EE Department Seminar

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Yorgo Istefanopulos Meeting Lounge (KB 217)

Intelligent Radio Frequency Adaptive Networking (IRFAN)

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Interference in the physical layer of wireless networks is due to frequency reuse. Reuse of spectrum can potentially increase capacity. However, any signal transmitted will add to interference and increase outage probability and limit capacity for all other nodes on the same frequency. For a multi-cellular system with frequency reuse 1, much of the cell area has an average signal to interference plus noise ratio (SINR) less than 0 dB. Cognitive reuse for underlay of multi-cellular base stations (CRUMBS) is a framework to reuse spectrum to assist disadvantaged users. First, we propose a single relay hop to assist indoor users subject to building insertion loss. Second, we propose a single relay hop for outdoor cognitive reuse while satisfying protection constraints to primary network.
Given N radios in a geographic area, cognitive overlay opportunistic and knowledgeable interference excision (COOKIE) is a framework to adapt waveform and frequency to mitigate interference. In single antenna systems, as the transmit power of each link is increased to improve SINR, the overall interference increases. In multiple antenna systems, one user's transmit beamform may simultaneously improve its SINR as well as reduce the interference to other users. We examine decentralized coordination for N links in a geographic area. Open problems and preliminary work for next generation radios with multiple radio frequency transceivers suitable for multiple antenna configuration conclude the talk.

Ufuk Tureli received his B.Sc. degree from Bogazici University, Istanbul, Turkey and the M.S. and Ph.D. degrees from the University of Virginia, Charlottesville, Virginia in 1998 and 2000 respectively, all in electrical engineering. Since January 2008, he is an associate professor and Director of the Radio Frequency Laboratory in the Department of Electrical and Computer Engineering, West Virginia University Institute of Technology, Montgomery, WV. Dr. Tureli is a member of the IEEE Communications Society, serves in technical program committees (TPC) for IEEE conferences as well as the IEEE Communications Society (COMSOC) Radio Communications Committee. He is on the Editorial Board of the Elsevier Physical Communication (PHYCOM) Journal and serves as an Associate Editor. Dr. Tureli was an Associate Editor for IEEE Transactions on Vehicular Technology in 2009.