

Lightpath Issues between NREN and Campus Network

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Preface

Today, the demands for lightpaths providing high performance networking have been increased in advanced research areas such as high energy physics, astronomy, climate, culture and so on. When we build and use a permanent or temporary lightpaths, networking collaboration among NREN (National Research and Education network), Campus network and researcher (or research group) happens. However several issues including difficulties occur among them due to their different views. These issues include a technical understanding of Lightpaths, collaboration system and contact point, security and performance etc.

1. Technical Understanding of lightpaths

The lightpaths technology has come into the spotlight for recent several years in NREN community globally and also used to data-intensive research. However it is true that IT staffs of campus network including network people are still not familiar with lightpaths. Moreover, though they have heard of lightpaths technology at least several times, it is difficult to understand lightpaths technology and its service. Above all, most of people are originally accustomed to IP network technology including routing and they are not to move to the lightpaths world. Sometimes it becomes a barrier to use lightpaths and establish high performance research environment. In order to resolve the issue, a collaboration model is needed to build and operate the lightpaths between operators of NREN and IT staffs of campus network.

2. Collaboration issues between NREN and Campus Network

Most of demands for lightpaths to NREN are from individual researchers or research groups. The reason is that they are generally aware of lightpaths via other projects or researchers in that projects, and NREN directly. After then, collaboration between NREN staffs and IT staffs of campus network takes place. As follow is collaboration flow in common case of building lightpaths.

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 between NREN - campus network – local network and end system of researcher, inspection connection points and types (SONET/SDH channeling, VLAN, ...), security configuration, etc.
 - ④ Establishing lightpath

Normally NREN becomes the organizer of collaboration for building lightpaths. That is because NREN is good at lightpaths technology and knows well both individual researchers and IT staffs of campus network. Additionally, if the management of campus network is outsourced, both technical manager of campus network and networking staffs of outsourcing company should be in the discussion.

While collaborating among NREN, Campus network and researchers, e-mail list is still used to contact each other. It is clear that e-mailing is easy way to do, but collaboration system is need to do more efficiently beyond just contacting. For instance, for that KREONet2 are developing a collaboration system based on Ticket System.

For building global lightpaths across several multi-domain, both the parallel “master contractor” process and the serial “peering relationship” process of [2] commonly occurs. Figure 1 shows that a researcher 1 or a campus network A request lightpath to NREN B, and NRENB is formally in contact with NREN C and NREN D based on SLS (Service Level Specification).

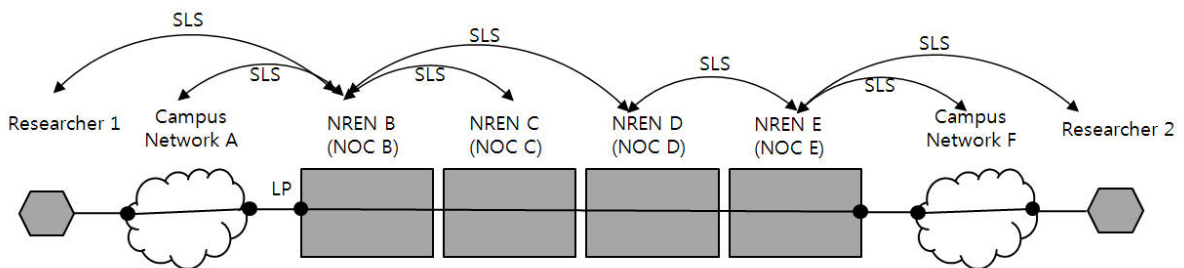


Figure 1: NREN B is formally in contact with other NREN, Campus Network and Researcher.

3. Performance and security issues

Most important factor in building lightpath is security including traffic isolation. Lightpaths is basically separated and isolated other network or traffic. However end system of researchers or research groups is sometimes another interface to use general IP connection service of campus network. At that time, the end-system

becomes multi-homed system and has security hole that malicious user can access to and go to the lightpaths service network through. In case of OPN (Optical Private Network) based on lightpaths, the effect is more severe. Therefore, while building lightpaths, NREN had better check the configuration of the end-system.

Additionally it should be checked if there are security systems and their operation mode such as firewall, IDS, IPS etc. in L1/L2 switch of lightpaths or not. As all you know, there is a tradeoff between performance and security.

In order to monitor and analyze the performance of the lightpaths, several systems such as MRTG, WeatherMap, Pinger and PerfSONAR are needed. Actually in case that the systems are installed in the border of the each NREN and Campus network, it is easy and convenient to make diagnosis with divide and conquer mechanism.

Finally, according to research or projects, additional functions such as Jumboframe, STP per VLAN, etc. is required. Sharing the specification for the access switch equipments of researcher with NREN, campus network and researcher is also helpful to build and operate the lightpaths.

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>.