

ABSTRACT

In the wireless communication system, especially high-rate communications, the transmission signal will be damaged because of the existence of multipath fading effect, it will degrade system performances. One of techniques to realize high data rate wireless communications system is OFDM (Orthogonal Frequency Division Multiplexing) modulation, where the channel effect of selective fading frequency will be felt as flat fading by each subcarrier. OFDM also can decrease bandwidth using because of the orthogonality of each subcarrier. Using a multiple antenna system which is known as MIMO (Multiple Input Multiple Output) with STBC scheme also aims to maximize the link reliability of wireless communications through channel fading by diversity method at antenna transmitter, so the multipath fading effect can be reduced. The performance of antenna array at the receiver side could be maximized in order to instruct or centralize the array ability to catch the desired signal (adaptive beamforming).

This final assignment investigated the combination method of MIMO-OFDM techniques with adaptive beamforming in Wimax IEEE 802.16e broadband wireless communications system standards. This research compares the performance between MIMO-OFDM (Space Time Block Code) system with MIMO-OFDM system added with adaptive beamforming at the receiver side.

From the simulation result, MIMO with or without beamforming has the same performance in single user. But, when an interference signal is added to the system from a specific direction, MIMO with adaptive beamforming system has better performance. When the direction of arrival signal is at 60° and the direction of interference signal is at 120° , the adaptive beamforming gives performance improvement around 0.2 dB, with user speed at 3 km/hours and BER 10^{-4} . With assumption SIR 10 dB. For lower values of SIR, adaptive beamforming has better performance than non-adaptive beamforming system.