# ABSTRACT

3GPP LTE (Long Term Evolution) is the evolution of the UMTS to respond the growing demand for high-quality multimedia services in accordance with user expectations. The LTE system uses multiple Input Multiple Output (MIMO) system which uses multiple antennas at the transmitter and receiver sections. One of the coding schemes in LTE MIMO technique is a Space Frequency Block Code (SFBC) scheme is based on more reliable research on the conditions of mobility compared to the Space Time Block Code (STBC).

In this final project has been designed SFBC encoder alamouti with two antennas transmitter and implemented on FPGA. SFBC encoder design is using VHDL programming language. In this final project, the SFBC encoder integrated with the OFDM 512 subcarriers that have been studied by previous researchers. SFBC-OFDM simulation results of testing conducted to verify the output. After that, SFBC encoder in VHDL designs implemented on FPGA board.

The result of the verification and implementation SFBC encoder and SFBC-OFDM have the same results. Bit rate achieved in this implementation is 50.12 Mbps. The synthesize results obtained on the Xilinx software is the amount of used resource in the FPGA for SFBC encoder is *occupied slice* 1%, *slice register* 1%, 4 input LUTs 1%, *bonded* IOBs 27%, BUFG/BUFGCTRLs 3% and SFBC-OFDM is *slice register* 9% , occupied slice 57%, input LUT 45%, IOB 27% and the number of BUFG/BUFGCTRLs 3%.


**Keywords : LTE, MIMO, SFBC  alamouti, FPGA, VHDL**