



THE CHINESE UNIVERSITY OF HONG KONG
Department of Information Engineering

Feedback and Information Exchange in Wireless Networks

by

Professor Michael L. Honig

Department of Electrical Engineering and Computer Science

Northwestern University

Evanston, Illinois

Date : 9 April 2009 (Thursday)
Time : 2:30pm
Venue : Room 833, Ho Sin-Hang Engineering Building
The Chinese University of Hong Kong

Abstract

Achieving high spectral efficiencies in wireless networks generally requires that the nodes exchange information about channel and interference conditions. This information exchange can increase link capacities, but requires signaling overhead (expenditure of power and bandwidth), which detracts from the overall network performance. To illustrate this tradeoff we first present a broadcast (downlink) Orthogonal Frequency Division Multiple Access (OFDMA) model in which feedback of channel state information from the mobiles to the base station must occur within a finite coherence time. Limited feedback schemes are presented for which the sum rate (accounting for feedback overhead) grows linearly with the number of users and sub-channels, and as the log of the feedback rate. We then consider a peer-to-peer network and present a distributed iterative algorithm for optimizing powers and beams, assuming each transmitter has multiple antennas. The algorithm relies on the exchange of interference "prices". Conditions are specified under which the algorithm converges to a globally optimal (utility-maximizing) solution.

Biography

Professor Michael L. Honig is a Professor in the Electrical Engineering and Computer Science Department of Northwestern University, Evanston, Illinois. He received his BS degree in electrical engineering from Stanford University (1977), and his MS and PhD degrees in electrical engineering from the University of California, Berkeley (1978 and 1981 respectively). Professor Honig subsequently joined Bell Laboratories in Holmdel, New Jersey, where he worked on local area networks and data transmission through band-limited telephone channels. In 1983 he joined the Systems Principles Research Division of Bellcore (now Telcordia), where he worked on digital subscriber lines and interference mitigation techniques for wireless systems. During that time he also co-authored a book on adaptive filters. He joined Northwestern University in the fall of 1994 and has been professor of the Department of Electrical Engineering and Computer Science since then. He has held visiting scholar positions at Naval Research Laboratory (San Diego), the University of California, Berkeley, the University of Sydney, Princeton University, and the Technical University of Munich. Professor Honig served as an editor for Transactions on Information Theory (1997–2000) and Transactions on Communications (1990–1995), both published by the Institute of Electrical and Electronics Engineers (IEEE), and Foundations and Trends in Communications and Information Theory (Now Publishers, 2003–present). He has been a guest editor for several other journals, and has served on numerous technical program committees for conferences and workshops on communications and signal processing. He was a member of the Board of Governors for the IEEE Information Theory Society from 1997 to 2002, the recipient of a Humboldt Research Award for Senior U.S. Scientists, the co-recipient of the 2002 IEEE Communications Society and Information Theory Society Joint Paper Award, and is a Fellow of IEEE.

***** ALL ARE WELCOME *****