
ECE Distinguished Seminar Series

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Training, Feedback, and Information Exchange in Wireless Systems

Michael Honig
Department of EECS
Northwestern University

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Dreese Laboratory 260

Achieving high spectral efficiencies in wireless networks generally requires that the nodes exchange information about channel and interference conditions. This information exchange requires signaling overhead (expenditure of power and bandwidth), which should be minimized subject to meeting performance objectives. The relation between signaling overhead and performance is discussed in three scenarios. In the first scenario, limited training and feedback are used to optimize the transmitted power distribution over a wideband, frequency-selective, block-fading channel. We characterize the growth in achievable rate as a function of the channel coherence time T . In the second scenario, limited training and feedback are used to determine beamformer coefficients at the transmitter, assuming a narrowband, block-fading channel. We show that the performance is limited by channel estimation error, and that to maximize the achievable rate, the number of transmit antennas should increase as $T/\log T$. Finally, we consider an ad-hoc network of peer-to-peer users, and specify the information exchange among nodes, which is needed for optimal (utility-maximizing) power control.

Michael L. Honig received the B.S. degree in electrical engineering from Stanford University in 1977, and the M.S. and Ph.D. degrees in electrical engineering from the University of California, Berkeley, in 1978 and 1981, respectively. He subsequently joined Bell Laboratories in Holmdel, NJ, where he worked on local area networks and voiceband data transmission. In 1983 he joined the Systems Principles Research Division at Bellcore, where he worked on digital subscriber lines and wireless communications. Since the Fall of 1994, he has been with Northwestern University where he is a Professor in the Electrical and Computer Engineering Department. He has held visiting positions at Princeton University, the University of California, Berkeley, and the University of Sydney. He has also worked as a free-lance trombonist.

He has served as an editor for the IEEE Transactions on Information Theory and the IEEE Transactions on Communications, and as a member of the Board of Governors for the Information Theory Society. He is the co-recipient of the 2002 IEEE Communications Society and Information Theory Society Joint Paper Award, and is a Fellow of IEEE.