



**Princeton University**

**Department of Electrical Engineering**

# **Information Sciences and Systems (ISS) Seminar**

**Speaker:** Athina P. Petropulu,  
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Currently on sabbatical at Princeton University

**Date:** Thursday, June 14, 2007

**Time** 4:30 pm ~ B205 ~ EQuad

**Title:** ALLIANCES: A Cross-Layer Cooperative Approach for Wireless Networks

**Abstract:**

We present ALLIANCES (Allow Improved Access in the Network via Cooperation and Energy Savings), a random access protocol for wireless networks. The wireless network is viewed as a spatially distributed antenna. When there is a collision, the packets involved in the collision are saved in a buffer. In the slots following the collision, a set of nodes, designated as non-regenerative relays, form an alliance and retransmit the signal that they received during the collision slot. By processing the originally collided packets and the signals forwarded by the relays, the destination node can set up a multiple-input multiple-output (MIMO) problem, the solution of which yields the original packets. The spatial diversity introduced via the cooperative relaying enables one to effectively deal with the wireless channel without bandwidth expansion nor additional antenna hardware. The proposed scheme maintains the benefits of ALOHA systems in the sense that all nodes share access to media resources efficiently and without extra scheduling overhead, and enables efficient use of network power.

We also discuss a multichannel extension of ALLIANCES with OFDM channelization that in addition to cooperation diversity exploits multipath diversity.

**BIO:**

Athina P. Petropulu received the Diploma in Electrical Engineering from the National Technical University of Athens, Greece in 1986, and a Ph.D in Electrical and Computer Engineering from Northeastern University in 1991. She is a Professor in the Department of Electrical and Computer Engineering at Drexel University. Her research interests include statistical signal processing, wireless communications and networking and ultrasound imaging. She is the recipient of the 1995 Presidential Faculty Fellow Award in Electrical Engineering. She is the co-author (with C.L. Nikias) of the book entitled, "Higher-Order Spectra Analysis: A Nonlinear Signal Processing Framework," (Englewood Cliffs, NJ: Prentice-Hall, Inc., 1993). She is co-recipient of the 2005 IEEE Signal Processing Magazine Best Paper Award.

She has served as an Associate Editor for the IEEE Transactions on Signal Processing and the IEEE Signal Processing Letters, and is a member of the editorial board of the IEEE Signal Processing Magazine and the EURASIP Journal on Wireless Communications and Networking. She is IEEE SPS Vice President-Conferences and member of the IEEE Signal Processing Board of Governors. She was the General Chair of the 2005 International Conference on Acoustics Speech and Signal Processing (ICASSP-05), Philadelphia PA.