© 2016 IJSRST | Volume 2 | Issue 6 | Print ISSN: 2395-6011 | Online ISSN: 2395-602X
Themed Section: Science and Technology

# Upgradation in Technology to Use Internet Protocol - Need of the Hour

**Bhart Bhushan*[1], Satveer[2]**
*[1]Village Gehli, PO Hamidpur, Tehsile Narnaul, Haryana, India
[2]VPO Banwala, Tehsile Dabwali, Sirsa, Haryana, India

## ABSTRACT

The internet protocol IPv4 was sufficient for years, but as the requirement of large address space is increasing, while address space of IPV4 is finite successor of IPv4 is needed. There are several limitations which are difficult to avoid and complicate such small address space, non-availability of auto-configuration, security factor, and need of new options and in some other cases present a obstacle to, the advance innovations in the field of the Internet. And to satisfy growing and expanded need of network security a new version or a new protocol is need of hour .The result of efforts to overcome this problem was the development of the new IPv6 protocol which enlarges the address space from 32-bits to 128-bits. IPv6 provide a high large address space, better address design and Enable high performance and scalable internet. Due to these improvements, these days IPv6 is very famous and widely used in associations, corporations and Internet Service Providers (ISP).This paper aim to provide a review about transition from IPv4 to IPv6.

**Keywords :** IPv6, IPv4, ISP, Transition, Tunnel, Datagram

## I. INTRODUCTION

An internet protocol (IP) is a connectionless datagram protocol which provides no guarantee of reliability. IP is used to uniquely identify a machine on internet. Every machine or protocol involved in internetworking requires IP address. IP transport data in packets called Datagram which may follow different routes to reach same destination. A Network is simply defined as collection of independent and autonomous hosts, via some shared media which can be physical or Atmosphere. A Computer networks enable its connected machines to to access and share the resources i.e. hardware, data and programs over the network. Network can be a classified as small network which connect hosts of a building called Local Area Network (LAN) or Metro Area Network(MAN) connect systems across a city like cable network or Wide Area Network (WAN) which connected hosts over cities or even countries (Internet is wide area network). Internet Protocol states that a set of technical rules that governs how computers communicate over a network. There are two different versions are used which are Internet Protocol version 4 (IPv4) and Internet Protocol version 6 (IPV6). Packet of data is called datagram in internet protocol. IPv4 is a connectionless protocol for use on packet-switched networks. It does not provide any guarantee of reliability. It also does not offer any error or flow control. IPv4 provide five different classes of addresses. IPv4 does not provide any sequencing of packets, so out of order and duplicate packets are common thing. IPv6 provides an identification and location system for machines or hosts over networks and routes packets across the Internet. It also offer Some technical benefits in computation of a better addressing space. IPv6 also allows hierarchical address allotment methods which helps in aggregation towards the Internet, and so it behave as frontier the extension of routing tables. Other benefits it (IPv6) offer optimization service, extended and simplified multicast addressing. The major improvement difference between IPv4 and IPv6 is IP addresses they offer to allocate. There are $2^{32}$ addresses that is equal to 4,294,967,296 IPv4 addresses. In IPv6, it is $2^{128}$ addresses means 340,282,366,920,938,463,463,374,607,431,768,211,456 IPv6 addresses.

## II. IP DATAGRAM

A datagram is a variable length packet. Its size may be up to 65536 bytes. Datagram is consisting of two parts:

header and data. Header of datagram contains information required for routing and delivery. Size of header may be from 20 to 60bytes. It is customary in TCP/IP to show header in four bytes sections. The datagram header contains various fields. These fields are as follows: Version (IPv4 or IPv6), Header length (HLEN), Service type, Total Length, Identification, Flags, fragmentation offset, Time to live (TTL), Protocol, header checksum, Source Address, Destination address and Options. In the below figure datagram is shown with fields.

| Header (20-60bytes) | Data (Optional) |
|---|---|

**Figure 1:** Datagram

## III. NETWORK ARCHITECTURE

A network is a interconnection of two or more independent and autonomous devices/hosts that share a communication medium. Here autonomous means no hosts is master or slave of other hosts. There are several topologies which describe the type of interconnection between nodes of network i.e. star, ring bus, mesh etc. A network architecture is shown below in figure.

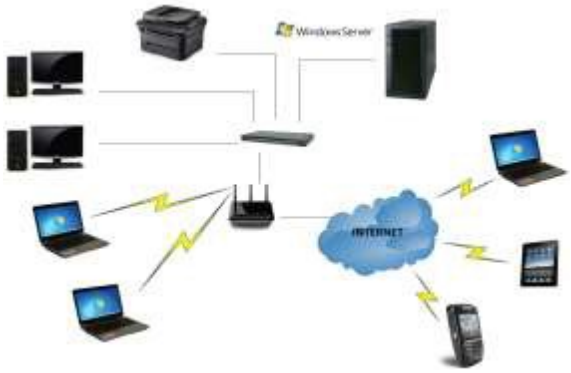

**Figure 2:** Architecture of Network

## IV. IPV6

IPv6 (Internetworking Protocol version 6) is also referred as IPng (IP next generation). In IPv6, Internet protocol was extensively modified to accommodate the unforeseen growth of internet. It is considered evolutionary from previous version IPv4. In IPv6, the NAT was eliminated, which is advantageous thing. The format and length of IP addresses were changed with packet format. It does not make a essential change to IPv4 and the major concept of IPv4 remains the identical, but various features have been added, which make better performance and offer a high-quality service. The configuration in IPv6 can be done stateless Configuration technique which makes it simpler protocol. The IP address is consist of the MAC address for the border and the prefix from the router, in general the DHCP is not used in IPv6, but it can be used with DNS( Domain name server). The IPv6 size is 128 bits, comprised of Hexadecimal digits which are able to provide 3.8X1038 addresses, which are sufficient to give a unique address to each host for need of these days and for future demands. Each four digits are separated by a colon which divides it into eight parts, the zeroes can be mislaid to make the address smaller as shown in figure 3.

2001:0DB8:0000:2F3B:02AA:00FF:FE28:9C5A

2001:DB8:0:2F3B:2AA:FF:FE28:9C5A

**Figure 3.** IPv6 addressing

IPv6 provide the global routing which is easier than IPv4. There is fewer outcomes on resources and recollection, which are beneficial to get better performance and to achieve extra competency. In the IPv6 security is provided end to end by encryption, which was not included within IPv4. The different type of address casting in IPv4 can be unicast, multicast or broadcast but in IPv6 the broadcast is no longer available due to its elevated consumption of resources. However, a broadcast can be sent from with the help of multicast. These three trafficking method are explained below.

1. Multicast Routing: the multicast routing is to send the packet for a cluster of addresses. The IPv6 use the ff00::/8 as a prefix for multicast. The type of addressing use two protocols to know which IPs in the similar group for multicast there are Multicast Listening Discovery protocol (MLD) and MLDv2.
2. Anycast Routing: when there are numerous parallel destinations in different areas the unicast use to send the packets to the secret destination from the sender.

3. Unicast Routing: the unicast is to send the packet for single destination unique address.

## V. DIFFERENCE BETWEEN IPv4 AND IPv6

The major differences between IPv4 and IPv6 are explained below with the help of a table.

| | Difference between IPv4 and IPv6 | |
|---|---|---|
| | **IPv4** | **IPv6** |
| 1 | Only $2^{32}$ possible ways how to represent address (About 4 billion possible address) | It offer $2^{128}$ possible ways how to represent address (About $3.4*10^{38}$ possible address) |
| 2 | Variable length header, basic length of header is 20bytes (without options), maximum length is 60 bytes. | Static header of 40 bytes in length. |
| 3 | It has a checksum field which has to be computed by each router. | IPv6 has no header checksum field. |
| 4 | Contains a 8-bit service type field. | It contains a 8-bit Traffic class field. |
| 5 | IPv4 hosts has only stateful address auto configuration mechanism. | IPv6 hosts has both stateful and a stateless address auto configuration mechanism |
| 6 | Security in this version is limited to tunneling between two networks. | IPv6 is designed to meet growing and expanded security in network. |
| 7 | IPsec support is optional. | IPsec support is required. |
| 8 | No identification of packet flow for QoS handling by routers within the IPv4 header. | Packet flow identification for QoS handling by router is present in header using Flow label field. |
| 9 | Must be configured either manually or through DHCP. | Does not require any manual or DHCP configuration. |
| 10 | ICMP Router discovery is used to determine the IPv4 address of best default gateway. | ICMP router discovery is replaced with ICMPv6 Router solicitation and router advertisement messages. |
| 11 | Header includes options. And Source and destination address are of 4 bytes in IPv4 | All optional data are moved to IPv6 extension header. And Source and destination address are of |
| | | 16 bytes |

## VI. LITERATURE REVIEW

In this paper "A Study of the Technology Transition from Ipv4 to Ipv6 for an ISP" Daniel Enache et.al., This work emphasize on IPv4 and IPv6, look into the necessities of an ISP network and present three mechanisms that will make the transition from IPv4 to IPv6 smoother: Translation, Tunnel and Dual-Stack . In this work "Routing Protocols in IPv6 enabled LoWPAN: A Survey"Dr.H S Ramesh Babu et.al., describes that 6LoWPAN consists of low power devices hat conform to IEEE 802.15.4 and uses the address scheme of IPV6. It is defined by IETF. It enables the incorporation of IPV6 and short power devices in a private or small area network. The devices connected in the 6LoWPAN network need to route packets and relocate data and thus consider efficient routing as a major concern. Issues relating to the routing requirements and the a variety of protocols in the area of routing in 6LoWPAN are obtainable in this survey In an another paper "A Detail Comparative Review on IPv4/IPv6 Dual Stack Co-existence Techniques Piyush Sharma1, et.al., This work covers the special transition techniques that were exploited for the evolution between IPv6 networks to IPv4 networks and vice versa. The whole appraisal confirms the proficient way of transition is IPv6 Rapid Development method. The paper is to take out the most well-organized method as evaluated to IPv6 Rapid Development is on course as it leads to large overhead and it is not appropriate for enormous mobile networks . In this research paper "Performance Analysis of IPv6 Dual-Protocol Stack and Tunnel Transition" Adarsh Misra1, Harsha Chawla describe that depending on investigation transition technique of the dual stack protocol, IPv6, 6 to 4 tunneling technique and ISATAP tunnel network recital are calculated and observed depending on program realized. In general, results showed that the dual stack protocol IPv6 network has better performance as compared to 6 to 4 technique, dual stack protocol IPv4 and ISATAP technique. The paper "A Survey on Next Generation Internet Protocol:IPv6" by Dipti Chauhan and Sanjay Sharma states that the development of Internet evolution, the evolution from Internet Protocol Version 4 to Internet Protocol version 6 has becomes inevitable and fairly immediate. Internet

Assigned Numbers Authority (IANA) has to conclude bushed the global IPv4 address space, which foliage the community no choice but pushes ahead the IPv6 transition process. IANA has finally run out IPv4 address space, the Internet is bound to enter the IPv6 era. Towards, IPv4 networks will coexist with IPv6 networks for a extensive time during the transition period. The IPv6 transition process should be sturdy and smooth. Hence, the IPv4-IPv6 coexisting networks should sustain the availability of both IPv4 and IPv6, and support IPv4- IPv6 interconnection as well.

In a research paper named "Analysis of Packet Transmission Overhead of IPv4 and IPv6 through Simulation" Nitul dutta, IPv4 gives better response, but still the important grounds for assuming IPv6 is the need for a large address space, refuge, and Quality of Service (QoS) features. Hence IPv4 network is also necessary where these particular features of IPv6 are less significant, consequently the require for the co-existence of mutually protocols is necessary. To make subsistence of both the versions of the protocol together, some mechanisms of interoperability is stated.

## VII. CONCLUSION

In this review paper we tried to presents the various related works in transition from IPv4 to IPV6 networks and also tried to understand the features which makes newer version of IP make it more beneficial for ISPs. This review paper shows how IPV6 network is better in many scenarios than the IPV4 network. The contribution of this related work is to find the way to reduce handover latency time, which means including handover delay packet. And in a IPv4 network, a packet of IPv6 can be transmitted using dual stack migration and tunnelling techniques.

## VIII. REFERENCES


[1]. http://www.mhhe.com/engcs/compsci/forouzan/dcn/student/olc

[2]. Ali Albkerat "Analysis of Ipv6 Transition Technologies" International Journal of Computer Networks & Communications (IJCNC) Vol.6, No.5, September 2014.

[3]. Piyush Sharma1 "A Detail Comparative Review on IPv4/IPv6 Dual Stack Co-existence Techniques" International Journal of Innovative Research in Computer and Communication Engineering, Vol. 4, Issue 4, April 2016

[4]. Kirandeep Kaur, Usvir Kaur, "A Review on IPv4 and IPv6 in Networking" International Journal of Computer Science And Technology, ISSN: 0976-8491 (Online) | ISSN: 2229-4333 (Print) June 2016.

[5]. Nitul Dutta "Analysis of Packet Transmission Overhead of IPv4 and IPv6 through Simulation "International Journal of Computer Applications® (IJCA) (0975 – 8887) National Conference cum Workshop on Bioinformatics and Computational Biology, NCWBCB-2014

[6]. Ramesh Chand Meena, Mahesh Bundele" A Review on Implementation Issues in IPv6 Network Technology", International Journal of Engineering Research and General Science, Vol. 3, Issue 6, November-December, 2015.

[7]. Adarsh Misra1 "Performance Analysis of IPv6 Dual-Protocol Stack and Tunnel Transition" International Journal of Science, Engineering and Technology Research (IJSETR) Volume 5, Issue 5, May 2016

[8]. DiptiChauhan, Sanjay Sharma,"A Survey on Next Generation Internet Protocol:IPv6", International Journal of Electronicsand Electrical Engineering Vol. 2, No. 2, June, 2014.