

Title: Energy Consumption Modelling and Optimization of Cooperative Relay Transmission

Speaker: Dr Brian Krongold, University of Melbourne, Australia

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Abstract:

Cooperative relays have been used in many wireless applications to reduce transmit power and add receiver diversity. We start with an energy analysis of a point-to-point link, including both analog and digital electronics' energy consumption. We then extend this to analyse the energy efficiency trade-offs of a single-relay system using either amplify-and-forward (AF) or decode-and-forward (DF) strategies. We propose an energy model that consists of relative power allocation, relay location, spectral efficiency, data rate, transmission distance, and target error rate as parameters. The goal is then to optimize the location of the relay and power allocations to minimize the total energy consumption. The optimum location for an AF system can be found independently of the modulation scheme, although the optimum location for a DF system is dependent on the modulation scheme. We verify our analytic results through numerical simulation and show optimal system configurations as a function of distance. Time permitting, we will show interesting results from extending the analysis to a dual-relay (three-hop) system and compare the energy efficiency of direct transmission, single-relay and dual-relay systems versus distance.

Brief Bio:

Brian Krongold was born and raised in New Jersey, USA. He received the B.S., M.S. and Ph.D. degrees in electrical engineering in 1995, 1997, and 2001, respectively, from the University of Illinois at Urbana-Champaign. Brian joined the University of Melbourne in December 2001 as a Research Fellow, and is currently an Associate Professor. In 2011, he spent 5 months on sabbatical at Bell Labs in Murray Hill, New Jersey, USA. His research interests include both wireless and optical communication systems.