

# Factor-graph based Inverse Problems in Cyclic<sup>1</sup> LDPC Decoding

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## Abstract

Due to its simplicity, cyclic low-density parity-check(LDPC) codes are attractive for implementation on integrated hardware like radio-frequency identification (RFID), where availability of power is scarce. However, real-time access to the RFID requires real-time decoding of the encoded data. In this paper, we formulate the decoding process for the cyclic LDPC code as an equivalent inverse problem and show that a probabilistic solution can be obtained using a graphical model based message-passing algorithm. We validate the formulation of our inverse problem using simulations and using a dedicated hardware implementation of a cyclic LDPC encoder-decoder.

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