AEU-International Journal of Electronics ans Communications

Volume 83, Issue 1, 2018, Pages 484-491

Modification of extrinsic information for parallel concatenated Gallager/Convolutional code to improve performance/complexity trade-offs

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Abstract: To benefit the properties of both Low-Density Parity-Check (LDPC) and Turbo Convolutional Codes (TCC), we propose a practical concatenated Gallager/Convolutional code in a turbo coding way. The modi?ed code creates a balance between the advantages and the disadvantages of LDPC and TCC in terms of the overall complexity and latency. This will be done through two di?erent component SISO decoders; LDPC and convolutional code of the same rate 1/2 without interleaver. Since the two SISO decoders are di?erent in nature, they exchange extrinsic information that will be easily adapted to each other. The study of computation complexity and decoding performance over an AWGN channel indicates that such approach leads to excellent performance because of several factors. The proposed approach achieves a trade-o? between waterfall and error floor regions. It reduces complexity decoding compared to TCC and 3D- TCC. It provides a better coding gain over LDPC and PCGC(Parallel Concatenated Gallager Codes). These features will ensure optimal outcomes and cost-performance ratio, and thus, this trend can be the best choice for today's communication systems.

Keywords : Computation complexity, Convolutional code, Extrinsic information, LDPC, Parallel concatenation, Turbo code