



Singapore Advanced Research and Education Network

OPEN EXCHANGE POINT

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GNA architecture

The discussions inside the GNA group have led to a global network architecture model that consists of a powerful intercontinental transmission substrate, consisting of

- Global Exchange Points (“GXPs”),
- High-bandwidth transmission pipes (running between GXPs).

The GXPs in this architecture model have two major functions:

- Attachment points for the high-bandwidth circuits of the substrate
- Connection points for the Regional and National R&E Networks.

The GNA substrate supports the creation, modification, and deletion of overlay networks.

We envision at least two GXPs per continent or region that are placed in consultation with the region’s R&E Network organizations.

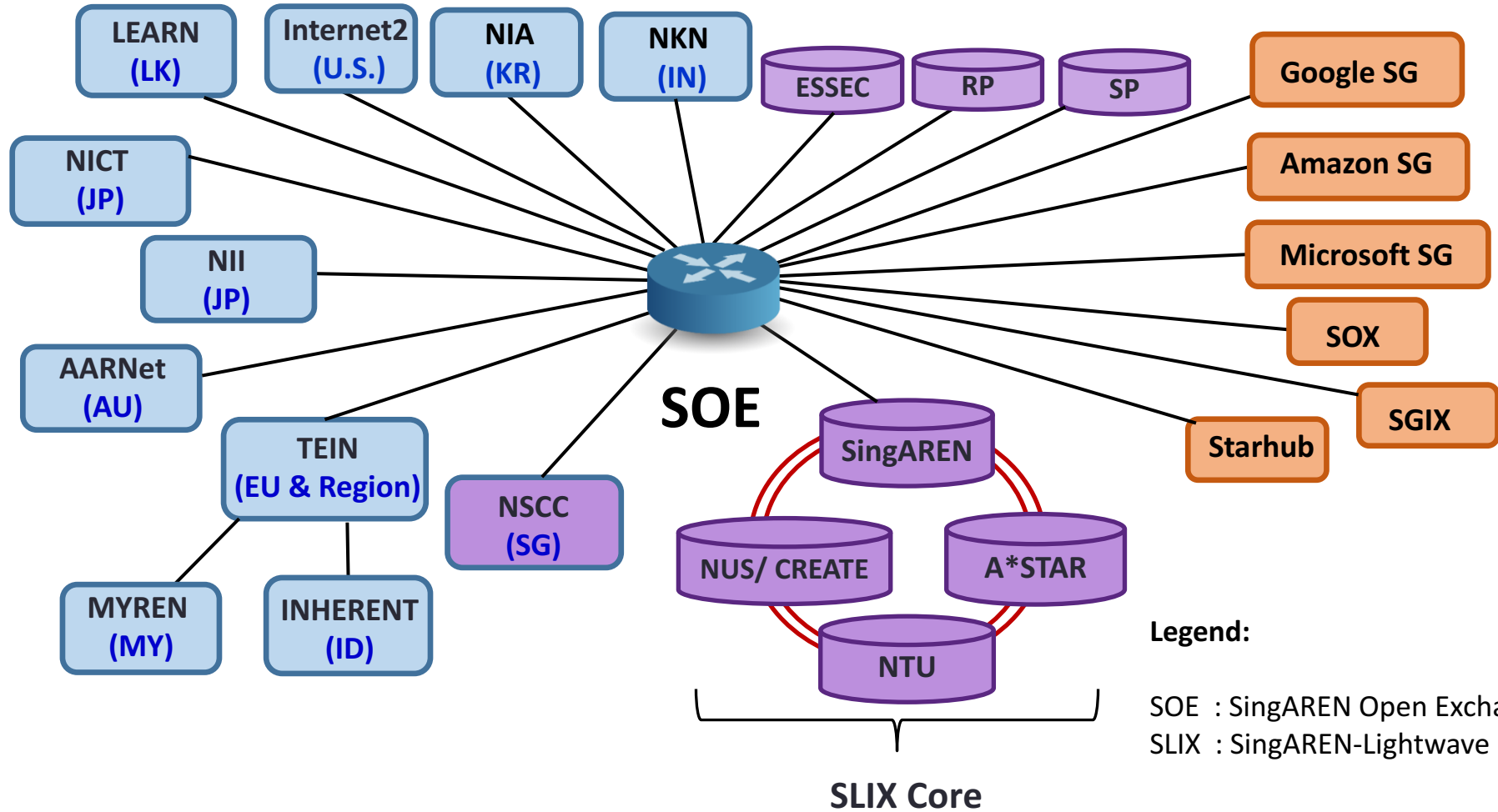
SingAREN Open Exchange(SOE)

- Official launched on 17th September 2016
- Supports connection speed of 1/10/100G
- Network services:
 - Open peering
 - Connected to commercial entities, eg. Google, amazon, etc..
 - Overlay network
- Network management service
 - PerfSONAR

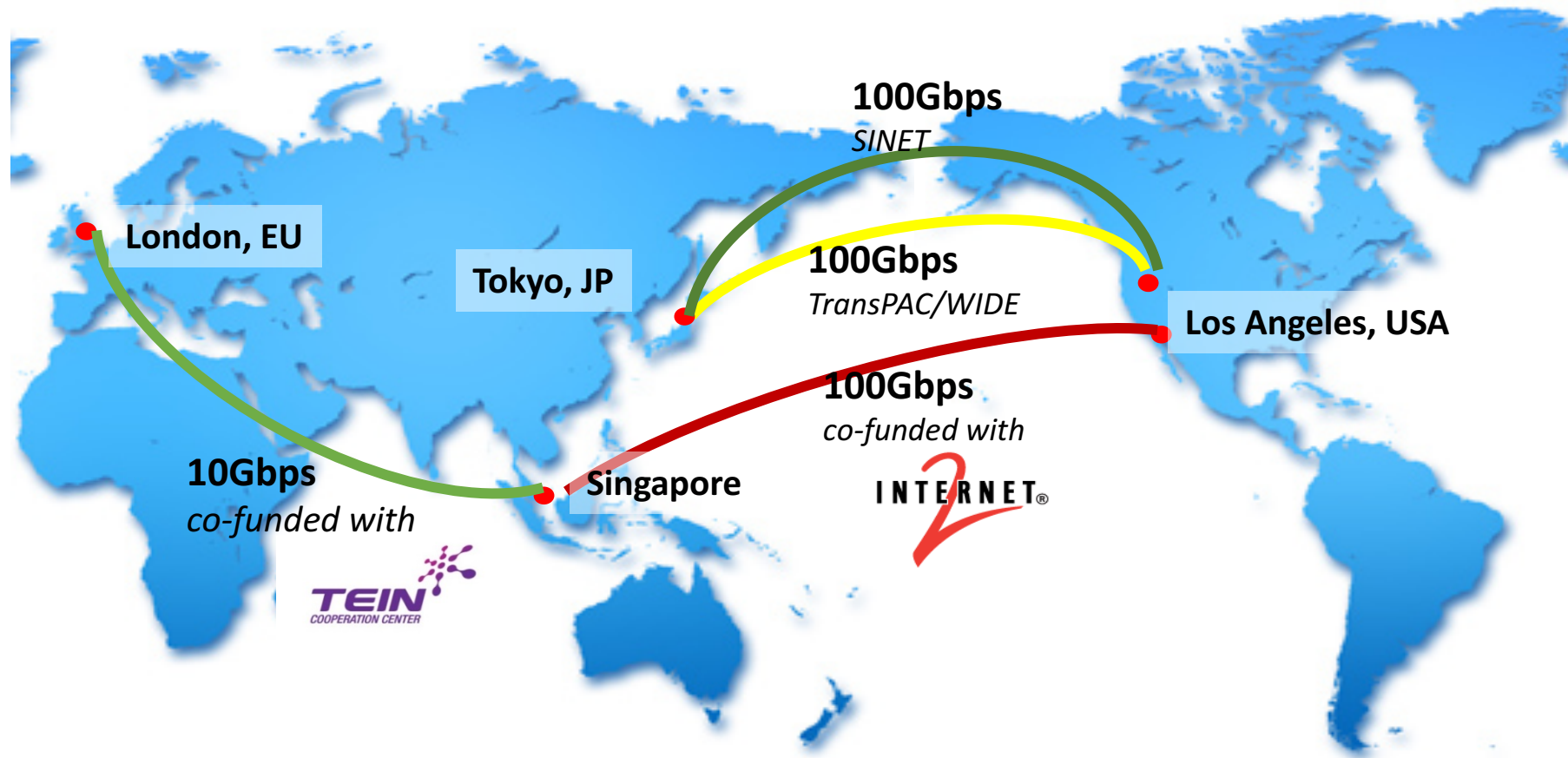
International Partners and Link Speeds

- LEARN, LK 1G
- AARNet, AU 1G
- KOREN, KR 10G
- NKN, IN 10G
- JGN-X, JP 10G
- SINET,JP 10G
- TEIN, EU 10G
- Internet2, US 100G
- via TEIN
 - MYREN, MY
 - ITB, ID

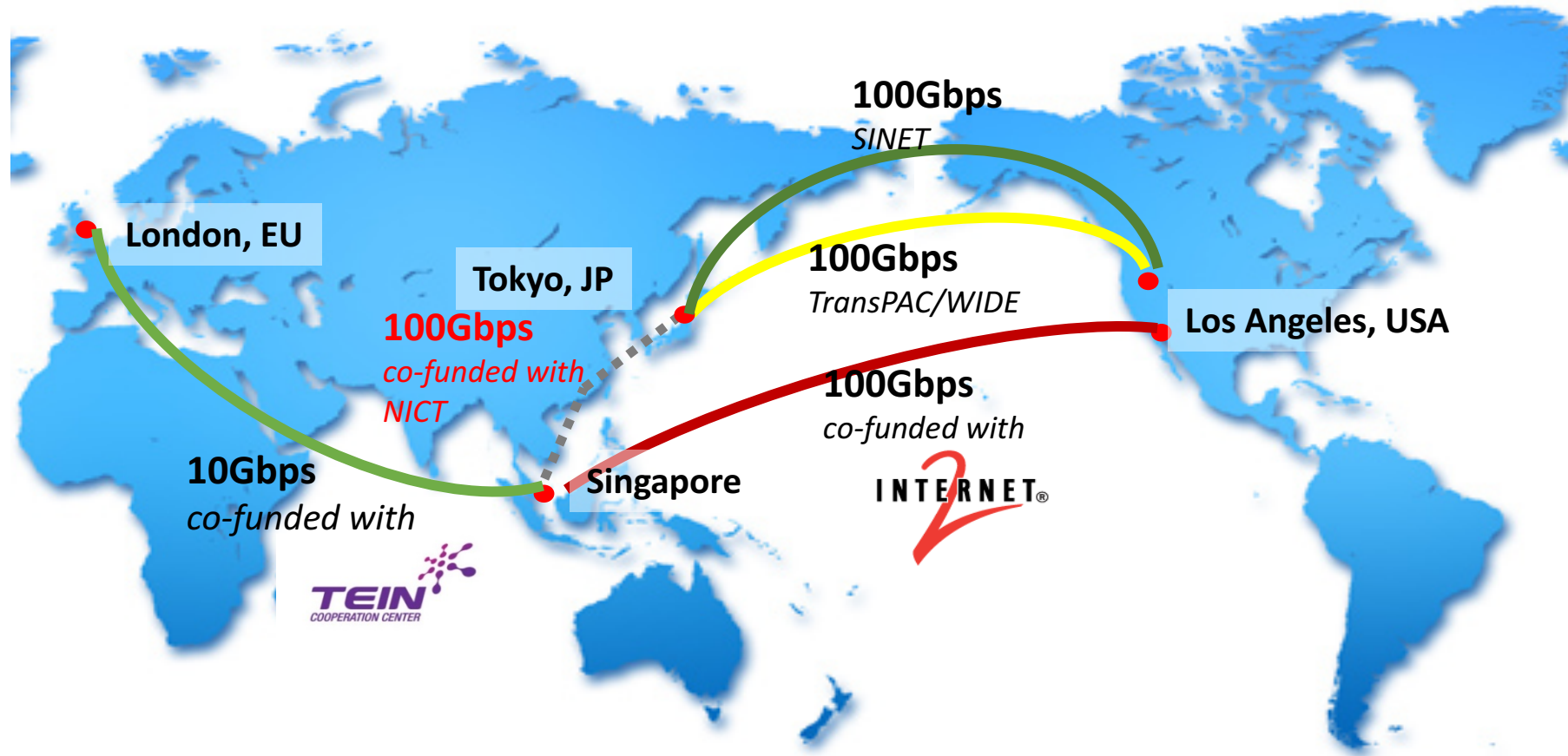
SingAREN Network Infrastructure



International Link: current status



By Oct 2017





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

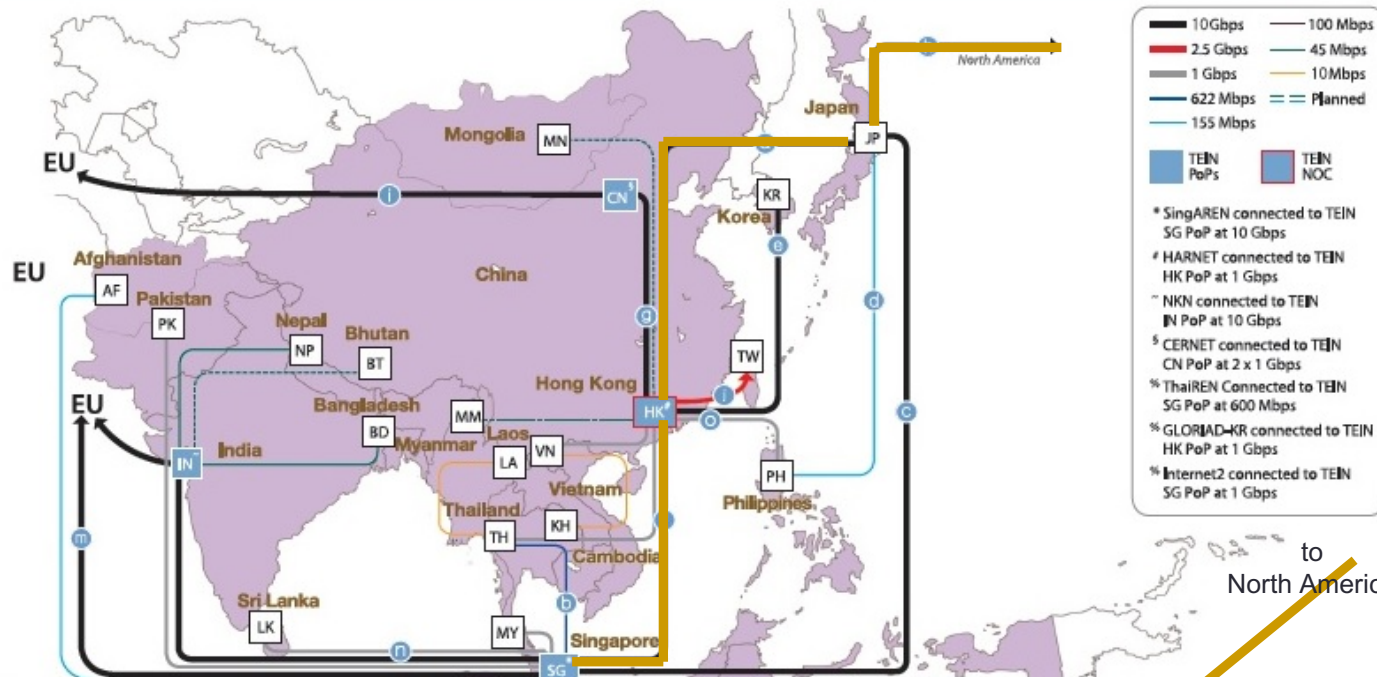
The following links are fully financed/co-financed by the link owners whose support is gratefully acknowledged

a NICT National Institute of Information and Communications, Japan	h TUBITAK 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 ASAC Academia Sinica Grid Computing, Republic of Chinese Taipei
d MARSIN Ministry of Agriculture, Forestry and Fisheries Research Network, Japan	k GARNet Australia Academic and Research Network, Australia
e NIA National Information Society Agency, South Korea	l REANZ Research and Education Advanced Network New Zealand
f NIA National Information Society Agency, South Korea	m National Supercomputing Centre, Singapore
g CERNET China Education and Research Network, China	n LEARN Lanka Education and Research Network, Sri Lanka
China Science & Technology Network, China	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:

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

Notes:

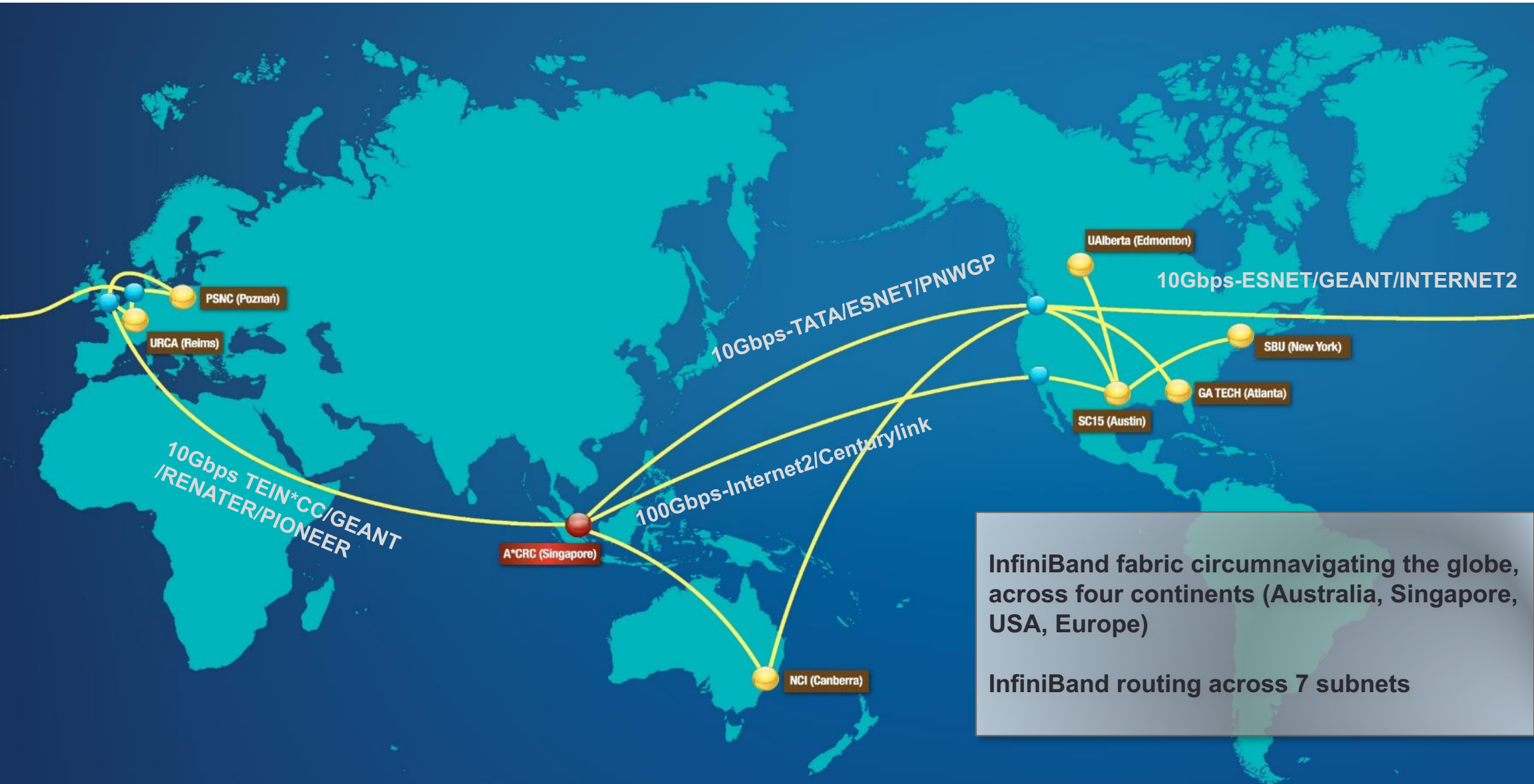
- * SingAREN connected to TEIN SG PoP at 10 Gbps
- † HARNET connected to TEIN HK PoP at 1 Gbps
- ‡ NKN connected to TEIN IN PoP at 10 Gbps
- § CERNET connected to TEIN CN PoP at 2 x 1 Gbps
- ¶ ThaiREN Connected to TEIN SG PoP at 600 Mbps
- ** GLORIAD-KR connected to TEIN HK PoP at 1 Gbps
- ** Internet2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

100G Links

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.

BEYOND CONNECTIVITY

InfiniBand Circumnavigation of the globe at SC15



InfiniBand fabric circumnavigating the globe, across four continents (Australia, Singapore, USA, Europe)

InfiniBand routing across 7 subnets

SingAREN Database Mirroring

- Service providing relatively up-to-date overseas bioinformatics databases locally in Singapore.
- Open databases thus everyone from anywhere may use the service
- <ftp://dbmirror.singaren.net.sg>
- Website for more information: <http://dbmirror.singaren.net.sg>

SOE: Applications

Enabling Cancer Genomics Research

SingAREN enables the Cancer Science Institute of Singapore (CSI Singapore) to have high-speed access to The Cancer Genome Atlas (TCGA), U.S., thus resulting in tremendous improvement in data download time from 2 – 3 weeks to a few days.



THANK YOU
