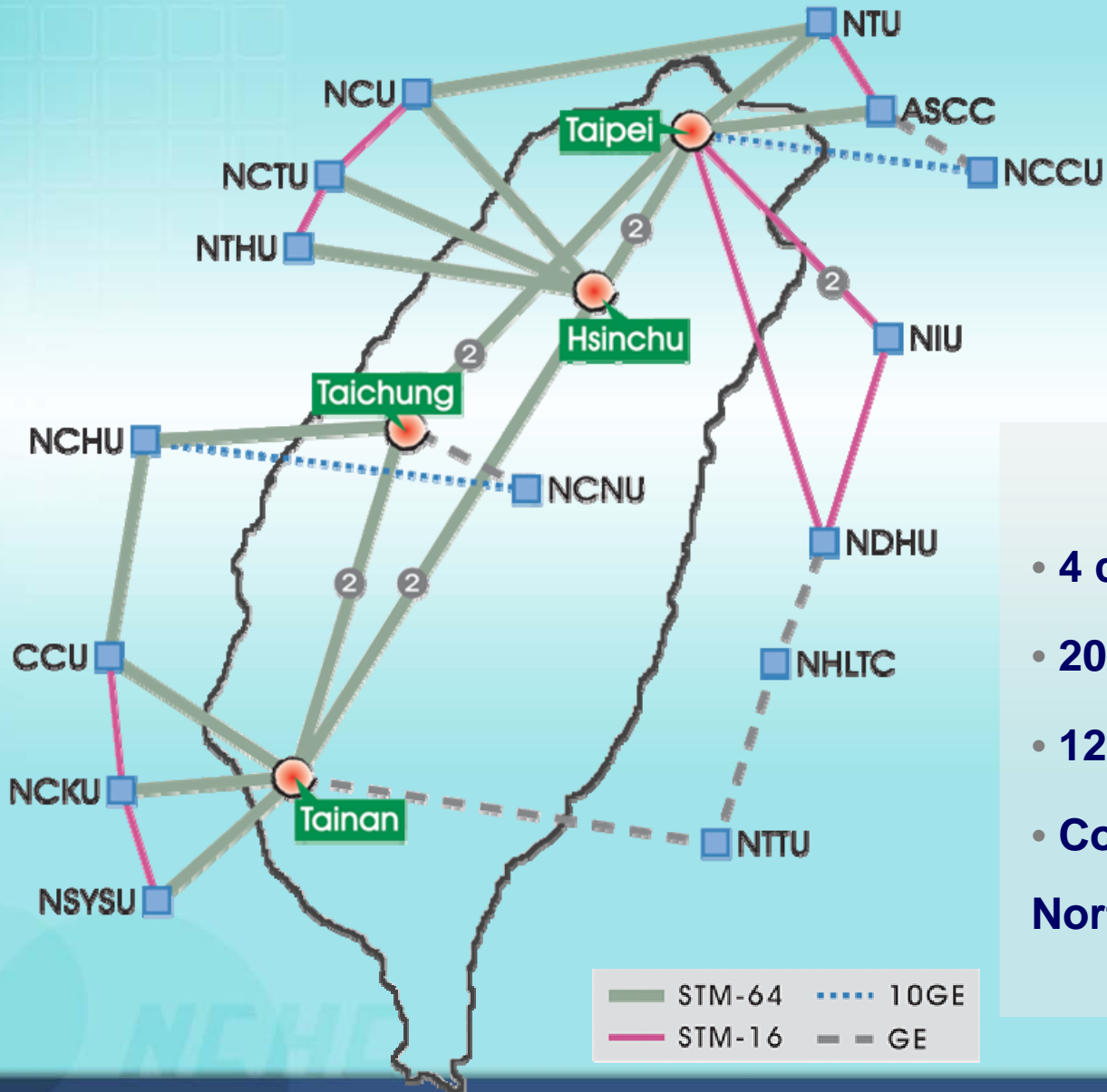


NCHC Research over Lightpaths

Te-Lung Liu, Shi-Wei Lo
NCHC

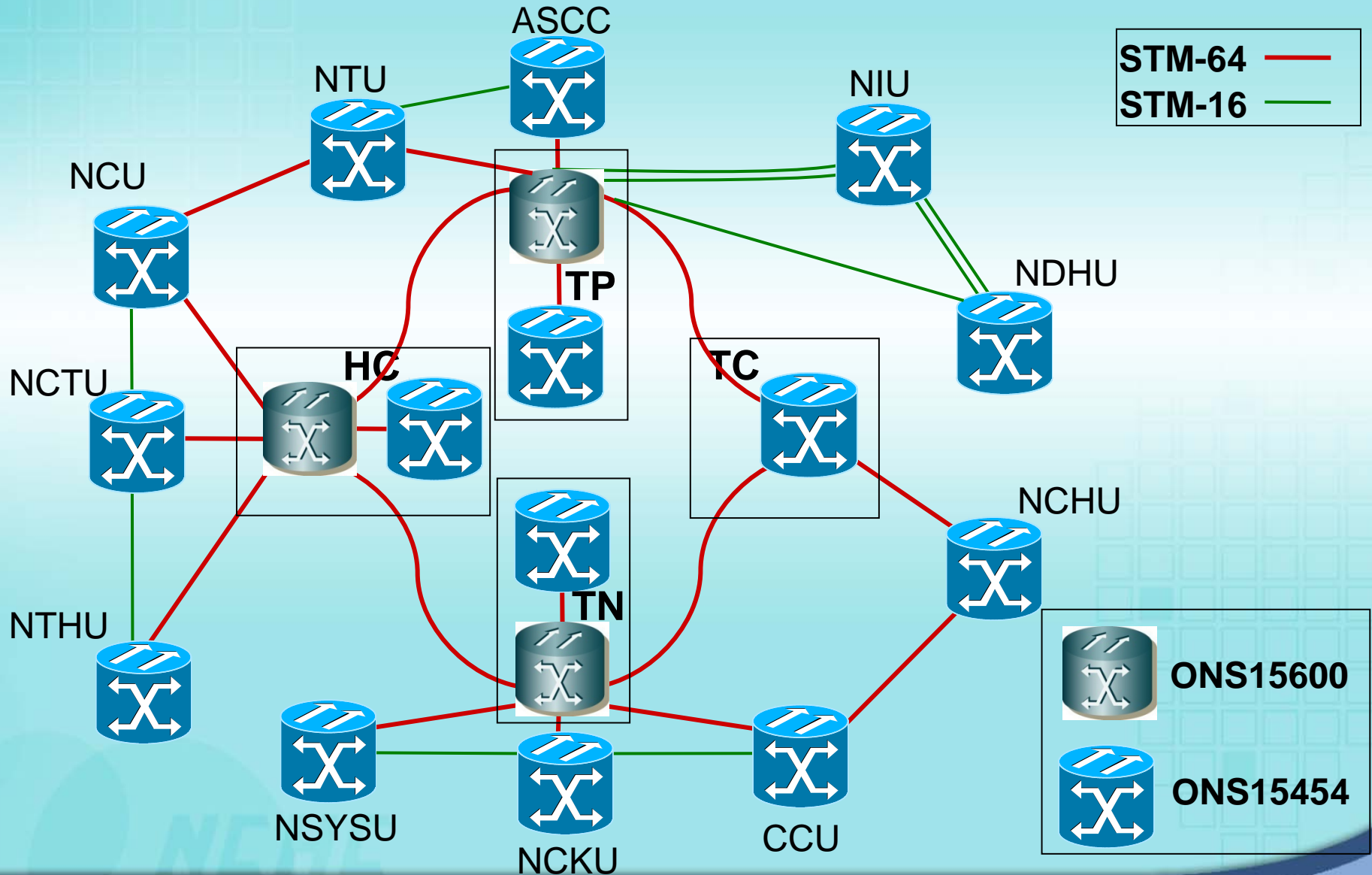


TWAREN Architecture

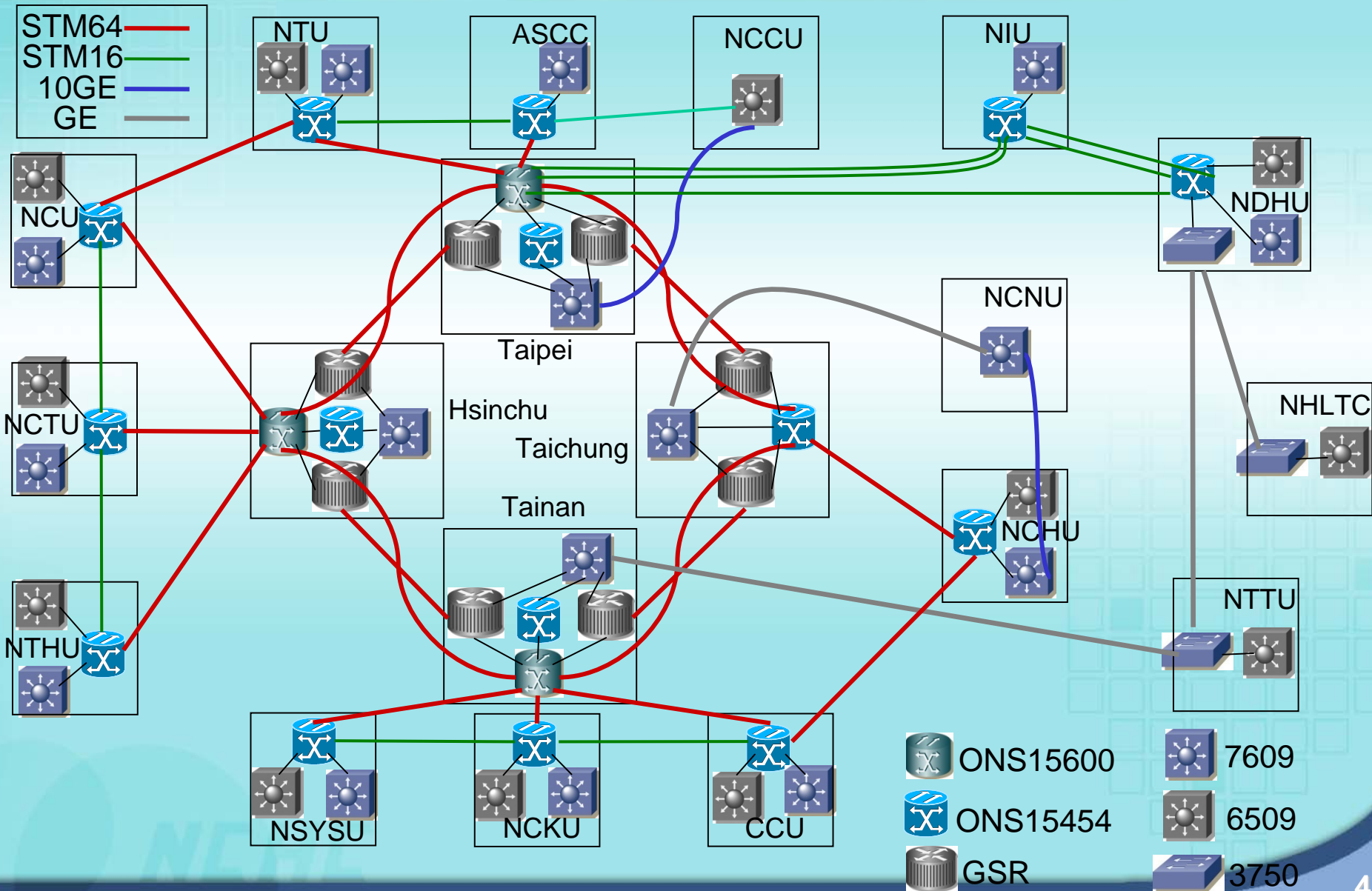


- 4 core nodes
- 20G backbone
- 12 GigaPops
- Connects HPC resources in North and South Taiwan

Optical Backbone



Interconnecting with L1/L2/L3 devices



TAIWANLight – Stretch TWAREN to GLIF community

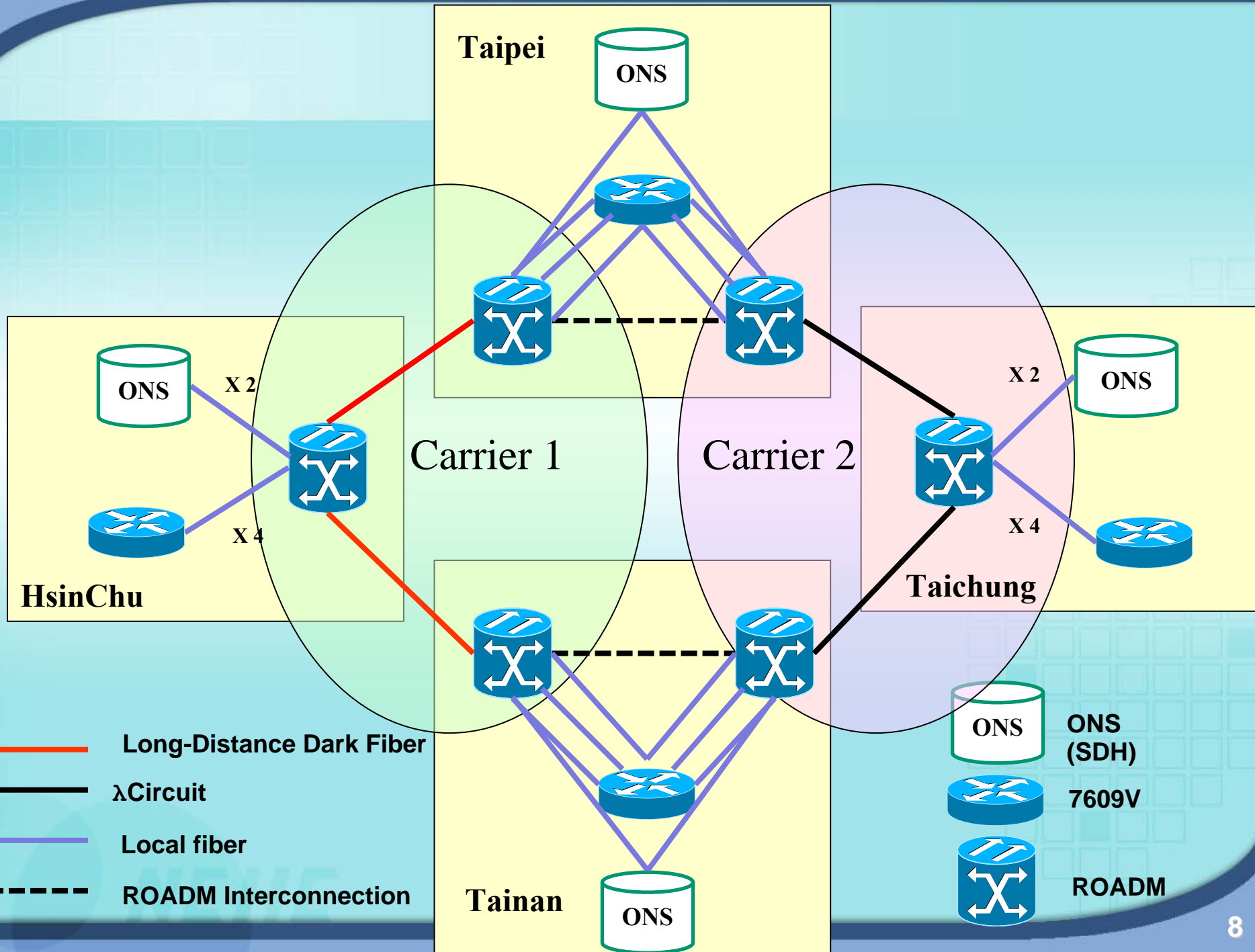
- Pacific Crossing to USA's west coast upgraded to 5 Gb/s
- Connections between LA, Palo Alto, Chicago, and New York are 2.5 Gb/s
- Connects to the rest of the world via the U.S.'s Abilene Network
- Connection expanded to Europe in 2006 (IEEAF donated 622 Mbps of bandwidth/fiber optic cable) ↗



DWDM/ROADM All-Optical Design for Next-Generation TWAREN

Design Concept

- Migrate four core nodes to ROADM in the first stage
 - ◆ scheduled in the mid 2010
- Circuits and ROADM devices in a single bid
 - ◆ Divided into two parts for two carriers
 - ◆ Challenges for ROADM interconnection

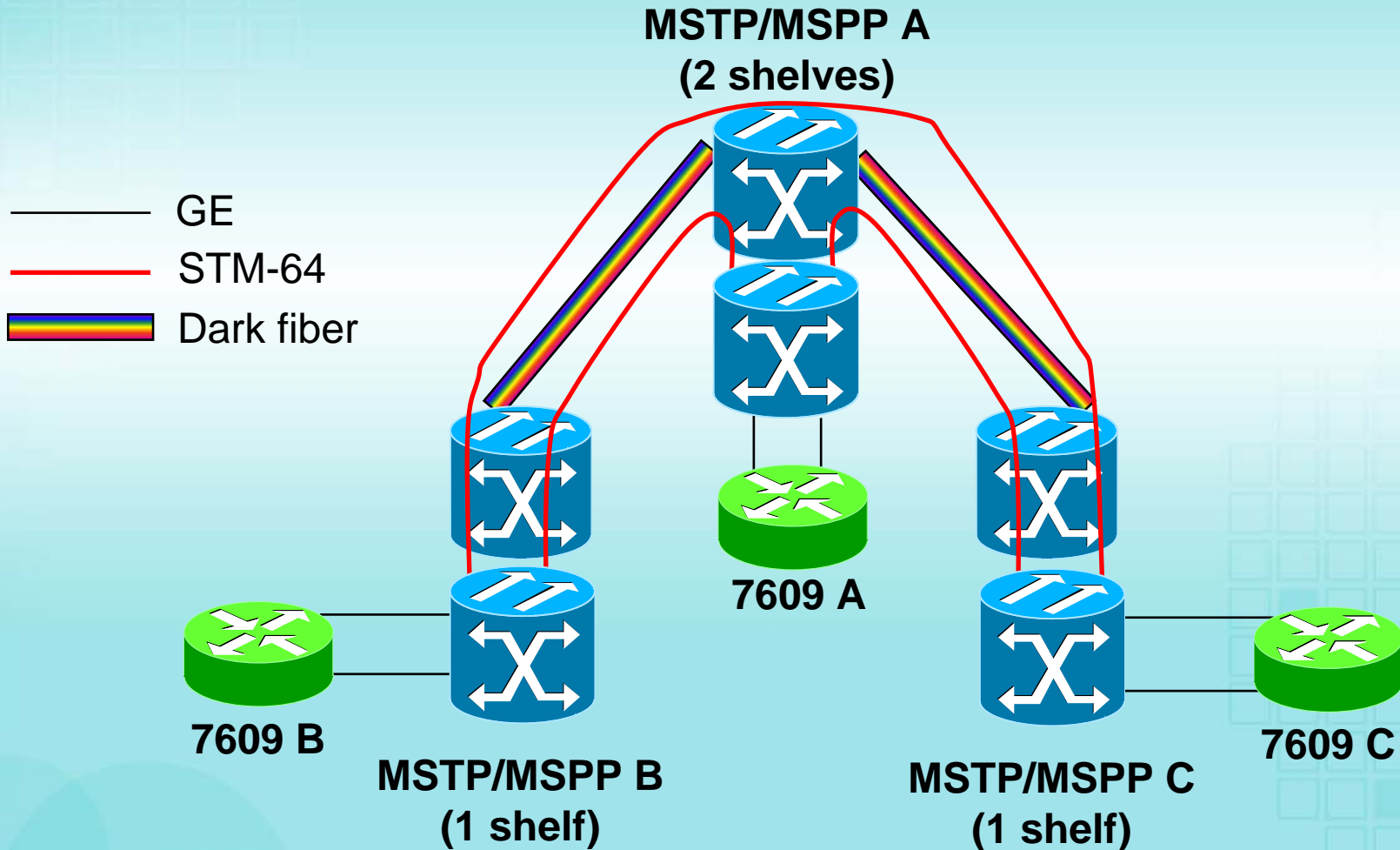


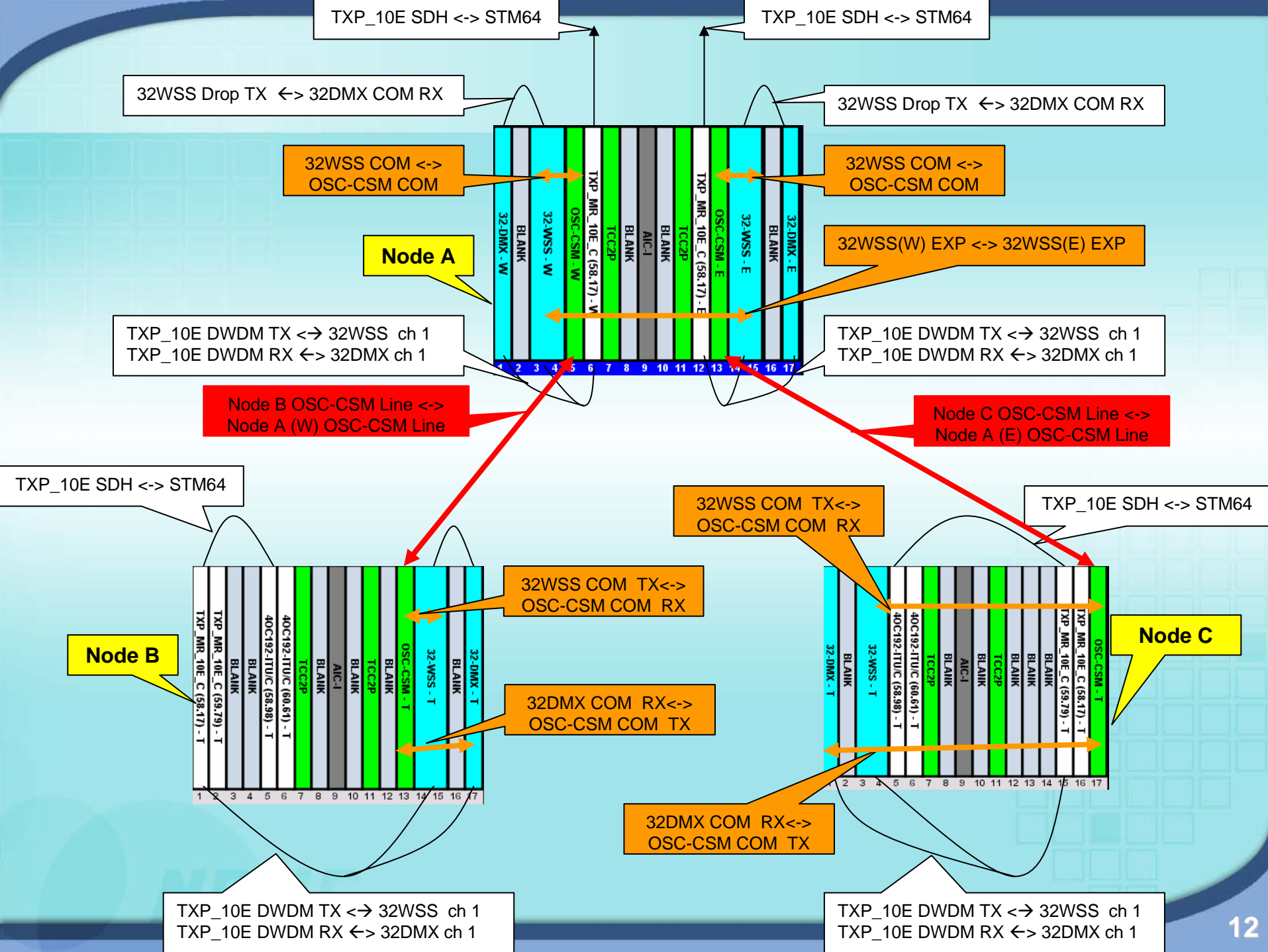
Alarm Correlation in Hybrid IP/Optical Network

TWAREN Optical Labs



Lab Network Topology





TXP_10E SDH <-> STM64

TXP_10E SDH <-> STM64

32WSS Drop TX <-> 32DMX COM RX

32WSS Drop TX <-> 32DMX COM RX

32WSS COM <-> OSC-CSM COM

32WSS COM <-> OSC-CSM COM

Node A

32WSS(W) EXP <-> 32WSS(E) EXP

TXP_10E DWDM TX <-> 32WSS ch 1
TXP_10E DWDM RX <-> 32DMX ch 1

TXP_10E DWDM TX <-> 32WSS ch 1
TXP_10E DWDM RX <-> 32DMX ch 1

Node B OSC-CSM Line <-> Node A (W) OSC-CSM Line

Node C OSC-CSM Line <-> Node A (E) OSC-CSM Line

TXP_10E SDH <-> STM64

32WSS COM TX <-> OSC-CSM COM RX

TXP_10E SDH <-> STM64

Node B

Node C

32WSS COM TX <-> OSC-CSM COM RX

32DMX COM RX <-> OSC-CSM COM TX

32DMX COM RX <-> OSC-CSM COM TX

TXP_10E DWDM TX <-> 32WSS ch 1
TXP_10E DWDM RX <-> 32DMX ch 1

TXP_10E DWDM TX <-> 32WSS ch 1
TXP_10E DWDM RX <-> 32DMX ch 1

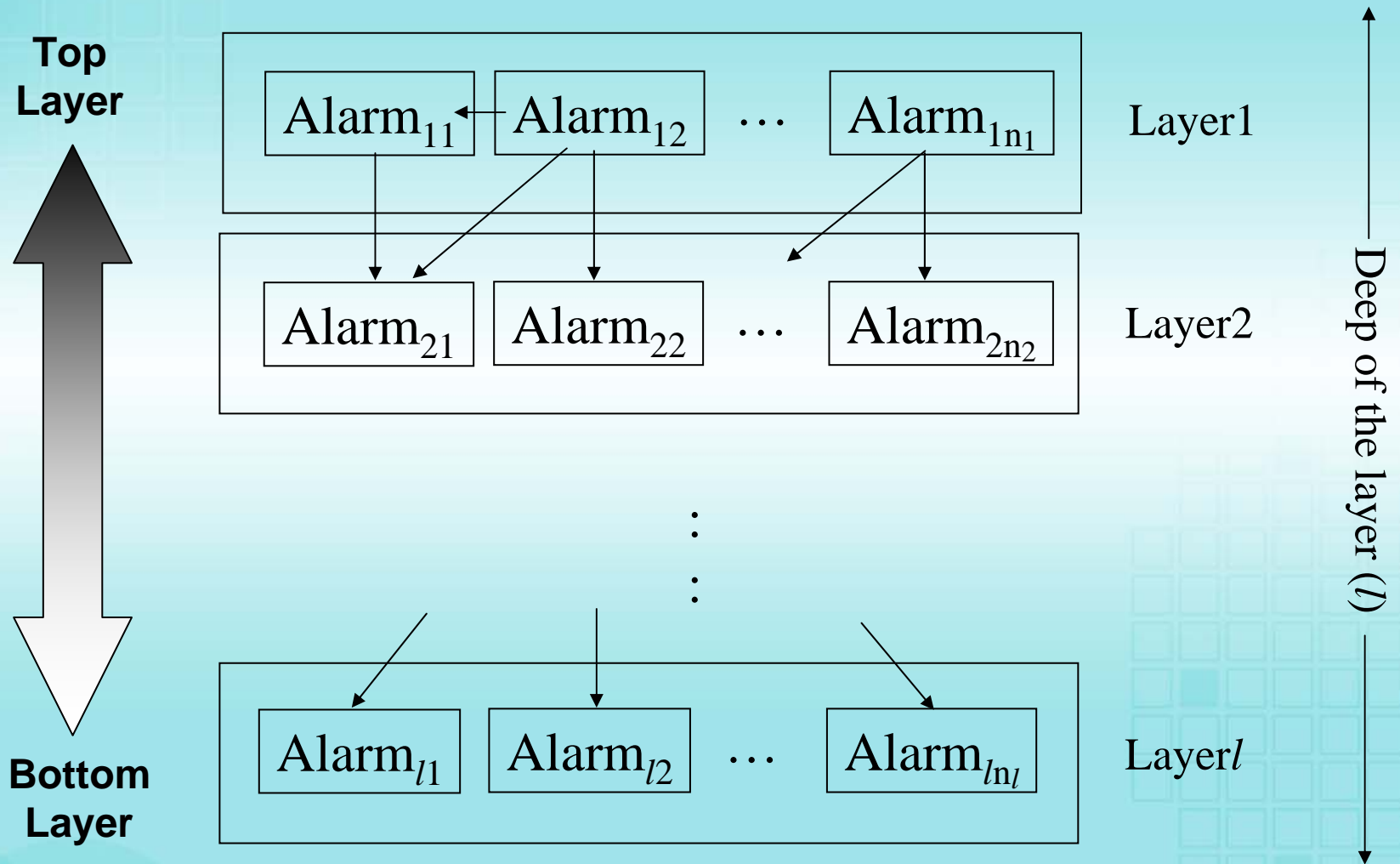
Hybrid IP/Optical Networks

- Hybrid networks contain Layer3 IP / Layer2 Switching networks with underlying optical infrastructure as its backbone.
- Optical infrastructure may consist of DWDM/ROADM wavelength-division technology and SONET/SDH time-division technology.

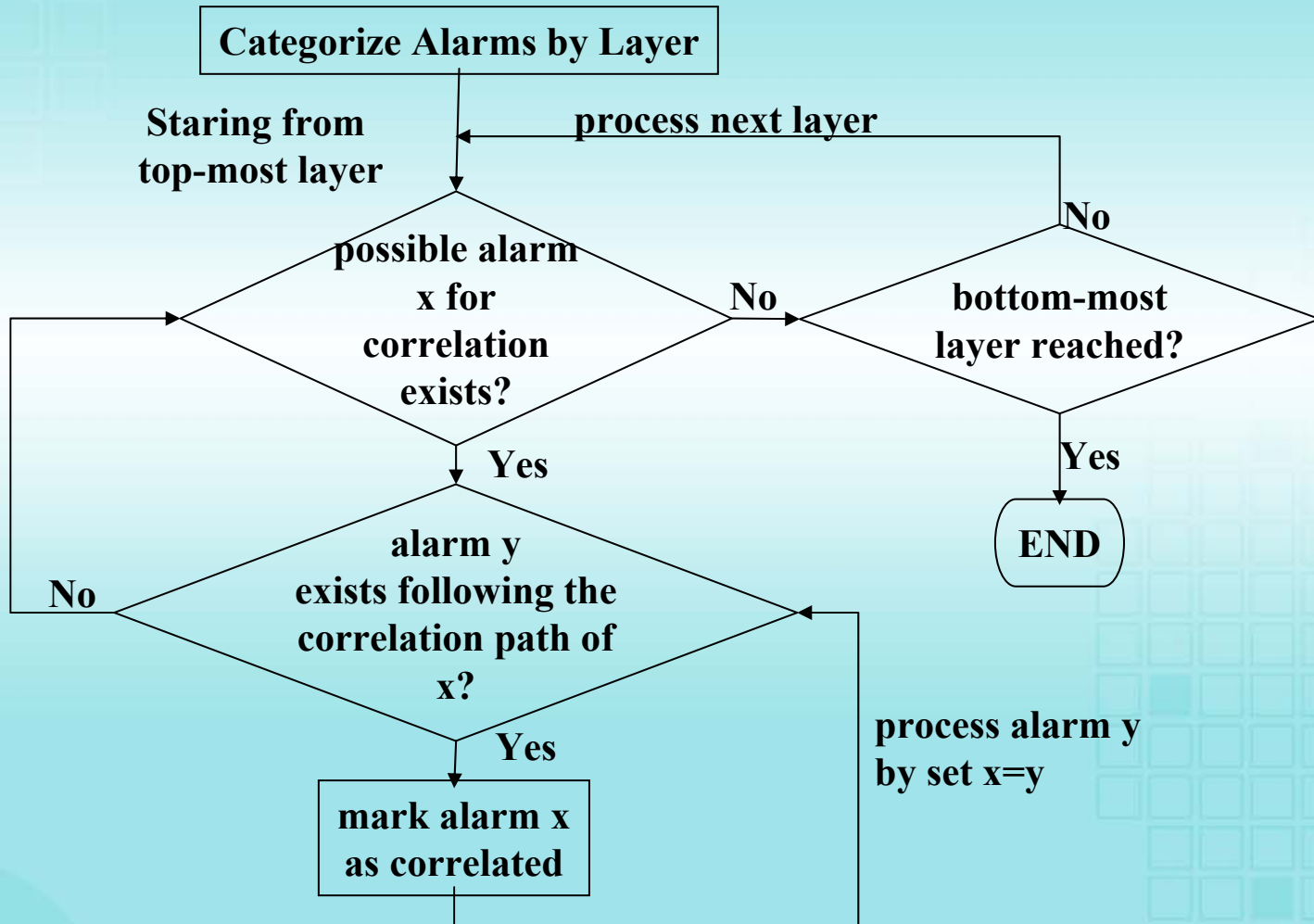
Alarm Management in Hybrid Networks

- If any disruption occurs in lower layer, it will cause upper layer alarms.
- Tens of alarms will show up in burst, which confuse network operators and engineers.
 - ◆ Fault location identification is possible with proper alarm analysis/correlation

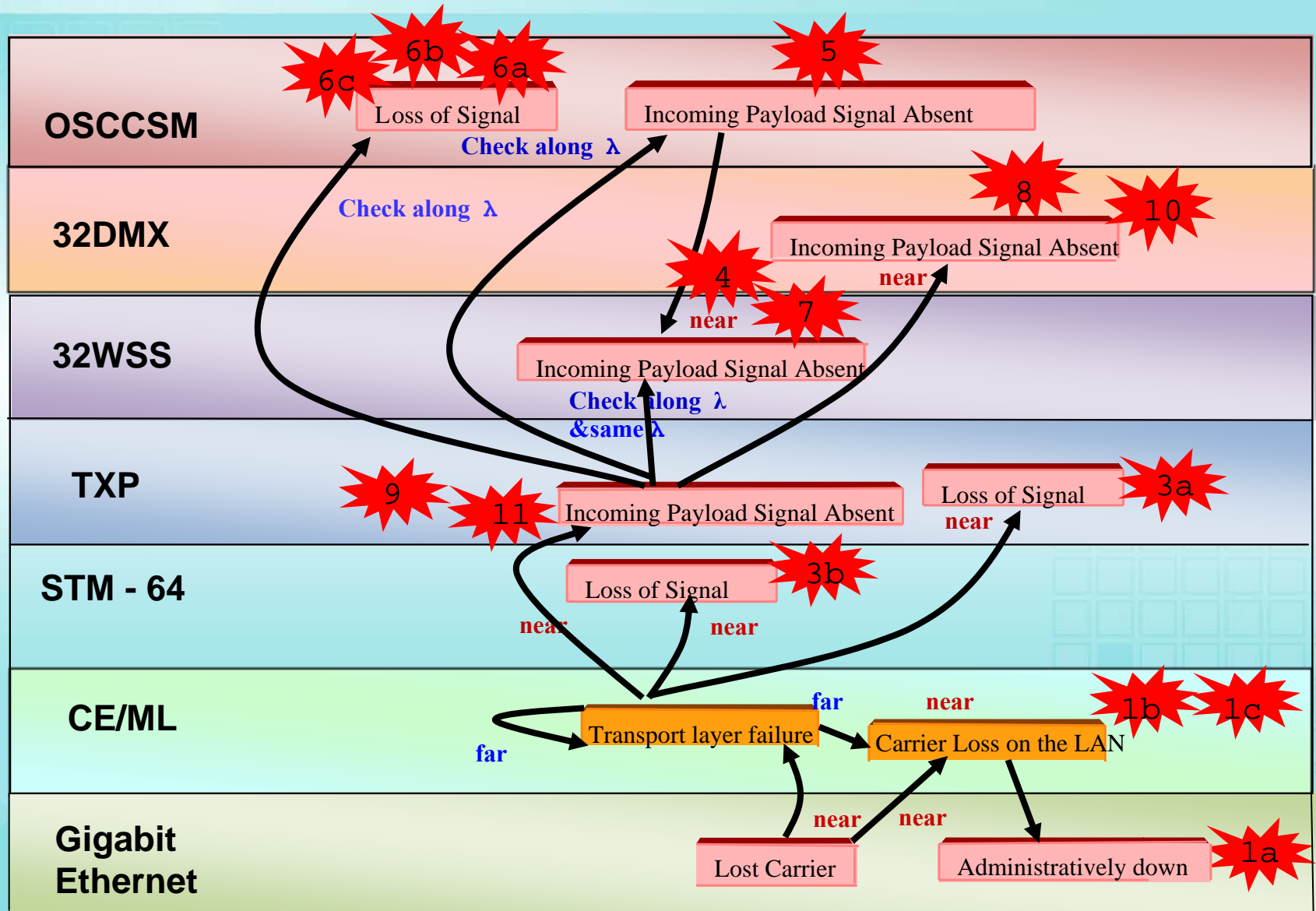
Correlation Diagram

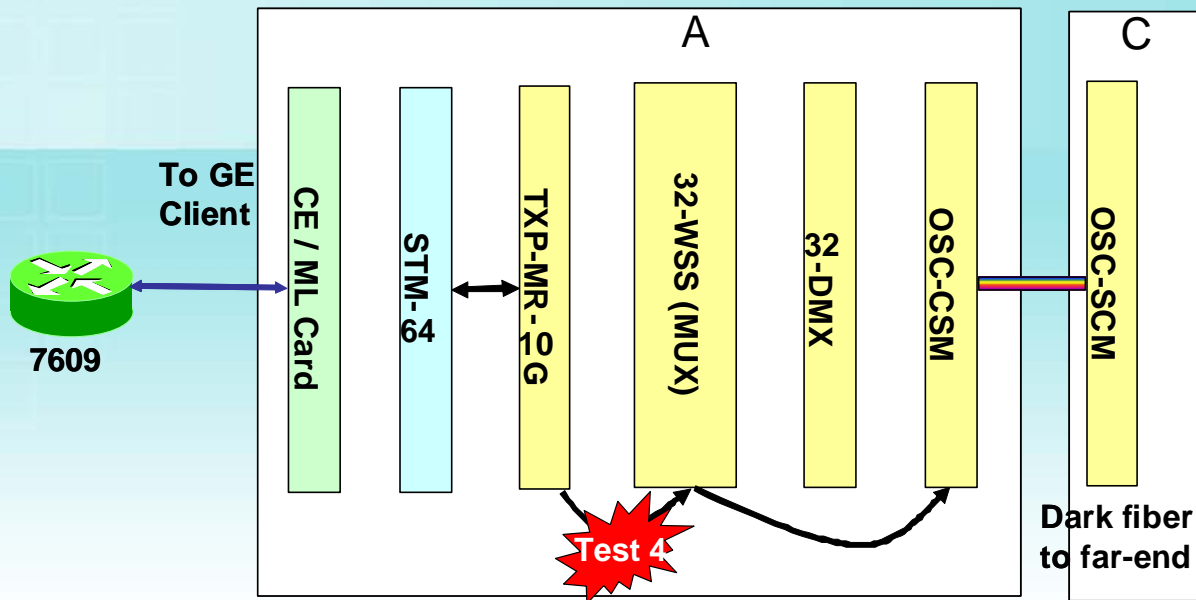


Alarm Correlation Algorithm



Alarm Correlation Diagram

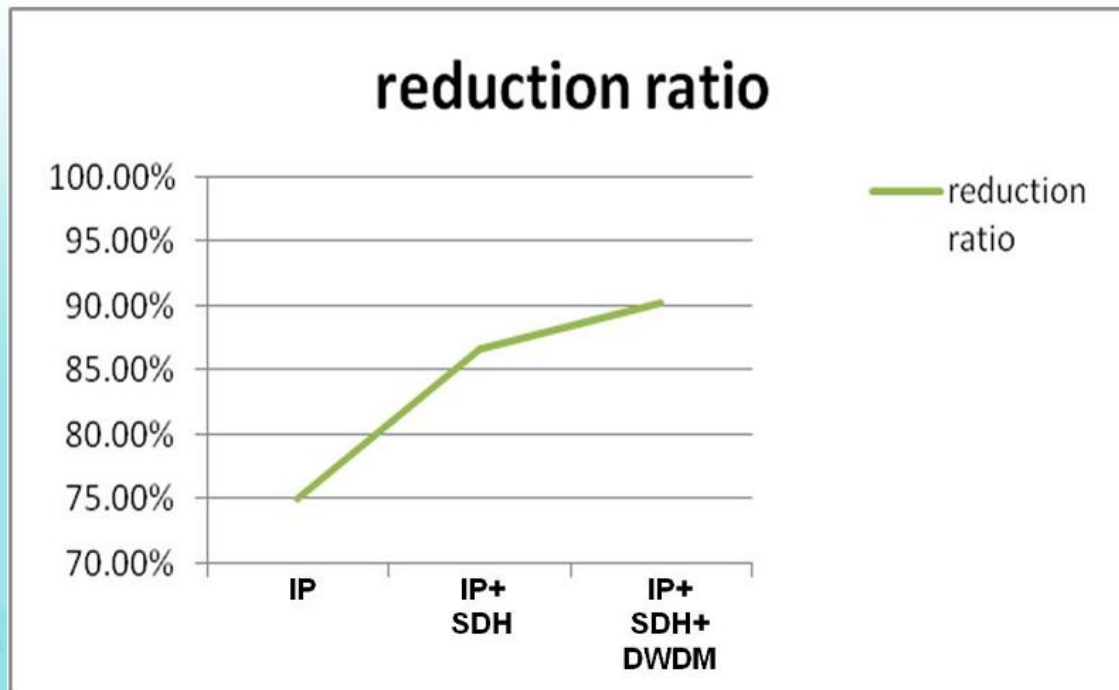




	Layer	Alarm Descriptions	Alarm source (near-end or far-end)	Affected card/module
Test 4	IP	Lost Carrier	Router A Router C	GigabitEthernet
	IP	Transport layer failure	Node A Node C	CE/ML
	Wavelength	Incoming Payload Signal Absent	Node C	TXP-MR-10G
	Wavelength	Incoming Payload Signal Absent	Node A	32-WSS
	Fiber	Incoming Payload Signal Absent	Node A	OSC-CSM

Results

- 75%, 87%, and 91% alarms are correlated in average when network disruption in IP Layer, SDH Layer, and DWDM layer respectively.



Implementation on perfSONAR

PerfsonarUI-v0.15

File Interfaces Circuits BWCTL Looking Glass FlowSA Link Status Links Playground Correlation Help

Interfaces Circuits BWCTL Looking Glass FlowSA Link Status Links Playground Correlation

perfSONAR

Query options

Service addresses
Options

Execute query

Ons Alarms
Snmp Alarms
Correlation
Clear

http://211.73.95.8:8080/01-mp/services/TLIService

Use	ONSdevice	IP	Port	Username	Password	Prompt
<input checked="" type="checkbox"/>	A2	211.79.63.108	3083	training	*****	>
<input checked="" type="checkbox"/>	A	211.79.63.109	3083	training	*****	>
<input checked="" type="checkbox"/>	B	211.79.63.113	3083	training	*****	>
<input checked="" type="checkbox"/>	C	211.79.63.117	3083	training	*****	>

http://211.73.95.8:8080/01-mp/services/SNMPLiteService

Use	Name	IP	port	ifIndex	version	community
<input checked="" type="checkbox"/>	7609A2	211.79.63.110	1613	2	2	public
<input checked="" type="checkbox"/>	7609A2	211.79.63.110	1614	2	2	public
<input checked="" type="checkbox"/>	7609A2	211.79.63.110	1615	2	2	public
<input checked="" type="checkbox"/>	7609B	211.79.63.114	1613	2	2	public
<input checked="" type="checkbox"/>	7609B	211.79.63.114	1614	2	2	public
<input checked="" type="checkbox"/>	7609C	211.79.63.118	1613	2	2	public
<input checked="" type="checkbox"/>	7609C	211.79.63.118	1614	2	2	public

http://211.73.95.8:8080/correlation-mp/services/CorrelationService

Alarms

Date	Node	Card	Slot	Port	Severity	Message	WaveLe...
08/15/08	A2	STM64	12	1-1	CR	Loss Of Si...	1550
08/15/08	A2				MN	Secondary...	x
08/15/08	A2	STM64	12	1-1	MN	Regenerat...	1550
08/15/08	A2	CE/ML	14	1	MJ	Transport...	x
08/15/08	A2	STM64	6	1-1	MN	Regenerat...	1550
08/15/08	C	CE/ML	13	1	MJ	Transport...	x

Open Test Case

Results

Date	Node	Card	Slot	Port	Severity	Message	WaveLe...
08/15/08	A2	STM64	12	1-1	CR	Loss Of Si...	1550

Completed. [請按這裡開始操作](#)

```

graph TD
    A2[A2] --- DWDM-2 --- A[A]
    A2 --- DWDM-1 --- B[B]
    A2 --- SDH-2 --- C[C]
    A2 --- SDH-1 --- B
    C --- SDH-2 --- B
    A --- 7609A2[7609A2]
    B --- 7609B[7609B]
    C --- 7609C[7609C]
  
```

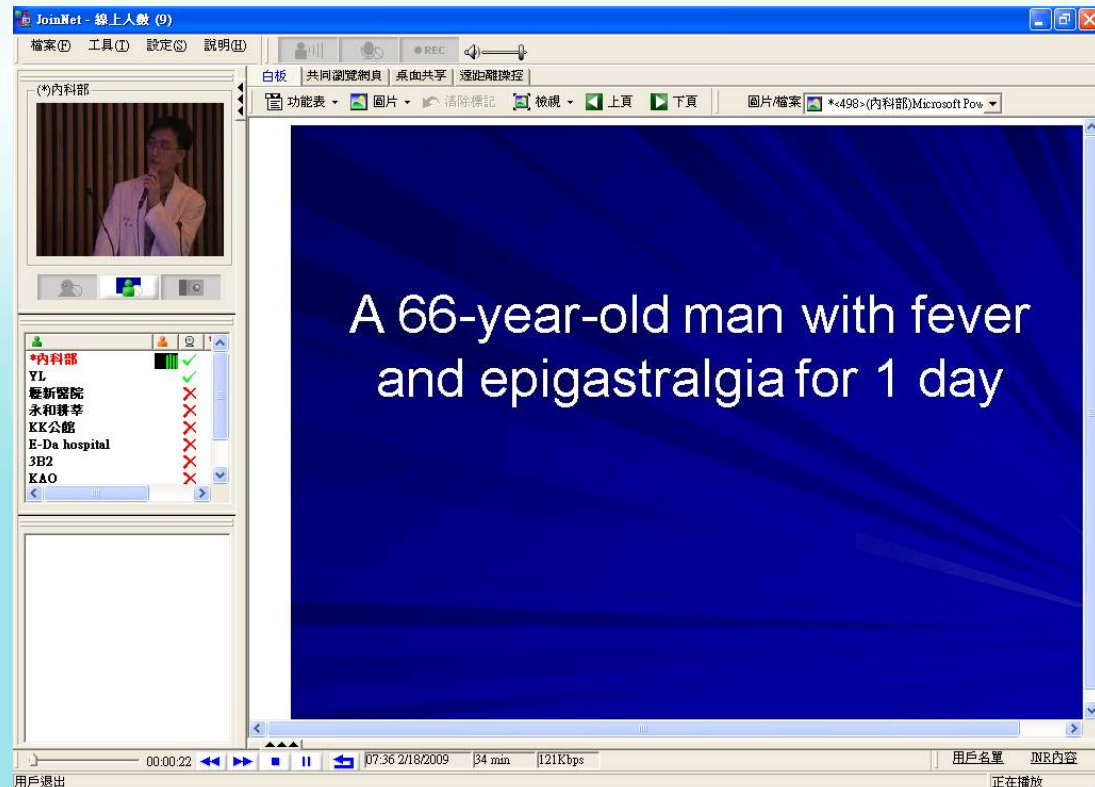
Domestic/International Medical Collaborations

Medical Video Trainings in Taiwan

■ Cross hospital medical case discussions and video trainings are periodically held by using video conference platforms.

■ Colife (developed by NCHC)

■ JoinNet

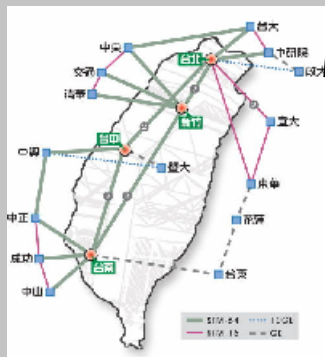


Medical Video Trainings

- The video trainings and case discussions effectively helped the doctors in Taiwan to:
 - Share their expertise on difficult medical cases,
 - Quickly adopt the knowledge of analysis and therapy to emergent diseases like H1N1, and
 - Learn new methods of surgery and treatments visually and interactively.
- Usually over 50 hospitals and hundreds of doctors and nurses participated and benefited.

TWAREN-CESNET connection

- A direct lightpath that connects TW and CZ is provisioned through Pacific and Atlantic oceans in 2008/2.
 - Joint work among TWAREN, CA*net, MANLAN, NetherLight and CESNET
- **IPv6** and **Multicast** are enabled and several video streams are exchanged between TWAREN and CESNET.
- Further collaborations on **live medical streaming** and **HPC computing** are going on.



TWAREN

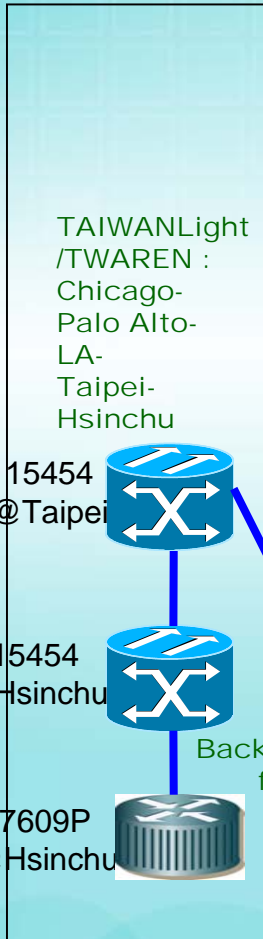
TW-CZ Lightpath
Single hop
RTT 310ms
Bandwidth 576Mbps



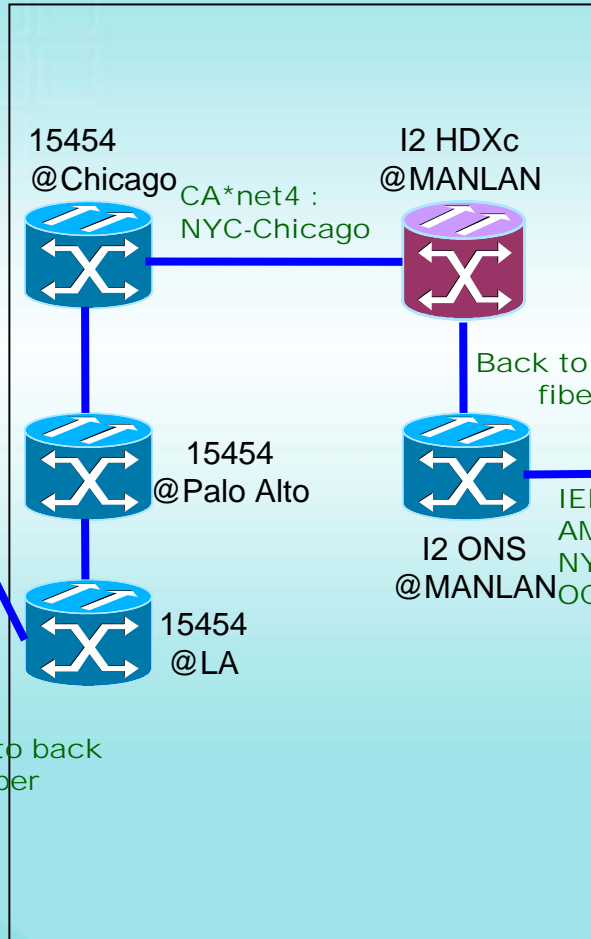
CESNET

TWAREN-CESNET Optical Topology

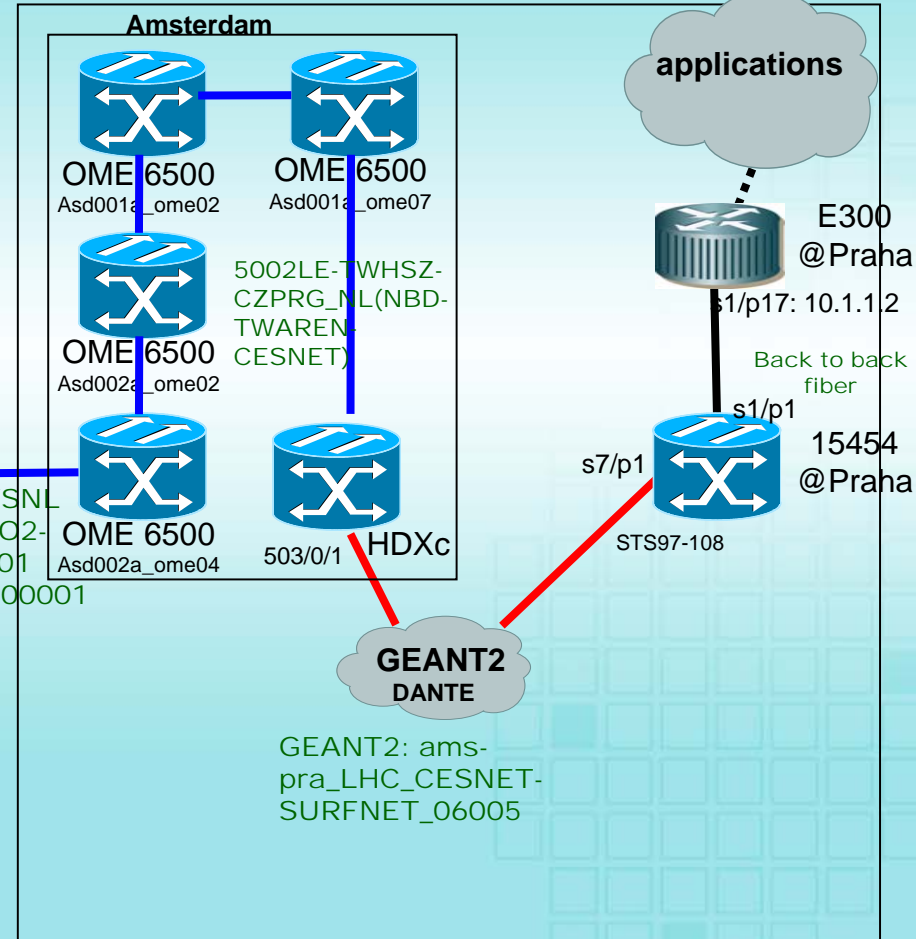
Taiwan



U.S.A



Europe

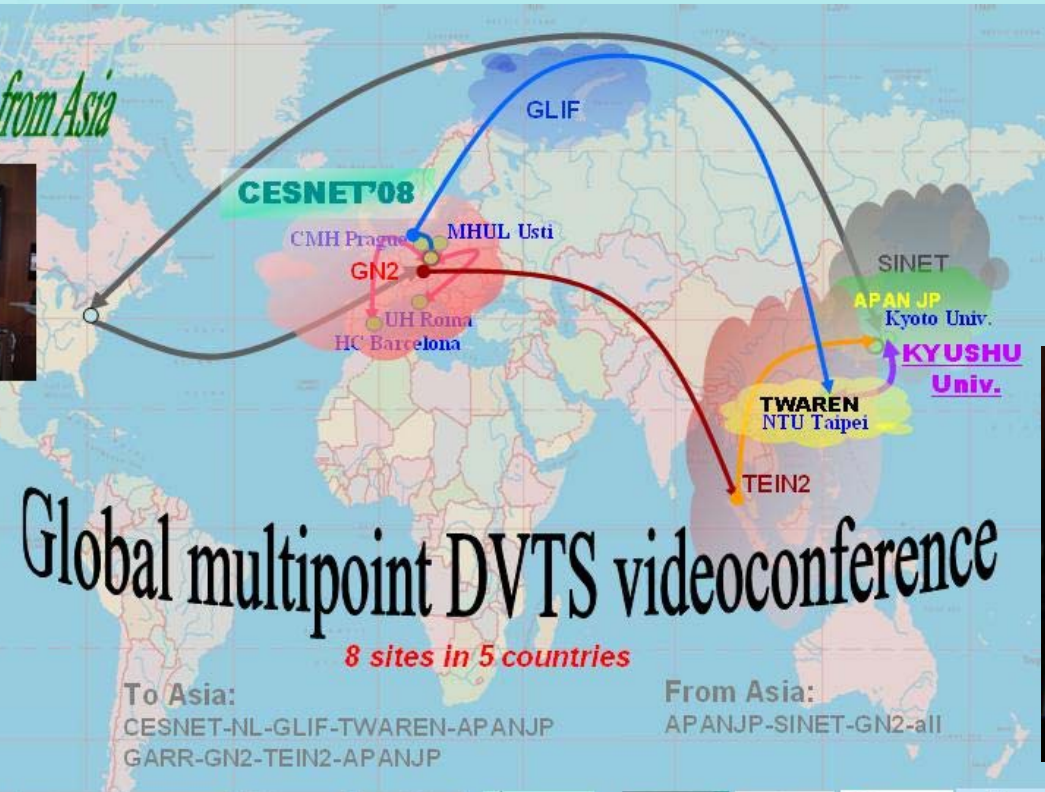
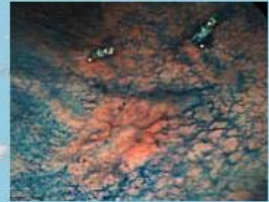


- 622M/s
- 1 GE
- OC-192c

Live Medical Streaming Demo

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

Live endoscopy lesson from Asia



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





Kyoto, JP



CMCH, CZ



CMH, CZ



Rome, IT



BCN, ES



2008.9



KUH, JP



NTU, TW



CTU, CZ

CESNET 08 conference
Prague, 25-26 September 2008

security
middleware
virtualization

Topics: The year conference focuses on issues for our networked life: desktop security, but also the less obvious building blocks of general distributed security, middleware, and virtualization.

Keynote speakers: Steve Caspehl (CERN, Italy), Jeff Dugan (Hewlett, Inc, USA), Viktor Moutafis (CNRS, France)

Registration fees and deadlines: 100 Euro early registration, until 15 July; 200 Euro late registration, until 25 September; 300 Euro onsite registration.

<http://www.ces.net/conference08/>

Venue: Faculty of Electrical Engineering, Czech Technical University of Prague, Technická 1, Prague, Czech Republic.

3D Interactive Medical Imaging

- Collaborated with CESNET and Brno University of Technology, we have been facilitating the 3D medical imaging of Computerized Tomography (CT) collaboration between National Taiwan University Hospital and doctors in Brno.
- A fully interactive way for remotely separated doctors to analyze and discuss the same subject.
- Enables the possibility of medical collaboration all over the world.


3D Interactive Medical Imaging

Virtual Collaborative Environment-VUT-FIT-UPGM - Mozilla Firefox

檔案 (F) 編輯 (E) 檢視 (V) 歷史 (S) 書籤 (B) 工具 (T) 說明 (H)


vutbr.cz https://zdislava.fit.vutbr.cz/vce-free/session/list

Yahoo! 奇摩字典



Virtual Collaborative Environment

UPGM-PGMED | FIT VUT Brno | CESNET



Information

- About
- Articles
- Download
- Documentation
- Video
- Developers

VCE session

- Session management
- VCE test session
- Create test session

Opened sessions

ID	Name	Description	
1507	NCHC Test		<i>demo</i>

[Force renew session list](#)

© PGMED team, VCE 2009

完成

3D Interactive Medical Imaging

YCE Client File Session Help

Slice Position

Slice: 62

Slice: 384

Slice: 384

Density Window

Center: 1047

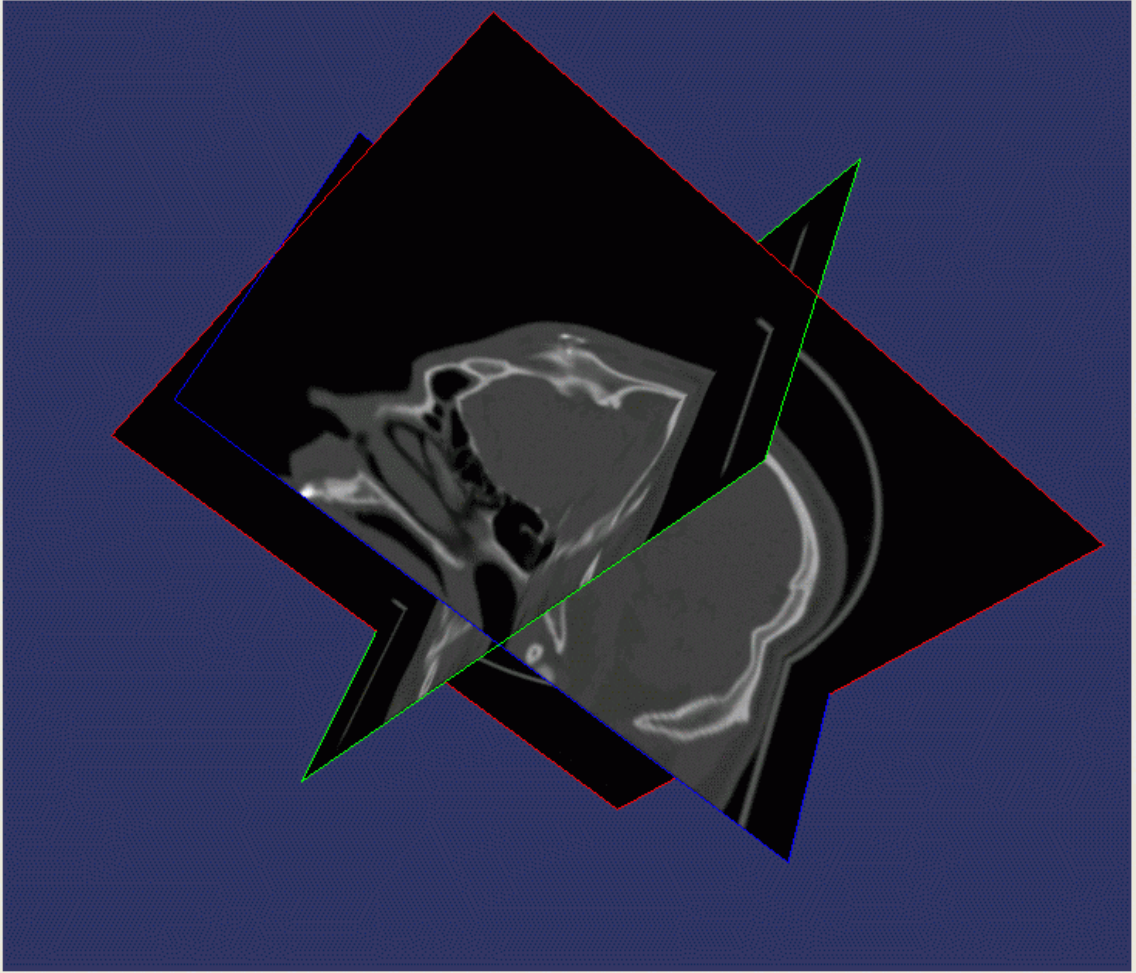
Width: 4095

Token

Request GiveUp

Models

Name	Color	Visible	File
Model 1	Red	<input checked="" type="checkbox"/>	Load...
Model 2	Green	<input checked="" type="checkbox"/>	Load...
Model 3	Blue	<input checked="" type="checkbox"/>	Load...
Model 4	Yellow	<input checked="" type="checkbox"/>	Load...
Model 5	Magenta	<input checked="" type="checkbox"/>	Load...
Model 6	Cyan	<input checked="" type="checkbox"/>	Load...
Model 7	White	<input checked="" type="checkbox"/>	Load...
Model 8	Olive	<input checked="" type="checkbox"/>	Load...
Model 9	Purple	<input checked="" type="checkbox"/>	Load...



VCE Session ID: 1507 Network: OK Token status: You Have



Thank You
Questions?

www.nchc.org.tw