asia and Europe's
Research and Education
Communities

www.tein.asia

TEIN Project Partners

AF Afghanistan	ID Indonesia	NZ New Zealand
AU Australia	JP Japan	PK Pakistan
BD Bangladesh	KR Korea	PH Philippines
BT Bhutan	LA Laos	SG Singapore
KH Cambodia	MM Myanmar	LK Sri Lanka
CN China	MN Mongolia	TH Thailand
HK Hong Kong	MY Malaysia	TW Taiwan
IN India	NP Nepal	VN Vietnam

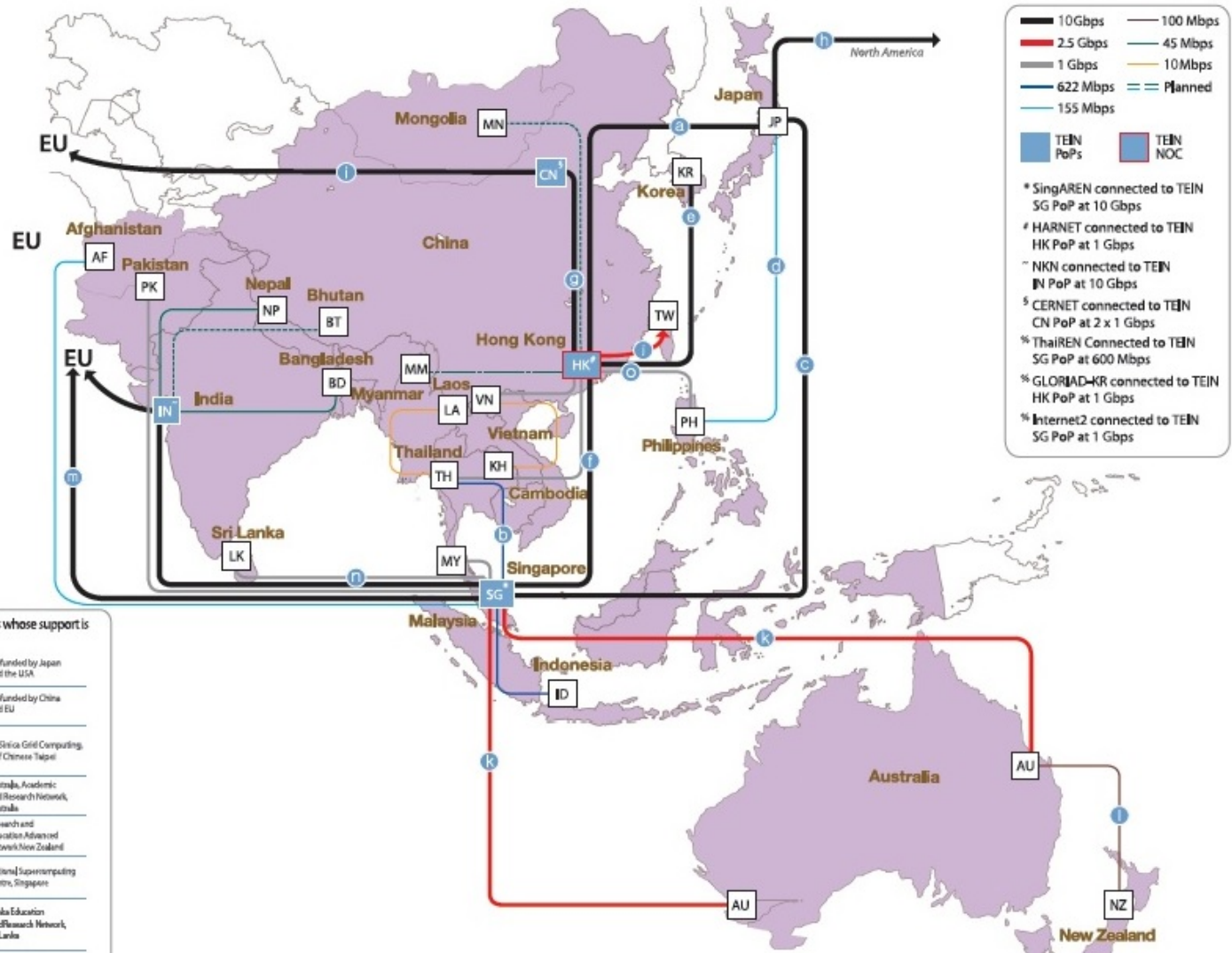
The following links are fully financed/co-financed by the link owners whose support is gratefully acknowledged

a NICT National Institute of Information and Communications, Japan	h NICT co-funded by Japan and the USA
b NICT National Institute of Information and Communications, Japan	i ORIENT plus co-funded by China and EU
c NRI National Institute of Informatics, Japan	j ASIC Academia Sinica Grid Computing, Republic of Chinese Taipei
d MARSIN Ministry of Agriculture, Forestry and Fisheries Research Network, Japan	k GARRnet Australia Academic and Research Network, Australia
e NIA National Information Society Agency, South Korea	l REANNZ Research and Education Advanced Network New Zealand
f CERNET China Education and Research Network, China	m National Supercomputing Centre, Singapore
g CERNET China Science & Technology Network, China	n LEARN Lanka Education and Research Network, Sri Lanka
	o Advanced Science and Technology Institute, Philippines

As of December 2016



TEIN is co-funded by the European Commission through the Directorate-General for Development and Cooperation-EuropeAid



Legend for link speeds and PoPs:

- 10Gbps (thick black line)
- 2.5 Gbps (thick grey line)
- 1 Gbps (thin grey line)
- 622 Mbps (blue line)
- 155 Mbps (light blue line)
- 100 Mbps (thin black line)
- 45 Mbps (thin grey line)
- 10Mbps (yellow line)
- Planned (dashed line)
- TEIN PoPs (blue square)
- TEIN NOC (red square)

* SingAREN connected to TEIN SG PoP at 10 Gbps
 † HARNET connected to TEIN HK PoP at 1 Gbps
 ‡ NKN connected to TEIN IN PoP at 10 Gbps
 § CERNET connected to TEIN CN PoP at 2 x 1 Gbps
 ¶ ThaiREN Connected to TEIN SG PoP at 600 Mbps
 ** GLORIAD-KR connected to TEIN HK PoP at 1 Gbps
 *** Internet2 connected to TEIN SG PoP at 1 Gbps



This map has been produced with the financial assistance of the European Union. The contents of this document are the sole responsibility of TEINCC, and can under no circumstances be regarded as reflecting the position of the European Union.

Asia Pacific Ring (APR)



APR is a resilient, high speed network system in excess of 100 Gbit/s.

Objective: Facilitate advanced research and education collaboration across the Pacific between Asia and North America.

Asia Pacific Ring

1 Dec 2017, Singapore

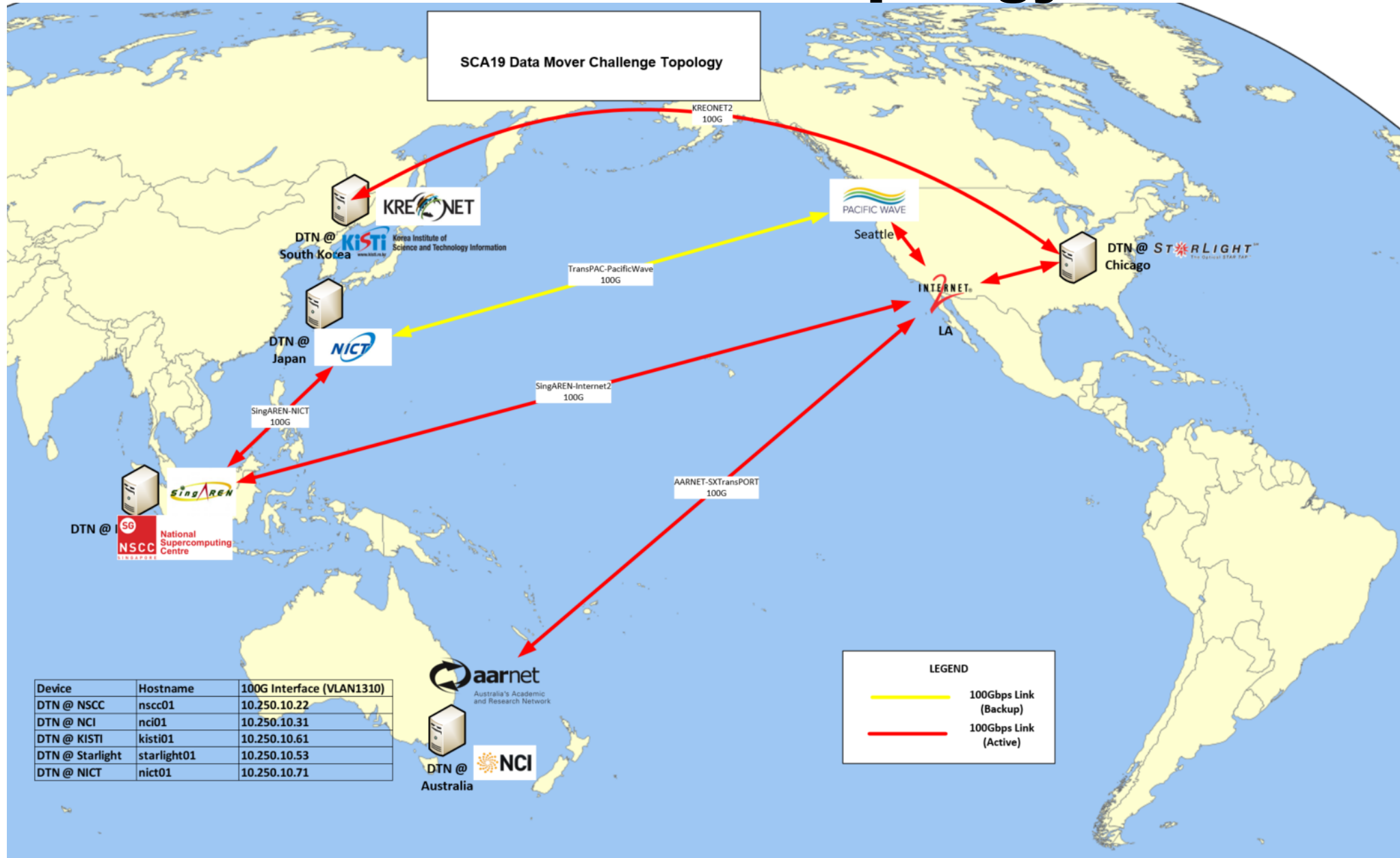


“Move That Data” Challenge Jan-March 2019

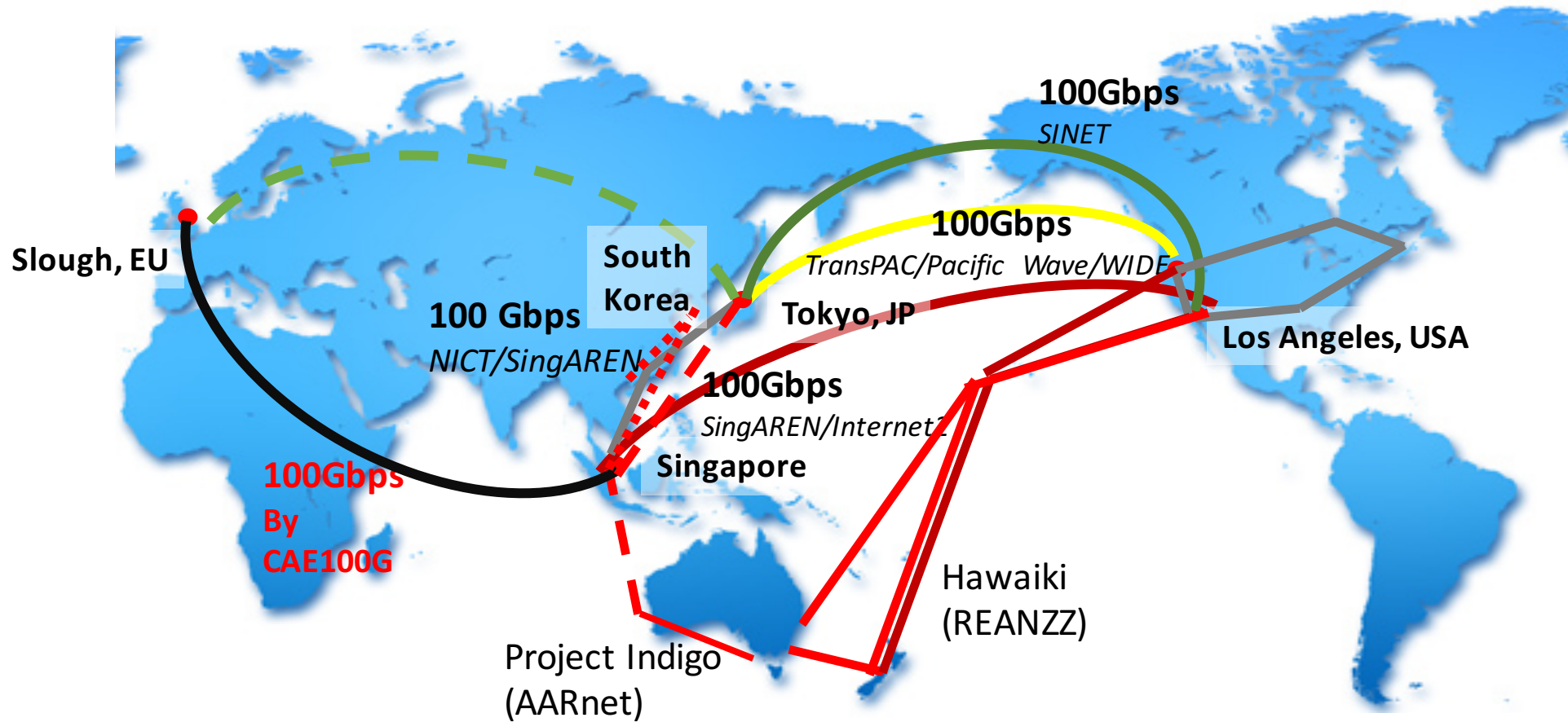
- Inaugural **Data Mover Challenge (DMC)** organised by NSCC
- Held in conjunction with NSCC’s flagship conference - **SuperComputingAsia 2019 (SCA19)**
- Bring together experts from industry and academia
- To test their software across servers in various countries connected by 100G international networks



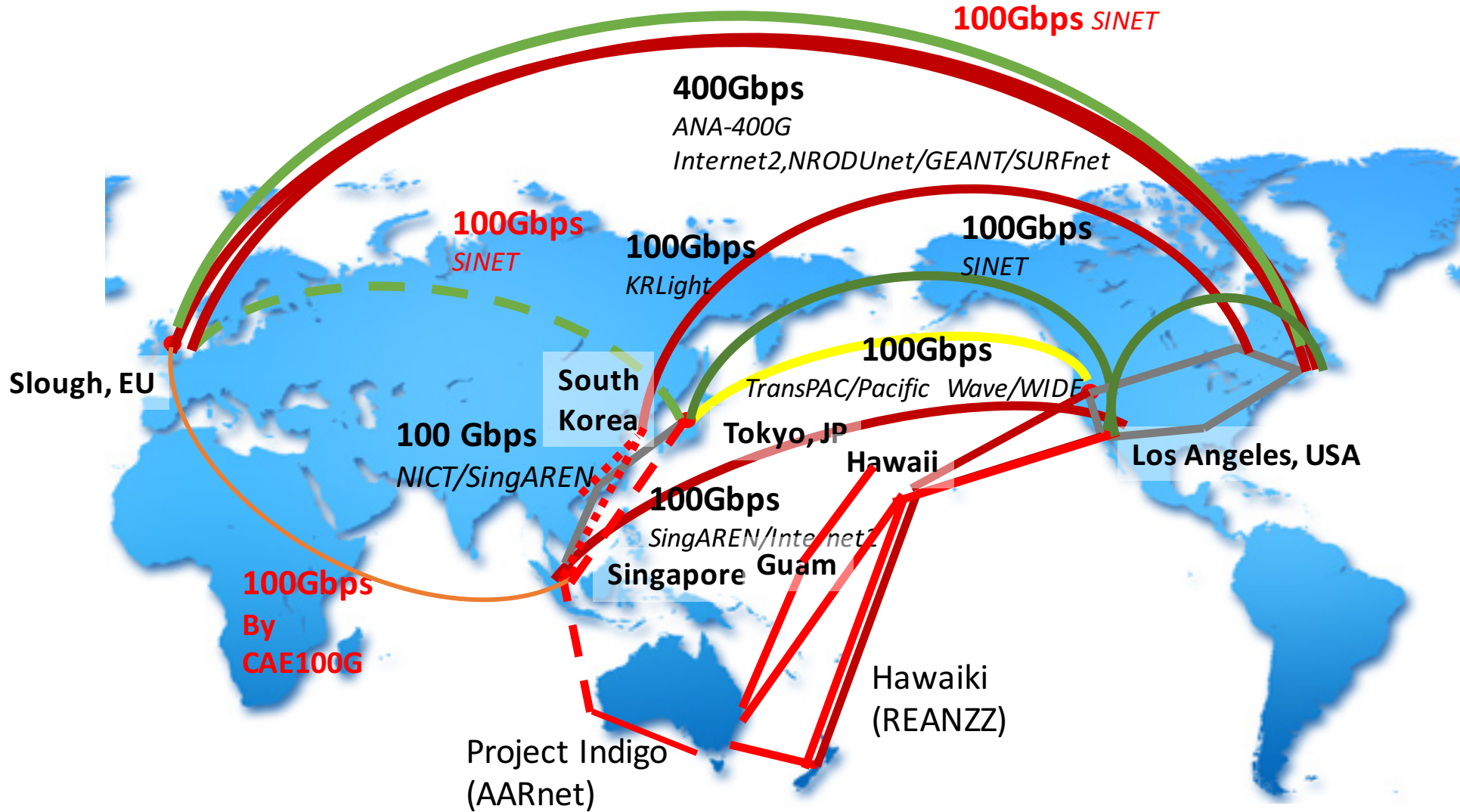
Data Mover Challenge Partner and Topology



100G links in 2019



2019 onwards



Thank You

