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Iterative block DFE (IBDFE) and IC techniques based chip-level multiple access systems

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Abstract:

In wireless broadband communications using single-carrier interleave division multiple access (SC-IDMA) with frequency domain equalization (FDE), a new combination of iterative block decision feedback equalization (IBDFE) and interference cancellation (IC) techniques is proposed to deal with several users accessing the common channel. Filtering operations of IBDFE, which are used to remove intersymbol interference (ISI), are implemented by fast Fourier transforms (FFTs) that yield a much lower complexity than equivalent time domain (TD) structures. Further, the proposed structure is performed iteratively and IBDFE is designed according to the minimum mean square error (MMSE) criteria. The feedback signal after error-correction code is directly designed from soft detection at the previous iteration. Simulations performed for downlink communication on wireless fading multipath channels show that the combination of IBDFE-IC provides an efficient solution with good performance for IDMA systems in ISI channels. Further, IBDFE-IDMA outperforms existing SC-FDE and multi-carrier IDMA schemes with cyclic prefixing (CP) and zero padding (ZP) techniques.

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