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Smart Grid (Wireless Communications):

IEEE Wireless Communications

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Message from the Editor-in-Chief

As energy needs continue to expand with the growing use of renewable sources by customers, the electric system of the future will face new challenges in balancing electricity flow on the grid. Management and control of future grids will require the support of robust and reliable networks for gathering information from wide ranging sensory devices and actuators. For the distributed generation system, in particular, the basic problem is a lack of communication network infrastructure, which is a key factor in monitoring the grid. Under dynamic conditions keeping the balance between demand and supply, as well as enabling the grid to reroute power in the case of local outages, are amongst the most important challenges. Despite the fact that wired technologies offer a good level of reliability and security, they are very costly. Therefore, in the absence of any infrastructure network, wireless is often viewed as the most cost effective alternative to wireless communications. The advancement of various IoT-centric wireless communication technologies is expected to have a major impact in supporting distributed generation grid systems that can provide access to a large number of smart sensors, actuators, and protective switches, as well as consumer endpoints on utility networks. With the anticipated deployment of new advanced technologies and smart devices in the next generation electric system, developing a robust wireless network along with effective design architectures for inter/intra communications between various entities and players in Smart Grid domains will become more challenging. As interoperability, reliability, scalability, resiliency, and security remain key tenets of the next generation of active grid systems, the wireless research community will continue to confront these challenges.

Our main goal has been to make sure that the IEEE communication society continues to play a major role in Smart Grid by publishing high quality papers. Therefore, I am very pleased that a sizable portion of this issue is dedicated to the wireless communication aspects of the smart grid. This special issue contains important papers that address some of the critical challenges described above. I would like to thank the Guest Editors for handling a large number of high quality papers that were submitted to this special issue. Unfortunately, due to limited space, they had to restrict themselves to selecting only a handful of papers.

This issue also contains several interesting open call papers. The paper by J. Zhang et al., focuses on the issues concerning the design of an antenna array architecture for future 5G millimeter-wave systems. For practical applications, the paper also provides a few guidelines for designing millimeter-wave cellular access networks. Resource management of ad hoc clouds in both static and dynamic modes is the main topic of the next paper entitled:

AMCloud: Towards a Secure Autonomic Mobile Ad Hoc Cloud Computing System. This paper also discusses security and privacy issues in ad hoc cloud computing. Another open call article in this edition is entitled: “Realizing the Tactile Internet: Haptic Communications over Next Generation 5G Cellular Networks”. The paper presents design efforts for both the Tactile Internet and the underlying Haptic Communications, as well as providing an overview of the Tactile Internet revolution.

As demand for building an infrastructure network for future Railway Communication is intensifying, the next article by F. Mazzenga, R. Giuliano, A. Neri, and F. Rispoli introduces a new telecommunication solution that is based on multi radio bearers using cellular and satellite public networks as an alternative to the deployment of a dedicated infrastructure. Relationships between network resources and a mechanism to allocate resources to virtual network operators (VNOs) is investigated in the paper entitled: Substitutability of Spectrum and Cloud-based Antennas in Virtualized Wireless Networks. The next paper by Chunxiao Jiang et al. covers the important aspects of machine learning and decision making for Next-Generation Wireless Networks. It investigates the family of supervised and unsupervised learning techniques and their deployment in 5G networks. A Flexible 5G Wide Area Solution for TDD with Asymmetric Link Operation is the title of the final paper in this issue. The paper offers a flexible multi-service 5G wide area (WA) solution for time division duplex (TDD) operation, which shows a clear advantage over the current LTE. I hope you enjoy this issue.

Biography

HAMID GHARAVI received his Ph.D. degree from Loughborough University, United Kingdom, in 1980. He joined the Visual Communication Research Department at AT&T Bell Laboratories, Holmdel, New Jersey, in 1982. He was then transferred to Bell Communications Research (Bellcore) after the AT&T-Bell divestiture, where he became a consultant on video technology and a Distinguished Member of Research Staff. In 1993, he joined Loughborough University as a professor and chair of communication engineering. Since September 1998, he has been with the National Institute of Standards and Technology (NIST), U.S. Department of Commerce, Gaithersburg, Maryland. He was a core member of Study Group XV (Specialist Group on Coding for Visual Telephony) of the International Communications Standardization Body CCITT (ITU-T). His research interests include smart grid, wireless multimedia, mobile communications and wireless systems, mobile ad hoc networks, bandwidth compression, and visual communications. He holds eight U.S. patents and has over 100 publications related to these topics. He received the Charles Babbage Premium Award from the Institute of Electronics and Radio Engineering in 1986, and the IEEE CAS Society Darlington Best Paper Award in 1989. He served as a Distinguished

Lecturer of the IEEE Communication Society. In 1992 he was elected a Fellow of IEEE for his contributions to low-bit-rate video coding and research in subband coding for video applications. He has been a Guest Editor for a number of special issues, including Smart Grid: The Electric Energy System of the Future, *Proceedings of the IEEE*, June, 2011; a Special Issue on Sensor Networks & Applications, *Proceedings of the IEEE*, August 2003; and a Special Issue on Wireless Multimedia Communications, *Proceedings of the IEEE*, October 1999. He was a TPC Co-Chair for IEEE SmartGridComm in 2010 and 2012. He served as a member of the Editorial Board of *Proceedings of the IEEE* from January 2003 to December 2008. From January 2010 to December 2013 he served as Editor-in-Chief of IEEE Transactions on CAS for Video Technology.

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