

Design of multi-edge-type bilayer-expurgated LDPC codes for decode-and-forward in relay channels

Abstract

We consider the design of bilayer-expurgated low-density parity-check (BE-LDPC) codes as part of a decode-and-forward protocol for use over the full-duplex relay channel. A new ensemble of codes, termed multi-edge-type bilayer-expurgated LDPC (MET-BE-LDPC) codes, is introduced where the BE-LDPC code design problem is transformed into the problem of optimizing the multinomials of a multi-edge-type LDPC code. We propose two design strategies for optimizing MET-BE-LDPC codes; the bilayer approach is preferred when the difference in SNR between the source-to-relay and the source-to-destination channels is small, while the bilayer approach with intermediate rates is preferred when this difference is large. In both proposed design strategies multi-edge-type density evolution is used for code optimization. The resulting MET-BE-LDPC codes exhibit improved threshold and bit-error-rate performance as compared to previously reported bilayer LDPC codes.