

ABSTRACT

High data rate wireless communication has become more important and has become a necessity. Orthogonal frequency division multiplexing (OFDM) is a promising solution for increasing a communication system's data rate by utilizing the available bandwidth in the most efficient way. Furthermore, the use of multiple receive and transmit antennas greatly increases the channel capacity and the performance over frequency selective channels. In order to operate in the most effective way, OFDM-based communication systems need accurate channel estimation. This can be a challenging problem when the channel itself is time varying due to the changing geometry and Doppler frequency shift.

The objective of this Final Paper was to investigate the performance of various channel estimation techniques for OFDM systems with multiple antennas. For a transmitter diversity OFDM system, cannot use the same channel estimation technique like on system with one transmitter antenna, due to the interference at the receiver caused by the multiple transmit antennas. In this Final Paper, will be analyzed about the channel estimation problem of single input multiple output (SIMO) and multiple input multiple output (MIMO) systems. For SIMO and MIMO systems, the use of maximal ratio combining (MRC) and space time block coding (STBC) would improve the performance in terms of channel capacity.). This simulation will follow IEEE 802.11a standard with only accommodate a fixed rate (12 Mbps) for all simulation, where the systems will be tested on multipath fading Rayleigh channel added with Gaussian noise.

The results from the simulation, on SIMO-OFDM (1x2) system the use of comb type estimator improves the overall performance about 2.8 dB comparing with the system use of block type, and on the higher Doppler's frequency the degradation performance of comb type is lesser than the use of block type. On MIMO OFDM STBC (2x2) system the use of block type Simplified gives 0.4 dB better than the use of comb type estimator but for higher SNR's value give the same value of BER.