

T5. Towards Spectrum and Energy Efficient Heterogeneous Wireless Networks

Abstract:

The proliferation of new applications, e.g., mobile TV, Internet gaming, large file transfer, and the development of user terminals, e.g., smart phones, notebooks, etc., has dramatically increased user traffic and network load. As the spectral efficiency of a point-to-point link in cellular networks approaches its theoretical limits, there is a need for increase in the node density to further improve network capacity and coverage to address the ever increasing traffic demand. Furthermore, the fast growing data traffic and dramatic expansion of network infrastructures will inevitably trigger tremendous escalation of energy demand and energy consumption in wireless networks, which will directly result in the increase of greenhouse gas emission and poses ever increasing threats to the environmental protection and sustainable development. Green evolution has become another urgent need for wireless networks today. The wireless network research should meet the challenges raised by the high demand of both wireless traffic and energy consumption. This tutorial discusses the need for such an alternative strategy, where low power nodes are overlaid within a macro network, creating a wireless Heterogeneous Network (HetNet). In this tutorial we explore a broad scope of technical areas that are under investigation in the context of HetNets. These areas include node/client cooperation, interference management, mobility, green radio, applications and services. This tutorial shall provide deep insights into the motivations and technology enablers for the emerging area as well as the HetNet development and deployment status.

Speaker's Biography:

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Rose Qingyang Hu received a B.S. degree in Electrical Engineering from University of Science and Technology of China, a M.S. degree in Mechanical Engineering from Polytechnic Institute of New York University, and a Ph.D. degree in Electrical Engineering from University of Kansas. From January 2002 to June 2004 she was an assistant professor with the Department of Electrical and Computer Engineering at Mississippi State University. She also has more than 10 years of R&D experience with Nortel, RIM and Intel as a technical manager, a senior wireless system architect, and a senior research scientist. Currently she is an associate professor with the Department of Electrical and Computer Engineering at Utah State University. Her current research interests include next-generation wireless communications, wireless network design and optimization, green radios, multimedia QoS/QoE, smart grid communications, wireless system modeling and performance

analysis. She has published extensively and holds numerous patents in her research areas. Dr. Hu is a Senior Member of IEEE and a member of Phi Kappa Phi and Epsilon Pi Epsilon Honor Societies.

Yi Qian received a Ph.D. degree in electrical engineering from Clemson University. He is an Associate Professor in the Department of Computer and Electronics Engineering, University of Nebraska-Lincoln (UNL). Prior to joining UNL, he worked in the telecommunications industry, academia, and the government. Some of his previous professional positions include serving as a senior member of scientific staff and a technical advisor at Nortel Networks, a senior systems engineer and a technical advisor at several start-up companies, an Assistant Professor at University of Puerto Rico at Mayaguez, and a senior researcher at National Institute of Standards and Technology. His research interests include information assurance and network security, computer networks, mobile wireless ad-hoc and sensor networks, wireless and multimedia communications and networks, and smart grid communications. He has a successful track record to lead research teams and to publish research results in leading scientific journals and conferences. Several of his recent journal articles on wireless network design and wireless network security are among the most accessed papers in the IEEE Digital Library. Dr. Yi Qian is a member of ACM and a senior member of IEEE.

Qian (Clara) Li received her B.E. and M.S. degrees in information engineering from Nanjing University of Posts and Telecommunications, Nanjing, China, in 2003 and 2006 respectively, and her Ph.D. degree in communication engineering from Nanyang Technological University, Singapore in 2011. Before joining Intel, she was a postdoctoral research fellow at Utah State University, US, working on a project funded by Intel. Her research interests include cross-layer design for LTE wireless communication networks, network information theory, cooperative communication systems and MIMO systems. She has been serving as a reviewer for several international journals and conferences, and TPC member for IEEE ICC2009, IEEE ICC2012, IEEE GLOBECOM2012 and IEEE SmartGridComm2012. Clara has numerous journal, conference and book chapter publications.