

## Workshop No. 5

### *All-Optical versus OEO Networks*

**September 21<sup>st</sup>, 2008, 14:00 - 18:00**  
**Brussels/Belgium**

### Workshop Objectives

The sustainable growth of the internet and high-bandwidth on-demand services has introduced new challenges to next-generation networks in terms of capacity, configurability, and resiliency. Significant networking advancements need to be achieved with architectures and technologies that are scalable with respect to performance, size, and power requirements, while they should be capable of handling high traffic volumes and dynamically changing connection patterns. And of course all these should be achieved at low cost, both CAPEX and OPEX, for the operators that deploy the networks.

Transparent (all-optical) networking solutions has been touted as having the potential to meet those requirements and offer significant benefits in terms of performance and cost. On the other hand recent advancements in photonic integrated circuits have enabled the operation of opaque networks based on optoelectronic conversions (OEO) at much lower cost than what was originally considered possible in the past.

During the workshop we would like to bring together all stakeholders to discuss about the pros and cons of the all-optical and oeo based networks. High level speakers from network operators, equipment vendors and academia, will share their experience and views for the evolution of the network architecture and the technologies that in the future may revolutionize the way that we design and operate the networks. The presented talks will provide the participants a thorough insight into the topic and gave the incentive for fruitful discussions during the breaks and the panel discussion at the end of the workshop.

### Workshop Topics

The workshop presentations will address both operational aspects and technical aspects with emphasis on emerging solutions proposed by vendors and major research project consortia.

1. Operational aspects
  - a. What are the considerations for 40G/100G upgrade in using all-optical and OEO configurations
  - b. Alien-wavelength injection
    - How important is it for various vendors' optical transponders to inject into an existing optical backbone?
    - Capacity upgrade friendliness and economics
  - c. Power consumption and space considerations for the all-optical and an oeo based node
  - d. CAPEX and OPEX considerations
  - e. Optical network control plane requirements
    - Is it easier to control an all-optical or OEO network?
  - f. Fiber network management
    - Is it easier to handle an all-optical or OEO network?
2. Technical aspects
  - a. The impact of transmission/networking signal impairments
    - Transparent, translucent, opaque architectures

- What is the optimum distance before OEO regeneration?
- b. Enabling technologies (PICs, ROADMs, regenerators, converters, etc.)
  - What is the optimum photonic IC approach for different network applications?
    - a. Integration of tunable laser(s) with InP MZI(s)
    - b. Fixed laser(s) with EA modulator(s)
    - c. What is the optimum number of Tx/Rx in an array?
  - Network applications of ROADMs
- c. Optimum add/drop, cross-connect, switching, and grooming granularity in optical and electrical domains, respectively?
- d. Current status of multi-wavelength regeneration, conversion and grooming?

## Workshop Flow

The workshop will consist of invited presentations from network operators, equipment vendors and academia. Following a brief introduction by the workshop organizers, representatives from network operators that have installed either all-optical or oeo based networks will open the workshop to present their experience so far and their requirements for the future. Representatives from system vendors will follow to outline the advantages of their respective all-optical or oeo based solutions as well as the upcoming capabilities of the future product releases. This will be followed by presentations of the leaders of major research project consortia that are working on the next generation of all-optical and oeo based systems. The workshop will conclude with a panel discussion during which the speakers and workshop attendees will have the opportunity to address important questions and have a lively debate on the important issues that the research community and the industry has to focus on in the future.

## Workshop Speakers & Program

14:00 "Workshop Opening"

*Ioannis Tomkos, Workshop Co-Chair, AIT, Greece*

*First-half session Chair: Winston I. Way, OpVista Inc., USA*

14:10 "Optics in Next Generation Networks"

*Andreas Gladish, Deutsche Telecom, Head of Unit, NG Broadband Networks, Germany*

14:25 "Bandwidth velocity and differentiated services enabled by digital optical networks"

*Paul Ruby, Level3, VP, Architecture & Engineering, European Markets Group, USA*

14:40 "EOE vs. all-optical networks: pros and cons from a carrier's perspective"

*Peter Magill, AT&T, Executive Director, Optical Systems Research, USA*

14:55 Q&A on Network Providers Specific Perspectives

15:05 "Role of Photonic and Electronic Switching in Optimized Network Architectures"

*Joseph Berthold, Vice President, Network Architecture, Office of the CTO, Ciena, USA*

15:20 "Bandwidth virtualization and the use of photonic integrated circuits to scale and simplify optical networks"

*David Welch, Chief Marketing & Strategy Officer, Infinera, USA*

15:35 Coffee Break

*Second-half session Chair: Ioannis Tomkos, AIT, Greece*

- 16:00 “Transparent optical networks: enabling technologies and operational advantages“  
Jean-Pierre Hamaide, *Director, Alcatel-Lucent, Bell-Labs, France* and Giovanni Bellotti,  
*Senior Product Manager, Alcatel-Lucent, Italy*
- 16:15 "How multi-reach DWDM platforms support the vision of all-optical networks".  
Michael Finkenzeller, *Strategy and Portfolio Manager, Nokia Siemens Networks, Germany*
- 16:30 Q&A on System Equipment Vendors Specific Perspectives
- 16:40 “Performance and benefits of an all-optical grooming switch”  
Juerg Leuthold, *Professor, University of Karlsruhe, Germany*
- 16:55 “Arms dealing in next generation networks”  
Greame Maxwell, *VP Integration Technologies, Center for Integrated Photonics (CIP), UK*
- 17:10 “Integrated Technologies for Optical Packet and Dynamic Circuit Switched Networks”  
Dan Blumenthal, *Professor, University of California - Santa Barbara, USA*
- 17:25 Panel Discussion among all workshop speakers and participants  
(Co-Chaired by Winston Way and Ioannis Tomkos)

## Workshop supporting organizations

The workshop is organized under the auspices of EU Network of Excellence BONE and the support of EU projects TRIUMPH, DICONET

## Organizers

- Ioannis Tomkos (AIT, Greece)
- Winston Way (Opvista, USA)

## Registration

Registration for the workshop is free, but mandatory to get access to the session rooms.  
Registration can only be done through the ECOC2008 registration webpage

## Contact:

Dr Ioannis Tomkos, [itom@ait.edu.gr](mailto:itom@ait.edu.gr)