TaiwanLight GOLE Update

GLIF Workshop
Oct. 1, 2008

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National Center for High-performance Computing

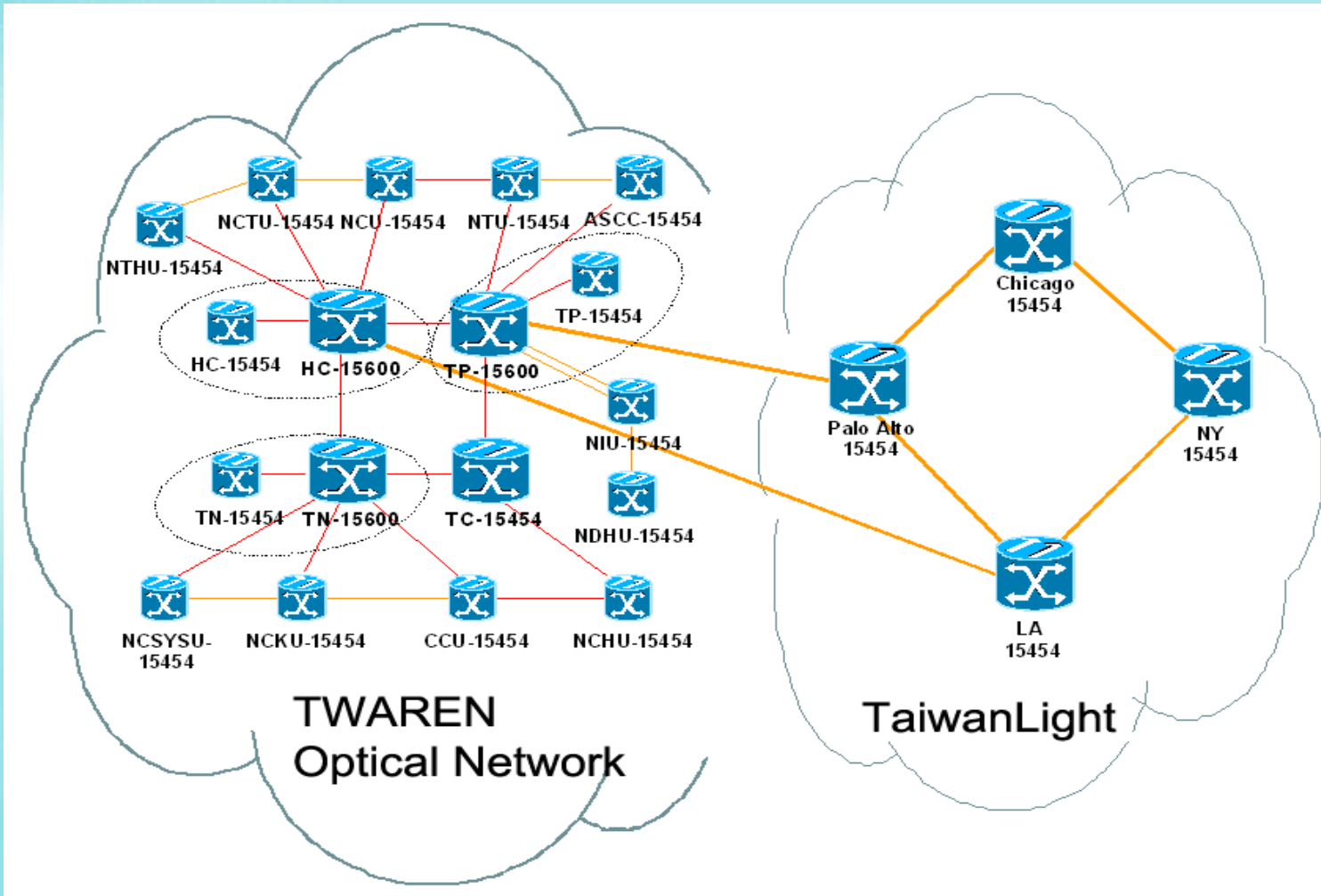# TWAREN Architecture
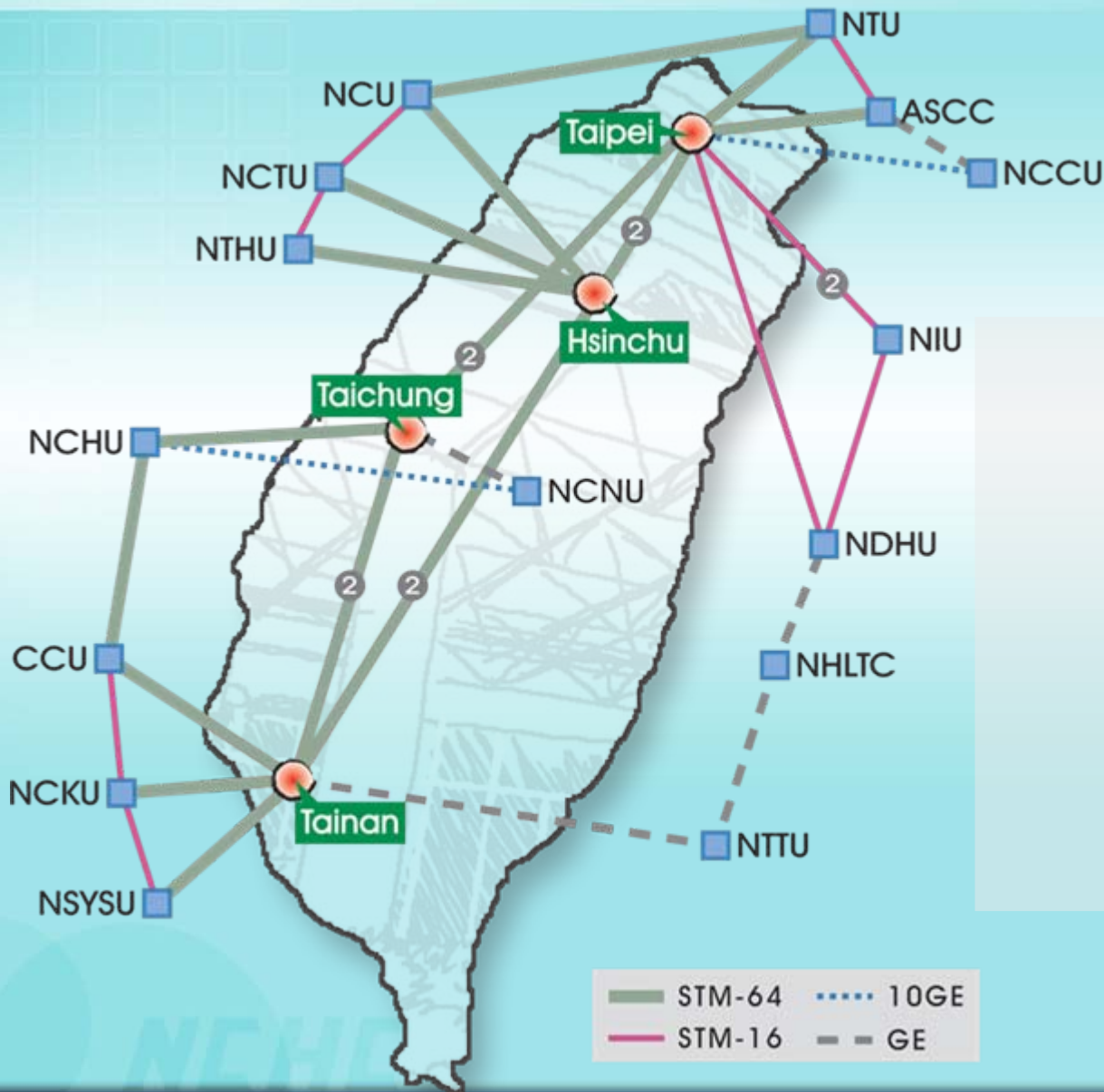
- **TWAREN: Taiwan Advanced Research and Education Network**
- **3-tier structure**
- **4 core nodes, 20Gbps backbone**
- **12 GigaPops**
- **2 circuit providers**
- **Highly fault-tolerant**

TaiwanLight Architecture
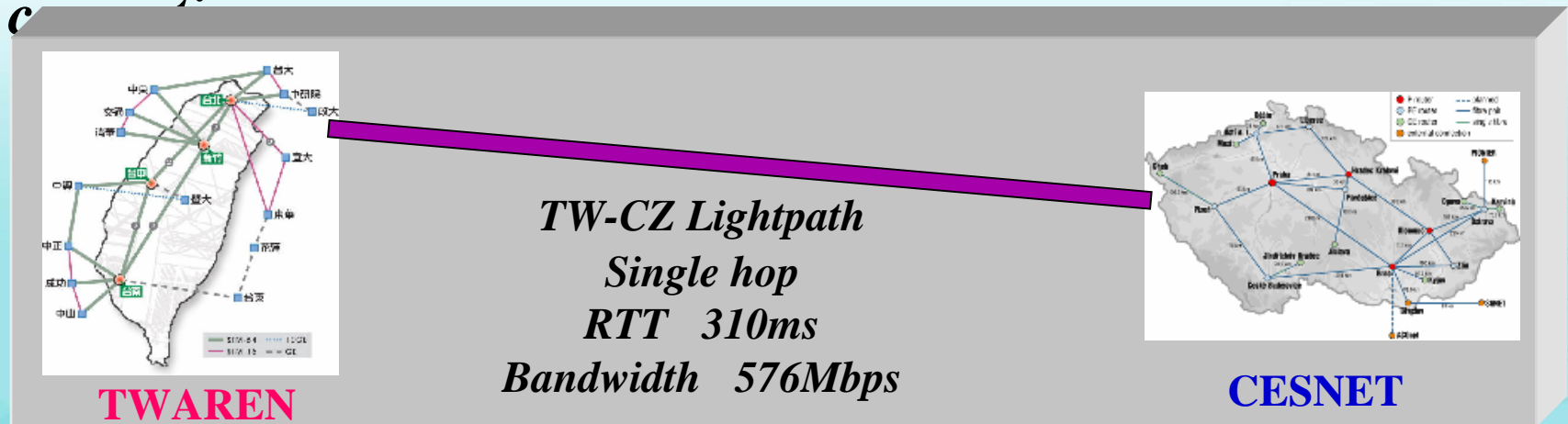
TaiwanLight Physical Links

■TaiwanLight is the international part of TWAREN

• **No router in the core.**

• **Switches are used to connect lightpaths.**

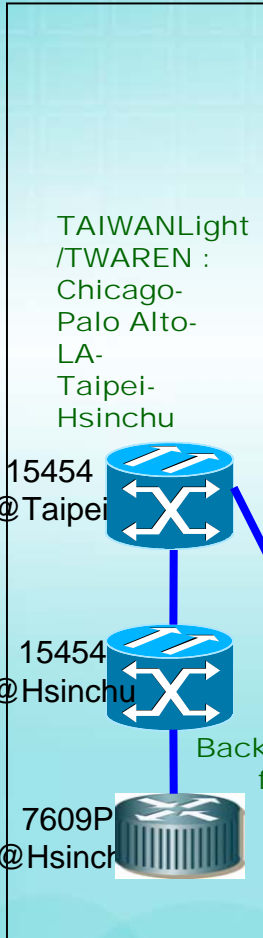• **MPLS-VPN service is provided on top of lightpaths.**

TWAREN-CESNET Connection

- A lightpath was established between Taiwan and Czech Republic in 2008/2, crossing Pacific and Atlantic oceans (at least 30,000km).

  - Joint work among TWAREN, CA*net, MANLAN, NetherLight and CESNET

- *IPv6* and *Multicast* are enabled; and video streams are exchanged between TWAREN and CESNET.

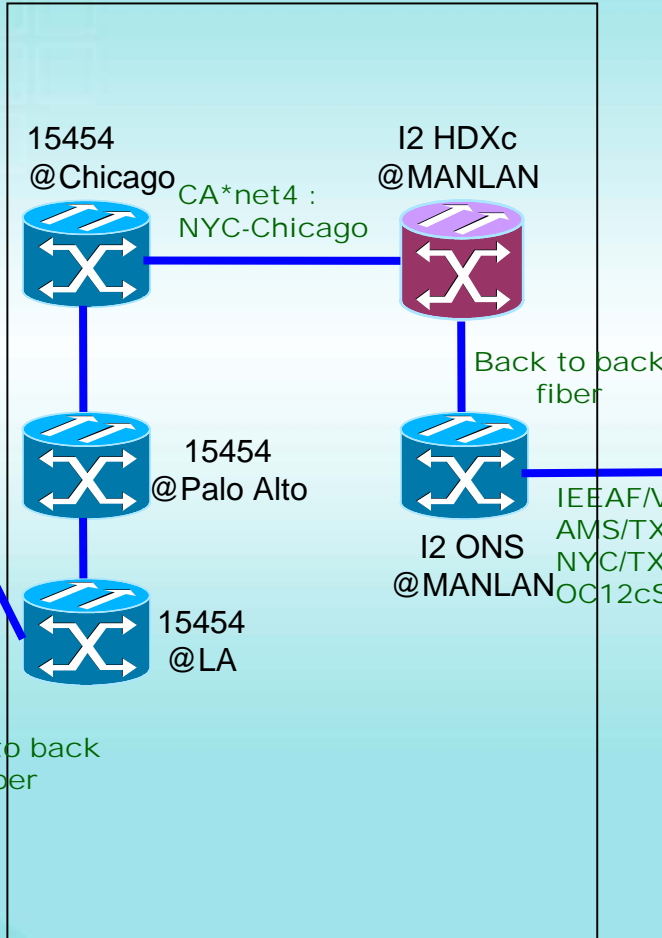- Further collaborations on *live medical streaming* and *HPC*

TW-CZ Lightpath
Single hop
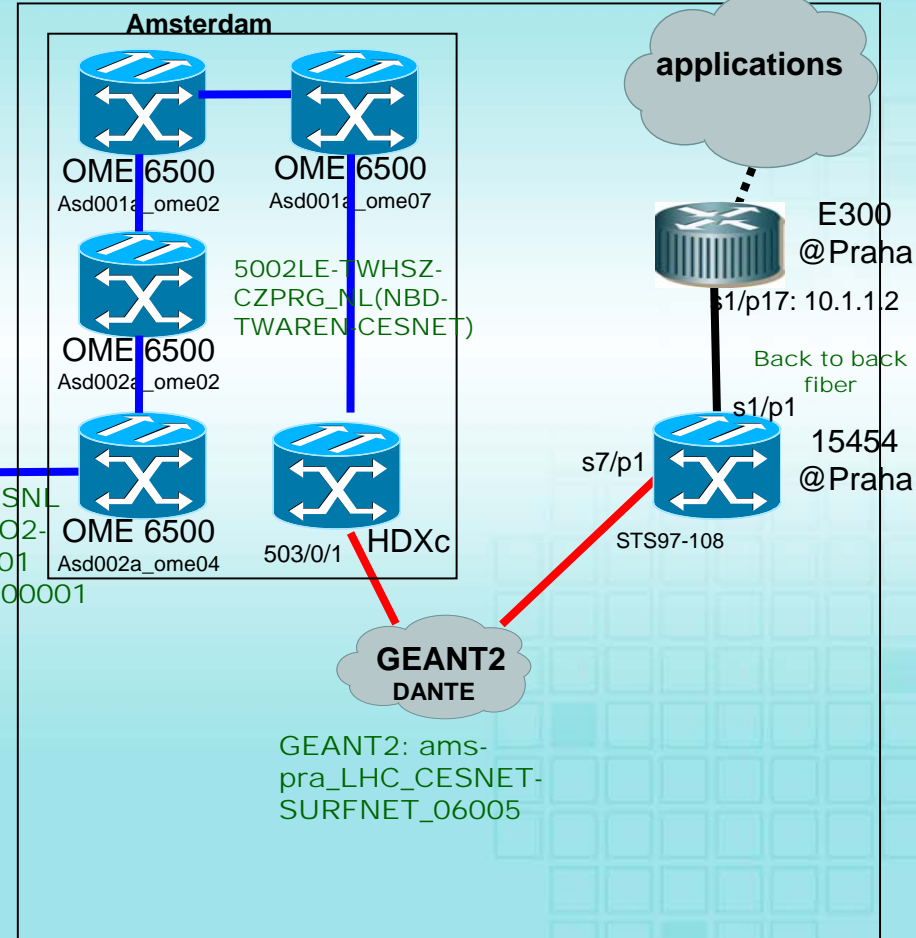*RTT   310ms*
Bandwidth   576Mbps

TWAREN

CESNET

TWAREN-CESNET Optical Connection

Taiwan　　　　**U.S.A**　　　　　　　**Europe**

Amsterdam

TAIWANLight /TWAREN : Chicago-Palo Alto-LA-Taipei-Hsinchu

15454 @Chicago

CA*net4 : NYC-Chicago

I2 HDXc @MANLAN

OME 6500
Asd001a_ome02

OME 6500
Asd001a_ome07

5002LE-TWHSZ-CZPRG_NL(NBD-TWAREN-CESNET)

OME 6500
Asd002a_ome02

applications

E300 @Praha
s1/p17: 10.1.1.2

Back to back fiber

s1/p1

15454 @Taipei

15454 @Palo Alto

Back to back fiber

OME 6500
Asd002a_ome04

503/0/1　HDXc

15454 @Praha
STS97-108

s7/p1

15454 @Hsinchu

15454 @LA

I2 ONS @MANLAN

IEEAF/VSNL AMS/TXO2-NYC/TX01 OC12cS00001

GEANT2 DANTE

Back to back fiber

7609P @Hsinchu

GEANT2: ams-pra_LHC_CESNET-SURFNET_06005

	622M/s
	1 GE
	OC-192c

6

Live Medical Streaming 1

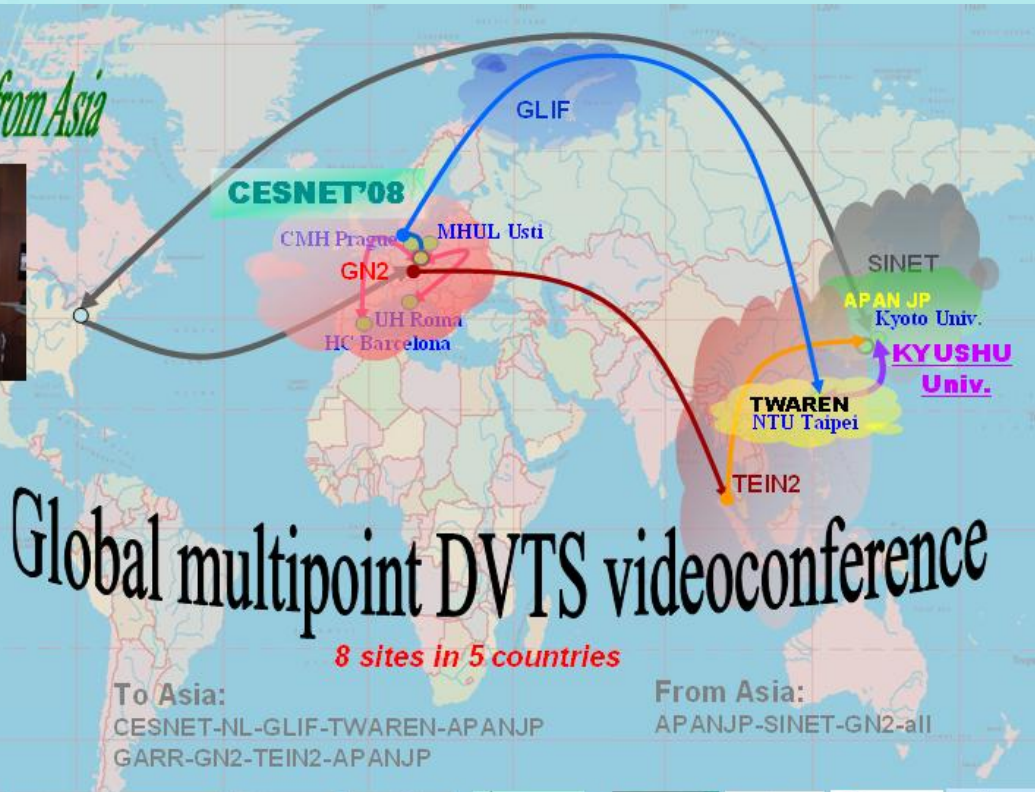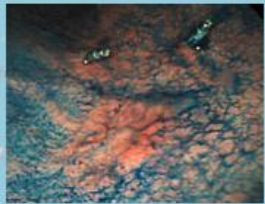High-quality video streaming of live surgery with CESNet:
• 2007/10: Ophthalmology surgery (NCKU College of Medicine in Taiwan and Central Military Hospital in Czech).

Live Medical Streaming 2

- 2008/9: Demo of gastrointestinal endoscopy in CESNET08 conference (8 sites in Japan, Taiwan, Italy, Spain and Czech).
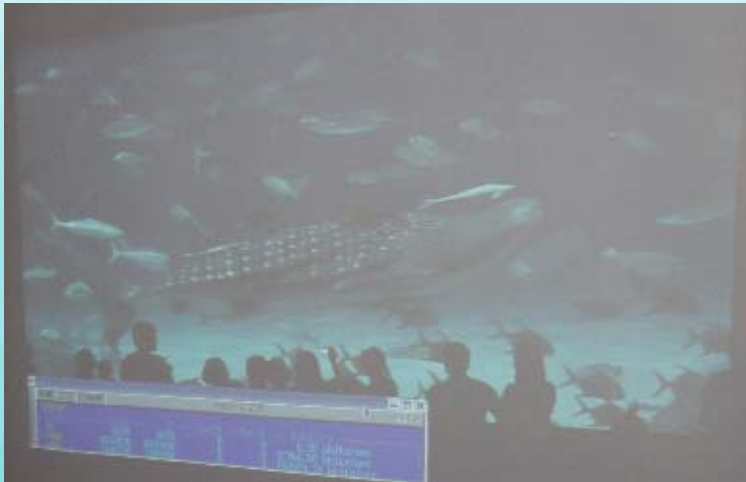

Live endoscopy lesson from Asia

CESNET'08

GLIF

CMH Prague   MHUL Usti
GN2
UH Roma
HC Barcelona

SINET
APAN JP
Kyoto Univ.
KYUSHU Univ.

TWAREN
NTU Taipei

TEIN2

Global multipoint DVTS videoconference

8 sites in 5 countries

To Asia:
CESNET-NL-GLIF-TWAREN-APANJP
GARR-GN2-TEIN2-APANJP

From Asia:
APANJP-SINET-GN2-all

glif   NL Light   IRIS   Consortium GARR   GEANT2   CESNET   TWAREN   TEIN2   APAN   SINET

September 25th 2008,
Prague, Usti o.Elbe., Fukuoka, Kyoto, Rome, Barcelona
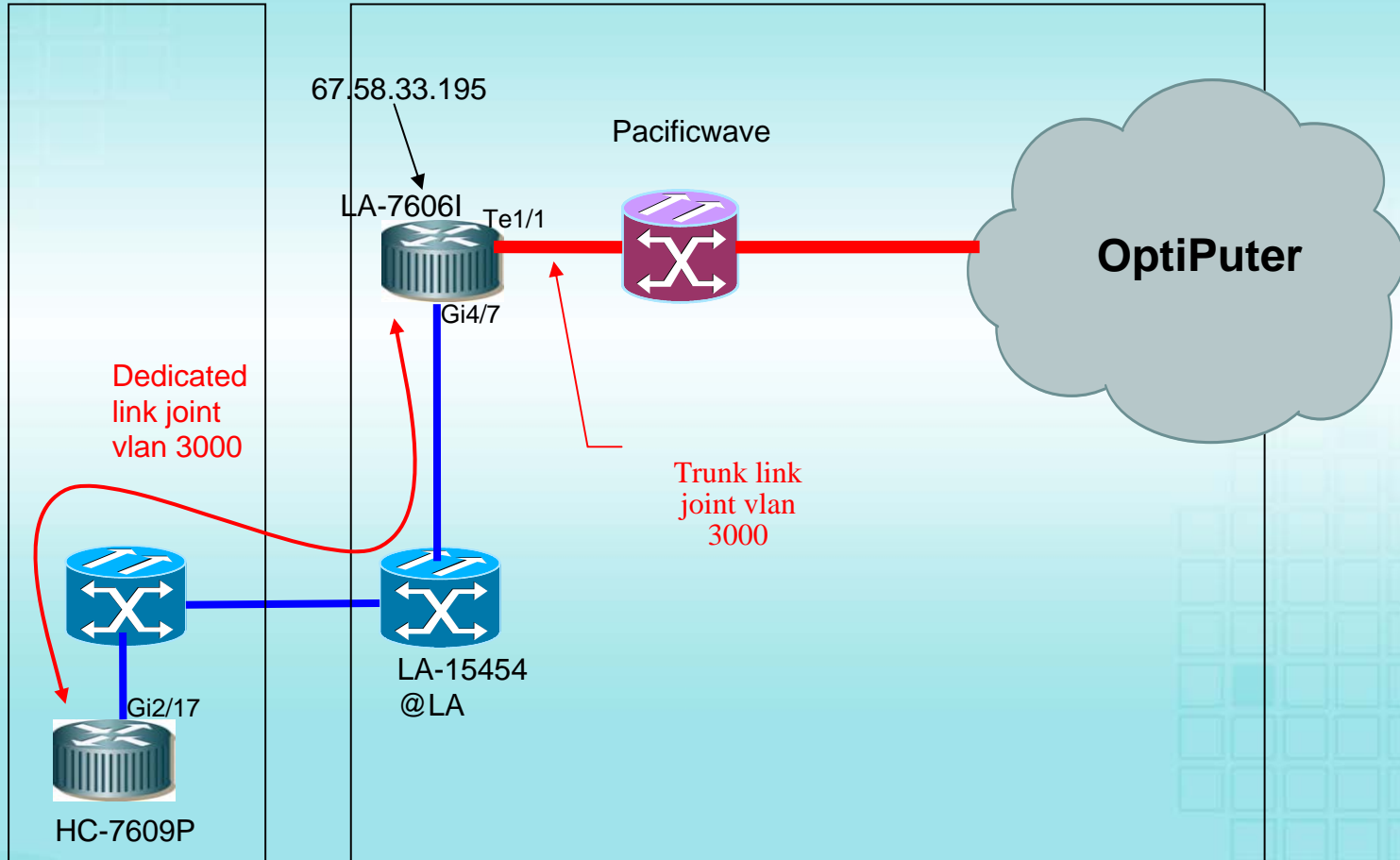
OptIPuter Participation

- NCHC is an *OptIPuter* participant
  - An experimental lighpath is connected to OptIPuter for testing performance and video transmission.
- NCHC Taichung site will serve as "OptIPuter-ready" video streaming and education center (PRAGMA), grand opening in 2009/03.
  - We will demonstrate in SC08
- *OptIPlanet* Collaboratory is ongoing with Calit2, UCSD

TWAREN-OptIPuter Optical Connection

TWAREN

Pacificwave

67.58.33.195

Pacificwave

LA-7606I   Te1/1

OptiPuter

Gi4/7

Dedicated
link joint
vlan 3000

Trunk link
joint vlan
3000

LA-15454
@LA

Gi2/17

HC-7609P

STM-4

10GE

TWAREN LightPath Control System

1. core node fails
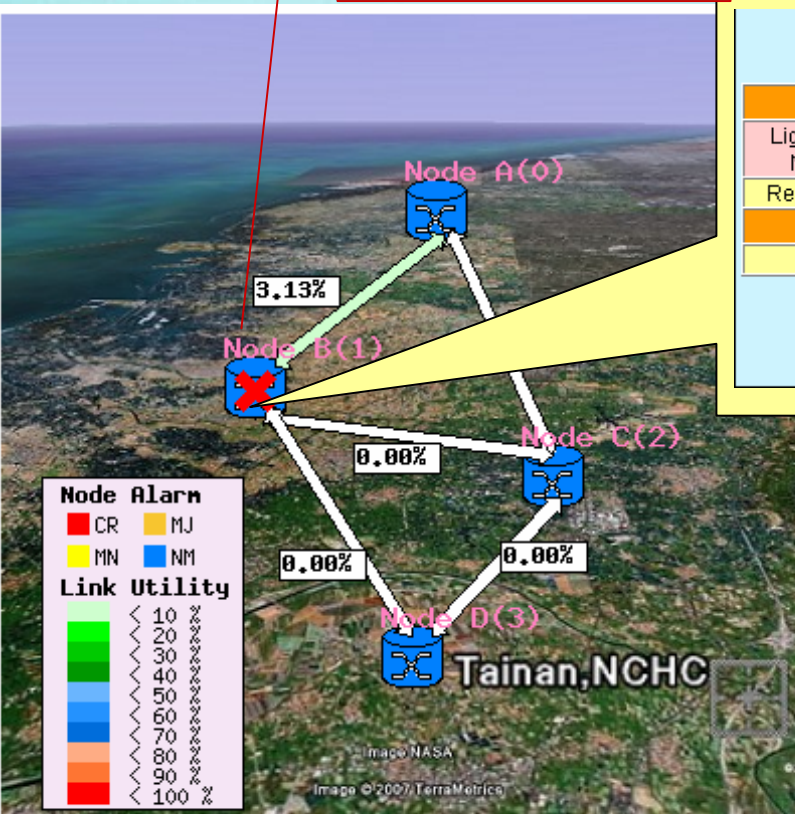
Figure out which Light path out of service temporarily ...

Ligth Path					
Ligth Path Name	Connect From (Node)	Connect From (Slot-Port)	Connect To (Node)	Connect To (Slot-Port)	Bandwidth
Req0-1-90	0	R0-13-0	1	R1-4-1	1
Backup path					
---	0	R0-13-0	2	R2-14-1	1

Restore

Channel Size: STM-1

Setup Connection

Release Connection

Connections: Req0-1-90   Release Connection   Details

Resource Status Query

Node Alarm Status	Query
Link Status	Query
Node Status	Query

2. Restoration confirmation

A Network Management System