Receiver Design in Downlink MC-CDMA Communication System with Antenna Array

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ABSTRACT

In this paper, we exploit transmit diversity in downlink multicarrier CDMA (MC-CDMA) system to provide a receiving scheme. Our first emphasis is on designing a blind (without knowing the undesired users' signatures) MC-CDMA receiver in the mobile station that can suppress the multiple access interference (MAI) and combine the desired signal stemmed from all the transmitting antennas. Three blind receivers are proposed in this paper. The first one is the conventional single-user matched filter (MF) receiver and the second one is designed to meet the minimum-output-energy (MOE) criterion. Since both receivers premise on accurate knowledge of the vector channel impulse responses (VCIR), hence we develop a subspace-based blind (without requiring training sequences) algorithm to estimate the VCIR of downlink antenna array MC-CDMA system. The third receiver is referred to as the Decorrelating-RAKE (D-RAKE) receiver which is designed without knowing the desired users channel parameters. Furthermore, we present a spreading codes selection rule that enables the simple MF receiver to achieve the performance of the MOE and optimum linear receiver. Simulation results demonstrate not only the significant gain by employing the proposed codes selection rule but also the MAI resistant.

Keywords: Multicarrier CDMA (MC-CDMA), Matched filter (MF), Minimum-Output-Energy (MOE), Vector channel impulse responses (VCIR), Subspace, Decorrelating-RAKE (D-RAKE)

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