Photonics in Switching 2012

September 11th, 12th, 13th and 14th, 2012

Palais des Congrès

Quai l'Herminier

BP 253

20180 Ajaccio, Corsica Island, France

About the conference:

Photonic in Switching Conference welcomes you to Ajaccio-Corsica, France in 2012 !! This conference addresses devices, systems, and networks which drive the design of promising future telecommunication and computing systems and networks. In 2012, the Photonics in Switching conference will include a forum called Telecom & Energy and a symposium on Photonics in Data Centers and Computing.

About Corsica and Ajaccio:

The Corsica Island called also "beauty Island" is located at 200 km from the south coasts of France. Ajaccio is the capital of the South part of the Corsica, and has more than 60 000 habitants. With kilometers of white sand beaches and a temperature of the sea particularly warm in summer, Ajaccio is one of most popular turistic city in France.

About the Palais des Congrès:

The Palais des Congrès of Ajaccio benefits from an ideal geographical situation.

At only ten minutes of the international airport, it is right in the heart of the city, between the sea and the mountain, around the commercial port and the sailor and main trading avenues.

Opened since March, 2003, this Palais des Congrès has authority to promote and to value the economic and tourist potential of the island of Beauty. It welcomes thus various types of demonstrations: congresses, events, seminars, shows, exhibitions, etc.

The rationality of its spatial layout allows to be functional for at once commercial and cultural activities.

It is endowed with an auditorium of 450 seats, several multi-purpose rooms, an exhibition hall of 1.000 m^2 and a panoramic terrace, the whole opened by wide plate glass windows giving to see the sea or the city.

Photonics in Switching 2012 and ECOC 2012:

This year, Photonics in Switching is organised just before ECOC 2012 and will offer facilitated transit between both conferences.
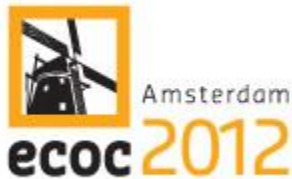
With the support of

Committees

ORGANIZING COMMITTEE
Michel Dupire and Valérie Alidor, SEE, France
Fiona Gerente, **Optics**valley, France
Sandrine Zonza, Palais des Congrès, France
Laurent Casasoprana, Communication Chair, France

GENERAL CHAIRMEN:
Dominique Chiaroni, Alcatel-Lucent, France (lead chair)
S.J. Ben Yoo, UCDAVIS, USA
Esther Lerouzic, France Telecom Orange Labs, France
Gilles Notton, Université de Corse, France

STEERING COMMITTEE:
USA representatives:
S.J. Ben Yoo, UCDAVIS
John Bowers, UCSB
Allan Willner, USC
ASIA representatives:
Ken-ichi Kitayama, Osaka University, Japan
Yoshiaki Nakano, University of Tokyo, Japan
Europe representatives:
Dominique Chiaroni, Alcatel-Lucent, France
Giancarlo Prati, CNIT, Italy

TECHNICAL PROGRAM COMMITTEE CHAIRS:
Ernesto Ciaramella, Scuola Superior Sant'Anna, Italy (lead chair)
Keren Bergman, Columbia University, USA
Harm Dorren, Technical University of Eindhoven, Netherlands
Paulette Gavignet, France Telecom Orange Labs, France
Ryo Takahashi, NTT corporation, Japan

TELECOM & ENERGY FORUM:
Dan Kilper, GREEN TOUCH consortium , USA (lead chair)
Dominique Chiaroni, Alcatel-Lucent, France
Nicolas Heraud, Université de Corse, France

TECHNICAL PROGRAM COMMITTEE MEMBERS:

SC1 : Optical Switching components & devices (Chair: H. Dorren)
Taro Arakawa, Yokohama National University, Japan
John Bowers, UCSB, USA
Nicola Calabretta, TuE, Netherlands
Giampiero Contestabile, Scuola Superiore Sant'Anna, Italy
Shaya Fainman, University of California San Diego, USA
Kiichi Hamamoto, Kyusyu University, Japan
Michael Hochberg, University Washington, USA
Richard Penty, University Cambridge, UK
Hiroyuki Tsuda, Keio University, Japan
Katsuyuki Utaka, Waseda University, Japan

SC2 : Optical switching functions & building blocks (Chair : P. Gavignet)
Dan Blumenthal, UCSB, USA
Antonella Bogoni, CNIT, Italy
Gabriella Cincotti, University of Roma, Italy
Hiroshi Hasegawa, Nagoya University , Japan

Odile Liboiron-Ladouceur, McGill University, Canada
Yoshiaki Nakano, University of Tokyo, Japan
Shu Namiki, AIST, Japan
Roberto Proietti, UCDAVIS, USA
Takuo Tanemura, University of Tokyo, Japan
Hiroyuki Uenohara, Tokyo Institute University, Japan
Naoya Wada, NICT, Japan
Kenneth K.Y. Wong, University of Hong Kong, China

SC3 : Optical systems (Chair: R. Takahashi)
Hercules Avramopoulos, NTUA, Greece
Polina Bayvel, University College Lodon, UK
Laurent Bramerie, ENSSAT, France
Fumio Futami, Tamagawa University, Japan
Philippe Gravey, Telecom Bretagne, France
Ken-Ichi Kitayama, Osaka University, Japan
Benjamin Lee, IBM, USA
Giancarlo Prati, Scuola Superiore Sant'Anna, Italy
Chester Shu, Chinese University of Honk Kong, China
Anne Vergonjanne, XLIM, France
Allan Willner, USC, USA
Thierry Zami, Alcatel-Lucent, France

SC4 : Optical Networking (Chair: K. Bergman)
Shinichi Arakawa, Osaka University, Japan
Soichiro Araki, NEC, Japan
Tulin Atmaca, Telecom SudParis, France
Calvin C.K. Chan, Chinese University of Honk Kong, China
Juan Fernandez-Palacios, Telefonica, Spain
Dan Kilper, Alcatel-Lucent Bell Labs, USA
David Neilson, Alcatel-Lucent Bell Labs, USA
Loukas Paraschis, CISCO, USA
Achille Pattavina, Politecnico di Milano, Italy
Mario Pickavet, IBBT, Belgium
June Koo Kevin Rhee, KAIST, South Korea
Frank Ruhl, Telstra, Australia
Dimitra Simeonidou, University of Essex, UK
Alexander Stavdas, UoP, Greece
Joe Touch, USC, USA
Anna Tzanakaki, AIT, Greece
Ryohei Urata, Google, USA
Lena Wosinska, KTH, Sweeden

Topics

SC1 : Optical switching components & devices
Photonic memory and optical buffers
Tunable laser technologies
Optical Amplifiers
Colorless interfaces
Optical decoder
FEC for optical packets
Burst mode receivers

SC2 : Optical Switching functions & building blocks
All optical processing : all optical flip-flops, optical logic
Optical memory: Optical RAM, FDL buffers
Wavelength conversion technologies, all-optical and hybrid
Integrated photonic switching technologies: MEMS, integrated devices, …
Photonic Integrated Circuits: Laser array + mux, PD array + mux, …
Silicon photonic switching technologies
Nanophotonic switching technologies
Optical label switching

SC3 : Optical systems
Optics in computing systems
Optical cross-connects
Reconfigurable optical add-drop multiplexers, WSS
Optical packet or burst switching systems for routers
Optical time domain multiplexed systems
Hybrid opto-electronic multi-ten Terabit Routers
Optical CDMA systems
Optical interconnects
Optical access systems

SC4 : Optical networking
Rapidly reconfigurable networks
Optical networks control and management
Next-generation GMPLS, ASON, Photonic MPLS
Optical label switching networks
IP_over-optical architectures
Optical access networks
Optical metro networks
Optical backbones
High-performance data server and computing networks with optical interconnects
Energy-efficient in networks and cloud computing
OTN
Cloud Computing
DATA centers
Future Internet Architectures
Performance of networks
Simulations of networks
Convergence fixed-mobile in optical networks

Keynote Speakers

Dr. Alan Benner,
Sr. Technical Staff Member in the IBM Systems and Technology, **IBM, USA**
"The Role of Optics in Super Computing and Data Center in a Rack"

Abstract: As clustered servers and high-performance computing systems have gotten larger, more powerful, and more dependent on high-performance interconnect, the advantages of optics have grown steadily more compelling. However, there are still many challenging (i.e., interesting) questions to be answered regarding exactly what types of optics technologies will be most useful, and how they'll be integrated into system designs. Such questions (e.g., VCSELs vs. silicon photonics, multi-mode vs. single-mode, electrical vs. optical switching,...) affect the most basic aspects of optics research and development. This talk will review some of the most advanced current optics deployments in the Power7-775/PERCS "Data Center in a Rack" system, and other high-performance clustered computing systems. It will also review, from the perspective of a computer system designer, how trends in various optical technologies will scale into the Exascale time-frame vs. trends in other technological components of large-scale system design.

Biography: Alan Benner is a Sr. Technical Staff Member in the IBM Systems and Technology Group, doing system architecture, design, development, and manufacturing of optical and electronic networks for high-performance servers and supercomputers since 1992. Dr. Benner received a B.S., Physics, from Harvey Mudd College and worked at AT&T Bell Laboratories before joining CU Boulder's Optoelectronic Computing Systems Center, receiving M.S. / Ph.D. degrees in 1990/1992. He has over two dozen technical publications, including books and book chapters on Fibre Channel, optical interconnect packaging, and specifications for the InfiniBand architecture, plus over 45 issued patents in the U.S. and other countries.

Dr. Patrice Robert,
R&D project manager, **France Telecom-Orange**
"Multilayer Network Design"

Abstract: Hegemony of Packet on business and residential services is a fact for several years. These services account for main part of traffic carried by transmission network in regional, national and international contexts regarding sizing. IP and transmission network architectures are closely connected for TCO savings as well as for availability and carbon footprint improvement. Some multilayer techno-

economic studies underline the benefit to take into account at the same time packet and transmission network issues. Moreover, at medium term, an efficient convergence between packet and transmission layers can improve flexibility and scalability of the global transport network. Several solutions to reach such convergence are considered and analyzed.

Biography: Patrice Robert has been working at France Telecom for several years in the transport networking domain as project manager.
Within the last years, he works in the area of NG-WDM networks and multi-layer optimization issues. He is currently in charge for Orange Labs of a Time To Market project on optical transport architecture evolution covering backhaul and core segments. Patrice is co-author of several papers on transport architecture evolution for European projects.

Dr. Atsushi Takahara,
Executive Director, **NTT Network Innovation Labs**
"The Future Network: its Prospects and Challenges"
Abstract: Information and Communication technologies enable to create new services or businesses for beneficial to our life over network.This introduces the traffic pattern changes so the requirements for networking is also changed. To meet new requirements of these changes, there are the activities to propose new network architecture and networking management methods as the Future Network. In this talk, the activities of exploiting the Future Network are reviewed in the several different categories such as system design, infrastructure implementation, management and operation of ICT system and applications. The possible use cases of the Future Network are also presented to understand what benefit the Future Network brings. Then, we clarify that programmability, virtualization and managed flexibility.are important aspects of realizing the Future Network.

Biography: Atsushi Takahara received a doctor of engineering degree in computer science from the Tokyo Institute of Technology. In 1988, he joined NTT. He has worked in the research of LSI design CAD system, Programmable device design, Programmable Network node architecture and flow based traffic control. From 2003 to 2008, he worked as the director of service and operation of visual communication service in NTT BizLink. Since 2008, he has been the executive manager of Media Innovation Laboratory, NTT Network Innovation Laboratories. Since 2011, he is the executive director of NTT Network Innovation Laboratories. His research interests are visual communication technology, new generation network architecture, and formal methods for system design.

Dr. Moray McLaren,
Distinguished Technologist, **HP Labs**
"Nanophotonics and Computing"

Abstract: The long heralded transition of photonic technology from a rack to rack interconnect to an integral part of the system architecture is underway. Silicon photonics, where the optical communications devices are fabricate using the same materials and processes as CMOS logic will allow 3D or monolithically integrated devices to be created minimizing the overhead for moving between the electronic and photonic domains. It is possible to view photonics as simply "better wires". However to fully exploit the capabilities of integrated silicon photonics we need to reconsider systems architecture to make use of capabilities such as broadband switching and distance independence. The combination of new device technologies and innovative system architectures will be critical in establishing the path to Exascale computing

Biography: Moray McLaren is a Distinguished Technologist with HP labs, working in the Intelligent Infrastructure. His recent research activities have focused on the impact of nanophotonics on future computer architectures. The two main areas of study have been high speed networking, and memory architectures. Prior to joining HP Labs in January 2007, he work on the development of high speed interconnects for parallel processors. These interconnects were successfully deployed in a significant number of supercomputing systems around the world. He holds a number of patents in the area of high speed network interconnect design. His previous experience also includes the development of parallel systems architectures, and CMOS microprocessors. He holds a 1st class honours degree in microelectronics from the University of Edinburgh

_____

Invited Speakers

List of invited speakers

SC1: Optical Switching Components and Devices
1. Th-S24-I06, X.J.M. Leijtens, "Functional Semiconductor Phonic Integrated Circuits", TU Eindhoven, Netherlands
2. Th-S23-I05, Shigeru Nakamura, "Si-based Photonic Switch Technology for Optical Communication", NEC, Japan
3. We-S22-I03, Yongbo Tang, "High Speed Hybrid Silicon Modulators and Switches", UCSB, USA
4. We-S11-I02, John Bowers, "Towards Efficient Hybrid Silicon Distributed Feedback Lasers", UCSB, USA
5. We-S22-I04, Yasuhiko Arakawa, "Advances in Photonics-Electronics Convergence System Technologies for Optical Interconnects", University of Tokyo, Japan
6. Fr-S36-I11, Jesse Simsarian, "Photonics in High-Capacity Routers", Bell Labs, USA
7. We-S12-I04, Ken Morito, "Silicon Photonics Optical Source for Temperature Control Free Operation with Ring Resonator Modulator", Fujitsu, Japan
8. We-S12-I03, Dr. Atsushi Kanno, "Ultra-High-Speed LN Vector Modulators", NICT, Japan
9. We-S11-I01, Efstratios Kehayas, "Energy_Efficient Coulourless Photonic Technologies for Next-Generation DWDM Metro and Access Networks", Constelex, Greece

SC2: Optical Switching Function and Building Blocks
1. Fr-S25-I12, Benjamin Eggleton, "Ultrahigh Speed Switching with Chalcogenide Waveguides", University of Sydney, Australia
2. Fr-S16-I10, Stylianos Sygletos, "Multi-Wavelength Regeneration of Differentially Phase-Encoded Signals Using Phase Sensitive Amplification", University College Cork, Ireland
3. Fr-S17-I11, Wolfgang Freude, "Quality Metrics for Optical Transmission", Karlsruhe Institute of Technology, Germany
4. Fr-S27-I13, Alexander L. Gaeta, "All-Optical Switching in Resonators using Raman-induced Loss", Ithaca, NY,
5. Th-S13-I05, Ioannis Tomkos, "Enabling Technologies for Evolving Flexible/Elastic Optical Transmission and Expected Benefits from Their Introduction in the Networks", Athens Information Technology Centre (AIT), Greece
6. Th-S13-I06, Juerg Leuthold, "Single-Laser 32.5 Tbit/s Nyquist WDM Transmission over 227 km with Real-Time Nyquist Pulse Shaping", University of Karlsruhe, Germany
7. We-S21-I01, Shinji Matsuo, "Ultra-low Operating Energy Lasers and Switches for Optical Interconnection", NTT Photonics Laboratories, Japan
8. Fr-S18-I12, Hiroyuki Uenohara, "Recent Advances in SOA-based Optical Signal Processing", Tokyo Institute of Technology, Japan
9. We-S21-I02, Katsuyuki Utaka, "Low Power Consumption Optical Switches for High—o-Low-end Applications", Waseda University, Japan
10. Fr-S25-I11, Alekxandr Biberman, "Switching in Photonic Interconnection Networks", Columbia University, NY, USA
11. Th-S13-I07, Tomoyuki Hino, "Transponder Aggregator Based on Silicon Photonics Technologies for Next Generation CDC- ROADM Systems", NEC, Japan

SC3: Optical Systems
1. Fr-S37-I14, Daniel Blumenthal, "All-Optical Packet routers Using Highly Integrated Optical Devices", UCSB, USA
2. Th-S14-I08, Colja Schubert, "New Trends and Challenges in Optical Digital Transmission systems", FhG-HHI, Germany
3. Fr-S26-I09, Kevin A. Williams, "Integrated Wavelength and Space Selective Switching Systems in II-Vs", COBRA Research Institute, TuE, Netherlands
4. Fr-S26-I14, Dominique Chiaroni, "Dynamic Optical Bypass for Next Generation Networks", ALU, France
5. Th-S25-I08, Gianluca Meloni, "Variable all-Optical Buffering Based on Semiconductor Optical Amplifiers and its Applications", Scuola Superiore Sant'Anna, Italy
6. Th-S15-I09, Hidenori Takahashi, "Optical OFDM for Higher Spectral Efficiency System", KDDI, Japan
7. Fr-S37-I13, Ryo Takahashi, "Recent Progress on Hybrid Optoelectronic Router", NTT Photonics Laboratories, Japan
8. Fr-S26-I10, Weisheng Hu, "Design of a Hybrid Packet and Circuit Switching Network Node", Shanghai Jiao Tong University, China
9. Th-S25-I07, Nikos Pleros, "Optical RAM Devices and architectures: a way to Solve the "Memory Wall" Problem ?", AUTH, Greece
10. Fr-S37-I12, Yong-Kee Yeo, "Large Port-Count Optical Cross-connects for Data Centers", A*STAR, Singapore
11. Fr-S26-I15, Hideaki Furukawa, "Optical Packet and Circuit Integrated Node for Ring Network Testbed", NICT,

Japan

SC4: Optical networking
1. We-S32-I02, Rodney Tucker, "Green Photonic in Switching", University of Melbourne, Australia
2. Th-S34-I06, Dimitra Simeonidou, "Adaptable Infrastructure for Future Scalable Flexible and Resilient Optical Networks", University of Essex, UK
3. Th-S33-I04, Ken-Ichi Sato, "Optical Transport Network Architecture: the Future Transport Node Technologies", Nagoya University, Japan
4. Fr-S38-I15, Naoya Wada, "Photonic Technologies for New Generation Network", NICT, Japan
5. Fr-S38-I16, S.J Ben Yoo, "Integrated Photonic-Electronic Technologies for Next Generation Data Centers and the Future Internet", CITRIS, USA
6. We-S31-I01, Christophe Lange, "Energy Efficiency Improvements in Telecommunication Networks – Optimizing the Power Supply Chain", DT, Germany
7. Th-S33-I05, Raul Munoz, "First Lab Trial of an integrated MPLS-TP/ WSON transport network controlled by a unified GMPLS control plane in the ADRENALINE testbed", CTTC, Spain
8. Th-S34-I07, Lei Liu, "OpenFlow-based Dynamic Wavelength Path Control for Future Photonic Networks", KDDI, Japan
9. Th-S35-I10, Gangxiand Shen, "Gridless CO-OFDM Optical Transport Networks", Soochow University, PR China
10. Th-S35-I09, Masahiko Jinno, "Elastic optical Transponder and Regenerator", NTT Innovation Labs, Japan
11. We-S32-I03, Satoru Okamoto, "E3-DCN: Energy Efficient Optical Network for Data-centric Network", Keio University, Yokohama, Japan
12. Th-S34-I08, Andrew Lord, "Alien waves: technology, benefits and standardisation", British Telecom, UK

Programme at a glance

The conference will start on Tuesday, September 11th, 2012, in the early afternoon and will be closed on Friday September 14th, 2012. The registration booth will be opened from Tuesday to Friday morning.

The main technical events of this conference are:
- 3 parallel workshops, on Tuesday afternoon to address key topics of this domain. More details are given in the workshop description
- A plenary session, on Wednesday morning, September 12th, 2012, with the participation off four distinguished speakers coming from the industry to address the future needs and the lasted research results of the industry. We will have presentations from Dr. Atsushi Takahara, NTT Network Innovation Labs (Japan), Dr. Patrice Robert, France Telecom-Orange (France), Dr. Alan Benner, IBM (USA) and Dr. Moray McLaren, HP Labs (Ireland).
- A symposium, on Wednesday afternoon, September 12th, 2012, focused on Photonics in DATA centers and computing.
- A Telecom & Energy Forum, on Thursday September 13th, 2012. The objective of this forum will be to address the future needs, and the telecommunication solutions proposed adapted to these needs. In particular, there will be presentations from scientists participating to the Green Touch initiative involving more than 50 institutions in the word to address this important topic.
- Parallel sessions covering the topics of the Photonics in switching conference that will include worldwide outstanding 42 invited speakers expert in different fields of this telecommunication area.
- A poster session on Thursday afternoon, September 13th, 2012
- A postdeadline session on Friday, September 14th, 2012.

Around these appointments, a welcome reception is programmed on Wednesday night, and a conference dinner on Thursday night in one of the most beautiful restaurant of the city.

PROGRAMME AT A GLANCE

Time	September 11th			September 12th				September 13th				September 14th		
9:00				Plenary session				Session 1.3 Transmission Systems (I)	Session 2.3 Switching Techno.	Session 3.3 Optical Transport Net	Telecom & Energy Forum	Session 1.6 Wave. conv. and reg.	Session 2.6 Switching Systems	Session 3.6 High-Capacity Routers
9:30														
10:00														
10:30								Coffee break				Coffee break		
11:00								Session 1.4 Transmission Systems (II)	Session 2.4 Switching Techno. & Ampl.	Session 3.4 Dynamic Networks	Telecom & Energy Forum	Session 1.7 Optical processing (I)	Session 2.7 Switching Systems and net	Session 3.7 Routers and DATA centers
11:30														
12:00														
12:30				Lunch				Lunch				Lunch		
13:00														
13:30														
14:00	WKP 1 Progress in Optical Routers and Buffers	WKP 2 What do we need to make an optical network robust against disasters?	WKP 3 Research directions for green networks	Session 1.1 Sources	Session 2.1 Low Energy Functions	Session 3.1 Network design	Symposium	Poster session			Telecom & Energy Forum	Session 1.8 Optical processing (II)	Session 2.8 OADM-based systems	Session 3.8 New Generation Networks
14:30														
15:00														
15:30	Coffee break			Coffee break				Coffee break				Closing		
16:00	WKP 1	WKP 2	WKP 3	Session 1.2 Modulators	Session 2.2 Integrated devices	Session 3.2 Green Networking	Symposium	Session 1.5 OFDM, CDMA	Session 2.5 OPS Enablers	Session 3.5 Elastic Networks	Telecom & Energy Forum			
16:30														
17:00														
17:30														
18:00				Welcome Reception at the City Hall				Gala dinner						

Workshops -Tuesday, September 11th, 2012

Workshop 1: Progress in Optical Routers and Buffers - Room Henri Matisse

Chairs: Kevin Williams, TUE, NL and Nicola Calabretta, TUE, NL,

Abstract: The capacity increase of tomorrow network is creating strong constraints at the switching node level. This workshop will then address the fundamental aspects from the memory to the integration and the scheduling to pave the way to ultra-high capacity switches. Top experts of the domain will share with the audience, the main research directions investigated.

Part 1: 14h00 – 15h30
14h00 – 14h30: "The future role of optics in routers "
Speaker: Daniel Blumenthal, UCSB, US,

Abstract: The latest advances in the implementation of integrated photonic components required for optical routing, buffering and switching are reviewed.

14h30 – 15h00: "Photonic RAM Technologies for High-speed Asynchronous Optical Packets"
Speaker: Salah Ibrahim, NTT Labs, Japan,

Abstract: We review an all-optical RAM subsystem based on photonic crystal bistable devices for 40-Gbps 4-bit optical signals, and a hybrid optoelectronic RAM composed of optical/optoelectronic interfaces and CMOS memory for 10-Gbps asynchronous optical packets.

15h00 – 15h30: "Monolithic InP Switches Based on Optical Phased Array"
Speaker: Takuo Tanemura, University of Tokyo, Japan

Abstract: We review our research on InP monolithically integrated photonic switching circuits based on optical phased array. In particular, recent work on a 1x100 integrated switch and the approaches toward NxN switching circuits will be discussed.

15h30 – 16h00 : COFFEE BREAK

Part 2 : 16h00 – 17h30
16h00 – 16h30: "Electronic-Photonic Integration within Switches and Routers"
Speaker: Michael Watts, Massachusetts Institute of Technology, US

Abstract: We review recent successes in silicon photonics and how the new capabilities afforded by silicon photonics will impact future Ethernet, Infiniband, and ultimately optical domain switches and routers. Specifically, we consider the impact silicon photonics can have on the cost, bandwidth, radix, and power consumption scaling of future switches and routers.
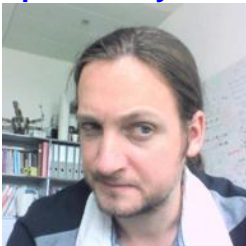
16h30 – 17h00: "Optical switch architectures"
Speaker: Andrea Bianco, Politechnic Torino, IT

Abstract: Optical microring resonators can be integrated on chip to perform switching operations directly in the optical domain, overcoming some of the limitations of today electronic networks. However, the peculiar asymmetric power losses of microring resonators impose new constraints on the design and control of on-chip optical switching networks. The design of multistage interconnection networks is introduced, taking into account the characteristic asymmetric behavior of microring based switching elements. Control algorithm that maximize the interconnection network throughput are also discussed.

17h00 – 17h30: "Controlling large scale optical switching fabrics"
Speaker: Cyriel Minkenberg, IBM, CH

Abstract: Real-world computing increasingly involves data-intensive operations at the scale of the entire machine,

requiring quick and efficient processing of massive petabyte-scale data sets. We present a circuit-switched network architecture specifically designed to support demanding graph algorithms, such as the increasingly popular Graph500 benchmark. Using the latest advances in optical technology, the network is designed deliver multiple terabytes per second of node bandwidth, predictable performance under heavy load, very high bisection bandwidth and low latency enabled by a transparent optical core switch that can be rapidly reconfigured. Through network simulations and analytical modeling combined with actual experimental results on IBMs Blue Gene/Q supercomputer, we demonstrate that we can achieve several orders of magnitude of performance improvements with a limited power consumption.

Workshop 2: What do we need to make an optical network robust against disasters? - Room Claude Papi A

Chair: Hiroaki Harai

Abstract: Robustness will play an important role in the broadband optical network as well as increased capacity and flexibility. This workshop will address the research direction of robust, resilient, and energy-conscious optical network. A panel session will be organized to discuss the important points that need to be covered to draw the requirements for the robust network especially against disasters.

Part 1: 14h00 – 15h30
14h00 – 14h30: "Optical technologies for making the information and communication technology network resilient against disasters"
Speakers: Toshikazu Sakano, Hirokazu Kubota, and Atsushi Takahara, NTT, Japan

Abstract: This presentation discusses optical technologies that are effectively applicable to make the information and communication technology (ICT) network resilient against catastrophic disasters. The impact of the Great Eastern Japan Earthquake to the ICT sector is first reviewed. It then discusses the candidate optical technologies such as large capacity digital coherent optical transmission technology that make the network resilient with flexible and economical ways.

14h30 – 15h00: "An overview of dynamic restoration in GMPLS-controlled WSON for disaster recovery"
Speaker: Raul Muñoz, CTTC, Spain.

Abstract: From all available recovery approaches for WSON, dynamic restoration is the most suitable for network disaster due to its high-recovery capacity against consecutive failures. However, the concurrence of multiple connection requests and the outdated information may introduce some limitations to a GMPLS-based restoration. This talk will give and experimental overview of the challenges and needs of a distributed control plane based on

GMPLS with PCE to efficiently deploy dynamic restoration schemes.

15h00 – 15h30: "Designing resilient optical grids/clouds"
Speaker: Chris Develder, Jens Buysse, Brigitte Jaumard, Ghent Univ., Belgium

Abstract: We address the problem of dimensioning infrastructure, comprising both network and server resources, for large-scale decentralized distributed systems such as grids or clouds. We will provide an overview of our work in this area, and in particular focus on how to design the resulting grid/cloud to be resilient against network link and/or server site failures. To this end, we will exploit relocation: under failure conditions, a request may be sent to an alternate destination than the one under failure-free conditions.

15h30 – 16h00: COFFEE BREAK

Part 1: 16h00 – 17h30
16h00 – 16h30: "Differentiated network resiliency"
Speaker: Lars Dittmann, Technical Univ. Denmark

Abstract: In order to meet the demand for more capacity and optimizing the cost for maintaining high availability the talk will introduce the concept of differentiated resilience that combines different kind of protection and restoration schemes and present the level of resiliency as a parameter for higher layer based on the GMPLS concept.

16h30 – 17h00: "Flexible capacity assignment in optical packet & circuit integrated network"
Speaker: Hideaki Furukawa, NICT, Japan

Abstract: Optical packet & circuit integrated network provides flexible service to users by using the same optical fibre facilities. A bandwidth shared service and a dedicated line service can be provided and the capacity for each service can be changed flexibly. This talk will address the overview of the network and case study in the recovery from disasters.

17h00 – 17h30 : Panel session:
Moderator : Hiroaki Harai
Panel: Chris Develder, Lars Dittmann, Hideaki Furukawa, Raul Muñoz, Toshilazu Sakano

---

Workshop 3: Research directions for green networks - Room Claude

Papi B

Co-Chairs: Catherine Lepers, Mounia Lourdiane, Dominique Chiaroni

Abstract: The electricity production reaching its limits, could impose an important power consumption reduction at the network level. In parallel the emergence of new applications are creating a need for more capacitive networks. This workshop will identify some key directions to reduce the power consumption of systems and networks, combining optics and electronics.

Part 1: 14h00 – 15h30
Chairs: Catherine Lepers, Dominique Chiaroni

14h00 – 14h30: "Improving network energy efficiency: a (partial) overview of initiatives in Italy"
Speaker: Luca Valcarenghi, Scuola Superiore Sant'Anna, Italy

Abstract: This presentation deals with the current ongoing initiatives to decrease energy consumption in communications networks in Italy. Actions taken from the main communications provider are outlined and ongoing research initiatives are summarized. The presentation will mainly focus on how optical networks can help reducing communications network energy consumption in different network segments.

14h30 – 15h00: "Research on functional optical network with keeping power consumption"
Speaker: Naoya Wada, NICT, Japan

Abstract: In the New Generation Network, energy efficiency and high throughput are essential. It is also necessary to

provide diversified services, such as best-effort and quality of service (QoS) guaranteed services. To satisfy these demands, NICT have proposed an optical packet and circuit integrated network. Our challenges and results are presented.

15h00 – 15h30: "Service and Energy Awareness in Optical Networks"
Speaker: Dan kilper, Bell Labs, USA

Abstract: In addressing energy challenges related to optical networks two general directions are available: increase efficiency and reduce carbon impact of the existing systems within the current range of functionality, or consider different systems and new functionality, some of which might present choices to the end user. Service awareness is one such approach that can enable energy savings through trading off different service functionality. The Service Energy Aware Sustainable Optical Networks (SEASON) project within the GreenTouch consortium is investigating this service aware approach to achieving deep efficiency improvements in core networks.

15h30 – 16h00: COFFEE BREAK

Part 2 : 16h00 – 17h30
Chairs: Dominique Chiaroni, Catherine Lepers

16h00 – 16h30: "Performance Evaluation of a Truly Cost-Efficient, Scalable and Green Optical Access Network"
Speaker: C. Matrakidis, T. G. Orphanoudakis, A. Stavdas, UoP, Greece

Abstract: We propose a novel access network architecture ensuring very low cost end-user ONUs, reduced complexity and high-level scalability. The scheme is allowing for a group of users to share the cost of an ultra-wide band long reach WDM-PON, via a group-ONU, leading to node consolidation and access-core integration.

16h30 – 17h00: "Graphene-enabled hybrid architectures for multiprocessors: bridging nanophotonics and nanoscale wireless communication"
Speaker: Josep Solé Pareta, UPC, Spain

Abstract: Due to their out-standing performance (huge bandwidth and high signal quality), optical communications have become the standardized technologies suited for long reach and high bit-rate communication systems. Nevertheless, the traditional incompatibility of CMOS with the optical technology, and the difficulty for all optical implementation of some key functions such as buffering and header processing, have been hindering the application of optical communications for short-range communications. However, the advent of nanophotonics is paving the way

for such approach by enabling CMOS compatibility and the possibility of building out micro and nanoscale optical components. In this paper, we do a first overview of the state-of-the-art in graphene and silicon nanophotonics, and its utilization for on-chip communication in multicore processors, to then propose a hybrid wireless/optical-wired architecture based on both a photonic Network-on-Chip (NoC) and a wireless NoC. The former for transferring heavy flows of data, the latter for supporting the control plane of the whole network, and carrying light data flows.

17h00 – 17h30: Panel session
Moderators: Catherine Lepers, Dominique Chiaroni
Panel speakers: Dan Kilper, Josep Solé Pareta, Alexandros Stavdas, Luca Valcarenghi and Naoya Wada

Telecom & Energy forum - Thursday, September 13th, 2012 - room Jean-Jacques Rousseau

Chairs: Dan Kilper (Bell Labs USA), Dominique Chiaroni (Bell Labs France) and Nicolas Heraud (University of Corsica)

Abstract: The objective of this forum is to merge the two scientific populations (telecommunications and energy) to address the fundamental problem of the power consumption of the telecommunication network and its predictable evolution, together with the energy production constraints.
Thus, we will start the forum with three keynote speakers addressing the energy, the telecommunication trends and the main outcomes of the Green Touch consortium. In the second part some key projects will be presented. In the afternoon key experts will address their research activity to illustrate some concrete example of Green Actions. Finally, this Telecom & Energy Forum will end with a round table to raise the most fundamental aspects.

MORNING SESSION
Part 1: 9h00 – 10h30
Chairs: Dan Kilper and Dominique Chiaroni

9h00 – 9h30: "Photonic Technologies that Create Future Green Networks"
Speaker: Ken-Ichi Sato, Nagoya University, Japan

Abstract: It has been recognized that exploiting photonic technologies will be the path to creating bandwidth abundant and energy efficient future networks, however, their introduction remains limited. The barriers and possible solutions are discussed. Another envisaged application area of optical switching technologies is data centers, where bulk data transmission among servers and storage areas will become important. Large-scale optical switches that have agile re-configurability and modular growth capabilities need to be developed. The recent technology advances are presented.

Biography: Ken-ichi Sato is currently a professor at the graduate school of Engineering, Nagoya University, and he is an NTT R&D Fellow. Before joining the university in April 2004, he was an executive manager of the Photonic Transport Network Laboratory at NTT. His R&D activities cover future transport network architectures, network design, OA&M (operation administration and maintenance) systems, photonic network systems including optical cross-connect/ROADM and photonic IP routers, and optical transmission technologies. He has authored/co-authored more than 300 research publications in international journals and conferences. He holds 35 granted patents and more than 100 pending patents.

He received his B.S., M.S., and Ph.D. degrees in electronics engineering from the University of Tokyo, Tokyo, Japan, in 1976, 1978, and 1986, respectively. He received the Young Engineer Award in 1984, the Excellent Paper Award in 1991, the Achievement Award in 2000, and the Distinguished Achievement and Contributions Award in 2012 from the Institute of Electronics, Information and Communication Engineers (IEICE) of JAPAN, and the Best Paper Awards in 2007 and 2008 from IEICE Communications Society. He was also the recipient of the distinguished achievement Award of the Ministry of Education, Science and Culture in 2002. His contributions to ATM (Asynchronous Transfer

Mode) and optical network technology development extend to co-editing five IEEE JSAC special issues and the IEEE JLT special issue once, organizing several Workshops and Conference technical sessions, serving on numerous committees of international conferences including OFC and ECOC, authoring a book, Advances in Transport Network Technologies (Artech House), and co-authoring fourteen other books. He is a Fellow of the IEICE of JAPAN and a Fellow of the IEEE.

9h30 – 10h00: "Energy-Centric Communications"
Speaker: Dan Kilper, Bell Labs, USA

Abstract: Energy is gaining attention as a key to future scalability for optical communication systems. Both transmission and switching systems are reaching thermal density limits. Transmission systems are also facing limits in spectral density. Each of these poses challenges to traditional mechanisms for network scaling. Energy efficiency can enable tighter integration and increased capacity. In this talk, we consider communication networks from a fully energy centric perspective and explore the potential benefits and consequences of evolving in this direction.

Biography: Dr. Daniel Kilper is a member of technical staff at Bell Labs, Alcatel-Lucent. He received the B.S. degree in electrical engineering and the B.S. degree in physics with honors from Virginia Tech, and the M.S. and Ph. D. degrees in physics from The University of Michigan, Ann Arbor. He was a post-doctoral research scientist at the Montana State University Optical Technology Center and became an assistant professor of physics at the University of North Carolina, Charlotte in 1997 before joining Bell Labs in 2000. Dan is a senior member of IEEE and an associate editor for the OSA/IEEE Journal of Optical Communications and Networking. He serves as the Bell Labs Liaison Executive and Operations Committee Chair for the Center for Energy Efficient Telecommunications, University of Melbourne, Australia. He was the founding Technical Committee Chair of the GreenTouch Consortium. While at Bell Labs he has conducted research on optical performance monitoring, energy-efficient networks, and transmission and control systems for transparent optical networks. He holds six patents and authored three book chapters and more than ninety peer-reviewed publications.

10h00 – 10h30: "Robust Flow Assignment in Green Networks"
Speaker: Nadeem Abji and Alberto Leon-Garcia, Univ. Of Toronto, USA

Abstract: First we report on a study that considers the robustness of flow assignments in core IP networks where a subset of routers is powered by renewable energy sources. For a given traffic demand, we optimize the flow assignment of the traffic to minimize the energy cost. We find several interesting conclusions. The preference for utilizing renewable energy to minimize cost results in flow assignments that favor longer, greener, paths through the network. This preference causes an increase in total energy consumption, but a decrease in cost, carbon emissions and conventional energy consumption. Next we study the robustness of the flow assignments using the network criticality metric, and we demonstrate that there exists a trade-off between the robustness of the network and the cost and emissions of the network. We reformulate the optimization problem with a constraint on robustness, which enables fine- grained control over the solutions. We find that a significant portion of the network's power consumption results from the baseline power a router consumes while idle. We, therefore, investigate algorithms that strategically power off line cards to further reduce power consumption without compromising the robustness or performance of the network.

Finally we report on an investigation of robust, energy-aware lightpath assignment in dynamically provisioned transparent and hybrid IP-Optical networks. The approach assigns cut-through lightpaths, which limit the amount of power-intensive optical-electronic-optical conversions needed in a core network. Although beneficial from an energy perspective, lightpaths tend to be underutilized resulting in wasted resources. Application of the network criticality concept enables strategic selection of lightpaths that are best suited to handle both random and known traffic matrices. The algorithm also factors in energy consumption, which results from operating amplifiers along a fiber link which can be powered off when the link is not in use. The algorithm provides a balance between power efficiency and network robustness.

Biography: Professor Alberto Leon-Garcia is Professor in Electrical and Computer Engineering at the University of Toronto. He is a Fellow of the Institute of Electronics an Electrical Engineering "For contributions to multiplexing and switching of integrated services traffic". He is also a Fellow of the Engineering Institute of Canada. He has received the 2006 Thomas Eadie Medal from the Royal Society of Canada and the 2010 IEEE Canada A. G. L. McNaughton Gold Medal for his contributions to the area of communications. He holds a Canada Research Chair in Autonomic Service Architecture. Professor Leon-Garcia is author of the leading textbooks: Probability and Random Processes for Electrical Engineering, and Communication Networks: Fundamental Concepts and Key Architecture. He is currently Scientific Director of the NSERC Strategic Network for Smart Applications on Virtual Infrastructures.

10h30 – 11h00 : COFFEE BREAK

Part 2: 11h00 – 12h30
11h00 – 11h30: "IEE Green Project"
Speaker: John Bowers, UCSB, Ca, USA

Abstract: Energy efficiency is important for communications and interconnects. Data centers consume about 2% of the overall electricity worldwide, with about 20% of this power spent on interconnects. A more energy efficient solution for interconnects is needed. Optics and photonic integration offer a promising alternative to electronic interconnects due to superior speed and large parallelism and hence potentially vastly reduced energy consumption. Silicon-on-insulator (SOI) based photonics is an attractive technology for interconnect applications due to its compatibility with CMOS electronics and with the CMOS fabrication infrastructure, which is vastly more standardized and mature than any other photonic technology. This allows for cost-effective and ubiquitous implementation of such technology. The indirect bandgap of silicon and silicon-compatible materials like germanium does not allow for efficient optical sources and hence the integration of III/V based materials, such as indium-phosphide, is necessary to meet the required energy footprint. I will review recent work on single-frequency lasers and high speed modulators realized in the hybrid silicon platform.

Biography: John Bowers holds the Fred Kavli Chair in Nanotechnology, and is the Director of the Institute for Energy Efficiency and a Professor in the Departments of Electrical and Computer Engineering and Materials at UCSB. He is a cofounder of Aurrion, Aerius Photonics and Calient Networks. Dr. Bowers received his M.S. and Ph.D. degrees from Stanford University and worked for AT&T Bell Laboratories and Honeywell before joining UC Santa Barbara. Dr. Bowers is a member of the National Academy of Engineering, a fellow of the IEEE, OSA and the American Physical Society. He is a recipient of the OSA/IEEE Tyndall Award, the OSA Holonyak Prize, the IEEE LEOS William Streifer Award and the South Coast Business and Technology Entrepreneur of the Year Award. He and coworkers received the EE Times Annual Creativity in Electronics (ACE) Award for Most Promising Technology for the hybrid silicon laser in 2007.

11h30 – 12h00: "An overview of research activities in the GreenTouch consortium"
Speaker: Rod Tucker, University of Melbourne, Australia

Abstract: The GreenTouch consortium brings together more than 50 industry and university research organizations in a coordinated research program aimed at improving the energy efficiency of ICT networks by factor of 1000. In this talk, I will give an overview of the GreenTouch research program and highlight some key research challenges.

Biography: Rod Tucker is a Laureate Professor at the University of Melbourne. He is Director of the University of Melbourne's Centre for Energy-Efficient Telecommunications (CEET) and Director of the Institute for a Broadband-Enabled Society. Rod leads a group of academics and students undertaking research on broadband access technologies, energy-efficient telecommunications, and the societal impact of broadband access technologies.
Rod has previously held positions at Plessey, AT&T Bell Laboratories, Hewlett Packard Laboratories, and Agilent Technologies. In 2009, he served on the Australian Federal Government's Panel of Experts, tasked with providing advice on the establishment of a National Broadband Network in Australia. He is a Board member of the GreenTouch consortium.

12h00 – 12h30: "TREND: The FP7 Network of Excellence on Green Networking"
Speaker: Andrea Bianco, PoliTo, Italy

Abstract: TREND (Towards Real Energy-efficient Network Design) is a FP7 Network of Excellence that integrates the activities of major European players in networking, including manufacturers, operators, research centers and universities.
TREND aims at quantitatively assessing the energy demand of current and future telecom infrastructures, and at designing energy-efficient, scalable and sustainable future networks.
In this talk, the main approaches studied in TREND and the most significant results achieved so far will be presented and discussed.
An energy monitoring tool that is under development will also be shortly described.

Biography: Andrea Bianco is Full Professor and Vice-Head of the Dipartimento di Elettronica e Telecomunicazioni of Politecnico di Torino.
He has coauthored over 150 papers published in international journals and presented in leading international conferences in the area of telecommunication networks.
His current main research interests are in the fields of protocols and architectures for all-optical networks, switch architectures for high-speed networks and energy saving techniques.

Dr. Bianco is Associate Editor for the Elsevier Computer Communications Journal, has been Guest or Co-Guest Editor of several special issues in international journals, including the IEEE Communications Magazine and Computer Networks and has been TPC co-chair of He is Area Editor for the Elsevier Computer Communications journal and he was Technical Program Co-Chair for HPSR in 2003 and 2008, for DRCN 2005, and IEEE ICC 2010 (Optical Networks and Systems Symposium).

12h30 – 14h00: Lunch

AFTERNOON SESSION

Part 1: 14h00 – 14h20
Chairs: Dominique Chiaroni & Nicolas Héraud

14h00 – 14h30: "Energy Efficiency of the Internet: Benchmarking Heterogeneous Networks"
Speaker: S.J. Ben Yoo, UC Davis, USA

Abstract: Exponentially increasing data consumption is driving the energy footprint of the Internet. By some estimates, the aggregate data consumption will rise by two orders of magnitude in the next decade. While fundamental and systematic improvements in the energy efficiency are essential, today's metrics for energy efficiency (e.g. nJ/b) lack a system-wide and holistic perspective. In this talk, we discuss the challenges in benchmarking heterogeneous networks and argue the need for a new metric based on the 'goodput' seen by applications and energy consumption based on life cycle analysis. We will give examples of application specific benchmarking developed for computing systems and discuss steps towards developing metrics and benchmarking for heterogeneous telecom networks or the Internet. We will then discuss the benchmarking for computing systems, data centers, and cloud computing environments, and argue the impact of elastic optical networking on energy efficiency under dynamic and heterogeneous traffic demands.

Biography: S. J. Ben Yoo received his BS, MS, and PhD in Electrical Engineering from Stanford University (1984, 86, 91), and is currently Professor of Electrical Engineering at University of California at Davis (UC Davis). His research at UC Davis includes high-performance optical switching systems, nano photonic-electronic systems integration for next generation networking, computing systems, and data centers. Prior to joining UC Davis in 1999, he was a Senior Research Scientist at Bellcore, leading technical efforts in optical networking research and systems integration. His research activities at Bellcore included optical-label switching for the next-generation Internet, reconfigurable optical networks, wavelength interchanging cross connects, wavelength converters, vertical-cavity lasers, and high-speed modulators. He also participated in the advanced technology demonstration network/multiwavelength optical networking (ATD/MONET) systems integration, and a number of standardization activities. Prior to joining Bellcore in 1991, he conducted research on nonlinear optical processes in quantum wells, a four-wave-mixing study of relaxation mechanisms in dye molecules, and ultrafast diffusion-driven photodetectors at Stanford University. Prof. Yoo is Fellow of IEEE and OSA, and a recipient of the DARPA Award for Sustained Excellence in 1997, the Bellcore CEO Award in 1998, and the Mid-Career Research Faculty Award in 2004 and the Senior Research Faculty Award in 2011 at UC Davis.

14h30 – 15h00: "A clean-slate network architecture to guarantee end-to-end QoS and sustainable power consumption figures"
Speaker: Alexander Stavdas, UoP, Greece

Abstract: Existing networking paradigms fail short in guaranteeing end-to-end QoS under reduced CAPEX and OPEX. Especially for the latter, power consumption is a major bottleneck. These are because of the current solutions are relying on an uncoordinated hop-by-hop packet forwarding scheme through a cascade of complex L3/L2 switches

and routers introducing a large number of interfaces between network segments and network layers. The proposed network architecture, allowing for access-core integration, is investing on a scheme with less switching and more multiplexing and transmission. In core, exploiting network virtualization, any power consuming electronic traffic processing is limited to core network periphery and aggregation/grooming is performed in a distributed manner obviating any L2/L3 machinery while ensuring a balanced performance across all QoS indexes. In access, the existing PON approach, to transparently interconnect the end-user to a Metro network, is not scalable in terms of capacity and power consumption. In the proposed architecture, making use of the existing DSLAM housing infrastructure, the traffic of end-users in close vicinity is terminated, both ways, in the local neighborhood. As a result of this a) end-user terminals can be of lowest cost and power consumption, b) the aggregated traffic can be transported cost-efficiently deeply in the core via ultra-long reach (e.g. 300 km) obviating the need for a Metro layer leading to core node consolidation. The significant reduction in the number of traffic processing locations is a green field to exploit the advances of SDNs.

Biography: Alexandros Stavdas received his B.Sc. in Physics from University of Athens, M.Sc. in Optoelectronics and Laser Devices from Heriot-Watt University/St-Andrews University, UK and a Ph.D. from University College London, UK in the field of wavelength routed WDM networks. He is the author or co-author of over 120 journal publications and conference articles. He is Professor in the Department of Telecommunications Science and Technology, University of Peloponnese, Greece. He served as Technical Program Committee Chairman and Member in a large number of International Conferences. Current interests include optical networking architectures, physical layer modeling of ultra-high capacity optical networks, Optical Packet/Burst Switching and WDM access networks.

15h00 – 15h30: "Power-efficient Flexible-ROADM Architecture supporting Modulation Format Adaptation"
Speaker: Filippo Cugini, CNIT, Italy

Abstract: A ROADM architecture supporting flexible transponders is presented. Modulation format adaptation is effectively exploited to guarantee adequate transmission performance while minimizing the power consumption.

Biography: Filippo Cugini received the M.S. degree in Telecommunication Engineering from the University of Parma, Italy. Since 2001, he has been with the National Laboratory of Photonic Networks, Consorzio Nazionale Interuniversitario per le Telecomunicazioni (CNIT), Pisa, Italy. His main research interests include theoretical and experimental studies in the field of optical communications. In particular, the focus is on Ethernet, GMPLS and PCE protocols and architectures, survivability and traffic engineering in IP over WDM networks, multi-rate flexible optical networks. He served as co-chair of the Optical Networks and Systems (ONS) Symposium at the IEEE Globecom 2010 conference. He serves as Editorial Board Member of the Elsevier Optical Switching and Networking journal. He is co-author of ten international patents and more than eighty IEEE publications.

15h30 – 16h00 : COFFEE BREAK

Part 2: 16h00 – 17h30
Chairs: Dominique Chiaroni & Nicolas Héraud
16h00– 16h30: "Improving energy efficiency in TDMA passive optical networks from theory to practice"
Speaker: Luca Valcarenghi, Sant'Anna, Italy

Abstract: Passive optical networks are currently the major contributor to fixed optical networks energy consumption. Within PON, almost 65% of their energy consumption is due to the customer premises equipments (i.e., the ONUs). Standardisation authorities, industries and researchers are proposing several methods for decreasing ONU energy consumption. Cyclic sleep or fast sleep is one of the proposed methods that is based on cycles of sleep and waking periods. However, cyclic sleep, while decreasing ONU energy consumption, causes an increase in the delay experienced by the transmitted data. Based on the requested Quality of Service (QoS) such additional delay can be more or less detrimental for the carried service. Therefore, it is essential to optimally select when to sleep and for how long, based also on the services subscribed by the ONU.
This presentation will outline a method for maximizing energy savings while providing services with delay guaranteed. The method exploits service-based variable sleep periods. Simulation results prove the method effectiveness with both Poisson and heavy-tailed traffic. The presentation will also provide an overview of the testbed implementation of the proposed approach.

Biography: Luca Valcarenghi holds a Laurea degree in Electronics Engineering (1997) from the Politecnico di Torino, Italy, a M.S. in Electrical Engineering (1999), and a Ph.D. in Electrical Engineering-Telecommunications (2001) both from the University of Texas at Dallas (UTD). Between January 2002 and August 2002 he was Research Associate of the Optical Networking Advanced Research (OpNeAR) Lab of the University of Texas at Dallas Erik Jonsson School of EE/CS. Since September 2002 he is Assistant Professor at the Scuola Superiore Sant'Anna of University Studies and Doctoral Research of Pisa, Italy. His main research interests are Optical Networks design, analysis, and optimization; Artificial Intelligence optimization techniques; Communication Networks reliability; IP over WDM networking; QoS in network infrastructures for Grid computing; fixed and mobile network integration; fixed network backhauling for mobile networks; energy efficiency in communications networks.

16h30 – 17h30: Round table
Panellists: Invited speakers plus Wolfgang Freude and Ioannis Tomkos
Moderator: Dominique Chiaroni

Wolfgang Freude received the Dipl.Ing. (M.S.E.E.) and the Dr.Ing. (Ph.D.E.E.) degrees in Electrical Engineering from the University of Karlsruhe, respectively, and was awarded an Honorary Doctorate of Kharkov National University of Radioelectronics, Ukraine. He is Professor at the Institute of Photonics and Quantum Electronics, at the Institute of Microstructure Technology, and in the Network of Excellent Retired Scientists, Karlsruhe Institute of Technology (KIT). His research activities are in the area of optical high-data rate transmission, high-density integrated-optics with a focus on silicon photonics, photonic crystals and semiconductor optical amplifiers, and in the field of low-energy opto-electronic devices and protocols for optical access networks. He has published more than 210 papers, delivered more than 270 lectures in Germany and abroad, and authored or co-authored a book and three book chapters on optical communications, multimode fibres, photonic crystals and semiconductor optical amplifiers. He is a member of OSA, IEEE, and VDE.

 Ioannis Tomkos (B.Sc., M.Sc. Ph.D.), has been with AIT since September 2002 (serving as Professor, Research Group Head and Associate Dean). In the past he was Senior Scientist at Corning Inc., USA (1999 – 2002) and Research Fellow at University of Athens, Athens, Greece (1995 - 1999). Dr. Tomkos has represented AIT as Principal Investigator in about 20 European Union and industry funded research projects (including 8 currently active projects) and has a consortium-wide initiator/leader role. Through his activities he has managed to attract over 6.000.000 Euros funding for AIT.

His fields of expertise are telecommunication systems, networks and photonics, as well as techno-economic analysis and business planning of ICTs. Together with his colleagues and students he has authored about 450 peer-reviewed archival scientific articles, including over 120 journal/magazine/book publications and 330 conference/workshop proceedings papers.

Dr. Tomkos was elected in 2007 as Distinguished Lecturer of the IEEE Communications Society for the topic of optical networking. He has served as the Chair of the International Optical Networking Technical Committee of the IEEE Communications Society (2007 - 2008) and the Chairman of the IFIP working group on Photonic Networking (2008 - 2009). He is currently the Chairman of the OSA Technical Group on Optical Communications (2009 - 2012) and the Chairman of the IEEE Photonics Society Greek Chapter (2010 - 2012). He is also Chairman of the working group "Next Generation Networks" of the Digital Greece 2020 Forum. He has also been General Chair, Technical Program Chair, Subcommittee Chair, Symposium Chair, or/and member of the steering/organizing committees for the major conferences in the area of telecommunications/networking (more than 100 conferences/workshops). In addition, he is a member of the Editorial Boards of the IEEE/OSA JOURNAL OF LIGHTWAVE TECHNOLOGY, the IEEE/OSA JOURNAL OF OPTICAL COMMUNICATIONS AND NETWORKING, the IET JOURNAL ON OPTOELECTRONICS, and the International Journal on Telecommunications Management.

Symposium - Wednesday, September 12th, 2012, room Jean-Jacques Rousseau

Symposium: Photonics in Data Centers and Computing
Chair: S.J. Ben Yoo, UC Davis, California, USA

Abstract: Rapidly expanding data services are fundamentally transforming our everyday lives. While large-scale data centers and ubiquitously networked computing systems are accelerating their deployment of cloud computing, their throughput and capacity are unable to keep pace with the exponentially growing data demands. Fundamentally new approaches can possibly bring breakthroughs in the new data infrastructure for both intra- and inter- data systems. For intra- data systems, photonic interconnects offer a disruptive technology solution that fundamentally changes the computing architectural design considerations towards a new generation of extremely energy-efficient and balanced computing systems. For inter- data systems, a new elastic optical networking technology is emerging for data-centric telecommunication networks where adaptive, energy-efficient, and on-demand capacity assignments are desired. Recent advances in silicon photonics and newly deployed foundry services are promising practical, cost-effective, and energy-efficient computing infrastructures of the future. This Symposium addresses technologies, system architectures, and networking aspects of future computing and data centers.

Part 1: 14h00 – 15h40

14h00 – 14h10: Overview and Introduction
Moderator: S.J. Ben Yoo, UC Davis, California, USA

14h10 – 14h40: "High Performance Computing"
Speaker: Cyriel Minkenberg, IBM, Zurich, Switzerland

Abstract :
Real-world computing increasingly involves data-intensive
operations at the scale of the entire machine, requiring quick and efficient processing of massive petabyte-scale data sets. We present a circuit-switched network architecture specifically designed to support demanding graph algorithms, such as the increasingly popular Graph500 benchmark. Using the latest advances in optical technology, the network is designed deliver multiple terabytes per second of node bandwidth, predictable performance under heavy load, very high bisection bandwidth and low latency enabled by a transparent optical core switch that can be rapidly reconfigured. Through network simulations and analytical modeling combined with actual experimental results on IBMs Blue Gene/Q supercomputer, we demonstrate that we can achieve several orders of magnitude of performance improvements with a limited power consumption.

Biography :

Cyriel Minkenberg is a Research Staff Member at IBM Research - Zurich, where he leads the System Fabrics group. His group pursues architectural and protocol innovation, performance evaluation, and implementation of interconnection networks for high-performance computing and data center networks. Cyriel obtained MSc and PhD degrees in electrical engineering from the Eindhoven University of Technology, the Netherlands, in 1996, and 2001, respectively. His research interests include interconnection networks, switch architectures, networking protocols, performance modeling, and simulation. Minkenberg received the 2001 IEEE Fred W. Ellersick Award for the best paper published in an IEEE Communications Society magazine in 2000, the Hot Interconnects 2005 best paper award, the IPDPS 2007 Architectures Track best paper award, and the HPCC 2012 best paper award.

14h40 – 15h10: "*Solution Path to Optical Packet Transport for Data Centric Next Generation Networks*"
Speaker: Atsushi Hiramatsu, NTT, Atsugi, Japan

Abstract: The network traffic in NGNs dramatically increases due to the video and digital data distribution services, and the coming M2M and big-data applications analysing huge number of various distributed sensors will spur the traffic increase trend. While many application servers are gathering to some of mega-data centers to reduce the inter-data-center traffic, the re-distribution of application servers to the micro-data centers nearer to the users might occur to reduce the response latency and congestion in response time sensitive applications. The data-entric next generation network (DC-NGN) is thus expected to dynamically support such demand changes from meandering huge traffic flows and many independent application-oriented virtual networks. Of course, the cost and energy reductions are the top priority in such networks. This paper describes the requirements and possible scenarios of DC-NGN and the expectations to the optical packet/burst switching technologies enabling the flexible, power-efficient large-capacity optical transport network as DC-NGN infrastructure.

Biography: He received the B.E. and M.E. degrees in applied physics from the University of Tokyo in 1984 and 1986, respectively. He joined NTT in 1986, and is currently an Executive Manager, Advanced Opto-electronics Laboratory, NTT Photonics Laboratories. From 1991 to 1992, he was a visiting associate of the Electrical Engineering Department at California Institute of Technology, USA. He received the Paper Award from the Institute of Electronics, Information and Communications Engineers (IEICE) in 1990 and 2000. His research interests are on broadband optical networks, network virtualization, software defined transport network, optical packet switching, and future network architecture.

15h10 – 15h40: "Optical Networking for High Performance Computing"
Speaker: Salvatore Spadaro, Universitat Politècnica de Catalunya, Barcelona, Spain

Abstract:
Data centres will be composed by an ever increasing number of servers inter-connected together over the intra data centre network. In such future data centre scenarios, flexible and highly scalable control and management solutions will be mandatory. Moreover, the advent of a control plane inside the data centre can include additional features such as reliability, congestion avoidance and energy consumption awareness. The talk will discuss the main challenges arisen by the implementation of a control plane for intra/inter data centers networks and it will highlight potential

control solutions.

Biography:
Salvatore Spadaro received the M.Sc. and Ph.Ddegrees in telecommunications engineering from the Universitat Politècnica de Catalunya (UPC), Barcelona, Spain, in 2000 and 2005, respectively. He also received the Dr.Ing. degree in electrical engineering from Politecnico di Torino, Turin, Italy, in 2000. He is currently an Associate Professor in the Optical Communications group of the Signal Theory and Communications Department of UPC. He has participated in various IST FP-6 and FP-7 European research projects. His research interests are in the fields of all-optical networks with emphasis on network control and management and optical network virtualization.

15h40 – 16h00: Coffee Break

Part 2: 16h00 – 17h30

16h00 – 16h30: "High-Performance Optoelectronic Packet Switching Network for Data Centers"
Speaker: Ken-ichi Kitayama, Osaka University, Osaka, Japan

Abstract: A five-year-long R&D program (2011~) funded by NICT, Japan will be presented, which aims at developing optical packet switching (OPS) network for green data center (DC) having huge number of servers. The consortium includes four institutes; NTT Laboratories, NEC Corp., Osaka University, and Kyushu University. In this intra-DC network, hybrid optoelectronic packet routers (HOERs) are interconnected with 100Gbps (25Gbps x 4 wavelengths) link. A novel "Express path" is proposed to enables the flow control. The traffic, which is part of a flow, can be bypassed the intermediate nodes and directly forwarded to the destination through the express path. On the other hand, an individual packet will be processed and forwarded by the HOERs. OpenFlow will be introduced to enable the flow control in a centralized fashion. At last but not the least, a drastic power saving is expected due to a substantial offload from the packet forwarding by using the proposed the express path.

Biography: Ken-ichi Kitayama received the M.E., and Dr. Eng. degrees in communication engineering from Osaka University, Osaka, Japan. In 1976, he joined the NTT Laboratory. In 1995, he joined the Communications Research Laboratory (currently, NICT), Tokyo, Japan. Since 1999, he has been the Professor with the Department of Electrical, Electronic, and Information Engineering, Graduate School of Engineering, Osaka University, Osaka, Japan.
His research interests are in photonic label switchings, optical signal processings, next-generation OCDMA and OFDMA access systems, and radio-over-fiber communications. He has published over 260 papers in refereed journals, written two book chapters, and translated one book. He holds more than 40 patents.
He currently serves on the Editorial Boards of the J. Lightwave Technol and J. Optical Communications and Networking as an Associate Editor. He is the Fellow of IEEE and the Fellow of IEICE of Japan.

16h30 – 17h00: "Multi-Project Wafer Silicon Photonics for Future Computing Systems"
Speaker: Michael Hochberg, OPSIS/University of Delaware, Delaware, USA

Abstract:

Over the last ten years, it has become possible to build fairly complex integrated optical systems at telecommunications wavelengths on electronics-compatible silicon substrates. The OpSIS project is focused on developing and sharing processes suitable for creating large-scale integrated photonic systems-on-chip. This talk will provide an update on the status of and technical capabilities of these publicly-accessible manufacturing processes, a description of our work on improving photonic design flows, and and an overview of some of the emerging applications being explored in the OpSIS processes.

Biography:
Michael Hochberg received his BS (Physics, 2002), his MS (Applied Physics, 2005) and his PhD (Applied Physics, 2006) from Caltech, and was awarded the Demetriades-Tsafka dissertation Prize in Nanotechnology. As a student, he received a merit-based fellowship from Caltech, an NSF Graduate Research Fellowship, and co-founded three companies, including Simulant and Luxtera. In 2007, he joined the faculty at the University of Washington where he received an Air Force Office of Scientific Research Young Investigators Program award, as well as a 2009 Presidential Early Career Award in Science and Engineering (PECASE). He recently became an Associate Professor in Electrical and Computer Engineering, Materials Science and Engineering, and Chemical and Biomolecular Engineering at the University of Delaware, and has joined the faculty in a joint position at the Institute for Microelectronics, A*Star and the National University of Singapore.

17h00 – 17h30: Panel session
Moderator: S.J. Ben Yoo
Panel: Atsushi Hiramatsu , Michael Hochberg, Ken-ichi Kitayama, Cyriel Minkenberg , Salvatore Spadaro

Postdeadline papers

Friday, September 14th, 2012

Room Papi, 1st floor of the Palais des Congres of Ajaccio.
Chair: Dominique Chiaroni, Alcatel-Lucent Bell Labs, France
Session: Postdeadline paper session, closing session and PS2013 announcement

The postdealine accepted are:

16h00 – 16h15: 1. "First Proof-of-Concept Demonstration of OpenFlow-Controlled Elastic Optical Networks Employing Flexible Transmitter/Receiver"

Lei Liu, Hyeon Yeong Choi, Takehiro Tsuritani, Itsuro Morita, KDDI R&D Laboratories Inc., 2-1-15 Ohara Fujimino-shi, Saitama, Japan
Ramon Casellas, Ricardo Martínez, Raül Muñoz, Centre Tecnològic de Telecomunicacions de Catalunya, (CTTC), 08860 Castelldefels, Barcelona, Spain

16h15 – 16h30: 2. "Four-Wave Mixing Bandwidth Enlargement Using Phase-Matching Control by Gain-Transparent Stimulated Brillouin Scattering »

Liang Wang and Chester Shu, Department of Electronic Engineering and Center for Advanced Research in Photonics, The Chinese University of Hong Kong, Shatin, N.T., Hong Kong

16h30 – 16h50: Closing session of PS2012, Dominique Chiaroni, Gilles Notton, Esther Le Rouzic and S.J. Ben Yoo
16h50 – 17h00: Announcement of PS2013 in Kyoto

17h00: end of PS2012.

Session 1.1 Sources

14h - 14h30
We-S11-I01 : Energy_Efficient Coulourless Photonic Technologies for Next-Generation DWDM Metro and Access Networks
Speaker : Efstratios, Kehayas - Constelex - Greece

14h30 - 14h45
We-S11-O01 : Single-Mode Narrow Linewidth Three-Section Coupled-Cavity Laser with Deeply Etched Trenches
Speaker : Yin Wang - Centre for Integrated Optoelectronics - Hangzhou - China

14h45 - 15h00
We-S11-O02 : Efficient Heat Dissipation in Optoelectronic Transmitter Modules Using Thermally Enhanced PCB
Speaker : Ikechi Ukaegbu - Korea Advanced Institute of Science and Technology (KAIST) - South Korea

15h00 - 15h15
We-S11-O03 : Short-Cavity Erbium-Doped Mode-Locked Fiber Laser with Tunable Pulse Repetition Frequency
Speaker : Guillermo E. Villanueva - Nanophotonics Technology Center, Universidad Politécnica de Valencia - Spain

15h15 - 15h45
We-S11-I02 : Towards Efficient Hybrid Silicon Distributed Feedback Lasers
Speaker : John Bowers - UCSB – USA

Session 1.2 Modulators
16h00 - 16h30
We-S12-I03 : Ultra-High-Speed LN Vector Modulators
Speaker : Dr. Atsushi Kanno. - NICT - Japan

16h30 - 16h45
We-S12-O04 : New planar architectures for optical digital modulators
Speaker : Gabriella Cincotti - University Roma Tre - Italy

16h45 - 17h00
We-S12-O05 - Scalability of Optical Waveguide Circuit for Recognition of Optical 16QAM Codes
Speaker : Kensuke Inoshita - The University of Tokushima - Japan

17h00 - 17h30
We-S12-I04 - Silicon Photonics Optical Source for Temperature Control Free Operation with Ring Resonator Modulator
Speaker : Ken Morito - Fujitsu - Japan

Session 1.3 Transmission Systems (I)
9h00 - 9h30
Th-S13-I05 : Enabling Technologies for Evolving Flexible/Elastic Optical Transmission and Expected Benefits from Their Introduction in the Networks *Speaker : Ioannis Tomkos - Athens Information Technology Centre (AIT) - Greece*

9h30 - 10h00
Th-S13-I06 : Single-Laser 32.5 Tbit/s Nyquist WDM Transmission over 227 km with Real-Time Nyquist Pulse Shaping
Speaker : Juerg Leuthold - University of Karlsruhe - Germany

10h00 - 10h30
Th-S13-I07 : Transponder Aggregator Based on Silicon Photonics Technologies for Next Generation CDC-ROADM Systems
Tomoyuki Hino - NEC – Japan

Session 1.4 Transmission Systems (II)

11h00 - 11h30
Th-S14-I08 : New Trends and Challenges in Optical Digital Transmission systems
Speaker : Colja Schubert - FhG-HHI - Germany

11h30 - 11h45
Th-S14-O06 : 1 Gbit/s Visible Light Communication Link Based on Phosphorescent White LED
Speaker : Amir Masood Khalid - Scuola Superiore Sant'Anna, Pisa - Italy

11h45 - 12h00
Th-S14-O07 : 512 Gbit/s Super-channel Field Trial over a 280 km DWDM Terrestrial Link in a Single 100 GHz Slot
Speaker : Gianluca Meloni - Scuola Superiore Sant'Anna, TECIP, Pisa - taly

12h00 - 12h15
Th-S14-O08 : Transmission of Y-00 Quantum Cipher from Transmitter using Directly Modulated DFB Laser for Secure Access Networks
Speaker : Fumio Futami - Tamagawa University, Tokyo - Japan

12h15 - 12h30
Th-S14-O09 : Accurate Statistical Performance Evaluation of EDC Techniques on 10 Gb/s Multimode Fiber Links
Speaker : Andrea Peracchi - Scuola Superiore Sant'Anna, Pisa – Italy

Session 1.5 OFDM, CDMA

16h00 - 16h30
Th-S15-I09 : Optical OFDM for Higher Spectral Efficiency System
Speaker : Hidenori Takahashi - KDDI - Japan

16h30 - 16h45
Th-S15-O10 : Chirped RSOA Modulation by Using Adaptive OFDM for Long Reach WDM-PONs
Speaker : Pallab Choudhury - Scuola Superiore Sant'Anna, Pisa - Italy

16h45 - 17h00
Th-S15-O11 : Analysis of Frequency Mismatch in All-Optical OFDM Systems
Speaker : Satoshi Shimizu - National Institute of Information and Communications Technology, Tokyo - Japan

17h00 - 17h15
Th-S15-O12 : Frequency-Based Frame Synchronization for High-Speed Optical OFDM
Speaker : Rachid Bouziane - university College London - UK

17h15 - 17h30
Th-S15-013 : Multiple Access Interference Impact on Outage Probability of Wireless Optical CDMA Systems
Speaker : Stephanie Sahuguede - XLIM DPT-C2S2 UMR CNRS 7252, LIMOGES – France

Session 1.6 Wavelength conversion and regeneration

9h00 - 9h15
Fr-S16-O14 : Novel Nonlinear Optical Circuits with Nested Time-Step Response for Optical Digital Processing
Speaker : Toshiya Sato - NTT Photonics Laboratories - Japan

9h15 - 9h30
Fr-S16-015 : Broadband DPSK Regenerative Wavelength Conversion
Speaker : Claudio Porzi - CNIT - Italy

9h30 - 9h45
Fr-S16-016 : Wavelength Characterization of All-Optical Wavelength Shifter
Speaker : Sergio Pinna - Scuola Superiore Sant'Anna - Italy

9h45 - 10h00
Fr-S16-017 : Nonlinear Crosstalk Between OTDM-OOK and DPSK Signals in Four-Wave Mixing Wavelength

Conversion
Speaker : Xuelei Fu - The Chinese University of Hong Kong, Shatin, N. T. - Hong Kong

10h00 - 10h30
Fr-S16-I10 : Multi-Wavelength Regeneration of Differentially Phase-Encoded Signals Using Phase Sensitive Amplification
Speaker : Andrew D. Ellis - University College Cork – Ireland

Session 1.7 Optical processing (I)

11h00 - 11h15
Fr-S17-O18 : Intra-node Optical Path Conditioner Using a Parametric Process of Highly Nonlinear Fibers for Dynamic Optical Path Networks
Speaker : Junya Kurumida - National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba, Ibaraki - Japan

11h15 - 11h30
Fr-S17-O19 : All-Optical NRZ-OOK/RZ-BPSK Modulation Format Conversion for Wavelength Multicasting Based on Cross-Phase Modulation in Optical Fiber
Speaker : Akihiro Maruta - Osaka University, Suita, Osaka - Japan

11h30 - 11h45
CANCELLED - Fr-S17-O20 : Study of the uniformity of 300mm wafer through ring- resonator analysis
Speaker : Clement Chauveau - CEA-Leti, Grenoble - France

11h45 - 12h15
Fr-S17-I11 : Quality Metrics for Optical Transmission
Speaker : Wolfgang Freude - Karlsruhe Institute of Technology – Germany

Session 1.8 Optical processing (II)

14h00 - 14h30
Fr-S18-I12 : Recent Advances in SOA-based Optical Signal Processing
Speaker : Hiroyuki Uenohara - Tokyo Institute of Technology - Japan

14h30 - 14h45
Fr-S18-O21 : Wavelength Tunable Flip-Flop Operation of a Modulated Grating Y-branch Laser
Speaker : Yi An - Technical University of Denmark, Kgs. Lyngby - Danmark

14h45 - 15h00
Fr-S18-O22 : Colorless All Optical XOR Gate for BPSK Signals Based on Periodically Poled Lithium Niobate Waveguide
Speaker : Antonio Malacarne - National Laboratory of Photonic Networks - CNIT, Pisa - Italy

15h00 - 15h15
Fr-S18-O23
Speaker : All-optical 2x4 decoder using external cavity self- locked Fabry-Perot laser diode
Speaker : Bikash Nakarmi - KAIST, Daejeon - South Korea

15h15 - 15h30
Fr-S18-O24 : All-optical SR Latching Circuit with Simultaneous Inverted and Non-inverted Outputs Using Fabry-Perot Laser Diodes
Speaker : Hoai Tran Quoc - KAIST, Daejeon - South Korea

Session 2.1 Low Energy Functions

14h00 - 14h15
We-S21-O01 : A Novel Optical Clock Pulse-Train Generator with Self-Stabilization by SOA and Saturable Absorber
Speaker : Tatsushi Nakahara - NTT Photonics Laboratories - Japan

14h15 - 14h30
We-S21-O02 : Energy-efficient performance enhancement in OC recognition using a multiport

encoder/decoder
Speaker : Takahiro Kodama - Osaka university, Suita - Japan

14h30 - 15h00
We-S21-I01 : Ultra-low Operating Energy Lasers and Switches for Optical Interconnection
Speaker : Shinji Matsuo - NTT Photonics Laboratories - Japan

15h00 - 15h30
We-S21-I02 : Low Power Consumption Optical Switches for High—o-Low-end Applications
Speaker : Katsuyuki Utaka - Waseda University – Japan

Session 2.2 Integrated devices
16h00 - 16h30
We-S22-I03 : High Speed Hybrid Silicon Modulators and Switches
Speaker : Yongbo Tang - UCSB - USA

16h30 - 17h00
We-S22-I04 : Photonic and Electronic Integrated Circuits for Photonic Interconnection
Speaker : Yasuhiko Arakawa - University of Tokyo - Japan

17h00 - 17h15
We-S22-O03 : Ultracompact 2×2 Directional Coupling Optical Switch with Si Waveguides and Phase-Change Material
Speaker : Daiki Tanaka - Keio University, Yokohama – Japan

Session 2.3 Switching Techno.
9h00 - 9h30
Th-S23-I05 : Si-based Photonic Switch Technology for Optical Communication
Speaker : Shigeru Nakamura - NEC - Japan

9h30 - 9h45
Th-S23-O04 : Optical Crossbar Switch Using Fifth-order Resonators
Speaker : Kevin A. Williams - COBRA Research Institute, Eindhoven University of Technology, Eindhoven - The Netherlands

9h45 - 10h00
Th-S23-O05 : LCOS-Based Matrix Switching for 2x4 WSS for Fully Flexible Channel Selection
Speaker : Jonathan Plumridge - Finisar Australia Pty Ltd, Sydney - Australia

10h00 - 10h15
Th-S23-O06 : Compact Tunable Filter Realized with Combination of Wavelength Routing and Switch Function
Speaker : Tomonobu NIWA from Nagoya University - Japan

10h15 - 10h30
Th-S23-O07 : Hitless Wavelength-Selective Switch Using Multiple Quantum Well Second-Order Series Coupled Microring Resonators
Speaker : Hiroki Ikehara - Yokohama National University, Yokohama, Kanagawa – Japan

Session 2.4 Integrated circuits & Amplification
11h00 - 11h30
Th-S24-I06 : Functional Semiconductor Photonic Integrated Circuits
Speaker : X.J.M. Leijtens - TU Eindhoven - Netherlands

11h30 - 11h45
Th-S24-O08 : Polarization Insensitivity of Gain Saturation in Dual-Orthogonal-Pump Fiber Optical Parametric Amplifier
Speaker : Xiaojie Guo - The Chinese University of Hong Kong, Shatin, N.T. - Hong Kong

11h45 - 12h00
Th-S24-O09 - Distributed Parametric Amplification at 1.3 µm in 25-km Single-Mode Fiber

Speaker : Xing Xu - The University of Hong Kong - Hong Kong

12h00- 12h15
Th-S24-O10 : Simulation of Nonlinear Gain Saturation in Active Photonic Crystal Waveguides
Speaker : Yaohui Chen - DTU Fotonik, Department of Photonics Engineering, Technical University of Denmark, Kongens Lyngby – Danmark

Session 2.5 OPS Enablers
16h00 - 16h30
Th-S25-I07 : Optical RAM Devices and architectures: a way to Solve the "Memory Wall" Problem ?
Speaker : Nikos Pleros - AUTH - Greece

16h30 - 17h00
Th-S25-I08 : Variable all-Optical Buffering Based on Semiconductor Optical Amplifiers
Speaker : Gianluca Meloni - Scuola Superiore Sant'Anna - Italy

17h00 - 17h15
Th-S25-O11 : A 1.34 Tb/s Full Duplex Optical Interconnect for Optical Backplane Applications
Speaker : Kobi Hasharoni - Compass Electro-Optical Systems, Netanya - Israel

17h15 - 17h30
Th-S25-O12 : A 10 Gbps Burst-Mode Clock and Data Recovery Circuit with Continuous Clock Output
Speaker : Roberto Proietti - University of California at Davis, California - USA

17h30 - 18h00
Th-S38-I15 : Photonic Technologies for New Generation Network
Speaker : Naoya Wada - NICT – Japan

Session 2.6 Switching Systems
9h00 - 9h30
Fr-S26-I09 : Integrated Wavelength and Space Selective Switching Systems in II-Vs
Speaker : Kevin A. Williams - TuE - Netherlands

9h30 - 10h00
Fr-S26-I10 : Design of a Hybrid Packet and Circuit Switching Network Node
Speaker : Weisheng Hu - Shanghai Jiao Tong University - China

10h10 - 10h15
Fr-S26-O13 : Core path switching based on multi-core fiber and Laguerre-Gaussian mode beam
Speaker: Yoshinari Awaji - National institute of information and communications technology, Tokyo - Japan

10h15 - 10h30
Fr-S26-O14 : IA Large Capacity Optical Cross-connect Architecture Exploiting Multi-Granular Optical Path Routing
Speaker : Hai-Chau Le - Nagoya University, Nagoya – Japan

Session 2.7 Switching Systems and Networks
11h00 - 11h30
Fr-S27-I11 : Switching in Photonic Interconnection Networks
Speaker : Alekxandr Biberman - Columbia University - USA

11h30 - 12h00
Fr-S27-I12 : Ultrahigh Speed Switching with Chalcogenide Waveguides
Speaker : Benjamin Eggleton - University of Sydney - Australia

12h00 - 12h30
Fr-S27-I13 : All-Optical Switching in Resonators using Raman-induced Loss
Speaker : Alexander L. Gaeta - Ithaca - USA

12h30 - 12h45

Fr-S27-O15 : Low contention and high resilience to partial failure for colorless and directionless OXC
Speaker : Dominique Chiaroni - Bell Labs – France

Session 2.8 OADM-based systems
14h00 - 14h30
Fr-S28-I14 : Dynamic Optical Bypass for Next Generation Networks
Speaker : Dominique Chiaroni - Bell Labs - France

14h30 - 15h00
Fr-S28-I15 : Optical Packet and Circuit Integrated Node for Ring Network Testbed
Speaker : Hideaki Furukawa - NICT - Japan

15h00 - 15h15
Fr-S28-O16 : Tunable Holographic Wavelength Filter Using a Photorefractive Polymer for Ultra-Broad Reconfigurable Add-Drop Multiplexers
Speaker : Yuta Wakayama - Hokkaido University, Sapporo - Japan

15h15 - 15h30
Fr-S28-O17 : Reconfiguration Performance of Stackable ROADMs with Bidirectional Optical Amplifiers for IP-over-CWDM Networks
Speaker : Yutaka Katsuyama - Osaka Prefecture University –Japan

Session 3.1 Network design
14h00 - 14h30
We-S31-I01 - Energy Efficiency Improvements in Telecommunication Networks – Optimizing the Power Supply Chain
Speaker : Christophe Lange - DT - Germany

14h30 - 14h45
We-S31-O01 - Power Dynamics Control in Optical Packet Rings
Speaker : Dominique Chiaroni - Bell Labs - France

14h45 - 15h00
We-S31-O02 : Experimental Demonstration of LIONS: A Low Latency Optical Switch for High Performance Computing
Speaker : Yawei Yin - Univ. of California, Davis - USA

15h00 - 15h15
We-S31-O03 : Hardware Scale Reduction in Large-Port Count OXCs Exploiting Selective Switch based Coarse Granular Routing
Speaker : Yuki TANIGUCHI - Nagoya University - Japan

15h15 - 15h30
We-S31-O04 : Network Design for Contention Avoidance in Optical Broadcast Network
Speaker : Tatsuya Fukuda - Osaka University, Ibaraki, Osaka – Japan

Session 3.2 Green Networking
16h00 - 16h15
We-S32-O05 : A Novel Optical Packet Switching with Flow Control for Green Data Centre Networks
Speaker : Soumitra Debnath - NTT Photonics Laboratories, Kanagawa - Japan

16h15 - 16h30
We-S32-O06 : Heated-Flow-First Traffic Grooming for Power and Delay Aware Optical Network
Speaker : Chankyun Lee - KAIST, Daejeon - South Korea

16h30 - 17h00
We-S32-I02 : Green Photonic Switching
Speaker : Rodney Tucker - University of Melbourne - Australia

17h00 - 17h30

We-S32-I03 : E3-DCN: Energy Efficient Optical Network for Data-centric Network
Speaker : Satoru Okamoto - Yokohama – Japan

Session 3.3 Optical Transport Networks

9h00 - 9h15
Th-S33-O07 : Power scaling of LDPC decoder stage in long haul networks
Speaker : Christian Dorize - Bell Labs - France

9h15 - 9h30
Th-S33-O08 : Impairment-Aware Multicast Tree Design for Hierarchical Optical Path Networks
Speaker : Yusuke HACHISUKA - Nagoya University, Nagoya - Japan

9h30 - 10h00
Th-S33-I04 : Optical Transport Network Architecture
Speaker : Ken-Ichi Sato - Nagoya University - Japan

10h00 - 10h30
Th-S33-I05 : First Lab Trial of an integrated MPLS-TP/ WSON transport network controlled by a unified GMPLS control plane in the ADRENALINE testbed
Speaker : Raul Munoz - CTTC – Spain

Session 3.4 Dynamic Networks

11h00 - 11h15
Th-S34-O09 : Proposal of Optical L2 Switch Network to Achieve Dynamic Bandwidth Allocation based on 10G-EPON
Speaker : Kyota HATTORI - NTT Corporation, Musashino-shi, Tokyo - Japan

11h15 - 11h30
Th-S34-O10 : Effectiveness of Waveband Conversion for Hierarchical Optical Path Networks and the Allowable Cost Bound
Speaker : Zhi-shu SHEN - Nagoya University, Nagoya - Japan

11h30 - 12h00
Th-S34-I06 : Adaptable Infrastructure for Future Scalable Flexible and Resilient Optical Networks
Speaker : Dimitra Simeonidou - University of Essex - UK

12h00 - 12h30
Th-S34-I07 : OpenFlow-based Dynamic Wavelength Path Control for Future Photonic Networks
Speaker : Lei Liu - KDDI - Japan

12h30 - 13h00
Th-S34-I08 : Alien waves: technology, benefits and standardisation
Speaker : Andrew Lord - BT – UK

Session 3.5 Elastic Networks

16h00 - 16h15
Th-S35-O11 : Quasi-Hitless Defragmentation Technique in Elastic Optical Networks by a Coherent RX LO With Fast TX Wavelength Tracking.
Speaker : Roberto Proietti - UC Davis, Davis - USA

16h15 - 16h30
Th-S35-O12 : Path Division Method for Fairnessin Dynamic Elastic Optical Path Networks
Speaker : Shohei Fujii - Osaka University, Suita, Osaka - Japan

16h30 - 17h00
Th-S35-I09 : Elastic Optical Transponder and Regenerator Toward Energy and Spectrum Efficient Optical Transport Networks
Speaker : M. Jinno - NTT Innovation Labs - Japan

17h00 - 17h30

Th-S35-I10 : Gridless Optical Networking
Speaker : Gangxiand Shen - Soochow University – Taiwan

Session 3.6 High-Capacity Routers

9h00 - 9h15
Fr-S36-O13 : First demonstration of 4-bit, 40-Gb/s optical RAM chip using integrated photonic crystal nanocavities
Speaker : Kengo Nozaki - NTT Photonics Laboratories - Japan

9h15 - 9h30
Fr-S36-O14 : A Novel Tunable Laser with Flat-Output Wideband Tuning Based on Parallel Ring Resonators
Speaker : Toru Segawa - NTT Photonics Laboratories - Japan

9h30 - 9h45
Fr-S36-O15 : Fast Wavelength Switching 100Gb/s Burst Mode Transceiver for Coherent Metro Networks
Speaker : Robert Maher - University College London - UK

9h45 - 10h00
Fr-S36-O16 : Error-free tunable channel selection using a PLZT arrayed-waveguide grating
Speaker : Hideaki Asakura - Keio University, Kanagawa - Japan

10h00 - 10h30
Fr-S36-I11 : Photonics in High-Capacity Routers
Speaker : Jesse Simsarian - Bell Labs – USA

Session 3.7 Routers and DATA centers

11h00 - 11h30
Fr-S37-I12 : Large Port-Count Optical Cross-connects for Data Centers
Speaker : Yong-Kee Yeo - A*STAR - Singapore

11h30 - 12h00
Fr-S37-I13 : Recent Progress on Hybrid Optoelectronic Router
Speaker : Ryo Takahashi - NTT Photonics Laboratories - Japan

12h00 - 12h30
Fr-S37-I14 : All-Optical Packet routers Using Highly Integrated Optical Devices
Speaker - Daniel Blumenthal - UCSB – USA

Session 3.8 New Generation Networks

14h00 - 14h15
Fr-S38-O17 : Planning of Optical and IT Resources for Efficient Virtual Infrastructure Embedding
Speaker : Albert Pagès - Universitat Politècnica de Catalunya (UPC), Barcelona, Catalunya - Spain

14h15 - 14h30
Fr-S38-O18 : Multi-Rate (10/112G) GMPLS based Autonomous Optical Testbed considering Physical IA Constraints
Speaker : Júlio C. R. F. de Oliveira - CPqD - Telecom & IT Solutions, Campinas, Sao Paulo - Brazil

14h30 - 15h00
Fr-S38-I16 : Advanced Optical Technologies for New Generation Internet
Speaker : S.J Ben Yoo - CITRIS – USA

Poster session

Th-S4-P01- Demonstration of optical multi-logic gates with single mode Fabry-Perot Laser diode
Authors : Bikash Nakarmi, Hoai Tran Quoc, Yong Hyub Won - KAIST, Daejeon, Republic of Korea

Th-S4-P02 - Dual-Header Signalling for Burst-Cluster Transmission in OBS Networks
Authors : Hiroyuki Ichikawa, Koji kamakura - Chiba Institute of Technology, 2-17-1,Tsudanuma, Narashino, Chiba, Japan

Th-S4-P03 - A Cost-effective Dual-WDM-PON with Shared Light Source Using OCS-SSB Technique
Authors : Zhao Zhou, Shilin Xiao, Hanlin Feng, Meihua Bi, Tao Qi, Weisheng Hu - State Key Laboratory of Advanced Optical Communication System and Networksm Shanghai Jiao Tong University, Shanghai, China

Th-S4-P04 - Modelling of Free-Space Optoelectronic Switching with MPLS for Storage Area Networks (SANs)
Authors : Hsi-Hsir Chou, T.D. Wilkinson, F. Zhang - Cambridge University, Cambridge, UK

Th-S4-P05 - Impairement Aware Routing in Elastic Multirate Optical Networks
Authors : Milorad Cvijetic, Yun He - University of Arizona, Tucson, AZ, USA

Th-S4-P06 - Digital Signal Processing for Compensating Fiber Nonlinearities
Authors : Domenico Marsella, Marco Secondini, Enrico Forestieri - Scuola Superiore Sant'Anna, Pisa, Italy

Th-S4-P07 - Impact of Tunable Wavelength Converter Performance on All-Optical Wavelength-Routing Switches for Data Centers
Authors : Houman Rastegarfar (1), Alberto Leon-Garcia (1), Sophie LaRochelle (2), Leslie Ann Rusch (2)
University of Toronto, Toronto, Ontario, Canada (1) ; Université Laval, Quebec City, Quebec, Canada (2)

Th-S4-P08 - Modelling Carrier Transport of a Photonic Crystal Cavity All-Optical Switch
Authors : Hasula Dias, Simeon Kaunga-Nyirenda, Jun Jun Lim, Andrew Phillips, Eric Larkins - University of Nottingham, Nottingham, UK

Th-S4-P09 - Mach Zehnder Interferometer Optical Switch Using Phase-Change Material
Authors : Paridhi Jain, Daiki Tanaka, Hiroyuki Tsuda - Keio University, Yokohama, Japan

Th-S4-P10 - Memory Speed analysis of Optical T-Flip-Flop circuits based on an SOA-MZI and a feedback loop
Authors : Dimitrios Fitsios (1,2), Christos Vagionas (1,2), Amalia Miliou (1), George Kanellos (2), Nikos Pleros (1,2)
Aristotle University of Thessaloniki, Thessaloniki, Greece (1) ; Centre for Research & Technology Hellas, Thessaloniki, Greece (2)

Th-S4-P11 - Effects of Innermost Rows on Slow Light Properties of Photonic Crystal Waveguides
Authors : Fulya Bagci, Baris Akaoglu - Ankara University, Ankara, Turkey

Th-S4-P12 - Scalable Autonomous Optical FDL Buffer System for Synchronous Packets
Authors : Yuta Maruo, Naoya Uegaki, Hiroki Kishikawa, Nobuo Goto, Shin-ichiro Yanagiya - The University of Tokushima, Tokushima, Tokushima, Japan

Th-S4-P13 - Optimal code set selection in *m*-sequence spectral phase-encoded time spreading (SPECTS) OCDMA systems
Authors : Pedro Bertarini, Anderson Sanches, Ben-Hur Borges - University of São Paulo, São Carlos, São Paulo, Brazil

Th-S4-P14 - Locking characteristics of single mode Fabry-Perot laser diode
Authors : Jian wei wu (1,2), Bikash Nakarmi (1), Hoai Tran Quoc (1), Yong Hyub Won (1)
KAIST, Daejeon, Republic of Korea (1); State key laboratories of millimeter wave, Nanjing, China (2)

Th-S4-P15 - Ameba Node Configuration Method Enabling Flexible Change of Logical Network Topology
Authors : Shuta Kohama, Kenji Tada, Hideki Tode - Osaka Prefecture University, Sakai,Osaka, Japan

Th-S4-P16 - IM/DD Optical OFDM Transmission Performance for High-Speed and Long-Reach Access Networks
Authors : Elias Giacoumidis (1), Ioannis Tomkos (1), Athanasios Kavatzikidis (2)
Athens Information Technology (AIT), Athens, Attica, Greece (1); iKnowHow S.A., Athens, Attica, Greece (2)

Th-S4-P17 - Photonic Amplification and Switching through Nonlinear Coupling with Negative Phonons
Authors : Alexander K Popov - University of Wisconsin-Stevens Point, Stevens Point, WI 54481, USA

Th-S4-P18 - QoS-Aware Wavelength Path Set-up Method Using Multiple Overlay in Optical Network Management System
Authors : Masashi Takada, Yosuke Tanigawa, Hideki Tode - Osaka Prefecture University, Sakai,Osaka, Japan

Th-S4-P19 - Resilience in Transparent OPS Multi-Rings

Authors : Lida Sadeghioon, Philipepe Gravey, Annie Gravey - Institut Mines Telecom - Telecom Bretagne,, Brest, France