



Illinois Center for Wireless Systems

ICWS Seminar Series



Next Generation Dynamic Spectrum Systems

Prof. Heather Zheng
University of California, Santa Barbara

May 2, 2008, 11:00 am
B02 CSL

Abstract: Today's static spectrum assignment policy has led to a critical spectrum shortage. While innovative wireless networks such as WiMAX are denied from spectrum access, the majority of existing networks use only 10-15% of their assigned spectrum. To reuse "wasted" spectrum, the recent proposal on dynamic spectrum access allows unlicensed (secondary) users to opportunistically utilize unused licensed spectrum on a non-interfering basis. This "creates" new capacity and commercial value from existing under-utilized spectrum.

While it shows great promise, the technology underlying dynamic spectrum systems is still in its infancy. Issues in wireless communications and networking, once addressed in the context of fixed spectrum assignment, offer new research challenges in the realm of dynamic spectrum systems. In this talk, we describe some existing and on-going efforts on dynamic spectrum systems. We begin by describing distributed algorithms for secondary users to access spectrum fairly and efficiently. We introduce (1) a distributed coordination approach where devices coordinate to adapt spectrum assignment over topology variations, and (2) a light-weight rule-based solution that requires minimum communication overhead. We then present a dynamic spectrum auction framework that addresses the impact of economic issues. We conclude by summarizing this work in context, and discussing current and future directions in combining these results with higher layer mechanisms, and applying cross-layer design to produce an end-to-end programmable and adaptive network. Additional information about this research can be found at <http://link.cs.ucsb.edu>.

Biography: Since August 2005, Heather Zheng has been an assistant professor at Department of Computer Science, University of California, Santa Barbara. Her research area includes wireless networking and communications, and multimedia computing. She currently focuses on Cognitive Radios and dynamic spectrum networks. Her research on Cognitive Radios was selected as one of the 10 Emerging Technologies of 2006 by MIT Technology Review Magazine, and the Best Student Paper in IEEE DySPAN 2007. Dr. Zheng was named as the MIT Technology Review's Top 35 Innovators under the age of 35 in 2005. She also received 2006 World Technology Award (top 5 in communication), 2002 Bell-Labs President's Gold Award, 1998-99 George Harhalakis Outstanding Graduate Student Award from University of Maryland, College Park. Dr. Zheng received her Ph.D. from University of Maryland, College Park in 1999 and then joined wireless research lab, Bell-Labs, Lucent Technologies. She then moved to Microsoft Research Asia as a project lead in March 2004 and later joined UCSB.

ICWS Seminar series is supported by a grant from Rockwell Collins

www.icws.uiuc.edu