

Performance Evaluation of Voice over WIMAX and UMTS

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Abstract

Voice over Internet Protocol (VoIP) has been an interesting topic of research in the last decade. The engrossing increase in the use of VoIP services is resulting in the enormous growth of broadband network. This paper aim to evaluate performance of WIMAX and UMTS to support VOIP traffic .OPNET have used for evaluation, performance parameter used are delay, jitter, mean opinion score (MOS), packet delay variation and throughput. The results show that WIMAX is the best technology to support VOIP applications compared with UMTS.

Keywords: VoIP, WIMAX, UMTS, Performance.

1. Introduction

Voice over Internet Protocol (VoIP) practices is potentially mounting day by day resulting in the demand of rapid improvements in the networks. There is a demand of decreasing the difference between the qualities of voice and increasing the available bandwidth to provide the best VoIP services comparative to the traditional circuit switched telephony [1]. VoIP has almost replaced the conventional Public Switched Telephone Network (PSTN) due to its cost effectiveness and the features being provided [2]. WIMAX (Worldwide Interoperability for Microwave Access) is a communication network without wire, based on the standard IEEE 802.16. WIMAX allows communications over long distances, and grater bandwidth cover approximately 40km. WIMAX provide high-speed internet access to home and business subscribers, without wire. And frequency range 10-66 GHz and sub 11GHz. UMTS (universal mobile telecommunications system) is a third mobile cellular system for networks based on the GSM standard. Developed and maintained by the 3GPP (3rd Generation Partnership Project) UMTS uses wideband code division multiple

access (W-CDMA) radio access technology to offer greater spectral efficiency and bandwidth to mobile network operators, the next section convey methodology, section 3 shows the results and discussions, section 4 conclude the paper.

2. Methodology

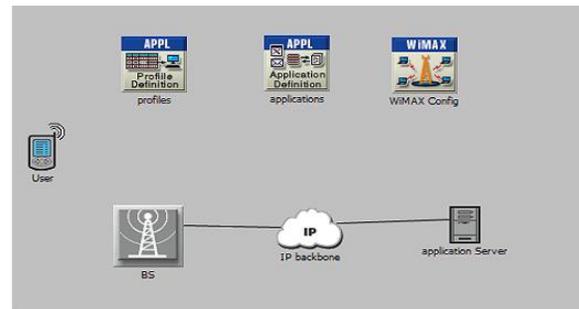


Figure 1: System Model

3. Results and Discussion

3.1 Delay

End-to-end delay is the time required for a packet to be traversed from source to destination in the network and is measured in seconds.

As can be seen from the figure 1 the average delay in WIMAX is much more steady than in UMTS, that's means WIMAX can provide better VOIP service in terms of end to end packet delay, because is that WIMAX is an all IP network. Whereas UMTS is still a combination of circuit and packet switched technologies.

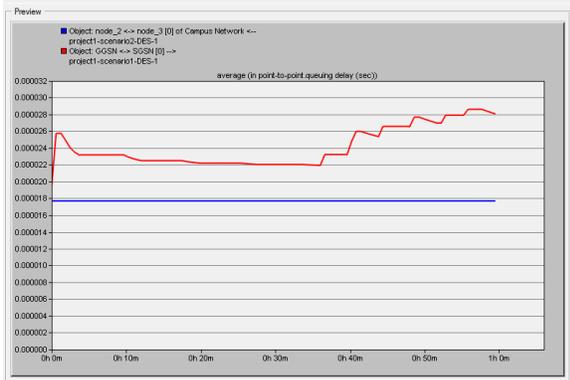


Figure 2: Delay

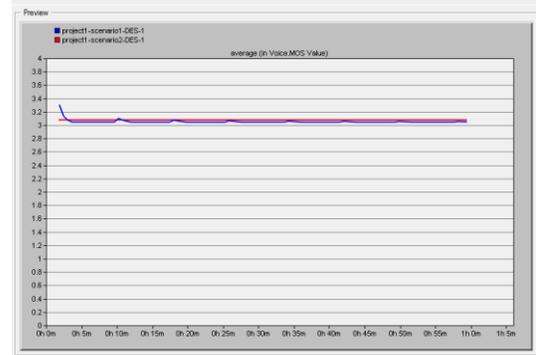


Figure 4: MOS

3.2 Jitter

Jitter is defined as a variation in the delay of receive packets.

In VOIP jitter is the variation in the time between packets arriving, caused by network congestion, timing drift, or route changes.

in fig 2 the result indicated a higher jitter for UMTS ,and in WIMAX have no jitter.

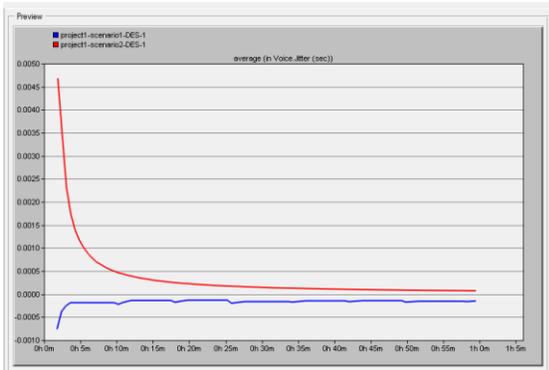


Figure 3: Jitter

3.4 Packet delay variation

Packet delay variation plays a crucial role in the network performance degradation and affects the user-perceptual quality. Higher packet delay variation results in congestion of the packets which can result in the network overhead.

Fig4 show that WIMAX is having a smaller delay variation of 0.001 ,UMTS on the other hand is having larger delay variation of 8.4.

3.3 MOS

Mean opinion score (MOS) is a test that has been used for decade in telephony networks to obtain the human user's view of the quality of the network. A calculated MOS of 3.9 in VOIP network may actually sound better than formerly subjective score of > 4.0. fig 2 show that MOS for WIMAX which was around 3.3 and of UMTS was around 3.1.

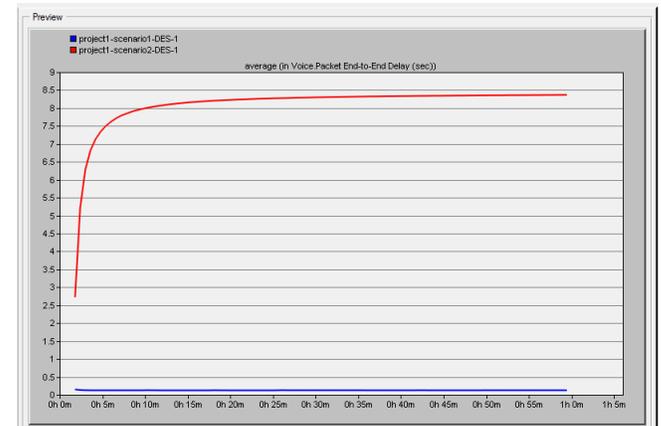


Figure 5: Packet Delay Variation

3.5 Throughput

Throughput: The amount of data transferred from one place to another or processed in a specified amount of time. Throughput is the rate of successful message delivery over a communication channel. Throughput is usually measured in bits per second. The result shows a higher throughput of UMTS.

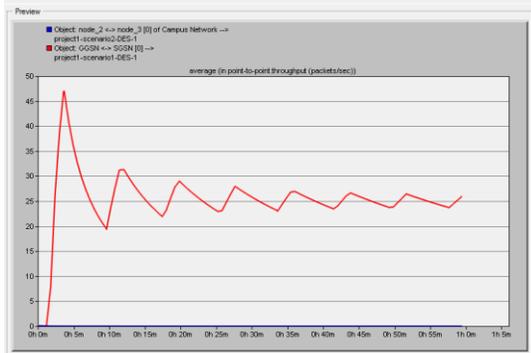


Figure 6: Throughput

4. Conclusion

The performance of WIMAX and UMTS have evaluated for supporting VOIP traffic and important parameters : delay , jitter , MOS , packet delay variation and throughput have analyzed. The results show that WIMAX is the better technology to support VOIP applications , compared with UMTS.

References

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