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

Network Coding In Future Mobile Networks (IMT-A & Beyond)

by

Prof. Ming Xiao

Communication Theory Laboratory

Royal Institute of Technology (KTH)

Sweden

Date : 13 October, 2010 (Wednesday)
Time : 4:30 - 5:30 pm
Venue : Room 833, Ho Sin Hang Engineering Building
The Chinese University of Hong Kong

Abstract

This talk summarizes our recent progress of research on applying network coding in cellular wireless networks. Relaying and CoMP (Coordinated Multi-Point access) are among the fundamental building blocks of the next generation mobile networks (IMT-A and Beyond). To meet the increasing requirement of the large capacity and high speed, we need to consider from a network point of view for physical-layer transmission protocols. Network coding is thus one of the essential technologies for improving the performance in the rate and reliability.

For relay fading networks, we study the design of network codes for the multi-source multi-relay networks and multi-user cooperative networks. We first show how to achieve full-diversity for such networks. An explicit construction based on MDS codes is also proposed. With the MDS network codes, we study the Diversity-Multiplex-Tradeoff (DMT) performance. We show appropriate network coding strategies and efficient clustering protocols are essential to DMT performance. Then we consider the multi-cell access with a backhaul support. For Gaussian networks with two-transmitter, one-relay and two-receiver, we compare the achievable rates of different network-coding-based protocols, e.g., finite-field coding, superposition coding, lattice coding. We also proposed new network beamforming strategy which has the highest rates in major of network settings. We derive the cut-set bound and show that the proposed network beamforming can achieve the bound in certain conditions.

Related publications:

M. Xiao and M. Skoglund, "Multiple-user cooperative communications based on linear network coding", *IEEE Transactions on Communications*, vol. 58, no. 11, November 2010.

M. Xiao, J. Kliewer and M. Skoglund, "Design of network codes for multiple-user multiple relay wireless networks," *IEEE Transactions on Wireless Communications*. Revision submitted in August 2010.

C. Wang, M. Xiao, and M. Skoglund, "Diversity-multiplexing tradeoff analysis of coded multi-user relay networks," IEEE Transactions on Communications, (Submitted August, 2010)

J. Du, M. Xiao, and M. Skoglund, "Cooperative network coding strategies for wireless relay networks with backhaul," IEEE Transactions on Communications (Submitted August, 2010)

Biography

Ming Xiao received his Ph.D degree in Chalmers University of Technology, Sweden in Nov. 2007. Since then, he jointed communication theory department, royal institute of technology (KTH), Sweden, where he is now an assistant professor. He was a visiting scholar at laboratory for information and decision system, Massachusetts Institute of Technology from Oct. 2006 to Mar. 2007. He received Hans Werthen Grant from royal Swedish academy of engineering science in 2006, Ericsson's research foundation in 2010. Dr. Xiao actively participates in European projects for future mobile networks, especially on the application of network coding, e.g., WINNER+, joint China-Swedish strategy cooperation on future mobile.

****ALL ARE WELCOME ****

Host: Professor Raymond W.H.Yeung (Tel: 2609-8375, Email: whyeung@ie.cuhk.edu.hk)
Enquiries: Information Engineering Dept., CUHK (Tel.: 2609-8388)