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IEEE802.11g vs. IEEE802.11b Networks from a QoS Point of View

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Abstract: ***Due to the fast development of technology, future communication and transmission are totally dependable on wireless network. Wireless networks are generally less efficient and irregular compared to wired networks, which makes the quality of service (QoS) provision a larger challenge for wireless communications. This paper presents a comparison between IEEE 802.11b & 802.11g network in terms of quality of service using the Opnet simulation program and the quality of service provided by the network itself can be described by different parameters called QoS parameter such as: Delay, retransmission count, download response time and data drop.***

Keywords: IEEE 802.11b, g, delay, packet loss and opnet

1. Introduction

QoS is defined as the measurement of the performance level for services provided by the network, wherever the QoS is high, the performance of the network is high and that makes a greater satisfaction for the customer. When QoS is achieved in the network, it results in Greater usage for resources and Best delivery for information carried by the network. Many parameters affect the QoS: Delay, Jitter, Packet loss, Throughput and Response time.

This paper discusses the QoS in two different technologies of wireless LAN 802.11net work (802.11b & 802.11g).

Overview of IEEE802.11:
802.11 is a set of IEEE standards that govern wireless networking transmission methods. It is implemented not only in personal computers but also in smart phones and other types of personal digital assistants. They are commonly used today in their 802.11a, 802.11b, 802.11g, 802.11n and the newer 802.11ac versions to provide wireless connectivity in homes and businesses.[1, 2]

The 802.11 family consists of a series of half-duplex over-the-air modulation techniques that use the same basic protocol.[3]

2. IEEE 802.11Standards

The IEEE 802.11 task group issued the first set of specifications in 1997 for Wi-Fi working at a frequency of 2.4 GHz. The IEEE 802.11 task group comprised several task forces named a, b, g, e, h, i, and n to address the user needs, regarding security, speed, Quality of Service (QoS) and throughput. [4]

IEEE802.11b:

802.11b is a Wi-Fi standard developed by the IEEE for transmitting data over a wireless network. The standard for 802.11b was ratified by the IEEE in July 1999. It operates on a 2.4 GHz band and allows for wireless data transfers up to 11 Mbps [5, 6].

Wi-Fi standard	Frequency (GHz)	Modulation	Channel BW (MHz)	Data rate (Mbps)	Max range (m)
802.11a	5.15-5.25	OFDMA	20	Jun-54	50
802.11b	2.4-2.485	CCk DSSS/FHSS	25	11	100
802.11g	2.4	Code keying OFDM	20	5.5-54	100
802.11n	2.4-5.5	MIMO	40	320	200

IEEE802.11g

Is the third modulation standard for wireless LANs. It works in the 2.4 GHz band (like 802.11b) but operates at a maximum raw data rate of 54 Mbit/s. Using the CSMA/CA transmission scheme, 31.4 Mbit/s is the maximum net throughput possible for packets of 1500 bytes in size and a 54 Mbit/s wireless. The modulation scheme used in 802.11g is orthogonal frequency-division multiplexing (OFDM) copied from 802.11a.

3. Simulation Processing

The circuit simulates the wlan 802.11circuit of different techniques using opnet 14.5 software design program to compare the quality of service for each of the two releases.

4. Methodology

This section discusses the following network components used in the suggested network models running on OPNET 14.5. 41 WLAN station were used, server and router. The Application_ Config includes a name and a description table that specifies various parameters for the different applications (i.e. FTP heavy applications and TCP). The specified application name is used while creating user profiles on "Profile_ Config" object. The Profile_ Config is used to create user profiles.

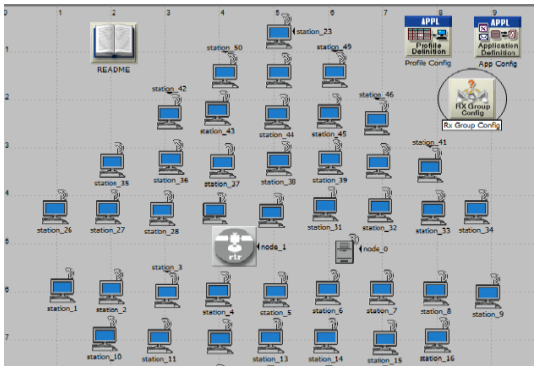

Figure 1: Circuit with implementation (IEEE802.11b and g)

5. Results and Discussion

The simulation ran for 1 hour: this time was enough to gain an overview of the proposed network behavior.

A-data drop:

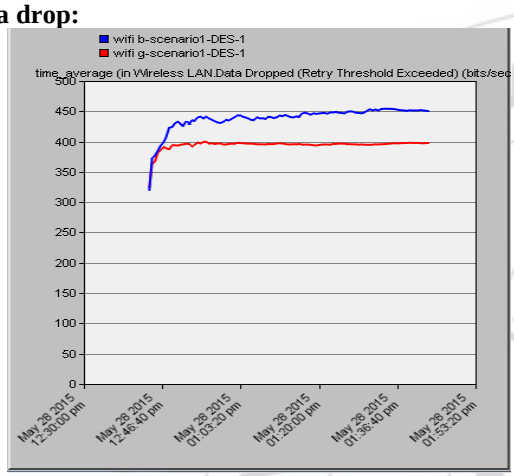

Figure 2

Figure (2) represents the packet loss of the Wi-Fi (b, g) releases. Based on Figure (2), Wi-Fi release g has a little amount of packet loss compared to release b.

B-download response time

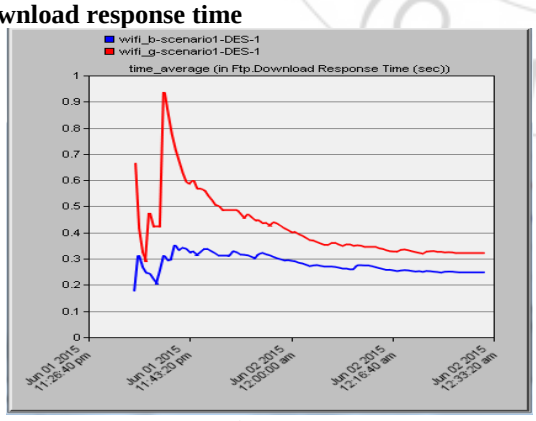

Figure 3

Figure (3) shows download response time; it is found that download response time is better in the case of IEEE802.11b. This is due to is simplicities. However, the overall refuse of 802.11b is poor control to other releases.

Retransmission count: C-

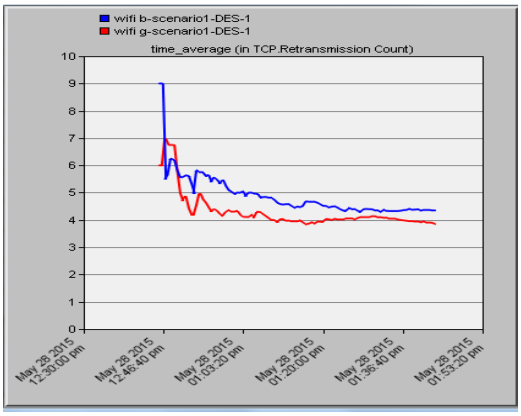

Figure 4

The figure above shows higher retransmission count in release b, this is due to its low transmission data rate.

d-delay

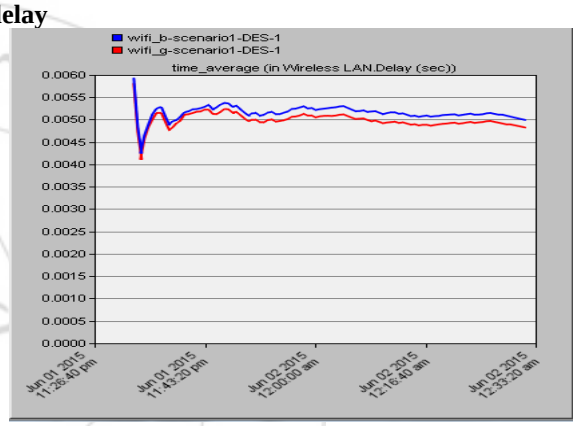

Figure 5

Figure (5) shows that Wi-Fi release b has more delay in the packet than the g release, some applications need small delay over the network like voice over ip, gamming, and in case of any delay, the quality of services for the application will be affected directly.

6. Conclusion

Simulation was run over OPNET14.5 tool,. Comparing between IEEE 802.11b &802.11g network in terms of quality of service it was found that the delay and data drop in release g was little compared to that of release b, release g transmits data at high rates therefore the retransmission count is lower than that of release b. Finally the download response time of release g was higher than b, this is due to is simplicities of release b.

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