T1. Challenges and Solutions for LTE and 5G based V2X Communications

Abstract:

A wide variety of work has been down in vehicle-to-everything (V2X) communications to enable various applications for road safety, traffic efficiency and passenger infotainment. Although IEEE 802.11p used to be considered as the main technology for V2X, new research trends nowadays are considering cellular technology as the future of V2X due to its rapid development and ubiquitous presence. This tutorial surveys the recent development and challenges on 4G LTE and 5G mobile wireless networks to support efficient V2X communications. In the first part, we highlight the technical motivations of 4G LTE for V2X communications. In the second part, we explore the LTE V2X architecture and operating scenarios being considered. In the third part, we discuss the challenges and the new trends in 4G and 5G for supporting V2X communications such as physical layer structure, synchronization, resource allocation, security, multimedia broadcast multicast services (MBMS), as well as possible solutions to these challenges. Finally, we discuss some open research issues for future 5G based V2X communications.

Speaker's Biography:

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Yi Qian is a professor in the Department of Electrical and Computer Engineering, University of Nebraska-Lincoln (UNL). Prior to joining UNL, he worked in the telecommunications industry, academia, and the government. His research interests include information assurance and network security, network design, network modeling, simulation and performance analysis for next generation wireless networks, wireless ad-hoc and sensor networks, vehicular networks, smart grid communication networks, broadband satellite networks, optical networks, high-speed networks and the Internet. He is serving on the editorial board for several international journals and magazines, including serving as the Associate Editor-in-Chief for IEEE Wireless Communications Magazine. He was the Chair of IEEE Communications Society Technical Committee for Communications and Information Security 2014-2015. He is the Technical Program Committee Chair for IEEE ICC 2018. He is a Distinguished Lecturer for IEEE Vehicular Technology Society & a Distinguished Lecturer for IEEE Communications Society. Prof. Qian received Henry Y. Kleinkauf Family Distinguished New Faculty Teaching Award in 2011, Holling Family Distinguished Teaching Award in 2012, Holling Family Distinguished Teaching Award for Advising and Mentoring in 2018, and Holling Family Distinguished Teaching Award for Innovative Use of Instructional Technology in 2018, all from University of Nebraska-Lincoln. In the recent years, he has been a frequent speaker on many topics in his research areas in various venues and forums, as a keynote speaker, a tutorial presenter, and an invited lecturer.