IEEE 802.16 is a series of wireless broadband standards authored by the Institute of Electrical and Electronics Engineers (IEEE). The 802.16 family of standards is officially called wireless Metropolitan Area Networks (MAN) in IEEE and it has been commercialized under the name of WiMAX (“Worldwide Interoperability for Microwave Access”).

The WiMAX multiservice environment is complex since it needs to serve various packet streams and its different Quality of Service (QoS) requirements and traffic behaviors. The packet schedulers operating at the Medium Access Control (MAC) layer are very important for QoS delivery of service classes. The WiMAX standard does not define any standard scheduling algorithm for QoS improvement of its service classes in both the uplink and downlink communications. Each of the defined service classes requires a distinct level of QoS. A single algorithm is not sufficient for all service classes. An appropriate algorithm for each service class is a major challenge in WiMAX networks.

The existing WiMAX scheduling algorithms are not capable of providing a fair scheduling service to all the service classes. Apart from the provision of QoS, a WiMAX scheduling algorithm should focus on maximizing the wireless channel utilization by minimizing the number of scheduling-related control messages and unnecessary transmissions. Even though previous research works addressed different packet scheduling algorithms with QoS support for IEEE 802.16 wireless MAN, they all focused
on MAC layer QoS problem. However the guaranteed QoS for service classes which travel both MAC and physical layers of IEEE 802.16 wireless MAN has not been addressed.

Although there have been many proposals in WiMAX networks by using generic algorithms, which are designed for wire line networks, it is not adequate for wireless networks. The wireless channel’s nature is absolutely different from the wired channel's. Hence an algorithm, which considers a wireless channel condition performs better than the one which does not.

In order to address the quality of the channel with regard to scheduling decision, an opportunistic scheduling algorithm has been proposed in the existing work. A cross-layer scheduling algorithm is a type of opportunistic scheduling algorithm which emphasizes more comprehensive information on channel quality.

The proposed channel aware cross-layer based scheduling algorithm considers the Signal to Noise Ratio (SNR) value, and allocates the bandwidth based on the information about the quality of the channel, and the service requirements of each connection, to improve the throughput.

The proposed channel aware cross-layer scheduling algorithm has been compared with one of the traditional scheduling algorithm, Weighted Round Robin (WRR). The proposed approach outperforms the traditional scheduling algorithm since the average system throughput has enhanced almost all of the simulation time.
In this research, cross-layer interaction approach is used to enhance the quality of voice delivery of a G.711 Compression/Decompression (CODEC) based Voice over Internet Protocol (VoIP) application. The proposed cross layer scheduling algorithm focuses mainly on QoS architecture of WiMAX network. This research work aims at enhancing the WiMAX QoS parameter of throughput, by reducing packet loss and transmission delay.

Video streaming over WiMAX wireless networks can benefit substantially from a cross-layer design. The research work takes two applications viz VoIP and video to investigate the fitness of appropriate service classes for each application. In the end, results have proven that Unsolicited Grant Service (UGS) service class is suitable for VoIP and rtPS service class is suitable for video transmission. The test results show that by reducing the packet delay, the throughput can be improved.

This cross-layer scheduling algorithm can be extended to WiMAX mobility environment and more real time multimedia transmissions. Many challenging problems lie ahead, and the challenge of optimal cross-layer design is far from being resolved. While cross-layering provides significant