Seminar

Heterogeneous Network Design: Spectrum Allocation, Traffic Adaptation, and Energy Efficiency

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Abstract

Existing cellular architectures are designed to cater to large coverage areas, which do not achieve the expected throughput to ensure seamless mobile broadband in the uplink as users move far from the base station. This is due to the increase in the inter-cell interference, as well as constraints on the transmit power of the mobile devices. Another limitation of the conventional macrocell approach is the poor indoor penetration and the presence of dead-spots, which results in drastically reduced indoor coverage. Heterogeneous networks, in which a large number of low-power nodes known as small cells overlay traditional macrocell networks, have been heralded as the most promising way to increasing cellular network capacity and meet future customer needs. In this talk, we will present our recent research results related to heterogeneous networks in the area of spectrum allocation, traffic adaptation through dynamic time duplex division, and energy efficiency.

Biography

Tony Q.S. Quek received the B.E. and M.E. degrees in Electrical and Electronics Engineering from Tokyo Institute of Technology, Tokyo, Japan, in 1998 and 2000, respectively. At Massachusetts Institute of Technology (MIT), Cambridge, MA, he earned the Ph.D. in Electrical Engineering and Computer Science in Feb. 2008. Currently, he is an Assistant Professor with the Singapore University of Technology and Design (SUTD). He is also a Scientist with the Institute for Infocomm Research. His current research topics include cooperative networks, interference networks, heterogeneous networks, smart grid, green communications, wireless security, localization, compressed sensing, and cognitive radio.

Dr. Quek has been actively involved in organizing and chairing sessions, and has served as a member of the Technical Program Committee (TPC) in a number of international conferences. He served as the Technical Program Chair for the Services & Applications Track for the IEEE WCNC in 2009, the Cognitive Radio & Cooperative Communications Track for the IEEE VTC in Spring 2011, the Wireless Communications Symposium for the IEEE Globecom in 2011, and the Systems, Standards, & Regulations Track for the IEEE WPMC in 2012; as Technical Program Vice-Chair for the IEEE ICUWB in 2011; and as the Workshop Chair for the IEEE Globecom 2010 Workshop on Femtocell Networks, the IEEE ICC 2011 Workshop on Heterogeneous Networks, the IEEE ICCC 2012 Workshop on Smart and Green Communications & Networks, and the IEEE Globecom 2012 Workshop on Heterogeneous and Small Cell Networks. He is currently an Editor for the IEEE Transactions on Communications, the IEEE Wireless Communications Letters, the Wiley Journal on Security and Communication Networks, and the Transactions on Emerging Telecommunications Technologies. He was Guest Editor for the Journal of Communications and Networks (Special Issue on Heterogeneous Networks) in 2011, the IEEE Communications Magazine (Special Issue on Heterogeneous and Small Cell Networks) in May 2013, and for the IEICE Transactions on Communications (Special Issue on Heterogeneous Networks for Future Cellular Systems) in Jun 2013.

Dr. Quek received the Singapore Government Scholarship in 1993, Tokyu Foundation Fellowship in 1998, and the A*STAR National Science Scholarship in 2002. He was honored with the 2008 Philip Yeo Prize for Outstanding Achievement in Research, the IEEE Globecom 2010 Best Paper Award, the 2011 JSPS Invited Fellow for Research in Japan, and the 2012 CAS Fellowship for Young International Scientist. He is a senior member of the IEEE.