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Enhancement of IPv4 Using Tunneling Method

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ABSTRACT: In the rapidly evolving concept of IPv4 addressing space, it has become a high priority for service providers, enterprises, IP appliance manufacturers, application developers and governments to initiate their own implementations of IPv6. Seamless migration from IPv4 to IPv6 is difficult to achieve. Therefore, several mechanisms are required to ensure a smooth, step-like and independent change of IPV6. Not only is the transition, IPv6 integration is also required in existing networks. The solutions (or mechanisms) can be divided into three categories: Tunneling, Dual Stack and Translation. Many people think that NAT is a better approach, but Tunneling is a preferred and more versatile way of deploying IPv6 in existing IPv4 environments. IPv6 can be enabled where IPv4 is enabled along with the associated features required to make IPv6 routable, highly available and secure. In some cases, IPv6 is not enabled on a specific interface or device because of the presence of legacy applications or hosts for which IPv6 is not supported. Conversely, you can enable IPv6 on interfaces and devices for which IPv4 support is no longer needed. The Mobile Internet Protocol (IP) allows the routing of IP packets on the Internet regardless of location. A tunnel is a virtual tube for the movement of data packets between its input and the endpoint. Encapsulation is the mechanism of wrapping the header and data of a packet and embedding it in the data section of the next packet. The biggest challenge was the increasing number of users with a variety of services and mobile devices in a wireless communication when moving from a home area network to a foreign network. In such a situation, the mobile node also interacts with the home network.

KEYWORDS*:* IPV4, IPv6, Tunneling, GNS-3, Wire shark

I. INTRODUCTION

In today's world of huge competition where "meet and exceed deadlines" is of the most important, ipv4 and ipv6 connectivity is very important issue. Tunneling point to a practice whereby a router or host encapsulates the Internet Protocol v6 (IPv6) packet within an IPv4 packet. Network devices send the IPv4 packet, avoiding the fact that the payload of the packet is an IPv6 packet. Some subsequent device or host automatically decapsulates the original IPv6 packet, sending it to the final destination. From a network design perspective, tunneling IPv6 over IPv4 results in fewer routers needing any IPv6 configuration. As such, it enables faster migration of any IPv6 support to sufficient support to obtain IPv6 packets between 2 sites. Smaller routers need a new configuration, fewer revisions mean less operational risk, and end hosts can send IPv6 traffic to each other. The researchers are also working to start the form of obilenet platform working with the support of Mobile IPv6 between entire subnets. In the previous method when there was no implementation of this approach, then the routing devices could not connect after 255 routers because there is an Internet Protocol Address (IPV4) behavior that could ping up to 255 routers only and in Second the ipv4 address are 4.3 Billion and when all these addresses are used in the future, then you cannot use IPv4 because of the limited numbers so there is an ipv6 solution, but this technique cannot change the network Whole world of ipv4 in IPv6 because billions of people are using IPv4 address and If they bought IPv6 then they need to pay again for the network. In IPv4 there is a problem of intra-domain movement; frequent intra-domain MH movement within a short area will lead to constant handoff. Consequently, a large number of registered messages are developed in the network and network performance is greatly altered. Some tunnels use a point-to-point concept (PTP), while others use a multipoint concept. For Point-to-Point, two devices (and only two) remain at the ends of the tunnel, just like the R1 and R3

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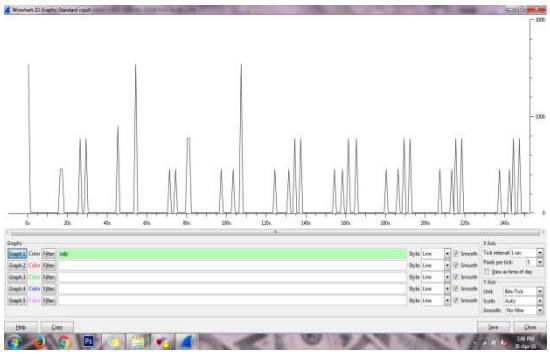
routers. These point-to-point tunnels function as a point-to-point virtual link. IPv6, as the only available next-generation Internet protocol, is still not commercially accepted, since a scheme such as that could resolve the migration of IPv4 resources to the IPv6 network, as well as the mutual communication between the two incompatible protocols Has developed and deployed completely. [1] To pose this problem, one method is to use link cache for the purpose of caching the current location from MN to CN. Mobile IPv4 also uses a reverse tunnel to force traffic through the HA in both forward and backward. [2] In addition, there are some problems to be solved and IETF (Internet Engineering Task Force) is still working on it to have the sophisticated protocol. The problems are: Redundant fields in -IP within IP "as IP is locked in another IP header that increases overhead, another problem is the fragility that explains the disadvantage of having a single source agent; The appropriate function, another is the Dogleg routing that is due to indirect routing to send packets to the appropriate node within the secondary network.Ivv4 is the most demanded routing protocol currently used on the Internet and in most individual networks With the arrival of a wide variety of nearby devices and technologies, limited IPv4 addresses are not able to handle the current Internet. IPv6 was primarily developed to address addressing problems as well as security concerns lacking IPv4. One of the major challenges on the Internet is to deploy IPv6. [3] The technical functioning of the Internet remains the same with both versions and it is likely that both versions will continue to operate simultaneously on networks in the future. To date, most networks using IPv6 support IPv4 and IPv6 addresses in their networks [4].

II. SIMULATOR DESIGN

GNS3 - version 0.3. New names like Jeremy Grossmann and Xavier Alt were added to the now fairly large cooperative of collaborators. Suddenly, we could drag icons around a screen and join routers with click and drag options, and GNS3 would go and build the appropriate .net file for Dynagen to do its magic with Dynamips that would lead to the routers. And GNS3 added some additional settings to the .net file (now called topology.net by default) so you could remember where all the objects were placed and redrawn the screen when you loaded your project next time.

1. in GNS 3 reads the graphical information from 1-5 with several outputs taken with or without projects
2. Each protocol specification runs with different color coding
3. Generates random samples of time in each run of simulation using the graphical methods in X-axix and Y-axix
4. to carry and send the cross-sectional network to the network from the first node to the final node
5. Calculate the value of the completion of the project
6. extracted the value with filter methods (tcp, udp, ipv4 and ipv6)
7. Use the output styles in the line and dot bar



Graph 1:- Graph with filter IPv4 and TCP

III. DESCRIPTION OF THE NETWORK MODEL

Tunneling refers to a process by which a router or host encapsulates the internal IPv6 packet of an IPv4 packet. Network devices send the IPv4 packet, ignoring the fact that the payload of the packet is an IPv6 packet. A later device or in other words, the host decapsulates the original IPv6 packet, then forwards it to the final destination.

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In this method we have taken the two locations that are connected via ipv6 but the path used by both the route devices is configured by the ipv4 address. Ipv4 is the internet protocol address which is the 32 bit address and the Medium we have seen there is less IP addresses So in the future we will not be able to survive too far. So for the ipv4 saving address we are using the tunnel method in this process our first router is configured with ipv4 and ipv6 addresses this router or host encapsulates the IPv6 packet inside an IPv4 packet and later device or host decapsulates the original IPv6 packet , Forwarding it to the final destination. More Internet traffic is expected to be carried through tunnels being done between the two IPv6 networks on this link in Fast Ethernet 0/0 we will use only ipv6 and se0 / 0 tunnel link will be created as the Internet migrates infrastructure From IPv4, the current version of the Internet protocol, to the long-awaited update known as IPv6. 6to4 is a method of connecting hosts or IPv6 networks to each other using IPv4. It does not require explicit tunnel configuration, and instead uses relay routers to forward encapsulated IPv6 packets over IPv4 links. [5] Uses unicast to create point-to-point links over the IPv4 backbone for transmission. 6 to 4 is the method of choice for users or networks that wish to connect to the IPv6 Internet through an IPv4 connection. It allows these users to communicate with other 6to4 users as well as users of native IPv6 connections. One of the benefits of this tunneling technique is that it does not require configured tunnels.

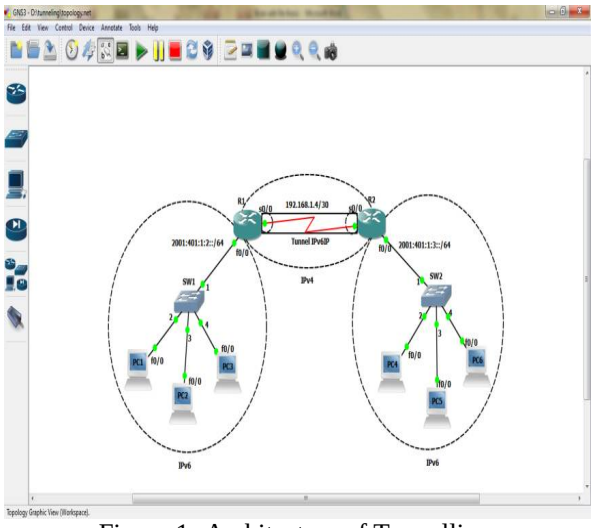

Figure 1:-Architecture of Tunnelling

IV. LITERATURE SURVEY

The document "A Survey on the Next Generation Internet Protocol: IPv6" by DiptiChauhan and Sanjay Sharma proposes the process of Internet evolution, the transition from Internet Protocol Version 4 to Internet Protocol version 6 has become inevitable and rather immediate . The Internet Assigned Numbers Authority (IANA) has finally exhausted the global IPv4 address space, leaving the community with no options, but rather driving the IPv6 transition process. Given that IANA has finally exhausted the IPv4 address space, the Internet is bound to enter the IPv6 era. However, IPv4 networks will coexist with IPv6 networks for a long time during the transition. The IPv6 transition process must be consistent and smooth. Therefore, coexisting IPv4-IPv6 networks should support the availability of IPv4 and IPv6, and also support IPv4-IPv6 interconnection.

By Ramesh Chand Meena, Mahesh Bundele advised that IPv4 addresses are already depleted in the Internet Assigned Numbers Authority (IANA) and have been depleted in the Regional Internet Registries (RIRs), while more customers are continually adding the Internet. IPv6 as the only peer group Internet Protocol has not yet been commercially accepted as a plan that could resolve the transfer of IPv4 resources to the IPv6 network as well as mutual communication between the two incompatible protocols has not been developed And fully deployed. There were four basic problems faced in the technology, such as security problems, addressing problems, error detection problems and

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wireless sensor network problems. Researchers have provided several solutions to the problems they face in implementing IPv6.

The document "Tunnel based IPv6 Transition with Automatic Bandwidth Management" by Srinidhi K S, Smt. R. Anitha, A.V.Srikantan proposed. The Internet will soon be surfing very hard as it is about to run out of current IPv4. Moving from IPv4 to IPv6 is not easy because IPv4 and IPv6 are irreconcilable protocols. To allow the direct transition between IPv4 and IPv6, several transition mechanisms have been proposed by IETF. Since the exhaustion of the IPv4 address, it has become imminent (fast) for all Internet service providers to migrate to the new address technology, ie IPv6 that can assign IP addresses to 2128 devices. The paper "A Comparative Review of IPv4 and IPv6 for Testing Bed Research" by Mohd. Khairil Sailan, Rosilah Hassan, and Ahmed Patel's proposed IPv6 also known as Next Generation IP (IPng) is an evolution of IPv4. It was designed as an upgrade version of IPv4 and should support network devices around the world. The limitation of IPv4 lies in the exhaustion of available public IPv4 addresses. Extending these mobile and home services will lead to faster consumption of IPv4 addresses, even if ISPs assign only one static public IP address to each home network. The main advantage of IPv6 over IPv4 is the address space. It was designed to support +340 undecillion (2128) Internet protocol addresses compared to 4.3 billion (232) IPv4 addresses. If everyone's estimate in this world ($ 6.77 million) will require 3 IP addresses per person, which will mean the total IP addresses required for all people around the world, which is equivalent to 6.77 trillion x 3 = 20.31 million IP addresses.

V. RESULTS AND DISCUSSION

There is an output taken in the graphical network simulator in which the packets are sending and receiving from the source and destination. When the packet is going to reach into the destination then the router sends an advertisement to the destination via the network with the help of the icmpv6 protocol which is Internet Control Protocol version 6 message in IPv6 address. The local address of the link is also used between source and destination and then the router sends the response of all announcements and the loopback :: 1 address is used to establish the connectivity between its own router and to send recived updates. With this virtually a single link will give the best reliability because the bandwidth is virtually combined with the port aggregation protocol (PAgP).

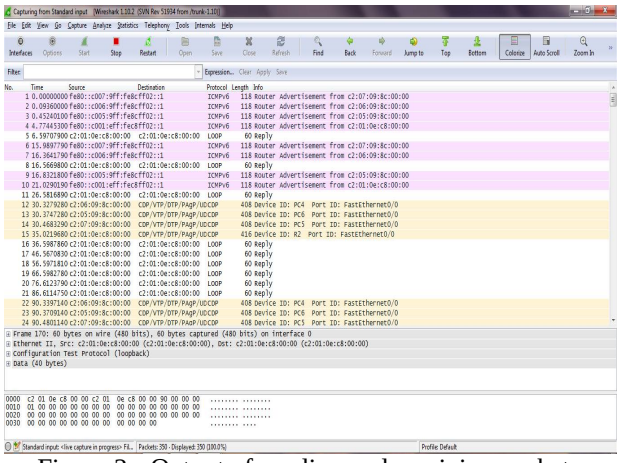

Figure 2:- Output of sending and receiving packets

Router 1 Router 2 now receives an advertisement from the source network with the help of the Cisco Discovery Protocol (CDP) and the Virtual Link Protocol (VTP) and Dynamic Link Protocol (DTP) used to establish the connectivity of the Host that is a proprietary Cisco protocol that propagates the definition of Virtual Local Area Networks and the entire host by sending a response via DTP and the Port Aggregation Protocol (PAgP), which is also known as ether-channel with The job of linking many links in a single link.

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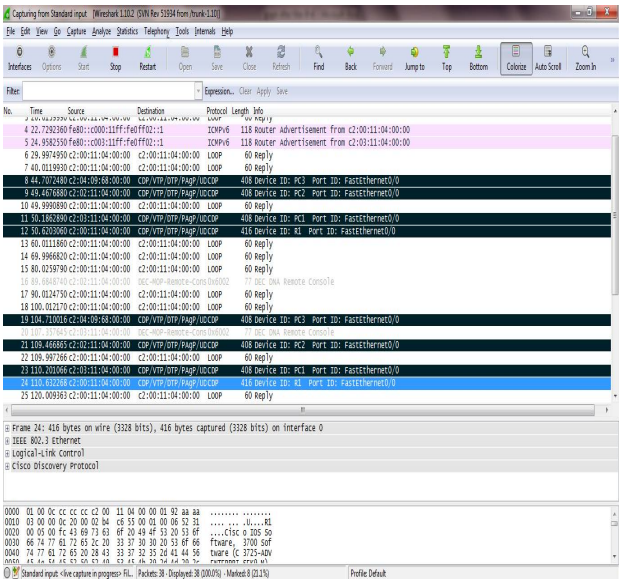

Figure 3:- Output from R2 as a destination

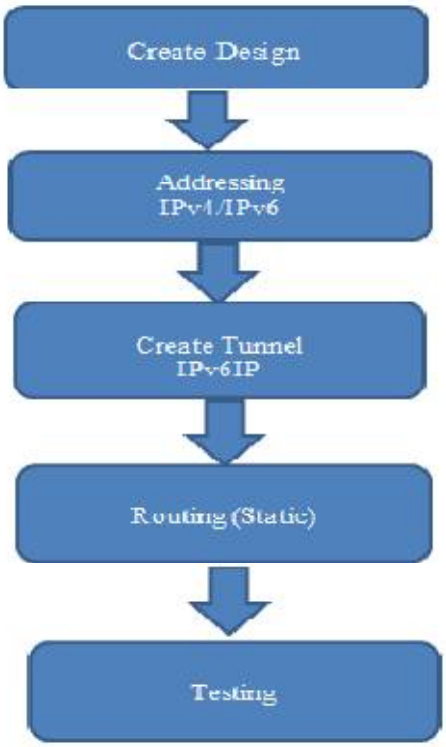

Figure 4:- Flow chart of Proposed Work

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VI. CONCLUSION

IPv4 and IPv6 must coexist for some years, and their coexistence must be transparent to end users. If a transition from IPv4 to IPv6 is successful, end users should not even notice it.
The tunnel is the preferred solution in many scenarios. The tunneling device can interoperate equally with IPv4 devices, in the transition method never works with the default encapsulation and bypass the ping problem with 255 routers because TTL (time to live) value is always one in transition so when There is packet reach destination Then TTL is one and the router detects it as a direct network that solves the ipv4 limitation, secondly Tunnel allows the encapsulated ipv4 packet to connect to the Ipv6 packet with the retransmission. Through our effort in creating a Tunnel network using GNS3 we have been able to develop expertise and become technically competent with IPv6 technology in an academic environment. It can increase our knowledge of IPv4 to IPv6 transition and migration. We have also been able to discover the basics of IPv6 technology and the implementation of transition mechanisms.
It also gave us the opportunity to test and understand IPv6 technology before the actual deployment time arrives. This thesis could be applied to another organizational environment that intends to implement IPv6 in its network interconnection.

VII. FUTURE WORK

In future work, with the help of our technique used in this, it does not need any explicit tunnel, and also uses retransmission routers to forward IPV6 packets over IPv4 and in the future IPv4 address will not be there. Therefore, it can work easily In the IPv6 address will be stable and reliable in the future and if any way any company uses IPv4 addresses then easily ipv4 can merge with IPv6 addresses.

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