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How to optimally tune sparse network coding over wireless links

Abstract—Despite their high computational complexity, Random Linear Network Coding (RLNC) techniques offer a notable robustness against packet erasure wireless links. Some novel approaches have been recently proposed to reduce such computational burden, for both encoder and decoder elements. One of those are the so-called Tunable Sparse Network Coding (TSNC) techniques, which advo- cate limiting the number of packets that are combined to build a coded packet. They also propose to dynamically adapt the corresponding sparsity level, as the transmission evolves, although an optimum tuning has not been proposed so far. In this paper we propose a TSNC implementation that exploits a novel analytical model to estimate the probability of generating an innovative packet (linearly independent combination), given the current status at the decoder. Taking advantage of the model's accuracy, the proposed scheme shows a gain of ↑ 2 times, compared to previous TSNC implementations. Furthermore, we broaden the analysis of TSNC techniques by thoroughly assessing their performance over wireless networks over the ns- 3 platform. The results yield a remarkable complexity reduction (↑ 70%), without jeopardizing the network performance.

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