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Research Article

Linear multiuser detection for a DS-CDMA system

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ABSTRACT

DS-Code division multiple access is considered as the third generation of cellular mobile used in interim standard 95(IS-95) [1] and it is currently being standardized for universal mobile telecommunication systems (UMTS). CDMA offers attractive features, such as frequency reuse, soft handoff, increased capacity, and multipath combating. In a CDMA system, several users simultaneously transmit information over a common channel using pre-assigned codes. The conventional single user detector consists of a bank of filters matched to the spreading codes. This detector suffers from two problems. First, multiple access interference (MAI) produced by the other co-channel users is a significant limitation to the capacity of this detector. The second problem is the near-far effect which occurs when the relative received power of interfering signals becomes larger. A potential solution is multi-user detection which exploits the information of signals of interfering users. In the present study performance of various linear detectors like matched filter detector, MMSE detector, and adaptive LMS detector are studied. These are the linear detectors that operate linearly on the received signal statistics and are suboptimal detectors. The matched filter bank is the conventional detector and offers the simplest way of demodulating CDMA signals .The detector resulting from the MMSE (minimum mean square error) criterion shows better performance over the conventional one for low SNR value. Adaptive LMS is employed to enhance the BER performance in MUD application. Several factors motivated the research to apply neural network as multi-user detector.

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