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Wireless Systems: Research Article

On transmission techniques for multi-antenna W-CDMA systems

Mário Marques da Silva[1,*], Américo M. C. Correia[1,2] and Rui Dinis[3]

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Abstract

In this paper we present and evaluate a new pre-processing scheme for Multiple Input Multiple Output (MIMO) channels. Its performance is compared with other MIMO schemes proposed for the downlink of Wideband-Code Division Multiple Access (W-CDMA) systems, namely a variation of the Beam Forming (BF), entitled Beam-Selective Transmit Diversity (BSTD) or post-processing schemes, such as the Alamouti-like MIMO or the Vertical Bell Laboratories Layered Space-Time (V-BLAST) MIMO scheme. It is assumed that the Base Station (BS) has $M \geqslant 2$ transmit antennas and the Mobile Station (MS) receiver has space enough to accommodate $N = 2$ uncorrelated receive antennas.

It is shown that the proposed pre-processing scheme allows receivers with very low complexity, contrarily to the case where a post-processing approach is followed, simplifying the MS receiver. Therefore, the proposed $M \times N$ MIMO pre-processing scheme can be seen as an alternative to post-processing schemes. It is also shown that the pre-processing scheme for MIMO channels tends to achieve the best performance in most scenarios, being followed by the BSTD, which allows interference cancellation and provides diversity. Copyright © 2007 John Wiley & Sons, Ltd.