THE CHINESE UNIVERSITY OF HONG KONG
Department of Information Engineering

Seminar

Beyond Throughput-Optimality --- Towards Cross-Layer Network Optimization with Quantifiable Delay Constraints

by

Professor Xiaojun Lin
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Date   :   **9 June, 2011 (Thur.)**
Time   :   **11:00am-12:00noon**
Venue   :   **Room 833, Ho Sin Hang Engineering Building**
            The Chinese University of Hong Kong

Abstract

The trend of wireless communication networks is to move towards fully packet-based systems that can support both data applications and high-data-rate delay-sensitive applications. In the past, advances in cross-layer optimization of wireless systems have focused on throughput-optimality, i.e., the goal is to maximize the throughput of the system, without accounting for the delay requirements. As a result, the delay performance of the control algorithms developed is often very difficult to characterize. Further, in various settings their delay performance has been found to be quite poor. Thus, there is pressing need to develop new methodologies that not only attain optimal throughput, but also lead to superior delay performance.

In this talk, we focus on the downlink of a single cell in a packet-based OFDM system with a large number of frequency sub-carriers. We study how to schedule transmissions over both time and carriers to support a large number of delay-sensitive users. We develop new insights that exploit the largeness of the system to significantly simplify the system dynamics. Specifically, we show that when the size of the system is large, the OFDM system can be approximated by a single-server queue, whose delay performance can be readily captured. These insights enable us to develop a new OFDM scheduling algorithm that is both throughput-optimal and asymptotically delay-optimal. We also discuss how similar insights can be exploited in delay-sensitive cross-layer optimization for multi-cell systems.

Biography

Xiaojun Lin received his B.S. from Zhongshan University, Guangzhou, China, in 1994, and his M.S. and Ph.D. degrees from Purdue University, West Lafayette, Indiana, in 2000 and 2005, respectively. He is currently an Assistant Professor of Electrical and Computer Engineering at Purdue University.

Dr. Lin's research interests are in the analysis, control and optimization of large and complex wireless and wireline networks. He received the IEEE INFOCOM 2008 best paper award and 2005 best paper of the year award from Journal of Communications and Networks. His paper was also one of two runner-up papers for the best-paper award at IEEE INFOCOM 2005. He received the NSF CAREER award in 2007. He was the Workshop co-chair for IEEE GLOBECOM 2007, the Panel co-chair for WICON 2008, and the TPC co-chair for ACM MobiHoc 2009. He is currently serving as an Area Editor for (Elsevier) Computer Networks journal, and has served as a Guest Editor for (Elsevier) Ad Hoc Networks journal.

** ALL ARE WELCOME **

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