NJIT

IEEE North Jersey Communications Chapter

Wireless Networking with Selfish Agents

by Li (Erran) Li, Bell Labs

Date: February 10, 2005 (Thursday)
Time: 6:15 pm (refreshment starts at 6:00 pm)
Place: 202 ECEC, NJIT

About the Speaker

Li (Erran) Li received the B.E. degree in Automatic Control from Beijing Polytechnic University in 1993, M.E. in Pattern Recognition from Institute of Automation, Chinese Academy of Sciences in 1996, and Ph.D. in Computer Science from Cornell University in 2001, respectively. During his graduate study at Cornell University, he worked at Microsoft Research, Bell-Labs Lucent as an intern and AT&T Research Center at ICSI Bekerley as a visiting student. He is presently a member of the Networking Research Center in Bell Labs. His research interests are in networking with a focus on wireless networking and mobile computing.

About the Talk

Traditionally wireless network protocols and architectures have been designed under the assumption that end users and network entities are cooperative. However, as wireless networks get more and more decentralized and pervasive, networking solutions must include and cope with entities who want to optimize their own utilities. We model these entities as selfish agents or players in game theory. In this talk, I will show how spectrum access can be made more efficient by the involvement of selfish agents in both 3G wireless networks and WiFi networks.

I will first present an architecture and protocol that allows 3G service providers to host efficient content distribution services. In this architecture, contents are offloaded to ad hoc networks composed of 3G subscribers. This alleviates the demand of 3G wireless spectrum from content distribution. Since the participants of this data distribution network act as selfish agents, we model caching as a market sharing game. We show that the selfish behavior of computationally bounded agents results in outcomes that are bounded within 50% of the social optimal.

I will then present mechanisms for efficient spectrum sharing in WiFi networks. Each access point (AP) in a WiFi network must be assigned a channel for it to service users. There are only finitely many possible channels that can be assigned. Moreover, neighboring access points must use different channels so as to avoid interference. Channel conflicts among APs operated by different entities are currently resolved in an ad hoc manner or not resolved at all. We view the channel assignment problem as a game, where the players are the service providers and APs are acquired sequentially. We consider the price of anarchy of this game, which is the ratio between the total coverage of the APs in the worst Nash equilibrium of the game and what the total coverage of the APs would be if the channel assignment were done by a central authority. We provide bounds on the price of anarchy depending on assumptions on the underlying network and the type of bargaining allowed between service providers.

Sponsors: **IEEE Communications Society North Jersey Chapter**
NJIT Department of Electrical and Computer Engineering

For more information contact Nirwan Ansari (973) 596-3670, or check **http://web.njit.edu/~ieeenj/comm.html** for latest updates. Directions to NJIT can be found at: **http://www.njit.edu/University/Directions.html**.