Computer Science > Information Theory

Approximately Optimal Wireless Broadcasting

Sreeram Kannan, Adnan Raja, Pramod Viswanath

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We study a wireless broadcast network, where a single source reliably communicates independent messages to multiple destinations, with the aid of relays and cooperation between destinations. The wireless nature of the medium is captured by the broadcast nature of transmissions as well as the superposition of all transmit signals plus independent Gaussian noise at the received signal at any radio. We propose a scheme that can achieve rate tuples within a constant gap away from the cut-set bound, where the constant is independent of channel coefficients and power constraints.

The proposed scheme operates in two steps. The inner code, in which the relays perform a quantize-and-encode operation, is constructed by lifting a scheme designed for a corresponding discrete superposition network. The outer code is a Marton code for the non-Gaussian vector broadcast channel induced by the relaying scheme, and is constructed by adopting a ``receiver-centric'' viewpoint.

Subjects: **Information Theory (cs.IT)**; Networking and Internet Architecture (cs.NI)

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