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Performance comparison of multimedia applications over IPV4 and IPV6 using tunnelling technology

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ABSTRACT:

This paper presents an analysis of performance comparison of multimedia applications of IPV4 over IPV6 using various types of tunnelling technology.Network is simulated on GNS3 simulation kit.We have taken IPV6 network as the existing system . In proposed system , we have taken both IPV4 and IPV6 networks using various types of tunneling which includes manual, auto, GRE and 6to4 tunnelling. To compare the results of existing and proposed systems, parameters like latency, throughput and convergence time RTT are calculated and analysed. This analysis can be taken as benchmark to show that proposed systemis more efficient than existing system.

Keywords- v2, IPV4,IPV6, GRE,GNS3,RTT

I. INTRODUCTION

IPv6 comprised of 128-bit binary number .It is used to solve the problem of congestion and traffic of data due to large number of users.IPv4 was developed by Internet Engineering Task Force.It is represented as 8 groups of four hexadecimal digits being separated by colonThe total number of addresses is 7.9*10^28 times as many as IPv4.Migration of IPv4 to IPv6 is done in order to handle more users as there is a need for more number of address bits.TheTunnelling technology is followed.

This technique allows to transfer information from one network(IPv6) via another network(IPv4) by encapsulating network protocol within packets. In this project we are using four types of tunnellinglike manualtunneling, auto tunnelling GRE tunneling and 6to4 tunneling.Components used here are switch ,routers,gateway,network host and tunneling technology. Switch is a multiport bridge with a buffer and design which can boost its efficiency. Routers normally connectLANs and WANs together .Gateway is a passage to connect two networks together that may work upon different networking models.A network host is a network node that is assigned a network address. Software used here is GNS3 (Graphical Network simulator-3) which allows the combination of virtual and real devices,used to stimulate complex networks.In this project we are comparing the results of existing and proposed system using parametres like Latency,Throughput, RTT.

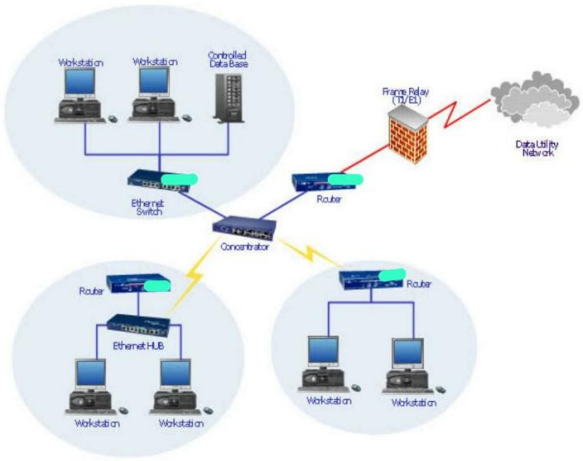

Fig. 1-Block Diagram

II. ROUTING PROTOCOL

We use RIPv2 protocol in this project .RIPv2 is very important for the connection among the routers. This analysis is tested on GNS3 software by using the routers,switches and hosts . RIPv2 has its own multicast MAC address and also it

checks security issues in the routers by giving authentication to the user. The commands for routing is specified in each and every router. By PING command , we can access the particular router.

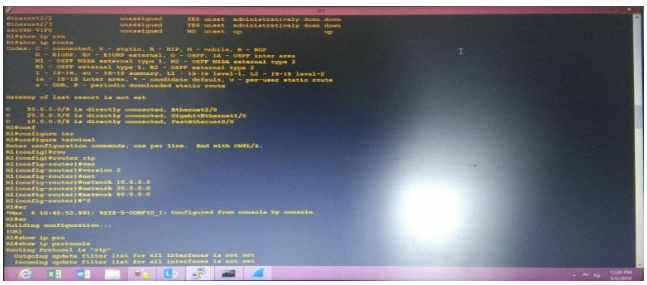

Fig. 2 shows how a routing program is written for IPv4

A. *MultimediaAapplications*

There are many multimedia applications being tested:-

- Video Streaming

  In order to test connections between source and destination, we can make use of VLC player .It's fixed in both server and client to check whether a video is displayed at the client. Even MP3 and MP4 can be used with certain protocols.

- FTP file transfer

  We use Filezilla client and server to transfer files in FTP software. Packets of various sizes are being transferred from source to destination. In this way, the latency and throughput witches and hosts . RIPv2 has its own multicast MAC address and also it checks security issues in the routers by giving authentication to the user. The commands for routing is specified in each and every router. By PING command , we can access the particular router. In the below image ,it's shown that how a routing program is written for IPV4can be checked.

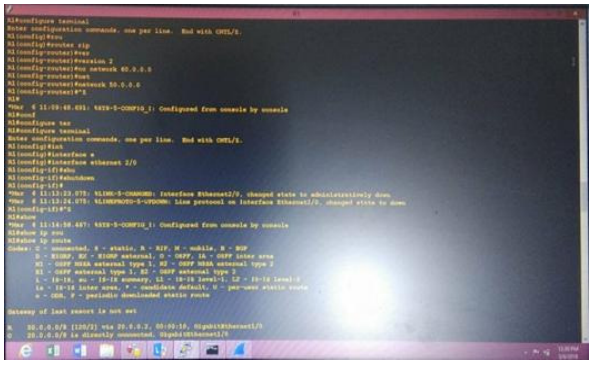

Fig. 3- example of routing protocol

B. *Network Analyser Tool*

The parameters to be analysed are being collected in the following tools:-

- PING- It is the command given in GNS3 to know whether a packet has reached to its destination or not. It gives error messages .It also helps in giving the time delay.
- Filezilla- It is a software that allows FTP messages to be forwarded and is used in windows like LINUX, MAC OS etc. It helps the packet to be moved from client to server.
- TCP- It helps to measure all kinds of parameters like packet loss , throughput and RTT for calculating the efficiency.
- VLC – It is video player that lets user watch any video on its destination . It is an open source cross-platform multimedia player.

III. MEASUREMENT AND DATA ANALYSIS

A few parameters were measured during this analysis and taken as result as listed

- Latency(delay)- The time taken by a multimedia transmissionto from source to destination.

Latency= avg RTT for packets/2 (MS)

- Throughput-Rate of data transfer from source to destination can be transmitted over sufficiently long period of time; the performance is measured in M bits/s.

Throughput= packetsize/latency (Mbits/s)

- Packet loss- dropped packet
- CPU Utilization- CPU utilization was monitored during the setup of gns3 simulation.For Windows 7 at the Windows Task Manager under the performance.The optimumCPU utilization is important to ensure the performance of pc during simulation.

IV. WORKING AND ARCHITECTURE

The existing system is the version 6 network in which the router to router connections and router to host connection is converged in IPv6 domain.The IPv6 addresses are assigned at each gateway and router to router interfaces.The information transmitted in form of sequences is made to pass from one switch to another across the routers.Their RTT and bit size is noted down to calculate latency and throughput of the system..The network type used in router to router connection is IPv4 network and correspondingly the addresses assigned at

their interfaces are of version 4.The switch to host connection has IPv6 addresses assigned at their gateway.For the transmission of information from version 6 to version 4 network tunnel is created from one router to another router where the data needs to be transmited.A tunnel is a virtual connection created in a network used for transmission purposes. In this paper we are going to implement five types of tunneling:GNS3 simulation kit is used to implement existing and proposed systems.For diifferent tunnels created in the proposed system latency and throughput is calculated.These parameters are calculated for 500, 1000 and 1500 bits.

The bit size is mentioned in the VPCS tool screen while pinging the address of the desired network.These values are compared with the existing system values and an analysis is made.Then by shutting down other paths in the network the information is transmitted through number of nodes.The more the number of nodes more is the time taken for data to be transmitted.The values are taken for 3,4 and 5 nodes correspondingly.This procedure is followed for all the tunnels and their performances is compared with the existing system..Routing Information Protocol is used for network convergence.

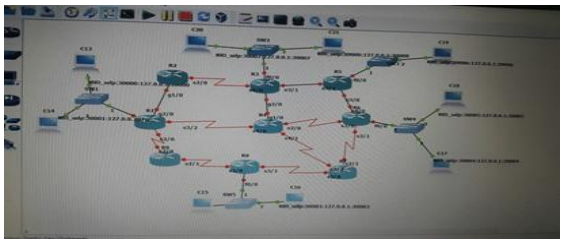

Fig. 4 Working Topology

V RESULTS AND ANALYSIS

Results present the ICMP, FTP and HTTP protocols test on Latency and Throughput performances.

a) Auto tunneling:In this technique only the source address is specified and destination address is mapped with version 6 address so as to provide the path between two networks.

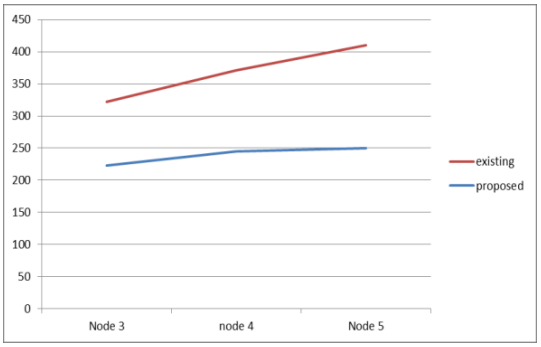

Fig. 5 Latency result using auto tunneling

Table 1 Latency Streaming

Source	Destination	Path	Node	Latency
R1	R6	R1-R4-R6	3	273
R1	R6	R1-R4-R7-R6	4	339.5
R1	R6	R1-R2-R3-R5-R6	5	365.3

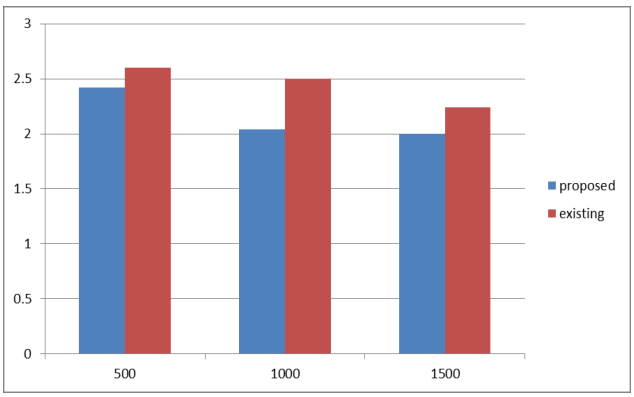

Fig. 6 Throughput Result using Auto Tunneling

Table 2 Throughput Streaming

Size	Throughput
500	2.53
1000	2.5
1500	2.32

b) GRE Tunneling- This is similar to manual tunneling in many ways.The main advantage of using GRE is it provides encryption and security to data being transmitted along the

tunnel

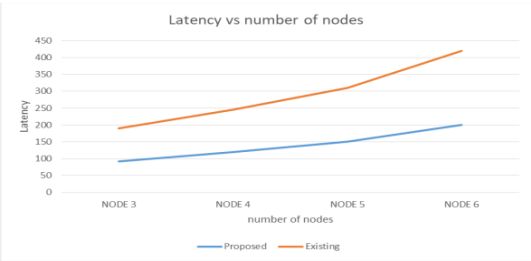

Fig. 7: Latency using GRE Tunneling

Table 3 Latency Streaming

Source	Destination	Path	Node	Latency
R1	R6	R1-R4-R6	3	86.3
R1	R6	R1-R4-R7-R6	4	92.18
R1	R6	R1-R2-R3-R5-R6	5	104.69

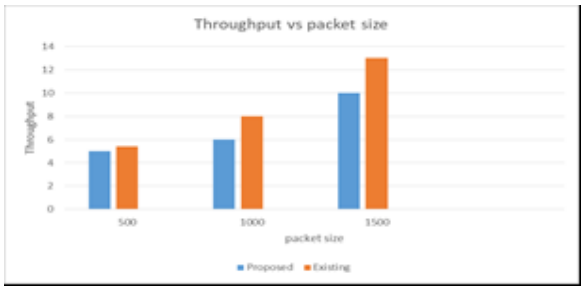

Fig. 8 Throughput analysis using GRE Tunneling

Table 4 Throughput Streaming

Size	Throughput
500	5.422
1000	9.41
1500	13.76

c) Manual Tunneling:Thistunneling is configured manually and it provides stable connection between the routers.The source and destination addresses are specified..

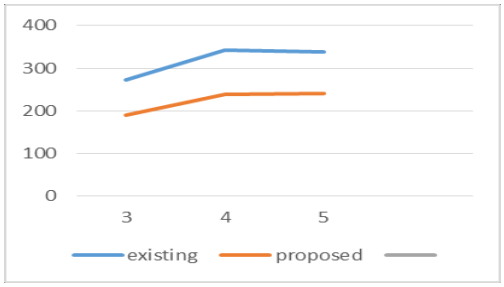

Fig. 9 Latency using manual tunneling

Table 5 Latency streaming

Size	Throughput
500	2.64
1000	4.97
1500	6.19

Table 6 Throughput streaming

Source	Destination	Path	Nodes	Latency(ms)
R1	R6	R1-R4-R6	3	189.57
R1	R6	R1-R4-R7-R6	4	239.079
R1	R6	R1-R2-R3-R5-R6	5	240

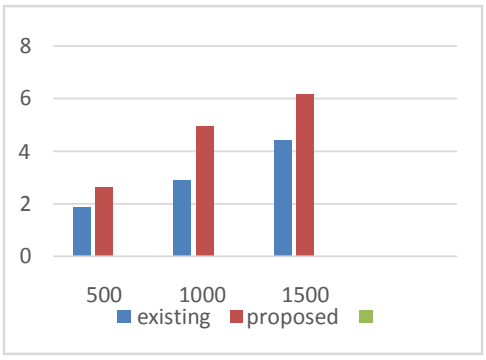

Fig. 10 Throughput using Manual Tunneling

d) 6to4 Tunneling: A 6to4 tunnel allows isolated IPv6 domains to be connected over IPv4 network.It is a point to multipoint tunnel.

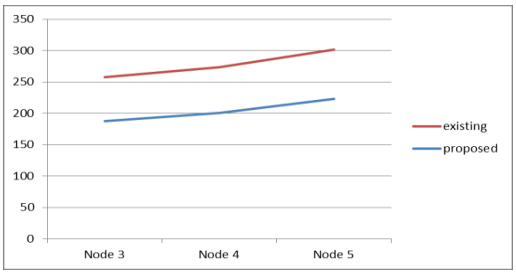

Fig. 11 Latency analysis using 6to4 tunneling

Table 7 Latency Streaming

Source	Destination	Path	Node	Latency
R1	R6	R1-R4-R6	3	70.31
R1	R6	R1-R4-R7-R6	4	73.44
R1	R6	R1-R2-R3-R5-R6	5	78.16

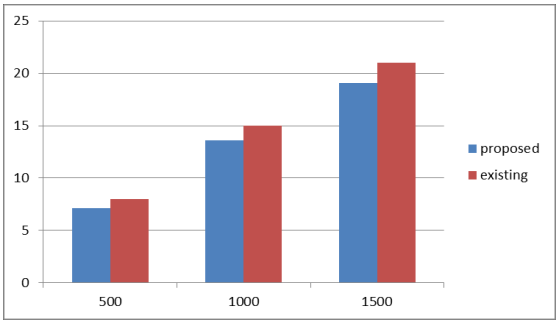

Fig. 12 Throughput analysis using 6to4 tunneling

Table 8**:** Throughput Streaming

Size	Throughput
500	7.14
1000	13.62
1500	19.06

Size	throughput
500	2.6
1000	5
1500	6.7

e) Existing system analysis

Table 9 Latency streaming

Source	destination	path	node	latency
R1	R6	R1-R4-R6	3	186.18
R1	R6	R1-R4-R7-R6	4	200.4
R1	R6	R1-R2-R3-R5-R6	5	223.2

Table10 Throughput streaming

VI. CONCLUSION

Research present successful analysis of performance comparison tested on Multimedia Applications over IPv6 and IPv4 Tunnelling Technology. Research method is done with experimental test with Cisco hardware and GNS3 simulators. This study benefits where multimedia applications and identified protocols are tested and analysed on both IPv4 and IPv6 platforms. Multimedia applications are tested due to most internet applications are running data type like video streaming,large document and photo in multimedia applications. Results presents from each network tools and measure parameters analysed that IPv6 is faster than IPv4 through Tunneling Technology. Multimedia streaming data analysis proved that IPv6 is faster than IPv4 transmission with Tunneling Technology. TCP is used as one parameter tested on RTT and Throughput for both IPv4 and IPv6 but still IPv6 is showing better performance than IPv4. Although IPv6 adoption is still in early stage,with result shown in this paper,it can be a benchmark of future investigation. Many researchers and analysis are done on performance of IPv4 and IPv6 seems to be the most ideal combination to achieved optimum Thoughput , Latency and RTT. Future research can be done to analysed some multiple size of multimedia files with various

length of time can be tested using multimedia and Throughput can be analysed using other network analyser tools like Wireshark.

VII ACKNOWLEDGEMENT

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