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PERFORMANCE STUDIES OF 2X2 MIMO SYSTEM FOR DIFFERENT MODULATION AND OFDM MULTIPLEXING TECHNIQUES USING ML DETECTOR

R BHAGYA[1] & A G ANANTH[2]

[1]Assistant Professor, Department of Telecommunication Engineering, RV College of Engineering, Bangalore, India

[2]Professor, Department of Telecommunication Engineering, RV College of Engineering, Bangalore, India

ABSTRACT

A detail analysis of the performance of 2X2 MIMO (Multiple Input Multiple Output) antenna systems has been carried out for different modulation schemes and multiplexing techniques using ML detector at the receiver end. The transmission characteristics of the MIMO system have been determined for BPSK, QPSK, and 16-QAM modulation schemes presuming Additive White Gaussian Noise (AWGN) and for the flat fading Rayleigh channel. On the receiver side, **Successive Interference Cancellation technique with Maximum Likelihood (**ML-SIC) detectors has been employed for determining the BER Vs SNR performance of the communication channel. The simulation results show that for BER of ~10^{-3}, the SNR increases with higher modulation schemes from BPSK to 16-QAM. Further the results of the analysis indicate that for BPSK modulation at BER of ~10^{-3}, the SNR performance for OSTBC multiplexing is found to be 14.39 dB, for CDMA multiplexing the SNR ~13.37 dB and for OFDM multiplexing the SNR ~12.54 dB. Thus the BER performance of 2X2 MIMO-OFDM transmission channel with ML detector shows the lowest SNR ~12.54 dB for the OFDM multiplexing. Further the MIMO-OFDM multiplexing system shows an ~2 dB and 1 dB improvement with respect to OSTBC and CDMA multiplexing techniques. A comparison of the MIMO performance with different multiplexing techniques indicate that the 2x2 MIMO–OFDM transmission channel for BPSK modulation depicts better performance with ML detector system at the receiving end. The simulations results are presented and discussed in the paper.

KEYWORDS: Signal to Noise Ratio (SNR), Quadrature Amplitude Modulation (QAM), Phase Shift Keying (PSK), Orthogonal Frequency Division Multiplexing (OFDM), Orthogonal Space Time Block Codes (OSTBC), Multiple Input Multiple Output (MIMO), Code Division Multiple Access Techniques (CDMA), Bit Error Rate (BER)