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Optical Network Design and Modeling

Anna Tzanakaki, Manos Varvarigos, Raul Muñoz, Reza Nejabati, Noboru Yoshikane, Markos Anastasopoulos, Johann Marquez-Barja

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Optical Network Design and Modeling


23rd IFIP WG 6.10 International Conference, ONDM 2019
Athens, Greece, May 13–16, 2019
Proceedings

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Preface

It was an honor and a pleasure to welcome everyone to ONDM 2019, the 23rd edition of the Optical Network Design and Modelling conference, which was held at the National and Kapodistrian University of Athens, Greece, May 13–16, 2019.

ONDM 2019 focused on cutting-edge research in established areas of optical networking as well as their adoption in support of a wide variety of new services and applications. This involved the most recent trends in networking, including 5G and beyond, big data and network data analytics, cloud/edge computing, autonomic networking, artificial intelligence assisted networks, secure and resilient networks, etc., that drive the need for increased capacity, efficiency, flexibility, and adaptability in the functions that the network can perform.

In this context new disaggregated optical network architectures were discussed, exploiting and integrating novel multidimensional photonic technology solutions, as well as adopting open hardware and software platforms relying on software defined networking (SDN) and network function virtualization (NFV) to allow support of new business models and opportunities.

Some of the thematic areas that were covered include:

- Novel and multidimensional optical network architectures
- Optical network control, management, and orchestration, including SDN and NFV solutions
- Slicing, virtualization, and multitenancy techniques for optical networks
- Optical networking supporting low latency and high bandwidth network function virtualization
- Optical and wireless network convergence, including radio-over-fiber access networks
- Optical networks in support of intra-/inter-data center connectivity and cloud/edge computing
- Artificial intelligence and data analytics techniques for optical networks
- Advances in optical network modeling and optimization
- Routing and spectrum assignment in fixed and flex-grid optical networks
- Novel optical node designs including disaggregation and open optical line systems
- Optical network availability, resilience, survivability, security, and privacy
- Optical networking in support of vertical industries
- Field trials and interoperability demonstrations of optical networks
- Techno-economic studies of optical networks with emphasis on 5G consideration

Some of the key take away messages of the conference include:

- The importance of network user increases, as armed with increasingly-capable smart devices drive network level specifications and design/operation choices
 - The concept of service is being expanded beyond the traditional end-user context to a variety of end-user and operational services that are ICT or vertical industry related

- This imposes the requirement for newer infrastructures, e.g., 5G, 6G and beyond consisting of (optical) communication networks, (edge and cloud) data centers, distributed network functions, etc., in order to become more agile and facilitate more application-centric services with improved user experience
- Infrastructures equipped with additional/newer resources supporting higher bandwidth and lower latency focusing only on the lower layers of the protocol stack are not sufficient anymore
 - Instead, novel, flexible, open, and scalable architectural approaches supporting technology convergence, not only across network domains but also across network and compute/storage domains, involving inter- and intra-Data Center connectivity, are becoming essential
 - Methods developing real-time network-, service-, and application-centric analytics, able to process huge volumes of data, adopting artificial intelligence and machine-learning methods are needed to offer improved network and network service performance as well as user-experience, in support of the vision of future IT infrastructures
- Significant experimentation activities in real-life test-beds (5G UK) have already provided proof of principle demonstrations of the use and potential of optical networking in support of the new 5G and beyond network paradigm to facilitate end-user services with emphasis in improved experience and quality of leaving
- Significant attention has been put towards resilience and security considerations in the context of optical networking and the role optical technologies can play to facilitate more resilient and secure future network infrastructures

ONDM 2019 was a single-track conference. The conference included two workshops, one industrial panel, and one summer school co-organized by the H2020 5G PPP project 5G-PICTURE and the Erasmus Mundus programme SMARTNET:

- Workshop I: Optical Networking an enabler for 5G Solutions, Trials and Demonstrators
- Workshop II: Optical Intra- and Inter- Data Center Networks
- Industry Panel: 5G in 2020 and beyond: reality check, rollout plans and path ahead

Attendance: 90 Attendees

May 2019

Anna Tzanakaki
Manos Varvarigos
Raul Muñoz
Reza Nejabati
Noboru Yoshikane
Markos Anastasopoulos
Johann Marquez-Barja

The original version of the book was revised: The affiliation of the volume editor Johann Marquez-Barja has been corrected. The correction to the book is available at https://doi.org/10.1007/978-3-030-38085-4_56

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