Computer Science > Information Theory

An Achievable Region for a General Multi-terminal Network and its Chain Graph Representation

Stefano Rini

(Submitted on 23 Jul 2011 (v1), last revised 5 Feb 2012 (this version, v2))

Random coding, along with various standard techniques such as coded time-sharing, rate-splitting, superposition coding, and binning, are traditionally used in obtaining achievable rate regions for multi-terminal networks. The error analysis of such an achievable scheme relies heavily on the properties of strongly joint typical sequences and on bounds of the cardinality of typical sets. In this work, we obtain an achievable rate region for a general (i.e. an arbitrary set of messages shared amongst encoding nodes, which transmit to arbitrary decoding nodes) memoryless, single-hop, multi-terminal network without feedback or cooperation by introducing a general framework and notation, and carefully generalizing the derivation of the error analysis. We show that this general inner bound may be obtained from a graph representation that captures the statistical relationship among codewords and allows one to readily obtain the rate bounds that define the achievable rate region. The proposed graph representation naturally leads to the derivation of all the achievable schemes that can be generated by combining classic random coding techniques for any memoryless network used without feedback or cooperation.

Subjects: **Information Theory (cs.IT)**

Cite as: **arXiv:1107.4705 [cs.IT]**

(or **arXiv:1107.4705v2 [cs.IT]** for this version)

Submission history

From: Stefano Rini [view email]

[v1] Sat, 23 Jul 2011 18:45:45 GMT (1245kb)

[v2] Sun, 5 Feb 2012 12:20:43 GMT (293kb)

Which authors of this paper are endorsers?