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RESEARCH ARTICLE

PERFORMANCE COMPARISON OF VOIP OVER WIMAX AND WI-FI MOBILE NETWORKS

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ABSTRACT

This paper highlights the comparison between Worldwide Interoperability for Microwave Access (WiMAX) is based on IEEE 802.16 broadband Wireless metropolitan area networks (MANs) and Wireless Fidelity (Wi-Fi) is based on IEEE 802.11 Wireless LANs using the application of Voice Over Internet Protocol (VOIP), to benefit from the technical features when their integration to overcome the problems in the technical, and we measured the percentage of Packet loss, Throughput and the proportion of the delay Using several scenarios.

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INTRODUCTION

In the world of wireless communications There are many techniques where the Institute of Electrical and Electronics Engineers (IEEE) selected and organized in the form of protocol has given numbers took the wireless networking family number (802) and each technology with in the family took a number where took Wi-Fi number (11) and Wi-Max (16) and each technology features and when experience discovered some flaws, such as the problem of the coverage area of Wi-Fi and the problem of security and cost in WiMAX technology.

For each their uses in the market where to meet market needs in terms of efficiency and cost. However the researchers that strive to provide the best for me and find solutions to problems and defects in these techniques and in this paper a comparison between Wi-Fi and WiMAX, where each with advantages and disadvantages have been in terms of quality requirements [9].

VoIP It is a technology that uses the network as a carrier of voice through the Internet, where he works VoIP transit packet via packet switched based network With a choice of the best of the packet path, The VoIP technology has gained high importance by users compared to public switched telephone network (PSTN) that the advantages offered by VoIP system.

VoIP community uses Session Initiation Protocol (SIP) protocol for signaling. SIP is an RFC (Request for Comment) Standard from the IETF (Internet Engineering Task Force), responsible for administering and developing protocols that define the Internet. SIP translates the user name to the current network address, manages the call admission, dropping, or Transferring mechanisms, allows for changing the features of a session, etc. Another popular protocol for a voice/video call

on an IP network is H. 323. VoIP is one of the most common and cheap technology to communicate for short and long distances. Many VoIP providers also offer the service free of charge regardless of the distance. The analog voice data is digitized and transferred as packets over the IP network. These packets are decoded and converted back to the analog voice signal [8].

Packet loss in wireless networking is Transmitted Data (TX) - Received Data (RX), actually modern routers routinely drop packets due to dash in traffic that exceed their buffering capacities, and the widely used Transmission Control Protocol (TCP) is designed to cause such losses as part of its normal congestion control behavior [6]

Wi-Fi stands for “wireless fidelity”. Is a technique to reduce the cost and meet the requirements concerning quality of service with increased pressure on wired networks require the emergence of such technologies and carried protocol 802.11 by any seemed to evolve Wi-Fi in the emergence number of protocol 802.11a, 802.11b, 802.11g Crown each protocol characteristics and uses, and satisfies to the requirements of the market in terms of cost and quality of service, where protocol 802.11g works at frequency 2.4 GHz band, data rate support up to 54 Mbps and it uses Orthogonal Frequency Division Multiplexing (OFDM). Uses this protocol in a number of devices that use Wi-Fi technology [11].

WiMAX (Worldwide Interoperability for Microwave Access) is a telecommunications protocol that provides wireless communication And then transfer data using Several factors The data rates is up to 144/35 Mbps per subscriber in 20MHz of spectrum [3], and cover the area in miles ( 3 to 10 Km). WiMAX operates in between 10 and 66 GHz Line of Sight (LOS) at a range up to 50 km (30 miles) and 2 to 11GHz non Line-of-Sight (NLOS) typically up to 6 - 10 km (4 - 6 miles)

for fixed customer premises equipment (CPE). It is based on IEEE 802.16 standard and also called Broadband Wireless Access [10].

**Related Work**

D.V. Chandra Shekar *et al* in [1] had proposed Durability WiMAX and Wi-Fi in the security however problem is the security of the most prominent problems that threaten the world of wireless networking. They have to intensify efforts by the researchers.

Garima Malik *et al* in [2] had proposed a comparison between the WiMAX and Wi-Fi and determine which one best in terms of cost and efficiency, however the cost is one of the most important topics in determining the validity of the technique is the most important reasons for the spread of Wi-Fi technology and other types of wireless networks are less expensive and better quality compared to wired networks.

Mihai-Florentin *et al* in [3] had proposed Compared to between WiMAX and Long-Term Evolution (LTE) in the ratio of performance and weaknesses as all of them have the High data rate exceeds LTE on both the WIMAX and WIFI in terms of security in cellular systems higher. MS. Reshma *et al* in [4] had proposed It highlighted the five-generation) 5G (technology and its role in meeting the requirements of VOIP where it's best in terms of cost and availability.

Vimmi Malhotra *et al* in [5] had proposed a comparison between the WiMAX and Wi-Fi networks and the integration of their work to benefit from the advantages of two technologies, but technique the WiMAX and Wi-Fi each with advantages and disadvantages and work integration of techniques solutions disadvantages to make the most of the techniques advantages.

**METHOD**

In this experiment, we used OPNET modeler with WiMAX and WIFI Module capability; we implement VoIP over WiMAX and WIFI using WiMAX and WIFI scenario.

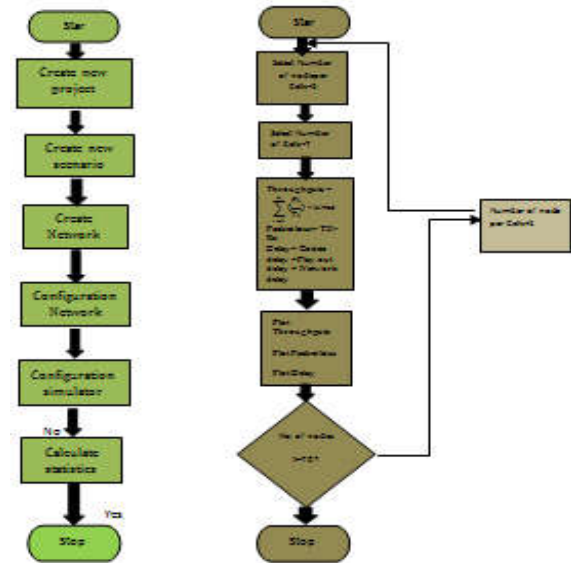
**Table 1**

Parameters Selected	Technologies	
	WIMAX	WIFI
Operational Mode	802.16	802.11g
Data Rate	343kbps	11 Mbps
Service classes	Unsolicited Grant service	not applied
Cell Radius (km)	1.00	
Path loss and Multipath Model	Vehicular	
Base Station Transmission Power (W)	0.50	
Subscriber Node Transmission Power (W)	0.50	
Number of Cells	7	
Number of node per Cells	5,6,7,8,9,10	
Overlay Cell	Hexagon	
Node Placement	Circular	
Number of Base Stations	7	
Number of Subscriber Stations	35,42,49,56,63,70.	
Type of Node	Mobile.	
Traffic Load	VOIP	
Simulation time	30 minute.	

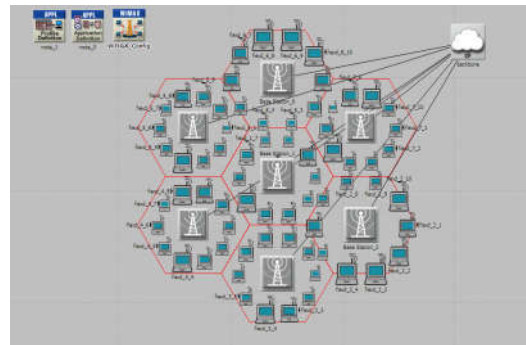
The parameters which were taken into our consideration were:-

**PROPOSED METHODOLOGY**

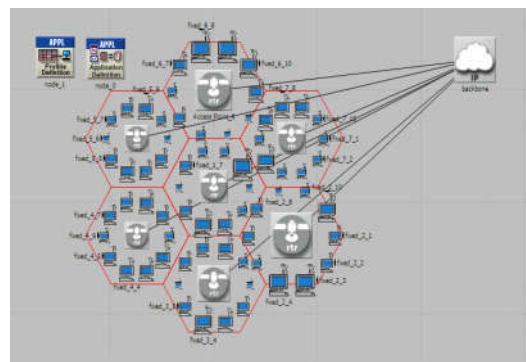
The simulator environment, descriptive analysis and mathematical model are designed using Opnet software program as shown in figure below:



**Figure 1** Computer Model. **Figure 2** Describe Computer Model.



(a) Network Model WIMAX



(b) Network Model WIFI

**Figure 3** Network Model WIMAX and WIFI.

**RESULT**

After the running of the simulator block diagram using Opnet software program we get the following results:

The comparison of Packet loss and Number of Subscriber Stations Using an application VOIP of Wimax/ Wi-Fi mobile

Node. The amounts of Packet loss drastically increase from Wi-Fi Comparison with Wimax.

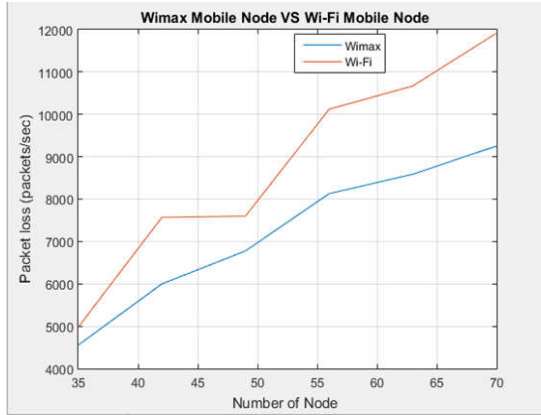


Figure 4 Packet loss

The comparison of Delay and Number of Subscriber Stations Using an application VOIP of Wimax/ Wi-Fi mobile Node. The amounts of Delay drastically increase from Wi-Fi Comparison with Wimax.

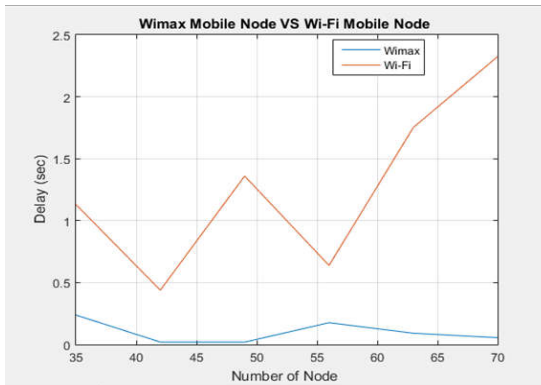


Figure 5 Delay

The comparison of Throughput and Number of Subscriber Stations Using an application VOIP of Wimax/Wi-Fi mobile Node. The amounts of Throughput drastically increase from WiMAX Comparison with Wi-Fi.

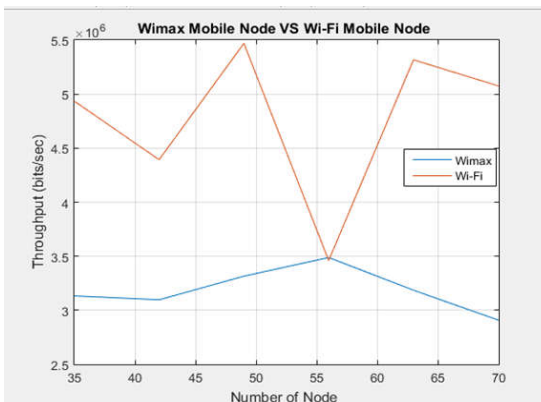


Figure 6 Throughput

## CONCLUSION

In this paper analysis, plan, design of the software program to simulate and Comparing the packet loss between the networks WiMAX/Wi-Fi Network and evaluate the performance of the system using Opnet software program. The parameters which were taken into consideration were: Technologies WiMAX/ Wi-Fi, Power transmitted, cell radius, Type of Node mobile, number of nodes, with profile VOIP. After the execution of the simulator the results were obtained in term of graphs. From the results we observed the following WiMAX has superiority over Wi-Fi for the Packet loss and delay however Throughput was higher in Wi-Fi compared to the WiMAX.

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