Performance Evaluation and Comparisons for Real Time Applications (VoIP) according to IPv6 and IPv4 Migration Techniques

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Abstract: ***Today IPv6 over IPv4 tunnels are widely used to connect large regional IPv6 networks, because it is relatively hard to construct an international or cross continent native IPv6 network. This makes the characteristics of IPv6 over IPv4 tunnels very vital to the performance of the global IPv6 Internet. In this paper we use the OPNET modeler 17.5 academic editions to evaluate the Tunneling between IPv4 and IPv6 routing protocol and dual stack technique.We create two scenarios in one topology the difference is based on the address type profile. In the first scenario all the clients has the same version of IP6 put the backbone network has ipv4 (tunneling) .in the other scenario we used different ipv4 and ipv6 for each pair of clients and each pair uses different protocol (dual stack),. The result shows that the two protocols can coexist without any problems. The migration from IPv4 to IPv6 tunneling technique must be implemented node by node by using auto-configuration procedures to eliminate the need to configure IPv6 hosts manually.***

Keywords: Delay, jitter, throughput 6-4 tunneling, dual stack

1. Introduction

1.1 Background

The most widespread implementation of IP currently is IPv4, which utilizes a 32-bit address. Mathematically, a 32-bit address can provide roughly 4 billion unique IP addresses (232 = 4,294,967,296). Practically, the number of usable IPv4 addresses is much lower, as many addresses are reserved for diagnostic, experimental, or multicast purposes.

The explosive growth of the Internet and corporate networks quickly led to an IPv4 address shortage. Various solutions were developed to alleviate this shortage, including CIDR, NAT, and Private Addressing. However, these solutions could only serve as temporary fixes.

In response to the address shortage, IPv6 was developed. IPv6 increases the address size to 128 bits, providing a nearly unlimited supply of addresses.

This provides roughly 50 octillion addresses per person alive on Earth today, or roughly 3.7 x 1021 addresses per square inch of the Earth's surface., as IPv6 is backward-compatible with IPv4

1.2 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 delve 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.

1.3 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 .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 emerged amidst concerns about whether the Internet would adapt to increasing demands. IPv6 is now gaining momentum as the apocalyptic predictions concerning address exhaustion have been fulfilled. We start our study by identifying problematic areas in migration technique and examining the solutions provided in IPv6.

1.4 Tunneling Techniques

Tunneling techniques can be used to deploy an IPv6 forwarding infrastructure while the overall IPv4 infrastructure is still the basis and either should not or cannot be modified or upgraded. Tunneling is also called encapsulation. With encapsulation, one protocol (in our case, IPv6) is encapsulated in the header of another protocol (in our case, IPv4) and forwarded over the infrastructure of the second protocol (IPv4). Transition mechanisms that allow IPv6 hosts to communicate via intervening IPv4 networks are based on a technique known as tunneling or software, which ensures there is no disruption to the end-to-end IP communications model. To accommodate different administrative needs, two types of tunneling techniques are available: configured (static) and automatic (dynamic).

1.5 IPV6 QOS

IPV6 brings quality of service that is required for several new applications such as IP telephony, video/audio, interactive games or ecommerce. Whereas IPv4 is a best effort service, IPv6 ensures QoS, a set of service requirements to deliver performance guarantee while transporting traffic over the network.

2. Methodology

The network is implemented by using same topologiesafter the network implementation; start to configure the attributes for different migration technique, three parameters (Delay, Voice jitter and throughput) has considered to evaluate the network performance for VOIP according two migration technique .

3. Network Scenario

The components used in the network models running on OPNET device used in the network are 40 end device .two Ethernet switch directly connected to end devices, and application server work as a VOIP Servers. To represent and supporting Voice transaction between workstations and switch, the switch (Ethernet 32) are used. The IP packets arriving on the input interface are switched to the appropriate output interface based on packet destination IP address.

This workstation requires a fixed amount of time to route each packet, as determined by the "IP Forwarding Rate" attribute of the node. Packets are routed on a first-come-first-serve basis and may encounter queuing at the lower protocol layers, depending on the transmission rates of the corresponding output interfaces.

We have two scenarios as shown in figure 1,2 Figure 1 representing for tunneling network scenario and figure 2 representing for Dual stack scenario.

4. Network Architecture

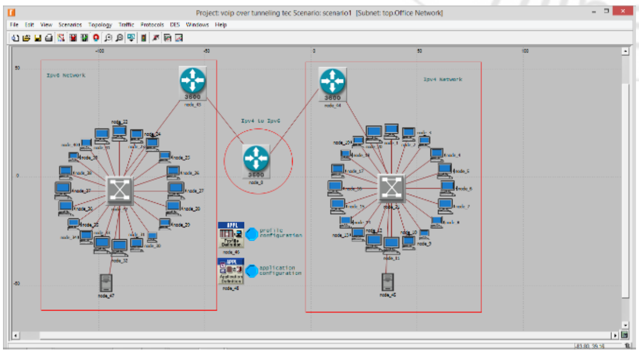

Figure 1: Tunneling network scenario

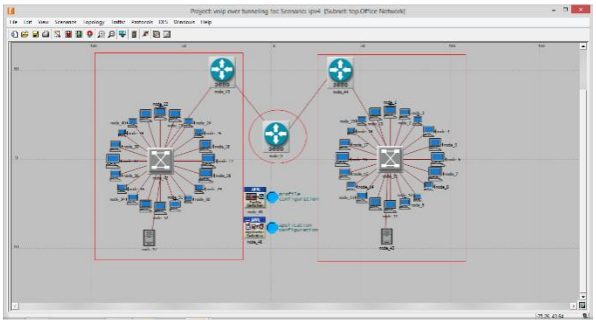

Figure 2: Dual Stack Network Scenario

5. Results and Discussion

The simulation ran for 1 hour (3600 sec), sufficient to overview of the network's behavior. The results of the network scenarios are shown in Fig. 3 – Fig 4 - Fig. 5; Dual Stack represented in blue,tunneling represented in red.

A. Delay in the Figure 3 below shows the comparison of delay The Tunneling Technique has a higher Delay than Dual Stack and dual stack has a smaller CPU utilization**.**

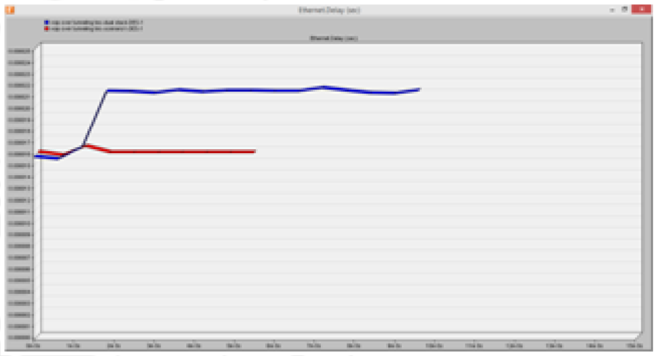

Figure 3: Packet delay

B. Voice jitter in the Figure 4below shows the comparison of jitter the tunuling had a frequently value of jitter and the dual stack its more stable jitter value .

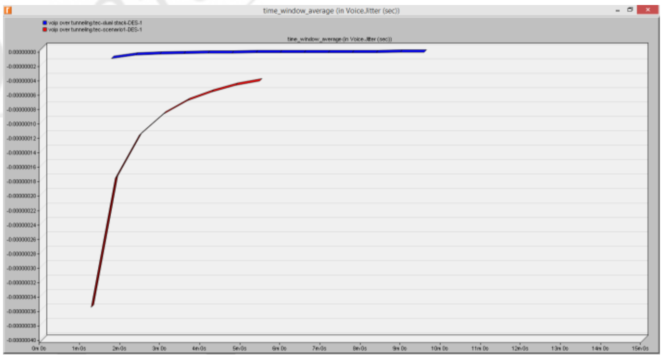

Figure 4: Voice Jitter

C. Throughput by server Figure 5 below shows the comparison of Voice traffic received (bits/sec) and shows twovalues of theoretical have tunnelingstate and stable because the traffic generated by simulator does not change. Also the small change of values dose not affected quality of service in this case.

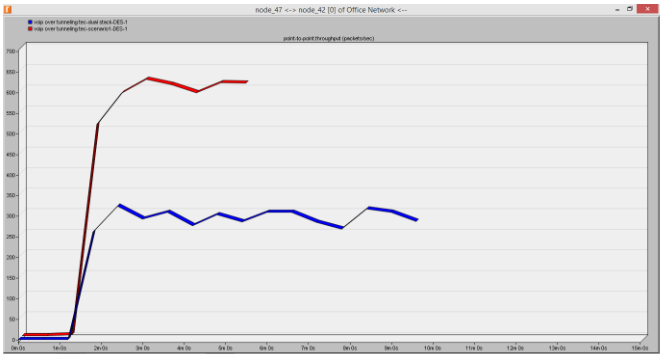

Figure 5: Throughput by VoIP Server

6. Conclusion

Migrating from IPv4 to IPv6 in an instant is impossible because of the huge size of the Internet and of the great number of IPv4 users. Moreover, many organizations are becoming more and more dependent on the Internet for their daily work, and they therefore cannot tolerate downtime for the replacement of the IP protocol. As a result, there will not be one special day on which IPv4 will be turned off and IPv6 turned on because the two protocols can coexist without any problems. In this paper we investigate when to immigrate from IPv4 to IPv6 and the risks of this immigration. The traffic sent and received are not affected by the routing protocols, the any cast and multicast affect the traffic dropped. but we had seen that there is a tiny difference in the buffer usage and the queuing delay parameters which guide us to an obvious fact which the IPv6 has the ability to migrate without any problem. But we recommended to use dual stack technique in migration process.

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