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QUALITY of SERVICE for REAL TIME VIDEO TRANSFERRING in WIRELESS WiMAX TECHNOLOGY

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Abstract: Recent days WiMAX technology has been the most important part of the communication industry for real time media transfers applications , here we focus on video quality transferring by testing QoS parameters for each three nodes in our network that had been designed for, using simulation of two fixed nodes and mobility one by taking benefits of WiMAX technology features.

1. Introduction

WiMAX (Worldwide Interoperability for Microwave Access) is a connection-oriented wide area network. It supports high bandwidth and hundreds of users per channel at speeds similar to currently seen for DSL, Cable or a T1 connection , mobile WiMAX products and certification follow the IEEE 802.16 air interface specifications. The network specifications of mobile WiMAX product are being developed internally by the WiMAX Forum, which include the end-to-end networking specifications and network interoperability specifications, the final evolution of the WiMAX usage scenario came in the form of mobility support. Here, the envisioned scenario has WiMAX serving as the air interface for the actual radio access network, where both fixed and mobile

users access the WiMAX network. The developers of the technology had created a technology capable of reasonably high data rates at reasonably long ranges.

The vary nature of anticipated WiMAX traffic—VoIP, data transfer, and video streaming— and the challenging aspects of the system deployment—mobility, neighboring cells, high required bandwidth efficiency—make the real time video transferring problem quite complicated in WiMAX. In this paper this issue will be discussed and make focus points on QoS and latency for real time video transferring in WiMAX technology.

2. Method

2.1 Qos of real time video

New and emerging services such as Video on Demand (VoD), Internet Protocol Television (IPTV), and triple play bring multimedia content to end users.

In online video streaming process, client request to view prerecorded view from the server. Server responds to this request and related data is sent over the network. Client on its end plays the video with the help of media player that is installed at the client's machine.

Video streaming can vary from about 100kbps for low quality video to 3Mbps for high definition movies. Video is typically displayed as a sequence of images played at constant rate of 24 to 30 frames per second.

The Real Time Transport Protocol (RTP) is a protocol that provides standardized packet structure that incorporates video and audio data, encoding scheme, time stamps, sequence numbers and other useful fields.

It is an end-to-end protocol that operates on top of the Transmission Control Protocol (TCP) or User Datagram Protocol (UDP). RTP provides best effort service without any guarantee of loss or delays. The sending side encapsulates the data to be sent into RTP packets, which is further encapsulated into UDP packet and is then handed over to the network layer. IP layer passes these packets to MAC and Physical layer, from where they enter the network. The receiving side extracts the RTP packet from the received UDP packet and extracts the media chunk from it. This is passed to the media player that decodes and plays it at a constant rate for the viewer.

2.2 simulation

OPNET 16.0 had been used to run this simulation. The reference model consists of 2 fixed WiMAX nodes located at 4km and 8km from the base station. Then a mobile node was added in the current subnet and assigned trajectories to it. Hence, after implementing the nodes and making related edits and modifications, it needed to validate the model against the reference model before the simulation could start. Therefore, to do this, the reference model simulation time was run of 60 minutes and compared the global statistics for the model.

3. Results and Discussions

3.1 QoS Quality of Service

For coverage estimation, the environment has an average propagation throughout. Yet, specific areas offer various propagation behavior due to different terrain.

WiMAX presents a very challenging multiuser communication problem: Many users in the same geographic area requiring high on-demand data rates in bandwidth with low latency. Multiple-access techniques allow users to share the available bandwidth by customizing each user some fractions of the total system resources.

The high data throughput enables efficient data multiplexing and low data latency. Attributes essential to enable broadband data services including data, streaming video and VoIP with high quality of service (QoS). The performance will enable transparency of quality of service between Mobile WiMAX and broadband wired services such as Cable and DSL, an important requirement for the success of the targeted Mobile Internet application for Mobile WiMAX. With other advantages of WiMAX include an open standards approach, IPR structure and healthy ecosystem.

With WiMAX MAC scheduling service witch designed to efficiently deliver broadband data services including voice, data, and video over time varying broadband wireless channel and The MAC scheduling service have the effesient properties that enable the broadband data services, scheduler witch located at each base station to enable rapid response to traffic requirements and channel conditions and the scheduling service that provided for both DL and UL traffic.

class	application	Bandwidth		Latency		Jitter	
1	Multiplayer Interactive Gaming	Low	50 kbps	Low	<25 msec	N/A	
2	VoIP & Video Conference	Low	32 -64 kbps	Low	<160 msec	Low	<50 msec
3	Streaming Media	Low, High	5kbps to2 Mbps	N/A		Low	<100 msec
4	Web Browsing &Instant Messaging	Moderate	10kbp to2 Mbps	N/A		N/A	
5	5 Media Content Downloads	High	> 2Mbps	N/A		N/A	

Table1. quality of service features

From the simulation results, while ADSL exhibited behavior that approached the ideal values for the performance metrics, WiMAX demonstrated promising behavior still well within the bounds of the defined metrics. Initial MPEG-4 content simulation runs exhibited significant packet loss. However, with further tuning, a configuration was derived that demonstrated packet loss that was more commensurate of the ADSL video client station.

Quality of service (QoS) evaluation was performed on static points chosen randomly by the test procedures following a pre-defined route, and a set of locations provided by each operator. Here it is provided combined QoS results of the model.

3.3 Latency test

Network latency (Ping test) was measured by sending an Internet Control Message Protocol (ICMP) echo request to the specified test server. The measurements consist measuring the average Round Trip Time (RTT) of 32 Kbytes IP packets - during 10 seconds to a server located on each operator's network.

	Random	Hotspots	Global
Number of test samples	901	98	999
Average-Latency-in milliseconds	75	67.6	74.1
Rate of successful PING within 100ms	95.6%	100%	95.1%

Table2. latency test results

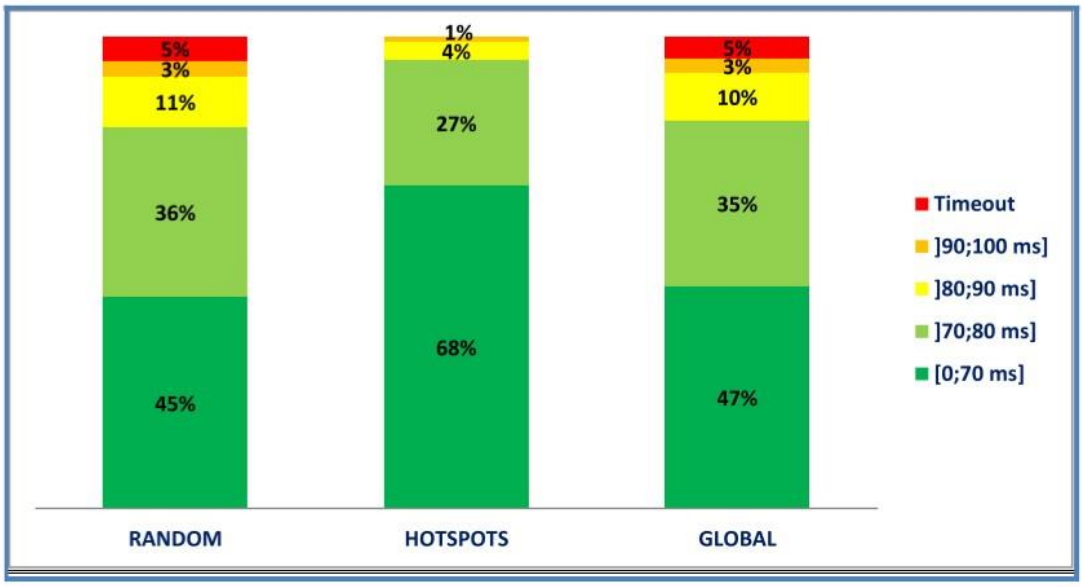

Fig1. latency test results

The results suite with real time media transfers applications needs with good rate of successful PING.

3.4 FTPDOWNLOAD AND UPLOAD RESULTS

File Transfer Protocol (FTP) is a protocol used for downloading and uploading files over the Internet. For this audit, a FTP server located on each operator's network was used.

		Random	Hotspots	Global
Number of test samples		1105	200	1224
FTP transfer time in seconds	Downlink	20.8	22.4	20.7
	uplink	14.2	13	14
Average throughput (Mbps)	Downlink	5.6	5.5	5.7
	Uplink	0.8	0.8	0.8

Table3. FTP download and upload results

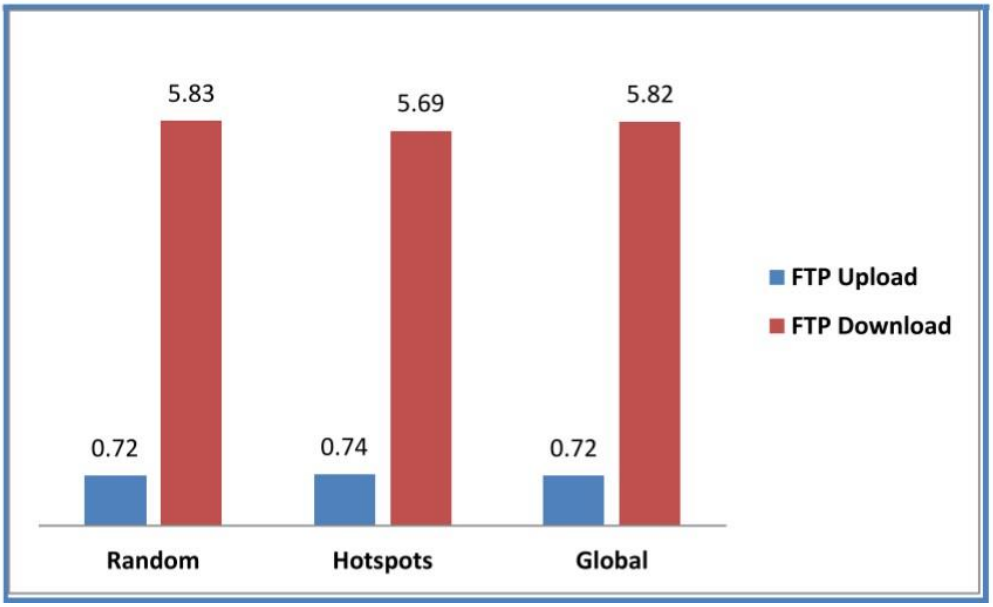

Fig2. FTP download and upload results

3.5 Video results

In this audit, video quality was evaluated from any location in Khartoum.

	Random	Hotspot	Global
Number of test samples	1021	113	1133
Rate of transfers with perfect video quality	78.3%	71.5%	77.8%
Rate of transfers with perfect or fair video quality	95.6%	97.2%	95.7%

Table4. video transferring results

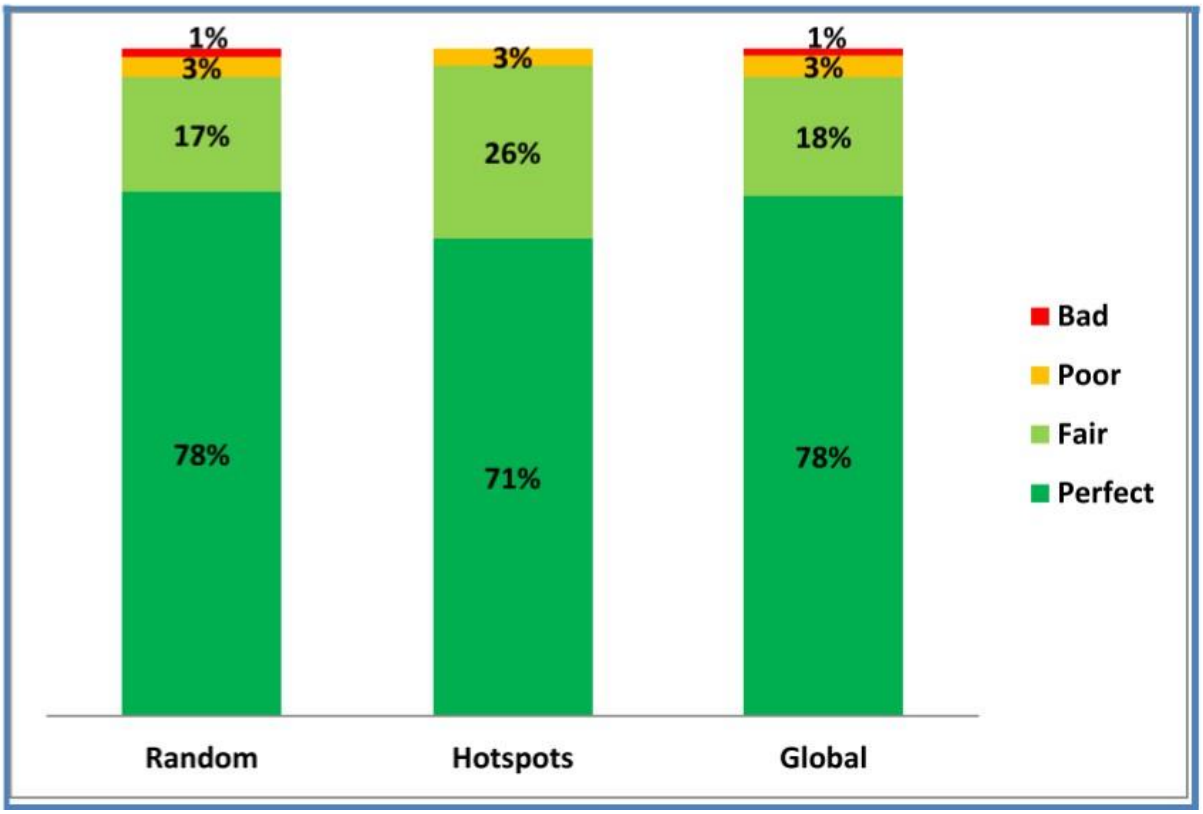

fig3. Video transferring results

Notice that the deferent between results of rates on perfect test and the fair test is reasonable and near to what the model built for.

Conclusion

The aim of this paper was to explore whether WiMAX technology could provide acceptable network performance for real time video streaming to WiMAX clients. OPNET modeler 16.0 was used to design two involving fixed clients and one mobile client (client moving in linear and circular trajectory). Performance was characterized using four metrics (FTP, latency, delay jitter and QoS video performance), which are critical when analyzing any video streaming services.

References

[1] ERNST AND YOUNG, The Necessity of Rogue Wireless Device Detection, White Paper, 2014.

[2] BEYAH (R.), KANGUDE (S.), YU (G.), STRICKLAND (B.), COPELAND (J.), Rogue Access Point Detection Using Temporal Traffic Characteristics, In IEEE Global Telecommunications Conference (GLOBECOM), 4, pp. 2271-2275, 2014.

[3] J. Camp, J. Robinson, C. Steger, and E. Knightly. Measurement driven deployment of a two-tier urban mesh access network. In Proceedings of ACM MobiSys, Uppsala, Sweden, June 2012.

[4] M. Lalwani , S. Kulasekare and Prof L. Trajkovic "Analysis of Video Surveillance over WiMAX Networks", ENCS 427 COMMUNICATION NETWORKS, 2011.

[5] M. M. Abo Ghazala, M. F. Zaghlou and M. Zahra, "Performance evaluation of multimedia streams over wireless computer networks", International Journal of Advanced Science and Technology, vol,13 , pp m61-73-, 2009.

