The IEEE Pittsburgh Section Signal Processing and Communications Society Chapters Present:

Understanding and Managing Interference in Wireless Networks

Venu Veeravalli, PhD
Professor
Department of Electrical and Computer Engineering
Director, Illinois Center for Wireless Systems (ICWS)
University of Illinios at Urbana-Champaign

Presentation to be held at Carnegie Mellon University, Pittsburgh
March 14, 2011

The understanding of point-to-point wireless communications channels with fading and receiver thermal noise is mature. Recent advances, particularly in the area of multiantenna communications, have led to significant increases in the capacity and reliability of point-to-point links. However, modern wireless networks are limited by interference from other links. While the information theory for interference networks is still in its infancy, several techniques are being explored in the research community for managing interference, while maintaining high spectral spatial reuse efficiencies in these networks. These techniques include spatial user separation, interference cancellation, user cooperation and relaying, dynamic spectrum access, and interference alignment. The first half of this talk will be an overview of these techniques.

In the second half of this talk, we will discuss some of our recent results towards an understanding of the information-theoretic capacity of interference networks. We first discuss a partial solution to the capacity of the two-user interference channel in the weak interference regime, a problem that has been open for more than thirty years. We also discuss new techniques for exploiting transmitter cooperation in interference channels in optimal ways.

Venu Veeravalli received the Ph.D. degree in Electrical Engineering from the University of Illinois at Urbana-Champaign in 1992, the M.S. degree from Carnegie-Mellon University in 1987, and the B.Tech degree from Indian Institute of Technology, Bombay in 1985. He is currently a Professor in the department of Electrical and Computer Engineering, and a Research Professor in the Coordinated Science Laboratory at the University of Illinois at Urbana-Champaign. He was on the faculty of the School of ECE at Cornell University before he joined Illinois in 2000. He served as a program director for communications research at the U.S. National Science Foundation in Arlington, VA during 2003-2005. His research interests include wireless communications, distributed sensor systems and networks, detection and estimation theory, and information theory. He is a Fellow of the IEEE, and a recipient of the IEEE Browder J. Thompson Best Paper Award and the U.S. Presidential Early Career Award for Scientists and Engineers (PECASE).