ASGC Activities Update

Hsin-Yen Chen
ASGC

LHCONE/LHCOPN meeting

Taipei

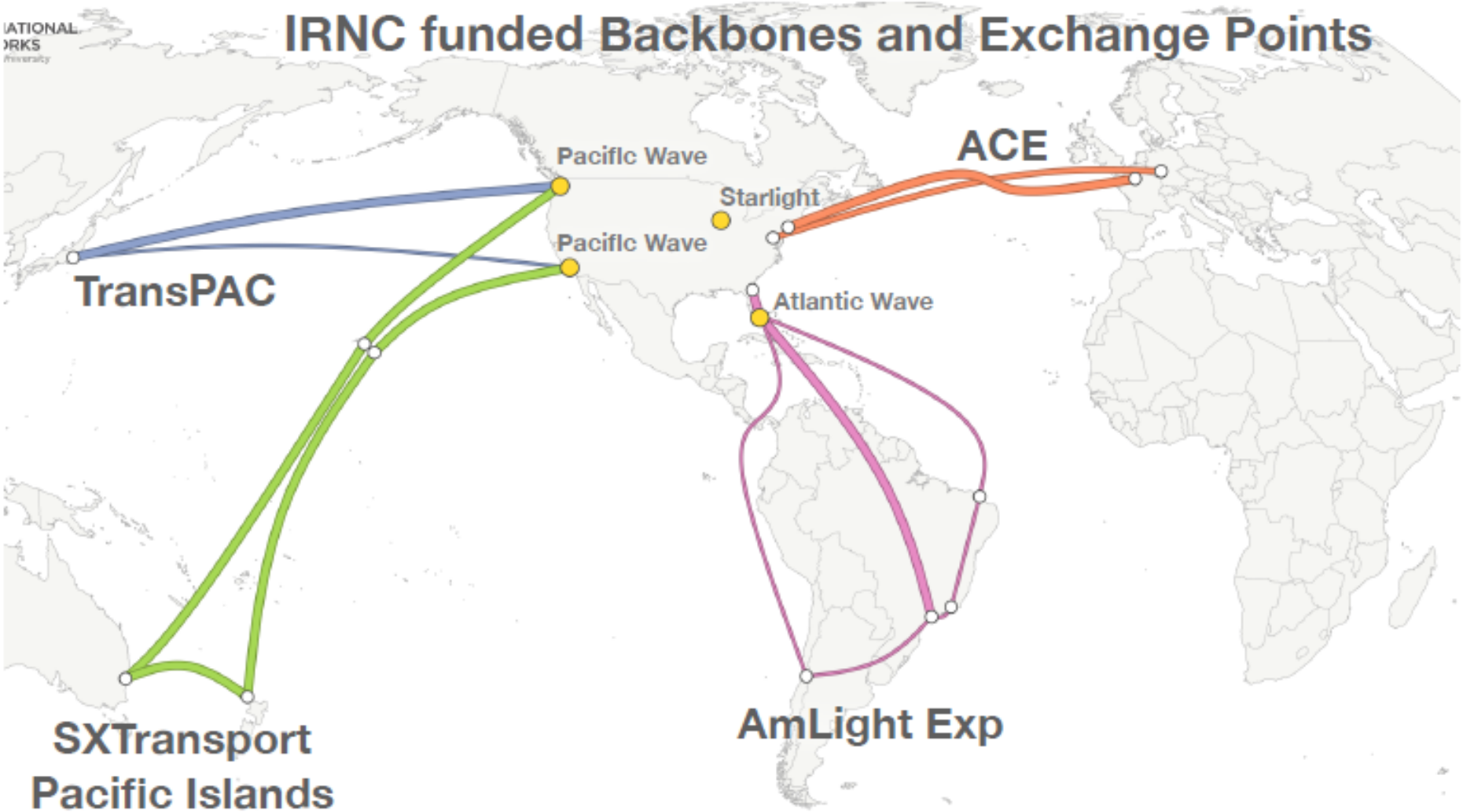
13 Mar. 2016

Asia R&E Infrastructure

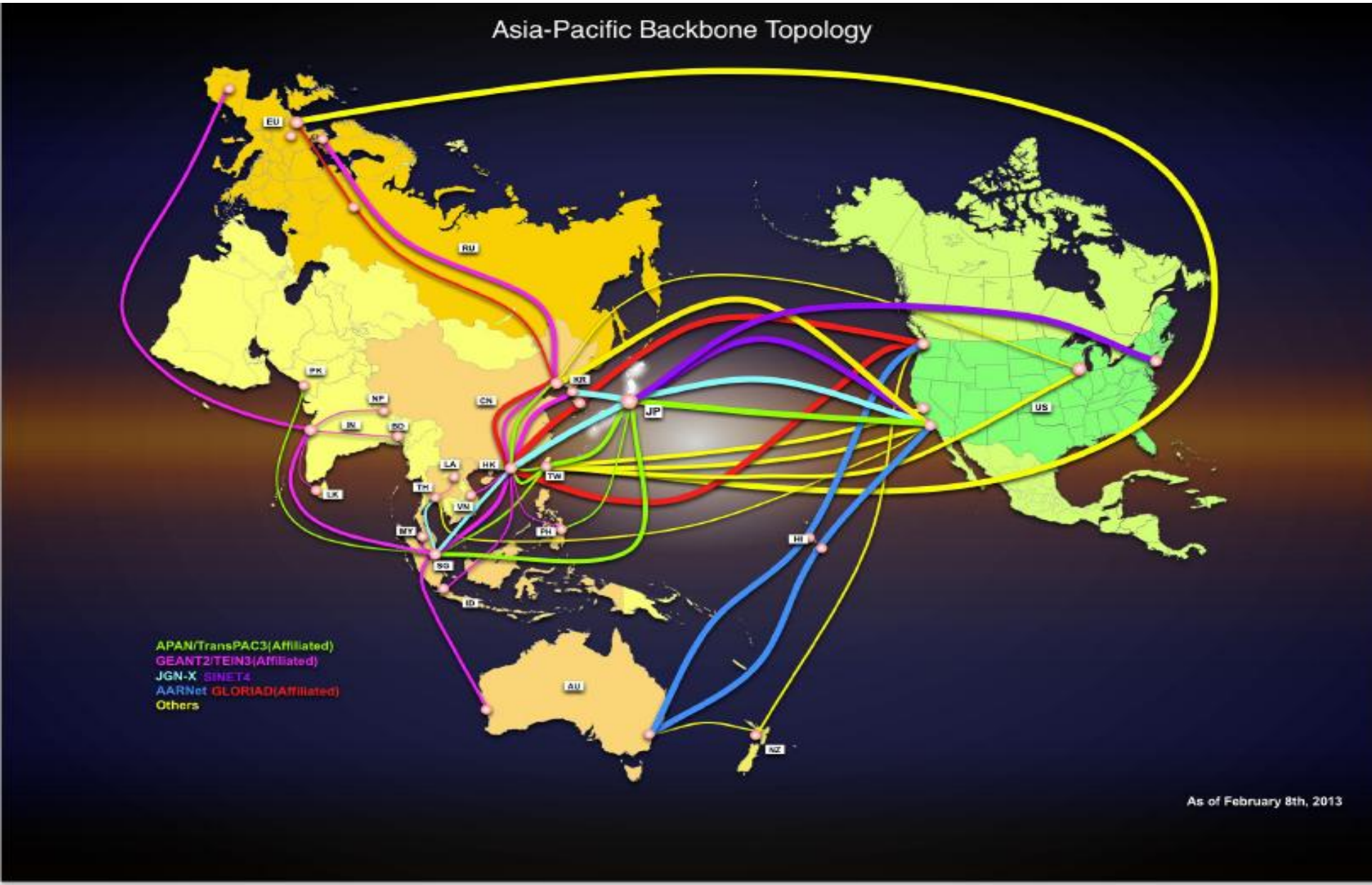
What's new in APAN 41

- Three transpacific 100Gbps R&E were activated
  - JP-US TransPAC 4 circuit funded by the US NSF
  - SG-US ACA 100 circuit in collaboration between Internet2, SigaREN and A*STAR
  - KR-US 100G circuit by KISTI
  - JP-US 100G circuit by SINET
- There are new 10Gbps planned to be deployed
  - TW-HK (deployed)
  - KR-HK (deployed)
  - SG-UK (deployed)
  - PH-HK; PH-US

IRNC funded Backbones and Exchange Points

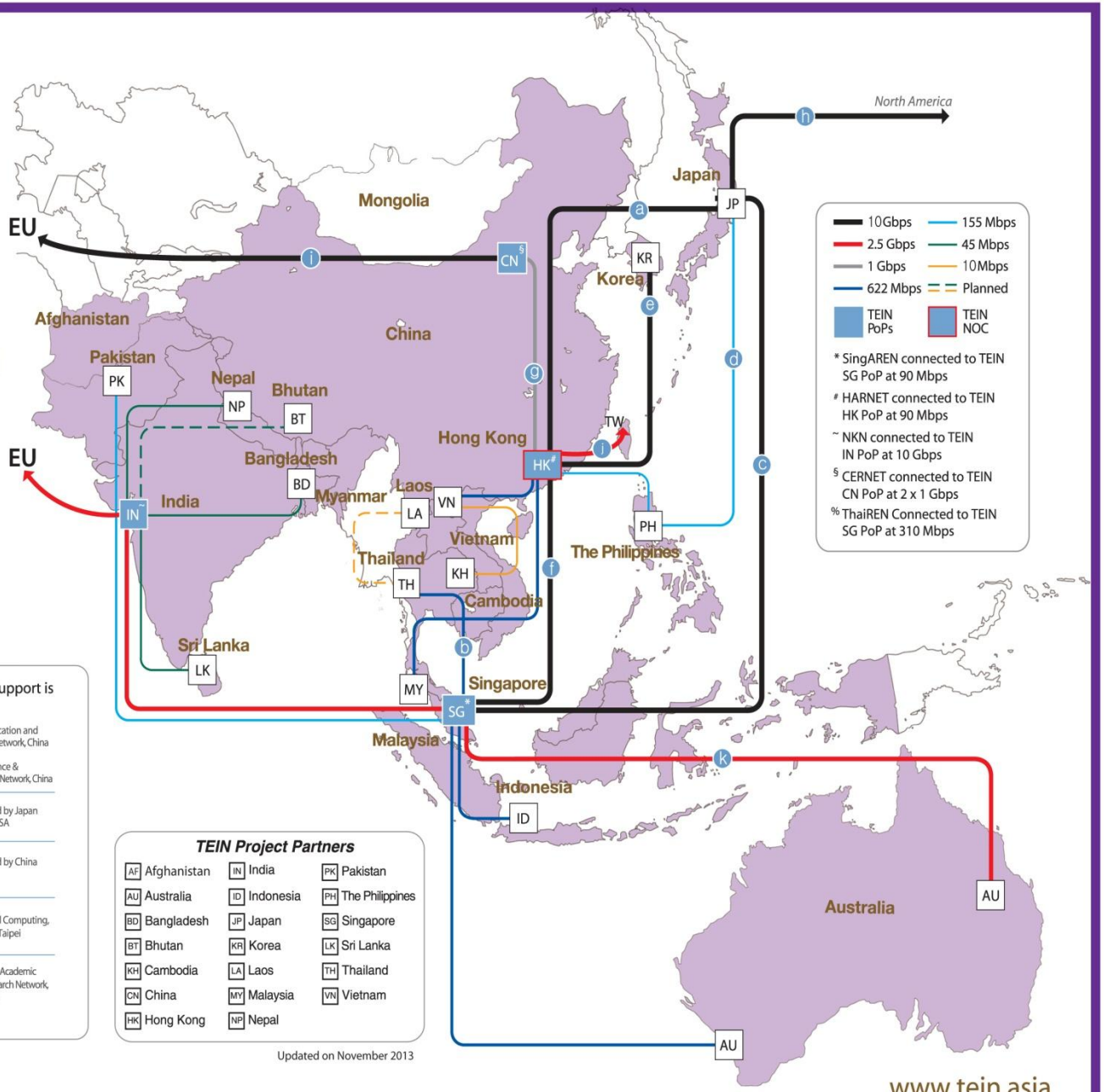


Asia R&E Network backbone



TEIN

Connecting Asia and Europe's Research and Education Communities



The following links are fully financed by the link owners whose support is gratefully acknowledged.

- a, b — NICT — National Institute of Information and Communications, Japan
- b — Thailand Research and Education Network, Thailand
- c — NII — National Institute of Informatics, Japan
- d — MAFFIN — Ministry of Agriculture, Forestry and Fisheries Research Network, Japan
- e, f — NIA — National Information Society Agency, South Korea
- g — CERNET — China Education and Research Network, China
- g — China Science & Technology Network, China
- h — TransPAC — co-funded by Japan and the USA
- i — ORIENT plus — co-funded by China and EU
- j — ASGC — Academia Sinica Grid Computing, Republic of Chinese Taipei
- k — aarnet — Australia, Academic and Research Network, Australia

TEIN Project Partners

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

Updated on November 2013

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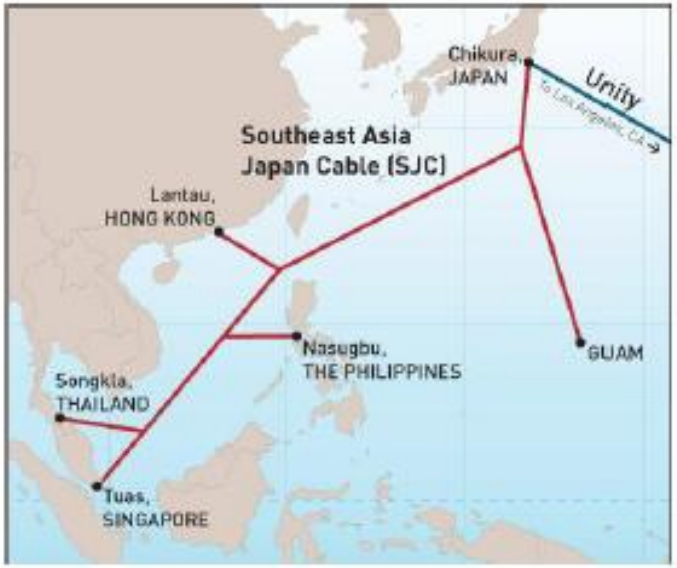
What's new on the subsea cable scene?

- MOANA cable: NZ to Hawaii via Samoa, 20Tbps, RFS 2018, Alcatel as supplier. A Cook Island – Samoa link with Samoa as hub planned.
- Samoa – Fiji cable with IDB funding; RFS March 2017. Will connect to Southern Cross.
- PLDC (Pacific Light Data Communications): direct HK-USA cable. Launch May 2018.
- ASC (Australia Singapore Cable): linking Perth is reactivated. Launch date early 2018.
- On the transatlantic side: activation of Hibernia Express, first new transatlantic cable in twelve years!
- Liquid Sea: Liquid Telecom project linking the African West Coast from South Africa to the Gulf. 20-30Tbps capacity. RFS 2018.
- Eulalink: Portugal- Brazil: 30Tbps; work will start in April 2016. The EU is investing US$25 million through Géant and RedClara through the BELLA project. (Building Europe link to Latin America).

A*STAR Computational Resource Centre

Cable status early 2016
Transpacific

- **PC-1** (Pacific Crossing): 8.4Tbps design capacity
- **JUS** (Japan – US): 9Tbps
- **TGN-P** (Tata Pacific): 15.36Tbps
- **TPE** (Trans Pacific Express): 3.2Tbps
- **AAG** (Asia America Gateway): 8Tbps
- **UNITY**: 12Tbps
  - RFS: April 2010
  - Google is partner



Computational Resource Centre
A*STAR

New Transpacific cables coming

- **FASTER**
  - Japan-US
  - Design Capacity: 60Tbps
  - RFS: Q2 2016; Google is partner
- **SEA-US**
  - Indonesia - Philippines – US – via Guam and Hawaii
  - Design Capacity: 20Tbps
  - RFS: Q4 2016
- **NCP**: New Cross Pacific
  - Will connect China, Japan, South Korea, Taiwan and the United States
  - Design capacity; 80Tbps; Micosoft is a partner
  - Supplier: TE Subcom
  - RFS: Q4 2017

A*STAR Computational Resource Centre

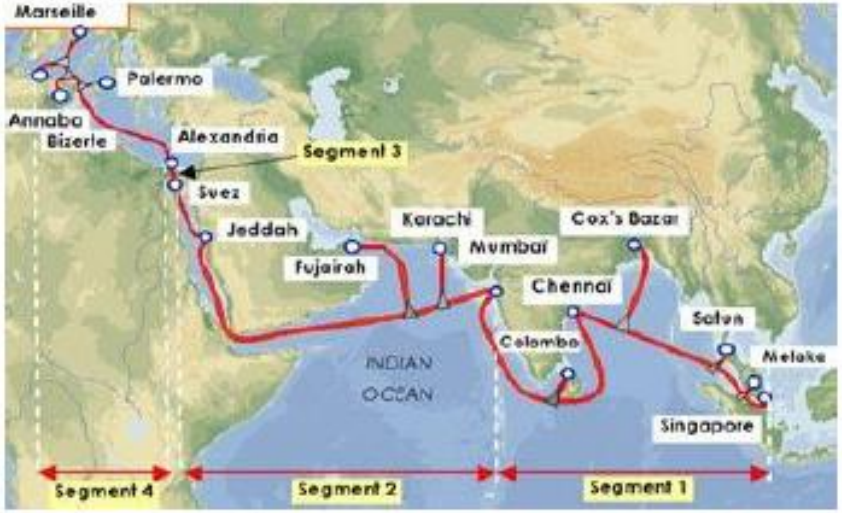
Cable status early 2016
Asia-Europe

- **SMW-4** (2005 RFS; 6.48Tbps potential capacity)
  - Upgrade from 40 to 100Gbps completed in March 2015 using Mitsubishi.
- **IMEWE** (2010; 9.6Tbps)
- **TGN-EA** (20011; 8Tbps)
- **FLAG FALCON** (2006; 6Tbps)
- **EIG** (2012; 2.88Tbps)
- **MENA** (2013; 4.8Tbps)
- **EPEG** (2012; 3.2Tbps)

A*STAR Computational Resource Centre

Two new Asia-Europe cables for end 2016

- **SEAMEWE-5**
  - RFS : November 2016
  - Design capacity: 24Tbps
  - Suppliers: NEC and Alcatel
  - 17 partners



- **AAE-1**
  - RFS: Q4 2016
  - Design capacity: 40Tbps
  - Suppliers:
    TE Subcom and NEC

Computational Resource Centre
A*STAR

cable status early 2016
intra Asia

- **APCN-2**: 10.56Tbps potential capacity
- **C2C**: 30.55Tbps
- **FNAL**: 42.52Tbps
- **TGN-IA**: 9.6Tbps
- **ASE**: 19Tbps
- **APG**: 54.8Tbps
  - RFS: 2016; Facebook is co-owner

- **SJC** (SE Asia Japan): 28.8Tbps RFS was June 2013
  - Links Brunei, China, Hong Kong, Japan, Singapore and the Philippines, option to connect with Thailand.
  - Upgraded by 6.5Tbps in May 2014 and a further 3.6Tbps by November 2015.
  - Connects into UNITY to cross the Pacific.

- **MCT**: Malaysia-Cambodia-Thailand
  - RFS: end 2016
  - Supplier: Huawei

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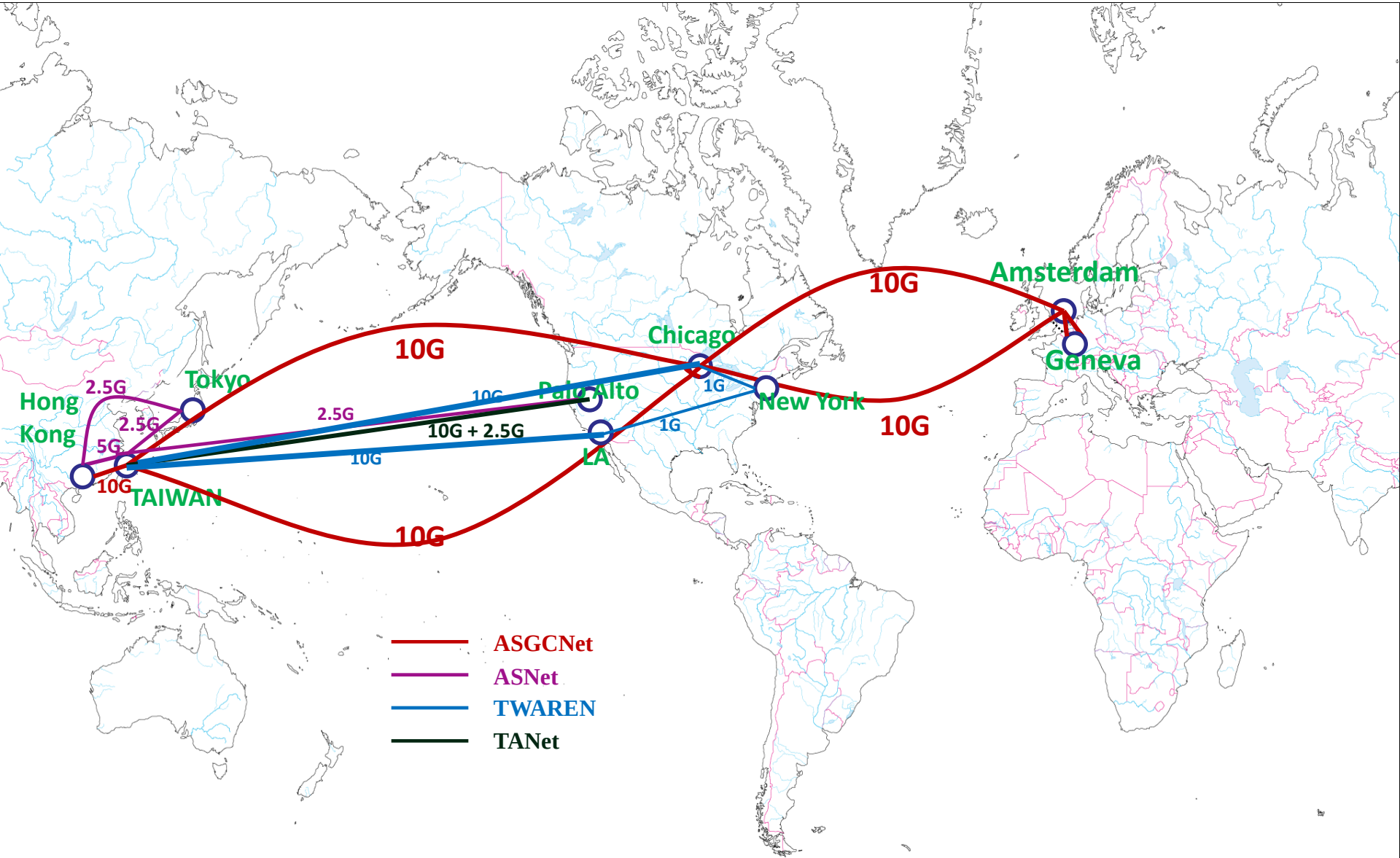
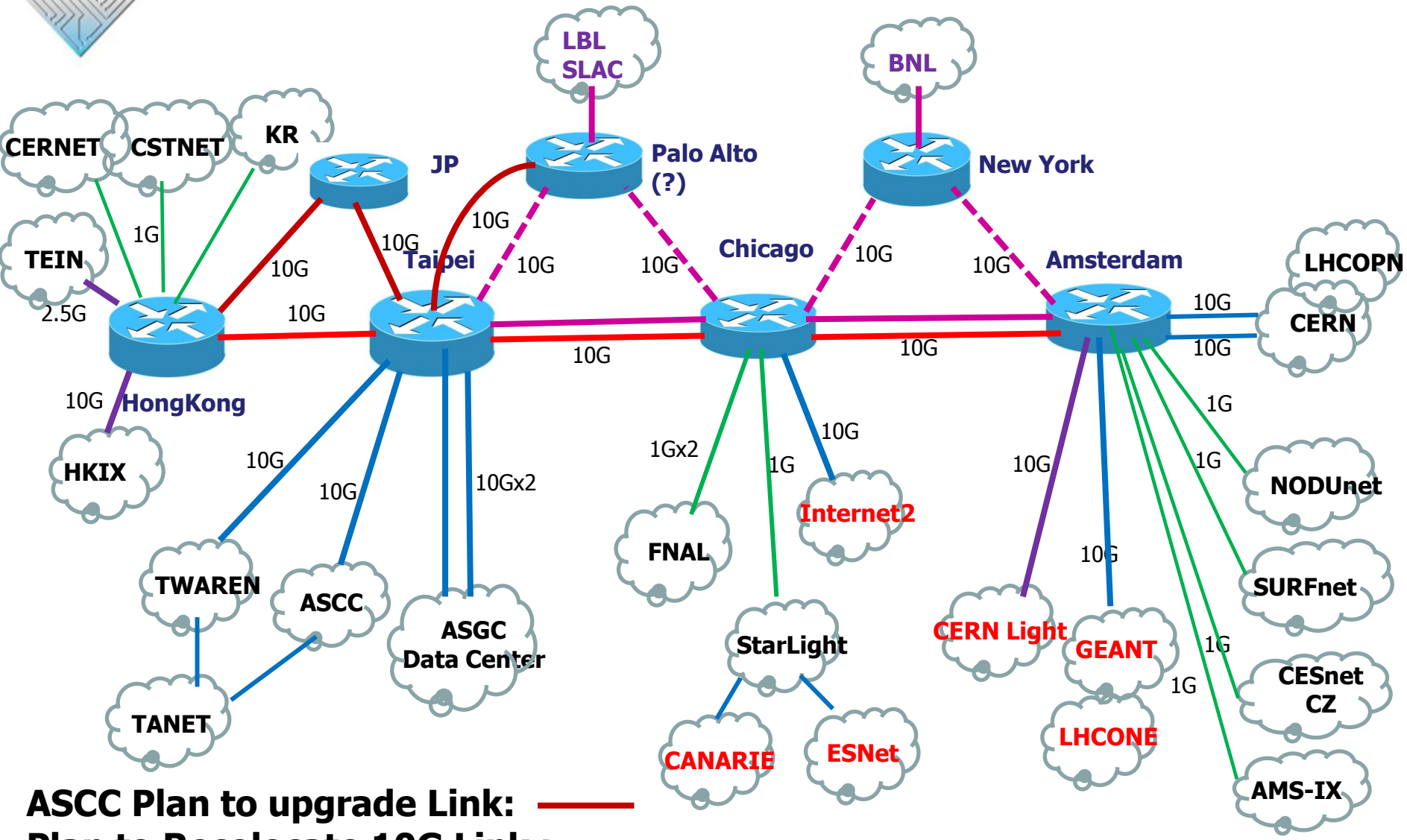
Taiwan Infrastructure

TAIWAN Global R&E Network



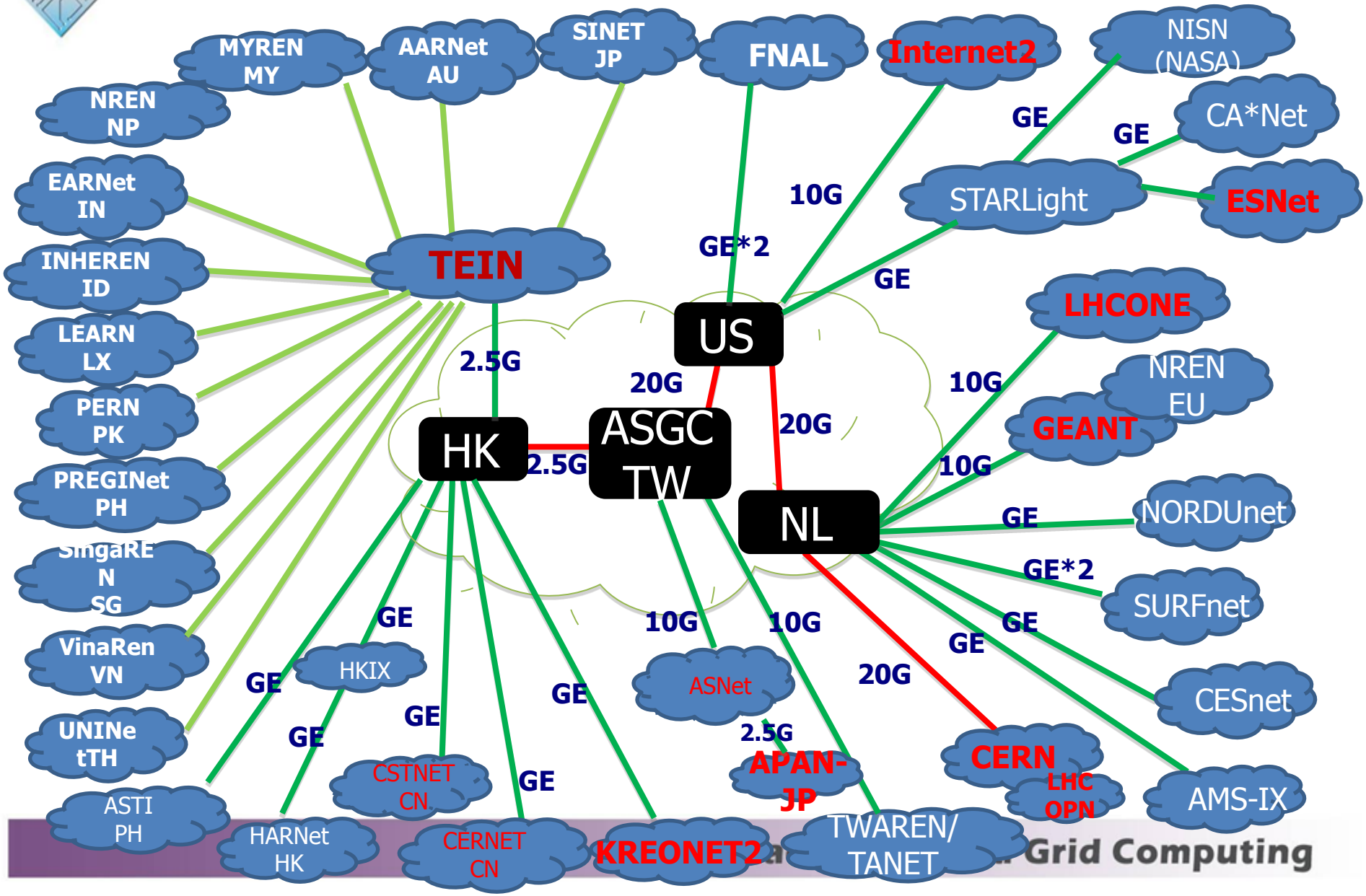
ASGCNet International Network



ASCC Plan to upgrade Link:

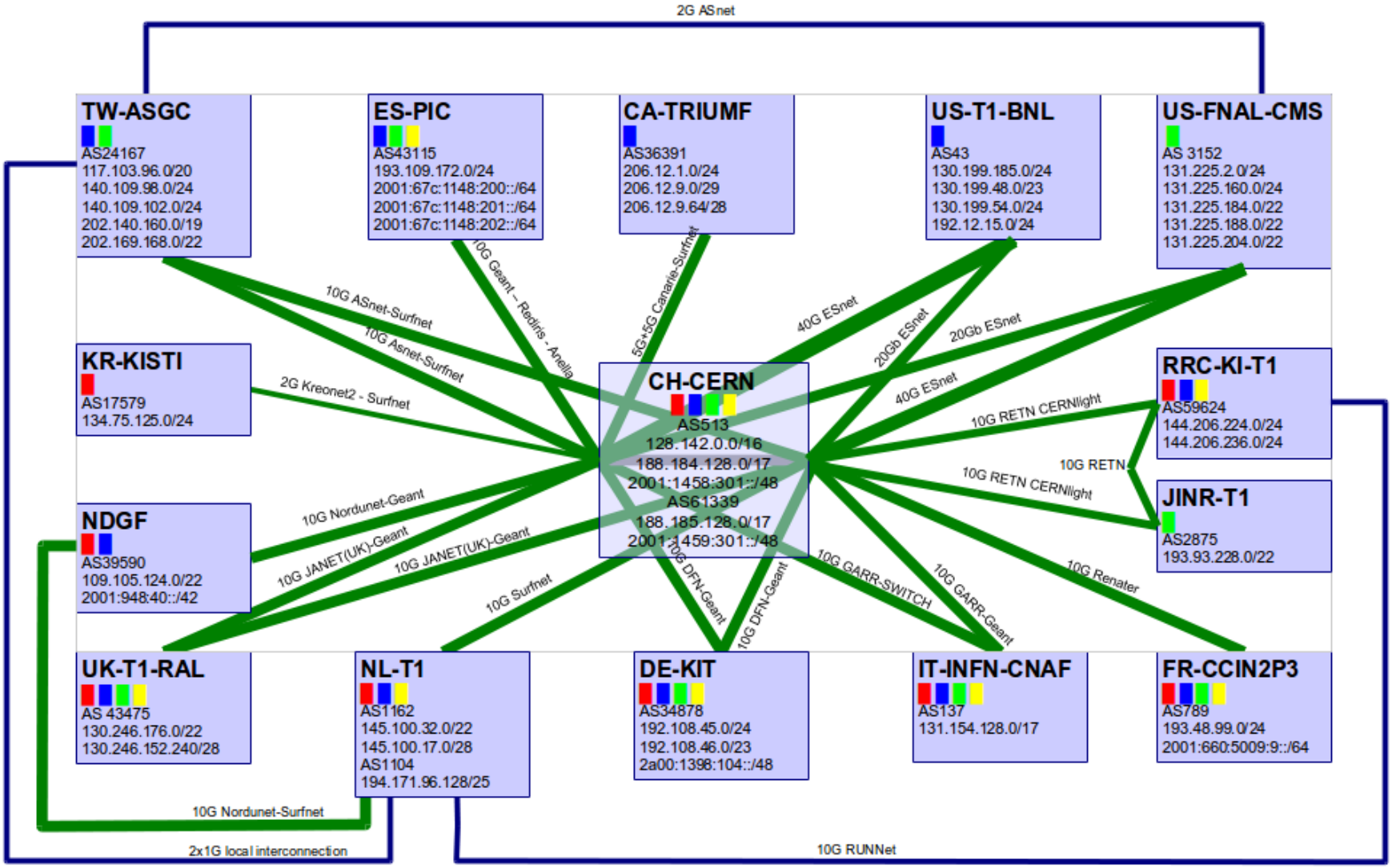
Plan to Recolocate 10G Link :

ASGC e-Science Global Network



ASGC LHCOPN/LHCONE

LHCOPN

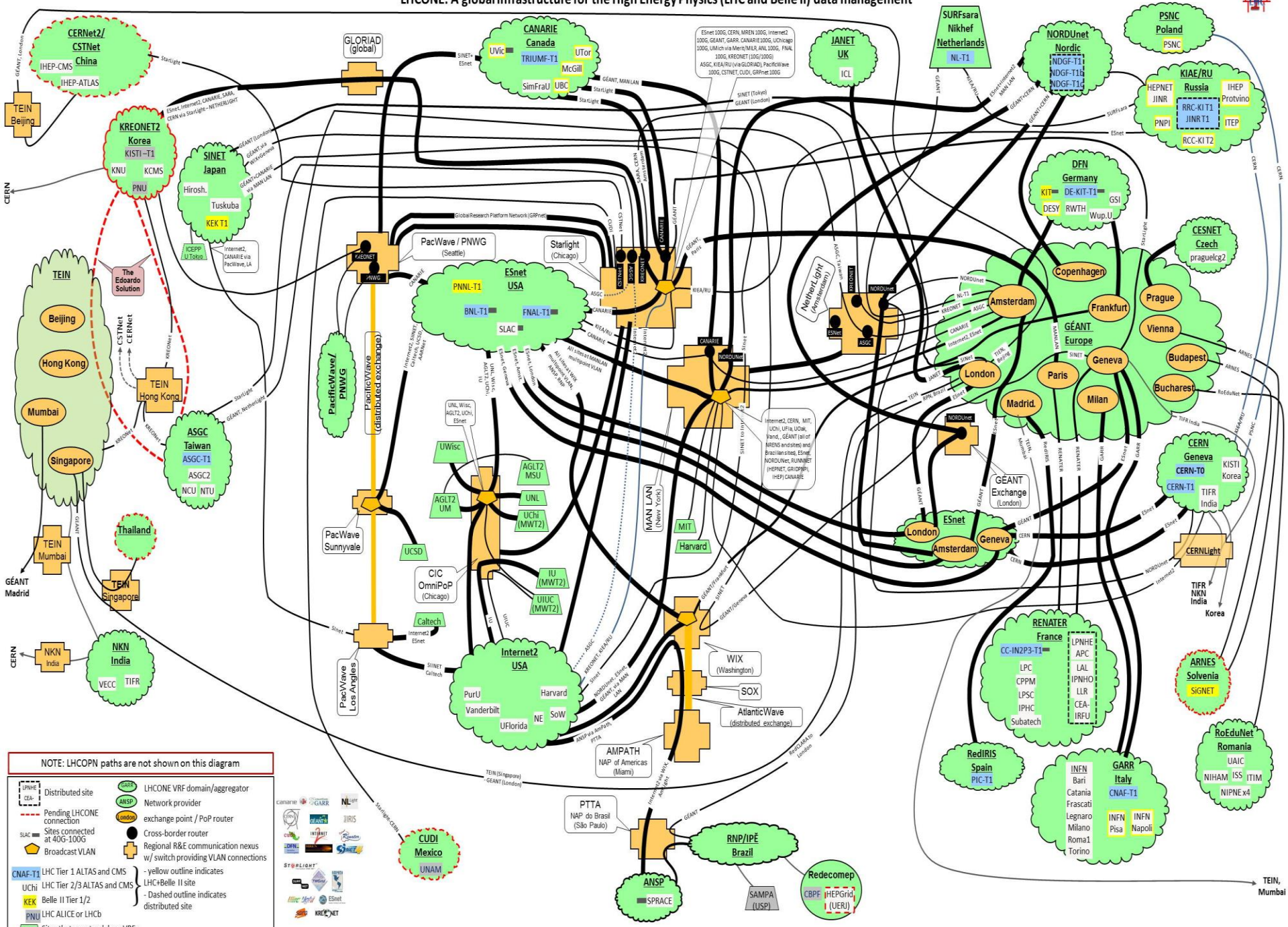


T0-T1 and T1-T1 traffic
T1-T1 traffic only
Not deployed yet
(thick) >=10Gbps
(thin) <10Gbps

= Alice = Atlas
= CMS = LHCb

p2p prefix: 192.16.166.0/24 - 2001:1458:302::/48
edoardo.martelli@cern.ch 20150515

LHCONE: A global infrastructure for the High Energy Physics (LHC and Belle II) data management



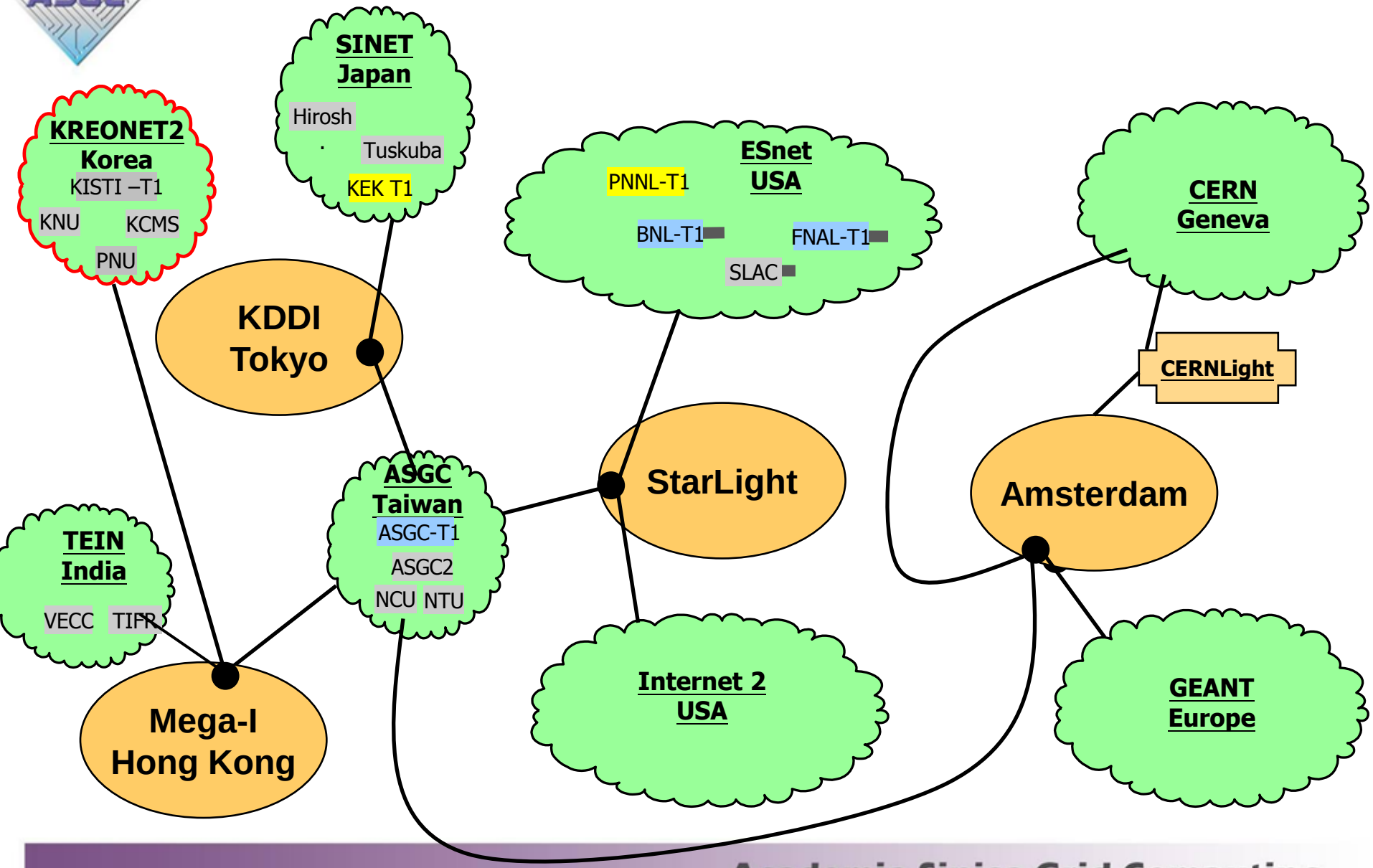
ASGC LHCOPN/LHCONE Update

- SARA proposes to decommission the ASGC 2xGE LHCOPN backup path at Vancis
- Connect to CERNLight with 10G link at Vancis
  - LHCONE VRF
- Plan to connect ESNet with 10G link at StarLight
  - LHCONE VRF
  - LHCOPN backup path
- Plan to upgrade the GE link with StarLight to 10G link that we peer with CARANIE, NIST, CERN, ESNet, GLORIAD and KREONET.
- Plan to connect JGN-X with 10G link at HK

LHC Network Challenges in Asia

- Routing Complexity
  - BGP peering can be realized among NRENs, if agreed bilaterally
  - Symmetry/Asymmetry routing
  - APAN backbone committee could address to the routing policy
- Network Performance
  - TCP Throughput <= TCPWinSize/RTT
  - Asian TierXs must tune server and client TCP kernel parameters to get better throughput
- LHCONE L3VPN could help resolving the application traffic

ASGC LHCONE VRF Plan



SDN technology study

- Deploy the Brocade routers on our WAN
- Survey the OESS, OSCAR and Brocade OpenDayLight controller on our lab
- OF 1.0/1.3 ?
- Focus on the Network Virtualization, Security & Cloud topics

Comment/Suggestion