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RESEARCH ARTICLE

FINITE–PRECISION ANALYSIS OF DEMAPPERS AND DECODERS FOR LDPC-CODED M-QAM SYSTEMS

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Abstract:- The performance of LPDC is strongly affected by finite-precision issues in the representation of inner variables. Great attention has been paid, to the topic of quantization for LDPC decoders, but mostly focusing on binary modulations and analyzing finite precision effects in a disaggregated manner, i.e., considering separately each block of the receiver. Modern telecommunication standards, instead, often adopt high order modulation schemes, e.g. M-QAM, with the aim to achieve large spectral efficiency. This puts additional quantization problems that have been poorly debated. The choice of suitable quantization characteristics for both the decoder messages and the received samples in LDPC-coded systems using M-QAM schemes is being understood. The analysis involves also the demapper block that provides initial likelihood values for the decoder, by relating its quantization strategy with that of the decoder. A new demapper version, based on approximate expressions, is also presented, that introduces a slight deviation from the ideal case but yields a low complexity hardware implementation. A relevant issue concerns comparison between the error rate performance that is achievable by using LDPC codes and that ensured by other schemes employing SISO decoding. Moreover, modern broadcast communications are characterized by increasing throughput requirements. For example, for the DVB-T2 standard, that must support High Definition Television (HDTV) services.. Another issue in broadcast transmissions concerns complexity of the decoder implementation that can be somehow reduced by introducing suitable approximations. The current scenario of error correcting codes is dominated by schemes using Soft-Input Soft-Output (SISO) decoding. Among them, an important role is played by Low-Density Parity-Check (LDPC) codes that permit to approach the theoretical Shannon limit, while ensuring reduced complexity

Index Terms—Integer wavelet transform, k-means clustering, masking, robust reversible watermarking (RRW).

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