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Single Carrier Cyclic Prefix-Assisted CDMA System with Frequency Domain Equalization for High Data Rate Transmission

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Abstract

Multiple-access interference and interfinger interference limit the capacity of conventional single-carrier DS-SS systems. Even though multicarrier CDMA possesses the advantages of conventional CDMA and OFDM, it suffers from two major implementation difficulties such as peak-to-average power ratio and high sensitivity to frequency offset and RF phase noise. A novel approach based on single-carrier cyclic prefix-assisted CDMA has been proposed to overcome the disadvantages of single-carrier CDMA and multicarrier modulation. The usefulness of the proposed approach for high-speed packet access with simplified channel estimation procedures are investigated in this paper. The paper also proposes a data-dependent pilot structure for the downlink transmission of the proposed system for enhancing pilot-assisted channel estimation in frequency domain. The performance of the proposed pilot structure is compared against the data-independent common pilot structure. The proposed system is extensively simulated for different channel parameters with different channel estimation and equalization methods and the results are compared against conventional multicarrier CDMA systems with identical system specifications.

Keywords

single-carrier cyclic prefix-assisted code division multiple access, data-dependent pilots, frequency domain