

# JOURNAL OF TELECOMMUNICATIONS AND INFORMATION TECHNOLOGY

## *Editors' Note on the Special Section*

The dynamic, not to say the rapid, development of wireless communication technologies has had enormous impact on nearly all aspects of our everyday life and in a large number of cases has changed them significantly in the process. The same also applies to the technologies and services that are related to the introduction of the fifth generation of mobile networks. As this development represents an evolution in communication architectures which should ensure much faster speeds, it will not be long before its particular and continued significance will become even more apparent to us all. Accordingly, the mission statement of the annual convention of the Federation of Telecommunications Engineers of the European Community to be held in Cracow and planned for September 28–29, 2020, was “5G – Opportunities and Threats”. Regrettably, the pandemic restrictions prevented the organization of the event in the traditional conference format with audience participation. Therefore, we invited our authors to submit their articles for publication in the special section. Ultimately, 5 articles by the authors from Italy, Greece, Finland, the UK and Poland have been selected for publication.

These articles have been divided into three sections that cover different areas of research. The first one, including two papers, presents the view of 5G networks from the operator's perspective. The first article in this part, authored by Peter McCarthy-Ward, Andy Valdar, Stuart Newstead, and Stuart Revell entitled “5G New Business Opportunities – New Business Models, Pricing and Use Cases”, presents a profitability analysis and return of investment following the introduction of 5G networks from the operator's perspective, with three exemplary practical usage scenarios for 5G. Then, the article “5G Is Out There: How to Ride the Market Storm and Thrive” by Edward Smith and Mauro Ugolini presents the changes in the commercial model adopted by the mobile ICT industry effected by the introduction of the 5G technology. The article discusses the influence of the 5G technology on the service market and its significance as an element of the competitive strength of mobile network operators.

The second section is devoted to a presentation of a number of exemplary practical solutions that are based on the 5G technology. This section includes the article entitled “C-V2X Communications for the Support of a Green Light Optimized Speed Advisory (GLOSA) Use Case”, prepared by an international team of twelve authors. The article focuses on the use of the 5G technology in vehicular communications, or more precisely within the framework of cooperative Intelligent Transportation Systems (C-ITS), in the context of cellular V2X (C-V2X) technologies. The article draws on the research results obtained within the framework of the 5G-DRIVE project promoting cooperation between the EU and China. The particular case of the Green Light Optimized Speed Advisory (GLOSA) is discussed in the article in more detail.

The last part of the special section contains two articles on different aspects of the research into the upcoming development of the fifth-generation mobile network technology. The article prepared by Piotr Remlein and Urszula Stachowiak and entitled “Security Verification in the Context of 5G Sensor Networks” focuses on the ways the safety of network solutions can be evaluated. With the example of a tool that performs automated symbolic analysis (Tamarin prover), the authors present how to verify the correctness of the operation of safety protocols in a formal way. The article also discusses an example of modeling the process of the DTLS 1.2 handshake protocol enriched with the TCP Syn Cookies mechanism which is dedicated to preventing DoS attacks. The authors have proved that the Tamarin software can be successfully used to evaluate safety protocols in 5G networks.

The last article in this section, authored by Małgorzata Wasilewska and Łukasz Kułacz, is entitled “Machine Learning-Based Small Cell Location Selection Process”. The paper discusses an algorithm to determine the location in small cells in a dense metropolitan area network. The algorithm proposed in the article makes use of machine learning methods, such as k-means clustering and spectral clustering, while it uses ray tracing to model channels. The article considers two scenarios for the choice of the base station: the one that is based on an arbitrary choice and the other that is based on the level of signal strength. To evaluate both scenarios, the value of the average bitrate is used. The authors claim and prove that the machine learning method can be successfully used in the solved example.

We recommend reading these interesting articles.

Maciej Sobieraj and Piotr Zwierzykowski  
Guest Editors