



Further Development of HKIX for the Future of Hong Kong

CUHK
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香港中文大學
The Chinese University of Hong Kong

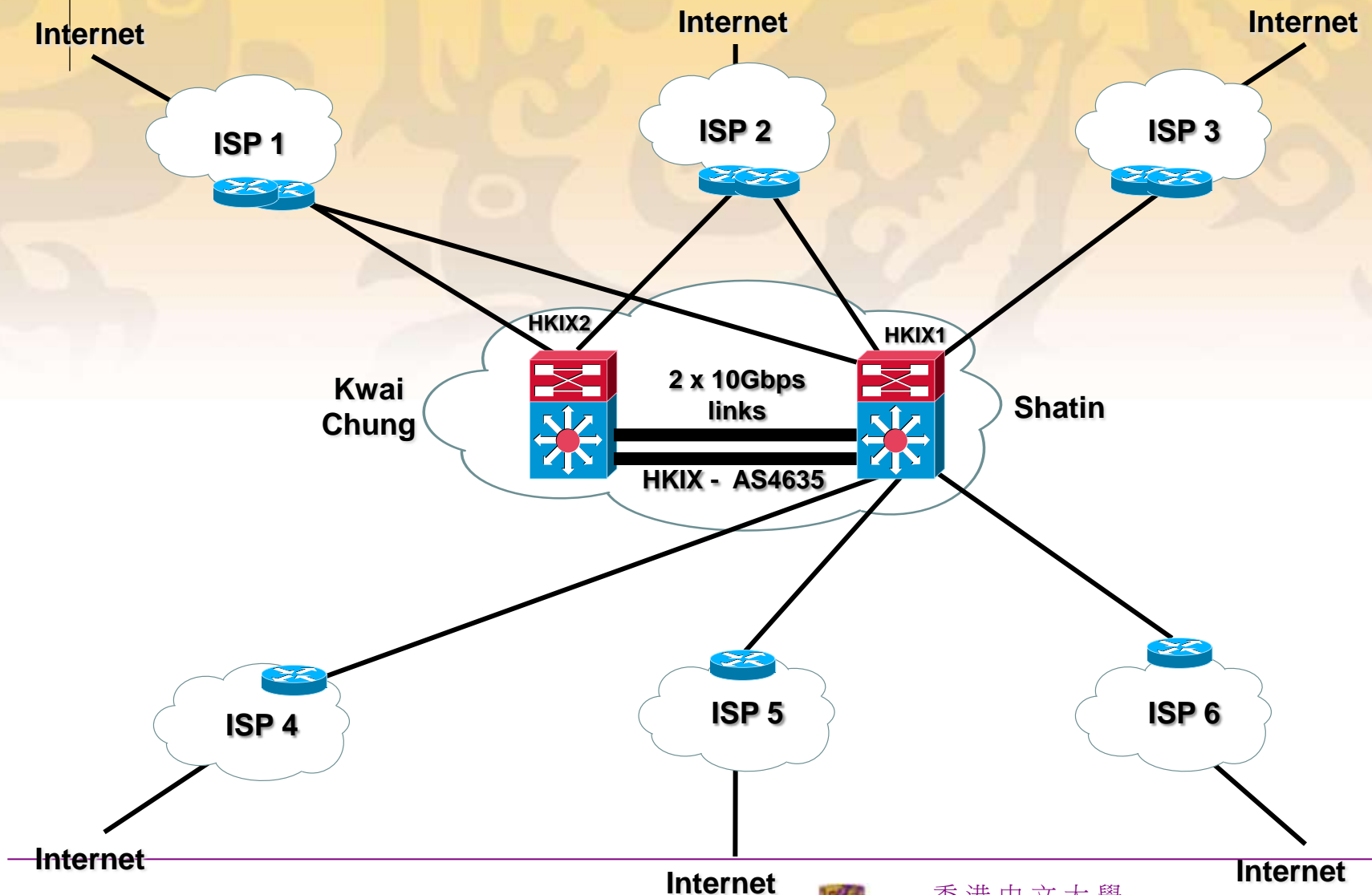


What is HKIX?

- HKIX is a public Internet Exchange Point (IXP) in Hong Kong
- HKIX is the main high-speed Interconnection point in HK where Internet industry players can interconnect with one another and exchange traffic
 - Not for connecting to the whole Internet
- HKIX was a project initiated by ITSC and supported by CUHK in Apr 1995 as **a public community service**
 - Still operated by and fully supported by CUHK (including space, utility, manpower arrangement and etc.)



Current HKIX Infrastructure





Values of HKIX to Hong Kong

- A key information infrastructure bringing faster and cheaper connectivity to Hong Kong citizens
- A key component for developing Hong Kong as an Internet hub in Asia
- A key component for helping Hong Kong's competitiveness in the cyber world
- A key component in facilitating competition in the telecommunication sector
- A successful business model for the liberalization of telecommunication industry for other economies





Our Edges

- **Neutrality**
 - Treating all partners alike, big or small
 - No settlement for exchange of traffic
 - Accessible to all local FTNS operators
 - ISP / telco / data centre / content provider neutral
- **Confidentiality**
 - Respect business secrets of every partner
- **Not for Profit**
 - Still a free service for basic setup
 - Never compete with our partners





CUHK's vision

- CUHK has a strategic uniqueness in running HKIX in a long-term
- While CUHK does not have a service provider role, we are still obligated to continue managing it as a public service
- Support from HKSARG is needed to make it prosper, and to maintain it as an Asian information hub

- HKIX is very much like road infrastructure and airport in Hong Kong





Current Charging Model

- An evolution from the free-of-charge model adopted at the very beginning
- HKIX provides two GE ports at each HKIX site for each member free of charge as Basic Setup
 - No formal agreement is needed for Basic Setup
- Requesting for 10GE ports or additional GE ports involves formal agreement
 - If port utilization is lower than 50%, there will be charges
 - If higher, no charges
 - This is to curb abuse
- Not for profit
 - Target for self-sustained operations

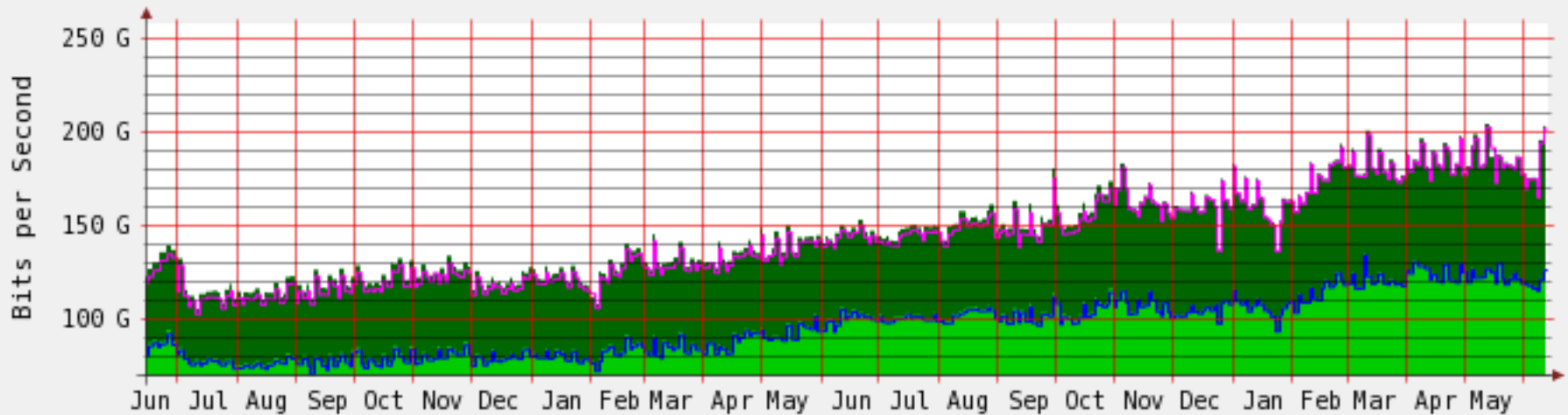


In Need of Continuous Upgrades

- Peak total traffic hit 200Gbps level and is growing continuously
- Not many ports left at HKIX1 for new connections
 - Only ~10 10GE ports and ~40 FE/GE ports available
 - ~50 10GE ports and ~230 FE/GE ports are being used to serve >170 participants
- Need to support 40G/100G interfaces soon
- Resilience is becoming a bigger concern to HKIX participants
- **We cannot afford any performance bottleneck**
- **We must cope with the continuous technology changes**



Recent Traffic Growth



- Maximal 5 Minute Incoming Traffic
- Maximal 5 Minute Outgoing Traffic
- Incoming Traffic in Bits per Second
- Outgoing Traffic in Bits per Second

Maximal In: 203.507 G Maximal Out: 202.447 G

Average In: 96.200 G Average Out: 95.835 G

Current In: 126.163 G Current Out: 126.108 G

The statistics was last updated on Wed Jun 13 05:56:31 2012





Problems Faced

- Although HKIX is charging for services
 - Current charging model is evolved from original free model
 - Income can cover Operating Expenses mainly
 - Including manpower
- HKIX needs to spend **Capital Expenses** to upgrade the core equipment from time to time
 - Which is getting more and more expensive because the equipment is high-end high-speed equipment and high availability is important
- The current income level cannot cover such level of Capital Expenses needed which are growing continuously



If No Change of Funding Arrangement

- HKIX can only afford to upgrade equipment gradually based mostly on our financial situation instead of based on actual need
- HKIX participants may have to delay their upgrades or new connections
 - **Which may affect the performance of Internet in HK as a whole**
- **For Internet industry players from overseas, they may put more traffic to Internet exchanges in other economies (such as Japan and Singapore) to fulfill their connectivity requirements and rely less and less on HK**
- **This will affect the competitiveness of HK in Internet industry**

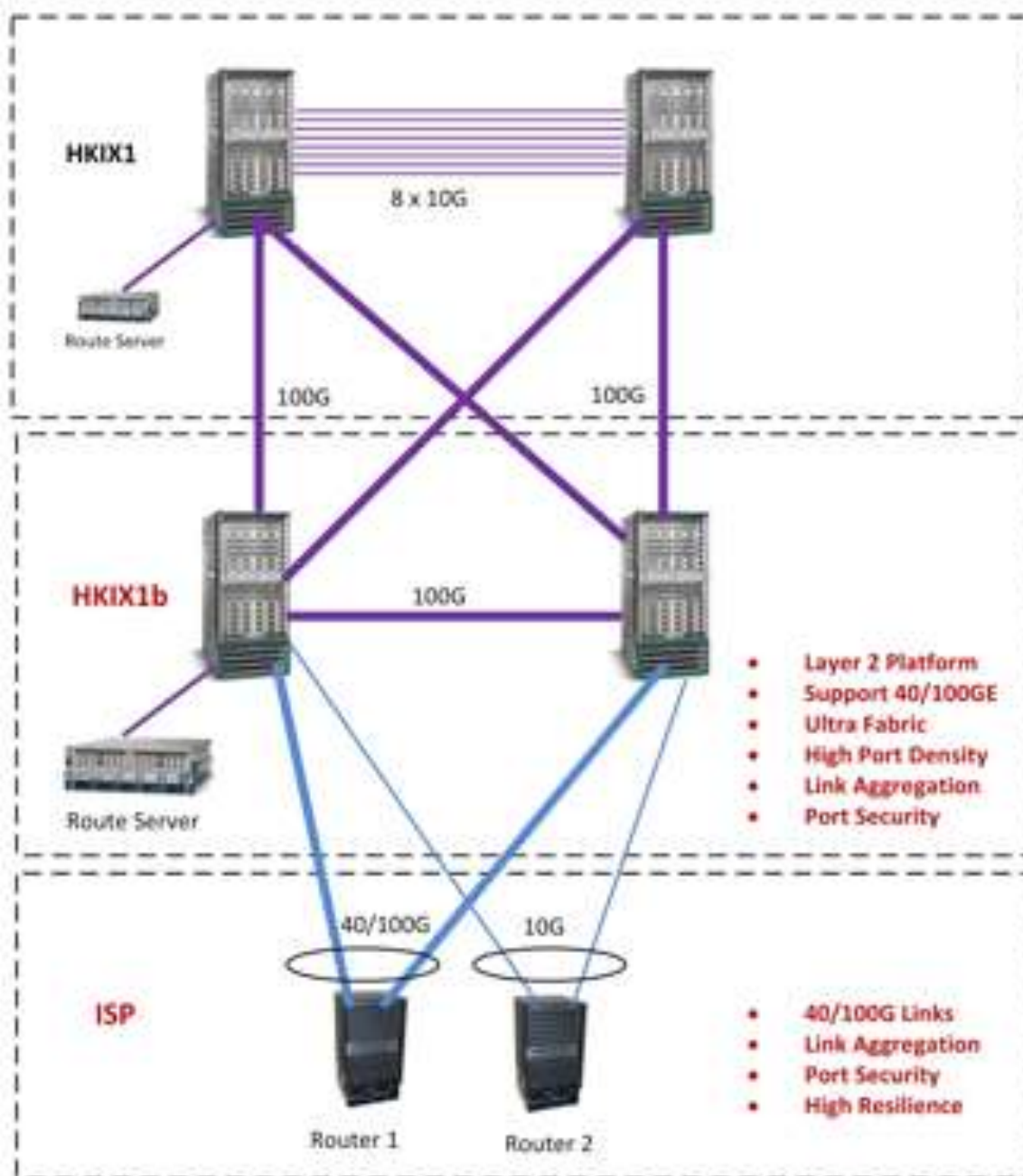


The Plan

– Technical & Operational

- CUHK is building a new data center close to University Station for 2Q2013
- Together with the existing data center in Pi Chiu Building, HKIX plans to build up a dual-core for high availability and for supporting more connections
 - HKIX1b site
- We plan to equip the site with basic set-up initially and do incremental upgrade gradually
- We plan to put HKIX1b site into production by end of 2013





State-of-the-Art New HKIX-Core (HKIX1b)

The Plan

– Desirable Outcomes

- Enlarged Capacity – More than 2Tbps at the core
- Improved Security – Less susceptible to DDoS attacks
- Increased Number of High-Speed Connections – No delay of connections because of port shortage
- Improved Resilience – Site resilience and chassis resilience in addition to card resilience
- >99.999% Overall Availability
- No Performance Bottleneck – Zero packet drop at the core
- Better 24x7 Support



The Plan

– Organizational & Financial

- HKIX will remain as not for profit operations
- HKIX will still be fully managed by CUHK
- Charging model will evolve to a simple port-charge model gradually
- HKIX will review the charging model from time to time to ensure it is fair and can cover the Operating Expenses fully as well as future Capital Expenses due to technology upgrades

- Our objectives are to facilitate HKIX to become the #1 Internet exchange in Asia Pacific region in terms of traffic volume and to solidify Hong Kong's leading position as the Internet hub in Asia Pacific region with a vision to run ahead of Japan and Singapore





Overseas Cases

- Larger Internet exchanges around the world all have dual-core for good redundancy:
 - <http://www.de-cix.net/about/topology/>
 - <https://www.ams-ix.net/infrastructure/>
 - <https://www.linx.net/pubtools/topology.html>
 - <http://www.jpnap.net/english/jpnap-tokyo-i/index.html>





Overseas Cases

- A number of Internet exchanges in Asia are modeled after HKIX and with heavy government involvement
- NIXI in India
 - Managed by government
- MYIX in Malaysia and SGIX in Singapore
 - Led by government but managed by industry consortium
- But they started late so still do not have the scale like HKIX

- We should leverage what we have with HKIX





Immediate Funding Need for Capital Expenses

- For building up a new HKIX-core in the new Data Center, we need:
 - Network equipment – high-end switches and route servers
 - Cabling, equipment racks and related facilities
 - Hardware & software for line quality test & assurance, network management, monitoring & operations, and accounting & charging
- We are seeking for funding support from Government
- **We hope D21SAC provides support-in-principle for this request**





Thank You



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