International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2013): 6.14 | Impact Factor (2013): 4.438

IPv4 and IPv6 Quality of Service First In First Out (FIFO) Using OPNET Simulator

Ali Ibrahim Yahia Mahmoud[1], Dr. Amin Babiker Abdel-Nabi Mustafa[2]

[1, 2]Faculty of Engineering, Neelain University, Khartoum-Sudan

Abstract: ***The quality of service is one of the most important areas of Internet development. As the Internet originally developed for data communications is now used more and more for real-time applications, there is a need for better service than the ``best effort''. In this study we will at first review the concept quality of service, what it is and then we study the two most important efforts to provide. The remarkable growth of the Internet Protocol version 4 (IPv4)-based Internet has highlighted several fundamental limitations with that protocol. Internet Protocol version 6 (IPv6) addresses these issues and provides additional enhanced services and functionality. IPv6, also called IP-NG (is the next generation) Internet Protocol and is the designated successor to IPv4. Although some aspects of IPv6 are still under development, the basic protocols, conventions, and formats have been stable for years and enjoy wide support. Real-world production deployment (allocation and assignment of production network addresses or prefixes) has been underway for several years, and IPv6 is no longer considered experimental.***

Keywords: Qos, FIFO, jitter delay, Throughput

1. Introduction

Background

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 will 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.

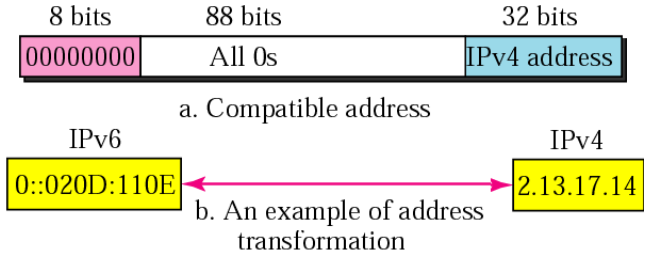

Figure 1:

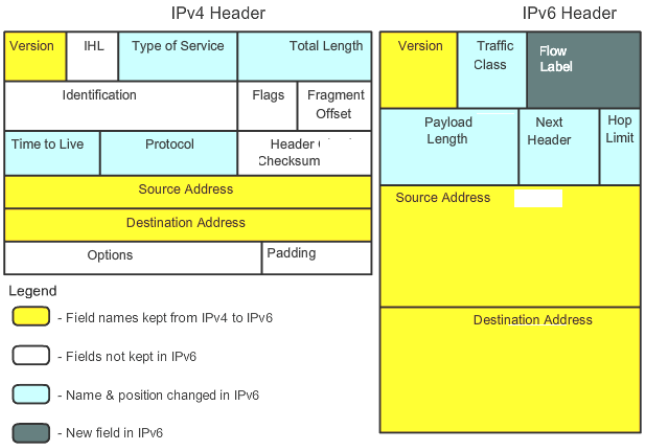

Figure 2

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 for QoS FIFO (delay, throughput, and jitter) has considered to evaluate the network.

3. Network Configuration

The network is composed of four pairs of video clients. Each pair uses a distinct TOS (Type of Service) for data transfer. The link between the two routers is a "potential" bottleneck. FIFO queuing can be enabled on each interface in "advanced" routers. Queuing Profile and queuing processing

mechanism are set in a sub-attribute called "Interface Information" in the "IP QoS Parameters" compound attribute. Queuing profile defines the number of queues and the classification scheme. Global queuing profiles are defined in the QoS configuration object.

QoS first in first out

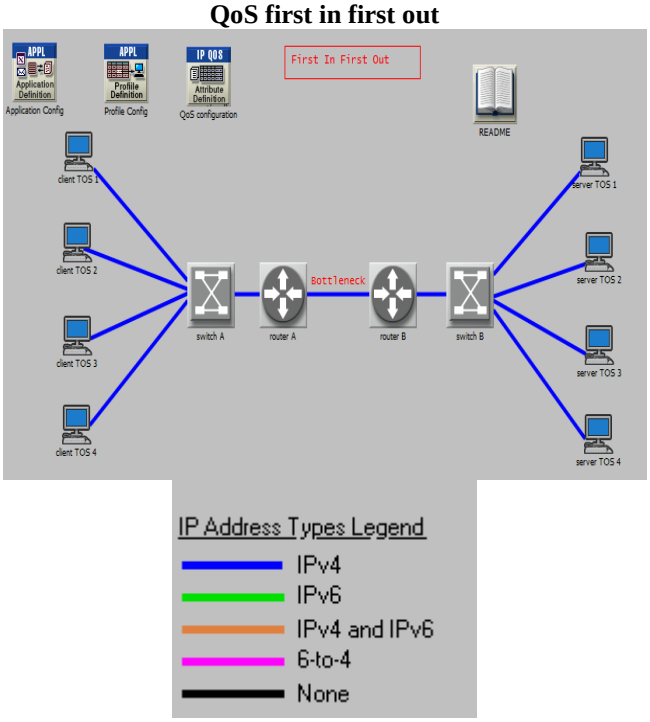

Figure 3
(IPV4)

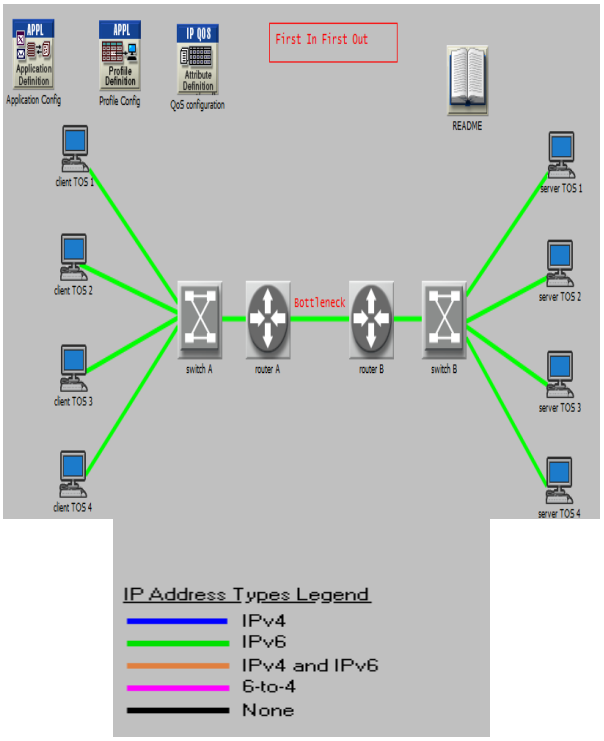

Figure 4 (IPV6)

4. Results and Analysis

The simulation run for 10min (600 sec): this time had been enough to gain an overview of the proposed network behaviour.

4.1 Delay

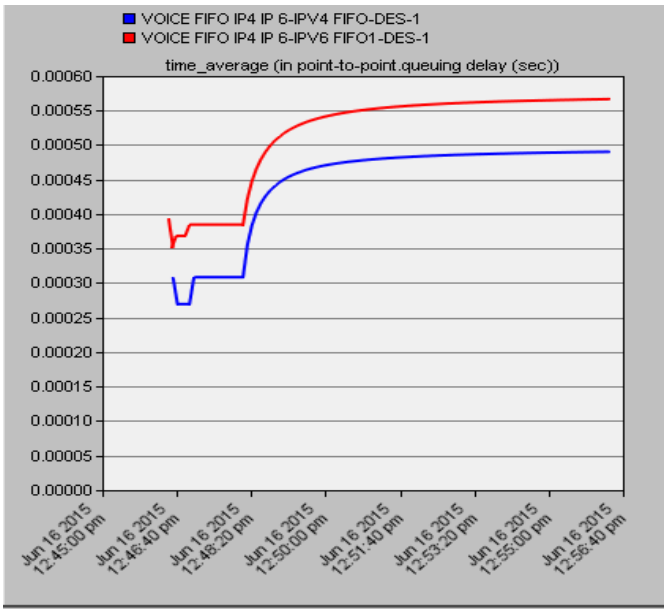

Figure 5

The fig 5 show that IPV6 have higher Delay (maximum close to.00058 compare to the IPV4 (maximum .000048 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 Throughput

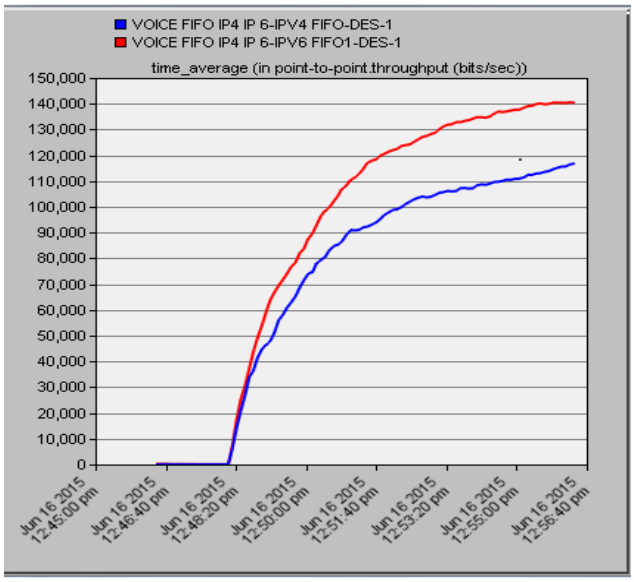

Figure 6

The comparison based on IP Versions 4 & 6 will be based on fig 6 ipv6 has higher throughput compare with ipv4 ipv6 has 140.000p/s and ipv4 has 120.000 p/s

4.3 Jitter

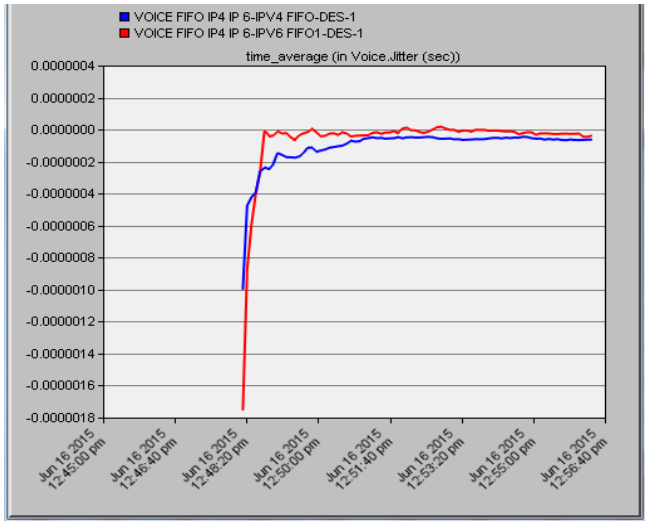

Figure 7

The comparison based on IP Versions ipv4 & ipv6 will be based on fig 7 ipv6 has higher jitter compare with ipv4.

5. Conclusion

Simulation is run over OPNE Tool, and three types of key parameters of QoS (FIFO) indicators (Delay Throughput, and Jitter) have been considered.

IPV6 has a greatest throughput while in the same time have higher delay & jitter to the traffic.

On the other hand, IPV4 has the lowest throughput compare to IPV6, while in the same time have less delay jitter to the traffic.

So, it is better to use IPV6 in applications that required high bandwidth, while it not suitable for real time applications due to the higher delay.

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