Guest Editorial: Special Issue on Cognitive, Cellular and Mobile Networks

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Abstract

This special issue consists of a collection of papers on the latest advances in cognitive, cellular, and mobile networks. It consists of the top papers selected and extended from The Cognitive, Cellular, and Mobile Networks (CCM) Track of 24th International Conference on Computer Communications and Networks (ICCCN 2015), held in Las Vegas, Nevada, USA. August 3 – August 6, 2015, as well as open call submissions. We hope that this SI will serve as good references for engineers, scientists, researchers, and academics in the field of Cognitive, Cellular, and Mobile Networks.

With the proliferation of smart handheld devices, mobile data is projected to grow drastically in the next few years. Coupled with emerging machine-to-machine communications, there is a compelling need to significantly improve the current network capacity and architecture. To meet this challenge, traditional cellular networks must be more adaptive and intelligent, e.g., adaptive to different types of spectrum (white space or dedicated) and traffic patterns. They must also interconnect with other coexisting wireless networks such as Wi-Fi, wireless mesh network, femtocells and small cells, etc., to support a wide range of applications.

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engineers, scientists, researchers, and academics in the field of Cognitive, Cellular, and Mobile Networks.

In the first paper, titled "Towards Effective Intra-flow Network Coding in Software Defined Wireless Mesh Networks," the authors developed a novel OpenCoding protocol, which combines the SDN technique with intra-flow network coding for wireless mesh networks. The authors show that the developed protocol can simplify the deployment and management of the network and improve network performance, and analyze the routing overhead of OpenCoding and derived closed formulae.

In the second paper, titled "Spectrum Hole Identification in IEEE 802.22 WRAN using Unsupervised Learning," the authors aim to improve cooperative sensing efficiency by developing a cooperative spectrum sensing algorithm using unsupervised K-means clustering classification approach for Cognitive Radios (CR) based on IEEE 802.22 Wireless Regional Area Network (WRAN) standard. The performance of proposed algorithm is quantified in terms of detection accuracy, training and classification delay time, and the detection accuracy of

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our proposed scheme meets the requirement of IEEE 802.22 WRAN.

The third paper, titled "Distance Based Method for Outlier Detection of Body Sensor Networks," present a distance based method for the outlier detection of body sensor networks. The authors
use a Kernel Density Estimation (KDE) to calculate the probability of the distance to k nearest neighbors for diagnosed data. They also formalize a sliding window based method to improve the outlier detection performance and introduce a Hidden Markov Model (HMM) based method to estimate the most probable ground truth values which have the maximum probability to produce the training data.

Recnetly, Cloud Radio Access Network (CRAN) was proposed as a promising architecture for future generation of cellular networks. The fouth paper, titled "Survey on Cloud Radio Access Network," presents a comprehensive survey on CRAN centring on optimized resource allocation, energy efficiency and throughput maximization under fronthaul capacity. It also reviews the existing solution and future opportunities in CRN related research.

The fifith paper is titled "Multiple Access Techniques for Next Generation Wireless: Recent Advances and Future Perspectives." It first provides a detailed review on the existing Space Division Multiple Access (SDMA) related works and highlights the main features and the drawbacks of various existing and emerging multiplexing/multiple access techniques. It then presents a novel concept of clustered orthogonal signature division multiple access for the next generation of cellular networks.

We would like to thank all the authors for their contributions and the reviewers for their great efforts in the SI review process. Especially, we would like to thank the Editor-in-Chief Prof. Min Song for allowing our GE team to have this SI and the great support from him and from the Deputy Editor-in-Chief Prof. Danda B. Rawat. We believe that the papers from the SI will contribute to the further development of wireless specterm technologies for future networks.

Guest Editors

Shiwen Mao received Ph.D. in electrical and computer engineering from Polytechnic University, Brooklyn, NY in 2004. Currently, he is the Samuel Ginn Endowed Professor and Director of the Wireless Engineering Research and Education Center (WEREC) at Auburn University, Auburn, AL, USA. His research interests include wireless networks and multimedia communications, with current projects on cognitive radio, small cells, mmWave networks, free space optical networks, indoor localization, and smart grid. He is on the Editorial Board of IEEE Transactions on Multimedia, IEEE Internet of Things Journal, IEEE Communications Surveys and Tutorials, IEEE Multimedia, Elsevier Ad Hoc Networks Journal, Elsevier Digital Communications and Networks Journal, and Wiley International Journal on Communication Systems. He is the Vice Chair – Letters & Member Communications of IEEE ComSoc Multimedia Communications Technical Committee. He received the 2015 IEEE ComSoc TC-CSR Distinguished Service Award, the 2013 IEEE ComSoc MMTC Outstanding Leadership Award, and the NSF CAREER Award in 2010. He is a co-recipient of the IEEE GLOBECOM 2015 Best Paper Award, the IEEE WCNC 2015 Best Paper Award, the IEEE ICC 2013 Best Paper Award, and the 2004 IEEE Communications Society Leonard G. Abraham Prize in the Field of Communications Systems. He is a Distinguished Lecturer of IEEE Vehicular Technology Society in the Class of 2014.

Honggang Wang received his Ph.D. in Computer Engineering at University of Nebraska-Lincoln in 2009. He is an associate professor at UMass Dartmouth. His research interests include Wireless Health, Body Area Networks (BAN), Cyber and Multimedia Security, Mobile Multimedia and Cloud, Wireless Networks and Cyber-physical System, and BIG DATA in mHealth. He has published more than 100 papers in his research areas. He is an Associate Editor of IEEE Transactions on Multimedia, an Associate Editor of IEEE Transactions on Big Data, an Associate Editor of IEEE IoT (Interne of Things) Journal, an Associate Technical Editor of IEEE Communication Magazine, an Associate Editor of IEEE Access Journal, a Guest Editor of IEEE IoT Journal special issue on "IoT for Smart and Connected Health", a Guest Editor of IEEE Communication Magazine SI on "Emerging Applications, Services and Engineering for Cellular Cognitive Systems", a Guest Editor of IEEE Sensors Journal, an Associate Editor of Wiley's Security and Communication Networks (SCN) Journal and Transactions on Emerging Telecommunications Technologies. He also serves as TPC Chair or Co-Chair for several conferences such as TPC Chair of 8th ICST/ACM International Conference on Body Area Networks (BODYNETS 2013) , TPC Co-chair of (BODYNETS 2015), TPC symposium Co-Chair of IEEE conference on communications 2015 (ICC 2015, Mobile and Wireless Networking symposium), TPC Chair of IEEE HEALTHCOM 2015 , TPC Co-Chair of IEEE ISCC 2015, TPC track co-chair for the "Cognitive, Cellular and Mobile Networks (CCM)" of IEEE ICCCN 2014 and 2015, and TPC Co-Chair of Ubi-HealthTech

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2015. He also serves as the steering committee co-chair of IEEE CHASE and general co-chair of of IEEE CHASE 2016, which is a leading international conference in the field of connected health. He is the TPC member for IEEE INFOCOM 2013-2015, BSN 2014 (ETH, Zurich), BSN 2015 (MIT), IEEE ICDCS 2015, IEEE ICC 2011-2015, IEEE Globecom 2010-2014, and IEEE ICME 2013-2014. He serves on NSF panel 2012-2015. He currently serves as a Board Co-Director of IEEE MMTC (Technical Committee on Multimedia Communications) E-Letter and received IEEE Multimedia Communications Technical Committee (MMTC) Outstanding Leadership Award (2015).

Aaron Striegel is currently an Associate Professor and serves as Associate Chair in the Department of Computer Science & Engineering at the University of Notre Dame. He received his Ph.D. in December 2002 in Computer Engineering at Iowa State University under the direction of Dr. G. Manimaran. Prof. Striegel's research interests focus on instrumenting the wireless networked ecosystem to gain insight with respect to user behavior and global network performance. Further research interests of Prof. Striegel include computer security and the adaptation of low-cost gaming peripherals for rehabilitation. Prof. Striegel has received several best paper awards including USENIX LISA, IEEE Healthcom, and HotPlanet. Prof. Striegel has received various research and equipment funding from NSF, DARPA, Sprint, Intel, Google, and Alcatel-Lucent. He has also been the recipient of a NSF CAREER award in 2004 and has been a recent participant in NAE symposia on Engineering Education and the Informed Brain in the Digital World.

Kewei Sha is an Assistant Professor in Computer Science at University of Houston, Clear Lake (UHCL). Before he moved to UHCL, he was the Department Chair and Associate Professor in the Department of Software Engineering at Oklahoma City University. He received Ph.D in Computer Science from Wayne State University in 2008. His research interests include sensor networks, cyber-physical systems and mobile computing, and network security and privacy. Dr. Sha has served as the secretary of Technical Committee on the Internet of the IEEE Computer Society (IEEE-CS TCI), a guest Editor at Wireless Personal Communications and International Journal of Security and Networks, a conference technical program committee chair for ICCCN 2015, a workshop general chair for ICCCN 2013, a workshop co-chair of MobiPST 2011, 2012 and 2014, a

session chair in ICCCN and CollaborateCom, a member of editorial board in several journals, and a program committee member in numerous conferences. He is also a reviewer for numerous journals including IEEE TPDS, IEEE TC, ACM TAAS, IEEE TDSC, IEEE TITS, Elsevier JPDC and so on.