

HKIX Development and HKIX-R&E Updates at APAN 46

Kenneth CHAN
Team Lead, HKIX

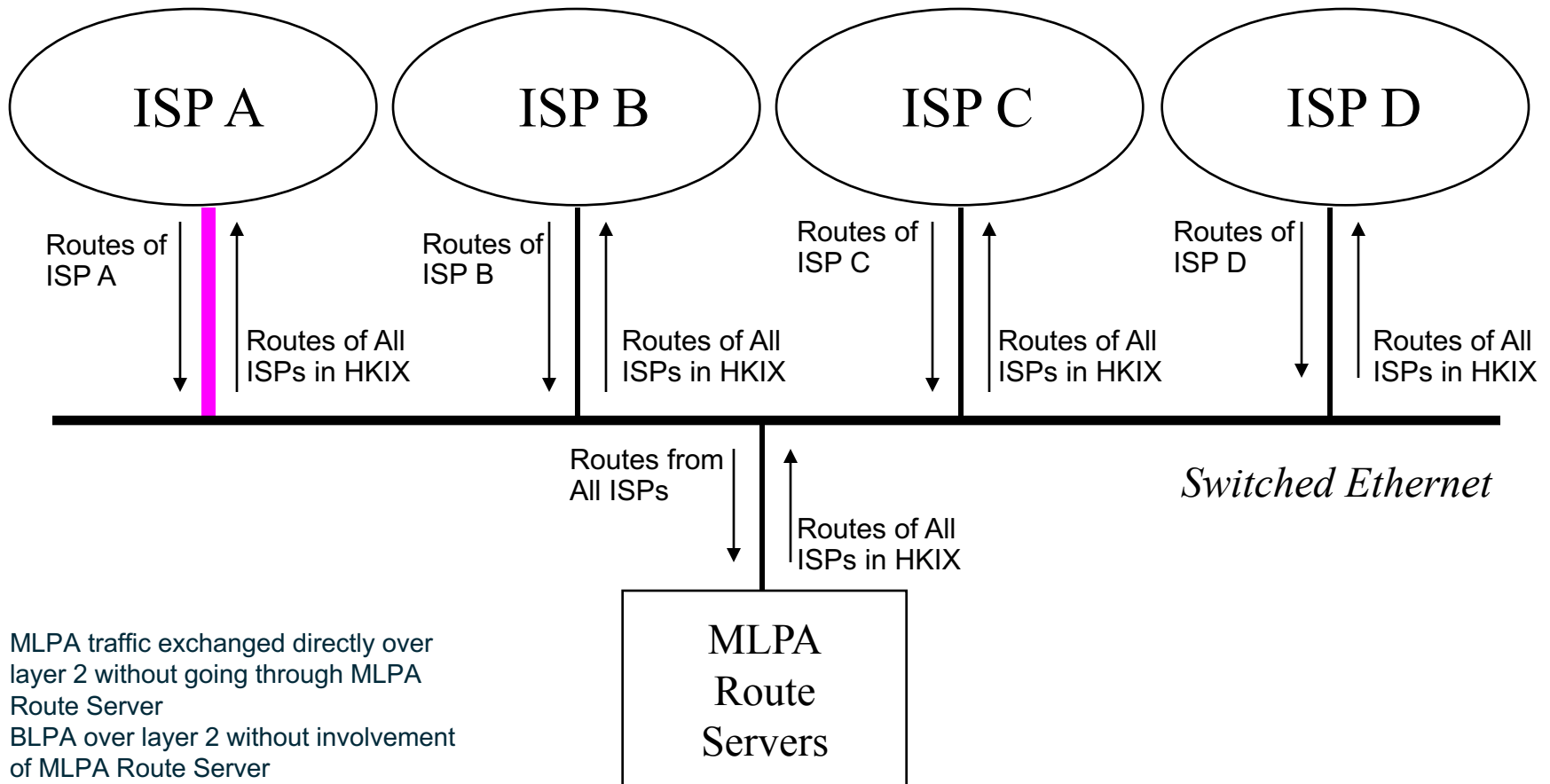
www.hkix.net

5-9 Aug 2018, Auckland

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



- 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

HKIX's Advantages

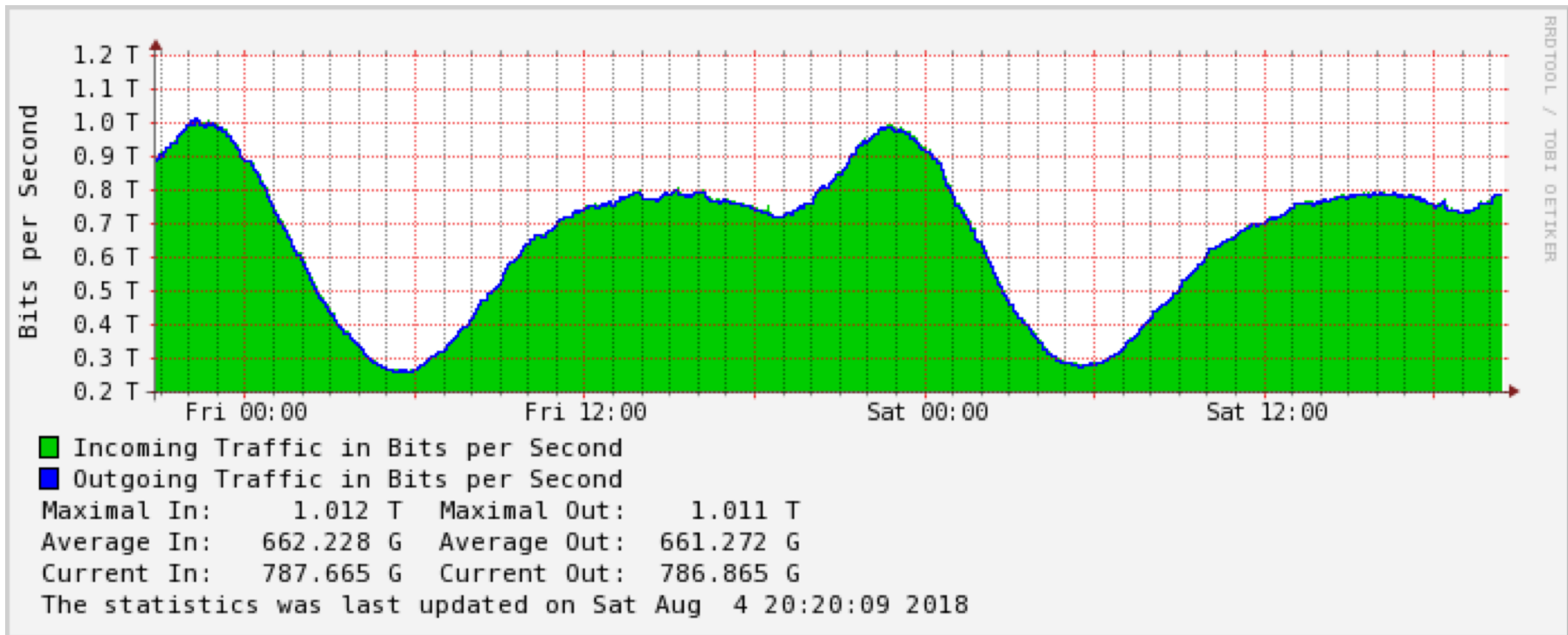
- **Location**
 - Hong Kong is a good central location in Asia
~50ms to Tokyo and ~30ms to Singapore
- **Neutral**
 - Treat all partners equal, big or small
 - Neutral among ISPs / telcos / local loop providers/ data centers / content providers / cloud services providers
- **Trustable**
 - Treat all partners fair and consistent
 - Respect business secrets of every partner / participant
- **High Performance**
 - No internal performance bottleneck, no internal packet loss
- **Not for Profit**
 - Charging mainly for equipment upgrade and long-term sustainability, not for profit-making

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
- 280+ different networks (autonomous systems) connected
- 490+ physical connections in total
 - 30 **100GE**, 300+ **10GE** & 150+ **GE**
- 1.17+Tbps (5-min) total traffic at peak
- Annual Traffic Growth **~30%**

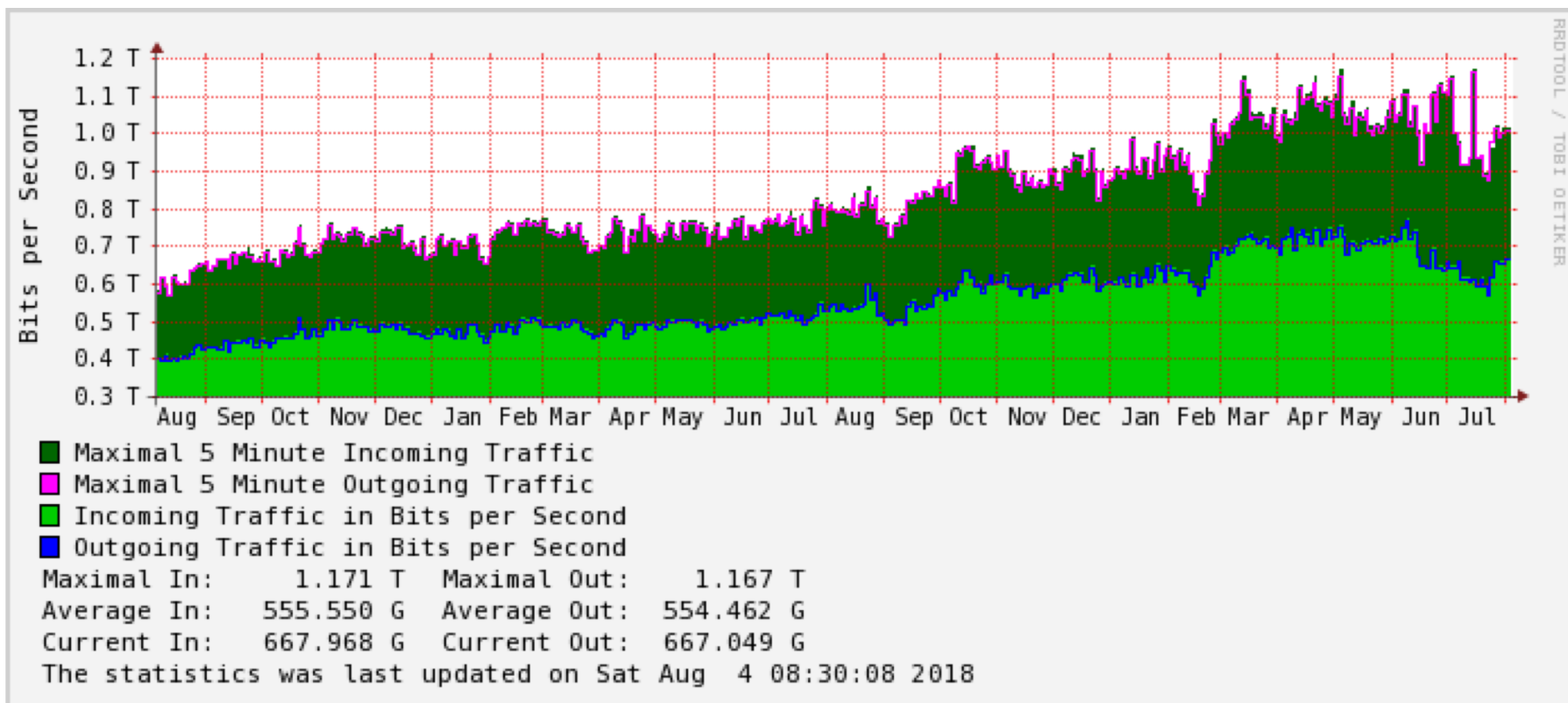
Current HKIX Traffic

Daily Graph (5-min average)



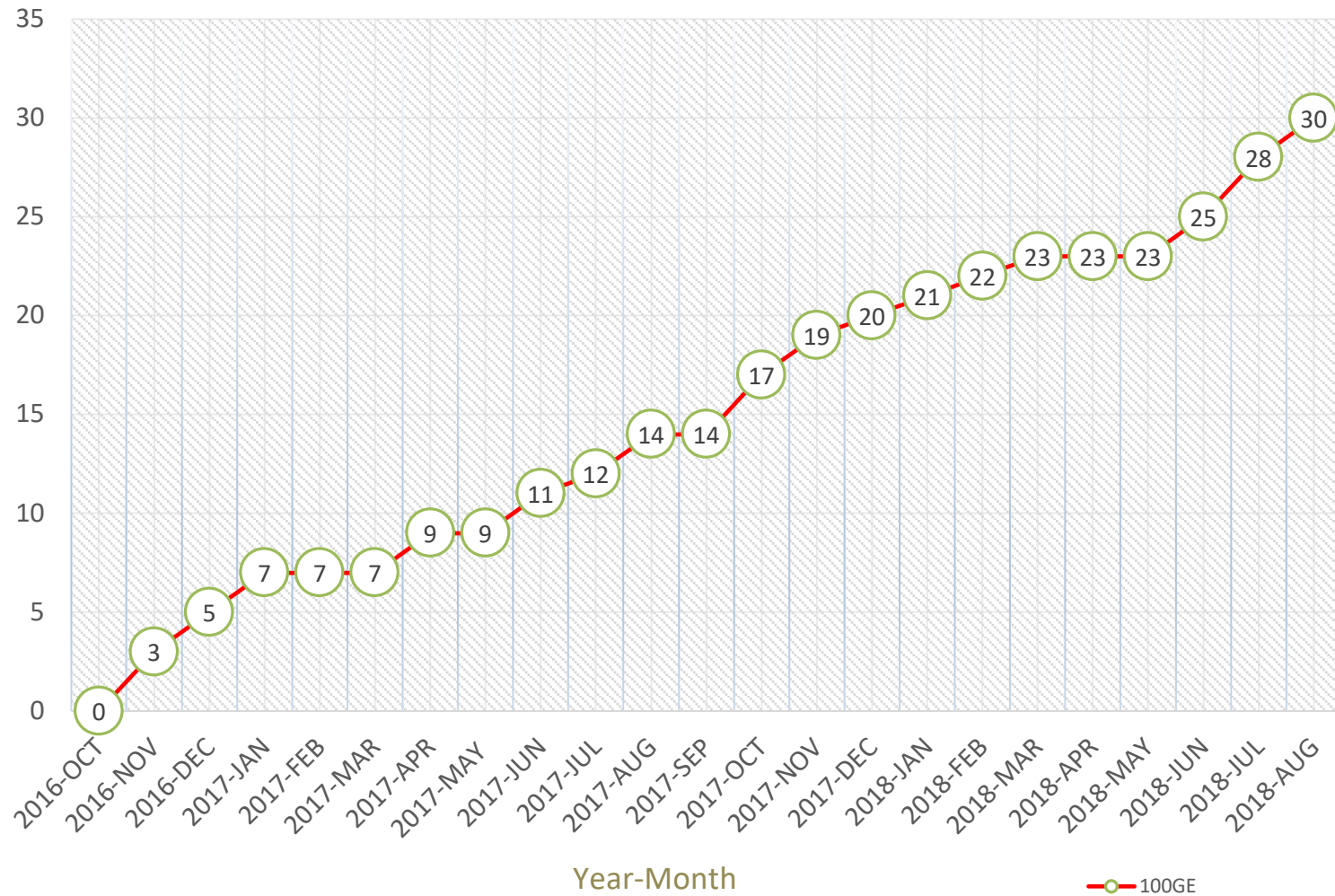
Current HKIX Traffic

Yearly Graph (1-day average)



Trend of 100GE connections

Total HKIX 100G Ports Connected (2016 OCT - 2018 AUG)



HKIX 100GE Participants

- Akamai
- Amazon
- AOFEI
- BGP Consultancy
- China Mobile International
- CloudFlare
- Facebook
- Google
- HKBN
- Hurricane Electric
- Limelight
- PCCW IMS
- Telstra
- Tencent
- TVB
- Udomain
- Valve
- Yahoo

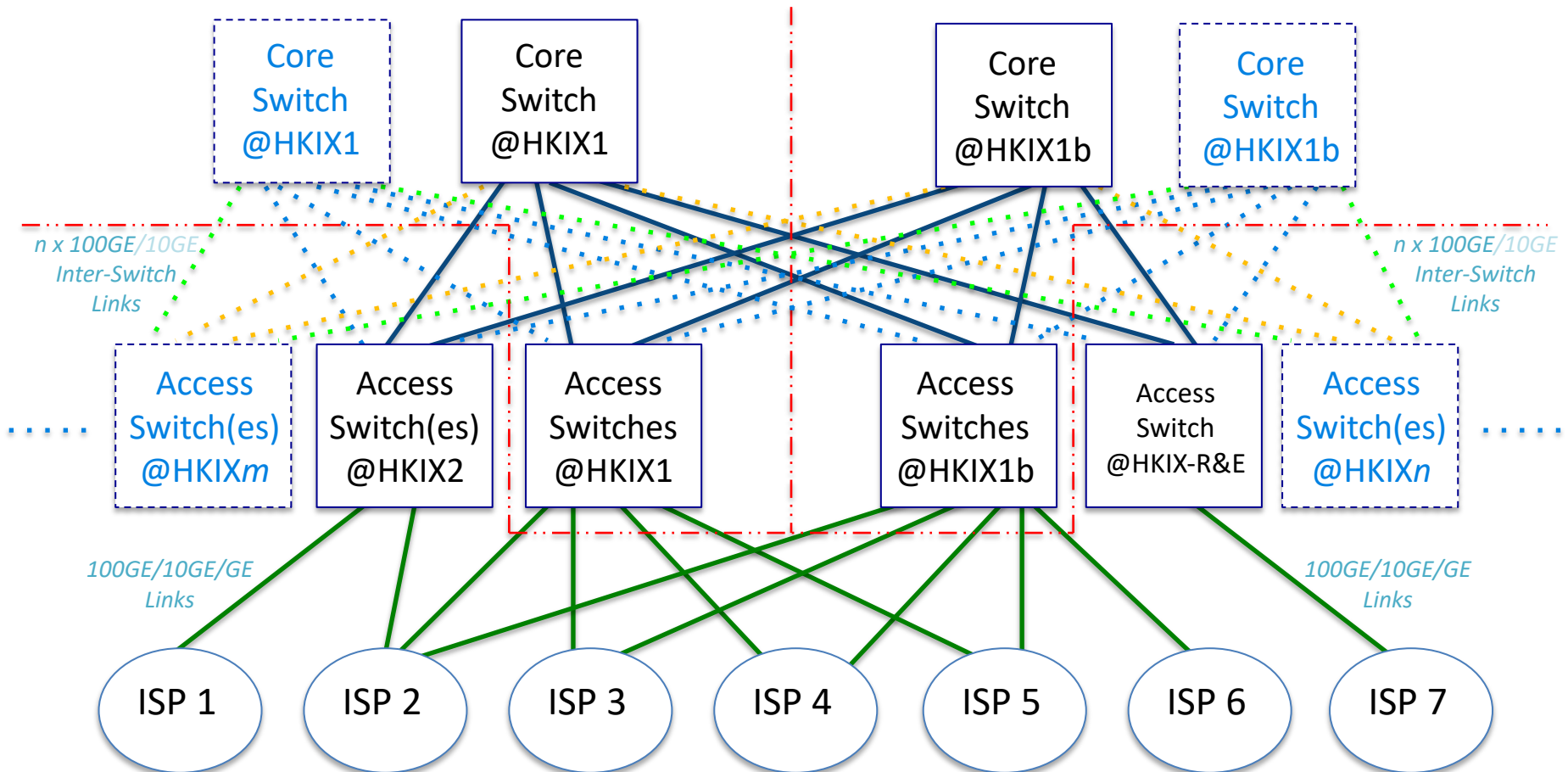
HKIX 100GE R&E Participants

- APANJP/NICT/JGN-X
- CERNET

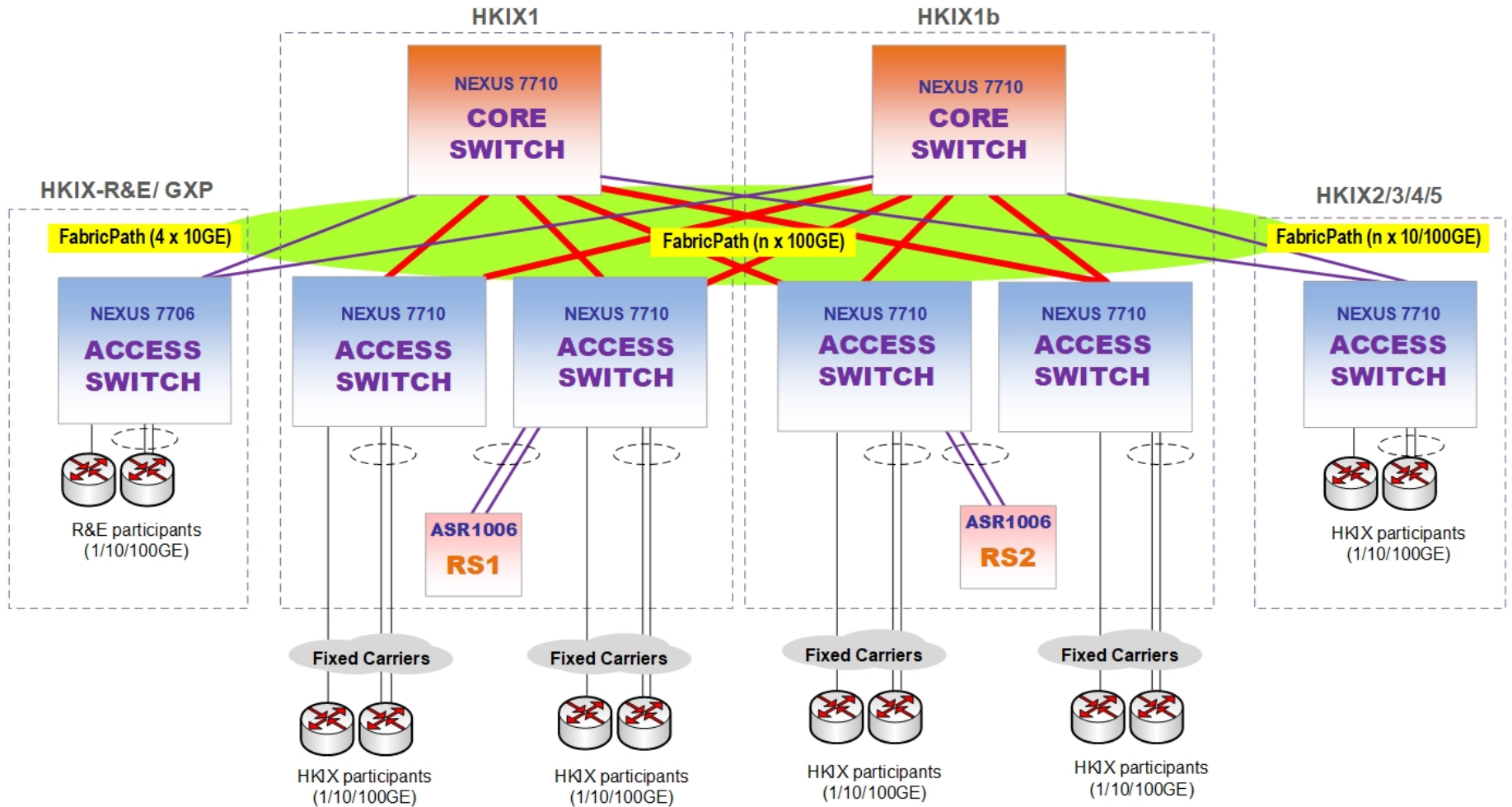
New HKIX Dual-Core Two-Tier Spine-and-Leaf Architecture For 2014 and Beyond



HKIX1 Core Site @CUHK -----(<2km)----- HKIX1b Core Site @CUHK



HKIX Network Diagram (Apr 2018)



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.

Setup 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	Ready for Service 28 Feb 2017
HKIX4	NTT Com Asia	Tseung Kwan O	GE/10GE/100GE	Ready for Service 19 Jun 2017
HKIX5	KDDI / Telehouse / HKCOLO.net	Tseung Kwan O	GE/10GE/100GE	Ready for Service 24 Mar 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 co-located 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.

Setup 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 been migrated from old model to HKIX Satellite Site
- HKIX3/4/5 are new Satellite Sites and they are **Ready for Service** now
- ***HKIX1 and HKIX1b (the two HKIX core sites located within CUHK Campus) will continue to serve participants directly***



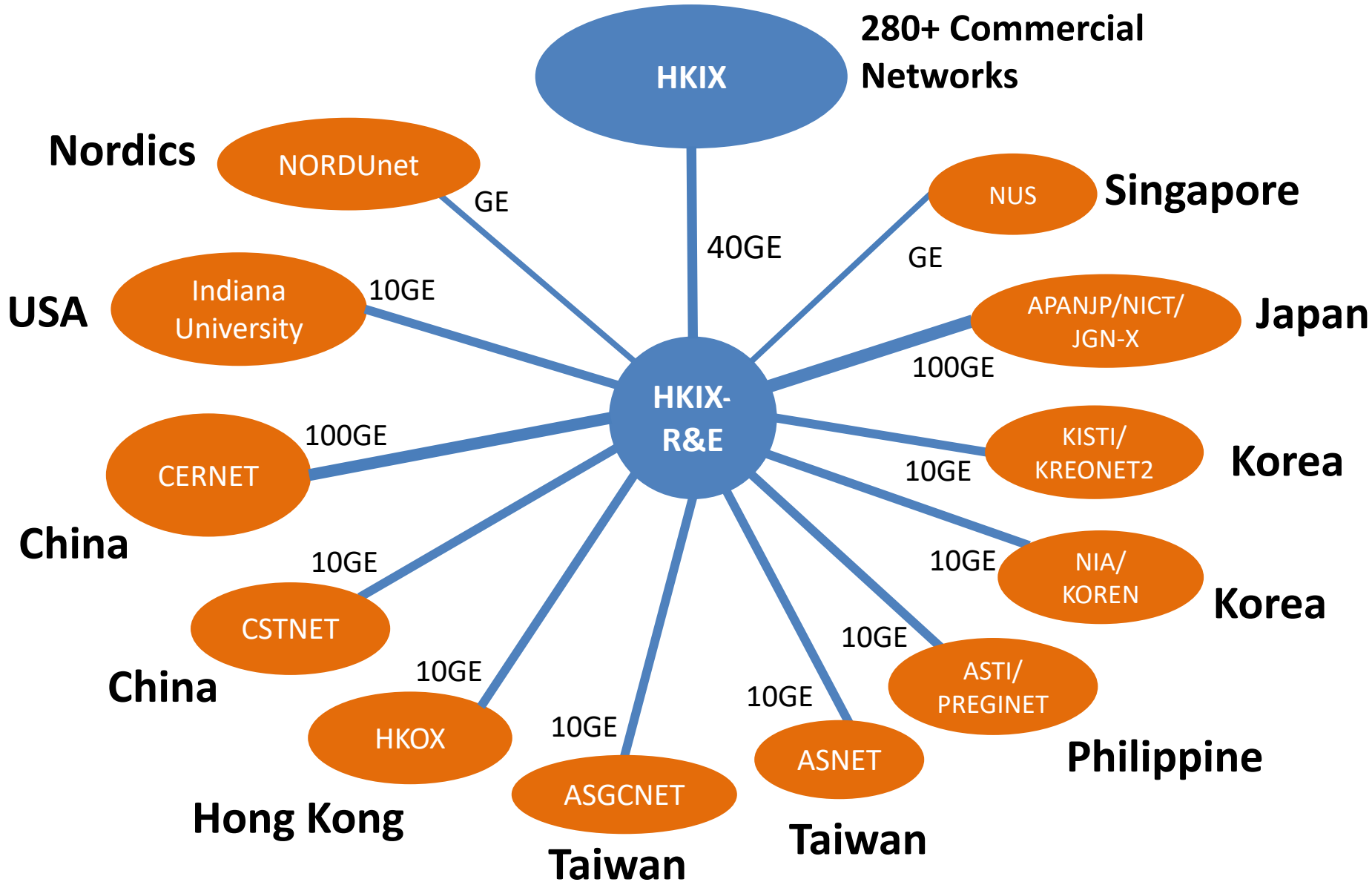
HKIX-R&E – Special Support for R&E Networks Having Presence in HK

- HKIX helps those R&E Networks interconnect among themselves and with commercial networks without restrictions via HKIX-R&E switch at MEGA-i
- The main purpose is to facilitate those National R&E Networks having presence in Hong Kong to do interconnections among themselves *and* do peering with commercial networks at HKIX more easily and at a lower cost.
- Started in 2008
- **Free of charge** (no port charge on HKIX-R&E switch and the connection to HKIX)
- Support GE/10GE/100GE Trunk Ports for R&E networks
- Support Point-to-point VLANs for R&E networks
 - For private interconnections among any 2 R&E networks
 - Jumbo Frame support
- Fiber Cross Connect to be provided by R&E networks
- 7x24 NOC support
- Operate by HKIX with the HKIX-R&E switch at MEGA-i

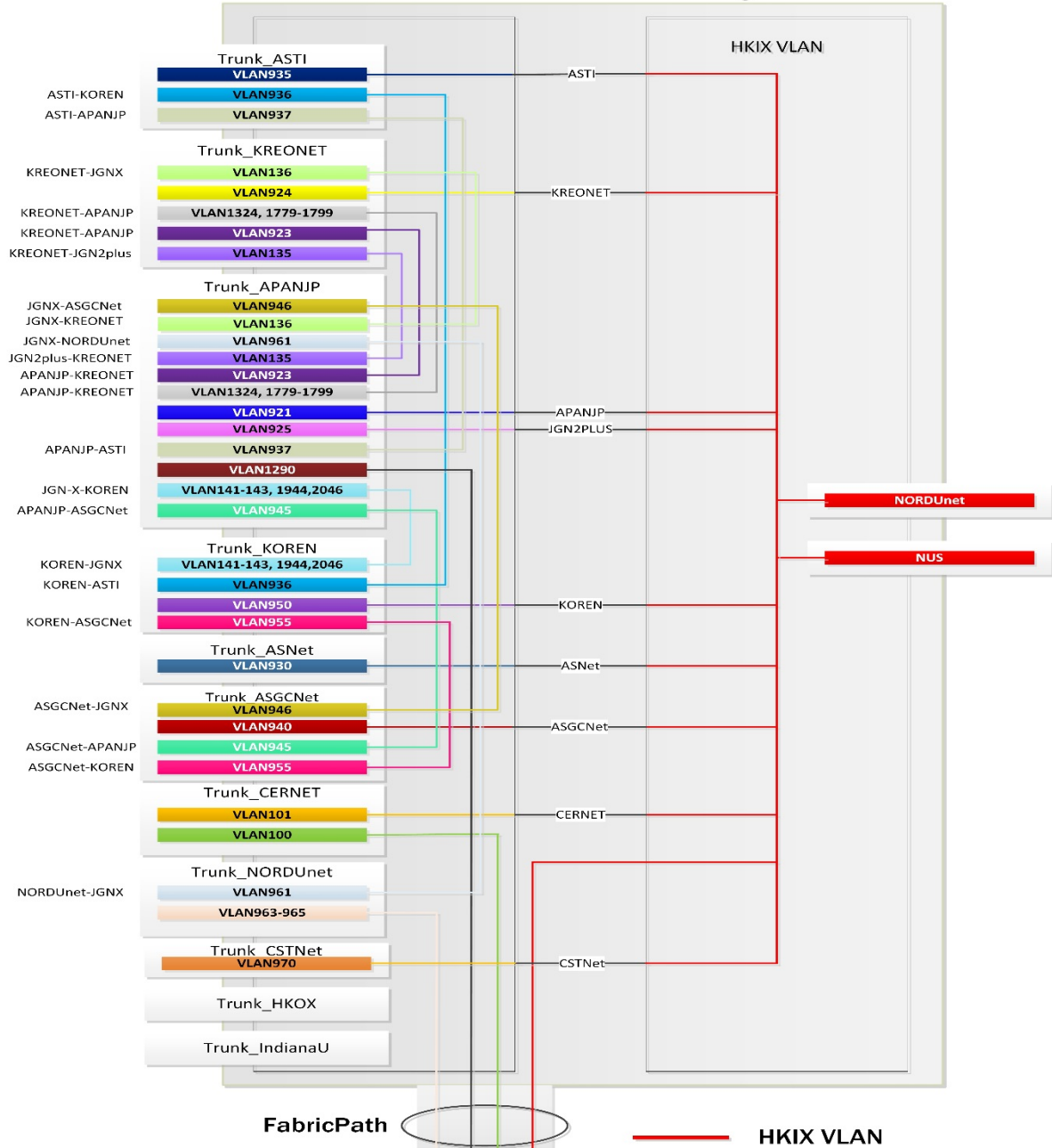
HKIX-R&E Updates

- New R&E participants
 - HKOX (2018 Jun)
 - Indiana University (2018 Aug)
- HKIX Portal for HKIX-R&E participants
 - View MRTG (HKIX VLAN, trunk port will be available later)
 - Change port-security MAC address (HKIX VLAN)
 - Schedule Maintenance Window
- More Resilience
 - 100G Line Cards
 - New Rack Space in MEGA-i
- 100G Connections from MEGA-i to HKIX
 - Upgrade existing 4x10G connections to 2x100G (Target by 2018)

HKIX-R&E Network Diagram



HKIX-R&E Network Diagram

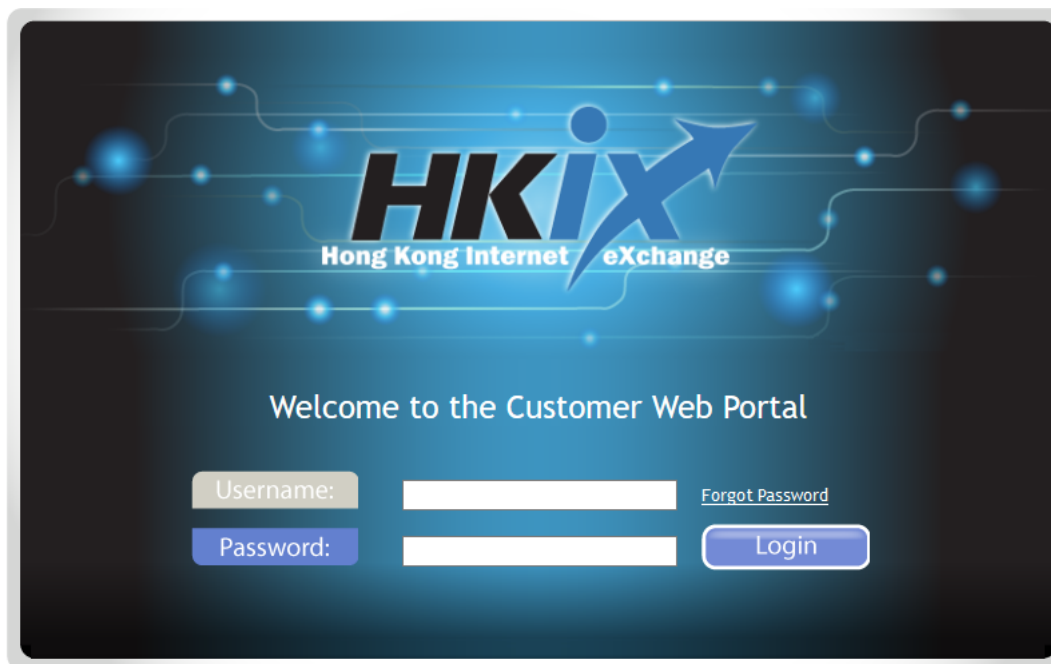


To HKIX1/HKIX1b

Updated on 01-Aug-2018

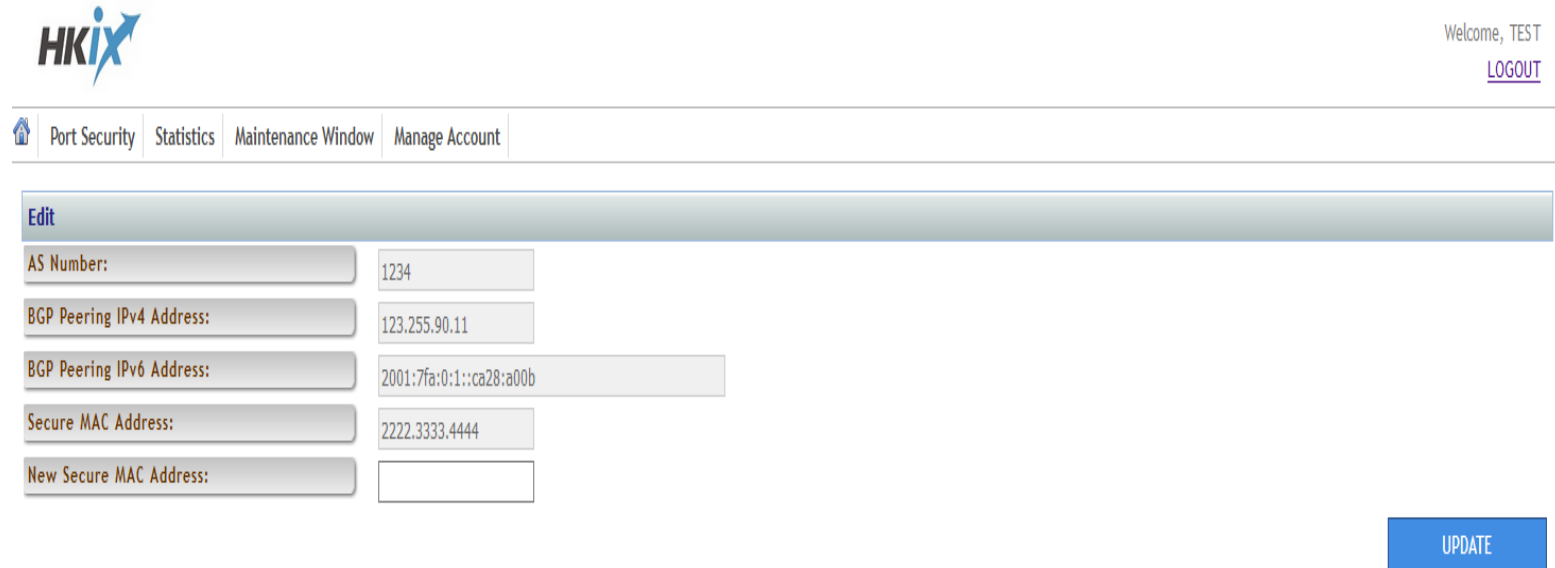
Portal for HKIX-R&E Participants

- Login Page (URL: <https://portal.hkix.net/>)

A screenshot of the HKIX Customer Web Portal login page. The page has a dark blue background with a glowing network pattern of lines and nodes. At the top center is the HKIX logo, which includes the text 'HKIX' in a large, bold, blue font, with 'Hong Kong Internet eXchange' written in a smaller, white font below it. Below the logo, the text 'Welcome to the Customer Web Portal' is displayed in white. The login form consists of two input fields: 'Username:' and 'Password:'. The 'Username:' field is a white box with a light blue border, and the 'Password:' field is a white box with a light blue border. To the right of the 'Username:' field is a link labeled 'Forgot Password' in blue text. To the right of the 'Password:' field is a blue button with the text 'Login' in white.

HKIX Portal – Port Security

- Change port security



The screenshot shows the HKIX Portal interface for configuring port security. At the top left is the HKIX logo. At the top right, it says "Welcome, TEST" and has a "LOGOUT" link. Below this is a navigation bar with a home icon and four menu items: "Port Security", "Statistics", "Maintenance Window", and "Manage Account". The main content area is titled "Edit" and contains five input fields for configuration:

AS Number:	1234
BGP Peering IPv4 Address:	123.255.90.11
BGP Peering IPv6 Address:	2001:7fa:0:1::ca28:a00b
Secure MAC Address:	2222.3333.4444
New Secure MAC Address:	<input type="text"/>

At the bottom right of the form is a blue "UPDATE" button.

HKIX Portal – MRTG Statistics

- Review an individual statistics / HKIX total statistics



Welcome, TEST

[LOGOUT](#)

[Home](#) |
 [Port Security](#) |
 [Statistics](#) |
 [Maintenance Window](#) |
 [Manage Account](#)

Port Statistics

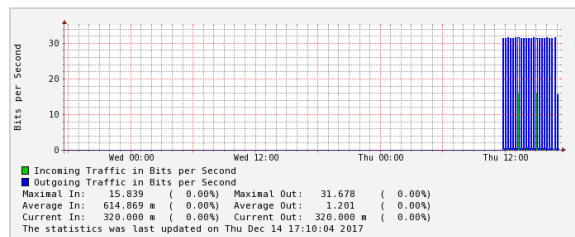
HKIX Total Statistics
 Aggregated by 1234
 123.255.90.11 / 2001:7fa:0:1::ca28:a00b

Traffic Analysis for 1234

IPv4: 123.255.90.11
 IPv6: 2001:7fa:0:1::ca28:a00b
 Speed: 1 Gbits/s
 Port Type: Non-LACP

The statistics were last updated: Thu Dec 14 17:15:04 2017

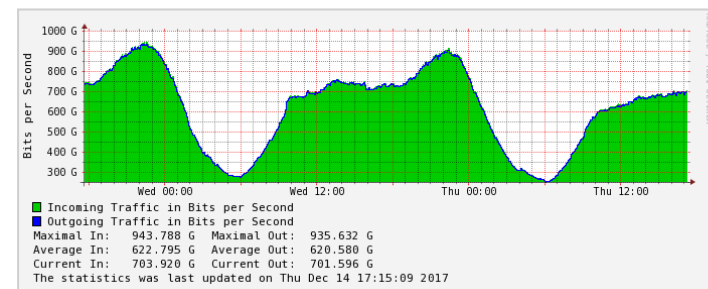
'Daily' graph (5 Minute Average)



HKIX Switching Statistics

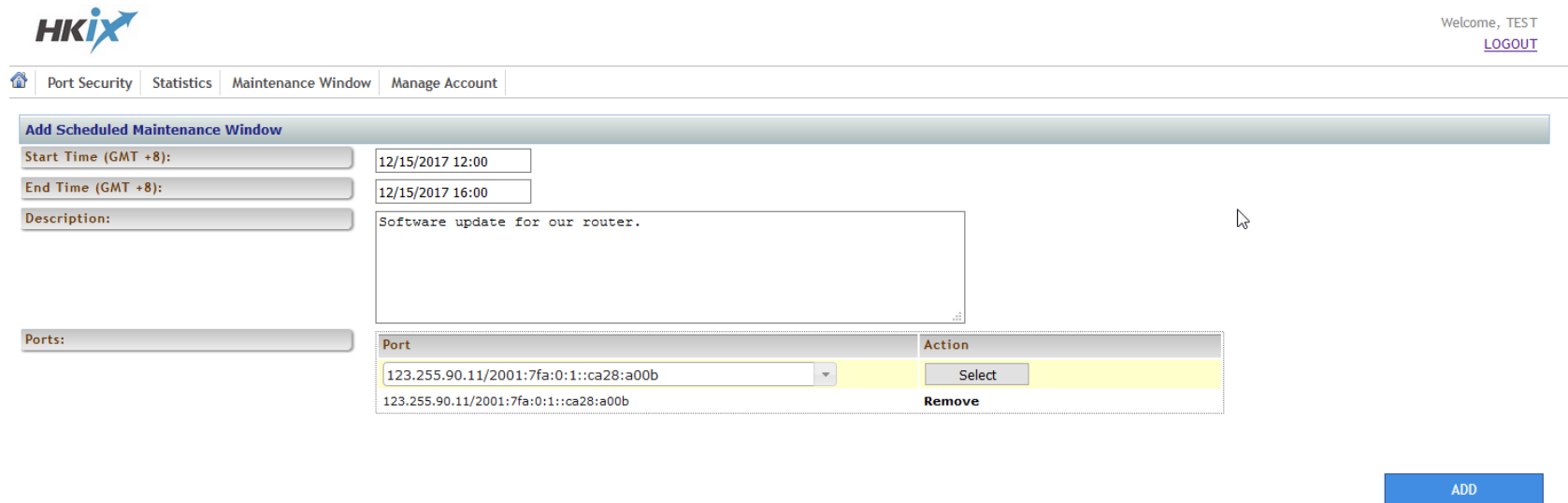
The statistics were last updated: Thu Dec 14 17:15:09 2017

'Daily' graph (5 Minute Average)




HKIX Portal - Maintenance Window

- Schedule Maintenance Window



The screenshot shows the 'Add Scheduled Maintenance Window' form in the HKIX Portal. The form includes fields for Start Time (GMT +8), End Time (GMT +8), and Description. Below these fields is a 'Ports' section with a table of IP addresses and their corresponding actions.

HKIX logo: 

Welcome, TEST [LOGOUT](#)

Home | [Port Security](#) | [Statistics](#) | [Maintenance Window](#) | [Manage Account](#)

Add Scheduled Maintenance Window

Start Time (GMT +8): 12/15/2017 12:00

End Time (GMT +8): 12/15/2017 16:00

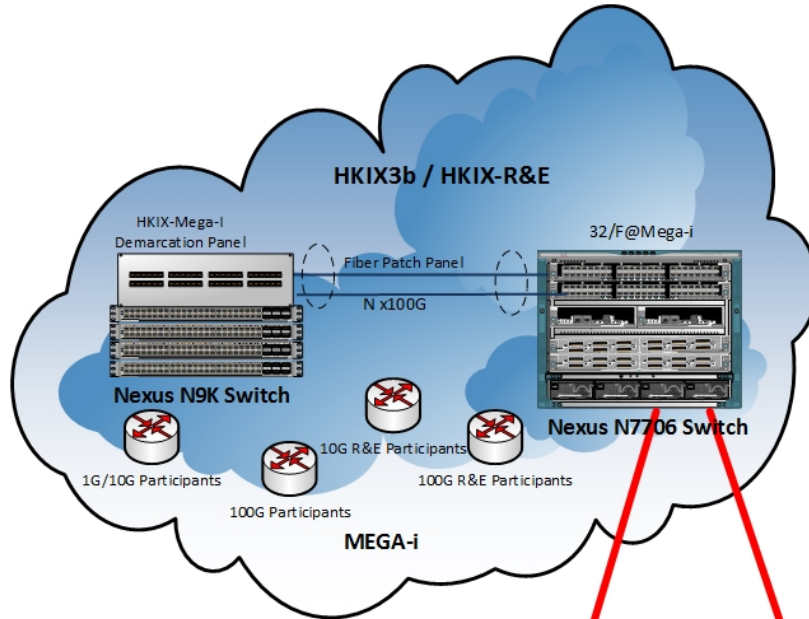
Description: Software update for our router.

Ports:

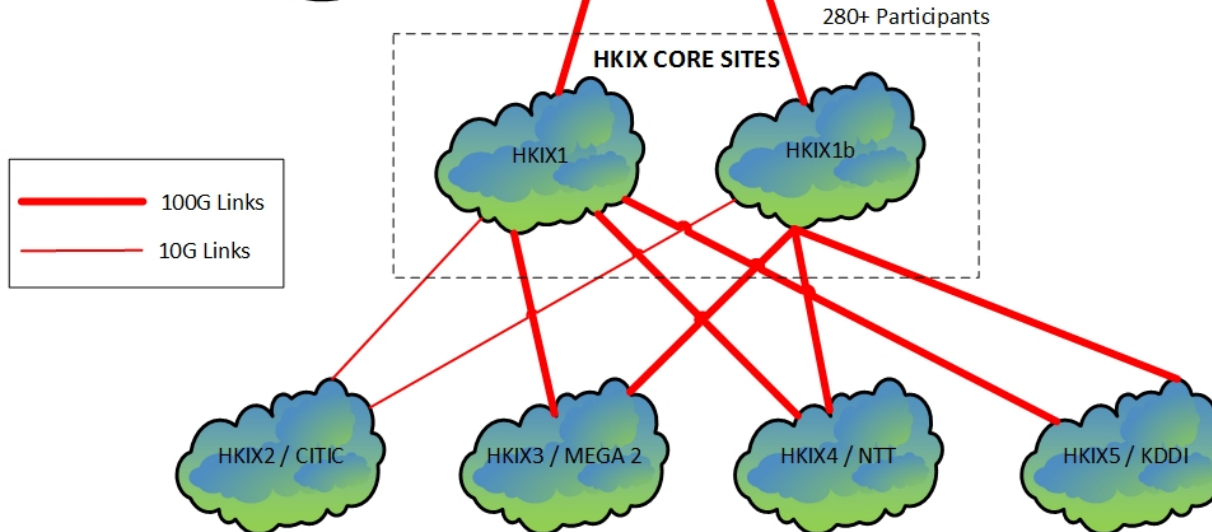
Port	Action
123.255.90.11/2001:7fa:0:1::ca28:a00b	Select
123.255.90.11/2001:7fa:0:1::ca28:a00b	Remove

[ADD](#)

HKIX Infrastructure Upgrade Plan @MEGA-i



More rack space
More resilience
More bandwidth



HKIX Planned Works for 2018/19

- Improved Stability
 - Better Control of Proxy ARP
- Improved Services
 - Rollout portal for HKIX participants / R&E participants
 - True 24x7 NOC (both email & hotline support)
 - Improve after-hour support
 - Introduce advanced Route Server functions
 - Automatic network filter update (support updates from IRR)
- Improved Security
 - ISO27001
 - Better support for DDoS mitigation
 - Implement MANRS IXP Programme for routing security
 - Implement RPKI on HKIX Route Servers to enhance routing security

Sharing of operating a GXP

- Importance of Resilience
 - Sites (Spine and leaf architecture to support active-active topology)
 - Switches (Cisco Nexus N7710 with full redundancy of supervisors, 10G&100G line cards, power supplies)
 - Multiple Route Servers
- Tools for participants
 - HKIX Looking Glass (Ping test, check BGP routes, BGP summary, etc.)
 - User portal for viewing MRTG, change port-security mac address
- Stability
 - Self-defending to Proxy-ARP
- NOC
 - True 7x24 NOC providing support via email and hotline
 - Skillset (Understanding of Exchange Point with adequate network knowledge)
 - Mindset (Task priority of Exchange Point vs Campus)



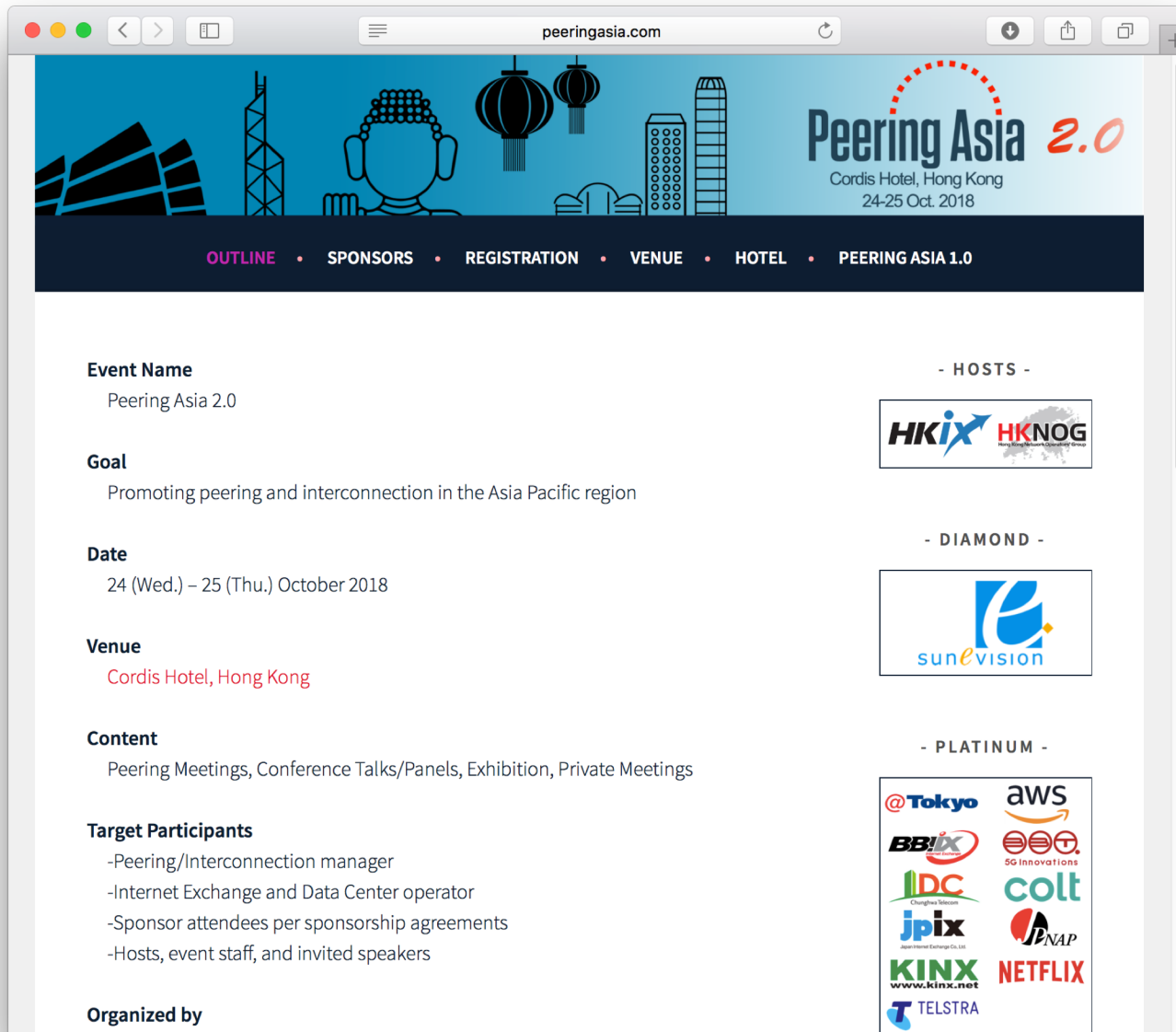
[By Base64 - Own work, CC BY-SA 3.0](#)

Peering Asia 2.0

Hong Kong co-host by HKIX and HKNORG

24th – 25th October, 2018

Peering Asia 2.0 Web Site



The screenshot shows a web browser window with the URL peeringasia.com. The page features a blue header with a navigation menu: [OUTLINE](#) • [SPONSORS](#) • [REGISTRATION](#) • [VENUE](#) • [HOTEL](#) • [PEERING ASIA 1.0](#). The main content area is divided into two columns. The left column contains event details, and the right column lists sponsors categorized by tier.

Event Name
Peering Asia 2.0

Goal
Promoting peering and interconnection in the Asia Pacific region

Date
24 (Wed.) – 25 (Thu.) October 2018

Venue
Cordis Hotel, Hong Kong


Content
Peering Meetings, Conference Talks/Panels, Exhibition, Private Meetings

Target Participants


- Peering/Interconnection manager
- Internet Exchange and Data Center operator
- Sponsor attendees per sponsorship agreements
- Hosts, event staff, and invited speakers

Organized by


- HOSTS -



- DIAMOND -



- PLATINUM -



Peering Asia 2.0 details

- Date : 24th to 25th October (Wed & Thu)
- Venue : Cordis Hotel, Hong Kong
 - » Conference capacity of 250+
 - » 35+ tables for peering meeting
 - » 14+ rooms for private meeting
 - » Walking distance to wide range of accommodation choices
 - » Walking distance to subway & train stations
 - » Surround by numerous restaurants and bars

**REGISTER
NOW!**

Please visit our web site at www.peeringasia.com for details

Thank You!

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