

# A Novel Approach to Enhance QoS in Mobile WiMAX Networks

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## ABSTRACT

Wireless network is fast growing area. Wireless network has an ability to provide a good quality of service i.e voice, data, video conferencing etc. Different mobile generations are presented i.e 1G to 4G. In this research paper, 4G technology is used. WiMAX is 4G technology. In this research work, create a WiMAX network and that network consist of 2 base stations, app configuration, profile configuration, WiMAX configuration and 16 mobile nodes. After creating a network check the quality of network i.e Jitter (sec) and delay (sec). In this research paper we conclude that when the speed of moving mobile node is increased we obtain the low delay and low jitter in network.

## Keywords

QoS, WiMAX, UGS, Rtps, nrtPS, BE.

## 1. INTRODUCTION

Quality of Service (QoS) is the service that is used to deliver the different services to the mobile user in appropriate time. Some QoS properties of network are fixed as well as predefined with boundaries. [4] QoS is service that is used to measure the overall performance of network. Performance of network is measured to check the speed, accuracy and reliability. Different services are provided to different network traffic. Bandwidth, error ratio, queuing delay, jitter (delay variation) and throughput are a different service that comes under QoS. Extra additional n/w resource is not created by QoS. Additional bandwidth is not created in the network.

### 1.1 Wimax Architecture

Subscriber station node and base station node are main component in WiMAX architecture. Subscriber station node sends the signal to the base station. Firstly create a connection and request for particular services. After creating a connection sends the packets from one node to other node.

### 1.2 WIMAX QoS SERVICES

WiMAX QoS standard has 4 different categories that is used for the prioritization of mobile node(traffic):

- (1) Unsolicited Grant Service (UGS)
- (2) Real-Time Polling Service (rtPS)
- (3) Non-Real Time Polling Service (nrtPS)
- (4) Best Effort (BE)

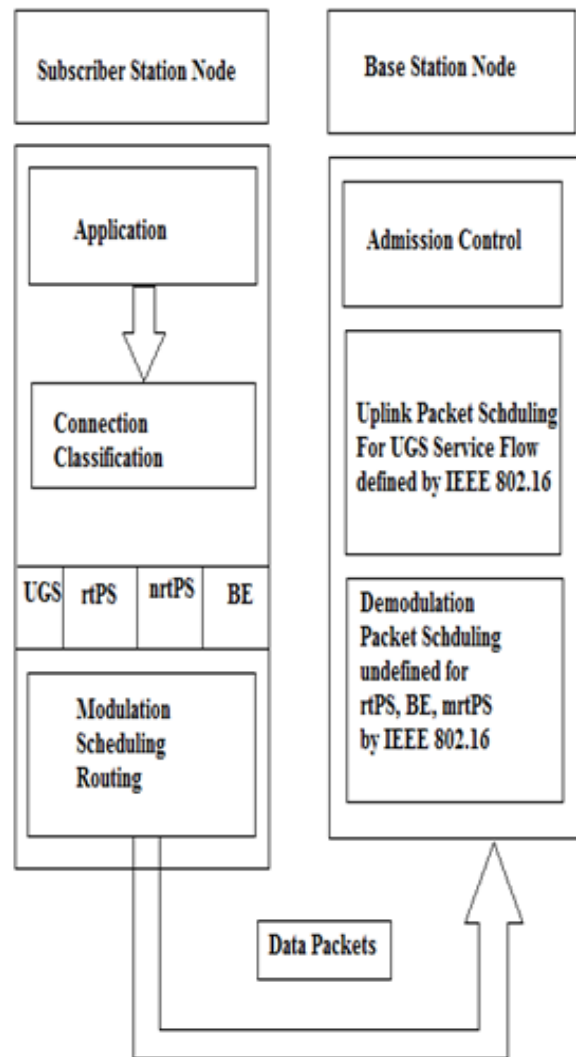


Fig. 1 Wimax Architecture

Scheduling Type	Polling Method
UGS	PM bits used to request the poll for bandwidth needs on non UGS connection.
ertPS	Uses unicast polling. BS offers unicast grant like unrequested UGS
rtPS	Only allows unicast polling
nrtPS	May restrict service flow to unicast polling in transmission request policy
BS	All forms of polling is allowed

Fig 2 QoS Classes

## 2. RELATED WORK

In [1] researchers proposed concept that analyze different QoS parameters. Analyze the parameter for WiMAX Network. This research helps in determining the overall performance of 4G n/w and parameters of 4G n/w is critical in nature. A very low value of Jitter, delay and packet loss) is achieved for 500 mobile users that exist in network. An AODV protocol helps in achieving the larger value of throughput. In [2] researchers proposed concept of performance of WiMAX (Worldwide Interoperability for Microwave Access) n/w that check quality parameter for network. Using Multimedia technique, it provides a optimize result for BS (Base Station). This paper shows overall performance of quality of network that is based on particular location. In [3], researchers examine concept of WiMAX – based network and evaluate the performance for quality of service (QoS) using an idea of IEEE 802.16 technology. This research used a multiprocessor architecture organized by the interconnection of n/w. OPNET 17.5 TOOL is used to create the architecture and to calculate performance criteria (i.e. throughput, delay and data dropped) that slightly concerned in network estimation. In [4] authors proposed a work to compare the QoS between UMTS 3G network and WiMAX 4G networks. Two network models were proposed has objective of studying a realistic approach: in UMTS model multiple users are placed in the network requesting some applications and then the network traffic measured and calculated. Regarding the WIMAX model scenario, where several users perform different services, enabling the analysis of network performance by measuring several parameters. In [11] researchers proposed a work to compare the QoS between UMTS 3G network and WiMAX 4G networks. Two network models were proposed has objective of studying a realistic approach: in UMTS model multiple users are placed in the network requesting some applications and then the network traffic measured and calculated. Regarding the WIMAX model scenario, where several users perform different services, enabling the analysis of network performance by measuring several parameters.

## 3. PROPOSED WORK AND SIMULATION

Create a WiMAX n/w with the help of OPNET TOOL 17.5. This network checks quality of service. The WiMAX network should consists of base stations, mobile nodes, application configuration, profile configuration and WiMAX configuration. Application configuration profile configuration and WiMAX configuration are used to set the properties of network

This network shown in figure 3 consists of 2 base stations, 1 profile configuration, 1 application configuration, 1 WiMAX configuration and 16 mobile nodes.

Some of the quality parameters like jitter and delay is checked in WiMAX network.

WiMAX network is shows in the given below figure 3. The WiMAX network consist of App config. , Profile config and WiMAX config.

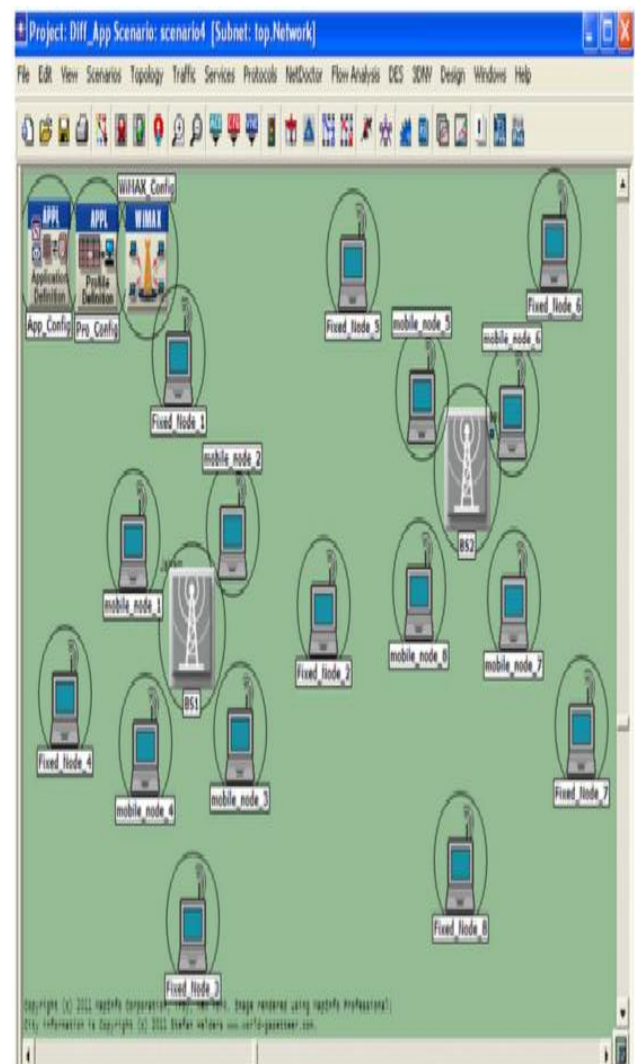


Fig 3 WiMAX Architecture

Some of parameters are given below which is used for simulation.

Parameters	Value
Transmission power	0.005
Examined Routing Protocol	AODV
MAC Type	IEEE 802.11 DCF , IEEE 802.16
Number of nodes	95
Simulation Area	1500x1500 Square meters
Mobility Speed	20,60,120 km/Hour(km/h)
Trajectory Inf.	MANET/WiMaX mobility scenario , Vector
Reception power threshold	-95dBm
Data rate	11Mbps
Mobility Model	Random Way point
Buffer size	256000bits
Fragmentation Threshold (bytes)	1024
Traffic	,Oracle VOIP
Simulation	500000 events Based on Kernel type preference
Simulation Time	30 min
Seed	128
Update Interval	500000
Values per Statistic	100

Fig 4 Simulation Table

### 3.1 Delay (sec)

Delay parameter is checked in WiMAX network. Delay is basically refers to time needed for a packet which is to be travelled from corner to corner of n/w from one moving node to another moving node in the network. The delay typically measured in fractions of seconds. When rate of moving node is greater than before then delay is degraded as shown in given below figure. This results shows that degraded performance of network.



Fig 5 WiMAX Delay (Sec)

### 3.2 Jitter (Sec)

Jitter is basically a form of latency. Jitter is measured in the variability over time of packet latency across a network.

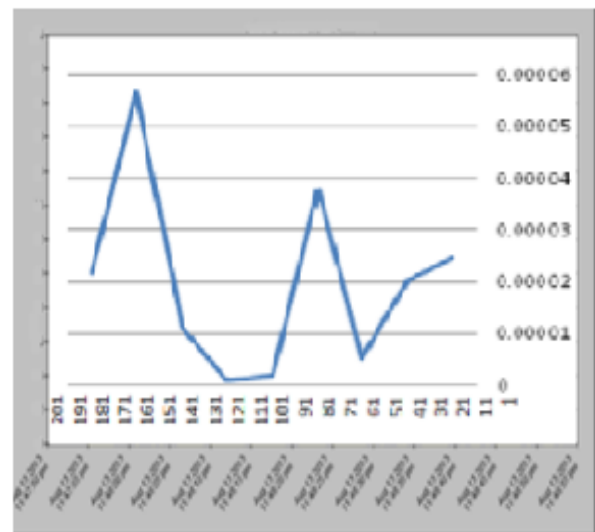


Fig 6 WiMAX Throughput (packet/sec)

## 4. CONCLUSION AND FUTURE WORK

This research paper is evaluating the performance of WiMAX network under QoS condition. In this research paper jitter and delay of the network is checked. Jitter per second and Delay per second is checked. Implemented network, practically verify the performance of networks. With OPNET TOOL, enlarge the region of network to check the performance of various Qos parameters. In this network perform a handover task after defining a trajectory into the network. Using better Qos, better handover results can be obtained.

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