

Network Modulation: A New Dimension to Enhance Wireless Network Performance

报告人单位: Dept. of Electrical & Computer Engineering, University of Victoria

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地点: 信电大楼 215

报告人: Professor Lin Cai

Abstract: We have witnessed the explosive growth of the Internet, and the growth will even accelerate in the coming few decades, thanks to the ever-increasing demand for ubiquitous network services, anywhere, anytime, and with any devices. New applications, communication technologies and paradigms are the main driven forces, and they also bring many new challenges. Cross-layer protocol design and optimization is a promising direction for next generation wireless networks. In this talk, we introduce an approach called network modulation which gives us a new dimension to improve wireless network throughput and save energy. In current wireless systems, when a source transmits data to the receiver through a single-hop or multi-hop wireless path, the physical layer modulates and demodulates the information bits hop-by-hop, and the transmission over each hop is treated the same as in a point-to-point communication link. Given the broadcast nature of wireless medium and the wide variation of wireless channel quality, we let a sender transmit messages to multiple receivers simultaneously, using a software mapping technology, called network modulation, to redefine the constellation of typical quadrature amplitude modulation (QAM) schemes. Network modulation can be used to improve network performance in a wide range of scenarios, for anycast (broadcast, multicast and unicast) services, one-way or two-way traffic, and single-hop or multi-hop wireless paths, in infrastructure or ad hoc networks.

Biography: **Lin Cai** received her Master and PhD degrees (awarded Outstanding Achievement in Graduate Studies) in electrical and computer engineering from the University of Waterloo, Waterloo, Canada, in 2002 and 2005, respectively. Since 2005, she has been an Assistant Professor and then an Associate Professor with the Department of Electrical & Computer Engineering at the University of Victoria. Her research interests span several areas in wireless communications and networking, with a focus on network protocol and architecture design supporting emerging multimedia traffic over wireless, mobile, ad hoc, and sensor networks.

She has been a recipient of the NSERC Discovery Accelerator Supplement Grant in 2010, and the best paper awards of IEEE ICC 2008 and IEEE WCNC 2011. She has served as a TPC symposium co-chair for IEEE Globecom'10, and the Associate Editor for IEEE Transactions on Wireless Communications, IEEE Transactions on Vehicular Technology, EURASIP Journal on Wireless Communications and Networking, International Journal of Sensor Networks, and Journal of Communications and Networks (JCN). She is a senior member of IEEE.