



THE ELECTRICAL & COMPUTER ENGINEERING PROGRAM PRESENTS

# Technical Talk 1: Physical Layer Network Coding for Wireless Networks

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Tuesday, June 1st  
2.00 – 2.30 p.m.  
Lecture Hall 143

The idea of mixing packets at the network layer instead of simply forwarding packets is known as network coding and has been shown to be very effective in some networking problems. In wireless networks, the physical layer naturally mixes packets over the complex field due to the superposition nature of the wireless medium. This leads to the natural question of whether one can exploit the mixing performed at the physical layer to realize gains similar to those obtained by mixing packets at the network layer. In this talk, we will discuss coding schemes that take advantage of the mixing at the physical layer. In these schemes, the coding performed at the physical layer serves the purpose of error correction as well as that of network coding and we refer to such schemes as physical layer network coding schemes. We will discuss some recent advances in the design and implementation of such coding schemes. We will also outline the challenges in designing coding schemes when the channel state information is not known at the transmitter and some approaches to tackle this problem.

Dr Krishna Narayanan received the Ph.D. degree in Electrical Engineering from Georgia Institute of Technology in 1998. He has been with the department of electrical engineering at Texas A&M university since then, where is currently a professor. He also serves as the group leader for the Telecommunications, Control and Signal Processing group. During the academic year 2004-2005, he held visiting positions at the University of Illinois at Urbana-Champaign, Institut Eurecom in France and the Indian Institute of Science in Bangalore, India. His teaching and research interests are broadly in the areas of coding/information theory and signal processing for wireless communications and data storage. He is the author of a web-based tutorial on low density parity check codes and has given several tutorials at universities and conferences in these areas. He is currently serving as the area editor for the coding theory and applications area of the IEEE Transactions on Communications and as one of the technical program co-chairs for the 2010 IEEE International Symposium on Information Theory. In the past, he has served on the editorial board of the IEEE Transactions on Wireless Communications and the IEEE Communications Letters and has served on the technical program committee for several international conferences. He is a recipient of the 2010 Halliburton professorship from the college of engineering at Texas A&M University, the 2006 best paper award from the IEEE Signal Processing for Data Storage Technical Committee, the NSF CAREER award in 2001, Outstanding young faculty award from the college of engineering in 2001, and the Outstanding Professor award from the Dept. of Electrical Engineering in 2002. He was nominated twice for the Montague Teaching Excellence Award at Texas A&M University.



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