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RESEARCH ARTICLE

APPLICATION ANALYSIS OF PARAMETERS FOR WIRELESS AND WIRE-LINE NETWORK WITH AND WITHOUT LOAD BALANCER

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ABSTRACT

The wired computer network provide secure and faster means of connectivity but the need of mobility i.e. anywhere , anytime and anyone access is tilting the network users towards wireless technology. This Paper Analyse the modelling and implementation of Wireless Local Area Network (WLAN) using different factors based on OPNET Modeller. Here OPNET Modeller is used to develop a new model that fits for Academic Site Location. Our model was analysed to measure the performance of factors of the wireless local area network based on such academic site location. Our model was tested adjacent to four applications (FTP, HTTP, Video Conferencing and Database) in four sites and found that other factors also were extremely influenced by the number of users per application with and without load balancer. OPNET Modeller simulation demonstrated the effect of load balancer on wireless and wire-line network for four different types of applications.

INTRODUCTION

Wireless local area networks (WLANs) based on the IEEE 802.11 standards are one of the fastest growing wireless access technologies in the world today. These are common place on many academic site locations[1-5]. It have all capabilities of Wired LANs along with additional feature that user terminal do not need to be physically connected to Wired Infrastructure. WLANs bring the user closer to the promise "anything, anytime, anywhere" of future technology.

Wireless resources are inclusive of broadband Internet connection, network printers, data files, and even streaming audio and video. Such resource sharing has become more prevalent as computer users have changed their habits from using single, stand-alone computers to working on networks with multiple computers, each with potentially different operating systems and varying peripheral hardware [2].

Most general technologies are applying for the series of IEEE 802.11 standards. IEEE 802.11b is the well recognized technology to be known using frequency 2.5GHz range. For this paper we have focused on IEEE 802.11b [4, 6, 7, 8].Our Paper focuses to study academic site location scenario. We use the OPNET Modeler [6,9,10,11] simulation environment, with its detailed models of IEEE 802.11b, TCP/IP, FTP, HTTP, Video Conferencing and Database. We have chosen simulative tool- OPNET Modeler for our research because of the several benefits it offers over the other contemporary tools available. It provides the set of complete tools and a complete user interface for topology design and development. Another advantage of using it is that it is being extensively used and there is wide confidence in the validity of the results it produces. We parameterized the simulation model based on academic site measurements, and validate the model adjacent to WLAN performance metrics using simple FTP, HTTP, Video Conferencing and Database workload models. It was used to investigate the various performance metrics in wireless and wire-line LAN for a balanced and unbalanced network which has been presented.

After briefing the introduction in section I, Section II introduces our model and the scenarios we tested, section III analyses the results and the conclusion is drawn in section IV.

Model Outline

The IEEE 802.11 WLAN architecture is built around a Basic Service Set (BSS). The IEEE 802.11 standard defines a set of wireless LAN protocols that deliver services similar to those found in wired Ethernet LAN environments. A BSS is a set of stations that communicate with one another. When all the stations in the BSS can communicate directly with each other (without a connection to a wired network), the BSS is known as an *ad hoc* WLAN. When a BSS includes a wireless access point (AP) connected to a wired network, the BSS is called an *infrastructure* network. A simulation model was developed using OPNET Modeller [6, 11].

OPNET 802.11b module was used as a standard with default data rate up to 11Mb/s. IEEE 802.11b Direct Sequence was used as a default Physical Characteristic. In this section we will introduce the two scenarios we tested:

Scenario 1: Here four WLAN Sites (Figure 2) each with 40 Users through 1 access points using DATABASE (10 users), and HTTP (10 users) and FTP (10 Users) and Video Conferencing (10 Users) connected with outside wire-line network without load balance in (Figure 1) (table I).

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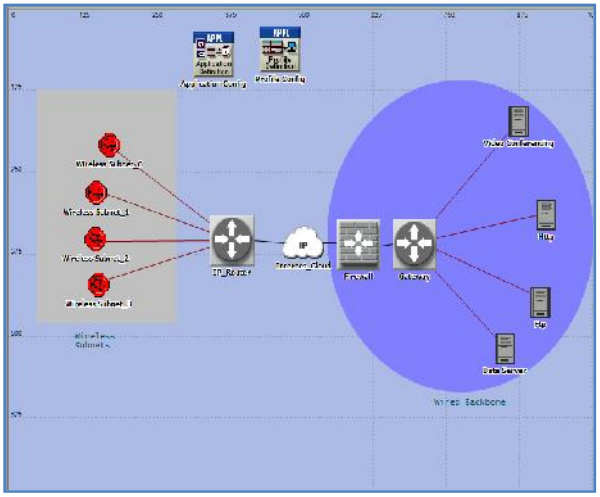

Fig 1 OPNET Model without load balancer

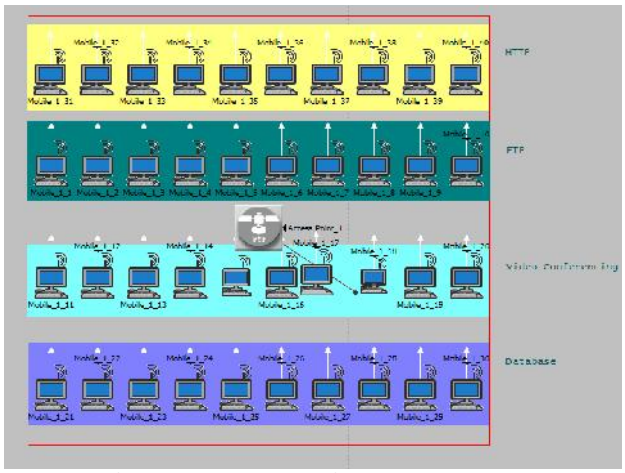

Fig 2:Mix of FTP, HTTP, Video Conferencing and DATABASE clients

Scenario 2: Here four WLAN Sites (Figure 2) each with 40 Users through 1 access points using DATABASE (10 users), and HTTP (10 users) and FTP (10 Users) and Video Conferencing (10 Users) connected with outside wire-line network with load balance in (Figure 3) (table I).

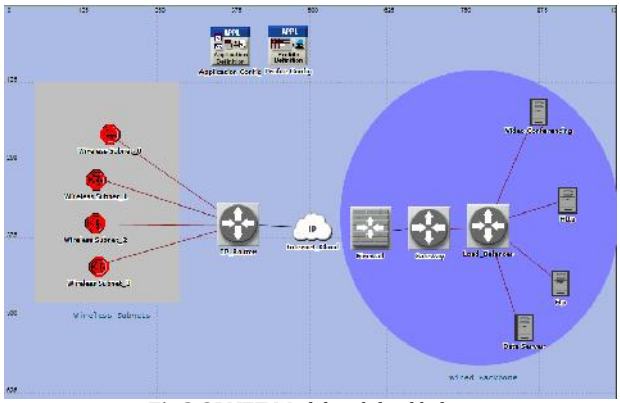

Fig 3 OPNET Model with load balancer

Scenario 2 is the duplicate of scenario 1 in terms of number of users and types of application each user accesses. In our model we installed 4 access points (sites) in a Academic site where mix of DATABASE, HTTP, Video Conferencing and FTP clients are there. Simulations have been conceded out for our model to determine performance of the Factors. Table I and II indicate the application description and the wireless traffic generation Factors.

Table 1 Application description

Applications	Attribute
Browsing	HTTP
Transactions (Query/Entry)	Database
File Transfer	FTP
Video Conferencing	Video

Table 2 Wireless lan traffic generation parameters

Attribute	Value
Start Time Offset (seconds)	uniform (5,10)
Repeatability	Once at Start Time
Operation Mode	Serial (Random)
Start Time (seconds)	uniform (100,110)
Inter-repetition Time (seconds)	constant (300)
Number of Repetitions	constant (30)
Repetition Pattern	Serial

Table 3 Simulated parameters

Application	Parameter	Unit
HTTP	Page Response Time Object Response Time	Seconds Seconds
Database (Query/Entry)	Response Time	Seconds
FTP	DownloadResponse Time UploadResponse Time	Seconds Seconds
Video Conferencing	Delay Variation End-End Delay	Seconds Seconds
WLAN	Delay Media Access Delay	Seconds Seconds
Ethernet	Delay	Seconds

Result Analysis along with Web Reports

Six graphs were selected after simulating our model (Figures 4 through 9). All graphs show a combination of the two scenarios. It has been analysed that DB Query/Entry Response time is less in scenario 2 (Figure 3) i.e. averagely it remains 0.041/0.047 seconds than scenario 1 (Figure 1) i.e. averagely it remains 0.062/0.078 seconds.

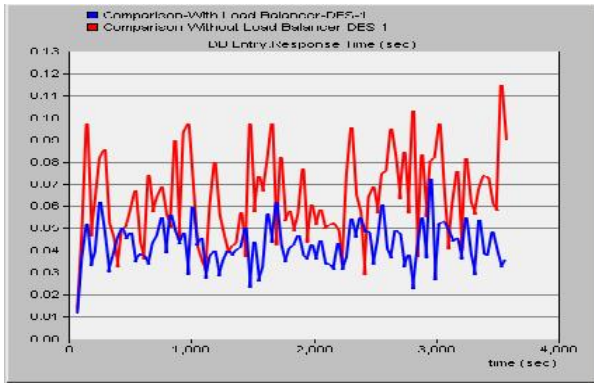

Fig 4 DB Entry Response time (sec)

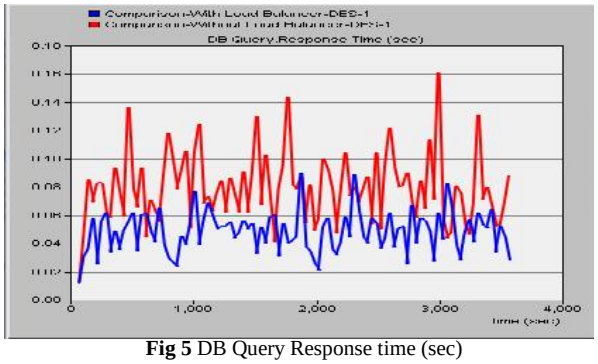

Fig 5 DB Query Response time (sec)

For FTP, it is observed that the Download Response Time for scenario 1 (Figure 1) averagely time consumed is 0.107 seconds where as for scenario 2 (Figure 3) averagely time consumed is 0.097 seconds.

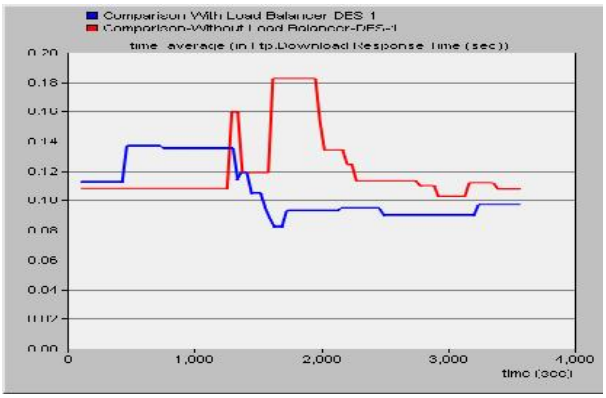

Fig 6 FTP Download Response (sec)

For HTTP, it is observed that the Page Response Time for ******* e consumed is 0.127 seconds where as for scenario 2 (Figure 3) averagely time consumed is 0.102 seconds.

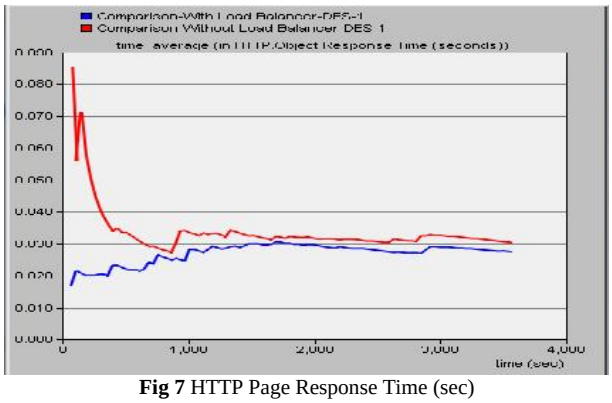

Fig 7 HTTP Page Response Time (sec)

For Video Conferencing, it is observed that Packet Delay Variation for scenario 1 (Figure 1) as well as for scenario 2 (Figure 3) averagely time consumed is 0.0001 seconds.

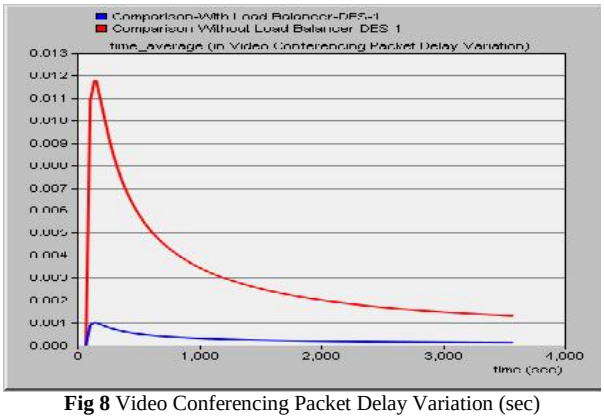

Fig 8 Video Conferencing Packet Delay Variation (sec)

For WLAN, it is observed that for scenario 1 (Figure 1) as well as for scenario 2 (Figure 3) averagely time consumed is 0.005 seconds.

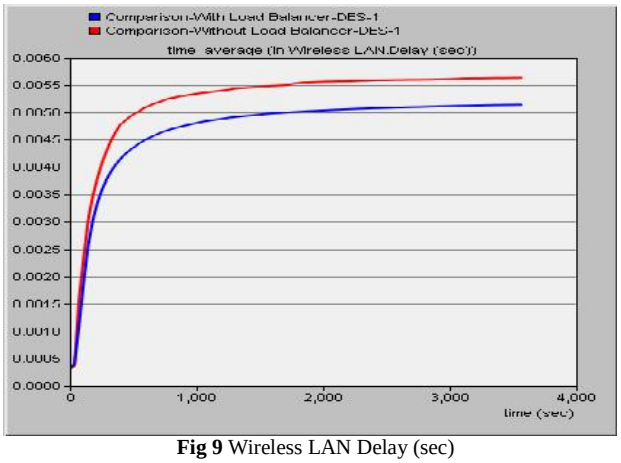

Fig 9 Wireless LAN Delay (sec)

CONCLUSION

In this Paper we have laid more stress on the time factor as all factors or the parameters are as per the time. We can observe by seeing at the table IV about the different values ofParameters i.e. averagely, maximises as well as minimum values of different parameters.

It is observed from table IV that while accessing FTP, HTTP and Database applications there will be less consumption of the time in scenario 2 (Figure 3) as compare to the scenario 1 (Figure 1) but if we see the time consumption at Video Conferencing as well as WLAN there is almost equal time consumed while accessing those applications.

So, it is conclusive that using Load Balancer, reduces the time consumption to access different applications as compare to without Load Balancer. Also there is equal Consumption of CPU in both the cases.

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Table 3 Web Report

Parameters	**No Load Balancer**			**Load Balancer**		
Statistics	Avg. Val.	Max. Val.	Min. Val.	Avg. Val.	Max. Val.	Min. Val.
DB Entry Response Time (sec.)	0.062	0.115	0.013	0.041	0.072	0.012
DB Query Response Time (sec.)	0.078	0.160	0.012	0.047	0.090	0.12
FTP Download Response Time (sec.)	0.107	0.373	0.036	0.097	0.190	0.036
HTTP Page Response Time (sec.)	0.127	0.393	0.039	0.102	0.324	0.038
Video Conferencing Packet Dela Variation (sec.)	.0001	.0218	.0000	.0001	.0018	.0000
WLAN Delay (sec.)	0.005	0.006	.0003	0.005	0.005	.0003

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