Efficient Collaborative (Viral) Communication in OFDM Based WLANs

Aggelos Bletsas and Andrew Lippman

Media Laboratory
Massachusetts Institute of Technology
20 Ames St, E15-495, Cambridge, MA 02139, USA
{aggelos,lip}@media.mit.edu

Abstract

In this work we investigate the coordinated transmission and processing of distributed radios employing OFDM signals similar to those employed in 802.11a. After showing that OFDM can be viewed as a set of parallel Gaussian channels with different frequency gain for each sub-carrier, we design receiving schemes that exploit both the direct transmission between transmitter and receiver as well as the assisting relayed signal of a radio that overhears the communication between transmitter and receiver and acts as an analogue repeater. The special structure of 802.11a OFDM signals allow the coordination between transmitter, receiver and intermediate relay to happen on the same channels and the collaboration results in substantial energy savings compared to the traditional single transmitter-single receiver case, providing efficient resource (energy, bandwidth) utilization.