Overloaded minimum total squared correlation signatures based pilot aided system for MC-CDMA and STBC MC-CDMA

Abstract

This paper proposes multiple-access schemes based on Overloaded Minimum Total Squared Correlation (TSC) signatures, namely Pilot Aided Multi-Carrier Code-Division Multiple-Access (MC-CDMA) and Pilot Aided Space Time Block Codes (STBC) MC-CDMA. Since overloaded minimum TSC signatures were used as the spreading codes, a number of sub-channels in the MC-CDMA and STBC MC-CDMA schemes were not utilized for data transmission. These empty sub-channels can be exploited for comb-type pilot signaling. To maintain low system complexity, for the pilot sub-channels Least Square (LS) estimation was employed and for interpolating the characteristics of the data subchannels linear interpolator was applied. The validity of the schemes is confirmed by comparing them with the original MC-CDMA method using Walsh-Hadamard orthogonal codes and also with Walsh-Hadamard based STBC MC-CDMA with block-type pilot. All systems use Equal Gain Combining (EGC) or Maximum Ratio Combining (MRC) in the MC-CDMA block at the receiver. The simulation result shows that although the spreading codes of interest are not fully orthogonal codes, for a low number of users the systems under investigation performed better than their Walsh-Hadamard based counterpart. This will be valuable for Wireless Personal Area Network (PAN) where the number of users is typically low. © 2007 Asian Network for Scientific Information.