HKIX Updates
at APIX Meeting #15

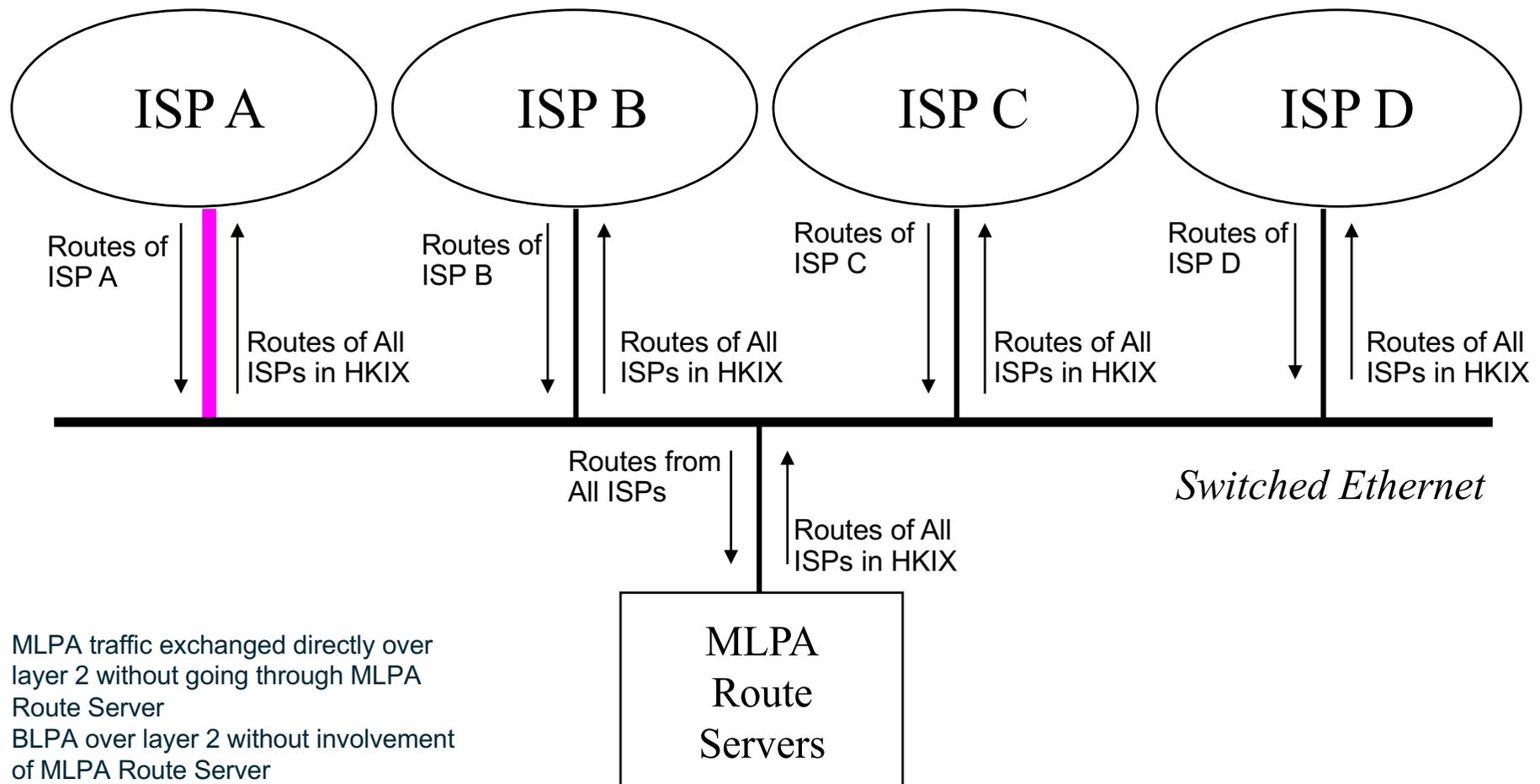*Ryan NG*

What is HKIX?

- Established in Apr 1995, Hong Kong Internet eXchange (HKIX) is the main layer-2 Internet eXchange Point (IXP) in Hong Kong where various autonomous systems interconnect with one another and exchange traffic
- HKIX is now owned and operated by the Hong Kong Internet eXchange Limited (a wholly-owned subsidiary of The Chinese University of Hong Kong Foundation Limited) in collaboration with Information Technology Services Centre of The Chinese University of Hong Kong
- HKIX serves both commercial networks and R&E networks
- The original goal is to keep intra-Hong Kong traffic within Hong Kong

HKIX Model —
MLPA over Layer 2 + BLPA

ISP A

ISP B

ISP C

ISP D

Routes of ISP A

Routes of ISP B

Routes of ISP C

Routes of ISP D

Routes of All ISPs in HKIX

Routes of All ISPs in HKIX

Routes of All ISPs in HKIX

Routes of All ISPs in HKIX

Routes from All ISPs

Routes of All ISPs in HKIX

Switched Ethernet

MLPA Route Servers

- MLPA traffic exchanged directly over layer 2 without going through MLPA Route Server
- BLPA over layer 2 without involvement of MLPA Route Server
- Supports both IPv4 and IPv6 over the same layer 2 infrastructure

# Help Keep Intra-Asia Traffic within Asia

- We have almost all the Hong Kong networks

- So, we can attract participants from Mainland China, Taiwan, Korea, Japan, Singapore, Malaysia, Thailand, Indonesia, Philippines, Vietnam, India and other Asian countries

- We now have more non-HK routes than HK routes

- We do help keep intra-Asia traffic within Asia

- In terms of network latency, Hong Kong is a good central location in Asia

- HKIX does help HK maintain as one of the Internet hubs in Asia

- HKIX supports both domestic and international traffic

HKIX Today

- Supports both MLPA (Multilateral Peering) and BLPA (Bilateral Peering) over layer 2

- Supports IPv4/IPv6 dual-stack

- More and more non-HK participants

- 260+ autonomous systems connected

- 480+ connections in total
  - **7 100GE, 270+ 10GE** & 200+ GE

- 770+Gbps (5-min) total traffic at peak

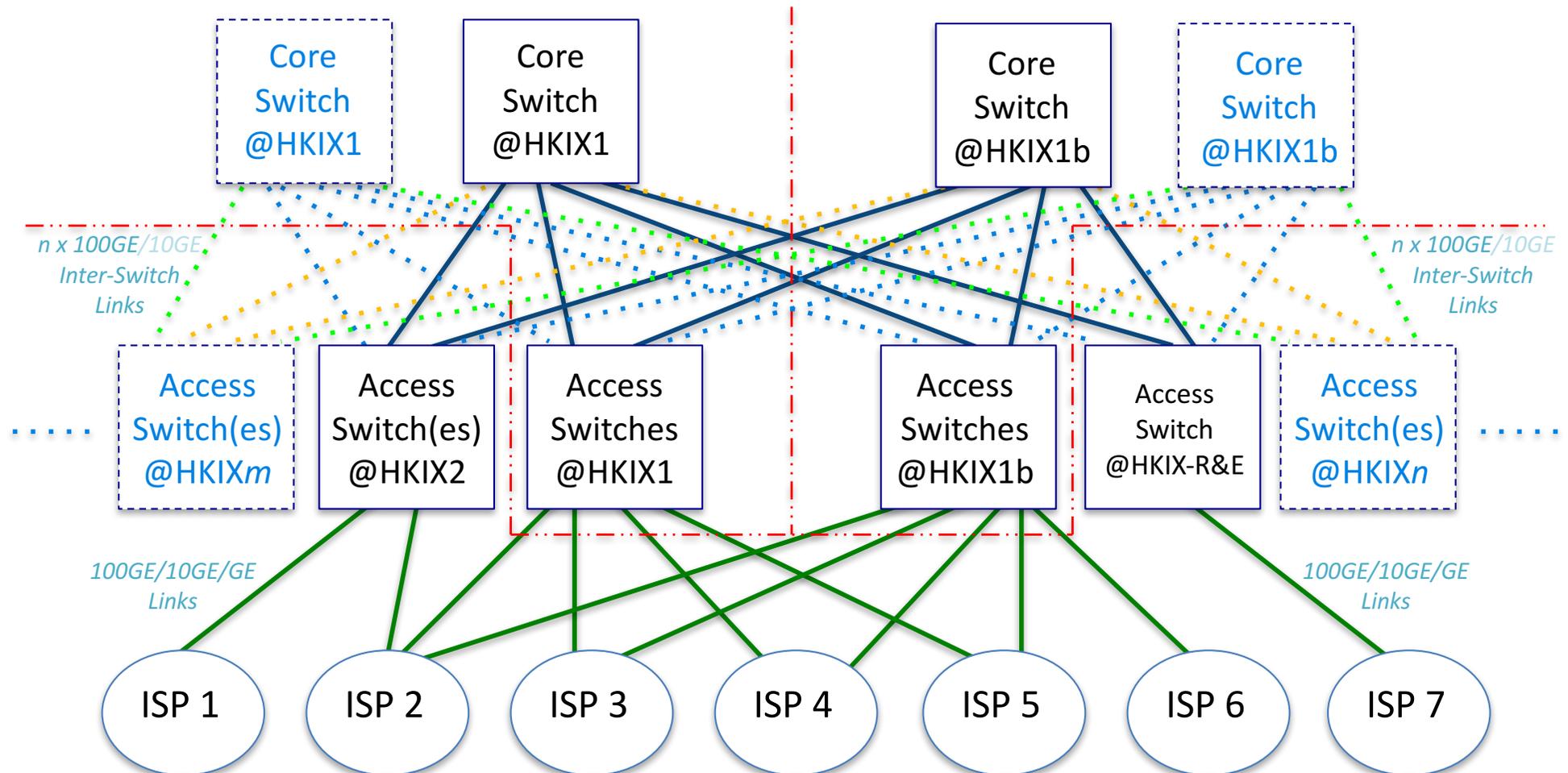- Annual Traffic Growth = 30+%

Daily Traffic Statistics
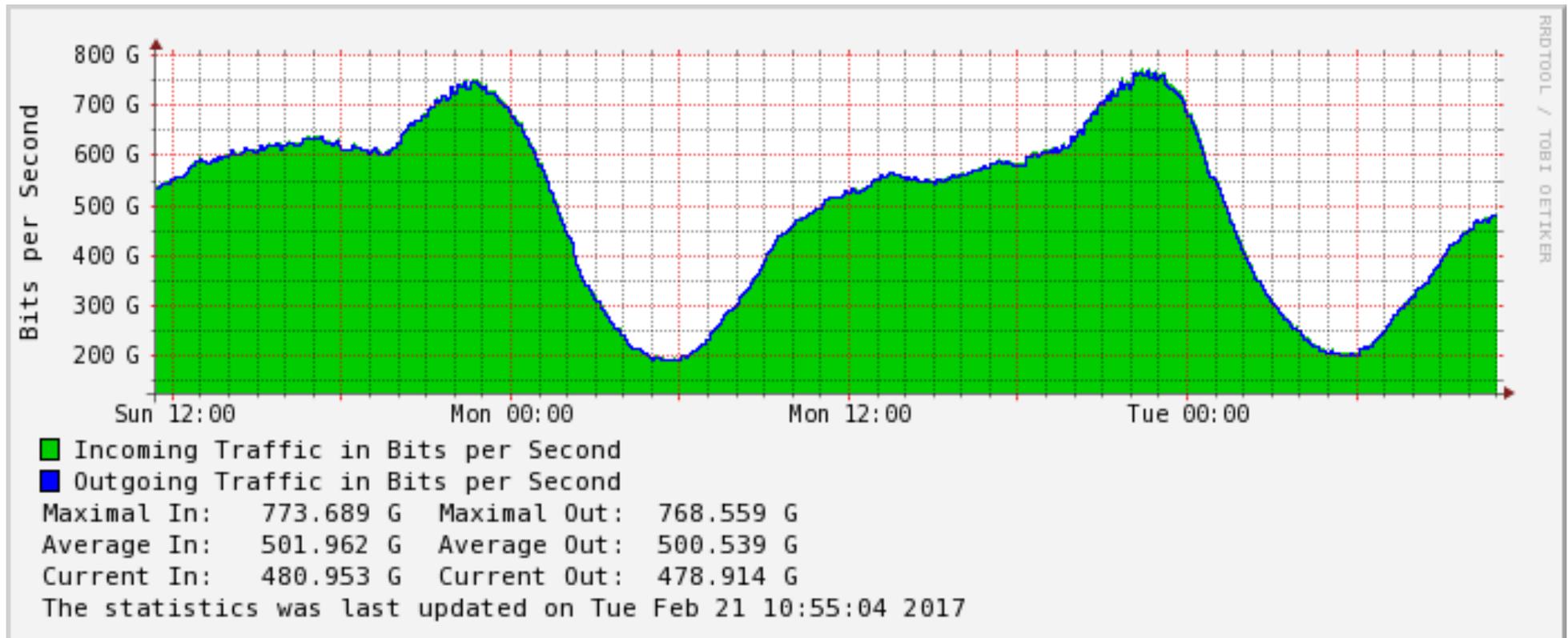
Yearly Traffic Statistics
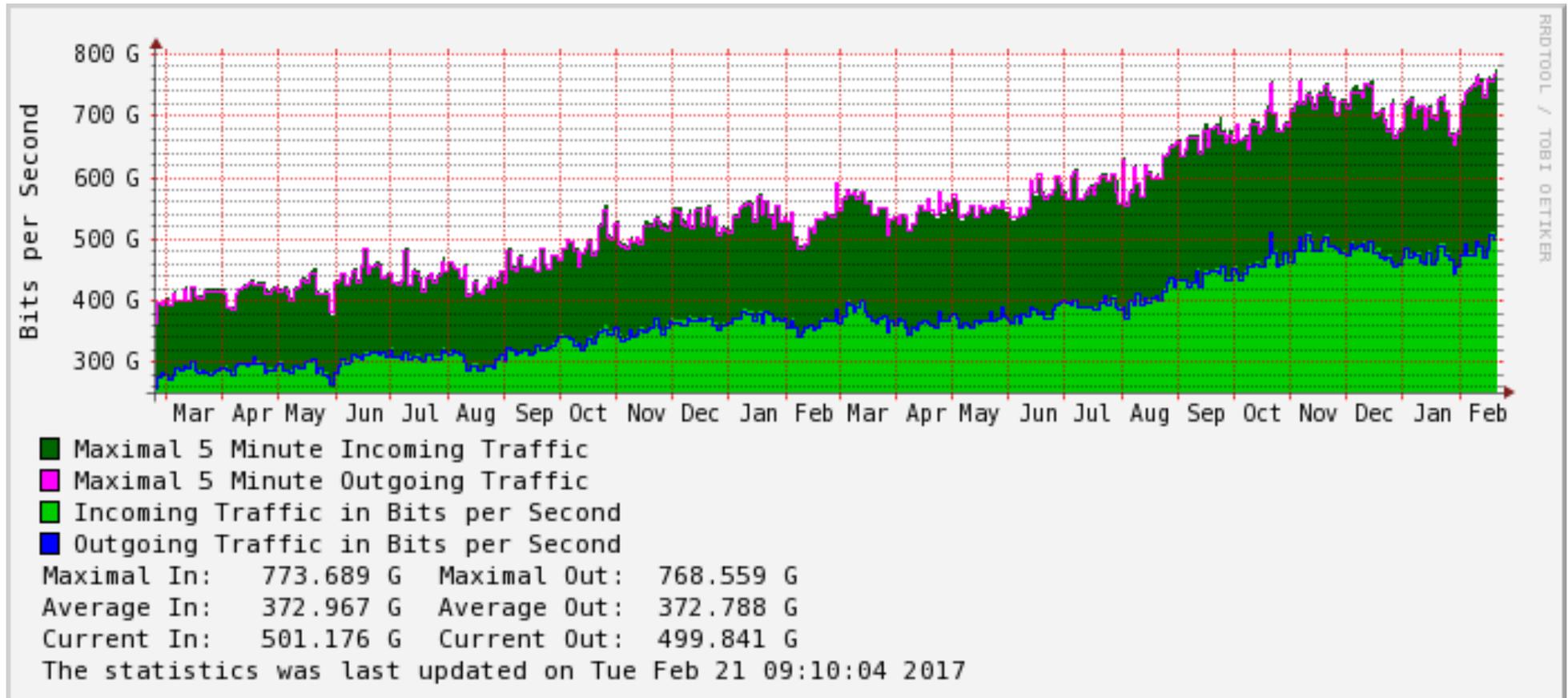
New HKIX Dual-Core Two-Tier Spine-and-Leaf Architecture For 2014 and Beyond

Setting up
Multiple HKIX Satellite Sites

- Allow participants to **connect to HKIX more easily at lower cost** from those satellite sites in Hong Kong

- Open to commercial data centres in HK which fulfil minimum requirements so as to maintain neutrality which is the key success factor of HKIX

- Create a win-win situation with satellite site collaborators

- To be named HKIX2/3/4/5/6/etc

  Recent updates:

  – HKIX2 has already been migrated from old model to new Satellite Site model

  – HKIX3/4/5 site will be Ready for Service by Apr 2017

- ***HKIX1* and *HKIX1b* (the two HKIX core sites *located within CUHK Campus*) will continue to serve participants directly**

Setting up
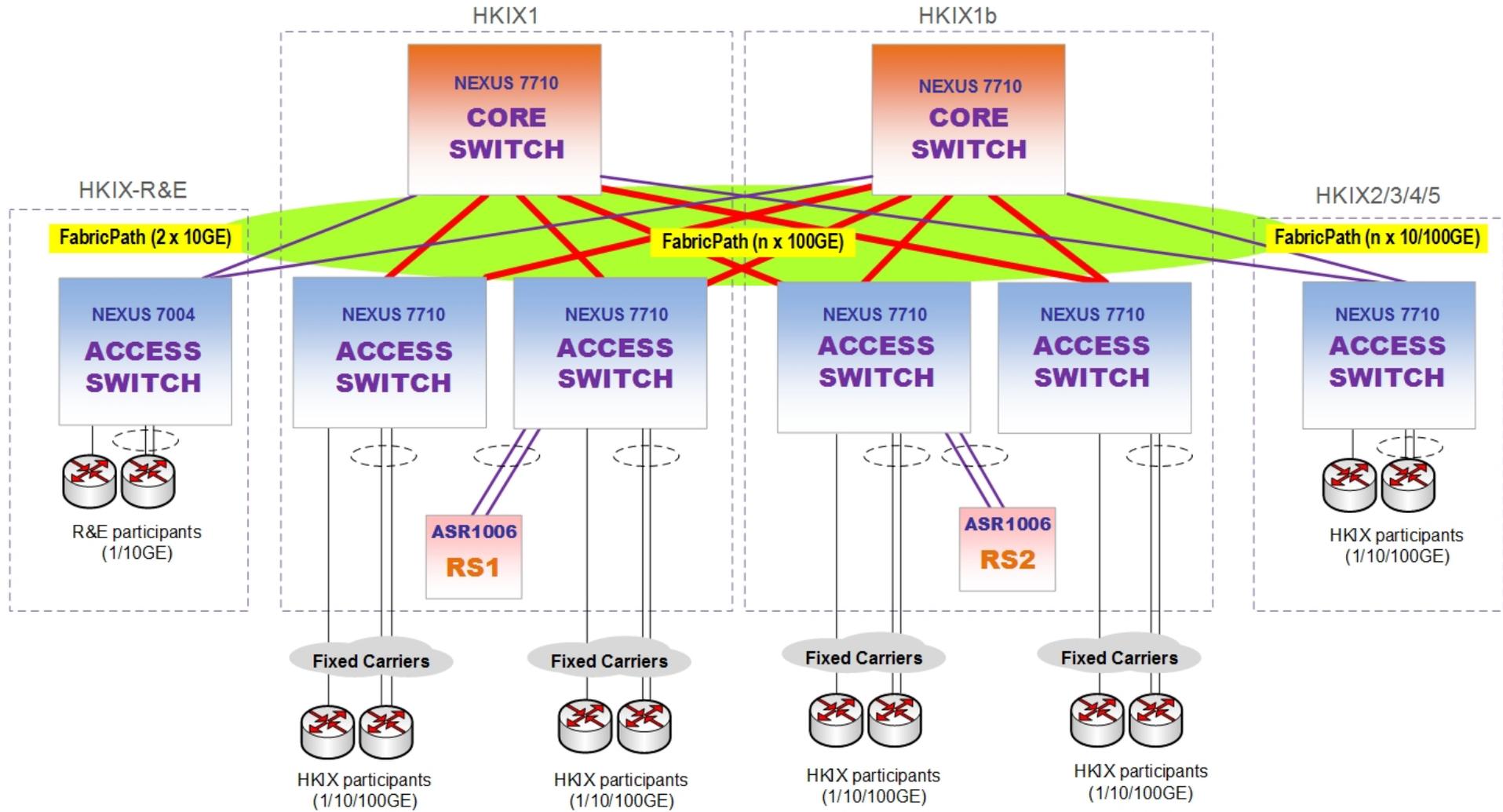# Multiple HKIX Satellite Sites

Hong Kong, 08 Feb 2017

HKIX announces that 3 new satellite sites will be established in collaboration with 3 commercial data centres which provide colocation services as well as easy connections to HKIX.

Satellite Site	Satellite Site Collaborator	District	Ports Supported	Status
HKIX2	CITIC Telecom International	Kwai Chung	GE/10GE	Ready for Service
HKIX3	SUNeVision / iAdvantage	Fo Tan	GE/10GE/100GE	Coming (by Feb 2017)
HKIX4	NTT Com Asia	Tseung Kwan O	GE/10GE	Coming (by Apr 2017)
HKIX5	KDDI / Telehouse / HKCOLO.net	Tseung Kwan O	GE/10GE/100GE	Coming (by Apr 2017)

- For connections to HKIX at Satellite Sites, special connection charges will be charged by relevant operators, in addition to the port charges charged by HKIX.
- For HKIX participants not colocated at HKIX satellite sites, they can still connect to any of the two HKIX core sites, i.e. HKIX1 and HKIX1b sites by local loops via local loop providers.

HKIX Network Diagram (Feb 2017)

HKIX1

HKIX1b

HKIX-R&E

HKIX2/3/4/5

NEXUS 7710 CORE SWITCH

NEXUS 7710 CORE SWITCH

FabricPath (2 x 10GE)

FabricPath (n x 100GE)

FabricPath (n x 10/100GE)

NEXUS 7004 ACCESS SWITCH

NEXUS 7710 ACCESS SWITCH

NEXUS 7710 ACCESS SWITCH

NEXUS 7710 ACCESS SWITCH

NEXUS 7710 ACCESS SWITCH

NEXUS 7710 ACCESS SWITCH

R&E participants (1/10GE)

ASR1006 RS1

ASR1006 RS2

HKIX participants (1/10/100GE)

Fixed Carriers

Fixed Carriers

Fixed Carriers

Fixed Carriers

HKIX participants (1/10/100GE)

HKIX participants (1/10/100GE)

HKIX participants (1/10/100GE)

HKIX participants (1/10/100GE)

1. **HKIX1** and **HKIX1b** are the two core sites of HKIX at CUHK while **HKIX2/3/4/5** are HKIX satellite sites outside of CUHK.
2. HKIX participants are encouraged to connect to multiple sites for site resilience.

HKIX

Support of Blackholing for Anti-DDoS on HKIX Route Servers

HKIX route servers support **Remote Triggered Black Hole Filtering** (RTBH) for announcement of black-hole filtering

No. of ASNs Participated : 27

How it works?

- The victim's address must be included in the participant filter on the HKIX route servers for BGP announcement
- Participant tag the /32 prefix with 4635:666 for its customer
- HKIX route servers set the prefix with next hop 123.255.90.66
- Other HKIX participants accept the /32 prefix and set the next hop address for 123.255.90.66 to null

Expected Results:
- Only the victim (/32) will be unreachable via HKIX network while saving the others
- The DDoS traffic will be black-holed at the side of the participating routers which are closer to the DDoS traffic sources

Support of Hiding AS4635 on HKIX Route Servers

- Hiding AS4635 (ASN of HKIX RS) on the AS Path in the BGP announcement
- Support both IPv4 and/or IPv6

Steps:
1. Disable BGP Enforce the First Autonomous System Path on your HKIX peering router
   - configuration:
       Router(config)# router bgp <Your-ASN>
       Router(config-router)# no bgp enforce-first-as
2. Notify HKIX for hiding AS4635 in the BGP announcement
3. Soft reset the BGP session
4. HKIX will hide the AS4635 on the AS Path for the IPv4 and/or IPv6 routes sending from HKIX route servers to your HKIX peering

Near-Term Plan

- 1Q2017 – True 24x7 NOC
- 3Q2017 – More BGP Communities will be supported on Route Servers for Routing Control
- 3Q2017 – HKIX Portal for Participants

Thank You!

For enquiries, please contact us at
info AT hkix.net