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LOAD ANALYSIS OF TRANSMISSION OF DATA IN WIRELESS NETWORK : AN EMPIRICAL STUDY

Vibhuti Vashishtha*, Manisha Dawra
Research Scholar, AFSET,Faridabad, India
Asst. Professor, AFSET,Faridabad, India

ABSTRACT

In any computer Network, there are a lot of communication devices trying to access resources and at the same time getting requests to carry out some work for some other device. At the same time certain types of communication devices may be busy to respond to the request being made to them. There is lot of information exchange in the Network in form of request and response. This data is basically in the form of a large number of packets floating around in the transmitting data. This large amount of data acts as a load on the Network, which results in decrement of the operations performance. Traffic monitoring is a difficult and demanding task that is a vital part of the network administrator jobs. In this paper, we discuss the problem of performance in wireless network and analyze the load of transmitted data in the network. Load can only be measure to maximize the performance of network. We would like to measure the performance of transmitted packets. In this, we have measure the ratio between transmitted and received packets which give the performance of transmitted data in wireless network.

KEYWORDS : wireless network; load analysis; network monitoring; Performance computation.

INTRODUCTION

As company intranets continue to grow it is increasingly important that network administrators are aware of and have a handle on the different types of traffic that are traversing the networks[9]. The traffic monitoring and analysis is essential in order to more effectively troubleshoot and resolve issues when they happened, so as to not bring network services to a stand still for extended time duration. Various tools are available to help administrators with the monitoring and analysis of network traffic. With the widespread deployment of IEEE 802.11 networks, it is common today to find multiple wireless LANs co-located in the neighborhood of each other. The multiple wireless LANs form an overall large network whose links interact and compete for airtime using the carrier-sense multiple access (CSMA) protocol. When a station hears its neighbors transmit, it will refrain from transmitting in order to avoid packet collisions.

Importance of Load Analysis.

Network monitoring is a difficult and demanding task that is a vital part of a Network Administrators jobs. The network Administrators are constantly striving to maintain smooth operation of their networks[9]. Whenever any network is to be down even for a small period of time, the productivity within a company would decline. In order to be proactive rather than reactive, administrators need to monitor traffic movement and performance throughout the network and verify that security breeches do not occur within the network.

An important problem in the operation of a wireless transmission is how to efficiently use the available channel bandwidth to provide good service to as many users as possible. This problem is becoming critical with the rapid growth in the use of wireless technology. As the number of users of wireless technology increases, the load on the managing system i.e server also increases and hence the performance of the system decreases and this may be caused connection problem or data transfer problem. This means if the number of user increases the rate of data transfer get decreases. Collision, is the main reason behind the decrement of data transfer between various users requests or their work.

This paper is an approach to measure the load in wireless networks which is mandatory to avoid such types of problem i.e collision. Collision can be erect at any instance during the transmission. So with the help of this analysis we are trying to minimize the collision so that the rate of data transfer got increases.

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Wireless Network

As technology advancement in society the need for wired and wireless networking has become essential. Both of these types of networking has their advantages and disadvantages. Wired networking has different hardware requirements and the range and benefits are different. On other hand, wireless networking takes into consideration the mobility, and the several types of hardware components needed to establish a wireless network. Any organization has two options when it comes to setting up a network. It can use a completely wired network, which uses cables (networking cables) to connect computers, or they can use a wireless network, which uses radio frequencies to connect computers. The wireless networks have allowed organizations to become more mobile; hence, many organizations are now using a combination of both wired and wireless networks.

There are four basic types of transmissions standards for wireless networking produced by the Institute of Electrical and Electronic Engineers (IEEE). They have established four transmission standards; 802.11, 802.11a, 802.11b, 802.11g. The basic differences between these four types are connection speed and radio frequency. Wireless networks are too good, but whenever interfered with it can reduce the range and the quality of the signal. Such interference can be caused by other devices operating on the same radio frequency and it is very hard to control the addition of new devices on the same frequency.

On the other hand, many wireless networks can increase the range of the signal by using many different types of hardware devices. A wireless extender can be used to relay the radio frequency from one point to another without losing signal strength. Though this device extends the range of a wireless signal, but it has some drawbacks. First drawback is that it extends the signal, but the transmission speed will be slowed.

There are many benefits to a wireless network. One is the option to expand your current wired network to other areas of your organization where it would not be cost effective. An organization can also install a wireless network without physically disrupting the current workplace or wired move than a wired network and adding users to an existing wireless network is easy.

Wireless Network Transmission

Signal interference is a major drawback of wireless networks. Entire aim of reducing interference is attempting to prevent adjacent nodes, which are linked by radio frequency which conflict together, from receiving and transmitting data. Hence, interference occurs when conflicting transmissions over one radio frequency are transmitted or received by one or more nodes in a wireless network. This setup is typically the definition and particular drawback of multi-hop wireless mesh network layouts.

Interference, or signal collision, inhibits nodes' abilities to decipher incoming signals and transmit outgoing signals clearly because the signals are easily mixed and transformed into an unrecognizable jumble. With careful assignment of communication channels to nodes in a network, it could be greatly reduced. The important thing is that the number of radio frequencies is finite and the problem of minimizing the number of channels allocated to a specific network is worthy of thorough investigation as well. In some instances , channel overlap is necessary if the number of assigned channels for a network is inadequate to connect all nodes.

Wireless communication is the transfer of information over a distance without the use of electrical conductors or "wires". Wireless operations provides services, such as large-range communications, which is impossible or impractical to implement with the use of wires. Wireless communications begin with a message that is converted into an electronic signal by a device called a transmitter, which are of two types: analog and digital.

An analog transmitter sends electronic signals as modulated radio waves. A digital transmitter encodes electronic signals by converting messages into a binary code, (i.e; series of zeros and ones). Further the encoded electronic signal is then sent as a radio wave. The devices called as receivers decode or demodulate the radio waves and reproduce the original message over a speaker.

Wireless communications systems involve either one-way transmissions or two-way transmissions. Transmission of data signals using infrared-light waves called the wireless infrared communication. Wireless infrared communications refers to the use of free-space propagation of light waves in the near infrared band as a transmission medium for communication, as shown in Figure. The communication can be between one portable communication device and another or between a portable device and a tethered device, called the base station. Portable devices include laptop, computers,

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personal digital assistants, and portable telephones, while the base stations are usually connected to a computer with other networked connection.

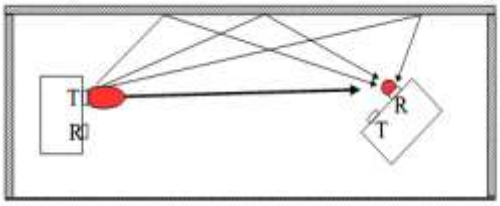

Fig : A typical wireless infrared communication system

Various drawback:

- Wireless communications are limited through the range of the transmitter.
- Cost of wireless communication system and components are high.
- The size of the device that's accessing the information is also still an issue. When transmitting data, users must sometimes send smaller bits of data so the information moves more quickly.
- If applications are going to be used through wireless connections, sometimes need to be reconfigured.
- Most client/server applications rely on a persistent connection that is not the case with wireless system.

The network layer of OSI model is responsible for packet forwarding including routing through intermediate routers, while the data link layer is responsible for flow control, media access control and error checking. A network is a medium to which many nodes can be connected, on which every node has an *address*. In addition to message routing, the network may (or may not) implement message delivery by splitting the message into several times, delivering each fragment by an individual route and reassembling the fragments, delivery report errors, etc.

The network layer has two approaches for transmission the packet ::1. **connectionless type.**
2. connection – oriented type.

The concept of addresses is fundamental to networking. There is no network without addresses. A large address space allows a large network, i.e. it is fundamentally required for network scalability. In connectionless networks, the most interesting differences revolve around addresses. IP addresses have two parts -- a network part (prefix), and a host part (suffix). This is illustrated in Figure.

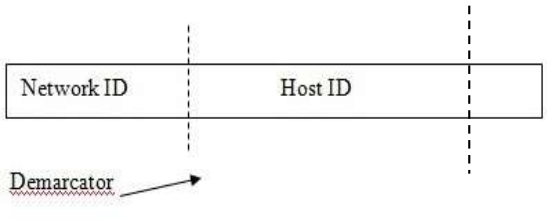

Figure : Hierarchical Structure of an IP Address

A packet data connection is indicated with a connection identifier and the destination of the packet data connection is indicated with a destination identifier in packet data transmission method.

Load Analysis of Transmission

An accurate, simple and efficient network traffic monitoring and analysis is required to understand the current usage as well as to plan for future.

The traffic Management consists of the amalgamation of various number of activities as shown below:

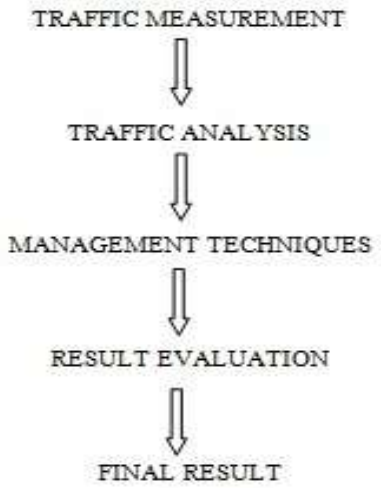

Figure : General Processes for Traffic Management

Why should I measure Network Traffic?

When we send a request on the network, it is possible that due to another requests or some other problem we have to wait for some time. Whenever over a duration of time a number of packets queue up and wait then it results in traffic. Once traffic is created, we must wait till it is finish that can be for any duration of time, depending on the conditions. Therefore, there has to be some way to deal with such condition. The solution for such condition is Network Traffic Management and this process starts first with measuring the traffic on the network.

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Some other reasons to measure network traffic are as Service monitoring, Network planning, Cost recovery and Research to improve network performance.

Approaches for Traffic Measurement

1. Active Measurement of Traffic –

As name indicates, in this measurement approach users or providers are directly related to the activities to the measurement. Many different ways to carry out such measurement as discussed below:

i) Involvement of probes into network by users and providers

ii) Ping and Trace out
- Path connectivity
- Round-trip delay

iii) Application performance as seen from hosts
- Loss
- Delay
- Throughput

iv) Distribute on measurement servers
- Probes are spread across mesh of paths through network to check scalability and growth of probe traffic

2. Passive Measurement of Traffic –

In this approach user is indirectly deal with system using some hardware or software tools. Generally some historical data is used to find the current traffic measurement. Presently used techniques for this type of measurement are as :

i) Packet monitors
- This can be achieved by recording packet headers on link
- Unique detail of protocol and architecture studies are required.

ii) Router / Switch traffic statistics.

Analyzing router or switch, the intelligent devices installed at network, which can provide internal behavior of the network. By using such devices we can get information about
- Counts
- Packet drops
- Flow statistics

iii) Server and router logs

These records or logs can perform well work in measuring and provide the summaries of dial session, web-server or log routing updates.

Conclusion

Load can only be measure to maximize the performance of network and is depends on the some factors. With this paper we present the concept of measure the performance of transmitted packets. Current work shows analysis of load in wireless network and after that measure the ratio between transmitted and received packets which further give the performance of transmitted data in wireless network.

The world is undergoing a major telecommunication revolution that will provide ubiquitous communication access to citizens. By considering the wireless telecommunication industry requirements, to develop new wireless systems, make meaningful comparison of competing systems, and that must be made in any system for better performance of networking system. Such understanding is achieved in this report to provide better solution to fulfill today's requirements (cumulative growth of 30% per year) of increasing demand of wireless communication industry.

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