THE CHINESE UNIVERSITY OF HONG KONG
Institute of Network Coding
and
Department of Information Engineering
Seminar

INC

Capacity of Large Scale Wireless Networks with Directional Antenna and Delay Constraint

by

Mr. Guanglin ZHANG
Shanghai Jiao Tong University, China

Date	**:**	**26 September 2012 (Wednesday)**
Time	**:**	**11:00 am - 12:00 pm**
Venue	**:**	**Room 833 , Ho Sin Hang Engineering Building**
		The Chinese University of Hong Kong

Abstract

Since Claude Shannon's work on the capacity of point-to-point communication, how to characterize the capacity of wireless networks is a long-standing open problem in information and communication theory. In fact, even for the simple three -node relay channel and four-node interference channel, it still remains partially unknown how the exact capacity is. Capacity of wireless networks is a fundamental issue in both theoretic analysis and network design. Take ad hoc network, sensor network, and mesh network, etc in large scale wireless networks for example. It remains a difficult problem to investigate the corresponding capacity of such networks. In their seminar work published in IT2000, Gupta and Kumar propose an asymptotic analysis framework to study the capacity of large scale wireless networks. Following this work, plenty of studies have been done to investigate the capacity of large scale networks under different physical layer techniques and/or network layer assumptions, which all falls into the category of scaling laws of network capacity.

In this presentation, we first investigate the unicast capacity of heterogeneous wireless network with directional transmitting-receiving and delay constraint while the nodes are static. We obtain the closed-form formula of the unicast capacity in order of magnitude under the framework of asymptotic analysis. Then, we propose corresponding scheduling strategy and routing construction to achieve the capacity in order of magnitude. In the second part of this talk, we will analyze the multicast capacity of vehicular ad hoc network (VANET), while the vehicles adopt different mobility modes. The closed-form capacity scaling results are also obtained. Moreover, we also analyze the relationship between the throughput capacity and the system parameters, such as the number of base stations, the beam-width of directional antenna and the delay constraint. We conclude that through the combination of infrastructure transmission, directional transmitting-receiving and delay constraint, the throughput capacity could be improved in large scale networks.

Biography

Guanglin Zhang received the B.S. degree in Applied Mathematics from Shandong Normal University, China, in 2003, and the M.S. degree in Operational Research and Control Theory from Shanghai University, China, in 2006. Currently he is pursuing his Ph.D. degree at the Institute of Wireless Communication Technology (IWCT) in Shanghai Jiao Tong University. His research interests include capacity and connectivity of wireless networks, modeling and analysis of vehicular networks, network information theory, applied probability and stochastic process.

ALL ARE WELCOME