THE CHINESE UNIVERSITY OF HONG KONG
Department of Information Engineering
Seminar

Analysis and Optimization of Joint Caching and Multicasting in Large-scale Cache-enabled Wireless Networks
by
Professor Ying Cui
Department of Electronic Engineering
Shanghai Jiao Tong University, China

Date   :   **16 June, 2016 (Thur.)**
Time   :   **2:00pm – 3:00pm**
Venue :   **Room 833, Ho Sin Hang Engineering Building**
              The Chinese University of Hong Kong

Abstract

Caching and multicasting at base stations are two promising approaches to support massive content delivery over wireless networks. However, existing analysis and designs do not fully explore and exploit the potential advantages of the two approaches. In this talk, I will present analysis and optimization of joint caching and multicasting in large-scale cache-enabled wireless networks. In the first part of this talk, I will focus on large-scale cache-enabled single-tier wireless networks. First, I will present a random caching design and a corresponding multicasting design for efficient content delivery. I will show tractable expressions for the successful transmission probability in the general region and the high signal-to-noise ratio (SNR) and user density region. Then, I will discuss the successful transmission probability maximization, which is a very complex non-convex problem in general. I will present an iterative numerical algorithm to obtain a local optimal solution in the general region and an asymptotically optimal solution in the asymptotic region. In the second part of this talk, I will focus on large-scale cache-enabled heterogeneous wireless networks (HetNets) with backhaul constraints. First, I will present a hybrid caching design and a corresponding multicasting design, to support massive content delivery and alleviate the backhaul requirement in HetNets. I will show tractable expressions for the successful transmission probability in the general region as well as the high SNR and user density region. Then, I will discuss the successful transmission probability maximization, which is a very challenging mixed discrete-continuous optimization problem. I will present a near optimal solution with superior performance and manageable complexity. The analysis and optimization results in the two parts provide valuable design insights for practical cache-enabled wireless networks.

Biography

Ying Cui received her B.E. degree in Electronic and Information Engineering from Xi'an Jiao Tong University, China, in 2007 and her Ph.D. degree in Electronic and Computer Engineering from the Hong Kong University of Science and Technology (HKUST), Hong Kong, in 2011. From January 2011 to July 2011, she was a Visiting Assistant in Research in the Department of Electrical Engineering at Yale University, US. From March 2012 to June 2012, she was a Visiting Scholar in the Department of Electronic Engineering at Macquarie University, Australia. From June 2012 to June 2013, she was a Postdoctoral Research Associate in the Department of Electrical and Computer Engineering at Northeastern University, US. From July 2013 to December 2014, she was a Postdoctoral Research Associate in the Department of Electrical Engineering and Computer Science at Massachusetts Institute of Technology (MIT), US. Since January 2015, she has been an Associate Professor in the Department of Electronic Engineering at Shanghai Jiao Tong University, China. Her current research interests include cache-enabled wireless networks, future Internet architecture, delay-sensitive cross-layer control and network coding. She was selected into China's 1000Plan Program for Young Talents in 2013. She received the Best Paper Award at IEEE ICC, London, UK, June 2015.

** ALL ARE WELCOME **

Host: Professor Minghua Chen (Tel: 3943-8452, Email: mhchen@ie.cuhk.edu.hk)
Enquiries: Information Engineering Dept., CUHK (Tel.: 3943-8385)