Lightpath issues between NREN and campus network

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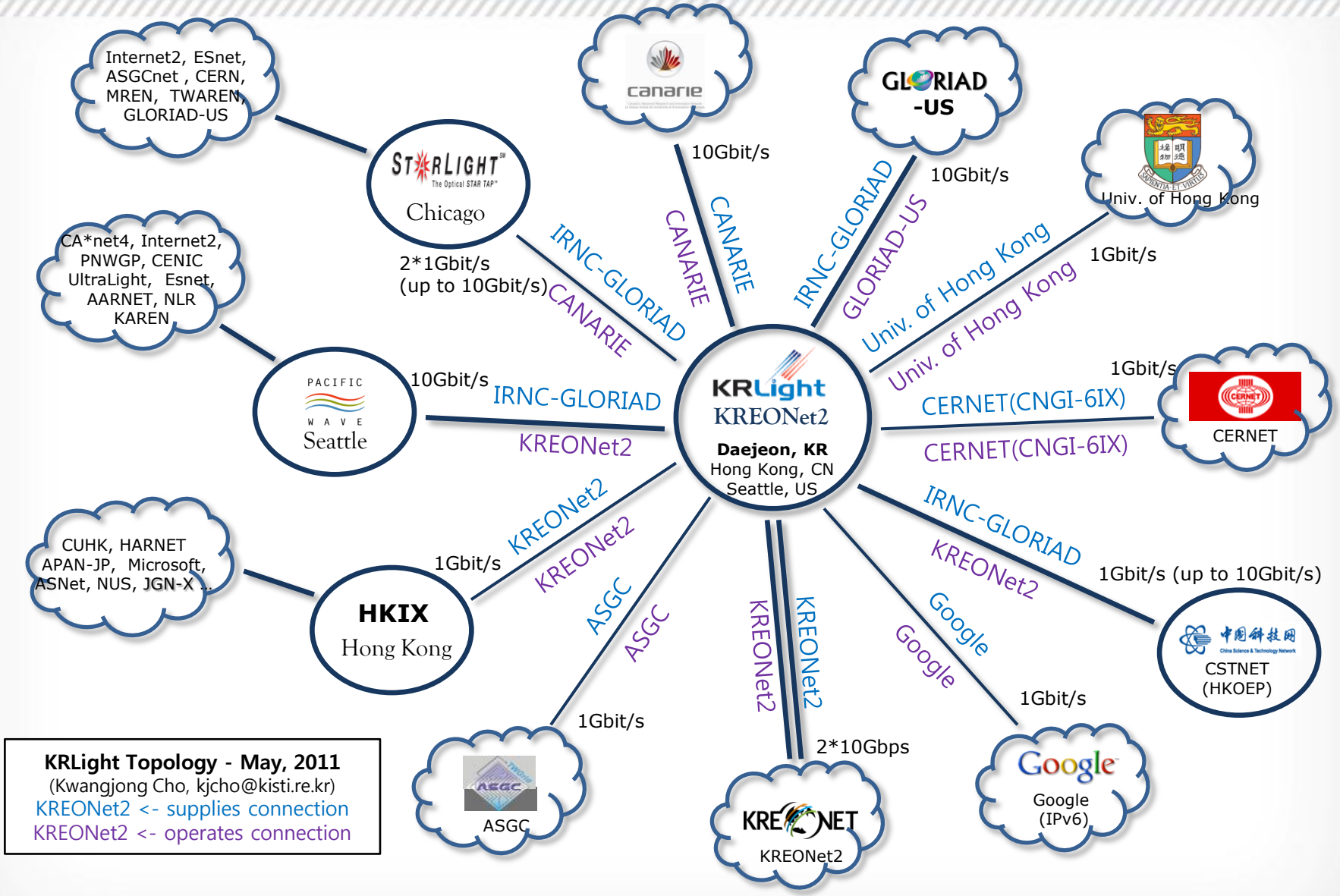
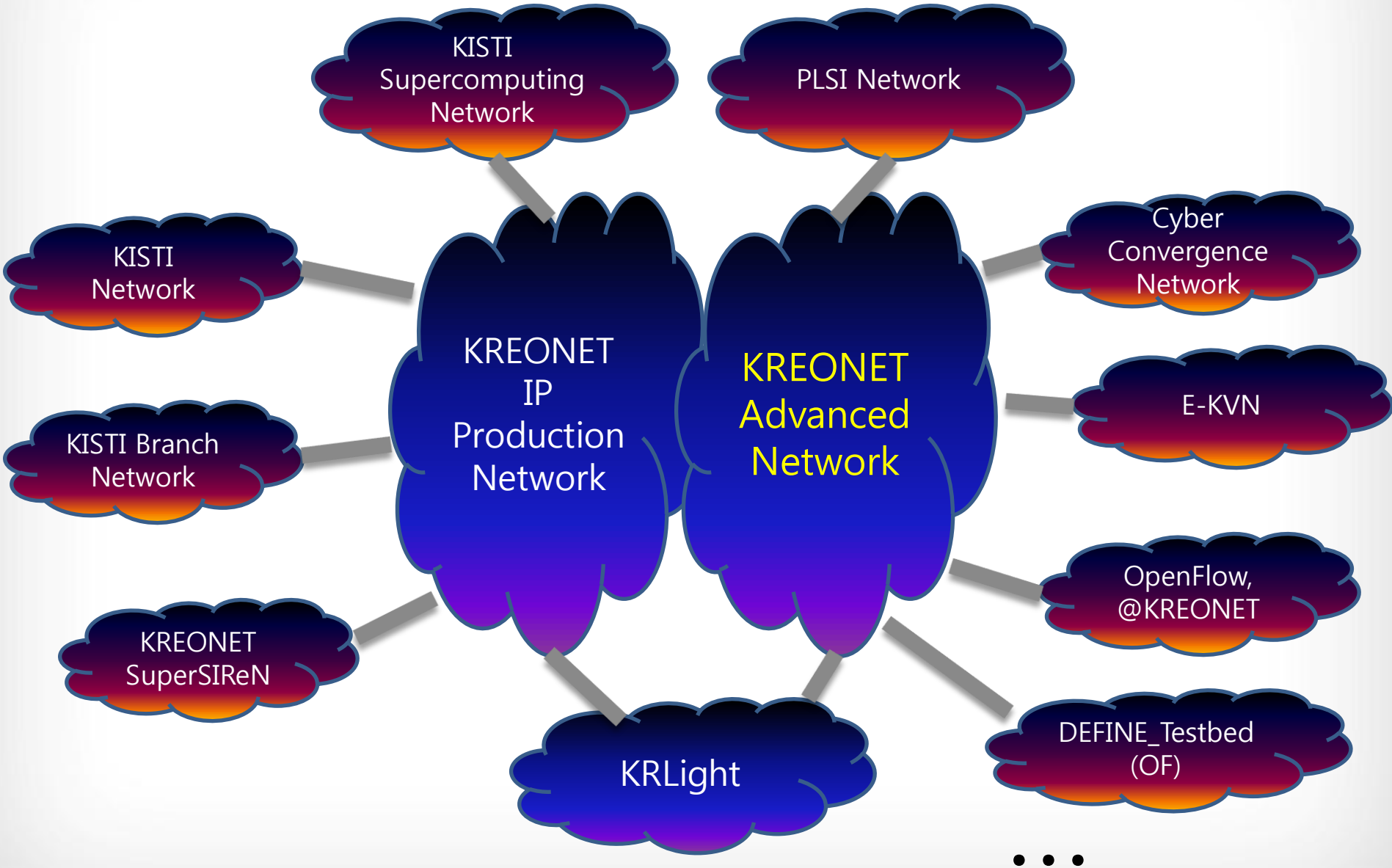
Kwangjong Cho

KISTI
(KREONET/KREONet2/KRLight)

KRLight Connectivity



KREONET/KRLight

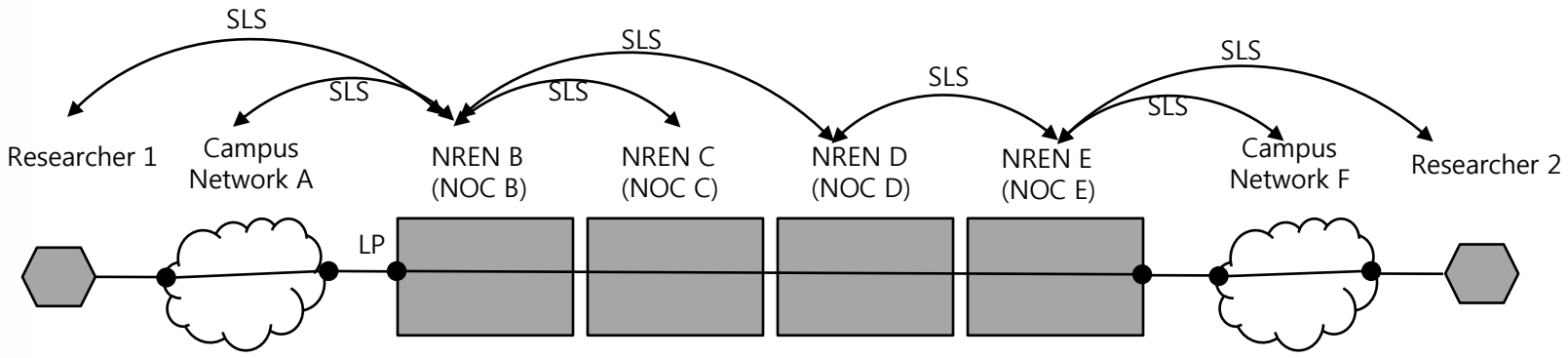


Technical Understanding of Lightpath

- Still most IT staffs (including network staffs) of campus network not familiar with Lightpath technology
  - ✓ Current campus network are still focusing on providing IP connectivity for general campus user, not researcher or researcher group that need high performance network (NREN connection)
  - ✓ Also, campus network staffs are accustomed to IP technology including IP addressing, routing, etc.
  - ✓ Sometimes, there are only general IT staffs, not network guys, in Campus. Moreover campus networking activities are all outsourced in some cases.
- Most users like researchers and researcher groups are still not aware of the Lightpath technology. But sometimes they are more familiar than IT staffs of campus network.

Role of NREN to establish a Lightpath

- Builder, Coordinator or Technical supporter among
  - ✓ IT staffs of campus network including network staffs
  - ✓ Researchers and researcher groups
- Global lightpaths building process across several muti-domain network
  - ✓ Combination of the parallel "master contractor" process and the serial "peering relationship" process of [2]



A researcher 1 or a campus network A request a lightpath to NREN B (becoming leader), and NREN B is formally in contact with NREN C and NREN D based on SLS (Service Level Specification)

Lightpath Building Process between NREN and CN

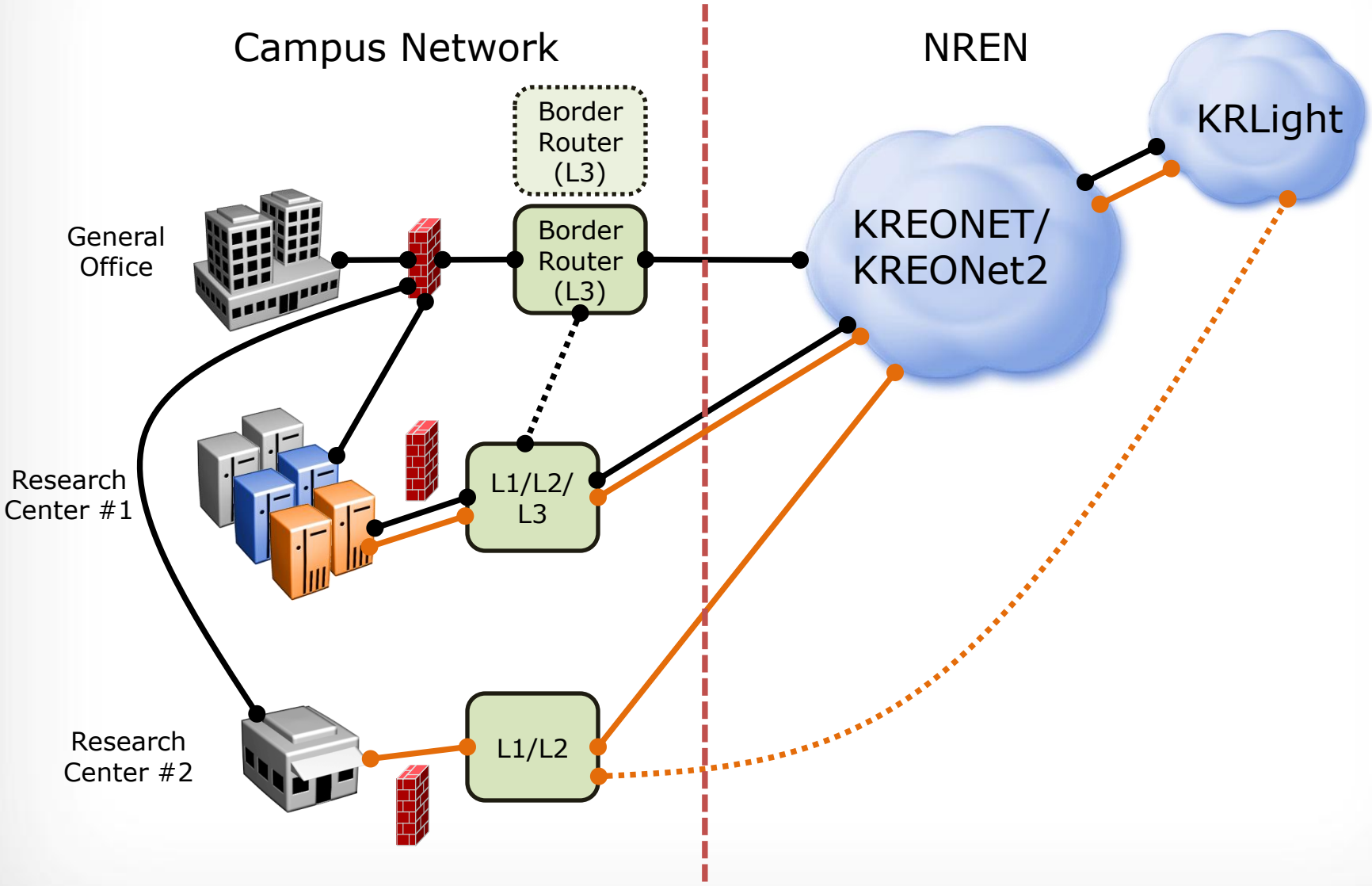
Collaboration flow among NREN, campus network and researcher

① NREN receives requests for lightpath by researchers, research groups or campus network staffs
② Analysis for lightpaths requirements between NREN and requester in terms of bandwidth and other network parameter (expected throughput, rtt, jitter, etc), duration, from and to, end system etc.
③ Consultation for building lightpaths between NREN and campus network of lightpaths requester : checking possibility for building lightpaths among NREN, campus network, local network and end system of researcher, and inspection connection points and types (SONET/SDH channeling, VLAN, …), security configuration, etc.
④ Establishing lightpath…

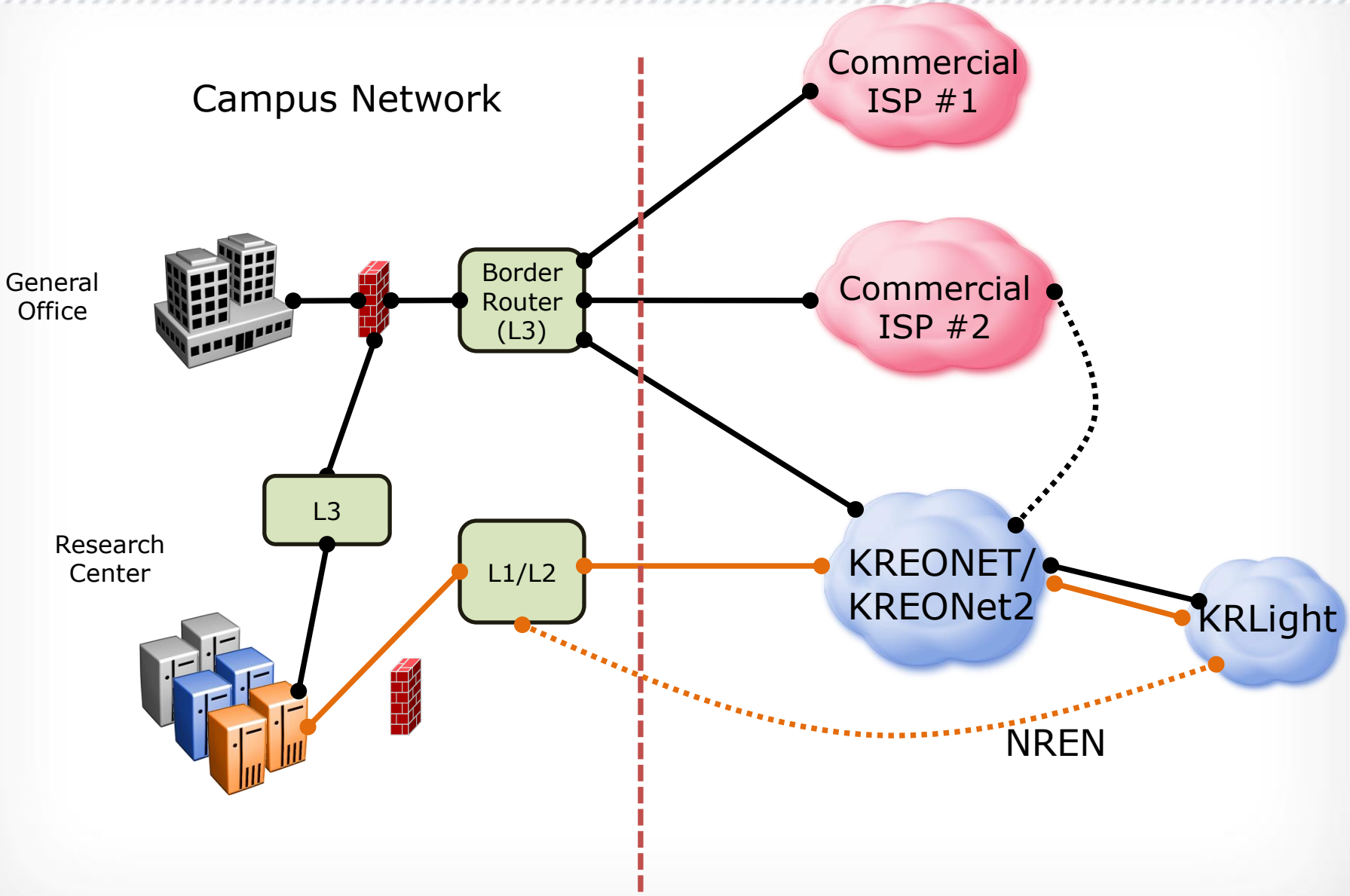
Performance and Security Issues

- Trade-off between performance an security
- Campus Network Views
  - ✓ Security issues are more critical thing than network performance issues at most cases
  - ✓ Lightpath users are still use IP communication at the end-system based on Public IP/Private IP
  - ✓ All connection should be across security zone, composed of Firewall, IDS, IPS, etc.
  - ✓ All traffic should be monitored by security monitoring system
- NREN Views
  - ✓ Providing high quality networking service with high performance backbone fulfilling requirement of advanced user
- Multi-homed system should be considered
  - ✓ Just for management, but it can become a security hole

Case 1.

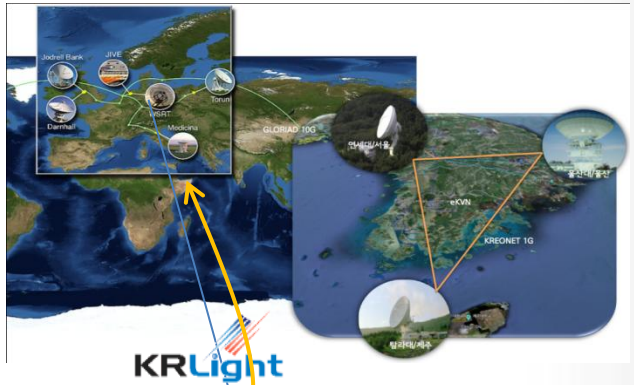

Campus Network
NREN
Border Router (L3)
KRLight
KREONET/ KREONet2
General Office
Border Router (L3)
Research Center #1
L1/L2/ L3
Research Center #2
L1/L2

Case 2.

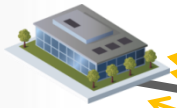

Campus Network
Commercial ISP #1
Commercial ISP #2
General Office
Border Router (L3)
L3
Research Center
L1/L2
KREONET/ KREONet2
KRLight
NREN

e-KVN on KREONET Dynamic Ethernet Service

- e-KVN: Korean e-VLBI(electronic Very Long Baseline Interferometry) Network
- Participants: Korea Astronomy & Space Science Institute (KASI), KISTI



Yonsei Astronomy Observatory



Yonsei Data Center

C2960

1G

C3560

1G

C4506

1G

Seoul

KREONET
IP Production Network

10G

T640

10G

Daejeon

Carrier Ethernet Switch
(MERS8610)

C2960

1G

Jeju

Ulsan

1G

C2960

Tamna Astronomy Observatory

Ulsan Astronomy Observatory

E-LAN Service type
(Multipoint-to-Multipoint EVC)

What we need…

- Educational program of Lightpath technology and its use cases for IT staffs and network staffs of campus network
- Description or Communication method with formal network diagram that represent at least L0 ~ L3
- Traffic, fault and performance monitoring system at each campus network
  - ✓ PerfSONAR, MRTG, Pinger,…
- (Ticket based) Information Sharing System between NREN and Campus Network
  - ✓ For collaboration, fault isolation and troubleshooting of lightpath
  - ✓ KREONET-IMS (KREONET Information Management System)
- Guideline for establishment lightpath with considering security, performance and so on

Suggestions through experience at the Univ. of Tokyo, from Akira Kato (T-LEX)

- Let install extra strands of fibers to each possible buildings.
- Alternatively, allow the experiment gear collocation at the network center (or a regional hub such as T-LEX or KRLight) to avoid intra-campus bottleneck.
- Many of the researchers are not familiar with the operational technique especially in remote management. So the people around a GOLE may need to suggest them for shopping. With proper remote management hardware, they may able to reduce the physical round-trip to the location where the machines are installed.
- Disable the daemons as much as possible unless absolutely necessary for the experiment. In some cases, cron could interfere the data transfer.

Reference

[1] Issue Analysis Hybrid Network, GigaPort Next Generation Network “Research on Networks”, August 21, 2006, http://www.glif.is/working-groups/tech/hybrid-network-issues.pdf.

[2] The ordering and fault resolution process for multi-domain Lightpaths across hybrid networks (version 0.9), René Hatem (CANARIE) (CANARIE), Almar Giesberts and Erik-Jan Bos(SURFnet), July 9, 2006, http://www.glif.is/working-groups/tech/fault-resolution-0.9.pdf.

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KiSTi 한국과학기술정보연구원
Korea Institute of Science and Technology Information

Thank you.

kjcho@kisti.re.rk