



AENSI Journals

Australian Journal of Basic and Applied Sciences

ISSN:1991-8178

Journal home page: www.ajbasweb.com



## Comparative Investigation On Mygrant Wlan Performance Analysis With And Without Load Balancer

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### ARTICLE INFO

#### Article history:

Received 20 November 2013

Received in revised form 24

January 2014

Accepted 29 January 2014

Available online 5 April 2014

#### Key words:

WLAN, Load Balance; OPNET

### ABSTRACT

For load balancing in WLAN the information from networking parts such as computer system is not enough to provide valuable information of optimal load balancer to maintain WLAN (or cloud) environments. In this paper MYGRANT WLAN network performance with and without Load Balancer is investigated. A simulated environment is created where many applications are in use at a time and their mutual effects using OPNET Academic Edition. This model is tested against various types of applications (HTTP and FTP) and found under a range of parameters. The performance metrics of throughput, delay, utilization and blocking probability were obtained via simulation which showed the impact of load balancing on WAN for different types of applications.

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**To Cite This Article:** R. Ramdan, N.A. Ahmed, M. Z. Jasni, M.F. Zolkipli., Comparative Investigation On Mygrant Wlan Performance Analysis With And Without Load Balancer. *Aust. J. Basic & Appl. Sci.*, 8(4): 107-113, 2014

## INTRODUCTION

Nowadays, the growth in the popularity of the web in particular has increased the requirement for load balancing which improve the performance of a parallel and distributed system through a redistribution of load among the processors or nodes (Raicu I., Foster I.T., and Beckman P. 2011). It can also generally be described as any process from distributing computation and communication evenly among processors, or a system that divides many client requests among several servers that requests to be as quickly as possible. A Wide local area network (WLAN) supplies networking capability to a group of computers in close proximity to each other such as in an office building, a school, or a home. So it is not so good in the area of network reliability and balanced effect on load; the characteristic of the former is that users can only see the IP of the front-end balancer which doesn't participate in practical service work, only collecting the load states of the servers behind, maintaining system consistency and doing load assignment. However, under the circumstances of massive network request quantity, the balancer is easy to be performance bottleneck in cluster system, so it is important to reduce the workload of the balancer.

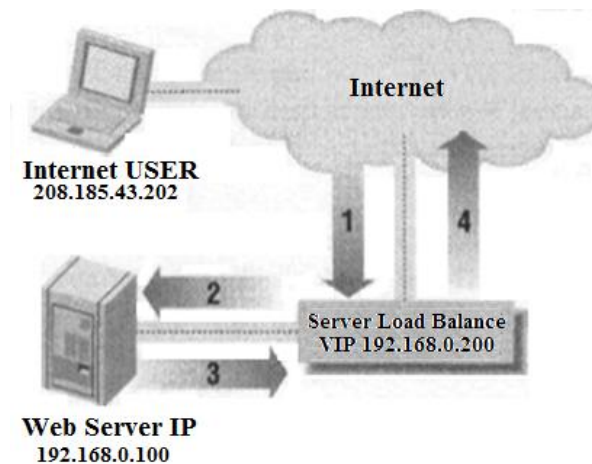
There are two kinds of load balancing topologies: one has front-end balancer and the other has not (Donald U. Ekong, 2004). The main different between them is that the former offers single IP address to the users, while, usually, the latter has several IP addresses. Network simulation used to be an important tool for researchers and engineers that allow analyzing network's behavior and performance. In (Nazy Alborz, Maryan Keyvani, Milan Nikolic and Ljiljana Trajkovic), describe and compare programming interfaces of three popular network simulators: ns-2, OPNET and J-Sim. Designing a network for optimal performance and meeting the requirements for all the users in an organization is very important decision. The OPNET technologies, offers simulation software for the enterprise and the universities. In (Marek Małowidzki), the main objective is to design the network configuration and select the equipment to be deployed to ensure maximum network performance after considering the requirements of different users. Using the network simulation software, various parameters were modified to determine the best design option.

This paper study different WLAN scheme, which reduces the time complexity of load balancing algorithm and the workload of balancer, and so it can reduce the possibility of its becoming performance bottleneck. The ability of OPNET to simulate WLAN enhances the teaching of computer networks concepts. The two models are used to study how the performance of the network is affected by the different design decisions that are made to upgrade the network. Therefore, it might not be possible to foresee the application behavior and prepare the computer systems for user actions in order to improve overall system performance, availability and stability.

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## 2. Load Balancing:

Load Balancing is a computer networking method to distribute workload across multiple computers or a computer cluster, network links, central processing units, disk drives, or other resources, to achieve optimal resource utilization, maximize throughput, minimize response time, and avoid overload as shown in Fig.1(ArtiSood, 2007; Verwoerd T,HuntR., 2001; Cao Z,WangZ,Zegura E W. 2000).



**Fig. 1:** Load Balancer

To illustrate how the server load balancing works, Fig. 1 explain how load balancer act to the packet in the network. The load balancer takes the packet destined for 192.168.0.200 and, instead of responding to the request, rewrites the packet. For the packet to get to the real server, the destination address is rewritten with the address of the real server. The source in step 2 is 208.185.43.202, and the destination is 192.168.0.100. The real server responds to the packet, and it is sent back to the user. In step 3, the source becomes 192.168.0.100, and the destination becomes 208.185. 43.202, which presents a problem. The user will ignore a response from the IP address of 192.168.0.100, since the user never initiated a connection to that address; the user sent a packet to 192.168.0.200. The SLB unit solves this problem by being the default route of the real server and rewriting the packet before it is sent. The source address is rewritten to be the VIP, or 192.168.0.200. The source in step 4 is 192.168.0.200 and the destination is 208.185.43.202. With that final rewrite, the packet completes its journey. To the user, it all seems like there is just one server, when in reality there could be several, even hundreds of real servers.

## 3. Scenarios And Settings:

OPNET (ArtiSood, 2007; Manju Sharma and Manoj Kumar, 2008) is a tool used to simulate the way networks run. In this paper, comparative study is carried out on the LAN performance for Low Load Campus environment with without load balancer. We have chosen this simulation tool – OPNET IT GURU Academic Edition for our research because of the several benefits:

- ❖ OPNET IT GURU provides the set of complete tools and a complete user interface for topology design and development.

- ❖ It is being extensively used and there is wide confidence in the validity of the results it produces.

- ❖ It enables realistic analysis of performance measures and the effectiveness of WAN design techniques.

OPNET IT Guru is very similar to an OPNET Modeler. The main differences are that it does not include a process editor, the possibilities of editing code level in C language, and various advanced modules. From that aspect, we cannot change existing communication models or create new components. Maximum network expanse, which can be simulated, is also bounded in OPNET IT Guru.

In this section, it has been considered that the campus having a LAN connected with 3 FTP Server and 3 HTTP Server with and without load balancer. All of these servers are provided to serve the load demand on the campus network. When one server is not enough then it will load the request will be routed to other servers. The simulation scenario is if the campus network had a high load demand, and all the servers serve the load request.

These LANs are connected via 100 based T Ethernet wired network. Two different scenarios & setting have been considered to optimize the network.

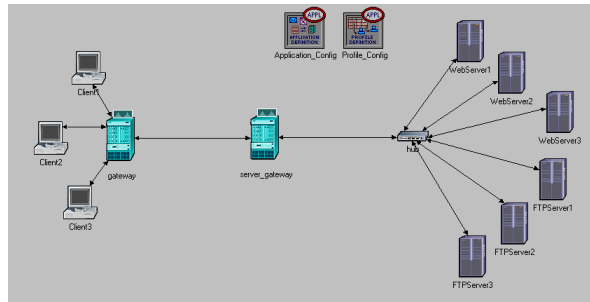


Fig. 2: Scenario I: LAN without Load Balancer

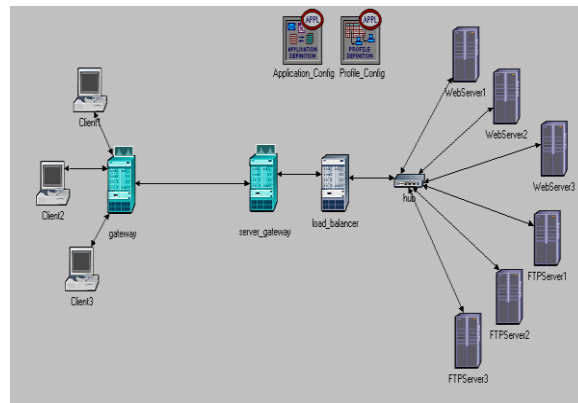


Fig. 3: Scenario II: LAN with Load Balancer

Fig. 2 and 3 show the two scenarios present a Campus Network with Local Area Networks. These scenarios are simulated each LAN with the same network and application configuration. LAN servers support all applications expect for FTP and HTTP which are supported by FTP Server and HTTP Server.

Table 1: Application Description

APPLICATIONS	ATTRIBUTE	LOAD
HTTP Server	HTTP	Heavy Browsing
FTP Server	FTP	High Load

Table 2: Simulated Parameters

APPLICATION	PARAMETER	UNIT
FTP Server	Download Response Time	seconds
	Traffic Sent	packets/seconds
	Traffic Received	packets/seconds
	CPU Utilization	percent
	Load	requests/seconds
HTTP Server	Page Response Time	seconds
	Traffic Sent	packet/seconds
	Traffic Received	packet/seconds
	CPU Utilization	percent
	Load	requests/seconds

In this network are examples of how LAN models may be used instead of explicitly modeling the entire LAN. This model represents aggregate traffic of many users on a LAN.

**Result Simulation:**

Some graphs were selected after simulating our models. In each network in both scenario there are 3 HTTP Server and 3 FTP Server. This 3 servers is provided to server the HTTP and FTP load in the campus’s network. In Fig. 4, it shows that FTP Download Response Time faster at starting point in network without load balancer, but after that network with load balancer has faster Download Response Time. In Fig. 5, Traffic Received in FTP Server in network without load balancer and with load balancer is similar, but after that network with load balancer is faster, and the Traffic Sent is faster at starting point in network without load balancer, but after that network with load balancer is faster.

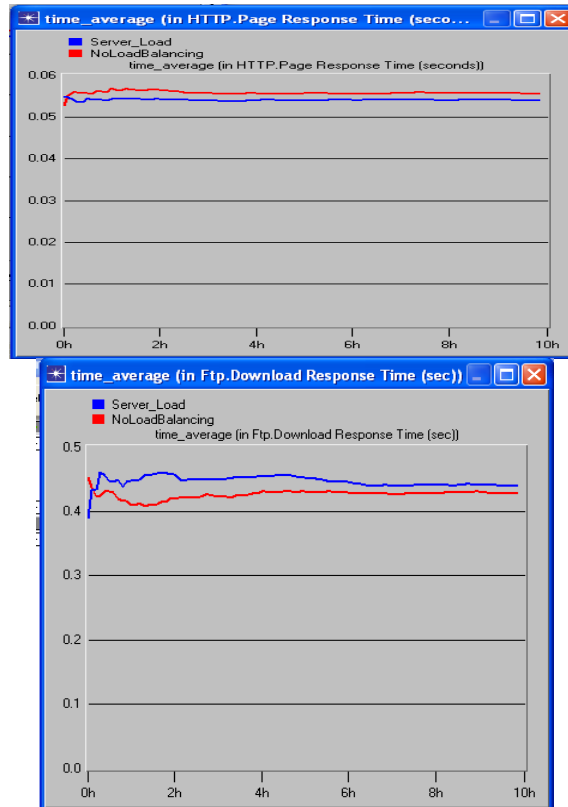


Fig. 4: FTP Download Response Time and HTTP Page Response

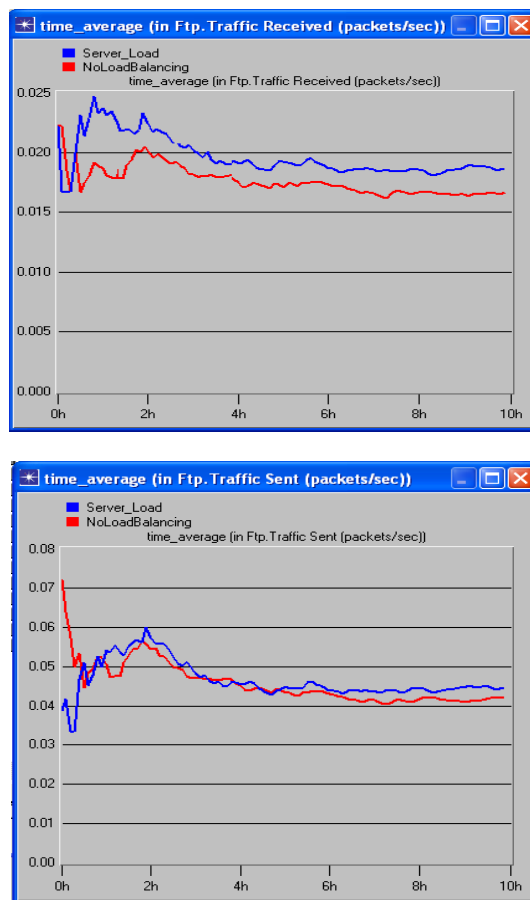
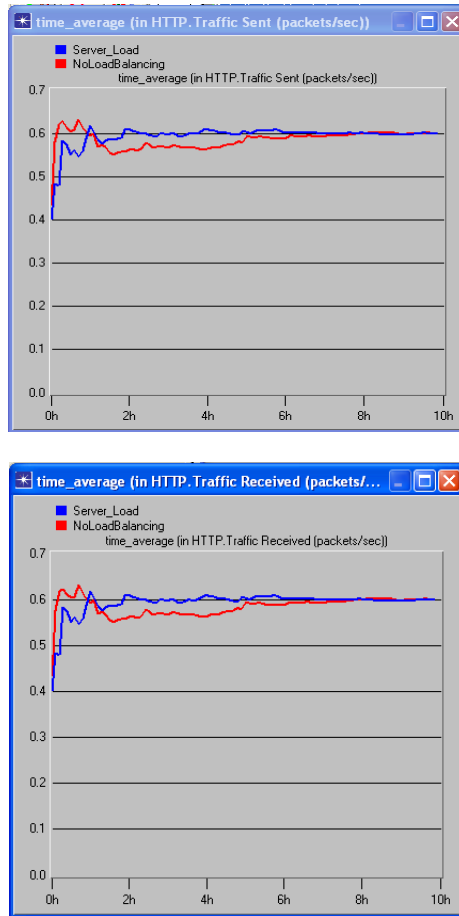
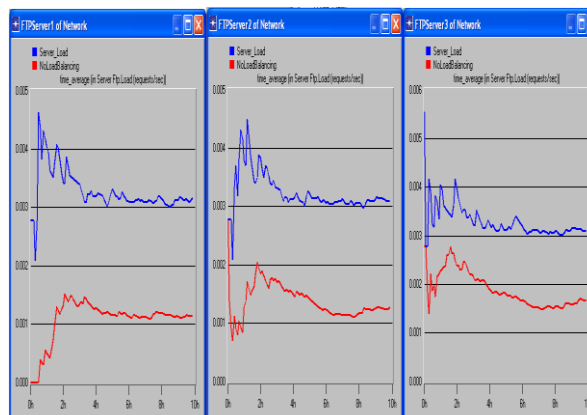


Fig. 5: FTP Server Traffic Received and Traffic Sent

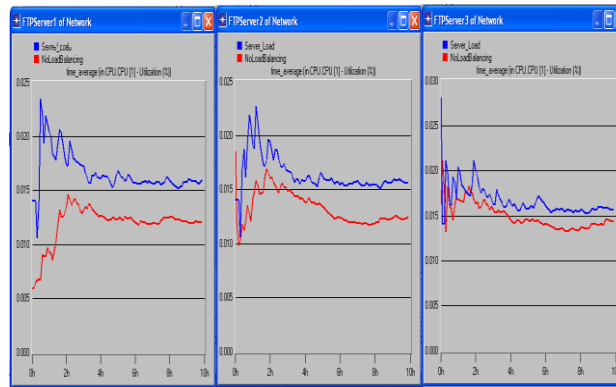


**Fig. 6:** HTTP Server Traffic Received and Traffic Sent

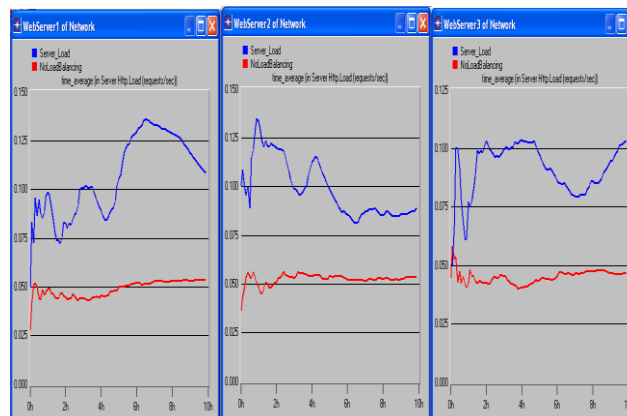
In Fig. 5, it shows that the HTTP Page Response Time in network without load balancer is faster than network with load balancer. And, in Fig. 6, it shows that both network has similar HTTP Traffic Received and HTTP Traffic Sent. In Fig. 7 and 8, the Load and Utilization in 3 FTP Servers in network with load balancer is higher, it can be concluded that the load balancer make each FTP Server has similar load. Similar with HTTP Server, the load balancer make each HTTP Server has similar load, like in Fig. 9. But, the Utilization in each HTTP Server is variety like in Fig. 10.



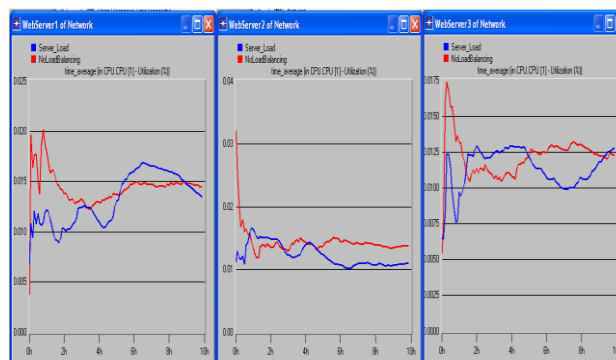
**Fig. 7:** FTP Servers Load



**Fig. 8:** FTP Servers Utilization



**Fig. 9:** HTTP Servers Load



**Fig. 10:** HTTP Servers Utilization

### **Conclusion:**

This paper investigates the load for campus environment with and without Load Balancer. In this paper we have build a model of browsing behavior for a HTTP and downloading for FTP application, and use this model in a simulation study addressing the performance of the campus area network. Our investigations reveal that load balancer is useful to increase the FTP download response time. Thus, it is evident that the use of load balancer is recommended for downloading processes. The observations indicate that FTP and HTTP traffic send and received is less in case of using load. Thus we conclude that the overall performance is better with load balancer as comparison of without load balancer.

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