

ABSTRACT

In today's digital telecommunication technology, data is transmitted through wireless technology. IEEE has issued specification of Worldwide Interoperability for Microwave Access (WiMAX), which is 802.16. WiMAX contain blocks named scrambler block for scrambling incoming data and descrambler block to restore the data to its original form. Implementation of scrambler and descrambler block is created as a part of whole WiMAX system in physical (PHY) layer.

The design of scrambler and descrambler is using pseudorandom binary techniques or Pseudo Random Binary Sequence (PRBS). PRBS implemented using an LFSR or Linear Feedback Shift Register. One of the two main parts of LFSR is a shift register (the other is the feedback). Shift register is a device that works to shift the contents of the register. When reaches its final condition, the register will cross the previous series. At the LFSR, the bits contained in the selected position in the shift register will be combined in a function, and the results will be fed back to the input bits of register. Feedback makes a system more stable and error free. A special tap is taken from a certain point, subsequently it XOR-ed and then returned as a feedback register.

The results of this final project is a design which implemented on FPGA that is able to prove the ability scrambler to randomize bit stream to be transmitted, as well as comparing the results of the software simulation and hardware implementation. Input generator block, scrambler block and descrambler block can be implemented using one piece of FPGA Altera De0-Nano EP4CE22F17C6 Cyclone IV E because the number of resources available on the FPGA is still sufficient.

Keywords: *WiMAX, FPGA, VHDL, random generator, scrambler, descrambler.*