

ABSTRACT

MIMO is an emerging technology using the principle of diversity with the aim of increasing data rate in a greater range without the need for bandwidth or great transmission power. In Indonesia, MIMO technology has never been implemented, so this research will implement MIMO system using a linear code method of Alamouti STBC. Space Time Coding is a coding system on the domain space and time (space-time domain). Space time coding aims to obtain maximum spatial diversity in MIMO channels through the right space-time transmits code words arrangement.

In this final project has been designed MIMO encoder decoder STBC Alamouti 2x2. Research was initiated by creating a model using MATLAB which been followed by a MIMO STBC 2x2 design using VHDL. This research also made three-channel modeling, Rayleigh channel and AWGN noise, AWGN noise channel only, and the ideal channel. Result of MATLAB simulations used as comparison with the simulation results by using VHDL language in ModelSim. After that, the design of MIMO STBC 2x2 on the ModelSim was implemented into FPGA board using the Xilinx software.

MATLAB simulation results and simulation results in ModelSim has the same result in every modeling channels. Simulation that using Rayleigh channel and AWGN noise got BER = 0.0625, simulation that using AWGN noise only got BER = 0, and simulation that using ideal channel got BER = 0. This MIMO STBC 2x2 design have delay 18 clock that is 9 clock in transmitter and 9 clock in receiver. In this research too got synthesis result on Xilinx software that is amount resource used on FPGA is the amount register slice 2%, slice 42%, amount 4 input LUT 36%, IOB 1%, total memory that used 292088 kB, and parameters result synthesis constrain is minimum period required for processing MIMO STBC 2x2 system is 4.045ns, with minimum

arrival delay before the clock input is 4.413 ns, which obtained the maximum frequency is 247.246MHz, and the maximum delay after the clock is 4.677 ns.

Keywords: MIMO, STBC Alamouti, VHDL, FPGA.