ABSTRACT

The decreasing of communication quality because of channel containing multipath propagation and doppler shift in wireless communication is unavoidable, but it can be minimized by MIMO-OFDM technique. MIMO techniques that can be amplifying signals and OFDM that can be increasing capacity of system, makes MIMO-OFDM become a right solution. However, the selection of coding techniques for MIMO-OFDM is equally important.

In this final project, the MIMO-OFDM system implementing Diagonal Algebraic Space-Time-Frequency Block Code (DASTFBC) as the coding technique, has been analyzed. DASTFBC is a combination of Diagonal Algebraic with three combinations of diversity commonly used in MIMO, that is the antenna diversity (space), time diversity, and frequency diversity. The DASTFBC MIMO-OFDM system performance is tested under various channel condition and modulation, with the STBC MIMO-OFDM system as a comparison. The channel variations that is used, is following the ITU-R M.1225 recommendation channel model that is Pedestrian A and Vehicular A channel model. While for modulation variation, 16 QAM and 64 QAM are used.

As a result, the DASTFBC system is suitable for low mobility communications. However, it is possible that DASTFBC system can be used also at high speed and multipath propagation. Proven on the Pedestrian A channel with a speed of 3 Km/hr, viewed at 30 dB SNR, obtained BER DASTFBC $5{,}8\text{x}10^{-3}$ while STBC $2{,}8\text{x}10^{-2}$. On the Vehicular A channel speed of 120 Km/hr viewed at SNR 30 dB, obtained BER DASTFBC $6{,}6\text{x}10^{-3}$, while STBC $6{,}9\text{x}10^{-3}$. To optimize DASTFBC system can be used 64 QAM modulation. Proven on 64 QAM modulation reviewed at SNR 30 dB DASTFBC performance can increasingly coincide with the performance of STBC, obtained BER DASTFBC $33{,}6\text{x}10^{-3}$ while STBC $31{,}2\text{x}10^{-3}$. In addition, the use of 64 QAM modulation supports high data rate communication, according to the demands on current wireless communications.

Keywords: MIMO-OFDM, DASTFBC, STBC