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Performance Evaluation and Comparisons For IPv4&IPv6 Using OPNET Simulator

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Abstract: ***This paper presents an evaluation performance study of ipv4 & ipv6 in LAN applied in Room office with of 100 square meter and compare IP protocols IPV4 and IPV6 using OPNET 14.5. Simulation tools. Evaluation based on Traffic sent, Delay and Traffic Received and Object Response Key Performance Indicators (KPI), which will help to ip protocols ipv4&ipv6 user's , student and researcher's for selection the better type of Internet Protocol Version.***

Keywords: ipv4, ipv6, delay, , Traffic Received and packet drop

1. Introduction

Background

IP (Internet Protocol) specifies the technical format of packets and the addressing scheme for computers to communicate over a network. Most networks combine IP with a higher-level protocol called Transmission Control Protocol (TCP), which establishes a virtual connection between a destination and a source. IP by itself can be compared to something like the postal system. It allows you to address a package and drop it in the system, but there's no direct link between you and the recipient. TCP/IP, on the other hand, establishes a connection between two hosts so that they can send messages back and forth for a period of time

IPV4: The IP layer of abstraction is mainly charged with delivering Internet Protocol (IP) packets from source to destination. In order to perform this task, the source and destination IP addresses are identified by unique fixed length addresses. In IPv4, a 32 bit numeric identifier was deemed sufficient when the Internet was created. However, as the Internet growth has been exponential it is clear that there is a need for a revision of the IPv4 addressing scheme. We will not dig deeply into the techniques that have been employed to delay IPv4 address exhaustion; instead we show the progression of events in order to better understand the proposed solutions. Introduces class full network addressing architecture, the first classification of IP addresses. This scheme supported few individual networks and clearly could not support the growing Internet.

IPV6: The described IP address space exhaustion mitigation techniques, each with their own draw backs. These techniques were only short-term solutions to delay exhaustion, while more tangible solutions were sought. In this section we discuss a long-term solution, the next Generation addressing scheme, IPv6.

The steep growth of the Internet has determined the fate of the Internet Protocol. The Internet Protocol version 6 or IPv6 occur among concerns about whether the Internet would adapt to increasing demands. IPv6 is now gaining momentum as the predictions concerning address exhaustion have been fulfilled. We start our study by identifying weakness areas in IPv4 and examining the solutions provided in IPv6.

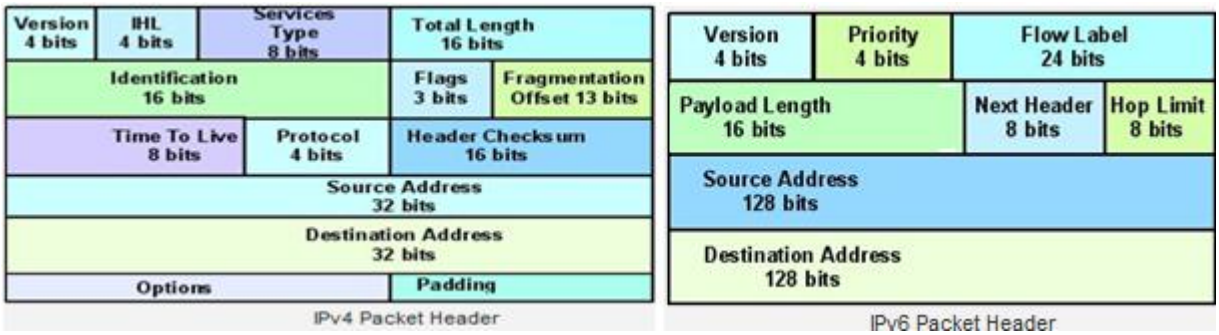

Figure 1: Difference between IPv4 AND IPv6

Table 1

IPv4	IPv6
The size of an address in IPv4 is 32 bits	The size of an address in IPv6 is 128 bits
Address Shortages: IPv4 supports 4.3×10^9 (4.3 billion) addresses, which is inadequate to give one (or more if they possess more than one device) to every living person.	Larger address space: IPv6 supports 3.4×10^{38} addresses, or 5×10^{28}(50 octillion) for each of the roughly 6.5 billion people alive today.[33(*)]
IPv4 header has 20 bytes IPv4 header has many fields (13 fields)	IPv6 header is the double, it has 40 bytes IPv6 header has fewer fields, it has 8 fields.
IPv4 is subdivided into classes <A-E>.	IPv6 is classless. IPv6 uses a prefix and an Identifier ID known as IPv4 network
IPv4 address uses a subnet mask.	IPv6 uses a prefix length.
IPv4 has lack of security. IPv4 was never designed to be secure - Originally designed for an isolated military network - Then adapted for a public educational & research network	IPv6 has a built-in strong security - Encryption - Authentication
ISP have IPv4 connectivity or have both IPv4 and IPv6	Many ISP don't have IPv6 connectivity
Non equal geographical distribution (>50% USA)	No geographic limitation

2. Methodology

OPNET 14.5 has used to simulate three different methods from IPV4&IPV6. For analysis of the traffic between source and destination, three parameters (delay, throughput and packet drop) has considered to evaluate the network.

3. Network configuration

In this section we discuss about the following network components used in the suggested network models running on OPNET 14.5 device used in the network at 19 work station, Ethernet 2server, and switch Ethernet 24.

The Application_ Config includes a name and a description table.
That specifies various parameters for the different applications
(I.e. web browser HTTP Heavy and FTP heavy applications). The specified
Application name is used while creating user profiles on
"Profile_ Config" object. The Profile_ Config is used to create user profiles. These user profiles can be specified on different nodes in

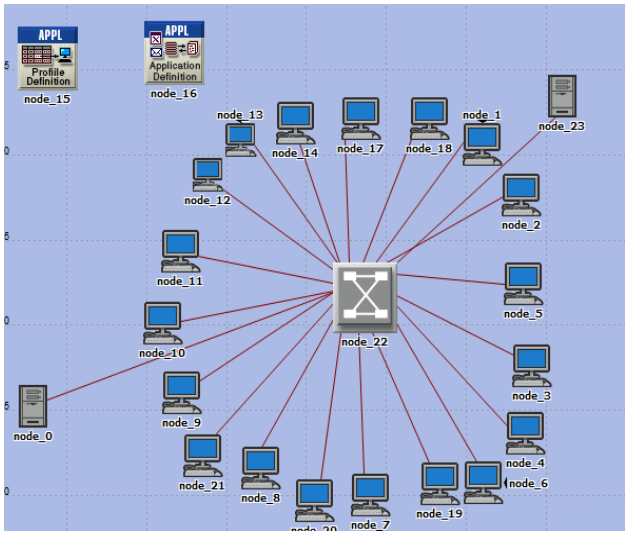

Figure 2: (IPV4)

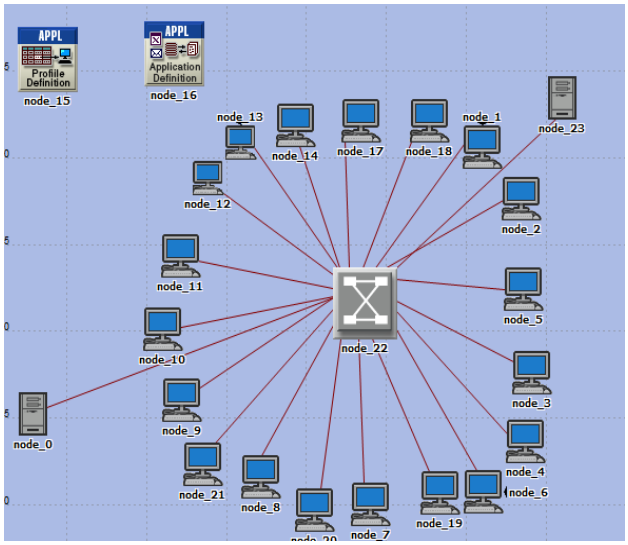

Figure 3: (IPV6)

4. Results and Analysis

The simulation run for 1 hour (3600 sec): this time had been enough to gain an overview of the proposed network behaviour.

4.1 Delay

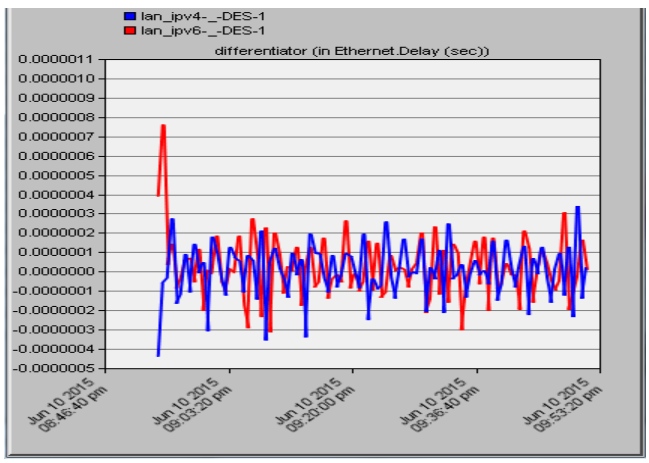

Figure 4

The fig 4 show that IPV6 have higher Delay (maximum close to.0000008 compare to the IPV4 (maximum .0000003 which mean that when using IPV6 will result bad performance with high packet delay , and this directly due to the header packet length in IPV6 is more longer than IPV4 .

4.2 Packet Drop

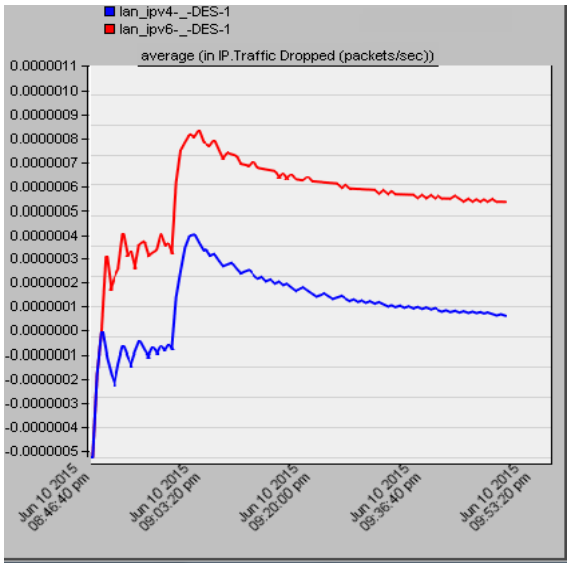

Figure 5

The fig 5, show that the ipv6 compare to IPV4 the packet drop that ipv6 have big packet drop. And ipv4 have less packet drop

4.3 Traffic Received

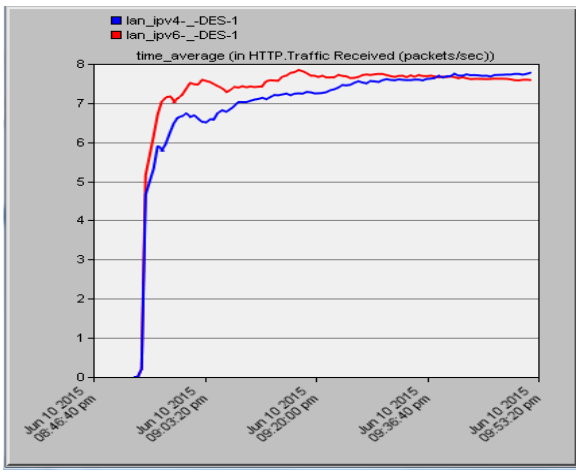

Figure 6

The comparison based on IP Versions ip4 &ipv6 will be based on fig6 ipv6 has higher traffic received compare with ipv4 ipv6 has 8000p/s and ipv4 has 7000 p/s that means ipv6 is better.

5. Conclusion

Simulation is ran over OPNET tool, and three types of key performance indicators, (delay, packet drop and Traffic Received have been considered.

IPV6 have greatest have Traffic Received while in the same time have higher delay & higher packet drop.

On the other hand, IPV4 have the lowest Traffic Received compare to IPV6, while in the same time have less delay & lower packet drop

So, it is better to use ipv4 in applications that required real time applications due to the low delay and high traffic received. use ipv6 in application required high bandwidth due to ipv6 have high, Traffic Received but have high delay and low packet drop.

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