

## ABSTRACT

In wireless communication system, there are multipaths fading that cause the damage of signal transmission, so that performance of system will be decreased. The order of data rate improving and the quality of service in wireless communication support the innovation of new technology to improve spectrum efficiency and quality of signal. This matter can be reached by using the multi antennas at both of transmitter and receiver. This technology is called MIMO.

Space Time Block Code (STBC) is one of MIMO scheme that is purposed to maximize performance link of wireless communication with channel fading by using diversity of antenna method. However MIMO system can improve the performance of wireless system by maximizing SNR, but the interferer be not pressed yet. Beamforming is the process of forming beams towards direction of the desired user while simultaneously suppressing signals originating from other direction. This Final Project will analyze the performance of MIMO Space Time Block Coding system with beamforming on fading rayleigh channel.

From simulation result, MIMO system without beamforming and MIMO system with beamforming have the same performance for single user condition. But if there is interference signal, MIMO system with beamforming give better performance than MIMO system without beamforming especially for SIR (Signal to Interference Ratio) less than 15 dB. The performance of MIMO system with beamforming decreases if the mobility of user is faster, BER  $10^{-4}$  can be reached when the rate of user mobility from 0 km/hour to 10 km/hour. The performance of MIMO system with beamforming can be increased by inserting more of pilot. Inserting pilot every 10 symbols give better performance if is compared with inserting pilot every 100 symbols and 480 symbols.