

Report on the 34th Optical Communication Systems Symposium “What Optical Communication Systems will Support the Era of Communications Revolution?”

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1. Introduction

The 34th Optical Communication Systems (OCS) Symposium “What Optical Communication Systems will Support the Era of Communications Revolution?” was held online on Dec. 15–16, 2020. It was organized by the IEICE Technical Committee on OCS, in cooperation with the IEEE Photonics Society Tokyo Section Chapter, the Photonic Internet Forum (PIF), and the IEICE Technical Committee on Extremely Advanced Optical Transmission Technologies (EXAT). The coronavirus disease 2019 (COVID-19) crisis has fundamentally overturned communication styles and made online communication even more important in business and education. This year's symposium, with 20 exhibitors and more than 240 attendees, was held as an opportunity to explore the ideal state of optical communication systems in the era of communications revolution.



Fig. 2 Keynote speech by Prof. Morikawa.

After that, we had workshop entitled “Evolving communication for a new lifestyle.” It was contributed by the following four invited speakers (Fig. 3): Mr. Tatsuya Nomoto (Z-kai) describing changes in education under the COVID-19 crisis and on EdTech initiatives in the Z-kai group, Mr. Takashi Honda (Fujitsu Laboratories) presenting on gymnastics scoring support system using 3D sensing technology, Dr. Tetsushi Watanabe (MaaS Tech Japan) talking about Mobility as a Service (MaaS) and its relationship with beyond 5G, and Dr. Hidenori Sakanashi (AIST) providing recent progress on social infrastructure diagnosis and medical diagnosis technologies using machine learning. From these talks, it was afresh reminded that further stable and high-speed optical communication systems will be necessary for the advanced online services such as EdTech, MaaS, and emerging applications.



Fig. 1 Picture of online OCS symposium, from top, Mr. Takuya Ohara (Secretary of OCS), and Prof. Joji Maeda (OCS committee chair).

2. Technical Sessions

On Day 1 (Dec. 15), following the welcome address (Fig. 1) by Prof. Joji Maeda, the IEICE OCS committee chair, the symposium started with a keynote speech given by Prof. Hiroyuki Morikawa (The University of Tokyo) entitled “Digital management in the new normal era” (Fig. 2). He gave the examples of the digital transformations and introduced the important perspectives for value creation and productivity enhancement in the new normal era.

The award ceremony whose details described later was followed by an online exhibition, in which the 10 exhibitors introduced the latest optical communication devices and systems.



Fig. 3 The presenters of Workshop 1: from left, Mr. T. Nomoto, Mr. T. Honda, Dr. T. Watanabe, and Dr. H. Sakanashi.

There were totally 206 attendees on Day 1. Day 1 of the symposium was closed with an online get-together, where 40 people participated and free discussions on the changes in work and lifestyles under COVID-19 crisis were held.

Day 2 (Dec. 16) started with three invited talks (Fig. 4). The first invited talk was presented by Dr. Shuto Yamamoto (NTT) on “Standardization trends for Ethernet and 200G/λ class short-reach optical

transmission by applying advanced digital signal processing.” He described the standardization activities of Ethernet such as 400 GbE and introduced the 200 G/λ next-generation short-reach optical communication technologies using advanced digital signal processing for realization of 800 GbE/1.6 TbE. The second invited talk was given by Prof. Hidetoshi Katori (The University of Tokyo) and entitled “New space and time information infrastructure created by optical lattice clocks.” He introduced the advances of optical lattice clock and its application to measurement systems. Furthermore, he described future prospects for the social implementation of optical lattice clock. Finally, Prof. Tomoyuki Miyamoto (Tokyo Institute of Technology) gave an invited talk entitled “Optical wireless power supply, its features, latest trends and future perspectives.” He introduced the advantages and issues of optical wireless power transmission technologies and the research trends in power transmission systems and devices.

After that, an invited lecture, organized by the IEEE Photonics Society Tokyo Section Chapter, was given by Prof. Mitsuru Takenaka (The University of Tokyo). His lecture was entitled “Dissimilar material integrated silicon optical circuit and optical neural network application.” He presented the latest research results on an III-V/Si hybrid MOS optical phase shifter for programmable optical circuit applications. He also lectured on a micro-ring resonator crossbar array technology and its application to deep learning.



Fig. 4 The presenters of invited talks and lecture: from left, Dr. S. Yamamoto, Prof. H. Katori, Prof. T. Miyamoto, and Prof. M. Takenaka.

The invited lecture was followed by an online exhibition, where the research results of five national research projects were reported

In the afternoon session, we had another workshop entitled “Optical communication technologies that support the era of communications revolution.” Invited talks were given by Dr. Kenichi Suzuki (Trimatiz) on underwater LiDAR and underwater optical wireless communication technologies, Dr. Kazuhiro Ikeda (AIST) on the latest technology of silicon photonics switch, Mr. Osamu Kurokawa (NTT Communications)



Fig. 5 The presenters of Workshop 2: from left, Dr. K. Suzuki, Dr. K. Ikeda, Mr. O. Kurokawa, and Prof. T. Morioka.

on advanced transmission system between data centers that will support the new normal era, and Prof. Toshio Morioka (Technical University of Denmark) on the current status and future prospects of spatial-division multiplexed optical transmission technologies (Fig. 5). It is strongly expected that the leading-edge technologies presented in the session will open the way to the realization of optical fiber communication systems that can handle the increasing traffic in the new normal era. There were totally 242 attendees on Day 2.

3. Award Ceremony

During the technical sessions, we celebrated this year’s OCS award winners at the award ceremony (Fig. 6). The OCS Technical Committee presented the awards to the following winners:

- OCS Best Paper Award: “402.7-Tb/s weakly-coupled 10-mode-multiplexed transmission,” by Mr. Daiki Soma (KDDI Research) et al.
- OCS Young Researchers Award: Mr. Shota Ishimura (KDDI Research) for “Analog radio-over-fiber transmission technology for mobile fronthaul networks.”
- OCS Young Researchers Award: Mr. Tsubasa Ishikawa (Kagawa University) for “Core Selective Switch for Spatial Channel Networks.”



Fig. 6 OCS award-winners: Mr. D. Soma (middle left), Mr. S. Ishimura (lower middle), and Mr. T. Ishikawa (middle right).

4. Conclusion

In this year, the OCS symposium was held online, in a different style from conventional ones due to COVID-19. The OCS technical committee would like to express gratitude to all the speakers, exhibitors, and audiences, for their contributions to the successful symposium. We hope that this symposium impressed on all participants an unforgettable memory during “communications revolution.”