Subproject 2:

Next-Generation Optical Internet and QoS Technologies

Third Meeting

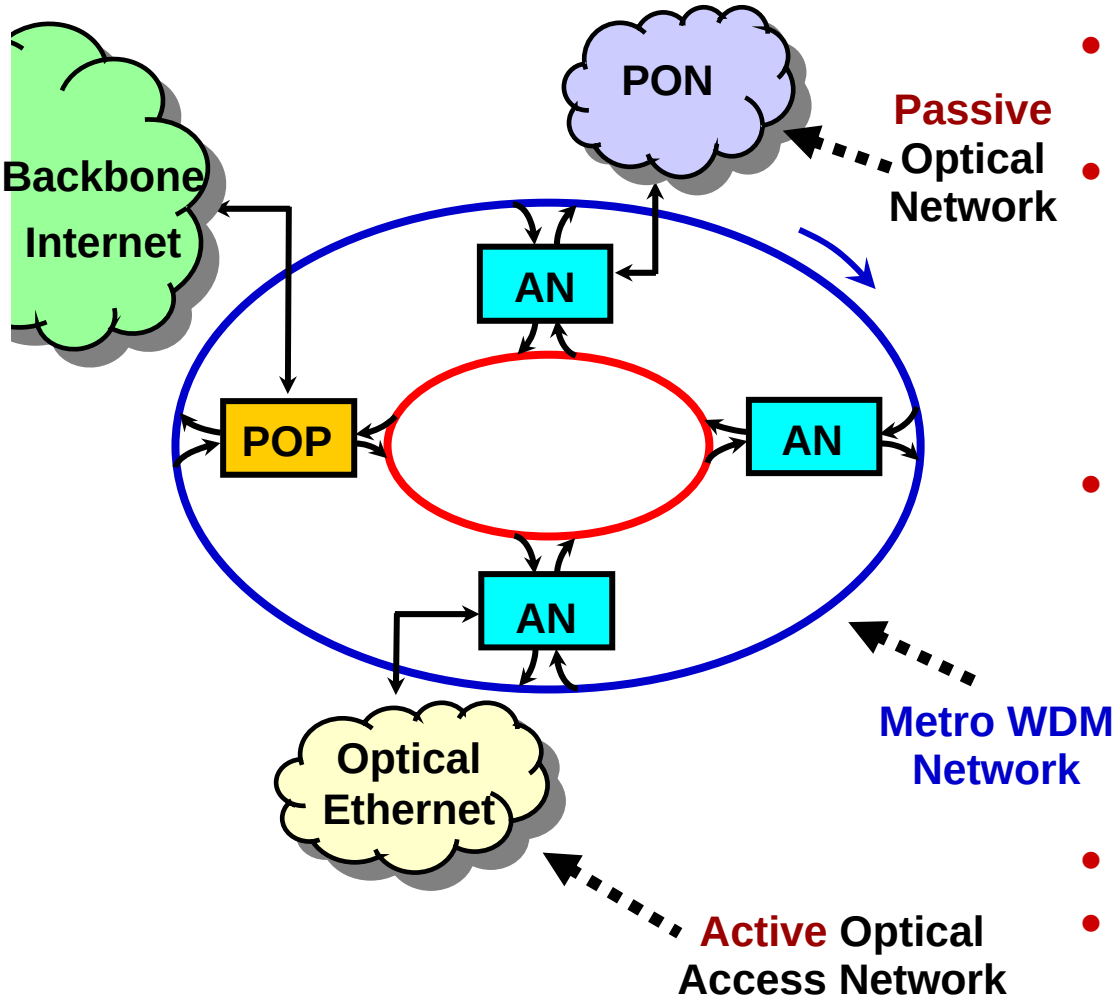
National Chiao Tung University

January 27, 2005

Outline

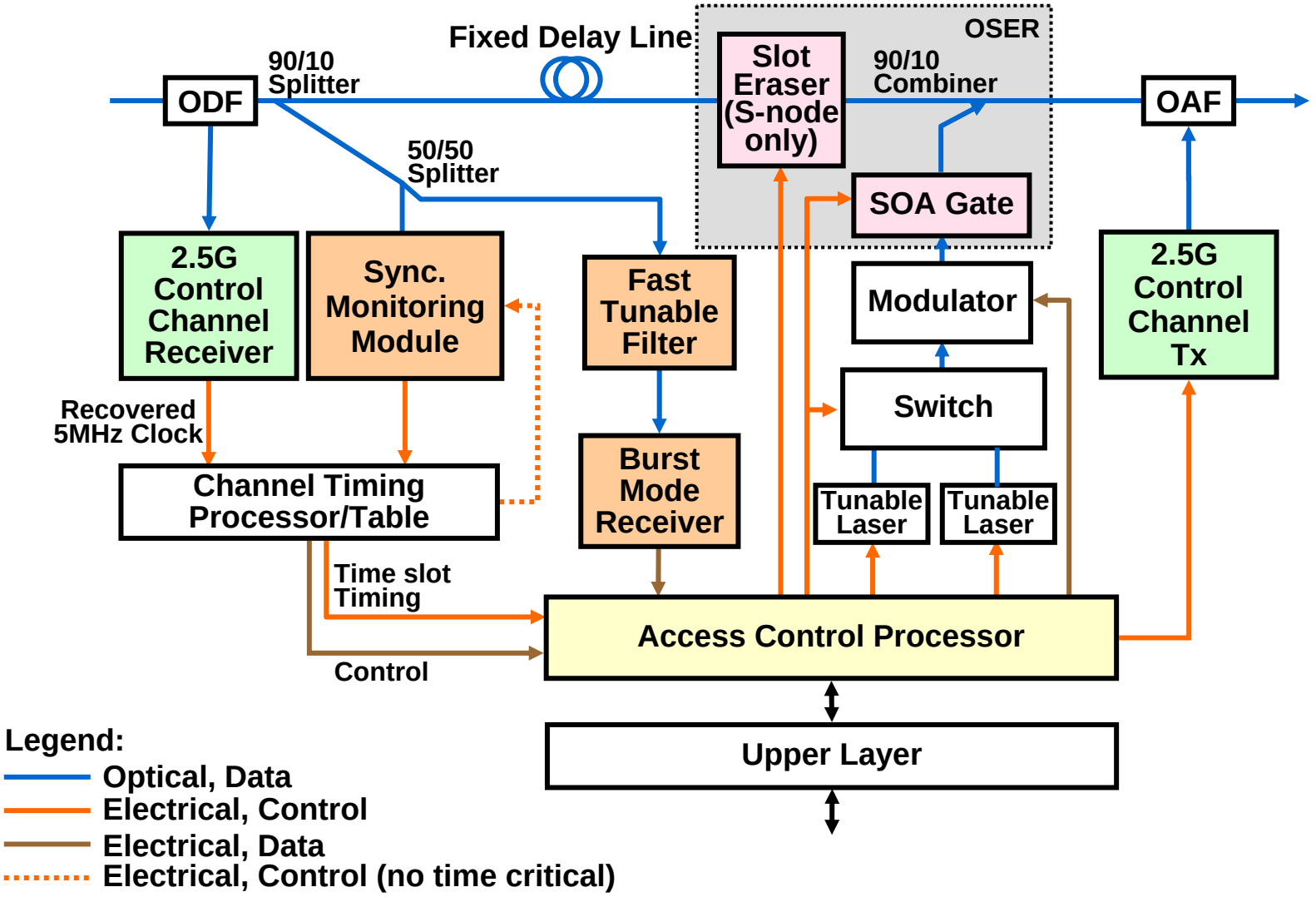
- **High-performance Optical Packet-Switched Metro Network (HOPSMAN): Technologies and Experimentation**
- **QoS Technology**
- 計畫整體性成果

HOPSMAN- Major Tasks

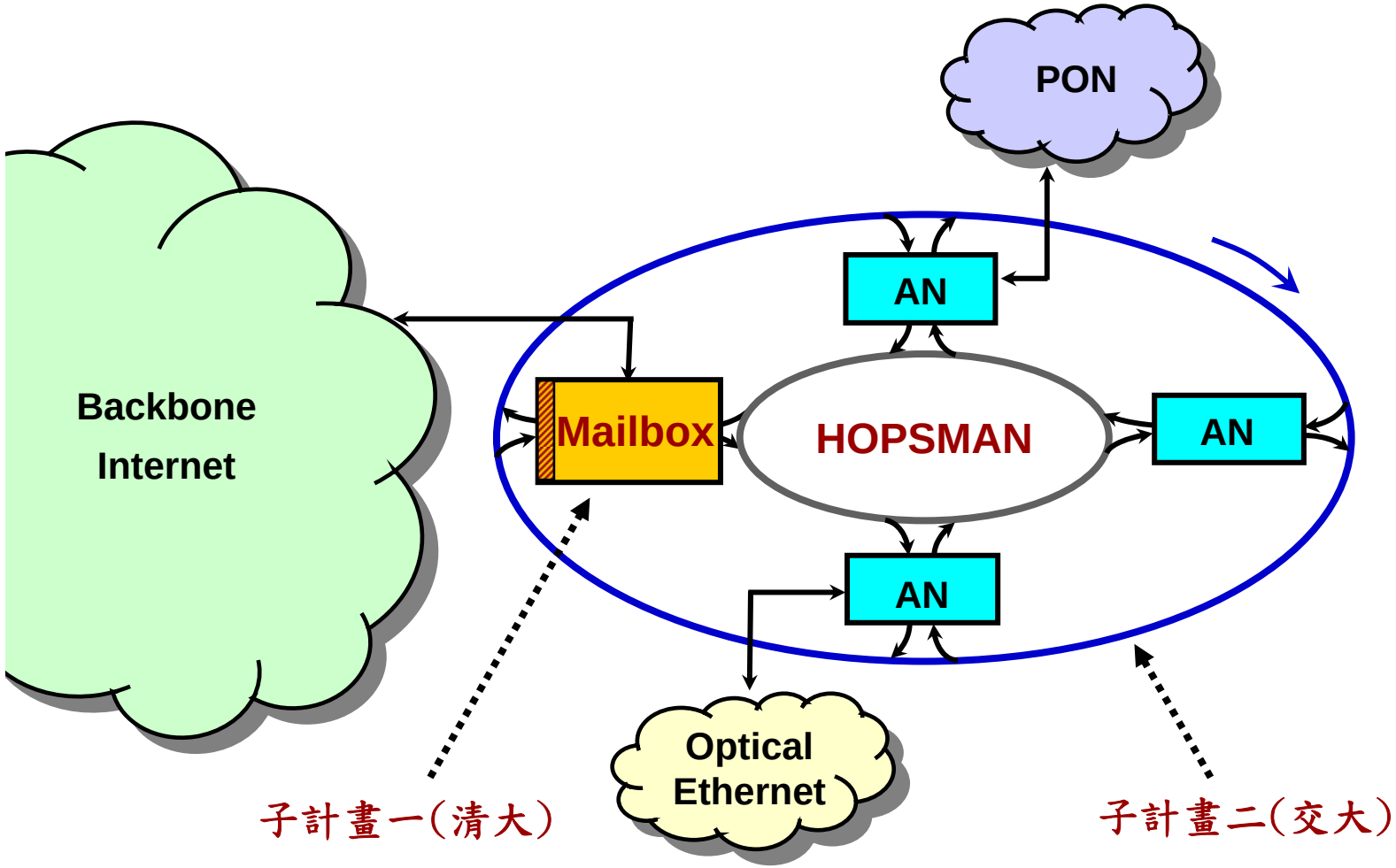


- Design of optical metro network architecture
- Design of AN architecture and control
  - MAC scheme with QoS
  - Access node architecture
  - Optical subsystems
- Design of optical access network architecture and control
  - MAC scheme with triple play support
  - Optical subsystems
- Traffic engineering/grooming
- ***Design and construction of an Optical metro/access network including all above***

Metro WDM Network- Optical Node Architecture



Project Integration



Evolution of Wall

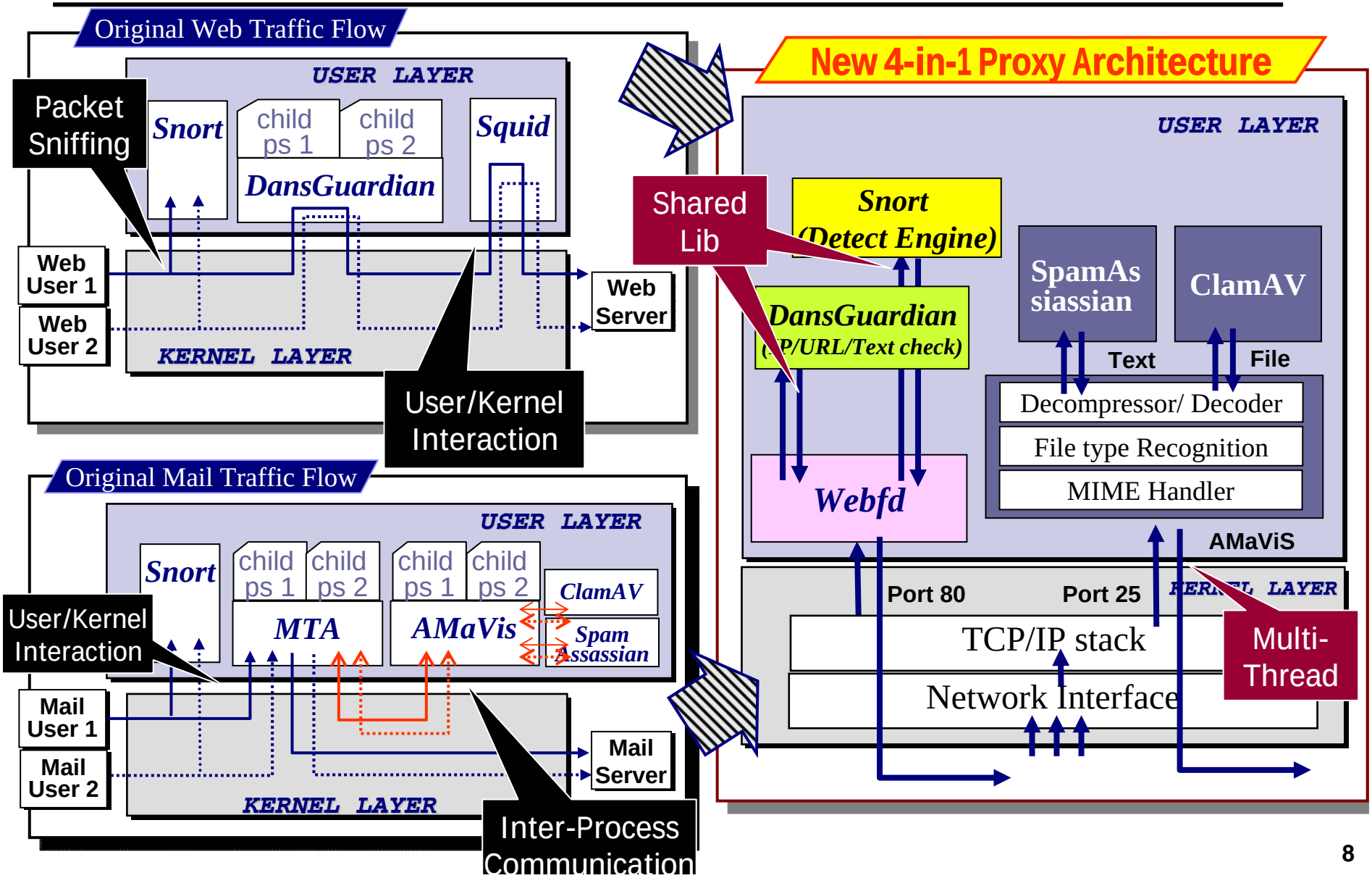
From Packet Networking to Content Networking

- **7-in-1 (NetBSD)**
  - Handling the problems in *TCP/IP layer*
  - NAT, Firewall, VPN, Router, BW mgnt., IDS, URL filter
- **10-in-1 (NetBSD)**
  - *Content-aware*
  - Anti-Virus, Anti-Spam, CF/Keyword
  - Reducing System Overheads: New Arch./Alg.
- **N-in-1 (Linux)**
  - *Easy* to add new modules
  - UPnP, APP Firewall, SSL-VPN, Wireless AP

Research Tasks

- **System Performance**
  - Architecture:
    - ***4-in-1 proxy arch.:*** **Spam+ Virus+ IDS+ CF (Throughput** X 2)
    - ***Stream-based mail proxy for anti-virus***
    - ***Content security processing on network processors and ASIC***
  - ***Algorithm:***
    - ***Fast accurate Web filtering with early decision and keyword matching***
    - ***Adaptive generic signature matching engine***
- **Request Scheduling for Differentiated QoS**
  - ***Website gateway:*** **Multi-Resources Req Scheduling**
  - ***Access gateway:*** **Requestized-GPS**

4-in-1 Proxy Architecture



整體性成果:產學合作與成果推廣

- 與工研院(CCL-NCTU 聯研中心)合作建構HOPSMAN光纖都會實驗網路
- 與清大子計畫一進行光網路與高速電交換(Mailbox)整合
- 美國國家工程學院院士 厲鼎毅 博士(WDM創始人)參觀並展示研究成果 (2004/7/9-12)
- UC Berkeley Prof. Connie J. Chang參觀並展示研究成果 (2004/7/20)
- UC Davis Prof. Biswanath Mukherjee參觀並展示研究成果 (2004/10/10-13)
- 工研院交大網路測試中心：通訊產業推動計畫中Security, WLAN, Switch, Router, VoIP產品測試

整體性成果:國際交流及學術合作(1)

- 與美國大學University of Maryland-Prof. Ray Chen進行合作
- 與Lucent公司洽談合作開發Burst-Mode Receiver關鍵技術
- 訪問University of California Davis Prof. Biswanath Mukherjee (2004/9/10)
- 訪問ANDevices光纖元件公司，討論合作開發目前計畫進行之光纖都會實驗網路所需光纖元件及系統控制模組(2004/9/13-17)
- 訪問Stanford University Prof. Leonid Kazovsky並參觀光通訊網路實驗室(2004/9/20-21)
- 邀請UC Davis Prof. Biswanath Mukherjee於交大作專題演講（題目：Optical Access Networks / Resilient Mesh Networks / Traffic Grooming in Mesh Optical Networks) (2004/10/11-13)
- 楊啟瑞教授應APOC'04國際會議邀請專題演講(題目：全光網路IP-over-WDM) (2004/11/7)

整體性成果:國際交流及學術合作(2)

- 林盈達教授應資策會邀請專題演講 (題目：台灣往通產業總體檢-產品技術面) (2004/7/21)
- 林盈達教授應Fortinet公司邀請專題演講(題目: Trends in Network Security Product Development) (2004/8/12)
- 林盈達教授應IFPI倫敦總部邀請專題演講(題目: P2P Application Behaviors) (2004/9/2)
- (Industry-oriented)拜訪美國十個單位
  - 三個實驗室(UNH/IOL, ICSA, Veritest) ：國外測試實驗室定位
  - 三個測試設備廠商(Azimuth, IXIA, Spirent)：對測試的重視程度
  - 四個網路設備廠商(Fortinet, Cisco, Juniper, Alcatel)：市場領導廠商產品線發展
- (Academia-oriented)拜訪美國五位知名教授
  - ICIR的Sally Floyd : TCP-Friendly Algorithms, the future of the Internet
  - Caltech CSEE, Steven H. Low : Limit and application of Fast TCP
  - UCLA CS, Mario Gerla : Request Scheduling Algorithm
  - Berkeley EE, Kurt Keutzer : Architecture design for network processors
  - UCLA CS, Peter Reiher : Implementation over network processors

整體性成果: 系統整合成就

- **OPSINET-II**：建構國際第一個整合光電硬體以及GMPLS控制之全光IP-over-WDM核心網路平台雛形系統 (phase-II, 10Gbps)
- **HOPSMAN**：建構能提供triple-play之光纖都會型實驗網路
- **HOPSMAN + Mailbox**: 整合光網路與高速電交換(Mailbox)
- **Content-aware Security and QoS Gateway**：以掃瞄content來達到安全過濾目的十機一體閘道器(林盈達教授)

整體性成果:量化成果

期刊論文	會議論文	專利申請與獲得	雛型系統	研討會
7	7	9	3	7