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Design and Implementation of WiMax System for Analysis of Power Dissipation Using AWGN Channel.

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***Abstract*— Worldwide Interoperability for Microwave Access (WIMAX) provides high data connectivity to various users over large area where other network systems are not available or are unable to reach to the users end. This is the most promising industry that is able to provide high bandwidth with high reliability to the users in comparison with the other network standards. Wireless Network systems are used by the users from several years, but the advancement and emerging growth of this standard enhances growth scale that can bring down the cost of equipment's, ensure reliability and reduce costing risk of service providers. The paper explains the Simulink block diagram of the wimax system and its VHDL implementation. The Simulink model was developed using Matlab 2013 and the RTL view was developed using Xillinx System generator.**

Key Words: WiMAX, Matlab 2013, VHDL, OFDM,AWGN, RS Decoder.

I. INTRODUCTION

The rapidly emerging progression in the usage of wireless setups has commanded to the obligation for the structure of advance communication links with high reliable bandwidth. With the accumulative demand for wider range of services, such as web browsing and with media related contents for video and audio conferencing solicitations, the telecommunication industry is also changing. The augmented trend on cellular networking and the web browsing has reverted in a larger demand for connection oriented terms to be provided to anybody in the requisite time and with sufficient connection thus heading towards the demanding necessity for higher space, higher bandwidth and high dependable wireless telecommunication systems. Availability of Wimax brings high performant data connection to over million subscribers all over the world, thus experiencing new wireless forums for providing coverage to a large number of users. Wireless communication mediums have experienced a splendid growth and advancement over last many years, hence have proven to be the most demanding technology. Wimax is the most promising and rapidly growing technology which can provide high data connectivity with a reliable safety to large number of users over a large area. Wimax has emerged as a reliable solution to provide high speed internet access with higher range of data connection to territorial dominion areas as well as to various small and large scale ventures. Wimax deployment can be considered to be an ensuring technology for various educational and industrial beneficial term purpose. This paper explains the Simulink block diagram for the Wimax system and RTL schematic of transmitter and receiver which is developed using VHDL Software.

II. PROPOSED WIMAX MODEL

The proposed Wimax model is developed using the Simulink tool. The model consist of various block diagrams. The randomizer helps in improving the coding efficiency of the system. The RS Encoder helps in correcting the block errors by adding redundancy to tha data sequence. The convolutional encoder reduces the random errors in the system. The interleaver functions like the randomizer, the difference is it does not work on the states of the bits but works on their positions. QAM maps the incoming data bits from the interleaver. OFDM modulator helps in providing high bit rate and high speed. Viterbi decoder reduces the computational load of the system. RS Decoder decodes the signal by performing the necessary functions. The reverse functioning takes place at the receiver part of the system and the transmitted data is received at the receiver.

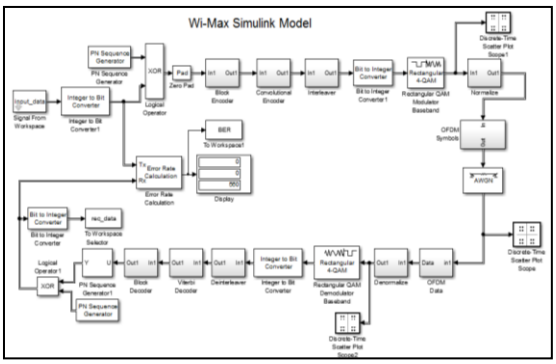

Fig -1. Wimax Simulink model

III. SIMULATION RESULTS FOR SNR 15.

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The simulation results for the proposed model are given below. The data that is transmitted is received at the receiver end. The error rate calculation block calculates the errors that are present at the reception of the data that is the number of bits that where transmitted to the number of bits that where received. The plot received for the transmitted data is shown for SNR 15 .

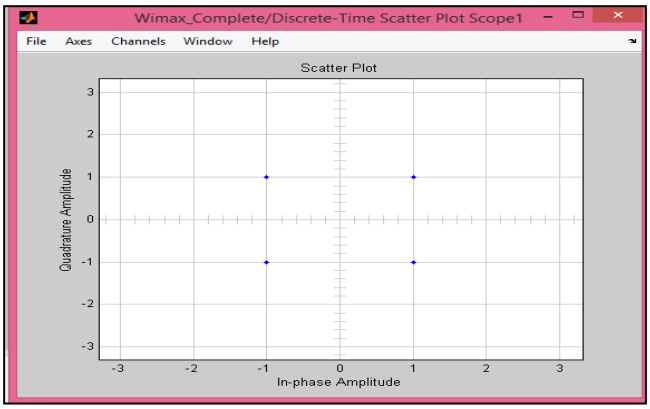

Fig -2 : Plot before adding AWGN channel

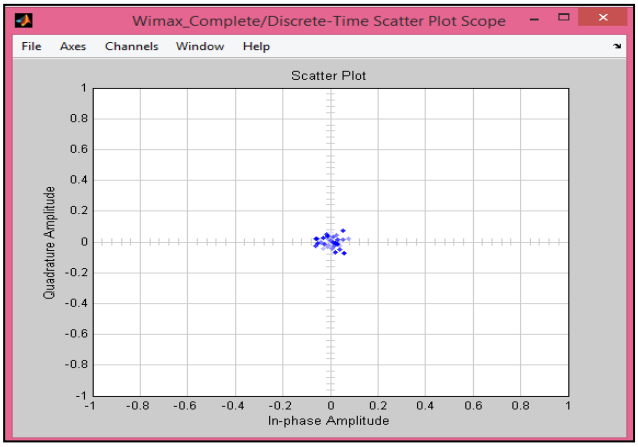

Fig - 3 Plot after adding AWGN channel

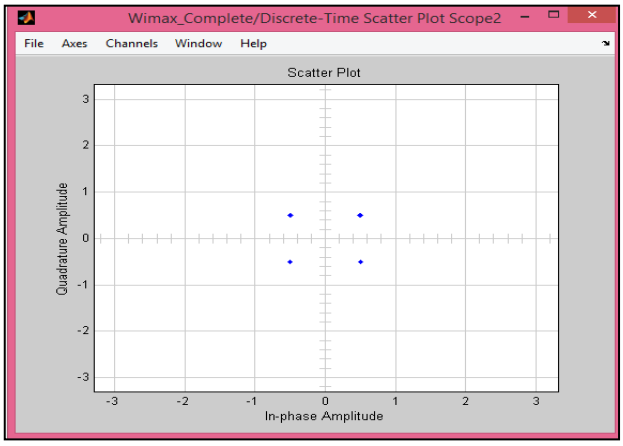

Fig -4 Output.

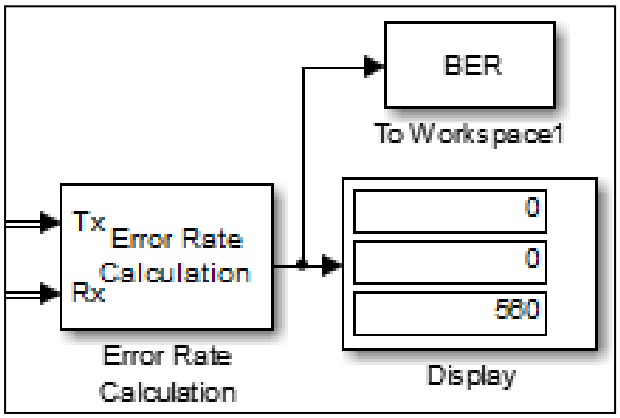

Fig -5 Error Rate Calculation.

IV. VHDL IMPLEMENTATION OF WIMAX SYSTEM.

The given RTL Schematic is developed by writing the VHDL code for the above Simulink model. The given RTL Schematic is the transmitter and receiver of the system. The blue colored schematic shows the

Fig -6 RTL View of Transmitter

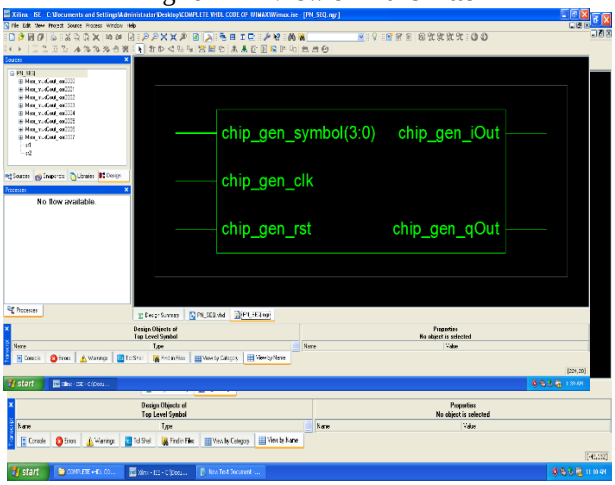

Fig -7 RTL View OF Reciever

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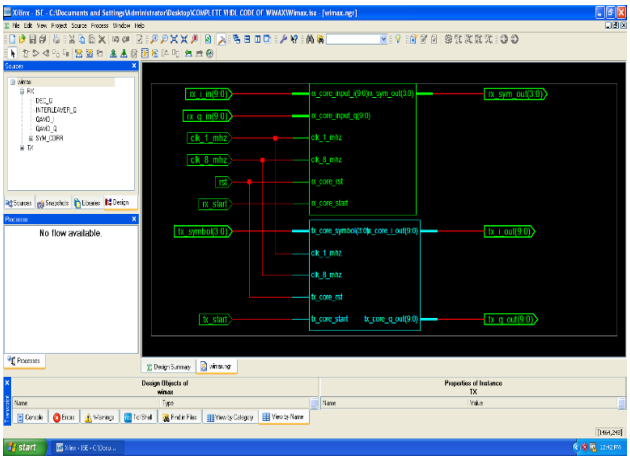

Fig -8 RTL view of Transmitter and reciever

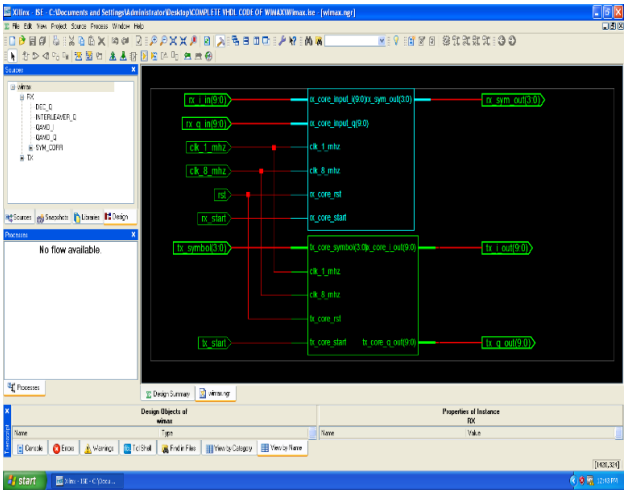

Fig -9 RTL View of Reciever And Transmitter.

V. RESULTS

The WiMax system is deployed and tested on Quartus for analysis of power dissipation. The table below explains the total power dissipation that is calculated in the software. The Core Static, I/O and Total Thermal Power Dissipation is calculated and stated below.

Table-1 Power analysis of Wimax System

Core Static Thermal Power Dissipation.	81.25mW
I/O Thermal Power Dissipation.	8.90mW
Total Thermal Power Dissipation	90.25mW

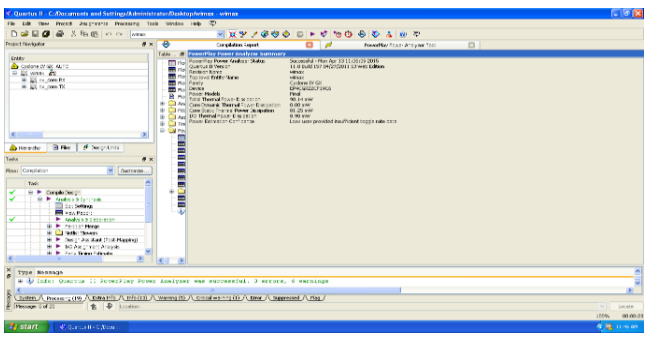

Fig -10 Power Play Analyser Summary.

VI. CONCLUSION

The Simulink model and its VHDL code using AWGN channel are proposed in this paper. The Simulink model is successfully developed and the VHDL code is successfully written. The data that is transmitted is received at the receiver end with zero bit error rate for SNR above 15. The Core Static, I/O and Total Thermal Power Dissipation is calculated via the Quartus Software.

In summary the proposed system provides proper transmission and reception of the data with lesser SNR and zero bit error rate that is complete transmission and reception of data.

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BIOGRAPHIES

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