International Journal of Engineering, Science and Mathematics
Vol. 6 Issue 8, December 2017 (Special Issue)
ISSN: 2320-0294 Impact Factor: 6.765
Journal Homepage: http://www.ijesm.co.in, Email: ijesmj@gmail.com
Double-Blind Peer Reviewed Refereed Open Access International Journal - Included in the International Serial Directories Indexed & Listed at: Ulrich's Periodicals Directory ©, U.S.A., Open J-Gage as well as in Cabell's Directories of Publishing Opportunities, U.S.A

COMPUTER NETWORK: DESIGNING AND REPLICATION OF LOAD BALANCING

Adapa Chandrakala*
Gangu Dharma Raju**
K S N Murthy***

Abstract

The servers overload and the Quality of Service (QoS) results reduced and operation becomes more serious as the use of Web services is developed. In order to avoid this, service donors use huge administrator networks of servers to attend the requests of the increasing visitors count in popular sites. OPNET (Optimum Network Performance) is used to develop a new model. The model was then evaluated to compute the operation of the wireless local area network. The model was used for two types of applications (ftp and http) and found that among a set of other specifications response time and wireless media access delay were highly affected by the number of users per application with and without load balancing. OPNET replication showed the impact of load balancing on wireless and wire-line network for two different types of applications.

Keywords:

WLAN,
Load balancing,
Media Access Delay,
Http response time,
ftp response time.

Author correspondence:

Adapa Charndrakala,
Asst. Prof, Dept. of CSE, Baba Institute of Tech. & Sciences, Visakhapatnam, AP, India.

1. Introduction

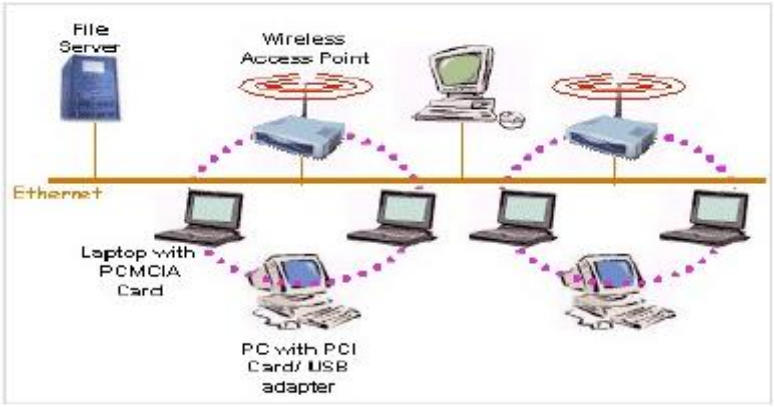
Now a days the Wireless usage points are common place on many sectors, Technologies such as IEEE 802.11b wireless LANs (WLANs) have reform the way people think about networks, by offering users flexibility from the restriction of visible wires. Mobile users are attracted in utilizing the full operations of the technology at their fingertips, as wireless networks bring adjacent the "anything, anytime, anywhere" assurance of mobile networking. Wireless local area networks (WLANs) are expanding quickly, their crucial benefit across wired ones being their quick installation. One of the most dynamic sectors of technology growth of our time is Wireless transmissions. Over the recent years it has quickly appear in the market providing users with network mobility, scalability and connectivity.

* Asst. Prof, Dept. of CSE, Baba Institute of Tech. & Sciences, Visakhapatnam, AP, India.
** Asst. Prof, Dept. of CSE, Baba Institute of Tech. & Sciences, Visakhapatnam, AP, India.
*** Asst. Prof, Dept. of CSE, Baba Institute of Tech. & Sciences, Visakhapatnam, AP, India.

Wireless Local Area Networks (WLANs) have been developed to provide users in a limited geographical sector with high bandwidth and similar services supported by the wired Local Area Network (LAN) Radio wave signals propagate through walls, ceilings, and even cement structures.

A WLAN is a flexible data communications system that can either replace or spread a wired LAN where cost is an issue or running cables between floors or different rooms on the same floor is not achievable (GloMoSim, 2011)Examples of structures that are difficult to wire are warehouses, historic buildings, and

construction facilities. A WLAN basically consists of one or more wireless devices associated to each others in a point-to-point manner or through APs, which in turn are associated to the backbone network providing wireless connectivity to the covered sectors. Fig.1 shows a typical layout of a WLAN with two APs (GloMoSim, 2011)



2. Research Methodology

2.1 Implementing Using OPNET Modeller OPNET is a tool used to simulate the way networks run. In this study, comparative study is carried out on the LAN performance for Low Load Campus environment with without load balancer. We have chosen this replication tool – OPNET IT GURU Academic Edition for our research because of the several benefits:

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

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

iii. 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 replication 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

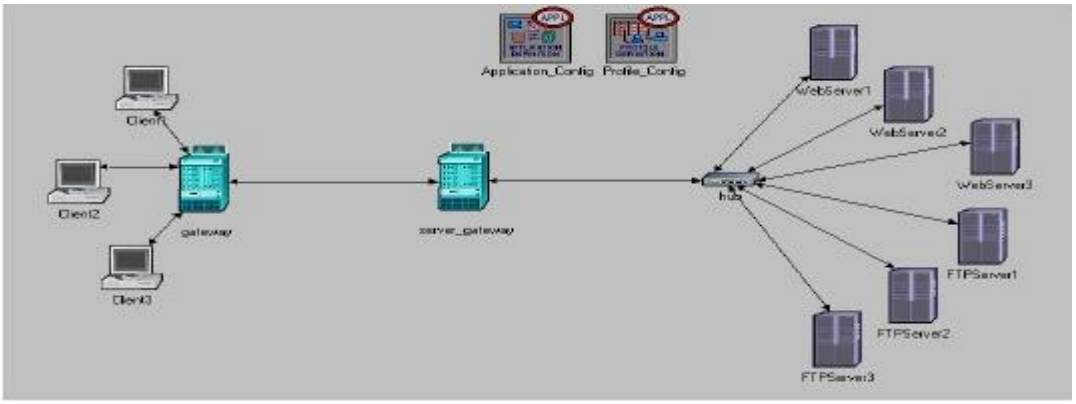


Fig. 2: Scenario I: LAN without Load Balancer

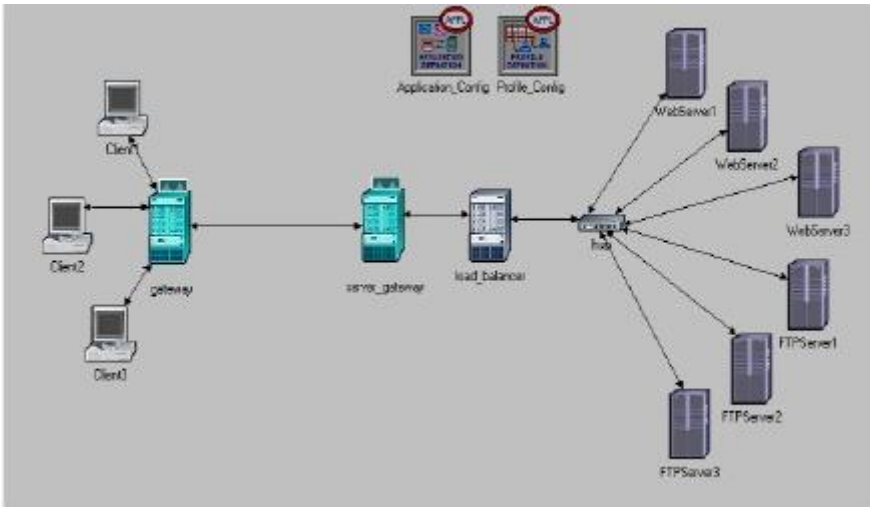


Fig. 3: Scenario II: LAN with Load Balancer

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	FTTP	High Load
EMAIL	CPU UTILISATION	%
PRINT	CPU UTILISATION	%

Table 2: Simulated Parameters

APPLICATION	PARAMETER	UNIT
FTP SERVER	Download Response Time Traffic Sent Traffic Received CPU Utilization Load	Seconds packets/seconds packets/seconds percent 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

2.2 Development of OPNET Replication Algorithm This project uses OPNET (Optimized Network Engineering Tool) replication research on artificial spider routing algorithm and comparative analysis. OPNET modeling hierarchy to the network, the process model and its underlying mechanisms using state machine to simulate the network protocol, node model middle usually contain multiple process model for equipment replication network, network model of the top, each node model are connected, forming network topology. The establishment of three levels of the model OPNET, both structure and the actual communication protocols, communication equipment and network corresponding to complete, evaluation, testing and improvement of the network routing protocol, so as to optimize the performance of the network. OPNET software provides a good experimental platform for artificial spider routing algorithm.

2.3 Development of Design Flowchart

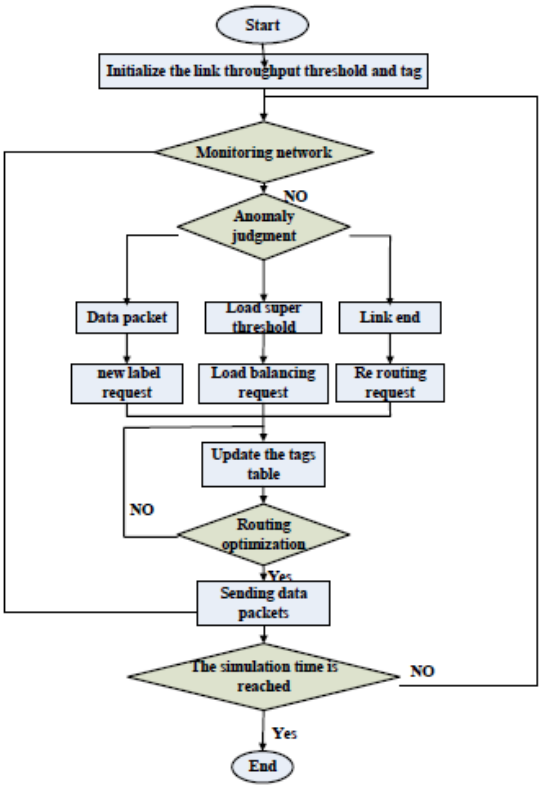


Fig. 4. Design Flowchart

The Figure 8 is the replication of OPNET software flow chart. In the replication the flow chart, the unit is bps, average end to end delay in seconds (s), the average packet loss rate is the ratio of overflow data packet and the total contract number, the abscissa replication map of all are the replication time, unit for minute (min).

2.4 Development of Load Balancing Algorithm

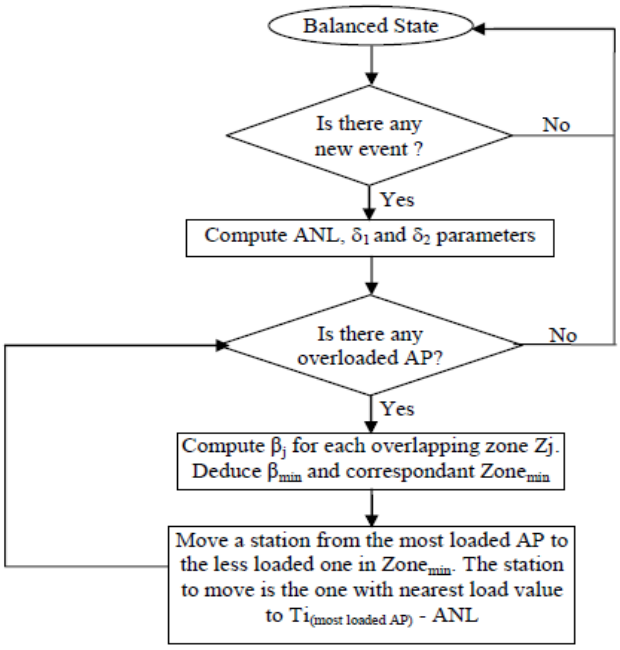


Fig.5 : the Load Balancing Algorithm

3. Results and Analysis

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. 6, 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. 7, 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.

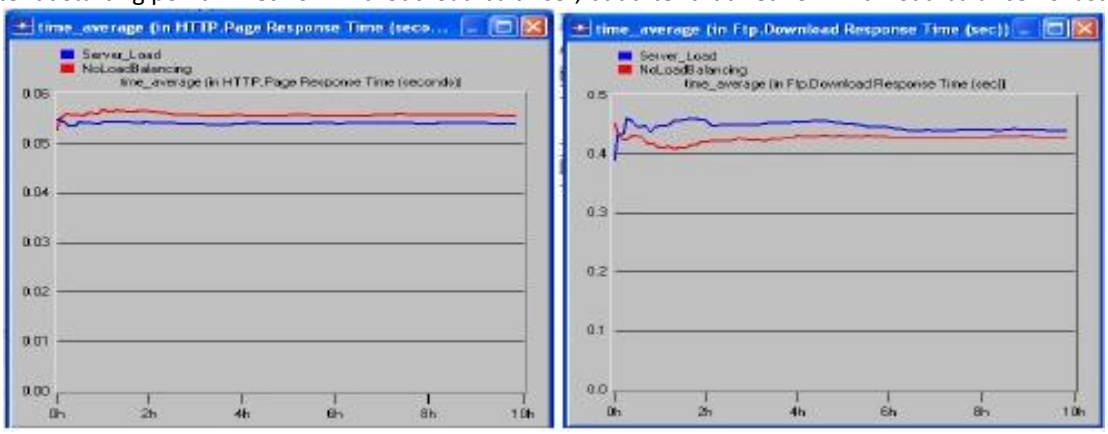


Fig. 6: FTP Download Response Time and HTTP Page Response

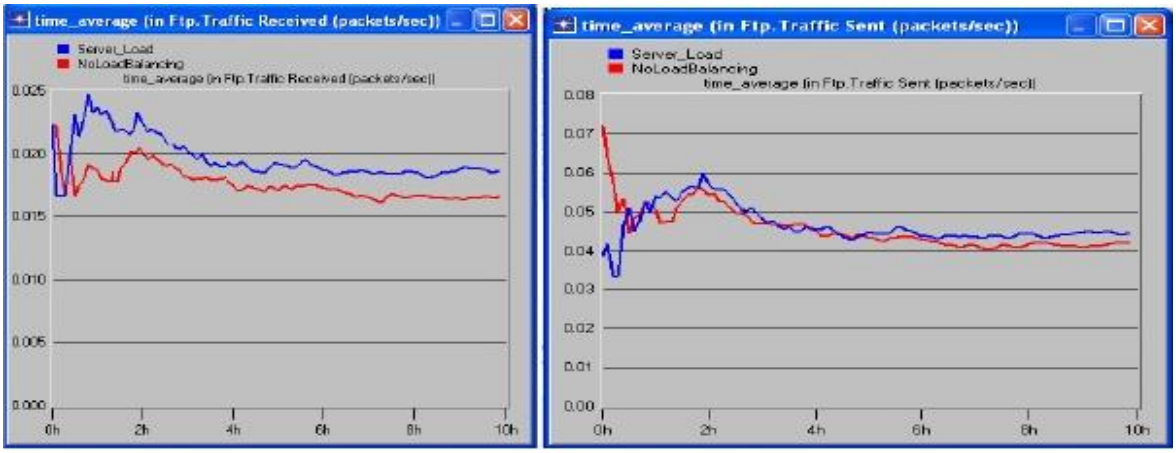


Fig. 7: FTP Server Traffic Received and Traffic Sent

Fig. 8: HTTP Server Traffic Received and Traffic Sent

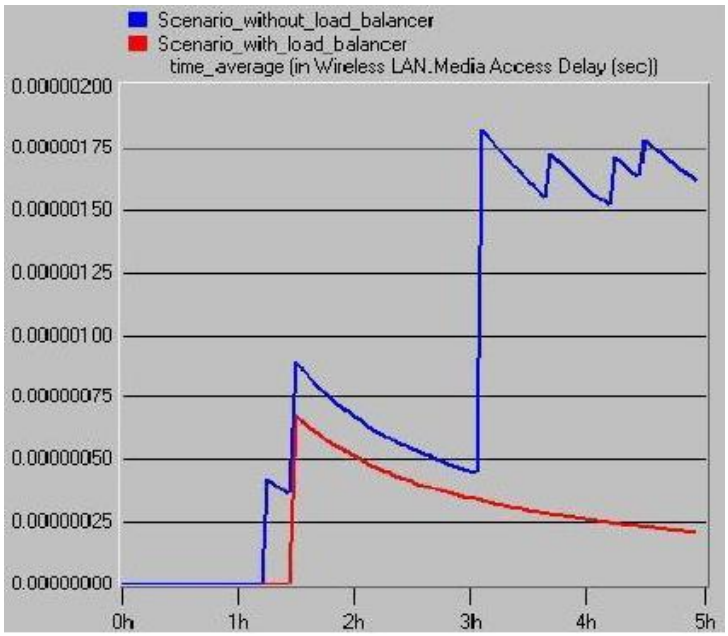


Fig. 9: Media Access Delay (sec)

4. Conclusion

This project examines the load for university sectors environment with and without Load Balancer. In this study we have build a model of browsing operation for a HTTP and downloading for FTP application, and use this model in a replication study addressing the performance of the campus sector network. Our analysis reveals that load balancer is useful to increase the FTP download response time. Thus, it is evident that the use of load balancer is approved for downloading actions. The observations indicate that FTP and HTTP traffic dispatch and collect is low in case of using load. Thus we conclude that the overall performance is superior with load balancer as differentiation of without load balancer.

References

[1] George Apostolopoulos, David Aubespin, Vinod G. J. Peris, Prashant Pradhan, and Debanjan Saha. Design, implementation and performance of a content-based switch. In proc. of INFOCOM, 2000

[2] GloMoSim. (2011). Global mobile information systems replication library. Retrieved January 26, 2006, from http://pcl.cs.ucla.edu/projects/glomosim

[3] Hansen T., Yalamanchili P. and Braun H-W., (2002) „Wireless Measurement and Analysis on HPWREN", Proceedings of Passive and Active Measurement Workshop, Fort Collins, Co, March, pp. 222-229.

[4] IT Guru Academic Edition. OPNET Technologies, (2007) http://www.opnet.com/university _program/ itguru academic_edition.

[5] Jipping, et al (2003). Using Java to teach networking concepts with a programmable network sniffer. Proceedings of the 34th SIGCSE Technical Symposium on Computer Science Education, 120-124.

[6] Jussara Almeida, Mihaela Dabu, and Pei Cao. Providing differentiated levels of service in web content hosting. In proc. of the First Workshop on Internet Server Performance, 2008.

[7] Bennington B. and Bartel C., (2007) „Wireless Andrew: xperience Building a High Speed, Campus-WideWireless Data Network", Proceedings of ACM MOBICOM, Budapest, Hungary, September, pp. 55-65,

[8] Fitzhugh, S. (2012). Portable network laboratory. 32nd ASEE/IEEE Frontier in Education Conference, Boston, MA, November 2002.

[9] Keshav, S. (2008). REAL: A network simulator. Technical report 88/472, University of California, Berkeley.

[10] NS-2 (2006). The Network Simulator – NS2. Retrieved February 18, 2006, from http://www.isi.edu/nsnam/ns

[11] OPNET (2006). OPNET network simulator. Retrieved February 21, 2006, from http://www.opnet.com

[12] Richards, B. (2001). Rtp: a transport layer implementation project. Proceedings of the Sixth Annual CCSC Northeastern Conference on the Journal of Computing in Small Colleges, 134-141.