



# HKIX Updates at APIX #16

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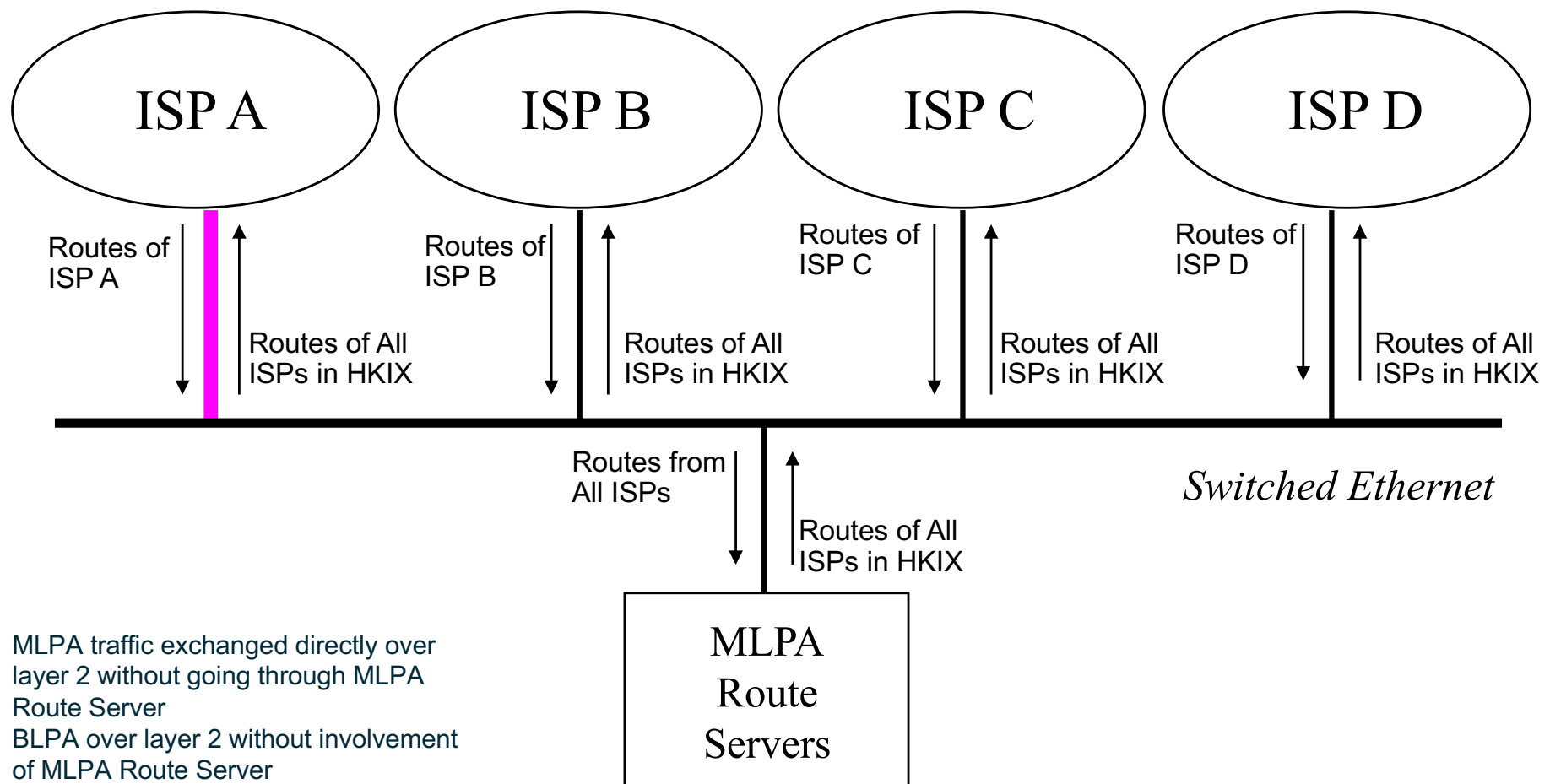
[www.hkix.net](http://www.hkix.net)

11 Sep 2017

# 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

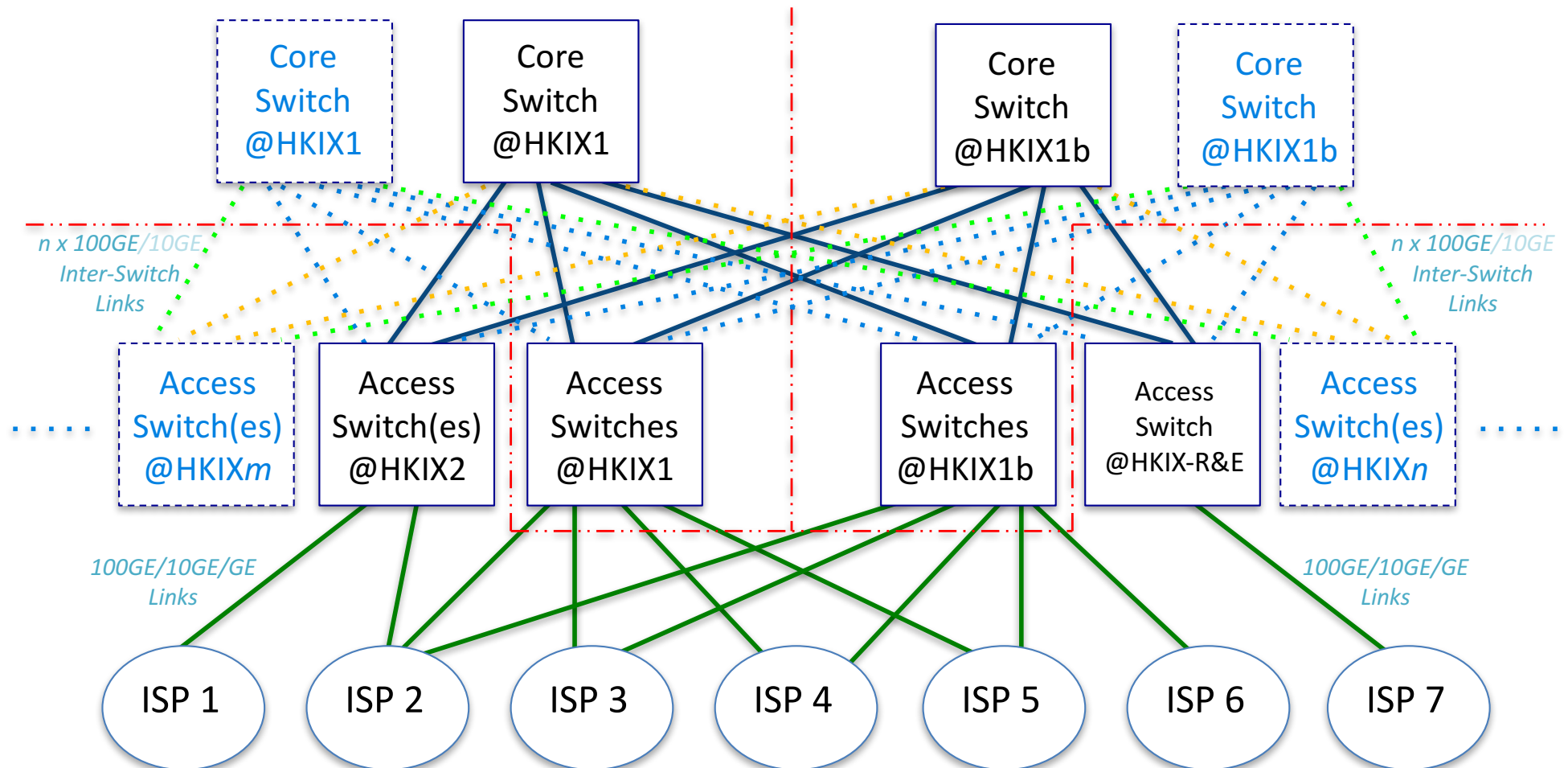
# Help Keep Intra-Asia Traffic within Asia

- 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

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

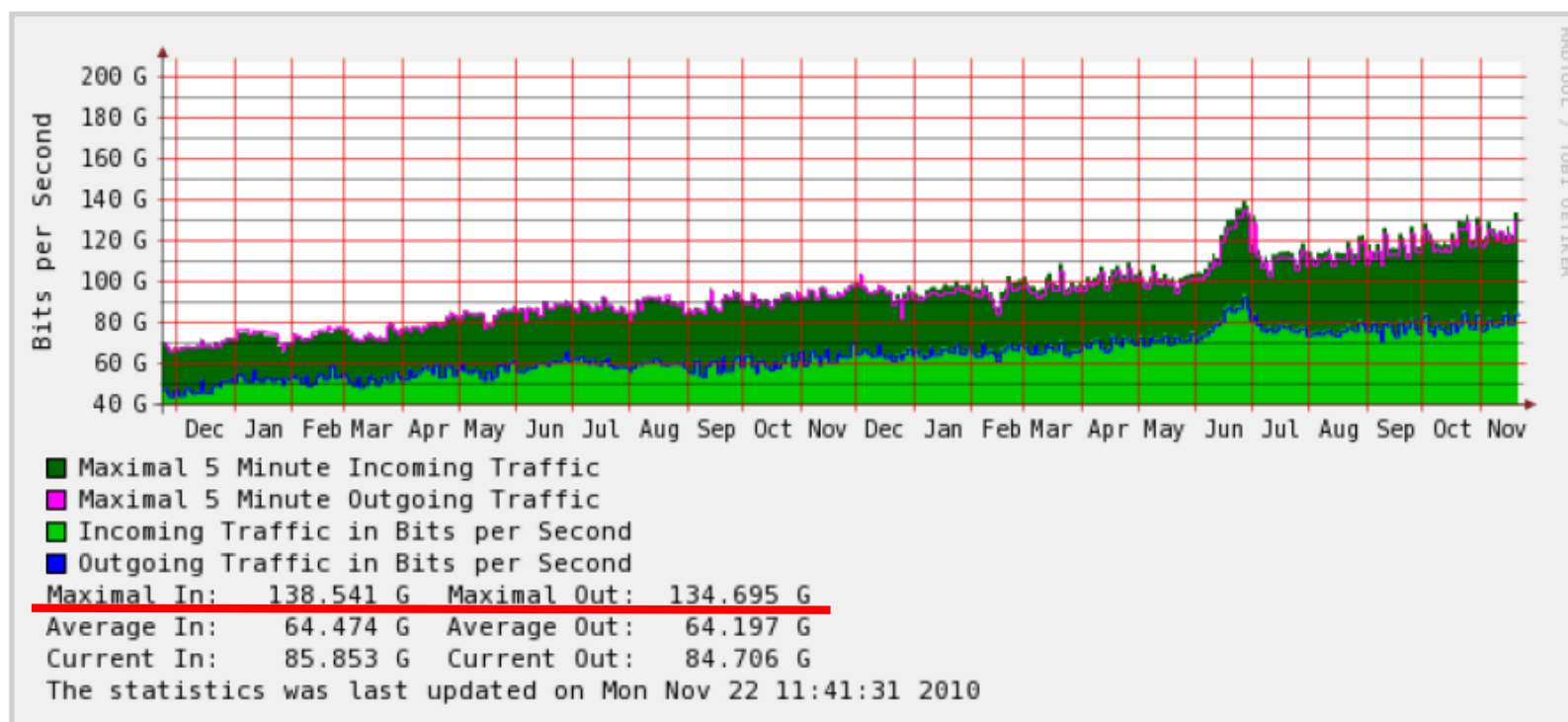


HKIX1 Core Site @CUHK -----(<2km)----- HKIX1b Core Site @CUHK



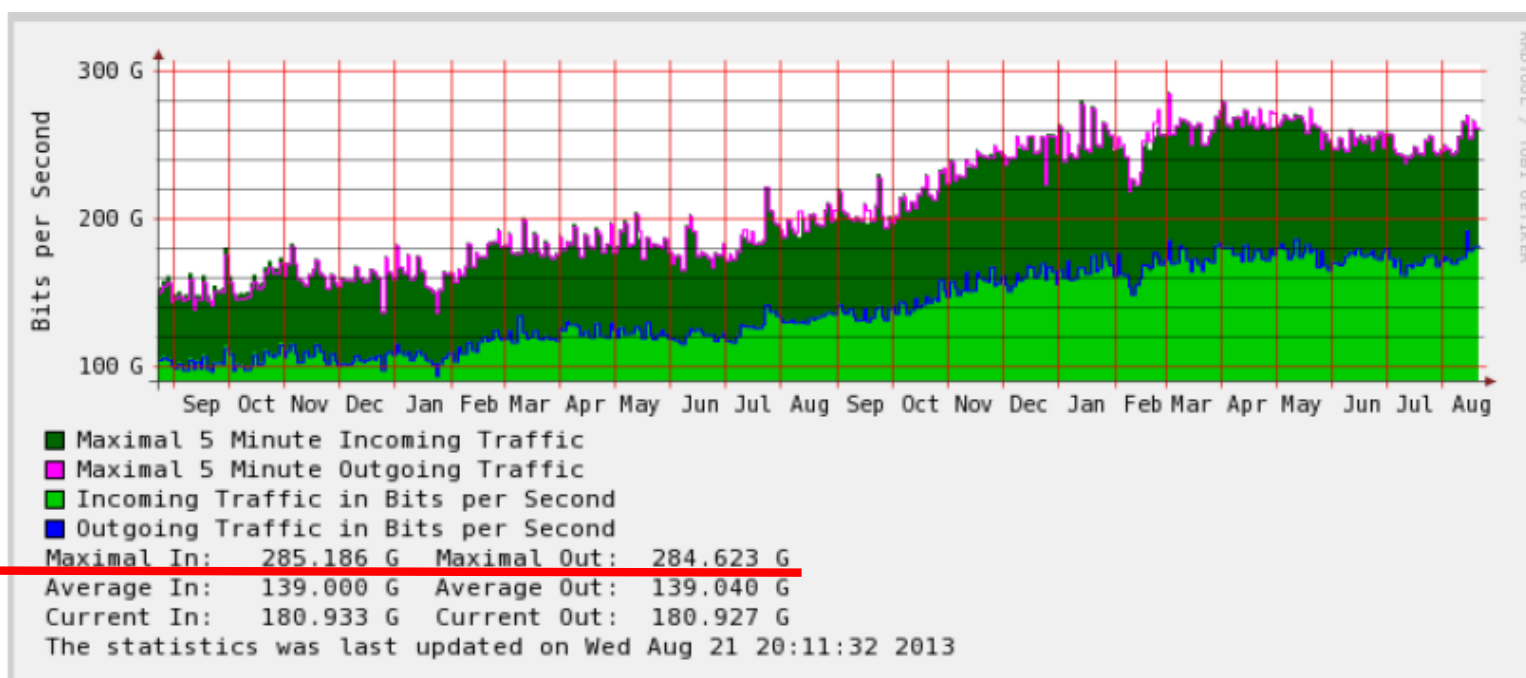
# Historical Statistics for HKIX's Traffic (1)

## Year 2010

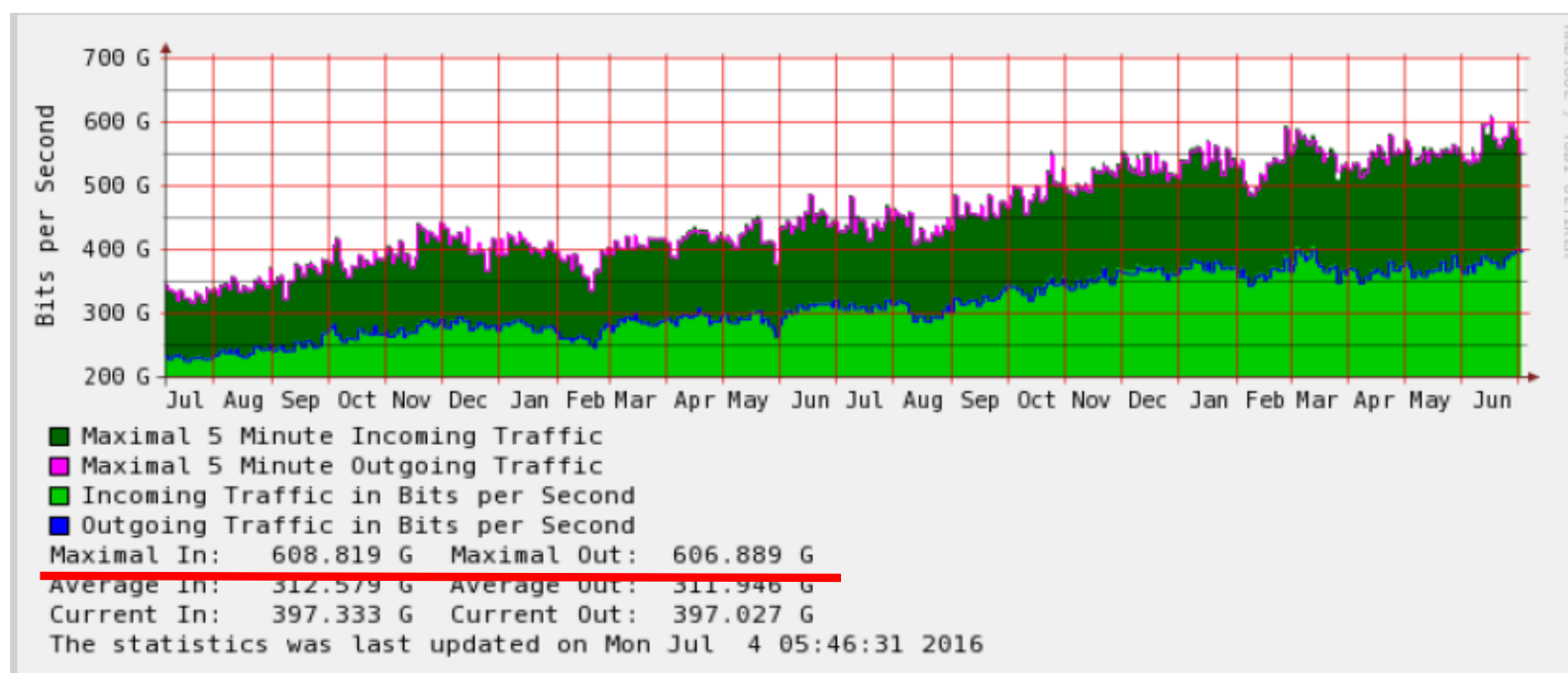


# Historical Statistics for HKIX's Traffic (2)

## Year 2013



# Historical Statistics for HKIX's Traffic (3) Year 2016



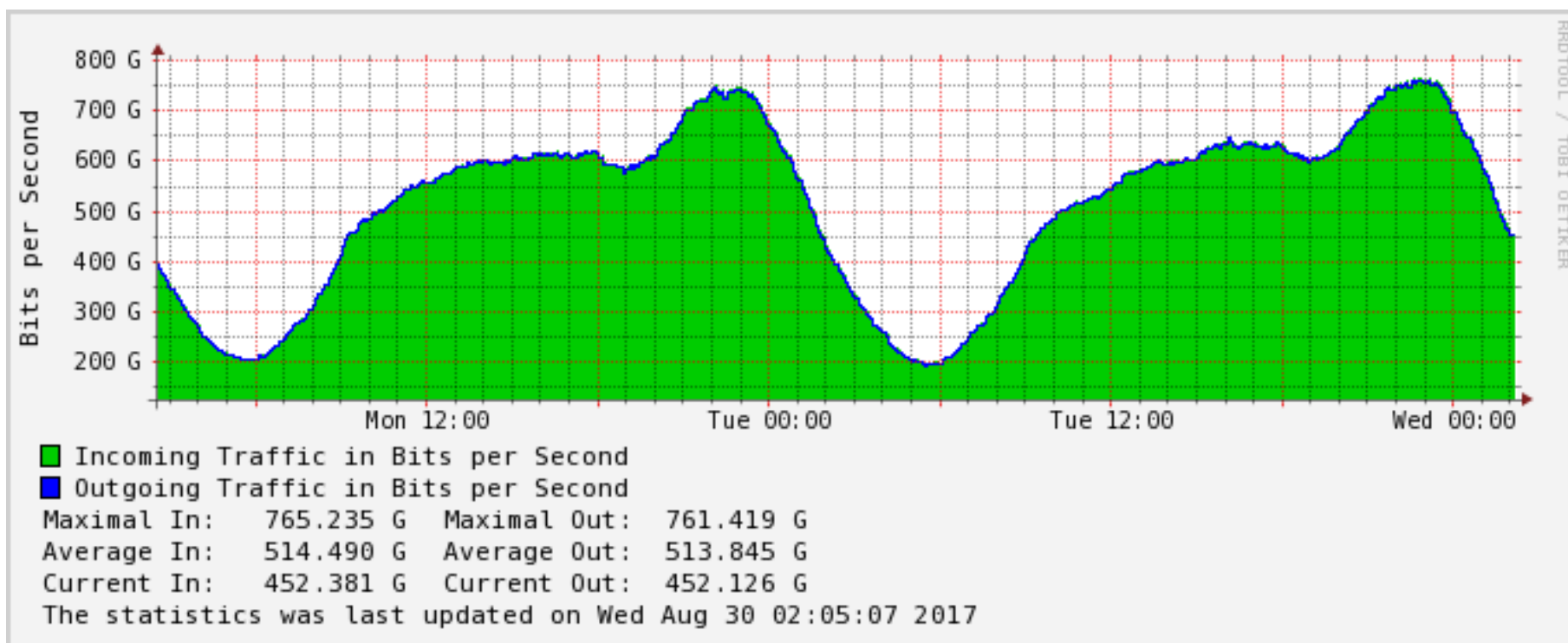


# HKIX Today

- Supports both MLPA (Multilateral Peering) and BLPA (Bilateral Peering) over layer 2
- Supports IPv4/IPv6 dual-stack
- More and more non-HK participants
- 270+ different networks (autonomous systems) connected
- 500+ physical connections in total
  - 15 **100GE**, 290+ **10GE** & 200+ **GE**
- 850+Gbps (5-min) total traffic at peak
- Annual Traffic Growth **~30%**

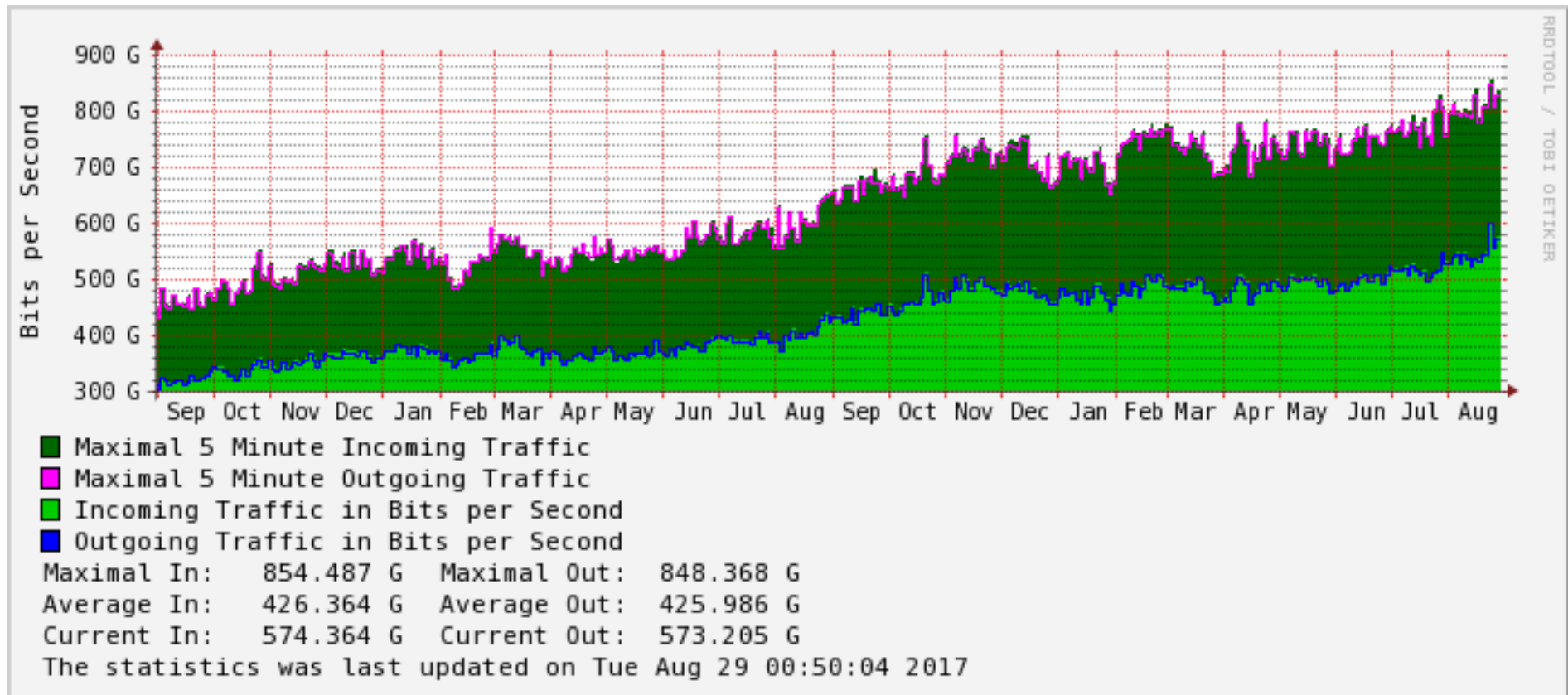
# Current HKIX Traffic

## Daily Graph (5-min average)



# Current HKIX Traffic

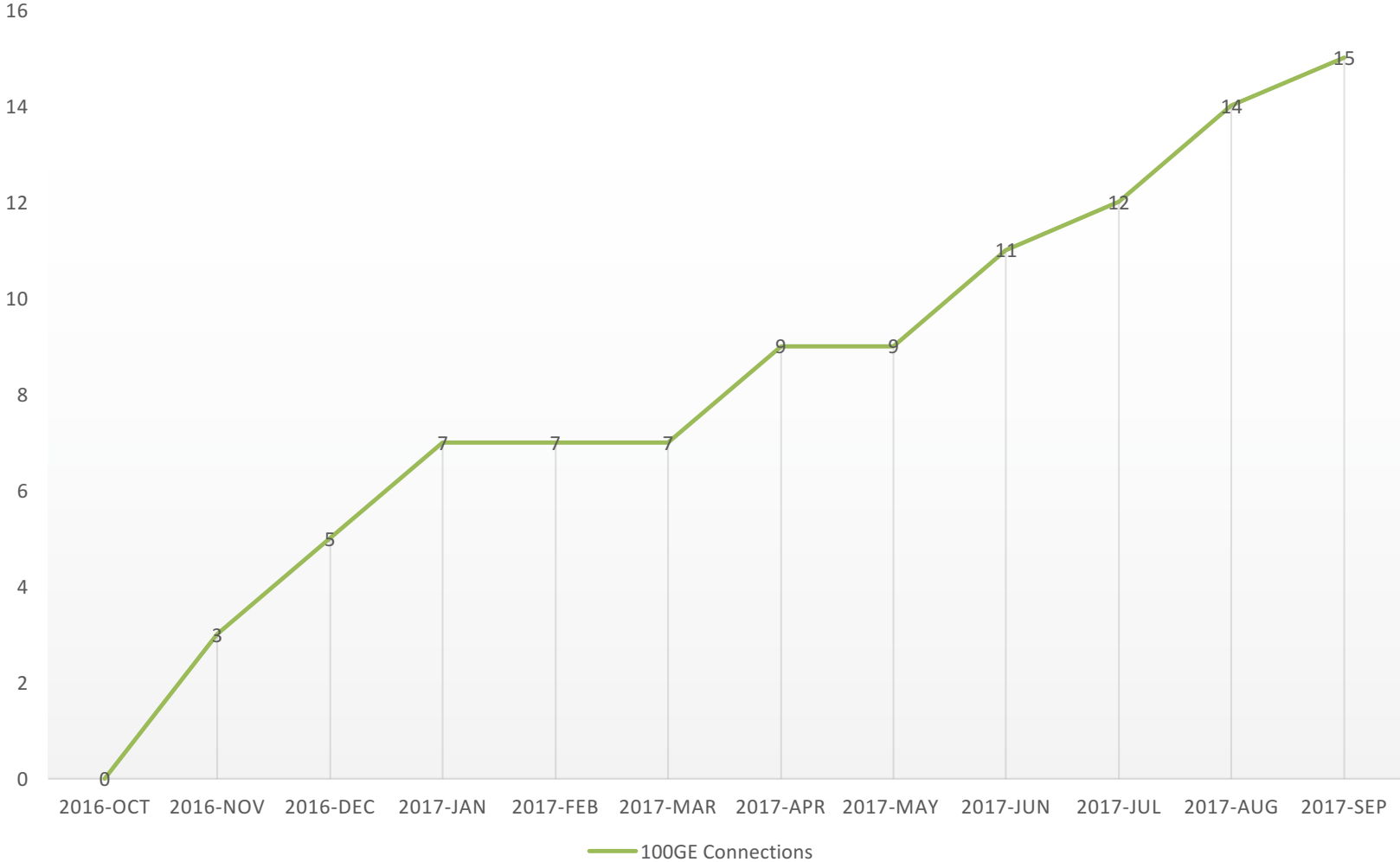
## Yearly Graph (1-day average)





# The 100GE Trends

Total HKIX 100GE Ports Connected (2016 OCT - 2017 SEP)



# HKIX 100GE Participants



- Akamai
- Amazon
- CloudFlare
- Facebook
- Google
- Hurricane Electric
- Tencent
- Yahoo



# 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          | <a href="#">CITIC Telecom International</a>       | Kwai Chung    | GE/10GE         | Ready for Service                |
| HKIX3          | <a href="#">SUNeVision / iAdvantage</a>           | Fo Tan        | GE/10GE/100GE   | Ready for Service<br>28 Feb 2017 |
| HKIX4          | <a href="#">NTT Com Asia</a>                      | Tseung Kwan O | GE/10GE/100GE   | Ready for Service<br>19 Jun 2017 |
| HKIX5          | <a href="#">KDDI / Telehouse /<br/>HKCOLO.net</a> | Tseung Kwan O | GE/10GE/100GE   | Ready for Service<br>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.

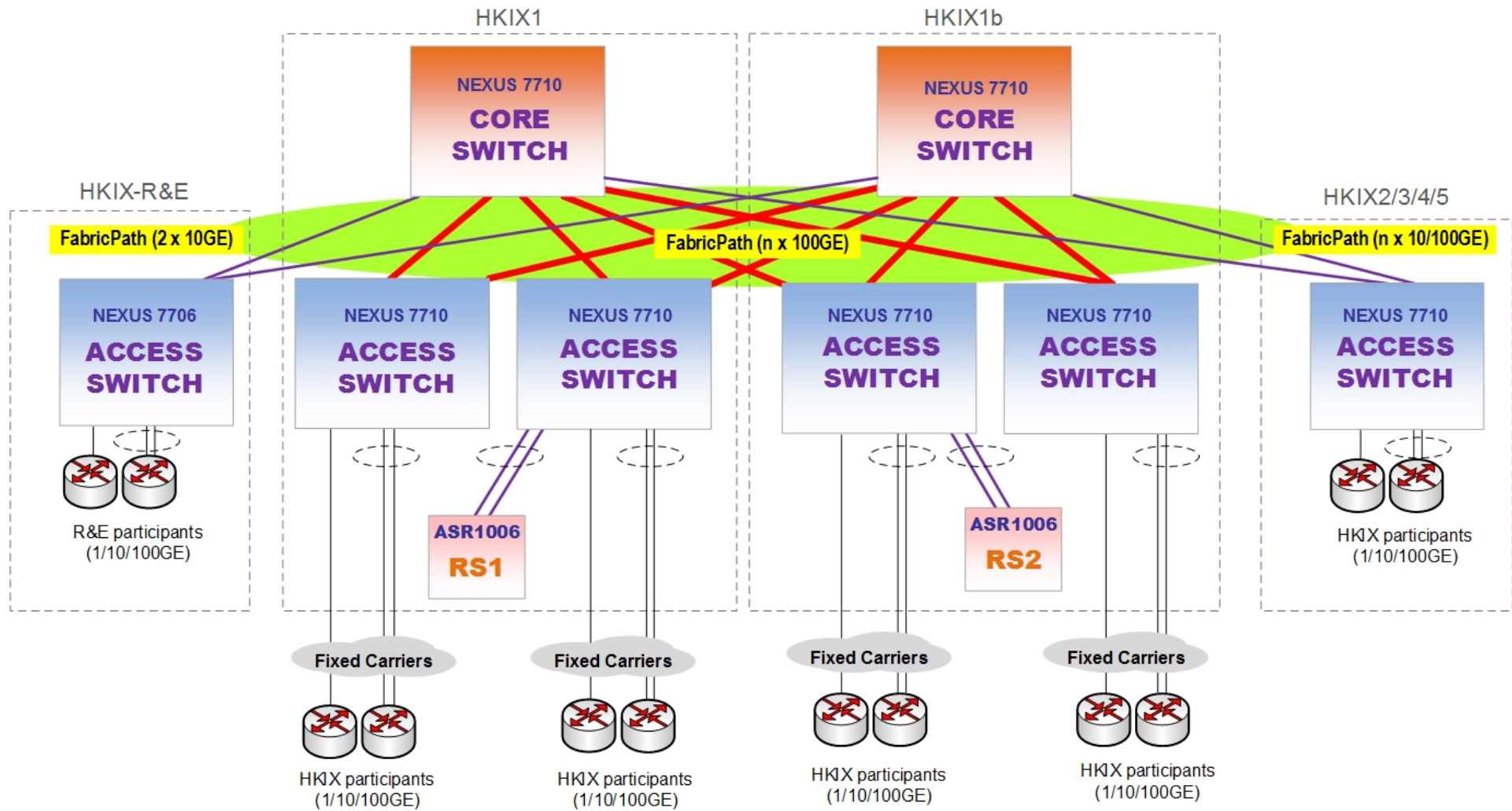
# Setup Multiple HKIX Satellite Sites

- 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 Network Diagram (Jun 2017)



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'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

# Planned Works in 2017

- Improved Stability
  - *Better Control of Proxy ARP*
  - *More L2 ACL on HKIX peering LAN*
- Improved Services
  - *Set up Satellite Sites in multiple commercial Data Centre*
  - *Set up portal for HKIX participants*
  - *True 24x7 NOC*
  - *Improve after-hour support*
  - *Introduce advanced Route Server functions*
- Improved Security
  - *ISO27001*
  - *Better support for DDoS Mitigation*

# 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 : 33

### 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



# Thank You!

For enquiries, please contact us at  
**[info@hkix.net](mailto:info@hkix.net)**