

Abstract

Channel capacity is an important parameter to analyze because it determines the maximum data rate that a system can achieve. The usage of MIMO system can improve the system's ability in transmitting the data because it can transmit more informations in a given time slots compared to a system with single antenna. One of the schemes in MIMO is STBC (Space-Time Block Code) which offers gain diversity. Beside MIMO, OFDM is also implemented to obtain a more reliable communication system. Analysis on channel capacity of MIMO STBC-OFDM is needed to consider the increasing in maximum data rate that can be achieved by a system which implements the scheme.

In this final task, channel capacity of a MIMO STBC-OFDM system in Mobile WiMAX IEEE 802.16/e is analysed. The MIMO which is analyzed is a system with 2 transmitter antennas and 2 receiver antennas. The objective of this final task is to analyze the channel capacity and some influencing parameters in MIMO STBC-OFDM system of Mobile WiMAX in frequency selective fading channel and AWGN with Rayleigh channel model.

The simulation results show that when the user's speed is 40 km/h and SNR 20 dB the system has 2.4104 bps/Hz of improvement in channel capacity if the number of transmitter antennas is increased from 2 to 4 transmitter antennas. In SNR 20 dB and the user's speed is 40 km/h, by using BPSK, the system's channel capacity is 0.9173 bps/hz, while QPSK can improve the channel capacity to 1.5672 bps/Hz. The result also proves that the implementation of MIMO STBC scheme with QPSK decreases the channel capacity by 2.6548 bps/Hz in SNR 20 dB and the 40 km/h of user's speed compared to MIMO with spatial multiplexing scheme.

Keyword : MIMO, STBC, OFDM, channel capacity, mobile WiMAX, IEEE 802.16/e