Recent Advances in Heterogeneous Networks

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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 (or homogeneous network) approach is the poor indoor penetration and the presence of dead-spots, which results in drastically reduced indoor coverage. To address these issues, there has been an increasing interest to deploy relays, distributed antennas, picocells, and femtocells in residential homes and offices. These network architectures, which may be either operator deployed or consumer deployed, are commonly referred as heterogeneous networks. With these multi-tier networks, we can potentially improve spatial reuse and coverage by allowing future cellular systems to achieve higher data-rates, while retaining the seamless connectivity and mobility of cellular networks. However, heterogeneous networks also come with their own challenges and there are significant technical problems that still need to be addressed for successful deployment and operation of these networks. In this talk, we will present some of our recent results related to heterogeneous networks.

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 a Principal Investigator and Senior Research Engineer at the Institute for Infocomm Research. He is also an Adjunct Assistant Professor with the Division of Communication Engineering, Nanyang Technological University.

Dr. Quek has been actively involved in organizing and chairing sessions, and has served as a member of the Technical Program Committee in a number of international conferences. He served as the Technical Program Chair for the Services & Applications Track for the IEEE Wireless Communications and Networking Conference in 2009, the Cognitive Radio & Cooperative Communications Track for the IEEE Vehicular Technology Conference (VTC) in Spring 2011, and the Wireless Communications Symposium for the IEEE Globecom 2011; as Technical Program Vice-Chair for the IEEE Conference on Ultra Wideband in 2011; and as the Workshop Chair for the IEEE Globecom 2010 Workshop on Femtocell Networks and the IEEE ICC 2011 Workshop on Heterogeneous Networks. Dr. Quek is currently an Editor for Wiley Journal on Security and Communication Networks. He was Guest Editor for Journal of Communications and Networks (Special Issue on Heterogeneous Networks) in 2011.

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, and the JSPS Invited Fellow for Research in Japan, 2011.