Editors's Introduction to the Special Issue on "Frontiers in Network Systems and Applications"

The growing availability of network infrastructure is paralleled by the ever growing number of network applications. These applications rely on network services to answer business needs and enable the interaction of users and devices. Not surprisingly, the development of applications promotes further research in the field of network systems. In particular, the growing complexity of network infrastructure gives rise to the need for even more complex research and development environments. This need is observed both in the case of complex fixed network layouts and mobile environments. To answer these needs the efforts of industry leaders and academia can be combined. By combining the ability to build and deploy complex network layouts with more theoretically grounded research, further progress in the field can be attained. This illustrates the benefits arising from the collaboration between industry leaders and academia.

In 2012, to promote such cooperation of industry experts and researchers with academic research groups, the first Frontiers in Network Applications and Network Systems symposium was organised in Wroclaw, Poland. The symposium provided a forum for the exchange of ideas between network operators, designers and researchers. The symposium was organised as a part of the Federated Conference on Computer Science and Information Systems (FedCSIS). This created a unique opportunity to discuss frontiers in network system development in view of recent developments in other areas of computer science. The solutions from many of these areas, such as the solutions incorporated from the domain of artificial intelligence, or database systems, are also vital components of modern network systems.

The first edition of the conference was followed by even further cooperation with other network-related events of the FedCSIS multiconference. As a result, in 2013, an International Conference on Innovative Network Systems and Applications (iNetSApp) was organised for the first time. It included a variety of network-related topics with the emphasis on network systems, applications and services (SoFast-WS track of the conference) and wireless sensor networks (WSN track of the conference).

This special issue includes selected extended versions of papers, most of which were presented during SoFast-WS conference i.e. the Frontiers in Network Applications, Network Systems and Web Services conference organised in 2013 in Krakow, Poland. The SoFast-WS conference is co-organised by the Research and Development Centre of Orange Polska – a part of a global chain of R&D Orange Labs centres of Orange telecom group, the Faculty of Cybernetics of the Military University of Technology, the Faculty of Mathematics and Information Science of the Warsaw University of Technology, and Zayed University. Hence, the idea of promoting the cooperation between business and academia is directly reflected in the composition of both the organising team and the program committee of the conference.

The selection of papers contained in this special issue reflects various research activities in the field of network systems. The first work, Future proof access networks for B2B applications, authored by P. Parol and M. Pawłowski, discusses the development of the Gigabit-capable Passive Optical Network (GPON). Moreover, the authors propose a way the GPON network can provide a basis for Software-Defined Networking (SDN). A solution based on OpenFlow is proposed in this context. At the same time, the work provides a clear illustration of the complexity of network systems combining recent hardware developments with sophisticated novel protocols.

In the next work, The architecture of Distributed Database System in the VANET Environment, J. Janech, E. Kršák, and Š. Toth discuss the role of a database system in a vehicular network. The unique requirements that have to be met by a database system serving the needs of moving objects while taking into account location aspects are discussed. This clearly illustrates the interdisciplinary research needed to develop modern network systems, in this case involving database-related research.

Another perspective on network systems is offered by the work Prototype Implementation of a Scalable Real-Time Dynamic Carpooling and Ride-Sharing Application. In this work, D. Dimitrijević, V. Dimitrieski and N. Nedić propose a way in which progress in the development of a ride-sharing application can be attained. Hence, a user perspective on the system and the requirements of the users of the network application are fundamental for this work.

Finally, in Tiny Low-Power WSN Node for the Vehicle Detection, the development of network systems is again considered from the hardware point of view. Even though the work, authored by M. Chovanec, M. Hodon, and L. Cechovic, refers to wireless networks, it documents the development of a novel hardware device. The device is a special low-power sensor node embedding a magnetometer as the main sensing tool for vehicle presence monitoring.

The works contained in this special issue illustrate various directions of research conducted in the field of network systems, involving both novel hardware and software developments.

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