An Efficient Signal Detection Technique for STBC-OFDM in Fast Fading Channel

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Abstract. In frequency selective fading channel, the STBC-OFDM system achieves optimal performance. Unfortunately, the STBC-OFDM system performance is degraded due to co-channel interference (CCI) in time selective fading channel. To suppress CCI effects various signal detection techniques are investigated including diagonalized zero forcing detection (DZFD), successive interference cancellation (SIC), decision feedback detection (DFD), List-SIC, and maximum likelihood (ML) methods. Although ML detection technique achieves optimal performance, it results into very high computational complexity. In this paper, the STBC-OFDM systems performance is analyzed under the influence of time selective channels. In particular, we proposed a suboptimal ordered iterative decision feedback (OIDF) detection technique based on dual combining scheme of DZFD and SIC with iterations. Finally, the performance evaluation is carried out for proposed OIDF method and various standard conventional signal detection methods based on complexity and bit error rate (BER). The results show that BER performance of OIDF method nearly approaches to ML method with substantial reduction in complexity.

Keywords: Signal Detection · STBC-OFDM · Co-channel Interference · Low Complexity · Fast Fading Channel

1 Introductions

Next generation wireless communication offers a wide range of applications starting from telephonic service to high quality video signal streaming. These causes major challenges due to high data rate and link reliability. Recently, the transmit diversity schemes have gained tremendous interest due to the improvement of link reliability without requiring extra transmitting power or bandwidth [1,2]. Alamouti in [3] first proposed transmit diversity technique known as space time

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