

Electronics and Communications Engineering Department

*B.Sc. Project Proposal
First Semester, Fall 2012
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Project Title : Design, Simulation and Implementation of the Physical Layer of WiMAX

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WiMAX, means “ *Worldwide Interoperability for Microwave Access*” . It is a wireless telecommunication system that provides transmission of data via various modes, from point – to multipoint links, to portable and fully mobile internet access. The technology utilized in this system provides higher broadband speeds without the need for cables. The technical requirements of the system are based upon the IEEE 802.16 standard .The bandwidth and range of WiMAX make it suitable for potential applications such as connecting Wi-Fi hotspots to the Internet, providing a wireless alternative to cable and DSL for “last mile” broadband access and providing portable connectivity.

The hardware component of the WiMAX system is called the physical layer (or simply PHY). The PHY incorporates the orthogonal frequency division multiple access (OFDMA) techniques, by which up to 256 subcarriers are used to handle the data. This leads to a substantial increase in data rates to reach 70Mbps in full mobility scenarios. One of the most important components of WiMAX is the user equipment. The project is aimed at designing, simulating and implementing the baseband circuitry of the user equipment

The project will cover the following topics:

- Investigating the differences between the WiMAX and other similar wireless systems.
- Reviewing the IEEE 802.16 standards
- Investigating the technical aspects of the PHY layer
- Designing, simulating and implementing the baseband building blocks of the user equipment

The practical part of the project will depend upon the use of:

- Software packages that can provide simulation of circuit designs.
- FPGA chip that can be downloaded with the successful simulated designs.

Each student in the group will be responsible for:

- Investigating the technicalities of the WiMAX system.
- Be responsible for designing, simulating and implementing a specific part of the user equipment circuitry in an integrated fashion with other designs carried out by his colleagues.
- Preparing his/her own final project document