International Journal of Advanced Information Science and Technology (IJAIST) ISSN: 2319:2682
Vol.3, No.12, December 2014 DOI:10.15693/ijaist/2014.v3i12.140-143

Migration of ipv6 through ipv4 Network by using tunneling

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Abstract: The IPversion4(IPv4) IP addresses has some limitations such as small address space, latency, delay so IP providers introducing IPversion6 (IPv6) addresses to users. So nowa days we want to use IPv4 and IPv6 address at an each time in the network criteria. Our project theme is two different networks can communicate with each other by another network criterion for example two IPv6 networks can connect by IPv4 network as a backbone network. In computer network IPv6 network sending data packets to another network through an IPv4 network these techniques are called as migration techniques these types are Tunnelling,Translation and Dual-stack. We are using Tunnellingmechanism,migrating the IPv6 packets to another IPv6 network trough a IPv4 networkby using Routing Information Protocol (RIP),Open Shortest Path First (OSPF) routing protocols.And finally analysing the tunneling technique is the mostly improved technique from the other migrating techniques.

Keywords: IPv4, IPv6, IP, RIP, OSPF, Tunneling, Dual-Stack.

I.INTRODUCTION

The Internet is a worldwide publicly accessible system of interconnected computer networks. Currently, two versions of the Internet Protocol (IP) are in use on the Internet namely IPv4 and IPv6. Internet Protocol (IP) is a piece of software that operates at the Network Layer of the Open Systems Interconnection Model(OSI). In some sense, there is a competition going on between these protocols, as they are not directly compatible, the aim of this project is to show the compatibility of Ipv6 packets through IPv4 and network providers and users are being forced to determine whetherto support one or both protocols for various network services.

II.EXISTING SYSTEM

IPv4 is the fourth revision in the development of the Internet Protocol (IP).IPv4 is a connectionless protocol for use on packet-switchedlink layer networks.Ipv4 is still by far the most widely deployed internet layer protocol. It operates on a best effort delivery mode.IPv4 is a network that enables data sharing between two or more computers.

A.IPv4 Addressing

IPv4 uses 32-bit addressing. IPv4 can address 232 or approximately 4.3 billion devices.IPv4 is represented in dotted decimal format. Networkaddressing changes by Classful networkdesign,Classless Inter Domain Routing, and Network Address Translation (NAT) have contributed to delay. The system defined five classes, Class A, B, C, D, and E.

IPv4 Address

172 . 16 . 254 . 1

10101100	00010000	11111110	00000001

1 Byte=8 Bits,(1 column)
4*8 Bits (4 column)=32 Bits or 4 Bytes

Fig 1. Address Representation of IPv4

IPv4 addresses have been freely allocated to growing public and private internetworks. In the IPv4.addressing architecture, Internet Assigned Numbers Authority (IANA) delegates Regional Internet Registries(RIRs) /8 address blocks (8-bit network identifiers, also historically called “class A” address blocks). The maximum address block that a site can ever be given is a /8, which leaves only 24 bits for Subnetting and addressing within the organization.

B.Address Exhaustion

IPv4 address exhaustion is the exhaustion of the pool of unallocated IPv4 addresses. The IP address space is managed by the IANA globally, and by five RIR responsible in their designated territories for assignment to end users and local Internet registries, such as Internet service providers. IPv4 provides approximately 4.3 billion addresses, subsets of these have been distributed by IANA to the RIRs in blocks of approximately 16.8 million addresses.The Internet Engineering Task Force (IETF) created the Routing and Addressing Group (ROAD) to responding the scalability problem caused by the classful network allocation system in place at the time. The anticipated

shortage has been the driving factor in creating and adopting several new technologies, including Classless Inter-Domain Routing (CI DR),NAT, and IPv6, which can support about 3.4×10^{38} addresses, is the IETF's successor technology to I Pv4. Although the predicted depletion was already approaching its final stage,most providers of Internet services and software vendors were just be ginning IPv6 deployment.

C.AddressDepletion

While the primary reason for IPv4 addr ess exhaustion is insufficient design capacity of the o riginal Internet infrastructure, several additional drivin g factors have aggravated the shortcomings. Each of them increased the demand on the limited supply of addresses, often in ways unanticipated by the original designers of the network.

D.EarlyMitigation Techniques

Techniques to delay address space exhaustion started with the recognition of the problem in the early 1990s, and include:

- Use of NAT, in which ma ny computers share one IP address, but wh ich makes the computers behind the NAT unaddressable from the outside, breakin g end-to-end connectivity.
- Use of private network addressing
- Name-based virtual hosting of web sites
- Tighter control by regi onal Internet registries on the allocation of addresses to local Internet registries

E.ExhaustionDates And Impact

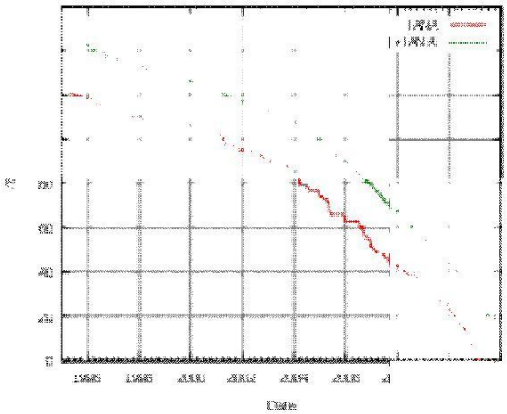

Fig 2.Exhaustion of IPv4 addresses since 1995.

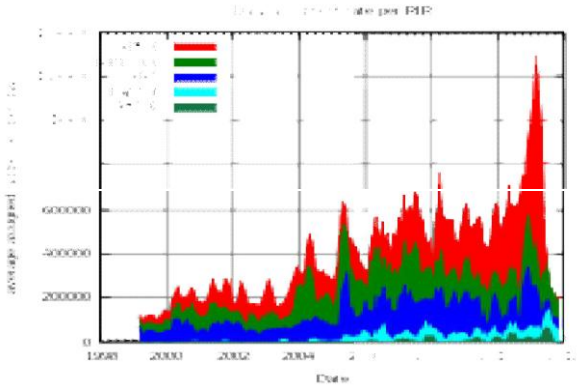

Fig 3.Exhaustion of IPv4 addre sses since 1995.

APNIC was the first regional Int ernet Registry to run out of freely allocated IPv4 addresses. This date marked the point where everybody who needed an IPv4 address could not be guar anteed to have one allocated. As a consequence of this exhaustion, end-to-end connectivity as req ired by specific applications will not be universa lly available on the Internet until IPv6 is fully implemented. However, IPv6 hosts cannot directly communicate with IPv4 hosts, and have to communicate using special gateway services. This means that general-purpose computers must still have IPv4 access, for example through NAT64, in addition to th e new IPv6 address, which is more effort than just supporting IPv4 or IPv6. The demand for IPv6 is expected to ramp up to pervasiveness over three to four IPv4 exhaustion migration technologies include IPv4 address sharing to access IPv4 content, IPv6 dual-stack implementation, protocol translation, IPv6-addressed content, and bridging and tunneling to bypass single protocol routers.

F.Problem Definition

When any organisation wants to implement IPv6 network in their service area, it is not possible to implement all of sudden in entir e area. It needs slow migration from IPv4 to IPv6 w ithout affecting the service much.IPv4 network has s ome limitation such as more latency,lesssecurity,less adderess space and no auto configuration facility.

III.PROPOSED SYSTEM

IPv6 network is proposed in this project that overcomes all the limitations th at are present in the existing IPv4 network.

A.IPv6

Internet Protocol version 6 or IP v6.It also known as IP next generation,IP enca psulation.IPv6 was developed by the IETF to de al with this long-anticipated IPv4 address exhaustion.IPv6 is

anInternet Layer protocol for Packet-switched internetworking and provides end-to-end datagram transmission across multiple IP networks. IPv6 also implements additional features not present in IPv4.

B. Need For IPv6

Address depletion of IPv4 has been the primary driver behind the need for IPv6. The increasing number of Internet users, systems, and the convergence of services into common infrastructure will drive the demand for IPv6. IPv6 has a number of features that overcome the limitations of IPv4. A significant improvement is that the additional addresses remove the need for NAT.

- IPv6 removes the need for NAT, allowing flawless transparent end-to-end security. IPv6 will result in faster and more efficient routing because of its well-regulated address allocation. Faster routing is possible because the efficient routing table created with hierarchical addressing. Thus there is the need on focusing Ipv6.
- IPv6 uses 128-bit addresses, so the new address space supports 2^{128}addresses. 128-bit addresses is divided Into 8 groups.8 blocks into 4 digit hexadecimal number separated by colons. Theresulting representation is called colon-hexadecimal.
- IPv6 has more addresses providing to users, It has security features, better header formats, multicasting.

IV.TUNNELING MECHANISM

A technology enables one network to send its data via another network's connections. Tunnel is a bidirectional point–to-point link between two network endpoints.

tunneling

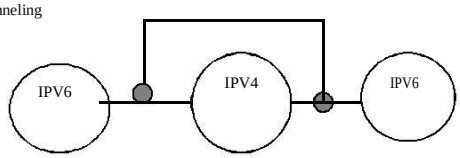

Fig 4. Tunneling Mechanism

A. Block Diagram OfTunneling

Tunneling popularly known as “port forwarding” is also called encapsulation. The tunneling concept is proposed in this project to transmit IPv6 packets through IPv4 network that enables and achieves fully in IPv6 network. In order to reach the IPv6 Internet, an isolated host or network must use the existing IPv4 infrastructure to carry IPv6 packets. This is done using a technique known as tunneling. By using tunneling one can carry a payload over an incompatible delivery-network, or provide a secure path through an untrusted network.Tunnelingprotocols may use data encryption to transport insecure payload protocols over a net providing VPN functionality.IPSec(Internet Protocol Security)has an end-to-end Transport Mode, but can also operate in a tunneling mode through a trusted security gateway. Computer networks use a tunneling protocol when one network protocolencapsulates a different payload protocol.

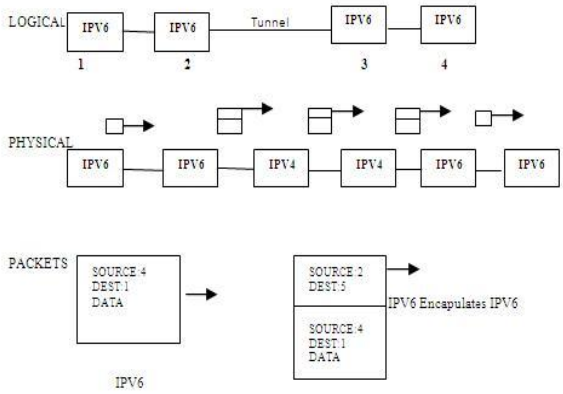

Fig 5.Concept of Tunneling

B.IPTunneling

An IP tunnel is an Internet Protocol (IP) network communications channel between two networks. It is used to transport another network protocol by encapsulation of its packets.

C. IP Tunneling Encapsulation

In IP tunneling, every IP packet, including addressing information of its source and destination IP networks, is encapsulated within another packet format native to the transit network.

V.DUAL-STACK PROTOCOL

In dual-stack, all hosts/routers maintain both protocol IPv4 and IPv6 stacks. Dual stack hosts/routers are able to communicate with not only IPv6 system, but also IPv4 system. The dual stack hosts use IPv6 address while communicating with IPv6 hosts, and use the IPv4 address while communicating with IPv4 hosts.

VI . RESULTS AND DISCUSSION

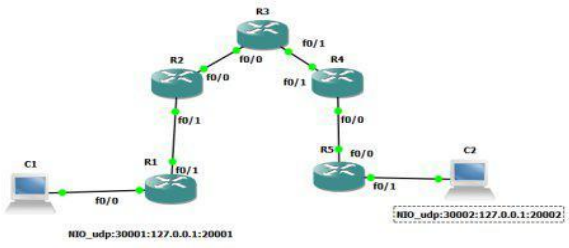

Fig 6.Screenshot for Tunneling Network

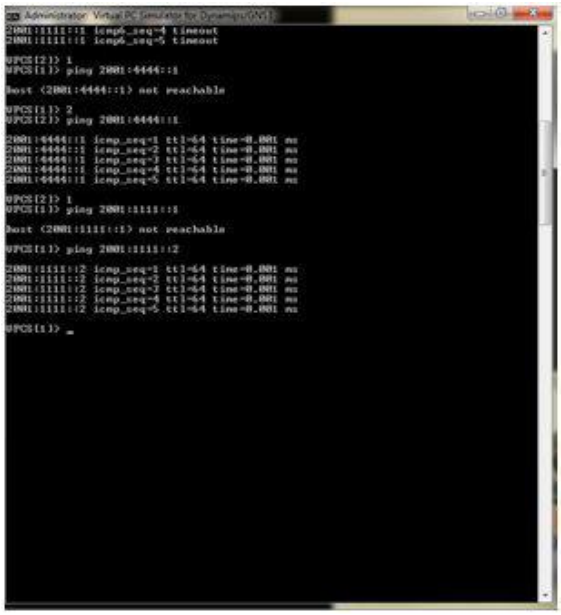

Fig 7. Screenshot of output

IPv6 Translation and Tunneling Technologies with the exhaustion at the IPv6 addressing space quickly approaching, it has becomes high priority for organisation to begin their own deployment of IPv6. This can be accomplished in a number of different ways.This common methods include side-by-side implementation of IPv4 and IPv6 the implement of tunnel over explicit IPv4 network and the implement of a translation access from IPv4 to IPv6.Tunneling is improved method from Dual-Stack and NAT-PT .

Table 1.1 Performance of Transition methods

Parameters	Dual-Stack	NAT-PT	Tunneling
Delay	85-90 ms	80-90 ms	75 ms
Through put	100 bits/s	100bits/s	200bits/s
Packet loss	1.4 packet/s	1.4packet/s	1packet/s

So in this network two different IPv6 networks can communicate with each other by an IPv4 network successfully.

VIICONCLUSION

The tunneling mechanism were sending the data packets from IPv6 Network to IPv6 Network through IPv4 Network .It sent quickest data packets from one Network to other Network,throughput was also very high and very low packet loss. IPv6 improves router performance issues and it is very simple to configure. IPv6 also offers improvements like security support embedded in the protocol's definition and more flexibility and extensibility than IPv4.The IPv6 increasing the address space and solving a major obstacle for the further growth of the Internet.The tunneling mechanism was the best method ,when comparing to the other methods such as Dual stack,Header,Translation.Thus the IPv6 are more advantages than the IPv4.

VIIIFUTURE WORK

The IPv6 has the advantages over existing IPv4, which has larger address.The IPv6 packets are being encapsulated over IPv4 and are converged to IPv6, for the next generation. Tunneling will use to show their interoperability between the networks which are useful for the future generations to utilize the existing IPv4. This tunneling mechnasim can be implemented for WAN. IPv6 that will improve the no NAT and auto configuration.Thus the mode of tunneling eliminates the need for the manual configurations.

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