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Research Article

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

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ABSTRACT

The aims of this paper is to evaluate the performance of VOIP over WIMAX and WIFI mobile network in terms of Packet loss, Throughput and the propagation of the delay Using OPNET simulation for different several scenarios.

The parameter which were taken into considerations of the performance evaluation are Data Rate, Cell Radius (km), Path loss and Multipath Model, Base Station Transmission Power (W), Number of Cells Number of node per Cells, Number of Base Stations, Number of Subscriber Stations and Simulation time. The results were obtained in terms of graphs.

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INTRODUCTION

Using the spread of communications technology to deliver voice over Internet Protocol, the application is designed to reduce the cost to the companies and institutions due the high cost of networks in voice transmission. However, the recent developments in telecommunications networks encouraged users to switch to VoIP service. The resulting progress of wireless telecommunications networks overcomes most of the geographical, temporal, organizational barriers to data transfer and salary. To provide multimedia services everywhere and wireless applications and mobile technologies. Evolve towards integration of heterogeneous access networks such as wireless personal area networks (WPAN), wireless networks, local networks (WLANs), wireless metropolitan area networks (WMANs), as well as third-generation (3G) and beyond 3G cellular networks. Hybrid network based on IEEE 802.11 / networks WLAN IEEE 802.16 and / WiMAX is strong. Since both of the rival technologies designed to provide low-cost everywhere, and high-speed data rates, quality of service (QoS) introduction, wireless internet broadband access. IEEE 802.11 / WLAN standard is to provide moderate-to high-speed data connections in short distances. And IEEE 802.16 / WiMAX is the standard for the provision of

broadband wireless services that require the transfer of high and strict proportion quality of service requirements in both the internal and external environments. Furthermore, IEEE 802.16 / WiMAX network is promising the solution to provide backhaul support for IEEE 802.11 hotspots / WLAN [1].

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 [7].

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

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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 [3].

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 [9] per subscriber in 20MHz of spectrum, 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 [8].

Related Work

Karanvir Singh *et al* in [2]. had proposed that the best WiMAX network in terms of coverage and security space after work, compared with wlan network however security in the field of wireless networks has a great need of further research. Sourangsu Banerji *et al* in [3]. had Proposed the role of WiMAX and Wi-Fi in solving the problem of the region inaccessible implementing last-mile. Wi-Fi and Wi-Max two complementary technologies each other in solving the problem of Difficult areas accessible where each area of particular use in terms of cost and efficiency. M.Sreerama Murty *et al* in [5] had proposed challenges in Wi-Fi networks and WiMAX in terms of security, seamless handover, location and Emergency services, cooperation, and quality of Service, WiMAX relatively better than the Wi-Fi network in these areas due to several factors.

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	Fixed.	
Traffic Load	VOIP	
Simulation time	30 minute.	

Patrice Obinna Umenne *et al* in [6] had proposed the work of integration between the WiMAX / Wi-Fi send streaming a video conference application where he realized that this integration quality of service requests Packet Loss <1%, Overall Packet delay <150mS, Jitter (Delay Variance) <30m. Amit Sondhi *et al* in [4] had proposed Upcoming changes in wireless networks between WiMAX and Wi-Fi on the basis of Official

release, Network architecture, Technologies employed, WiMAX and Wi-Fi network provides a solution for secular system problems or can be used to solve part of the problems, such as backhaul.

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. The parameters which were taken into our consideration were:-

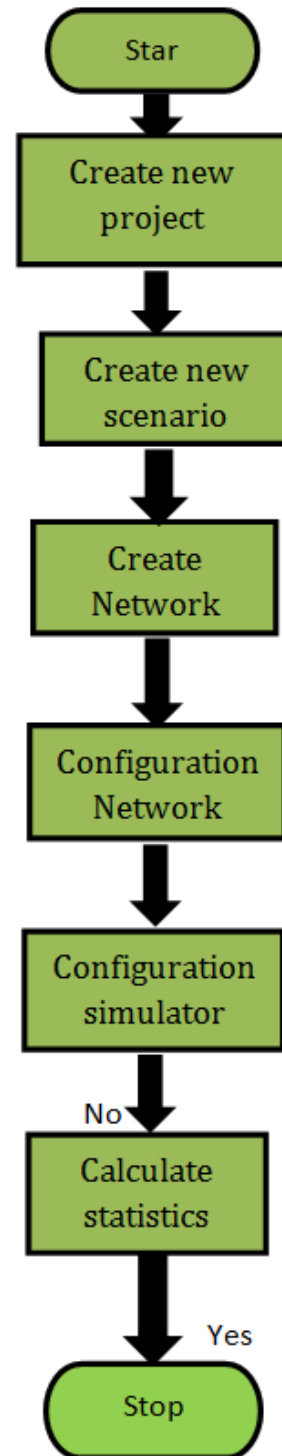


Figure 1 Computer Model

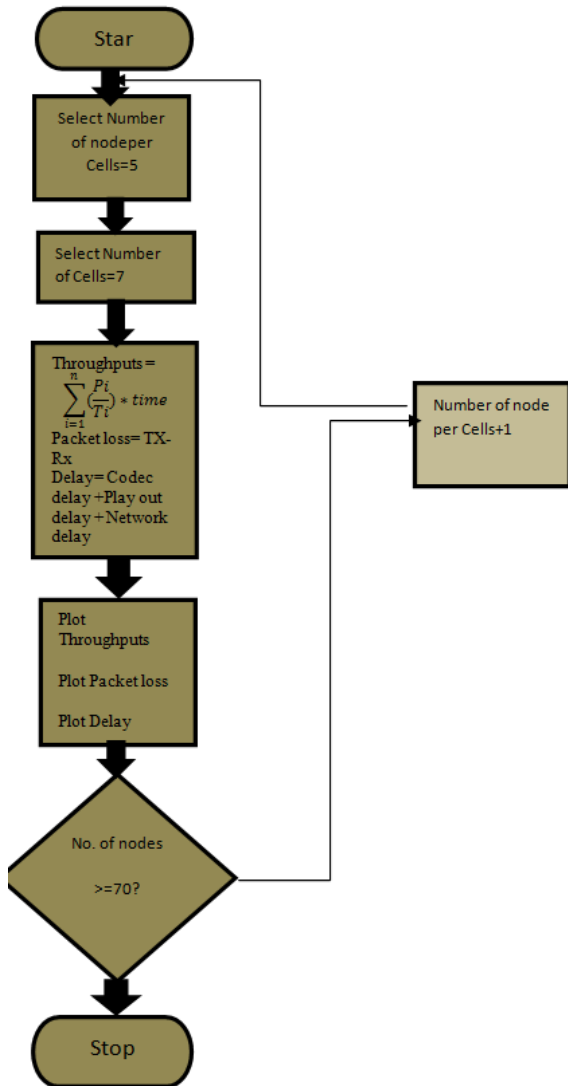
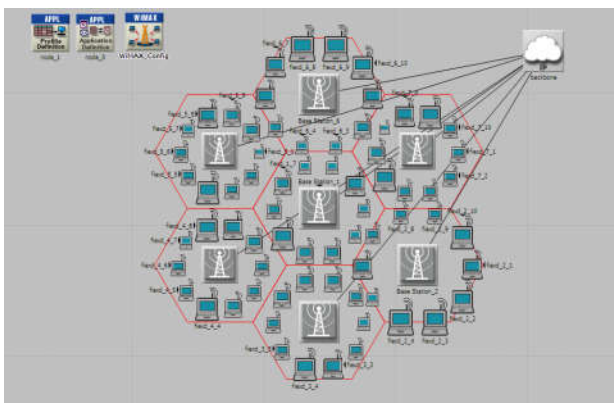


Figure 2 Describe Computer Model.

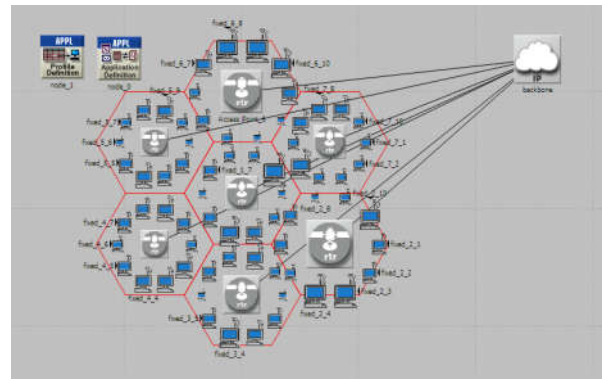
The simulator environment, descriptive analysis and mathematical model are designed using Opnet software program as shown in figure below

RESULT

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



(a) Network Model WIMAX



(b) Network Model WIFI

Figure 3 Network Model WIMAX and WIFI.

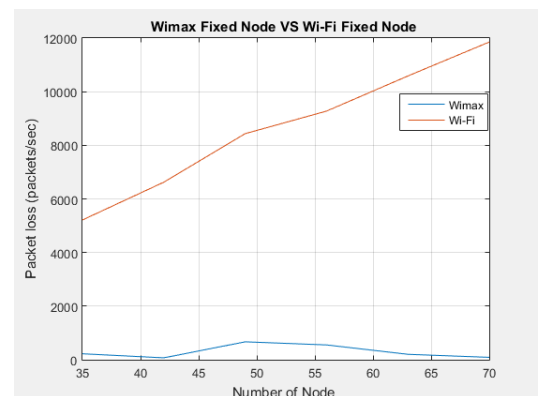


Figure 4 Packet loss.

The comparison of Packet loss and Number of Subscriber Stations Using an application VOIP of Wimax/Wi-Fixed Node. The amount of Packet loss drastically increase from Wi-Fi Comparison with Wimax.

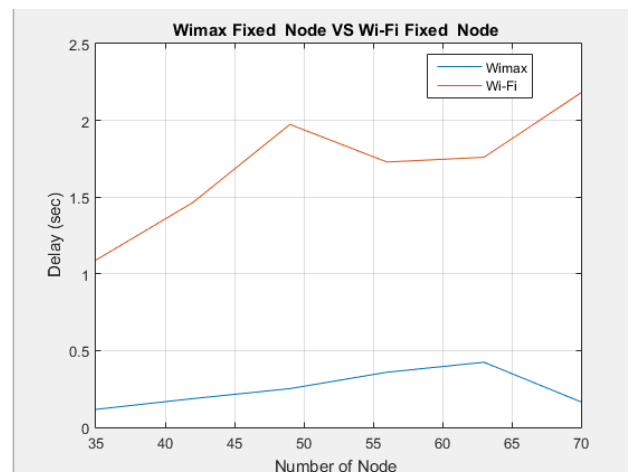


Figure 5 Delay.

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

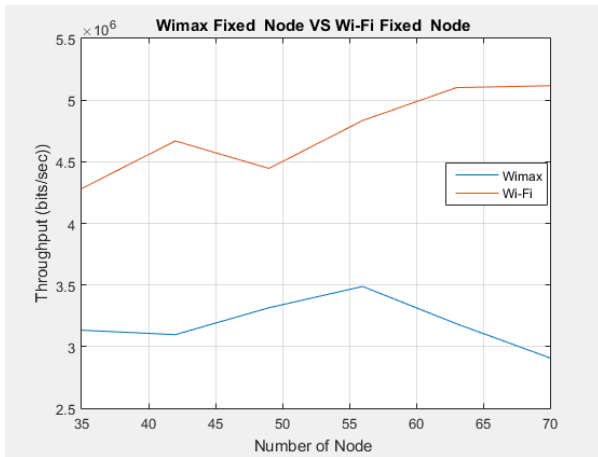


Figure 6 Throughput.

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

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 parameter which were taken into consideration were: Technologies WiMAX/Wi-Fi, Power transmitted, cell radius, Type of Node fixed, 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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