



Hong Kong Internet Exchange (HKIX)

<http://www.hkix.net>

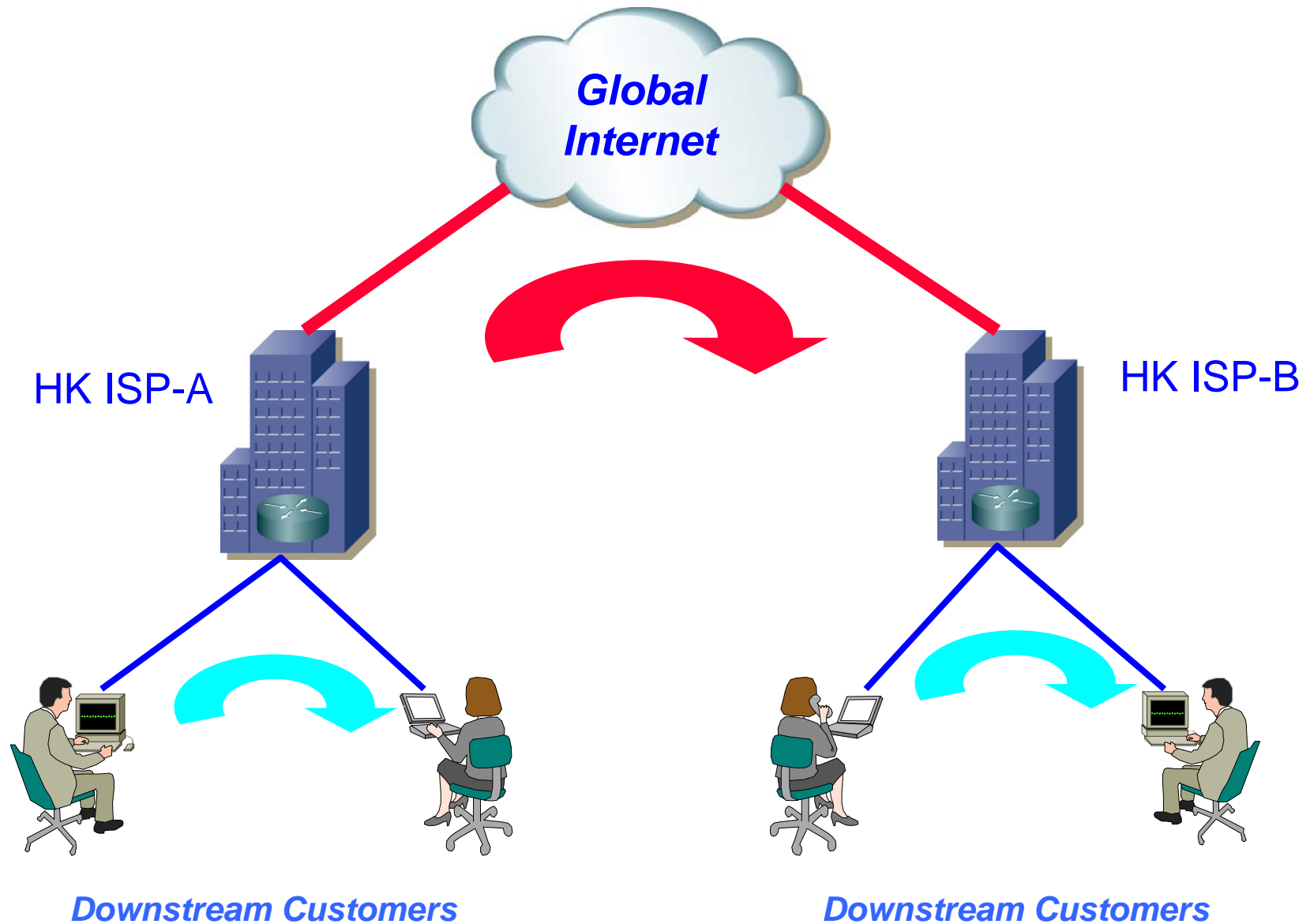
Hong Kong Internet eXchange

- What is HKIX ?
- The Evolution of HKIX
- Present Situation – HKIX2

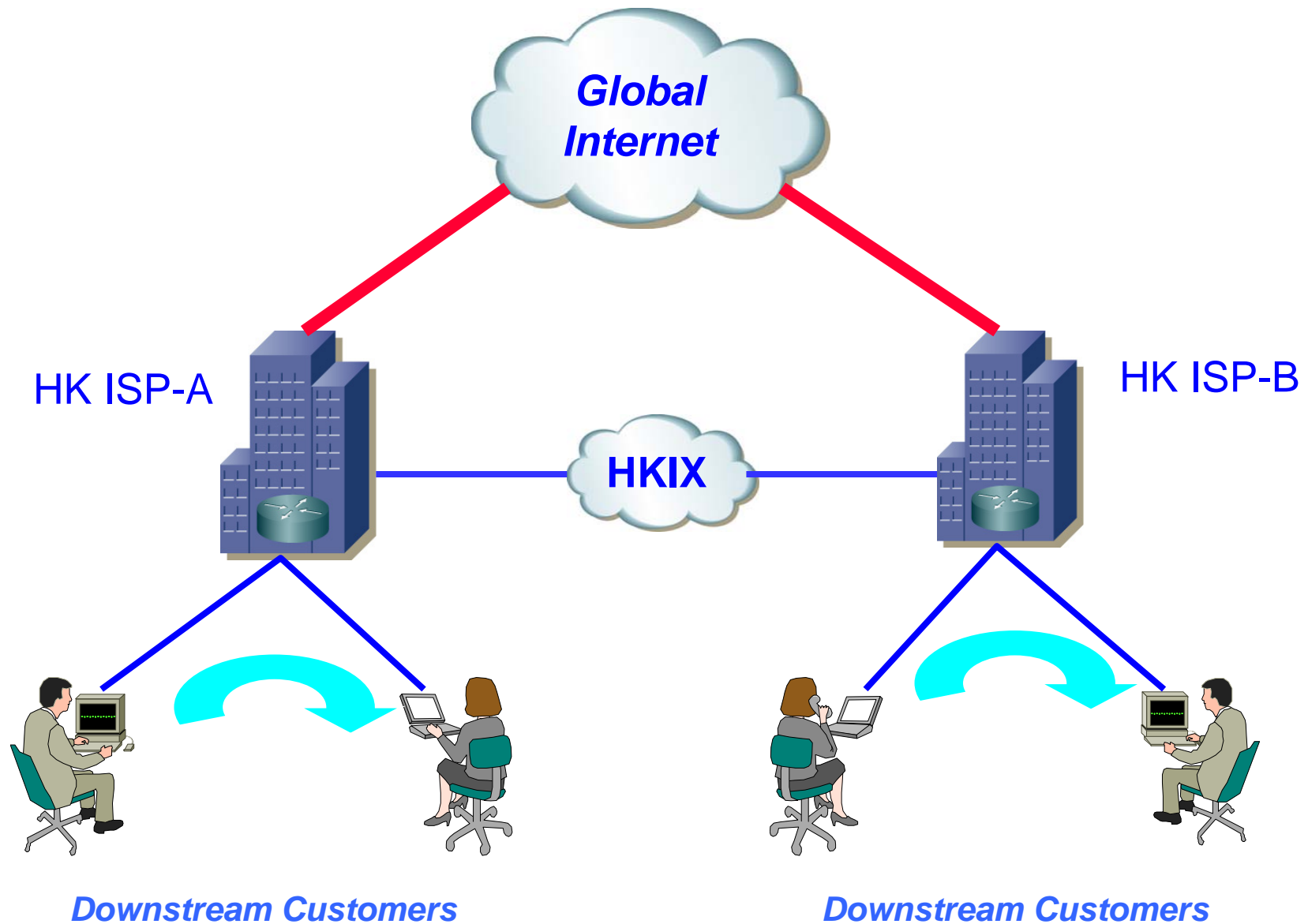
What is HKIX?

- HKIX is the major Internet traffic Exchange Point in HK
- At HKIX inter-ISP traffic can be exchanged
- The concept is similar to the NAP in US
 - MAE-West California operated by WCOM
 - MAE-East Wash. DC operated by WCOM
 - Chicago NAP operated by Ameritech
 - New York NAP operated by Sprint

Without Local Internet Exchanges



The Role of Hong Kong Internet Exchange



Similar Internet Exchange Set-up

- USA – Major NAPs
 - MAE-West California, MAE-East Wash. DC operated by WCOM
 - Chicago NAP operated by Ameritech
 - New York NAP operated by Sprint
 - Nap of the Americas – operated by Terremark
- China - TerreNAP (Beijing), ShangHai IX (SHIX)
- UK - MaNAP, LINX, LoNAP, ScotIX...
- Japan - JPIX, Media Exchange (TTNet), NSPIXP, NSPIX2, NSPIX3
- Korea - KINX, KIX, KTIX
- Taiwan - TWIX
- Singapore - SingTel IX
- HKSAR – HKIX, ReachIX, Pilhana

Benefit of HKIX

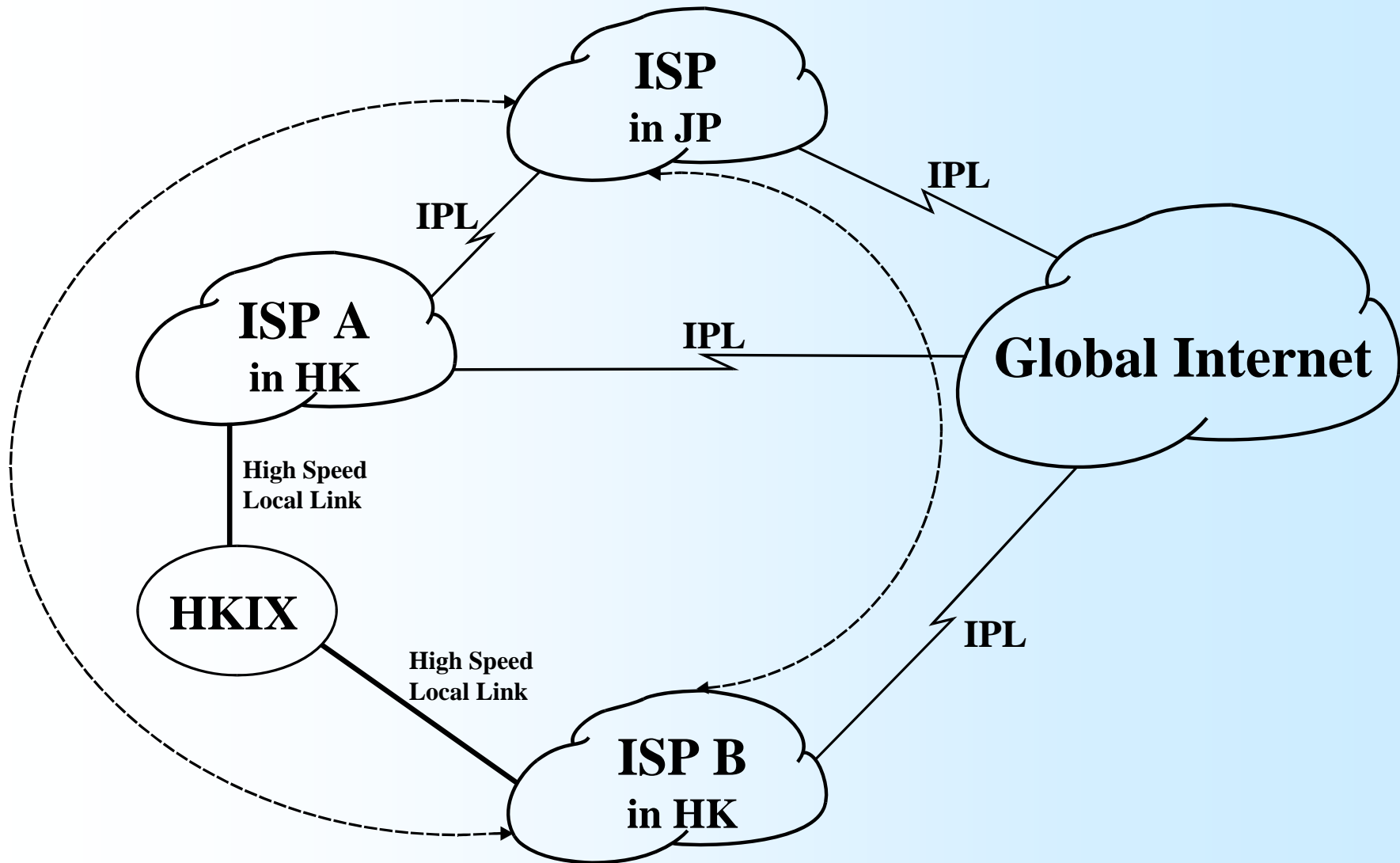
- Internet is still pretty much US-centric, though intra-regional connections or backbones are being set up in Asia Pacific.
- Setting up local Internet exchanges for intra-country or intra-city traffic is very important for faster and healthier Internet development within that country or city.
- It also reduces the loading to the Internet cores.
- HKIX is a short cut mainly for routing of intra-Hongkong traffic providing **faster and less expensive** paths to local sites in its early stage.
- Currently, there is a trend for Large ISPs to use HKIX to exchange Intra-AP Internet traffic.

HKIX: Exchange of Intra-AP Traffic

- Intra-AP backbones / connections being established by many global / regional service providers
- Intra-AP circuits are expensive. To maximize their return on investment for their links to HK, they can allow their clients in other AP countries to communicate with HKIX participants via HKIX. Further on, intra-AP traffic can be exchanged via HKIX.
- Some international carriers are doing this for their customers or partners overseas.
- HKIX as Asia hub?

Intra-AP Internet Traffic Via HKIX

Nov 00



Evolution of HKIX - part I

- **Sep 91:** CUHK set up a 64Kbps Internet link to US
- Early 92: Other Universities joined
- Jul 92: JUCC/HARNET took up the management
- Late 92: HARNET T1-Ring Backbone was set up
- Sep 93: HARNET-US link upgraded to 128Kbps
- Late 93: 2 commercial ISPs (HK Supernet and HKIGS) were set up with their own 64Kbps links to US. HK Supernet connected to HARNET via UST; No local connections between HKIGS and HARNET/HK Supernet

Evolution of HKIX - part II

- Sep 94: HKIGS together with its downstreams connected to HARNET via CUHK using a T1 link; Still no local connections between HKIGS and HK Supernet
- Early 95: More ISPs were set up. CSC/ITSU of CUHK saw the needs of setting up a local exchange point and started negotiating with individual ISPs.
- **April 95: ISPs started to connect to CUHK and HKIX was established.**
- Early 97: Started to provide ATM services to ISPs
- Early 03: Hosting root-level Domain Name Server for APNIC
- Early 04: Start supporting IPV6 and 10GbE for traffic exchange
- Late 04: Established a secondary site of HKIX (i.e. called HKIX2)
- Present: Over 150 members connected to HKIX

Technical Aspects of HKIX- part I

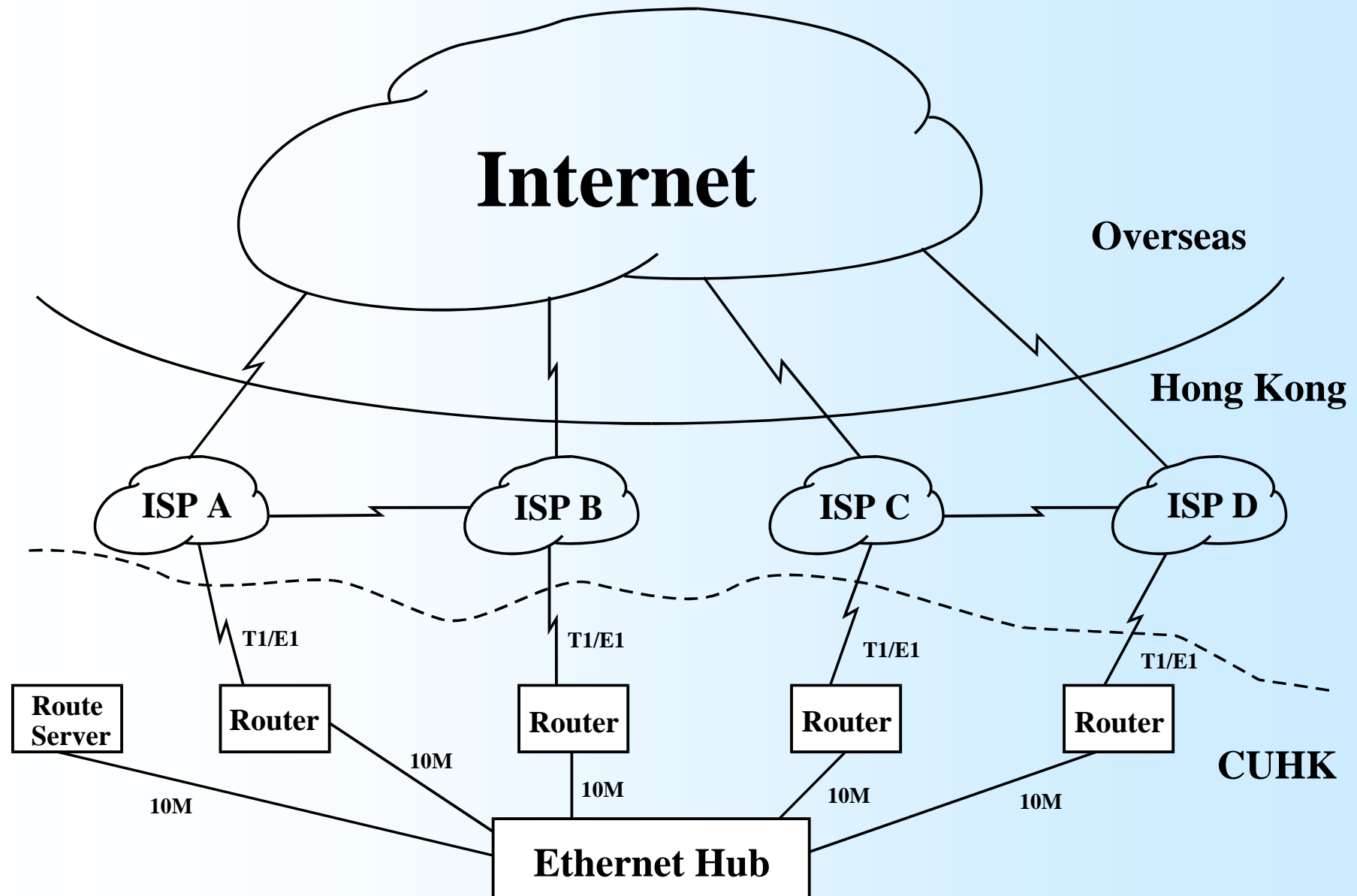
- Provide space, electricity, air-conditioning, core equipment and manpower for coordination and operations
- Very much like a Facility Management Center **but provide space for critical Internet infrastructure only**
- Just an Ethernet segment interconnecting routers of participants initially; upgraded to **an Ethernet switch in Dec 95**
- Use Border Gateway Protocol 4 (BGP4) for distributing routing information
- A Cisco router is used as a route server / reflector for simplicity of peering
- Routing information distribution controlled by IP network prefix or Origin AS access lists in the route server

Technical Aspects of HKIX- part II

- HKIX does not provide Internet connectivity
- Mandatory Multi-Lateral Peering Agreement (MLPA) for routes within Hong Kong for greatest possible benefits to all
- ITSC manages the route server for MLPA.
- Minimum connection speed to HKIX is T1 (1.5Mbps) starting from July 96

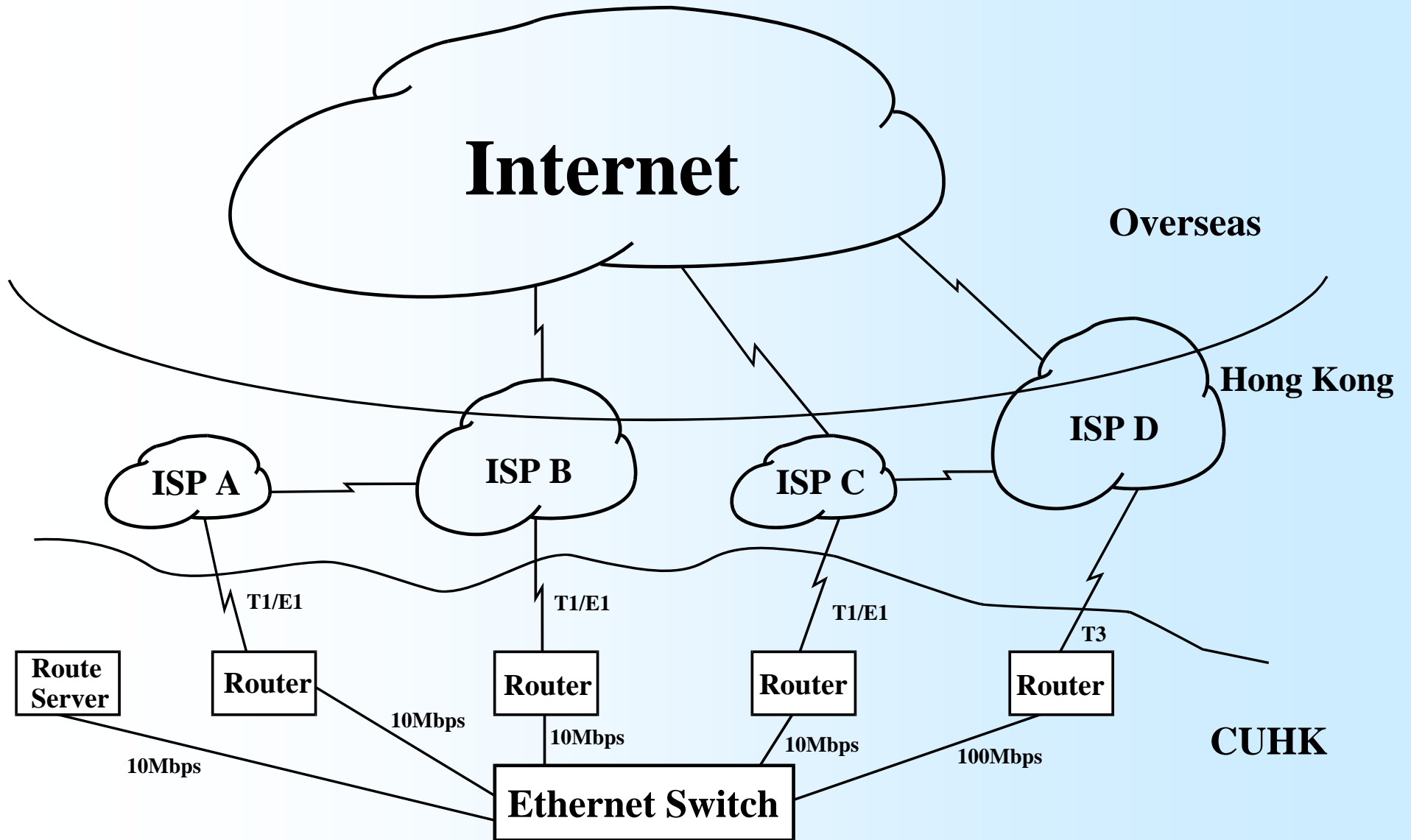
Schematic Diagram of HKIX (Phase I)

Apr. 95



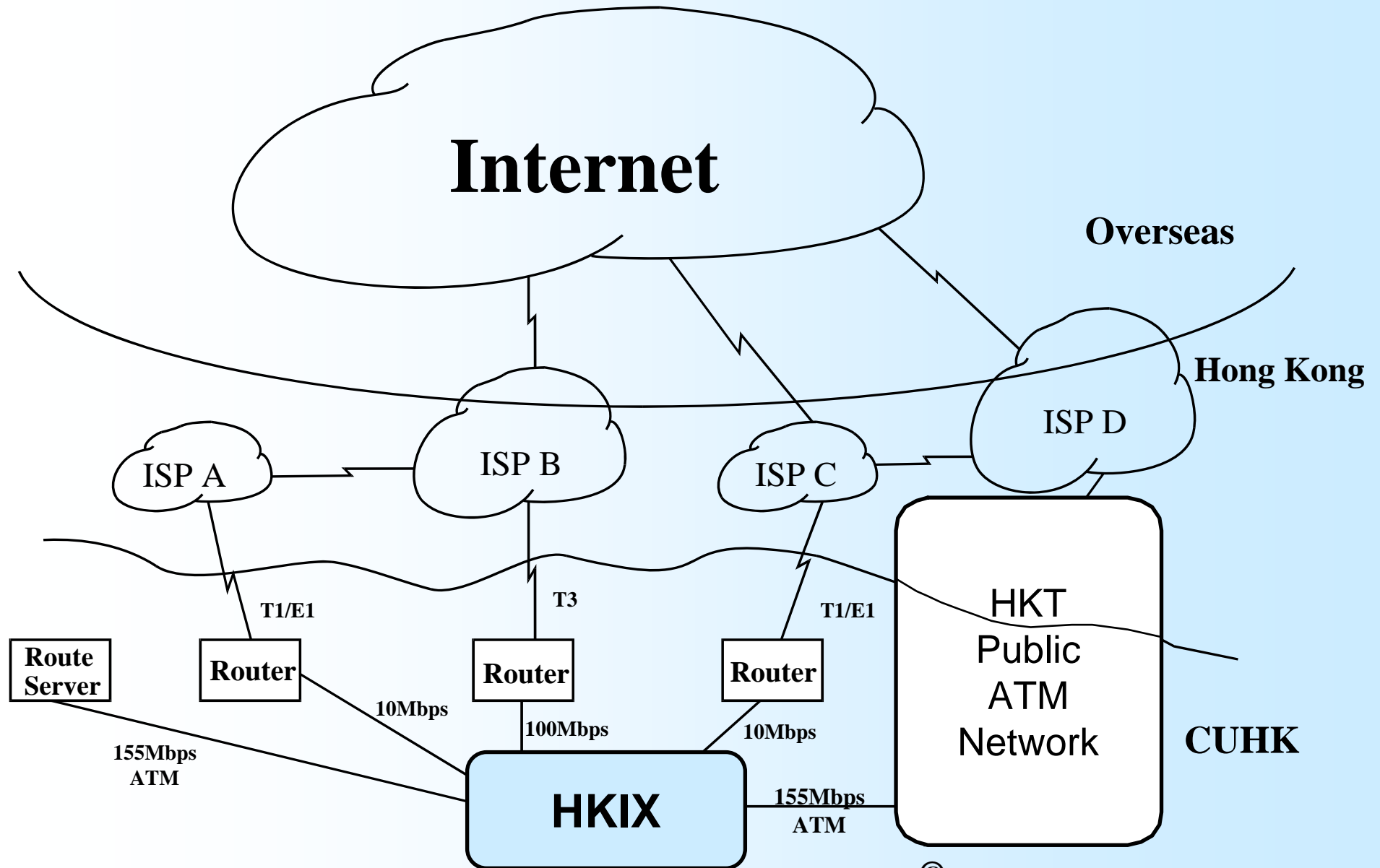
Schematic Diagram of HKIX (Phase II)

Jun 96



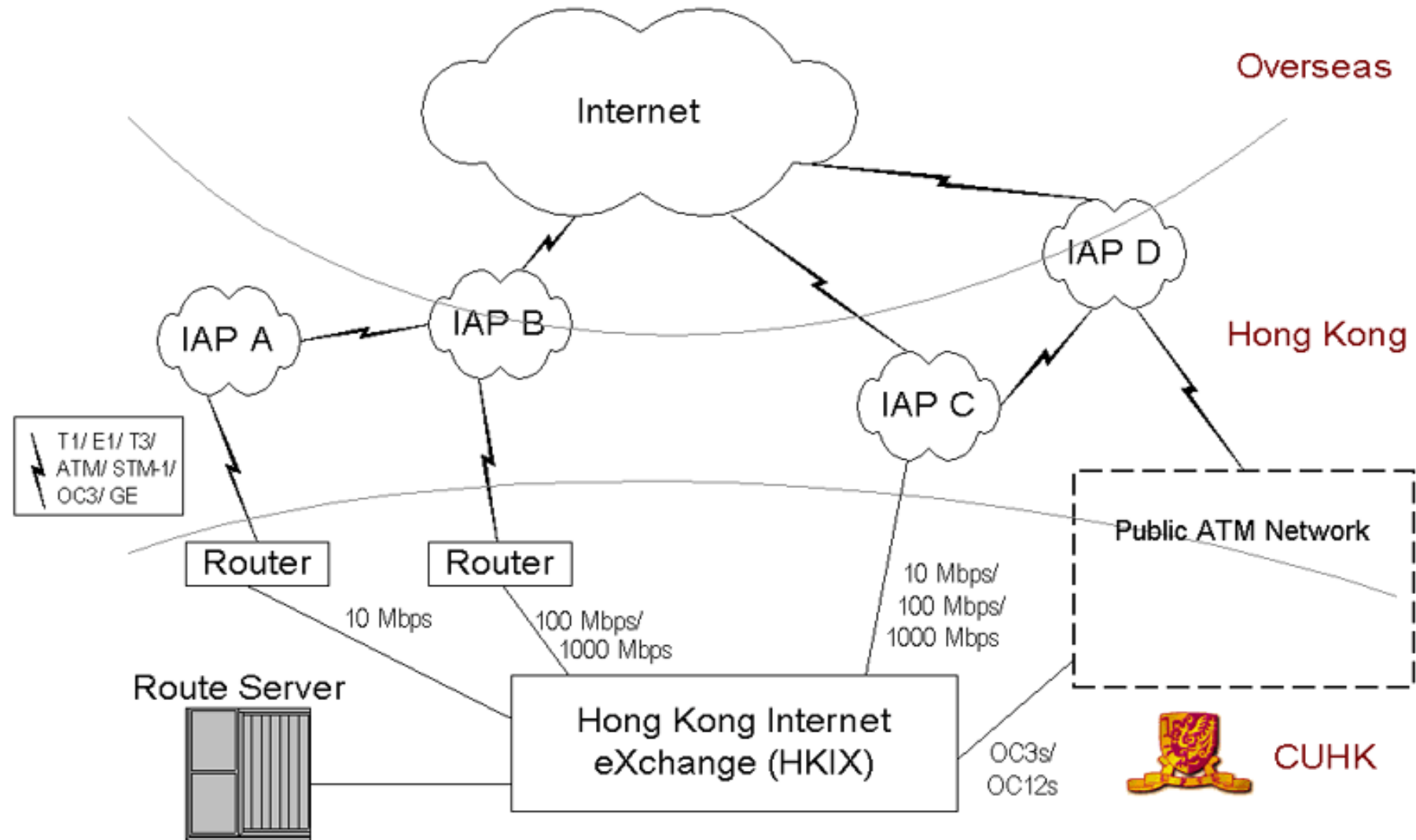
Schematic Diagram of HKIX (Phase III)

Jan 97

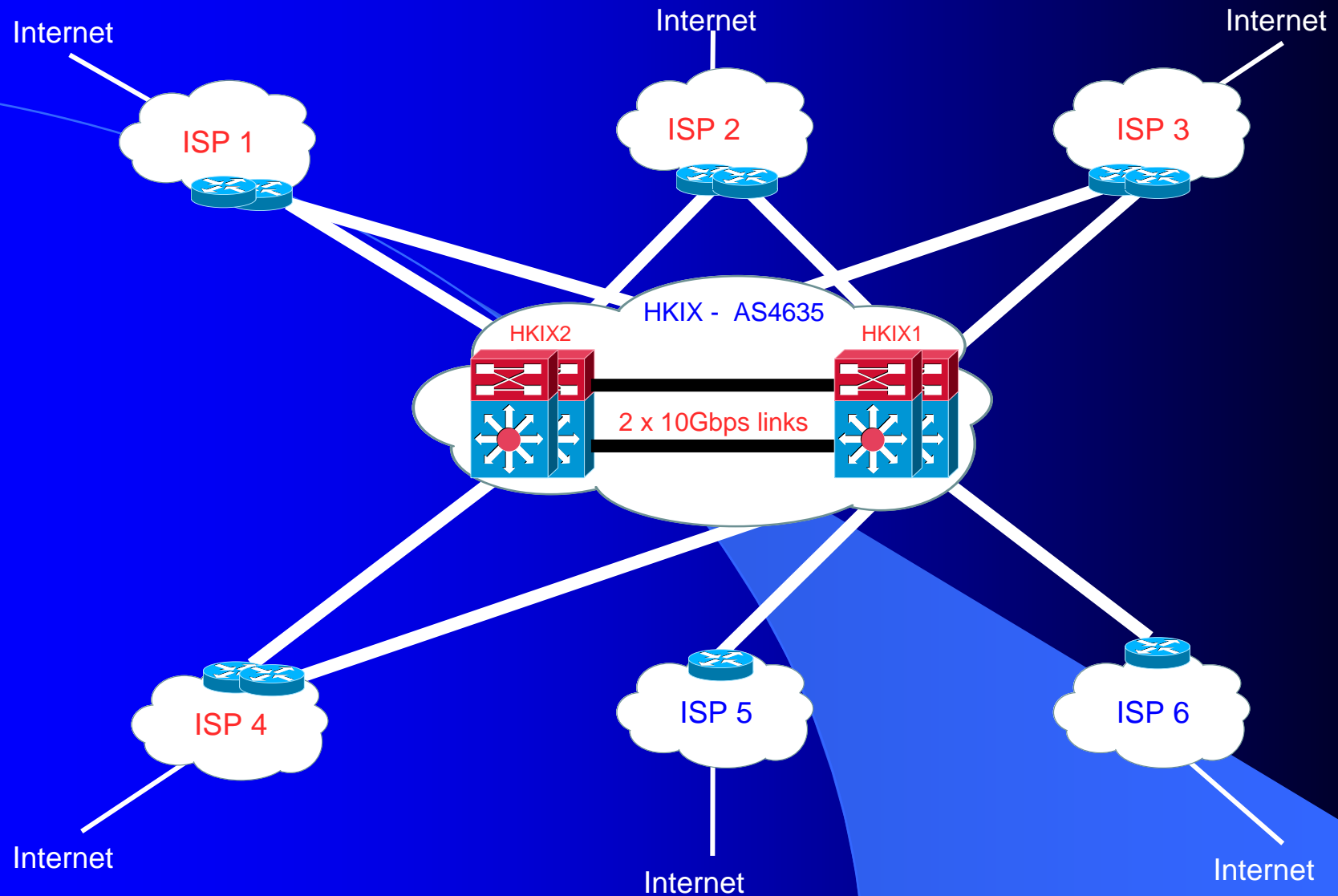


Schematic Diagram of HKIX (Phase IV)

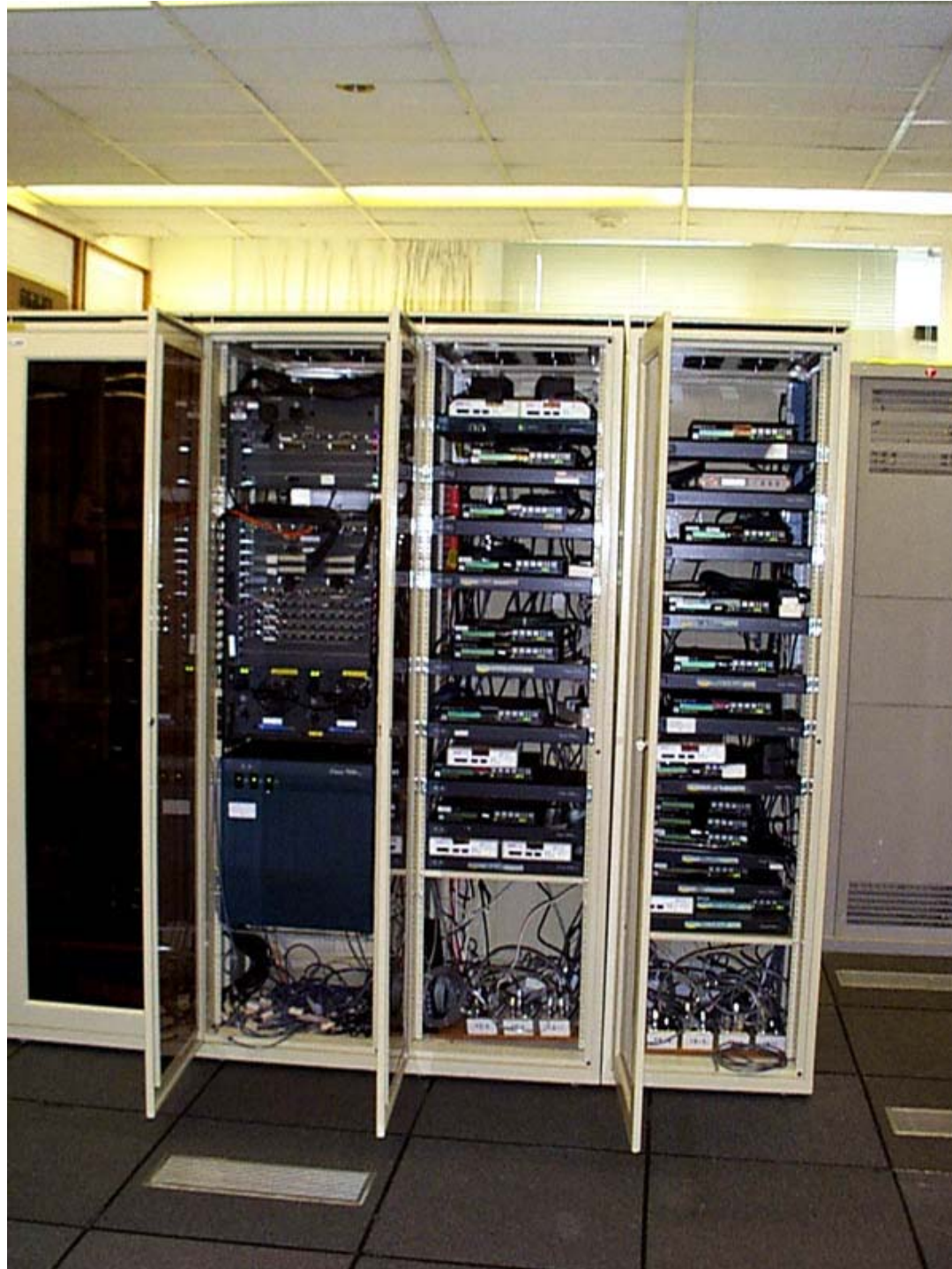
November 2000



HKIX Infrastructure (Phase V)







HKIX Policies for Participants

- **Internet Service Providers with proper licenses (SBO/PNETS)**
- Have global Internet connectivity independent of HKIX facilities
- Use BGP4 to exchange routing information
- Have globally-unique autonomous system (AS) number
- Have IP address block of at least /24 (class C equivalent)
- T1 or above for connecting to HKIX
- Provide necessary router and circuit
- Allow Bilateral Peering/Transit Agreements
- Allow offering of transit services over HKIX

HKIX: Connections Supported

- Coaxial segment changed to Ethernet switch in Dec 95
- Dedicated Ethernet switch port for each participant now (10/100/1000BaseT and 10GE)
- Support E / FE / GE / 10GE direct connections without co-located routers
- Support Link aggregation (LACP) protocol

HKIX Services

- Current Services
 - News exchange
 - Stratum 1 Time Server
 - Multiple carriers: 8 FTNS providers have direct fibers to the site of HKIX
 - HKIX Looking Glass
 - IPv6 Address Assignment and Routing
 - Link aggregation with port security
 - Filter updates from routing registry

IPv6 Support at HKIX

- Native IPv6 Peering Service
- IPv6 Addresses Assignment – for peering only
- Looking Glass
- BGP Route Server
- Extending Current IPv4 Services to IPv6

Success of HKIX

- **Neutral**
- **Not for Profit (free of charge)**
- Low set-up cost and simple configuration
- Mandatory multi-Lateral Peering Agreement (MLPA)
- No settlement for routing of local traffic
- Non-discriminatory operating on equal basis
- Highly efficient network infrastructure required by ISPs
- Dedication and enthusiasm of **ITSC** staff

Thank You