



ICWS Seminar Series



PHY-Based Approach for Secure Wireless Networking

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141 Coordinated Science Lab

Abstract:

Due to unique features of mobile ad hoc networks (MANETs) such as lack of infrastructure, node mobility, dynamic topology, and unreliable channel transmission, it is very challenging to protect MANETs from security attacks using key-based security approaches. Thus, the physical layer (PHY) security approach, which is emerging as a promising technique to solve security problems over wireless networks, is particularly appealing to MANETs. The basic idea of physical layer security is to use the inherent randomness of the physical wireless medium to advantage legitimate receivers in order to achieve secure communications.

In this talk, I will first introduce the idea of the PHY-based security approach, and the secure communication schemes and corresponding information theoretic characterizations for some basic physical layer channels. I will then present applications of the PHY-based security approach to MANETs to achieve secure communication among legitimate nodes under malicious attacks. In particular, I will describe a novel PHY-based protocol that achieves the optimal secrecy throughput (in the order sense) of the network. I will finally talk about several future directions.

Bio:

Yingbin Liang received the Ph.D. degree in Electrical Engineering from the University of Illinois at Urbana-Champaign in 2005. In 2005-2007, she was working as a postdoctoral research associate at Princeton University. In 2008-2009, she was an assistant professor at the Department of Electrical Engineering at the University of Hawaii. Since December 2009, she has been an assistant professor at the Department of Electrical Engineering and Computer Science at the Syracuse University. Dr. Liang's research interests include communications, wireless networks, information theory, and machine learning.

Dr. Liang was a Vodafone Fellow at the University of Illinois at Urbana-Champaign during 2003-2005, and received the Vodafone-U.S. Foundation Fellows Initiative Research Merit Award in 2005. She also received the M.E. Van Valkenburg Graduate Research Award from the ECE department, University of Illinois at Urbana-Champaign, in 2005. In 2009, she received the National Science Foundation CAREER Award, and the State of Hawaii Governor Innovation Award.