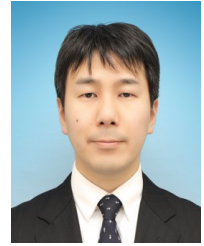


Report on International Workshop on Technology and Proof-of-Concept Activities for 5G Evolution & Beyond 5G (TPoC5GE 2021)

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1. Introduction

International Workshop on Technology and Proof-of-Concept Activities for 5G Evolution & Beyond 5G (TPoC5GE 2021) was organized in conjunction with IEEE 93rd Vehicular Technology Conference (VTC) 2021-Spring. TPoC5GE 2021 is technically cosponsored by IEICE Communication Society. It is also supported by the Technical Committee on Radio Communication Systems (RCS), IEICE and organized by Prof. Eiji Okamoto, Chair of Technical Committee on RCS. IEEE VTC 2021-Spring was originally planned to be held in Helsinki, Finland, from April 25th to April 28th. However, owing to COVID-19 pandemic, it was held in on-demand style as a virtual conference through CONFlux virtual platform from April 25th to May 19th. The number of attendances of this international workshop is around 240 during the 25-day period. The series of this workshop were held at IEEE VTC 2017-Spring, 2018-Spring, 2019-Spring, 2019-Fall, and 2020-Spring. Thus, it was the sixth time to be held. TPoC5GE 2021 focused on the novel technologies, technical concepts, evaluation results, and the proof-of-concept activities for 5G evolution and beyond 5G/6G.

2. Workshop Program

TPoC5GE 2021 consists of 11 oral technical presentations, including two keynote presentations. The first keynote presentation was provided by Dr. Yoshihisa Kishiyama from NTT DOCOMO, INC. The title of his presentation is “Challenge to the Extreme in 6G Wireless Communications”. His talk gave an overview of the trends of mobile communications in 5G evolution and beyond 5G/6G, and he also introduced the research and development activities for the near future mobile communications system in Japan.

The second keynote presentation was provided by Prof. Preben E. Mogensen from Aalborg University, Denmark, and Nokia Siemens Networks. The title of his presentation is “Communications in the 6G Era”. He introduced the visions overseas for 5G evolution and beyond 5G/6G, and he explained the important technical issues of the near future mobile communications system. Both the keynote speakers also covered the predictions for 2030 and beyond, and gave the attendances thought-provoking views.

3. Technical Sessions

In technical sessions, there were nine presentations. The followings are the focuses of those presentations, which are state-of-the-art of the research fields:

- Enhanced interference coordination for 5G advanced ultra-dense Radio Access Network (RAN). The work of the presentation evaluated the performance the proposed coordination scheme that is using multi-layered clustering.
- Parallel spatial modulations for large-scale Multiple-Input Multiple-Output (MIMO) systems. The work of the presentation studied a time-indexed scheme with antenna grouping.
- Channel estimations for millimeter wave MIMO systems. The work of the presentation studied the channel estimation using multi-stage compressed sensing method.
- Cross-carrier schemes for 5G and beyond 5G. This presentation evaluated a dynamic cross-carrier technique that has enhancement of latency.
- Quadrature index modulation for 5G wireless communications. In the work of the presentation, the multi-dimensional generalized quadrature index modulation has been evaluated.
- Successive Interference Cancellation (SIC) detector for Non-Orthogonal Multiple Access (NOMA) systems. In the work of the presentation, an intelligent SIC detector based on deep learning has been evaluated.
- Load-balancing for 5G millimeter wave distributed antenna systems. In the work of the presentation, load-balancing methods are studied and compared.
- Data collection for smart city. A data collection platform using gigabit Vehicle-to-Everything (V2X) communication over 60 GHz band has been evaluated in the work of the presentation.
- Radio resource allocation for distributed antenna transmission systems. The work of the presentation evaluates user set elimination in allocation sequences of Round-Robin (RR) scheduling.

4. Acknowledgement

The TPoC5GE 2021 committee members would like to give thanks to all the authors, the speakers, the participants, and the staffs.