

Communication via Decentralized Processing

Amichai Sanderovich*, Shlomo Shamai (Shitz)*, Yossef Steinberg* and Gerhard Kramer[†]

*Department of Electrical Engineering, Technion, Haifa 32000, Israel

[†]Bell Laboratories, Alcatel-Lucent, NJ, USA

Email: {amichi@tx, sshlomo@ee, ysteinbe@ee}.technion.ac.il, gkr@bell-labs.com

Abstract

The problem of a nomadic terminal sending information to a remote destination via agents with lossless connections to the destination is investigated. Such a setting suits, e.g. access points of a wireless network where each access point is connected by a wire to a wireline-based network. The Gaussian codebook capacity for the case where the agents do not have any decoding ability is characterized for the Gaussian channel. This restriction is demonstrated to be severe, where allowing the nomadic transmitter to use other signaling improves the rate. For both general and degraded discrete memoryless channels, lower and upper bounds on the capacity are derived. An achievable rate with unrestricted agents, which are capable of decoding, is also given and then used to characterize the capacity for the deterministic channel.

Index Terms

Cooperative reception, decentralized detection, relay channel, wireless networks