Abstract

Error control coding has been used to mitigate the impact of noise on the wireless channel. Today, wireless communication systems have in their design Forward Error Correction (FEC) techniques to help reduce the amount of retransmitted data. When designing a coding scheme, three challenges need to be addressed, the error correcting capability of the code, the decoding complexity of the code and the delay introduced by the coding scheme. While it is easy to design coding schemes with a large error correcting capability, it is a challenge finding decoding algorithms for these coding schemes. Generally increasing the length of a block code increases its error correcting capability and its decoding complexity.

Product codes have been identified as a means to increase the block length of simpler codes, yet keep their decoding complexity low. Bit flipping decoding has been identified as simple to implement decoding algorithm. Research has generally been focused on improving bit flipping decoding for Low Density Parity Check codes. In this study we develop a new decoding algorithm based on syndrome checking and bit flipping to use for binary product codes, to address the major challenge of coding systems, i.e., developing codes with a large error correcting capability yet have a low decoding complexity. Simulated results show that the proposed decoding algorithm outperforms the conventional decoding algorithm proposed by P. Elias in BER and more significantly in WER performance. The algorithm offers comparable complexity to the conventional algorithm in the Rayleigh fading channel.