

Speaker:

Xin Liu, University of California, Davis

Host:

Rong Zheng

Title:

Optimal Opportunistic Access Strategies in Cognitive Radio Networks

Abstract:

Cognitive radio is a promising technology to mitigate spectrum shortage in wireless communications. It enables secondary users (SUs) to opportunistically access low-occupancy primary spectral bands as long as the primary user (PU) access is protected. PU protection is vital to the success of cognitive radio system because no PU would be inclined to accommodate secondary cognitive networks without such assurance. Such a protection requirement is particularly challenging for multiple SUs over a potentially wide geographical area.

In this talk, I will present our results on the fundamental limit on the throughput performance of cognitive networks under the PU packet collision probability constraint. We consider two cases. In the case of perfect sensing, we develop an optimum spectrum access strategy under generic PU traffic. Moreover, we develop and evaluate a distributed access scheme that enables multiple SUs to collectively protect the PU while adapting to changes in the PU activity pattern.

In the case of imperfect sensing, we develop an optimal threshold-based sensing-transmission structure that goes beyond the widely studied periodic structure. Our results provide useful insight on the trade-off between the protection of the primary user and the throughput performance of the secondary users. Last, if time permits, I will briefly discuss our current progress on feedback-based access and power control for distributed multiuser cognitive networks.

Bio:

Xin Liu is an assistant professor in the Computer Science Department at the University of California, Davis. Before joining UC Davis, she was a postdoctoral research associate in the Coordinated Science Laboratory at UIUC. She received her Ph.D. degree in electrical engineering from Purdue University in 2002. Her research is on wireless communication networks, with a focus on resource allocation and cognitive radio networks. She received the Best Paper of Year Award of the Computer Networks Journal in 2003 for her work on opportunistic scheduling. She received NSF CAREER award in 2005 for her research on "Smart-Radio-Technology-Enabled Opportunistic Spectrum Utilization." She received the Outstanding Engineering Junior Faculty Award from the College of Engineering, University of California, Davis, in 2005.