ABSTRACT

Satellite communication has been implemented in various areas,such as remote sensing,mobile communication, and digital satellite TV . Nano satellite which weighs less than 10kg, is currently being developed for research by universities, one of them is Telkom University. Characteristics of data transmission via satellite are limited power, high delay, bursting noise, and Low BER. One way to improve the reliability of satellite communication systems is the implementation of channel coding in the system, which was shown from a comparison EbNo of the BER.

In this final project has compared the performance without channel coding, with turbo coding (rate 1/3 and ½), and with convolutional coding (rate ½) for sending images via satellite according to the CCSDS recommendations. Bit is generated as much as 491520 bit. The simulation results show that the Turbo code has the most excellent performance compared with a convolutional code and without channel coding. EbNo to 10^{-6} BER simulation results for 5.55 dB for turbo code of R = 1/3, 9.67 dB turbo code of R = ½, 9.45 dB for convolutional code R = 1/2, and 16.6458 dB for systems without channel coding. Based on these results, design prototype turbo code encoder circuit R = 1/3 is used for the application of nano satellites using Field Programmable Gate Array (FPGA) Spartan-6 XC6SLX45 ATLYS CSG324C.

The results of synthesis system FPGA resources that used for the turbo encoder system is 0.0044% Number of Slice Registers, 3% Number of Slices LUTs, 25% Number of fully used LUT-FF, 1% Number of bounded IOBs, and 12% Number of bufg / BUFGCTRL / BUFHCEs. Results synthesis system designed have a minimum period of 5.913 ns and the maximum clock frequency that can be achieved is 169.122 MHz. From the results of the synthesis system is shown that the design of the prototype Turbo encoder can be implemented on board ATLYS Spartan-6 XC6SLX45 CSG324C.

Keywords : ***nanosatellite, turbo code, convolutional code, FPGA***