



26th International Conference on  
Optical Network Design and Modelling  
16 -19 May 2022, Warsaw, Poland

# Programme

## SPONSORS

Platinum

Best Paper Award



**HUAWEI**



**ADVA**<sup>TM</sup>

Technical co-sponsorship



# Agenda

|       | Monday<br>16 May 2022     | Tuesday<br>17 May 2022    | Wednesday<br>18 May 2022                | Thursday<br>19 May 2022                     |
|-------|---------------------------|---------------------------|---|---|
| 9:00  | Mo1: Opening and Keynotes | Tu1: Quantum and security | We1: Planning II                        | Th1: Recent advances in deployable networks |
| 9:30  |                           |                           |   |   |
| 10:00 |                           |                           |   |   |
| 10:30 |                           |                           |   |   |
| 11:00 | Coffee break              |                           | Coffee break                            |   |
| 11:30 | Mo2: Machine learning I   | Coffee break              | We2: Techno-economics in access network | Coffee break                                |
| 12:00 |                           | Tu2: Keynote              |   | Th2: Workshop III                           |
| 12:30 |                           |                           |   |   |
| 13:00 | Lunch                     | Lunch                     | Lunch                                   | Lunch                                       |
| 13:30 |                           |                           |   |   |
| 14:00 | Mo3: Workshop I           | Tu3: Workshop II          | We3: Poster session                     | Th3: Machine learning II                    |
| 14:30 |                           |                           |   |   |
| 15:00 |                           |                           |   |   |
| 15:30 |                           |                           | Coffee break                            |   |
| 16:00 | Coffee break              | Coffee break              | We4: Disaggregation and automation      | Coffee break                                |
| 16:30 | Mo4: Planning I           | Tu4: Network resilience   |   | Th4: Re-architecting networks               |
| 17:00 |                           |                           | Th5: Awards and closing ceremony        |   |
| 17:30 |                           |                           |   |   |
| 18:00 |                           |                           |   |   |
| 18:30 | Social event I            | Social event II           | Social event III                        |   |
| ...   |                           |                           |   |   |

**Monday**  
**16 May 2022**

**Mo1: Opening and keynotes**

9:00 – 11:10 (Warsaw/CEST)

Chair: Teresa Gomes (University of Coimbra & INESC Coimbra, Portugal)

**9:00 Opening**

Jarosław Turkiewicz (Warsaw University of Technology)

**9:10 KEYNOTE: Coherent technologies for the edge**

David Welch (Infinera, USA)

The extension of coherent technology to the edge and the novel architectures thereby enabled remove current metro/access barriers and deliver new levels of capacity and service agility in a wide set of applications. The use of intelligent coherent pluggables in the network enables a management architecture that enhances end-to-end visibility, accelerates service turn-up and enables advanced networking functions. Recent techno-economical case studies to quantify the benefits of such emerging technologies will be reported.

**10:10 KEYNOTE: Towards multi-Pbps scale backbone optical networking in support of future 6G access networks**

Ioannis Tomkos (University of Patras, Greece)

Since we have entered the research era of 6G networks, disruptive approaches should be investigated about the optical x-haul technologies associated with advance optical nodes and their transceiver Interfaces that will enable flexible capacity scaling (up to 10Tbps rate per interface, 10Pbps capacity per transmission link and over 100Pbps throughput per optical node), based on the utilization of ultra-high bandwidth photonic devices and the efficient exploitation of both optical spatial and spectral dimensions (i.e. Ultra-Wide-Band Spectral Lanes Multiplexing & Spatial Lanes Multiplexing in a hybrid UWB/SDM configuration) at the data transport plane. The x-haul 6G optical network infrastructure should be capable to adapt its capabilities according to the needs of the various network segments forming the end-to-end connections, by utilizing new ML-enabled SDN control-plane approaches that incorporate novel resource allocation algorithms and protocols to optimize the routing of network traffic across network layers and segments, with the goal to achieve ultra-high energy efficiency and low-cost per switched/transmitted bit and support improved network QoS (e.g. high rates, low latency, high reliability/availability), as required by upcoming 6G applications. The talk will discuss key network elements and approaches that should be developed to support this vision.

**Coffee break**

11:10 – 11:30 (Warsaw/CEST)

## Mo2: Machine learning I

11:30 – 13:00 (Warsaw/CEST)

Chair: José Alberto Hernández (Univ. Carlos III Madrid, Spain)

### **11:30 INVITED: Optical networked systems to scale-up and speed-up training of distributed deep learning models: architectures, technologies, and control**

Georgios Zervas (University College London, UK)

### **12:00 On Feature Selection in Short-Term Prediction of Backbone Optical Network Traffic**

Aleksandra Knapińska, Katarzyna Póltorak, Dominika Poręba, Jan Miszczyk, Mateusz Daniluk and Krzysztof Walkowiak (Wrocław University of Science and Technology, Poland)

### **12:20 An ML Approach for Crosstalk-Aware Modulation Format Selection in SDM-EONs**

Shrinivas Petale and Suresh Subramaniam (The George Washington University, USA)

### **12:40 If Not Here, There. Explaining Machine Learning Models for Fault Localization in Optical Networks**

Oleg Karandin (Politecnico di Milano, Italy). Omran Ayoub (University of Applied Sciences of Southern Switzerland, Switzerland), Francesco Musumeci (Politecnico di Milano, Italy), Yusuke Hirota (NICT, Japan), Yoshinari Awaji (NICT, Japan) and Massimo Tornatore (Politecnico di Milano, Italy)

## Lunch break

13:00 – 14:00 (Warsaw/CEST)

## Mo3: Workshop I

14:00 – 16:00 (Warsaw/CEST)

Chair: Juan Jose Vegas-Olmos (NVIDIA) and José Manuel Delgado Mendinueta (NICT, Japan)

### **14:00 – 16:00 Physical layer technologies for decomposed and disaggregated data center, cloud and edge computing platforms**

Networks for datacom and telecom have been decomposed into its key components and they are being disaggregated in order for services and applications to access them seamlessly. Hence, instead of building very heterogenous fabrics, current cloud and edge computing platforms are uniformly stack with clusters of underlying technologies (i.e. memory or processing). This decomposition process is possible thanks to high-capacity and low latency interconnect systems that effectively bridge space and distance, so abstract layers on such individual components can be virtualized to support this decomposition.

#### **Workshop program**

- Maximizing capacity in data center interconnects and 6G converged PON and optical fronthaul, using NOMA-CAP, Jose Antonio Lazaro (UPC)
- Towards a converged computing, networking, and optical solution at the edge, Filippo Cugini (CNIT)
- Path towards Tbit/s short reach interconnects, Nikolay Ledentsov Jr. (VI-Systems)

## Coffee break

16:00 – 16:30 (Warsaw/CEST)

## Mo4: Planning I

16:30 – 18:30 (Warsaw/CEST)

Chair: Karcus Assis (Federal University of Bahia, Brasil)

### **16:30 INVITED: Routed Optical Networking: An Alternative Architecture for IP+Optical Aggregation Networks**

Valerio Viscardi, Dirk Schroetter and Moustafa Kattan (CISCO)

### **17:00 Long-Term Cost-Effectiveness of Metro Networks Exploiting Point-To-Multipoint Transceivers**

Mohammad M. Hosseini (Aston University, UK), João Pedro (Infinera Unipessoal Lda & Instituto de Telecomunicações, Portugal), Antonio Napoli (Infinera, UK) and Nelson Costa (Infinera, Portugal), Jaroslaw Prilepsky (Aston University, UK) and Sergei K. Turitsyn (Aston University, UK)

### **17:20 Capacity and Energy Consumption Comparison in Translucent Versus Transparent Multi-Band Designs**

Rasoul Sadeghi (Politecnico di Torini, Italy), Bruno Correia (Politecnico di Torini, Italy), Andre Souza (Infinera, Portugal), Antonio Napoli (Infinera, Germany), Nelson Costa (Infinera, Portugal), João Pedro (Infinera Unipessoal Lda & Instituto de Telecomunicações, Portugal) and Vittorio Curri (Politecnico di Torini, Italy)

### **17:40 A Filterless Design with Point-To-Multipoint Transceivers for Cost-Effective and Challenging Metro/Regional Aggregation Topologies**

Johan Back (Infinera, Sweden), Antonio Napoli (Infinera, Germany), Emilio Riccardi (Telecom Italia, Italy), Marco Quagliotti (Telecom Italia, Italy), Mario Porrega (Infinera, Italy), João Pedro (Infinera Unipessoal Lda & Instituto de Telecomunicações, Portugal), Tobias A. Eriksson (Infinera, Sweden), Fady Masoud (Infinera, Canada), Atul Mathur (Infinera, USA) and Dave Welch (Infinera, USA)

## Tuesday

### 17 May 2022

#### Tu1: Quantum and security

9:00 – 11:40 (Warsaw/CEST)

Chair: Konrad Banaszek (Warsaw University, Poland)

**9:00 TUTORIAL: Security threats in Software Defined Networks**

Donna O'Shea (Munster Technological University, Ireland)

**10:00 INVITED: Secure communications in quantum networks**

Eleni Diamanti (CNRS and Sorbonne Université, France)

**10:30 INVITED: Design and Applications of Quantum Secure Networks**

Emilio Hugues-Salas (British Telecom, UK)

**11:00 Eavesdropping G.652 vs. G.657 Fibres: A Performance Comparison**

Stefan Karlsson, Rui Lin, Lena Wosinska and Paolo Monti (Chalmers University of Technology, Sweden)

**11:20 Quantum Bit Retransmission Using Universal Quantum Copying Machine**

Masab Iqbal (Universitat Politècnica de Catalunya, Spain), Luis Velasco (Universitat Politècnica de Catalunya, Spain), Marc Ruiz (Universitat Politècnica de Catalunya, Spain), Antonio Napoli (Infinera, Germany), João Pedro (Infinera Unipessoal Lda & Instituto de Telecomunicações, Portugal) and Nelson Costa (Infinera, Portugal)

#### Coffee break

11:40 – 12:00 (Warsaw/CEST)

#### Tu2: Keynote

12:00 – 13:00 (Warsaw/CEST)

Chair: Lena Wosińska (Chalmers University of Technology, Sweden)

**12:00 Keynote: What can be done to make optical networks more intelligent?**

Polina Bayvel (University College London, UK)

Optical networks have evolved almost beyond recognition since the installation of the first optical fibre links in late 1970s. They are sometimes viewed as essential 'plumbing' in the digital infrastructure – but does the optical bandwidth they provide, play a greater role in network evolution? Can it be made more intelligent, more flexible and adaptive, how can bandwidth be accessed – can optical networks help in 'seeing through the cloud'?

**12:40 INVITED: Towards a Traffic-Optimal Large-Scale Optical Network Topology Design**

Ruijie Luo, Robin Matzner, Georgios Zervas and Polina Bayvel (University College London, UK)

#### Lunch break

13:00 – 14:00 (Warsaw/CEST)

### Tu3: Workshop II

14:00 – 16:00 (Warsaw/CEST)

Chair: Alberto Gatto (Politecnico di Milano, Italy) and Michela Svaluto Moreolo (CTTC, Spain)

#### **14:00 – 16:00 Are we ready for the Quantum Era? The evolution of the QKD test-beds in the next decade**

The workshop aims to present the already deployed QKD test-bed infrastructures, focusing on their peculiarities in terms of involved technology and strategic vision for future implementation. Different architectures will be discussed in view of a widespread adoption of QKD in the already-deployed communication networks and to open a vibrant debate on new challenges and test-bed evolution for the next years.

#### **Workshop program**

14:00 Welcome & Introduction (Alberto Gatto – Michela Svaluto Moreolo)

14:05 Hannes Hübel (AIT Austrian Institute of Technology, Austria)

“Deployment of QKD use-cases in the OPENQKD project”

14:25 Diego Lopez (Telefonica, Spain)

“MadQCI. The Multiverse Quantum Testbed”

14:45 Paul Wright (British Telecom, UK)

“BT’s UK QKD System Field Trials”

15:05 Paolo Martelli (Politecnico di Milano, Italy)

“PoliQI initiative for a QKD infrastructure in the urban area of Milano”

15:25 Chigo Okonkwo (TuE, The Netherlands)

“Building up a National Quantum Communications Infrastructure in the Netherlands”

15:45 Final Panel

### Coffee break

16:00 – 16:30 (Warsaw/CEST)

### Tu4: Network resilience

16:30 – 17:40 (Warsaw/CEST)

Chair: João Pedro (Infinera Unipessoal Lda & Instituto de Telecomunicações, Portugal)

#### **16:30 INVITED: Efficient Network Traffic Prediction After a Node Failure**

Róża Goścień and Aleksandra Knapinska (Wrocław University of Science and Technology, Poland)

#### **17:00 Disaster-Resilient Network Upgrade**

Ferenc Mogyorósi and Alija Pašić (Budapest University of Technology and Economics, Hungary)

#### **17:20 Resources Optimization for a Resilient Time-Shared Optical Network**

Karcus Assis (Federal University of Bahia), Romerson Oliveira (University of Bristol, UK), Ekin Arabul (University of Bristol, UK), Rui Wang (University of Bristol, UK), Raul C. Almeida, Jr (Federal University of Pernambuco, Brazil), Reza Nejabati (University of Bristol, UK) and Dimitra Simeonidou (University of Bristol, UK)

## Wednesday

### 18 May 2022

#### We1: Planning II

9:00 – 11:00 (Warsaw/CEST)

Chair: Hiroshi Hasegawa (Nagoya University, Japan)

**9:00 INVITED: Towards Regeneration in Flexible Optical Network Planning**

Saqib Amjad (Technical University of Munich, Germany), Sai Kireet Patri (ADVA, Germany), Carmen Mas-Machuca (Technical University of Munich, Germany)

**9:30 Impact of Physical Topology Features on Performance of Optical Backbone Networks**

Katsuaki Higashimori, Takeru Inoue, Takafumi Tanaka, Fumikazu Inuzuka and Takuya Ohara (NTT, Japan)

**9:50 Adaptive Multi-Path SnF Scheduling Method for Delay-Sensitive Transfers Across Inter-Datacenter Optical Networks**

Xiao Lin (Fuzhou University, China), Shuo Ji (Fuzhou University, China), Shengnan Yue (Shanghai Jiaotong University, China), Jun Li (Soochow University, China), Weiqiang Sun (Shanghai Jiaotong University, China) and Weisheng Hu (Shanghai Jiaotong University, China)

**10:10 Ultra-Fast Optical Network Throughput Prediction Using Graph Neural Networks**

Robin Matzner; Ruijie Luo; Georgios Zervas; Polina Bayvel (University College London, UK)

**10:30 Adaptive Joint Optimization of IT Resources and Optical Spectrum Considering Operation Cost**

Takashi Miyamura (NTT, Japan) and Akira Misawa (Chitose Institute of Science and Technology, Japan)

#### Coffee break

11:00 – 11:30 (Warsaw/CEST)

#### We2: Techno economics in access network

11:30 – 13:00 (Warsaw/CEST)

Chair: Yvan Pointurier (Huawei, France)

**11:30 INVITED: Fixed/wireless heterogeneous network solutions for future industrial services**

Thomas Pfeiffer (Nokia Bell Labs, Germany)

**12:00 Techno-Economics of LiFi in IoT Applications**

Madeleine Kaufmann (Technical University of Munich, Germany), Carmen Mas-Machuca (Technical University of Munich, Germany), Marcel Müller (Weidmüller Group, Germany), Daniel Behnke (Weidmüller Group, Germany), Pieter J Stobbelaar (Signify, The Netherlands), Jean-Paul M. G. Linnartz (Signify, The Netherlands), Maximilian Riegel (Nokia Bell Labs, Germany), Dominic Schulz (Fraunhofer Heinrich Hertz Institute) and Volker Jungnickel (Fraunhofer Heinrich Hertz Institute and Technische Universität Berlin, Germany)



**12:20 Planning a Cost-Effective Delay-Constrained Passive Optical Network for 5G Fronthaul**

Abdulhalim Fayad (Budapest University of Technology and Economics, Hungary), Manish Jha (Budapest University of Technology and Economics, Hungary), Tibor Cinkler (Budapest University of Technology and Economics, Hungary & Gdansk University of Technology, Poland) Jacek Rak (Gdansk University of Technology, Poland)

**12:40 Cost Effective Hybrid FSO-Wireless Architecture for Broadband Access Network**

Priyanka Singh, Akshita Gupta, Vivek A Bohara and Anand Srivastava (Indraprastha Institute of Information Technology Delhi, India)

**Lunch break**

13:00 – 14:00 (Warsaw/CEST)

**We3: Poster session**

14:00 – 15:30 (Warsaw/CEST)

Chair: Markos Anastasopoulos (University of Bristol, UK)

**14:00 P1: On the Effectiveness of Small Multicast Switches in Next-Generation Optical Transport Networks**

João Pedro (Infinera Unipessoal Lda & Instituto de Telecomunicações, Portugal), António Eira (Infinera, Portugal), Cátia Pinho (Infinera, Portugal)

**14:00 P2: Quantum Limits on the Capacity of Multispan Links with Phase-Sensitive Amplification**

Karol Lukanowski and Marcin Jarzyna and Konrad Banaszek (University of Warsaw, Poland)

**14:00 P3: A Reinforcement Learning-Based Dynamic Bandwidth Allocation for XGS-PON Networks**

Abdullah Quran (Politecnico di Milano), Sebastian Troia (Politecnico di Milano), Omran Ayoub (Scuola Universitaria Professionale Della Svizzera Italiana, Switzerland), Nicola Di Cicco (Politecnico di Milano) and Massimo Tornatore (Politecnico di Milano and University of California, Davis, Italy)

**14:00 P4: Impact of Modal Dispersion on the Performance of an SDM Optical Network**

Nicola Sambo (Scuola Superiore Sant'Anna, Italy), Chiara Lasagni (Università dell'Aquila, Italy), Paolo Serena (University of Parma, Italy), Piero Castoldi (Scuola Superiore Sant'Anna, Italy) and Alberto Bononi (University of Parma, Italy),

**14:00 P5: Quantum Key Distribution Resource Sharing Schemes for Metropolitan Area Networks**

Juan Carlos Hernandez-Hernandez (University Carlos III de Madrid, Spain), David Larrabeiti (University Carlos III de Madrid, Spain), Maria Calderon (University Carlos III de Madrid, Spain), Ignacio Soto (Universidad Politécnica de Madrid, Spain) and Bruno Cimoli (Eindhoven University of Technology, The Netherlands), Hui Lui (Eindhoven University of Technology, The Netherlands) and Idelfonso Tafur Monroy (Eindhoven University of Technology, The Netherlands)

**14:00 P6: Outage Performance of Mixed RF-FSO Cooperative Satellite-Aerial-Terrestrial Networks**

Yuanyuan Ma (Beijing University of Posts and Telecommunications, China), Tiejun Lv (Beijing University of Posts and Telecommunications, China) and Han Liu (Beijing Institute of Technology, China)

**Coffee break**

15:30 – 16:00 (Warsaw/CEST)

**We4: Disaggregation and automation**

16:00 – 18:00 (Warsaw/CEST)

Chair: Cristina E.M. Rottondi (Politecnico di Torino, Italy)

**16:00 INVITED: Network automation for disaggregated optical transport networks**

Achim Autenrieth (ADVA, Germany)

**16:30 SDN Automation for Optical Networks Based on Open APIs and Streaming Telemetry**

Jelena Pesic (Nokia Bell Labs, France), Marina Curtol (Nokia, France), Lahcen Abnaou (Nokia, France), Abdelali El Imadi (Nokia, France) and Stefano Morganti (Nokia, Italy)

**17:00 TUTORIAL: Photonic Switching Technologies, Architectures, and Integrated-Systems for Future Disaggregated and Optically Reconfigurable Data Centers**

S. J. Ben Yoo (University of California, Davis, USA)

## Thursday

### 19 May 2022

#### Th1: Recent advances in deployable networks

9:00 – 11:40 (Warsaw/CEST)

Chair: Wojciech Kabaciński (Poznań University of Technology, Poland)

**9:00 INVITED: Optical Sensing in Urban Areas by Deployed Telecommunication Fiber Networks**

Pierpaolo Boffi (Politecnico di Milano, Italy), Maddalena Ferrario (Politecnico di Milano, Italy), Ilaria Di Luch (Politecnico di Milano, Italy), Giuseppe Rizzelli (Politecnico di Torino, Italy) and Roberto Gaudino (Politecnico di Torino, Italy)

**9:30 INVITED: Optical Communications for Space Applications**

David Mackey (mBryonics, Ireland)

**10:00 INVITED: A SDN-Operated MEC Node for Network Cybersecurity Assurance**

Teodor Buchner (EXATEL and Warsaw University of Technology, Poland)

**10:30 P4 Postcard Telemetry Collector in Packet-Optical Networks**

Faris Alhamed (Scuola Superiore Sant'Anna, Italy), Davide Scano (Scuola Superiore Sant'Anna, Italy), Piero Castoldi (Scuola Superiore Sant'Anna, Italy), Francesco Paolucci (CNIT, Italy), Filippo Cugini (CNIT, Italy), Ilya Verschkov (NVIDIA, Israel) and Juan Jose Vegas Olmos (NVIDIA, Denmark)

**10:50 A MEC and UPF Compatible OLT for Time-Critical Mobile Services**

Minqi Wang (Orange Labs, France), Gael Simon (Orange, France), Luiz Anet Neto (IMT Atlantique, France), Isabel Amigo (IMT Atlantique, France), Loutfi Nuaymi (IMT Atlantique, France) and Philippe Chanclou (Orange Labs, France)

**11:10 INVITED: Prioritizing Deployments Achieving Targeted Network Performance Across a Multilayer Pb/s Network**

Srivatsan Balasubramanian (Meta, USA), Bodhisattwa Gangopadhyay (Meta, UK), Vinayak Dangui (Meta, USA), Satyajeet Singh Ahuja (Meta, USA), Varun Gupta (Meta, USA), Grigory Pastukhov (Meta, USA), Max Noormohammadpour (Meta, USA), Alexander Nikolaidis (Meta, USA), Ariyani Copley (Meta, USA), Arash Vakili (Meta, USA), Chiun Lin Lim (Meta, USA), Guanqing Yan (Meta, USA), Xueqi He (Meta, USA), Jiachuan Tian (Meta, USA), Jiajia Chen (Meta, USA), Anand Gokul (Meta, USA), Biao Lu (Meta, USA), Debottym Mukherjee (Meta, USA)

#### Coffee break

11:40 – 12:00 (Warsaw/CEST)

## Th2: Workshop III

12:00 – 13:00 (Warsaw/CEST)

Chair: Patryk Urban (West Pomeranian University of Technology, Poland)

### **12:00 – 13:00 Fiber-Optic Telecom Network as a Sensor: Scientific Endeavour, Business Opportunity or just a Buzz Word?**

The workshop will address the interleaving application areas of photonics in sensing and telecommunications. The speakers will present their views on the concept of using telecom infrastructure also for sensing purposes. The representatives of telecom operator, telecom equipment vendor, sensing equipment vendor and academia to provide a complete perspective onto opportunities and challenges in this area.

#### **Workshop program:**

- “Optical Access Network Serving Sensor Applications”, Philippe Chanclou, Fabienne Saliou, Gaël Simon, Orange (France)
- “Is Joint Optical Communication and Sensing a Table Stake?”, Jim Zhou, ADVA (Germany)
- “Current challenges in the Fiber Bragg Grating-based sensing for telecom networks”, Konrad Markowski, Fiber Team Photonic Solutions (Poland)

## Lunch break

13:00 – 14:00 (Warsaw/CEST)

## Th3: Machine learning II

14:00 – 16:00 (Warsaw/CEST)

Chair: Massimo Tornatore (Politecnico di Milano, Italy and University of California, Davis, USA)

### **14:00 INVITED: Machine-Learning-Aided Dynamic Reconfiguration in Optical DC/HPC Networks**

Sandeep Kumar Singh (University of California, Davis, USA), CheYu Liu (University of California, Davis, USA), S. J. Ben Yoo (University of California, Davis, USA) and Roberto Proietti (University of California, Davis, USA and Politecnico di Torino, Italy)

### **14:30 INVITED: Machine Learning Applied to Inverse Systems Design**

Uiara de Moura (DTU Fotonik, Technical University of Denmark, Denmark), Francesco Da Ros (DTU Fotonik, Technical University of Denmark, Denmark), Darko Zibar (DTU Fotonik, Technical University of Denmark, Denmark), Ann Margareth Brusin (Politecnico di Torino, Italy) and Andrea Carena (Politecnico di Torino, Italy)

### **15:00 INVITED: Federated Learning for Optical Network Automation: A Data Ownership Perspective**

Behnam Shariati (Fraunhofer HHI, Germany)

### **15:30 Transfer Learning Aided QoT Computation in Network Operating with the 400ZR Standard**

Fehmida Usmani (National University of Sciences and Technology, Pakistan), Ihtesham Khan (Politecnico di Torino), Muhammad Umar Masood (Politecnico di Torino), Arsalan Ahmad (National University of Sciences and Technology, Pakistan), Muhammad Shahzad (National University of Sciences and Technology, Pakistan) and Vittorio Curri (Politecnico di Torino)

## Coffee break

16:00 – 16:30 (Warsaw/CEST)

## Th4: Re-architecting networks

16:30 – 17:30 (Warsaw/CEST)

Chair: Jarosław Turkiewicz (Warsaw University of Technology, Poland)

### **16:30 TUTORIAL: Re-architecting metro and aggregation networks with coherent interfaces for beyond 5G**

Paul Wright (BT, UK)

## Th5: Awards and closing ceremony

17:30 – 18:30 (Warsaw/CEST)

Chair: Jarosław Turkiewicz (Warsaw University of Technology, Poland)

### **17:30 Awards and closing ceremony**