



**THE CHINESE UNIVERSITY OF HONG KONG**  
Department of Information Engineering

*Seminar*

**Matching & Large Deviation over Random Bipartite Graph:  
An Innovative Framework for OFDMA Systems**

by

**Professor Wei Chen**  
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**Date : 26 July, 2011 (Tue.)**  
**Time : 11:00am- 12:00noon**  
**Venue : Room 833, Ho Sin Hang Engineering Building**  
**The Chinese University of Hong Kong**

Abstract

OFDMA is an emerging and powerful solution that can realize reliable, efficient, fair and flexible multi-user wired and wireless communications for next generation information infrastructure. It plays a key role in a number of communication system standards, e.g. WiMAX, LTE, IEEE 802.20, IEEE 802.22, and DVB-C2. As OFDMA systems have attracted much attention from both academia and industry in the past decade, a lot of diversity coding and resource allocation mechanisms have been developed for OFDMA. However, there has not been much work on understanding its fundamental performance limits in an analytical way. In this talk, we shall present an innovative framework, which can not only reveal the underlying performance bounds of OFDMA given resource constraints, but also provide some insights on designing sub-linear complexity OFDMA algorithms. In this framework, OFDMA with stochastic channel gains is modeled by Random Bipartite Graph (RBG). As a generalization of error exponent, outage probability, and diversity-multiplexing tradeoff, a large deviation based performance metric, referred to as outage exponent is proposed to characterize the reliability and efficiency of OFDMA in a unified way. A modern combinatorial approach, namely, H-matching and f-matching can be adopted respectively to optimize the overall performance of OFDMA with and without diversity coding. The matching & large deviation based framework shows that there has been a great potential to dramatically improve currently developed communications standards by applying modern math tools.

Biography

Wei Chen received his BS and PhD degrees (both with the highest honors and thesis awards) from Tsinghua University, in 2002, and 2007, respectively. From 2005 to 2007, He was a visiting research staff in Department of Electronic and Computer Engineering, the Hong Kong University of Science and Technology. Since July 2007, he has been with Department of Electronic Engineering, Tsinghua University, where he is currently an Associate Professor, PhD Advisor, and Vice Director of Institute of Communications. Prof. Chen visited the Chinese University of Hong Kong as Sino-British Research Fellow on October, 2007, the Hong Kong University of Science & Technology from August to September, 2008/2009. From June 2010 to September 2010, he visited University of Southampton as UK-China Science Bridge Research Fellow, supported by UK Research Councils. His research interests are in the broad areas of wireless communications, information theory, and applied optimizations. In these areas, he has published over 60 papers and won best paper awards from IEEE Trans. on Wireless Communications (2009 Marconi Prize Paper Award), IEEE IWCLD 2007, IEEE ICC 2006. He also received the 2010 IEEE Comsoc APB Best Young Researcher Award, 2011 Tsinghua Raising Academic Star Award, as well as, the First Prizes in Young Faculty Teaching Competition of Beijing City and Tsinghua University. He served as TPC co-chair of ICC2010 Wireless Communications Symposium, and TPC co-chair of VTC 2011, Spring and tutorial chair of ICC 2013.

**\*\* ALL ARE WELCOME \*\***

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