Mobile Netw Appl (2015) 20:781–782
DOI 10.1007/s11036-015-0658-4

Editorial: Recent Advances on the Next Generation of Mobile Networks and Services

Zheng Yan[1,2] · **Athanasios V. Vasilakos**[3] · **Laurence T. Yang**[4,5]

Published online: 4 November 2015

Editorial

Following the great success of 2G and 3G mobile networks and the fast growth of 4G, the next generation mobile networks or 5th generation wireless systems (in short 5G) was proposed aiming to provide infinite networking capability to mobile users. Different from 4G, 5G is much more than increased maximum throughput. It aim to involve and benefit from many current technical advances including massive dense networks, interference and mobility management, Internet of Things (IoT), pervasive and social computing, mobile ad hoc networks (MANET), cognitive radio, World Wide Wireless Web (WWWW), cloud computing, IPv6, and so on. How 5G should and will be, what will be the keys for 5G? What is the perspective of 5G architecture and technologies? How to effectively apply and benefit from the above technologies and make them intelligently interoperate together? How can 5G stimulate our innovation for the next generation of mobile networks and services? Obviously, integrating all above existing advanced technologies and innovating new techniques for 5G bring extreme challenges on 5G networks and services in both research and development. This study has just initiated in both industry and academia, but with great fervor all over the world.

This special issue features six selected papers with high quality. The first article, "D2D Communication Meets Big Data: From Theory to Application", authored by Liang Zhou, proposed a systematic solution for large-scale video transmissions over D2D communications in order to overcome the challenges of D2D communications, such as limited storage capacity, discrepant computational ability, dynamic communication environment, random network establishment, and the diverse services of the large scale video applications.

The second article titled "Software-Defined Wireless Transport Networks for Flexible Mobile Backhaul in 5G Systems" presented the motivation for introducing programmability concepts in wireless transport networks and illustrated the applicability of control plane with two use cases for dynamically controlling wireless transport nodes in 5G networks towards Software Defined Wireless Transport Networks (SDWTNs).

In the next article with the title "Context-Aware User Association for Energy Cost Saving in A Green Heterogeneous Network with Hybrid Energy Supplies", the authors studied the user association problem to reduce the total energy cost of a heterogeneous cellular network with wireless backhauls and hybrid energy supplies. By considering both the power consumption of a base station and backhaul links, two algorithms were proposed to exploit available context-aware information of a network in a centralized way or a distributed way in order to find a feasible and near-optimal solution. Network architecture knowledge, users' data requirements, and available green energy are investigated in solving energy cost saving problems.

Cognitive radio (CR) is widely regarded as one of the most promising technologies for 5G wireless communications. The fourth article titled "Dynamic Spectrum Access Algorithm Based on Game Theory in Cognitive Radio Networks" proposed a dynamic spectrum access (DSA) algorithm based on

✉ Zheng Yan
zyan@xidian.edu.cn

[1] State Key Laboratory on Integrated Services Networks, Xidian University, Xi'an, Shaanxi, China

[2] Department of Communications and Networking, Aalto University, Espoo, Finland

[3] Lulea University of Technology, 97187 Lulea, Sweden

[4] School of Computer Science and Technology, Huazhong University of Science and Technology, 1037 Luoyu Rd, Hongshan, Wuhan, Hubei, China

[5] Department of Computer Science, St. Francis Xavier University, Antigonish, NS B0H 1X0, Canada

game theory. It jointly performs spectrum leasing and interference mitigation among secondary users. The proposed scheme enables secondary users to efficiently utilize the licensed spectrum shared with primary users in a dynamic environment while maximizing the spectrum utilization.

Cloud computing offers a new way of service provision and will definitely play an important role in the next generation mobile networks and services. Cloud data protection is a crucial issue that impacts the success of cloud computing and may impede the development of 5G. The fifth article, "Controlling Cloud Data Access Based on Reputation" proposed a practical scheme to securely access cloud data and effectively reduce access risk according to the reputations of cloud computing entities. By applying proxy re-encryption, cloud data access can be efficiently controlled in the situation that the data owner is not available online or does not know how to control the access.

The last article titled "Efficiently Predicting Trustworthiness of Mobile Services Based on Trust Propagation in Social Networks" investigated efficient trust prediction in a large-scale social network. The authors proposed a trust propagation method that exploits the peculiar properties of social networks and incorporates a landmark-based method with preprocessing to improve the efficiency of trust prediction. In this method, a small number of landmark users in the social network are firstly selected as referees in trust propagation, and the trust between these landmark users and the other users are then precomputed. The trust between two indirectly connected users is finally estimated via aggregating the referrals provided by the landmark users.

Acknowledgments The guest editors are thankful to our reviewers for their effort in reviewing the manuscripts. We also thank the Edit-in-Chief, Dr. Imrich Chlamtac for his supportive guidance during the entire process. The special issue is sponsored by 111 project (Grant No. B08038), NSFC (Grant No. 61472308), the PhD grant of Chinese Educational Ministry (Grant No. JY0300130104), the initial grant of Chinese Educational Ministry for researchers from abroad (Grant No. JY0600132901), and the grant of Shaanxi Province for excellent researchers from abroad (Grant No. 680F1303), as well as Aalto University.

Zheng Yan (M'06-SM'14) is currently a professor at the Xidian University, Xi'an, China and a visiting professor at the Aalto University, Espoo, Finland. She authored more than 100 publications and solely authored two books. She is the inventor and co-inventor of 39 patents and patent applications. Her research interests are in trust, security and privacy, social networking, cloud computing, networking systems, and data mining. Prof. Yan serves as an organization and program committee member for numerous international conferences and workshops. She served or is serving as an Editor or/and Guest Editor for many technical journals, such as Information Sciences, ACM TOMM, Information Fusion, IEEE Systems Journal, Future Generation Computer Systems, Computers & Security, IET Information Security, IJCS (Wiley), SCN (Wiley), ACM/Springer MONET, and KSII TIIS. She is a senior member of the IEEE.

Athanasios V. Vasilakos (M'00–SM'11) is currently a professor with Lulea University of Technology, Sweden. He served or is serving as an Editor or/and Guest Editor for many technical journals, such as the IEEE Transactions on Network and Service Management; IEEE Transactions on Cloud Computing, IEEE Transactions on Information Forensics and Security; IEEE Transactions on Cybernetics; IEEE Transactions on Information Technology in Biomedicine; ACM Transactions on Autonomous and Adaptive Systems; IEEE Journal on Selected Area in Communications. He is also a General Chair of the European Alliances for Innovation (www.eai.eu).

Laurence T. Yang (M'97–SM'15) received the B.E. degree in computer science and technology from Tsinghua University, China, and the Ph.D. degree in computer science from the University of Victoria, Canada. He is currently a professor with the School of Computer Science and Technology, Huazhong University of Science and Technology, China, and Department of Computer Science, St. Francis Xavier University, Canada. He has published more than 250 papers in various refereed journals (about 40% on top IEEE/ACM TRANSACTIONS/Journals and the others mostly on Elsevier, Springer, and Wiley Journals). His research interests include parallel and distributed computing, embedded and ubiquitous/pervasive computing, big data. His research has been supported by the National Sciences and Engineering Research Council of Canada and the Canada Foundation for Innovation.