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Performance Analysis Real Time Implementation of Cost Effective IPv4-IPv6 Multimedia Communication Network

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Abstract: **This paper presents a new implementation idea through which we can have a cost effective IPv4 – Ipv6 multimedia communication network. The paper deals with the protocol used in the past internet protocol IPv4 (Internet Protocol Version 4) and presently used protocol IPv6 (Version 6). Then it states about, how we can use IPv4 in IPv6 Networks and different combinations of IP networks. The cost effective design is the use of IPv4 server and IPv6 client.**

Keywords: **IPv4, IPv6, Server & Client.**

I INTRODUCTION

Advances in network technology permit sophisticated configurations in the local area, which have resulted in a wealth of multimedia data being exchanged on the network. It has therefore become necessary to establish a transfer medium that can accommodate both traditional computer data traffic (e.g. busty file transfers) and communications data (e.g. continuous audio and video).

As the cost of peripherals capable of generating multimedia data (e.g. cameras and microphones) continues to drop, it is reasonable to expect that such peripherals will be commonly used at the desktop. The traditional way to interface these devices to the network is via specialised boards on the workstation's I/O bus. An alternative approach moves the devices from the bus and attaches them directly to the network. In this architecture, the networked devices can be easily shared, the I/O intensive work is moved away from the workstation and it is possible to set up, for example, audio only locations without the need for an expensive workstation.

The rest of the paper is organised as follows: Section II gives an overview on IPv4 communication. Section III presents the details on IPv6 communication. Section IV details IPv4 and IPv6 formats. Section V gives the simulation results and analysis. Finally section VI gives the concluding remarks.

II IPv4 COMMUNICATION

In order to support multi-media services in IP-based networks, it is important to assure service qualities, e.g., delay, since IP networks inherently provide best effort service. In general, modelling of IP-based networks supporting multi-media services is complex and thus QoS estimation is challenging. IPv4 is the dominant addressing protocol used on the Internet and most private networks today. With the current exponential growth in Internet users worldwide, combined with the limited address range of IPv4, the number of available public IPv4 addresses remaining is very limited.

IPv4: 232 addresses equals 4.3 billion addresses (less than the global human population of 4.7 billion).

Because no further large allocations of IPv4 addresses are available, the ability of Asia-Pacific ISPs to allocate IPv4 addresses for new customers depends on the number of addresses they already hold, the rate at which they are using them for new services, and the ISP's capability to adopt address translation technologies, which may reduce their rate of address demand. These factors will be different for each ISP, so it is likely that ISPs across the industry will run out of IPv4 addresses across a wide timeframe – some may run out within only a couple of years, others may be able to delay that exhaustion well into the future.

III IPv6 COMMUNICATION

IPv6 was designed during the mid-1990s, when the Internet Engineering Task Force (IETF) realised that IPv4 address size constraints would soon be a major impediment to the continued growth of the Internet. IPv6 was first known as the Next Generation Internet Protocol (IPng) during development within the IETF. Since 1998, it has officially been known as IPv6. In the transition to IPv6, both IPv6 and IPv4 will co-exist until IPv6 eventually replaces IPv4.

The most obvious difference between IPv6 and IPv4 is the address size. IPv6 addresses comprise 128 bits, whereas

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IPv4 addresses comprise 32 bits. This difference results in a huge expansion in available IP address space:

IPv6: 2128 addresses. Because the last 64 bits are used to allocate addresses within a subnet that leaves 264, which equals 18 billion subnet addresses.

IPv4 and IPv6 will co-exist in the Internet for many years, quite likely for decades. Unlike Y2K, there is no cut-off date when IPv4 use will cease and the world will fully migrate to IPv6. The plan is for gradual transition: different regions and industry players will move to IPv6 at different rates. Consequently, end users will need the capability to access both IPv4 and IPv6 content and services on the Internet. This dual capability may be inherent in the end users' equipment, or may be provided transparently by their or the content publishers' ISPs.

To enable this dual protocol access during the transition period, technology solutions were developed in conjunction with the development of the IPv6 protocol in the mid-1990s. Three categories of transition technologies exist:

- Tunnelling – encapsulates one protocol within another (e.g. IPv6 in IPv4, IPv4 in IPv6)
- Protocol Translation – translates packets between protocols (e.g. IPv6 to IPv4)
- Dual-stack – support both protocols in parallel within one network.

IV IPv4 & IPv6 NETWORKS

In general, very few modem gateways and other CPE appliances in use by consumers currently support IPv4. The main exception includes some high-end PDA mobile phones running Windows Mobile, and some CPE made for specific markets such as Japan. In the vast majority of cases, these IPv4-only devices will not be economically upgradeable to support IPv6. This is because the device is not upgradeable in any way, or because additional resources (e.g. flash memory or RAM) are required to support IPv6. IPv6 capability from many consumer gateway vendors is only starting to be released during 2011.

The IPv6 server can act as dual-stack and support both IPv4 & IPv6 clients but IPv4 server is able to support only the IPv4 client but nit the IPv6 client. IPv6 with the above mentioned three characteristics will help a lot in communicating with IPv4 network. The communication between IPv4 and IPv6 systems within a network is possible with the above mentioned process. But when it comes to the matter of server and client there are many things to note about communication, mapping of addresses etc.

We see that, now-a-days each and every company is replacing their IPv4 server to IPv6 servers. The process of replacing IPv4 server to IPv6 servers is cost effective.

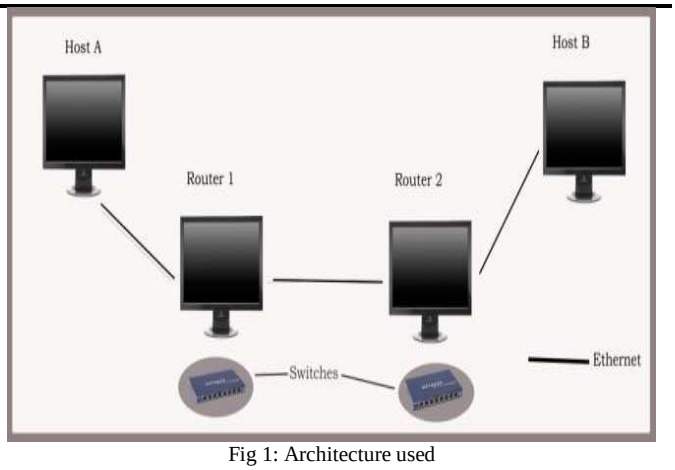

Fig 1: Architecture used

We have arranged four systems which are cable of supporting both IPv4 and IPv6 addressing as shown in the figure. Out of four systems, two are configured as routers and the remaining act as server and client. There are two switches used to distinguish between the different networks connected.

The process of configuration of systems into routers will add up to the less cost network configuration as said above. Similarly, the other cost effective thing in multimedia data communication is the requirement of replacement of Pv4 server to IPv6 server. Our experiment as shown up that the IPv4 server can also be configured such that it can support IPv6 client with damaging any data.

V SIMULATION RESULTS AND ANALYSIS

There are four computers used with are of Ubuntu 12.04(Linux) platform. These computers are arranged as shown in the architecture diagram. The middle two systems are externally added with an extra NIC (Network Interface Cards) or Ethernet port and are configured to act as routers. Then the remaining systems are used to act as server and client respectively.

First system is made to work as server whereas the last as client. We have used the apache server to configure the system to work as server.

In Ubuntu we have the option of modifying the type of connection or addressing required (IPv4 or IPv6). Thus the network can be differently organized and analyzed.

We have used WIRESHARK (A Network simulator and Network Analyzer) software to analyze the data flow in different combinations of network as discussed below:

(i) Initially the whole network was configured to be IPv4 multimedia data communication network and the multimedia data like: audio, video are transmitted from server to client.

The resulting analysis is as shown below:

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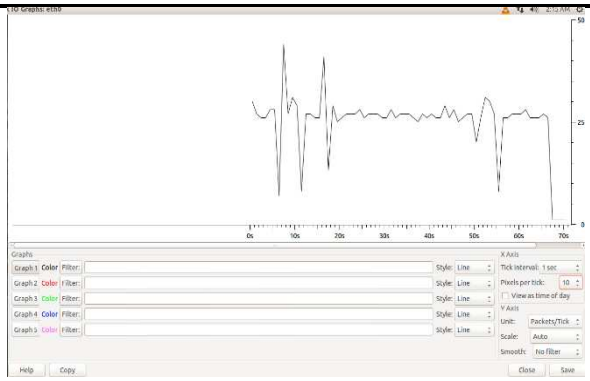

Fig 2: IPv4 Network Operation

(ii) Then the whole network was configured to be IPv6 multimedia data communication network and the multimedia data are transmitted from server to client.

The resulting analysis is as shown below:

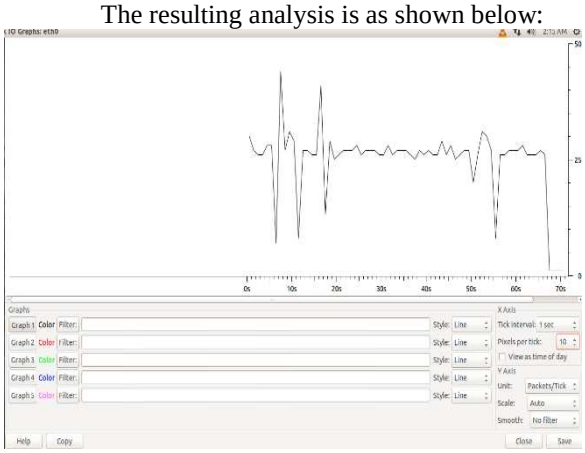

Fig 3: IPv6 Network Operation

(iii) Now the server is configured to be IPv6 addressing and the client is configured to be IPv4 addressing. To construct the communication between the IPv6 and IPv4 systems we have used the tunneling mechanism. Then the multimedia data is transmitted from server to client and analyzed.

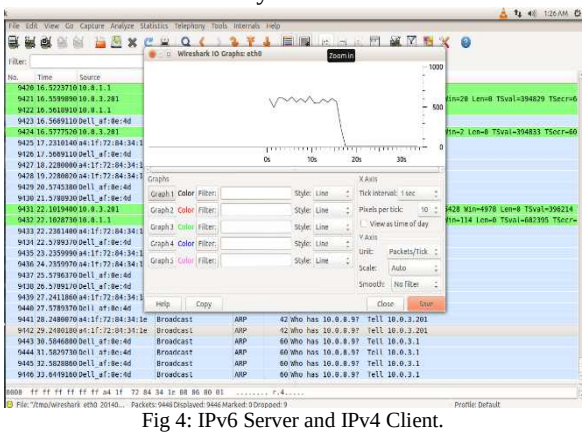

Fig 4: IPv6 Server and IPv4 Client.

(iv) Then the server if configured to IPv4 addressing and the client is configured to IPv6 addressing and the multimedia data is transmitted over the network.

We observed that there was not much difference in the communication outcome of both the combination of networks.

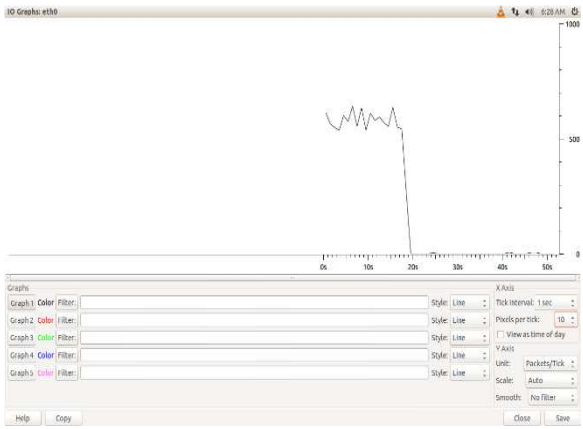

Fig 5: IPv4 Server and IPv6 Client

VI CONCLUSION

The paper concludes that the IPv4 and IPv6 addressing networks have a lot of difference between them. The addressing must be chosen properly for a particular network for an efficient communication. We also saw that there are many techniques to utilize the IPv4 systems inside IPv6 network and vice versa.

The requirement of replacement of IPv6 server is not needed to support both the IPv4 and IPv6 clients. The result shows that there is not much difference in the data analysis for both IPv4 and IPv6 servers.

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