KRLight and GLIF Activities

6th Annual Global LambdaGrid Workshop
Tokyo, Japan
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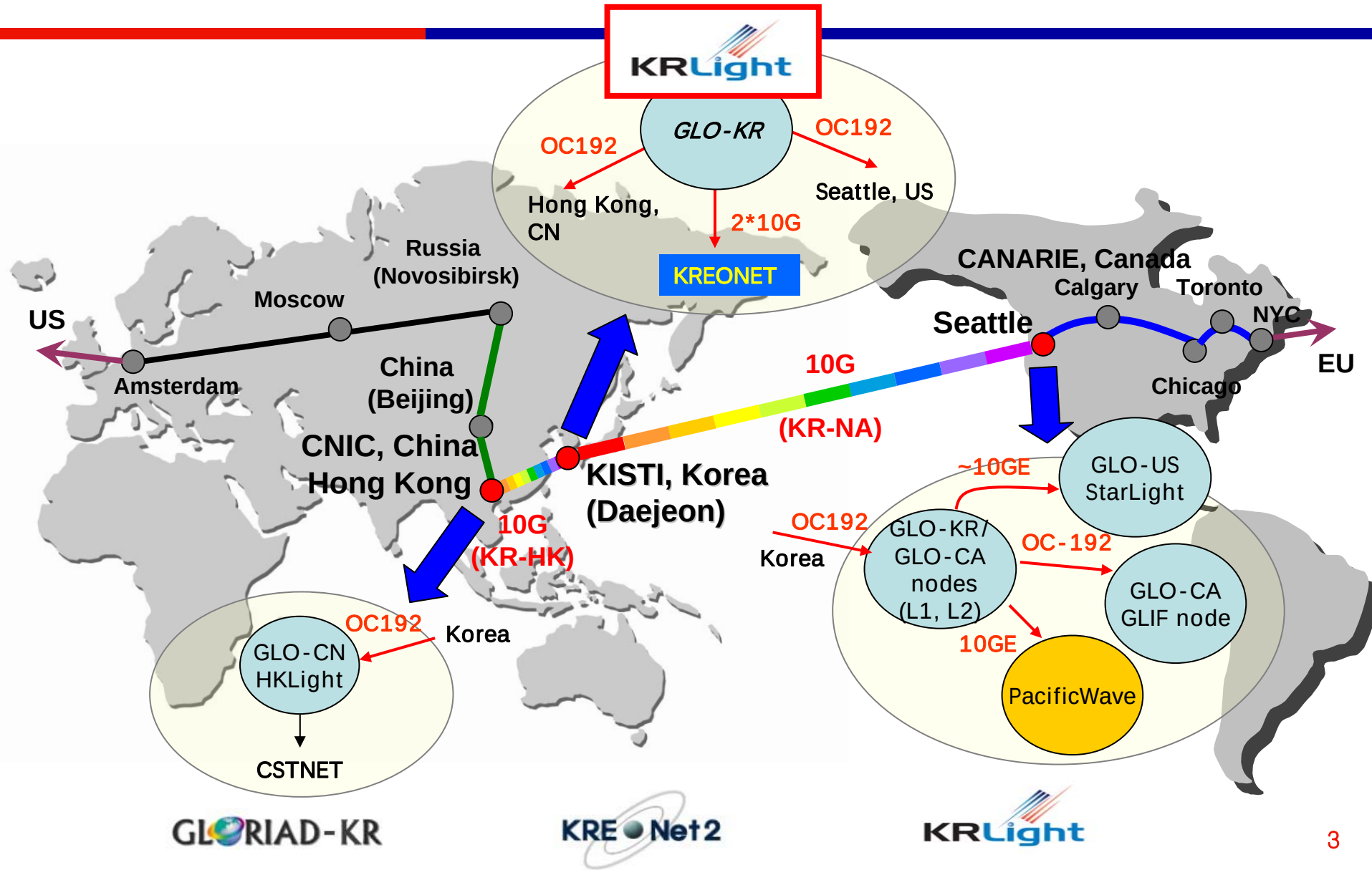
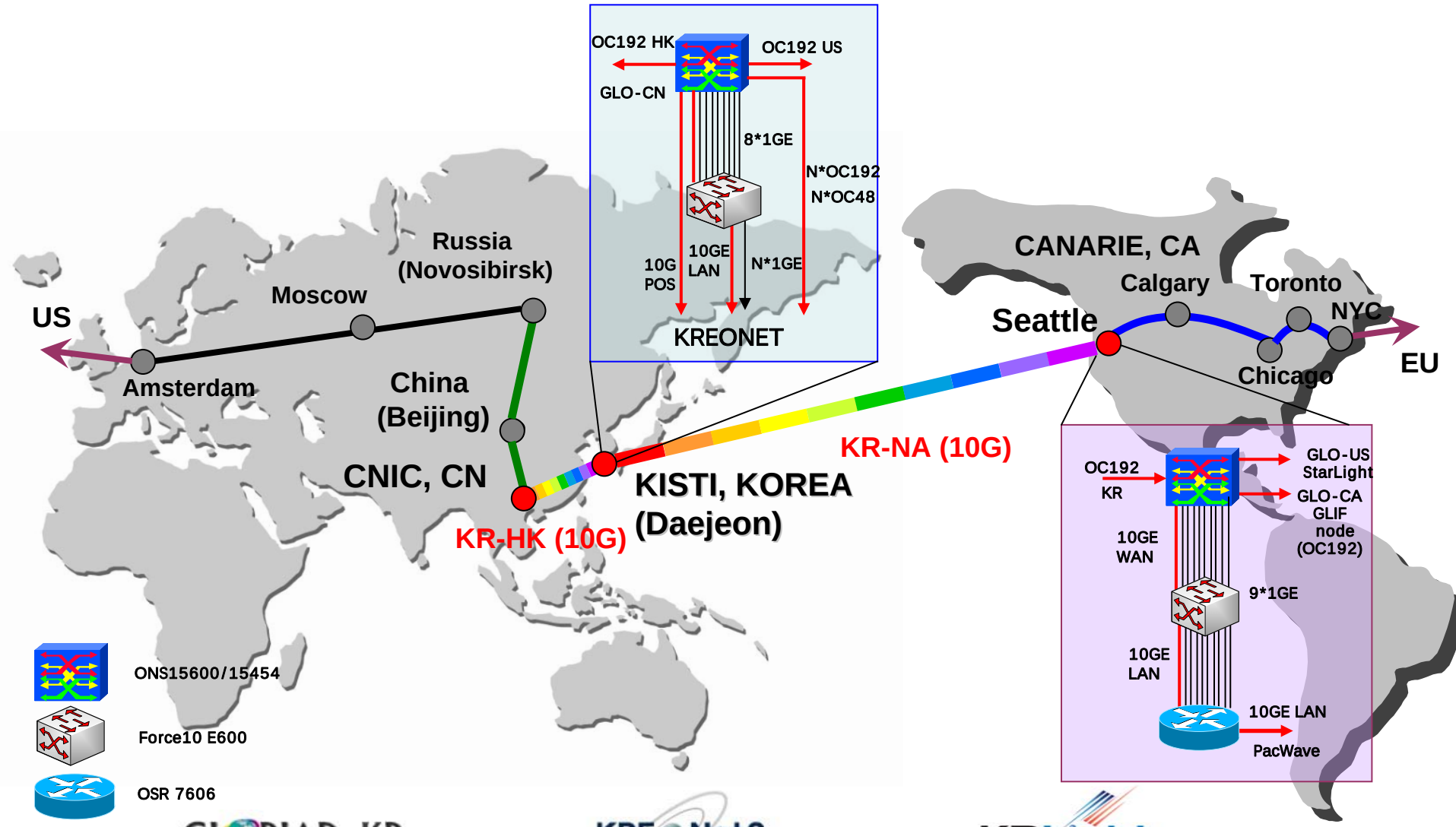
Topics

- GLORIAD-KR/KRLight Network
- Services on KRLight
- Activities on Lightpath Provisioning
- Activities on Uncompressed HDTV
- Collaborative Work
- Summary

GLO-KR/KRLight Network



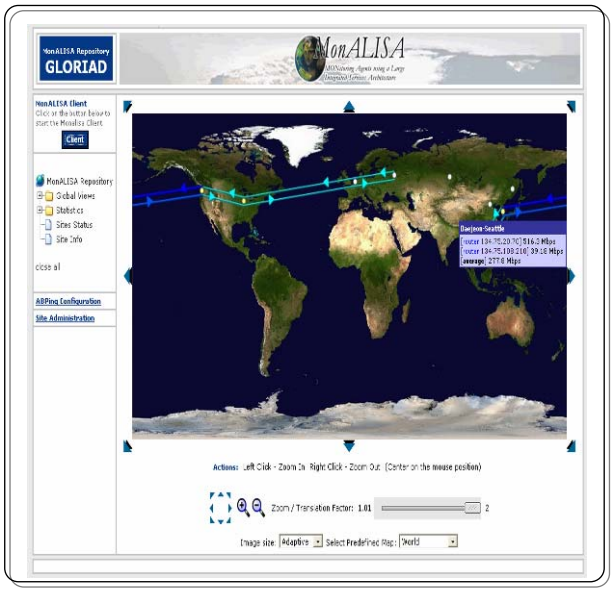
GLO-KR/KRLight Network



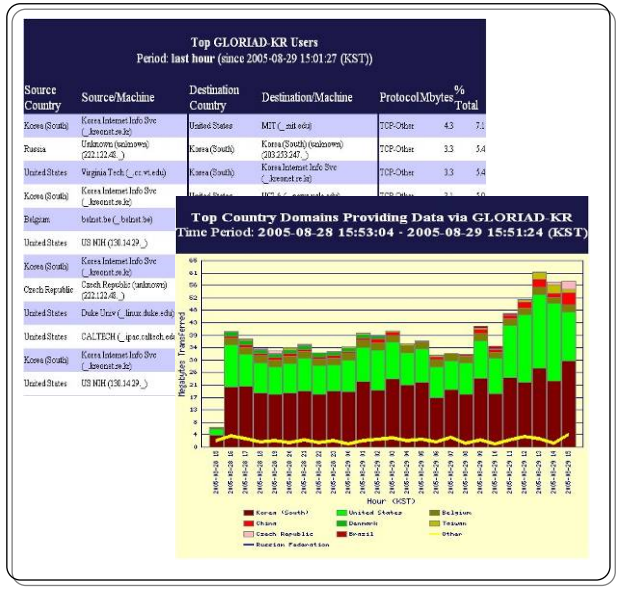
GLORIAD-KR KRE Net 2 KRLight

Traffic Monitoring

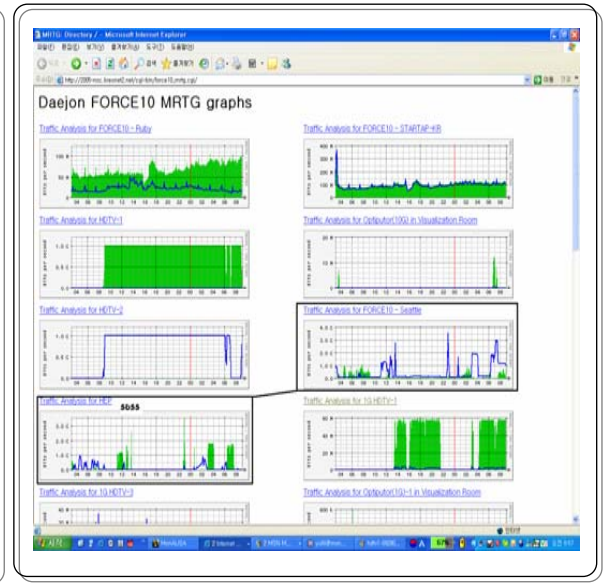
MonALISA



GMON-KR



MRTG



GLORIAD-KR KREONet2 KRLight

Application Proxy Center

- **To support high performance applications with high performance systems and networks**
- **Scientific applications requiring high performance network bandwidth**
  - HEP, SDSS, OptIPuter

Application Test Proxy Center: High Performance Test-bed

PCI-X(133MHz)

4CPU

SATA2 Disk Controller

10G NIC(Xframe)

Activities on UCLPv1.x

> Deployed UCLPv1.3 (2Q/2005)

- Collaborated with CANARIE and KAIST
- Additionally developed the supporting modules for L2 equipments and ONS15600

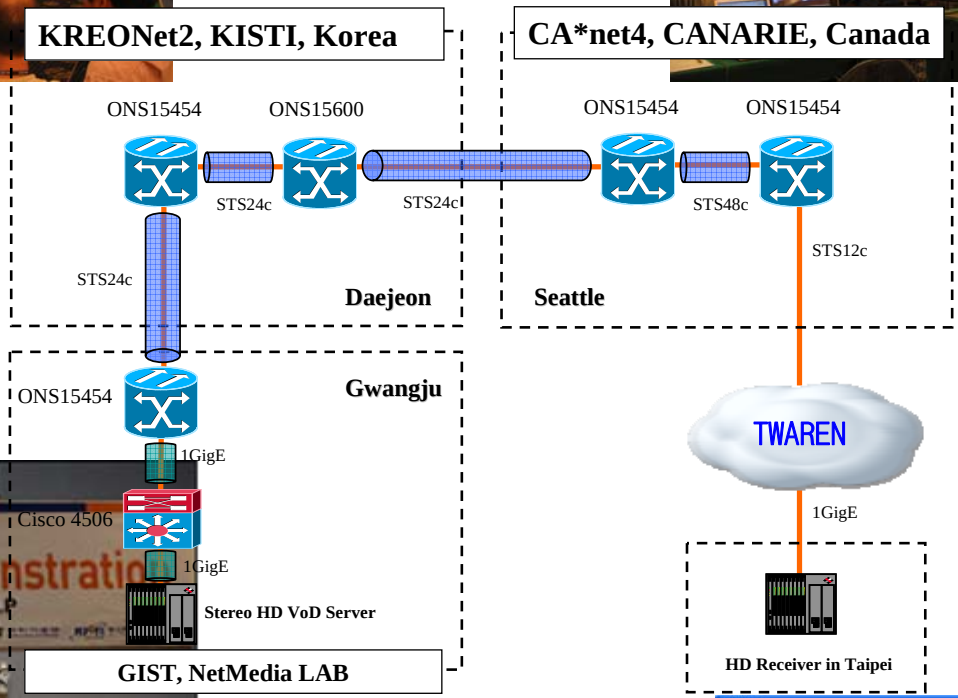
> Participated in International Events

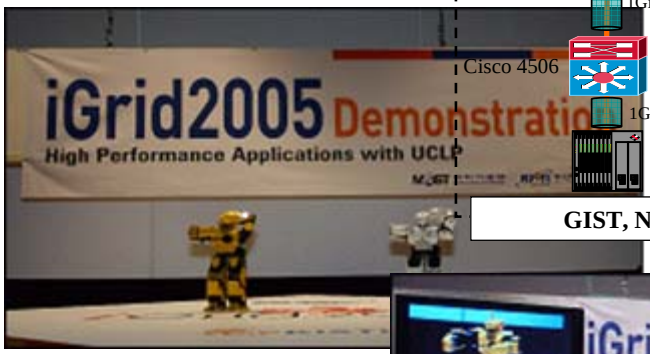
Events	Demonstration	Collaborator
19th & 20th APAN	Stereo HD Stream Transmission over UCLP	Canarie, NCHC, GIST
iGrid 2005	Bidirectional Real time Uncompressed and Stereo (compressed) HD Stream Transmission over UCLP	Canarie, GIST, ResearchChannel
	Real-time Transmission and Analysis of HEP Data over UCLP	Canarie, KNU

< Demonstrations >

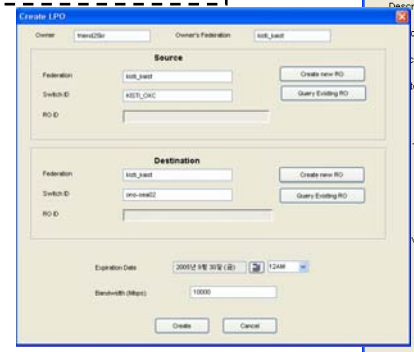
19th APAN

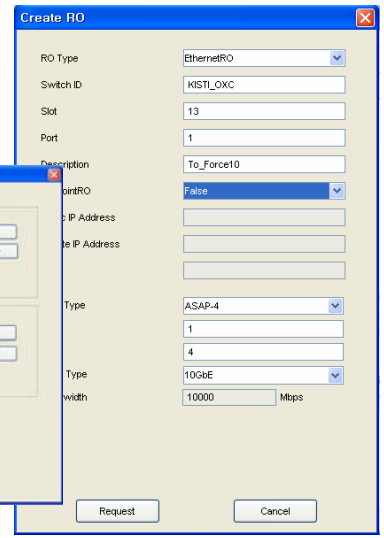
20th APAN





iGrid 2005

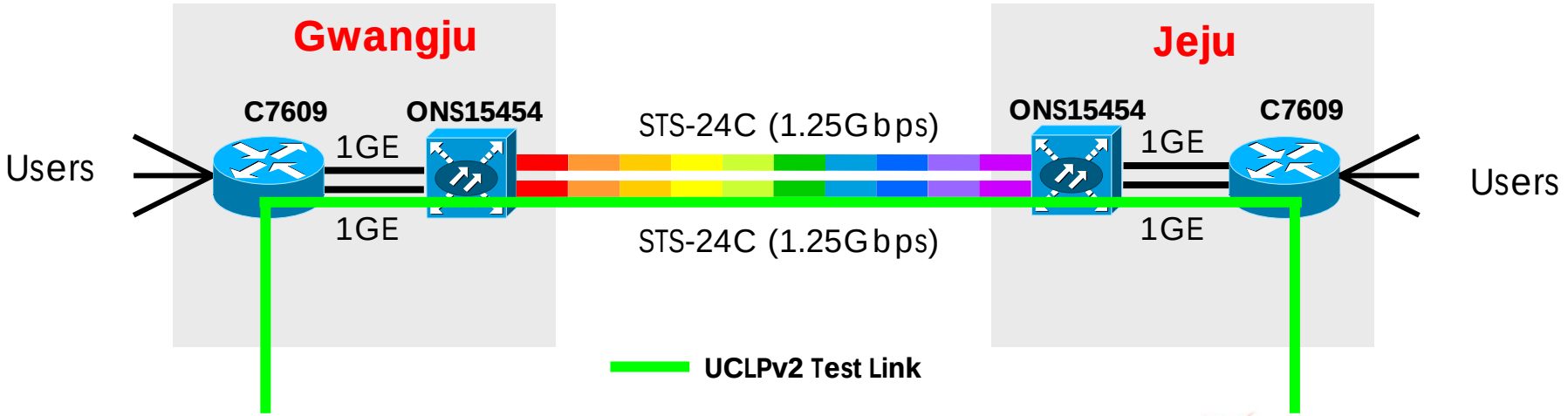




GLORIAD

Activities on UCLPv2.x

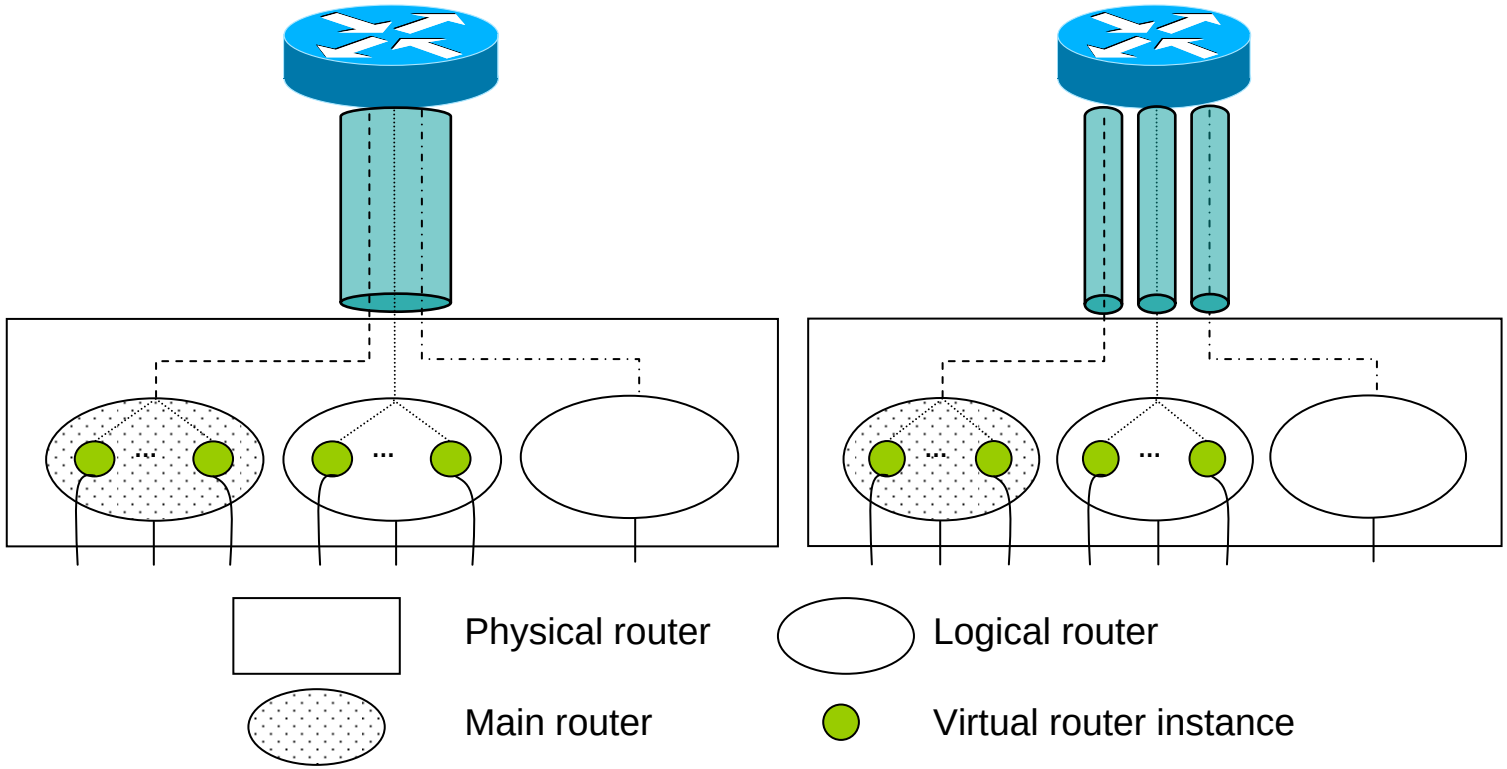
- **Extension of UCLPv1.x's concepts**
  - LightPaths → APNs
- **Will deploy UCLPv2.x on KREONET and KRLight at the end of next month**
  - Collaborating with CANARIE, CRC, Inocybe, and KAIST
  - Developing some modules applicable to KREONET and KRLight



GLORIAD-KR KREONET2 KRLight

Logical/Virtual Routing Test

- For providing L3 lightpath
- In Juniper Router



Logical/Virtual Routing Test

> Logical router & Virtual router instance in Juniper

	Logical router	Virtual router instance
Implementation	**Partitioning**	**Emulation at software layer (One of 6 routing instance types)**
Functionality	**Almost Same**	**Some limitation (ex. MPLS, RSVP, DVMRP)**
Maximum #	**Up to 16**	**No limit (in theory)**
Routing table #	**Multiple**	**Single**
Where to configure	**In a physical router**	**In a main or logical router**

Logical/Virtual Routing Test

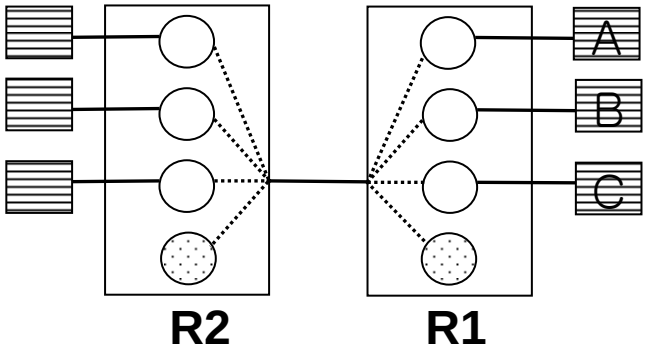
> Experimental environment

- Purpose: Examine the network virtualization in 100Mbps network environment.
- 6 Host computers
  - Fast Ethernet NICs
  - Running Windows XP
- 2 Routers
  - Juniper Networks M5™
  - Running JUNOS™ Internet software 7.1.2
- Iperf 1.7.0
  - TCP traffic with 1Mb window for 100 seconds
- Get the average throughput after 10 trials.

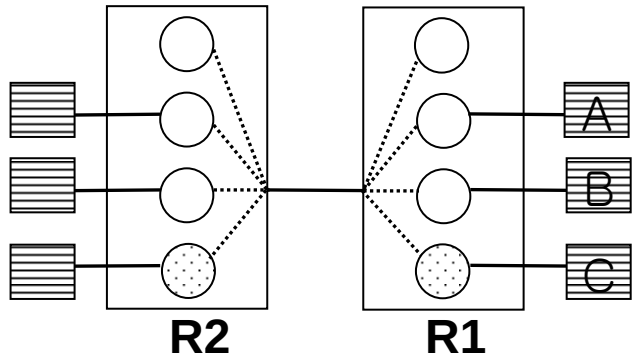
Logical/Virtual Routing Test

> **Test scenarios**

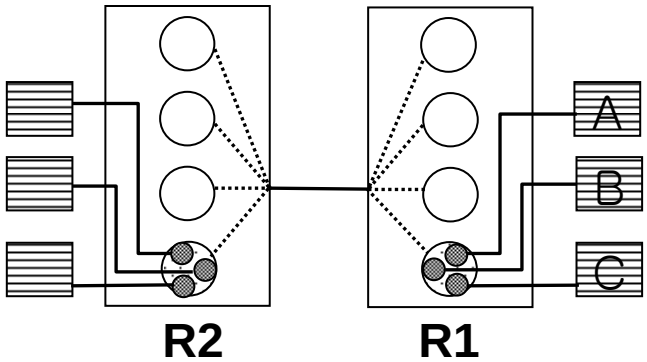
Test 1



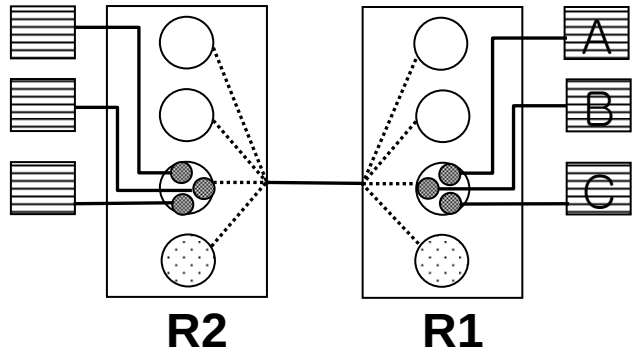
Test 2



Test 3



Test 4

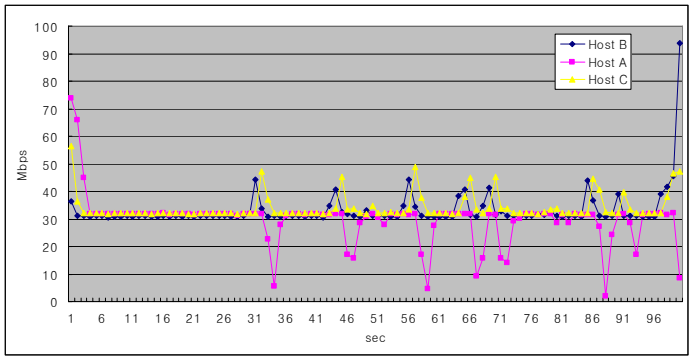


Logical/Virtual Routing Test

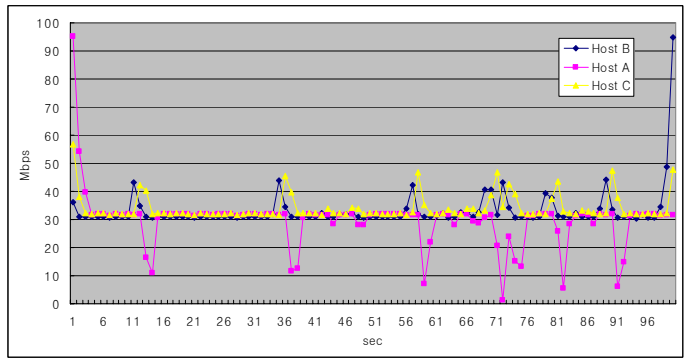
> Experimental results

- *Throughput of TCP flows for 100 seconds*

Test 1



Test 2



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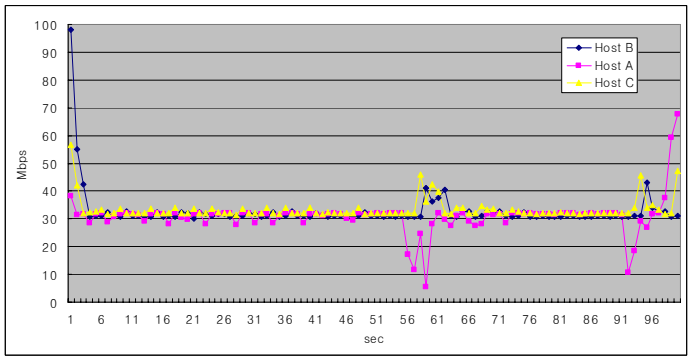
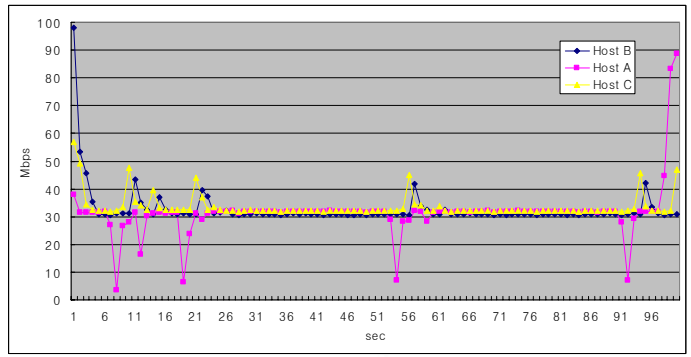


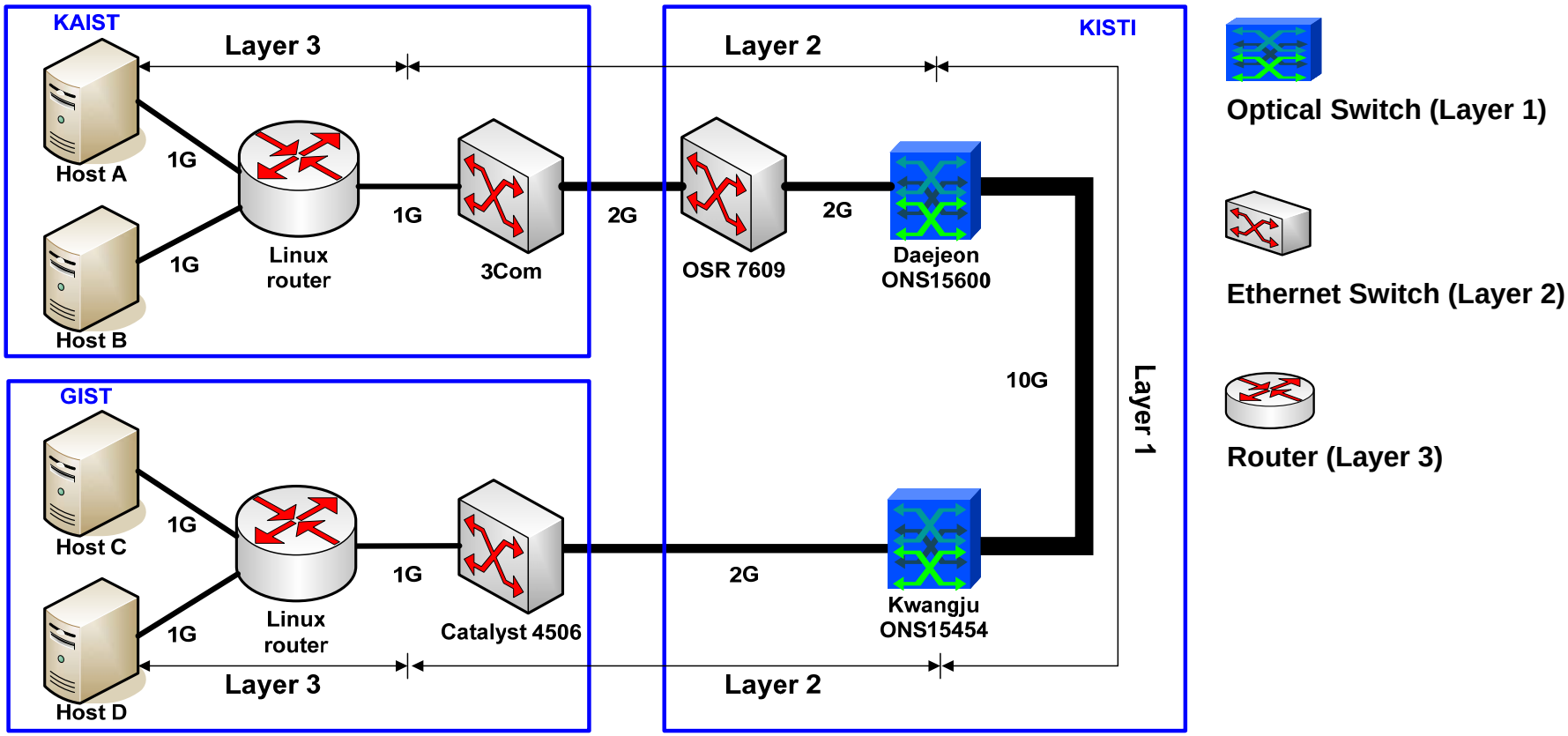
Test 4



GLORIAD-KR KREONet2 KRLight

Class-of-Service Test with Linux Virtual Router

> Test environment



Class-of-Service Test with Linux Virtual Router

> Linux Virtual Router

- Priority : Higher Priority for Class 1 (A→C) and Lower Priority for Class 2 (B → D)
- Hierarchical Token Bucket (HTB) : Assign 500Mbps for each Class
- *Test Results: Single TCP Stream vs. Multiple TCP Streams*

	Plain FIFO		Priority		HTB	
Number of TCP streams in Class 2	Class 1	Class 2	Class 1	Class 2	Class 1	Class 2
1	478	457	479	453	461	465
3	260	680	258	680	434	492
10	102	839	112	819	431	494
30	44	898	65	875	435	492
100	23	932	54	886	445	489

Uncompressed Internet HDTV

> Our goals

- Develop *a low-cost system for uncompressed HDTV* services over high-speed IP networks
- Combine uncompressed HDTV services *with on-the-edge Lambda technologies* (User-Controlled Light Path, virtual routing, and so forth)
- Provide actual services (culture, seminar, or ETC.) and promote domestic/international collaborations

> Open-source software

- http://www.gloriad-kr.org/hdtv
- UV-0.3.9 (GLORIAD-KR version), which is based on UltraGrid from USC/ISI

Uncompressed Internet HDTV

> Our contributions

- Support *low-cost HD-SDI interface* (AJA OEM-HS)
- Provide *HW audio playout* (in case of using native packetization) *along with a separate audio RTP stream*
- Transport 8/10-bit video using *software packet-striping* (dual-port streaming)
- *SW audio playout* (ON-GOING, Linux ALSA)

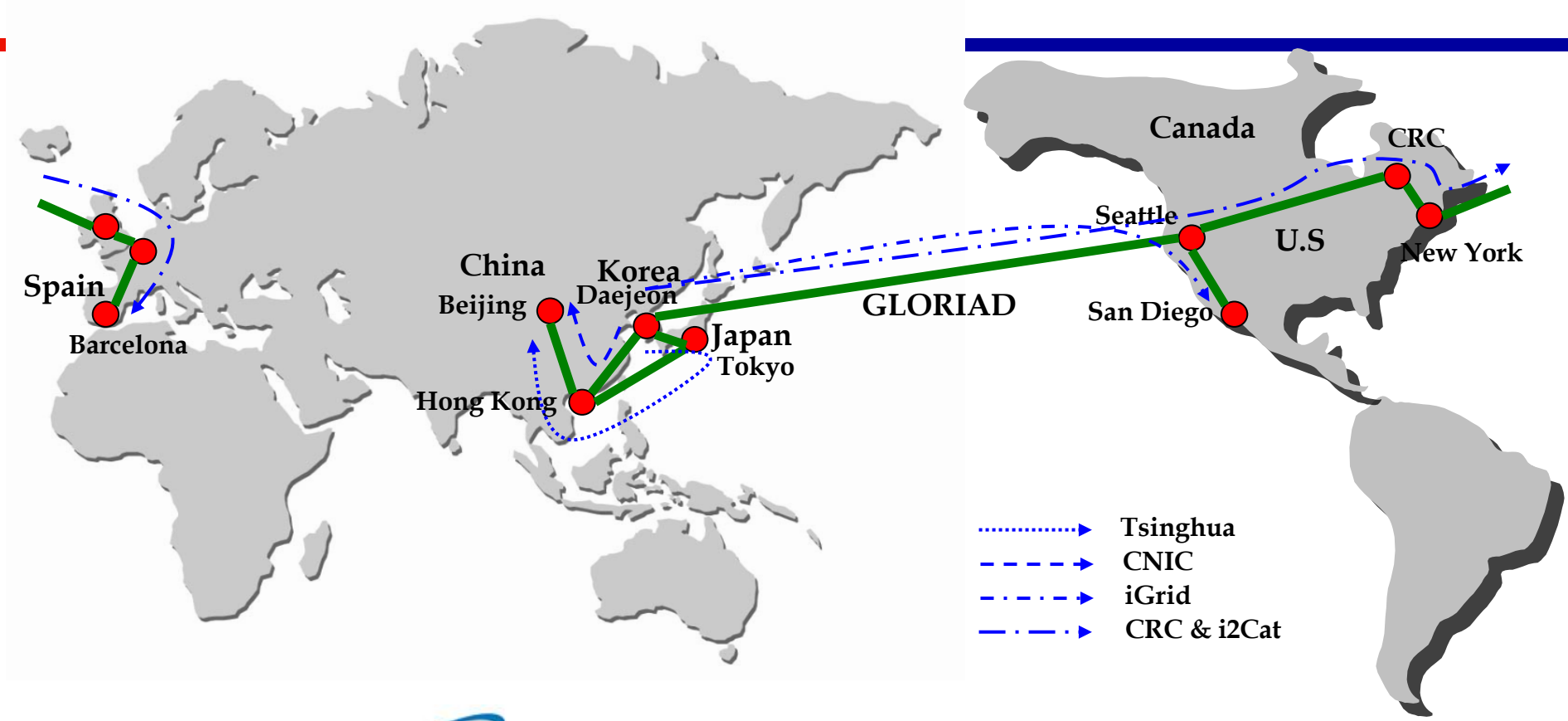
Test-bed and Facilities

- **Able to make collaborations with any research groups *using UltraGrid* (USC/ISI) or *iHD1500* (Research Channel)**

Name	Spec.	Qt.
Server	EM64T, Daul-Xeon 3.0, Dual-port GigE NIC	3
10 GigE NICs	Chelsio N210, T210	4
HD-SDI Converter	AJA OEM_HS DeckLink HD Plus	2 1
Signal Converter	AJA HD10A, HD10AM, HD10C, HDP, Audio A/D converters	
Camera	Sony HVR-Z1N	1

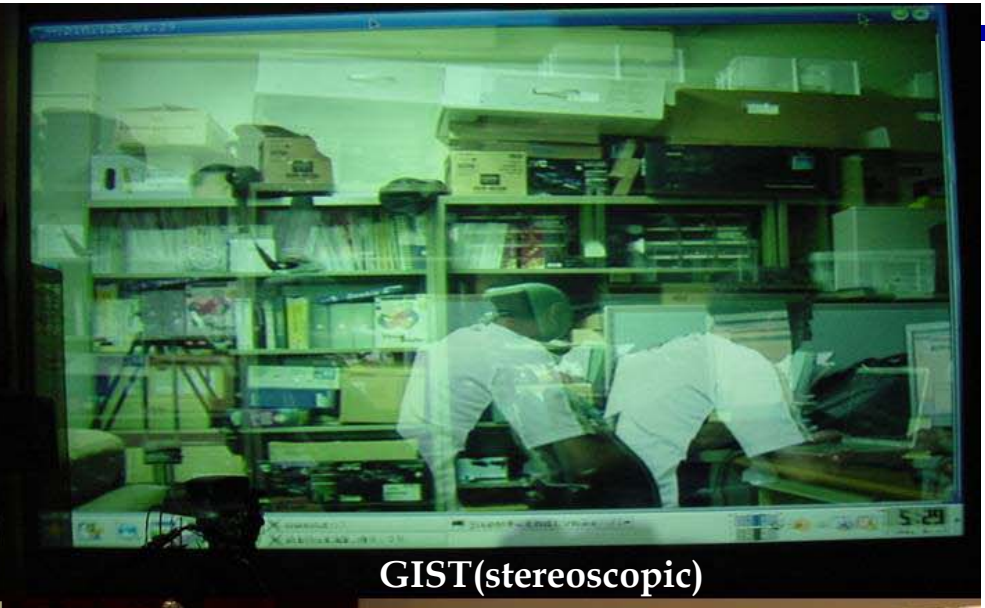
Domestic Links (KREONET)	2x1 Gbps
International Links (GLORIAD)	4x1 Gbps 2x10 Gbps

Uncompressed HDTV Exp. & Demo.



Uncompressed HDTV Exp. & Demo.

CNIC (one-way)



GIST(stereoscopic)

Tsinghua (one-way)

iGrid2005 (two-way)

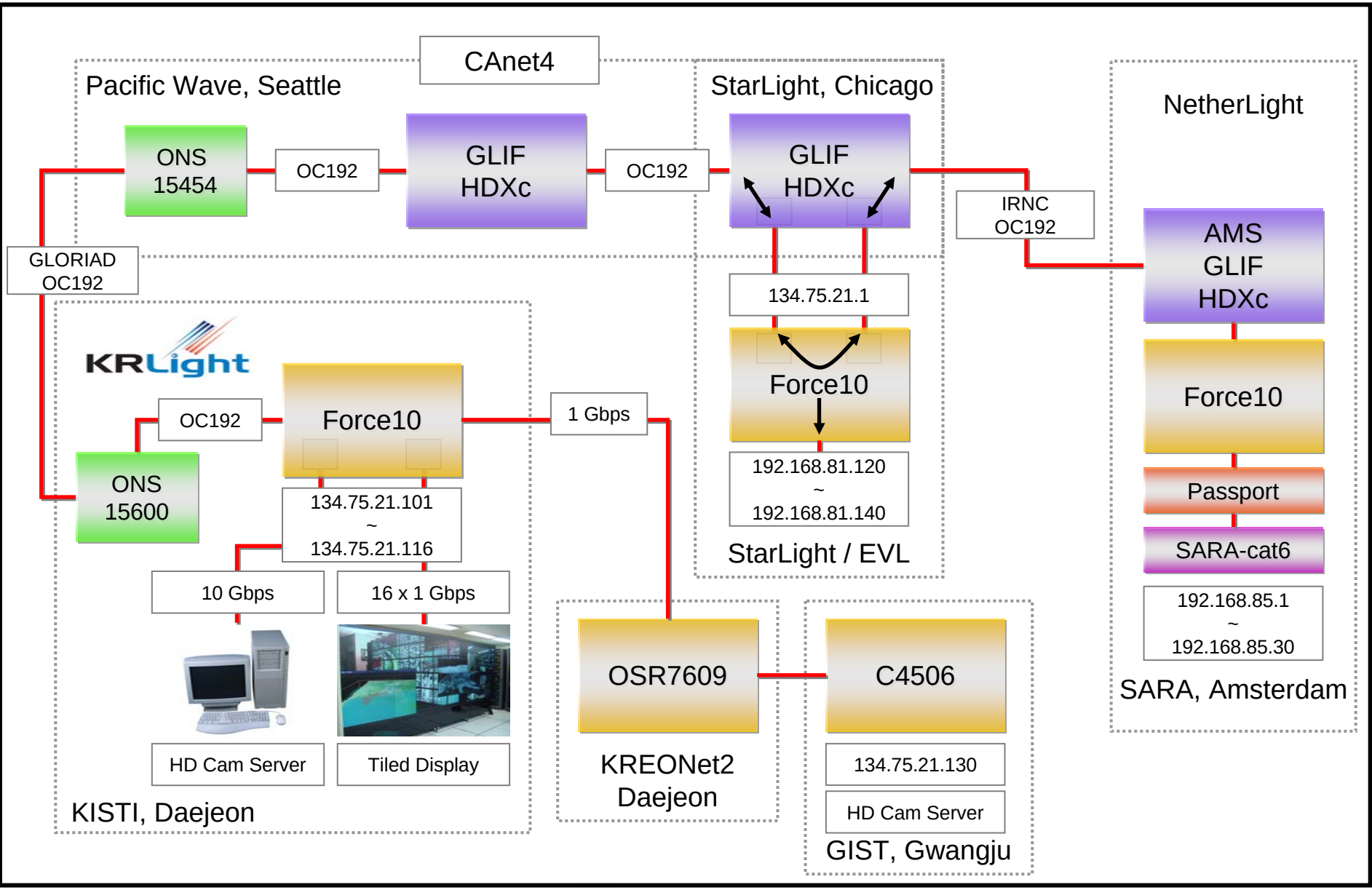
GLO-KR/KRLight & GOLE Collaborations

OptIPuter Demonstration on Feb 22, 2006

Korea, the Netherlands, the US, and Canada participated over 10G Lightpath on GLORIAD

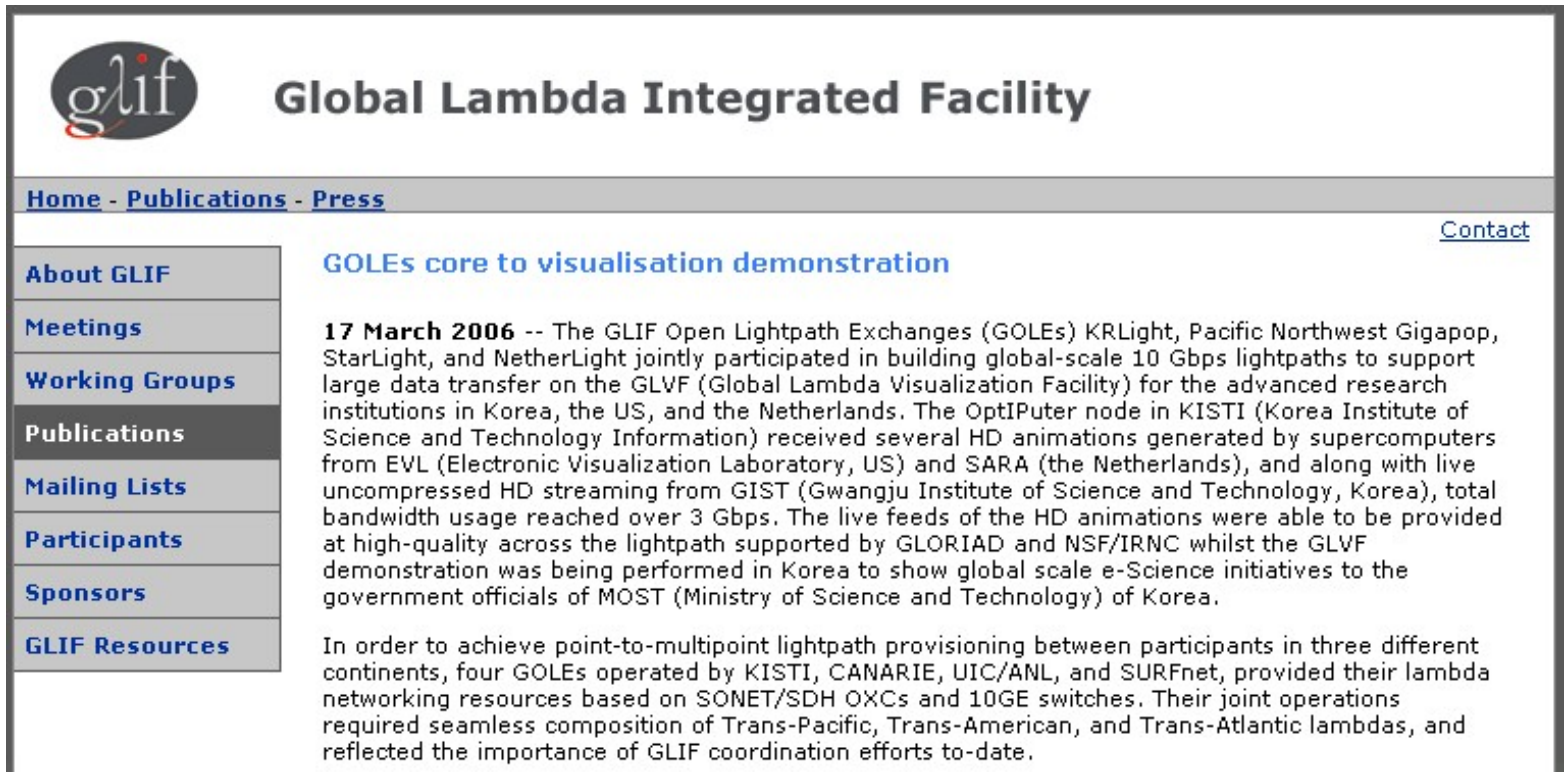
GLORIAD-KR KREONet2 KRLight

GLO-KR/KRLight & GOLE Collaborations



GLO-KR/KRLight & GOLE Collaborations

> **Refer to Press Release on GLIF Homepage**



Global Lambda Integrated Facility

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- GLIF Resources

GOLEs core to visualisation demonstration

17 March 2006 -- The GLIF Open Lightpath Exchanges (GOLEs) KRLight, Pacific Northwest Gigapop, StarLight, and NetherLight jointly participated in building global-scale 10 Gbps lightpaths to support large data transfer on the GLVF (Global Lambda Visualization Facility) for the advanced research institutions in Korea, the US, and the Netherlands. The OptIPuter node in KISTI (Korea Institute of Science and Technology Information) received several HD animations generated by supercomputers from EVL (Electronic Visualization Laboratory, US) and SARA (the Netherlands), and along with live uncompressed HD streaming from GIST (Gwangju Institute of Science and Technology, Korea), total bandwidth usage reached over 3 Gbps. The live feeds of the HD animations were able to be provided at high-quality across the lightpath supported by GLORIAD and NSF/IRNC whilst the GLVF demonstration was being performed in Korea to show global scale e-Science initiatives to the government officials of MOST (Ministry of Science and Technology) of Korea.

In order to achieve point-to-multipoint lightpath provisioning between participants in three different continents, four GOLEs operated by KISTI, CANARIE, UIC/ANL, and SURFnet, provided their lambda networking resources based on SONET/SDH OXCs and 10GE switches. Their joint operations required seamless composition of Trans-Pacific, Trans-American, and Trans-Atlantic lambdas, and reflected the importance of GLIF coordination efforts to-date.

GLORIAD-KR KREONet2 KRLight

Summary

- **Cooperative to expand global lambda environment**
- **Collaborative for advanced applications**
  - OptIPuter
  - Uncompressed HD
  - Etc

Thank you !!

> http://www.gloriad-kr.net
> http://www.kreonet2.net

GLORIAD-KR KREONet2 KRLight