What is the IPv6 Protocol in Computer Network?

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Internet Protocol version 6 (IPV 6) is the replacement for version 4 (IPV 4). The phenomenal development of the Internet has begun to push IP to its limits. It provides a large address space, and it contains a simple header as compared to IPv4.

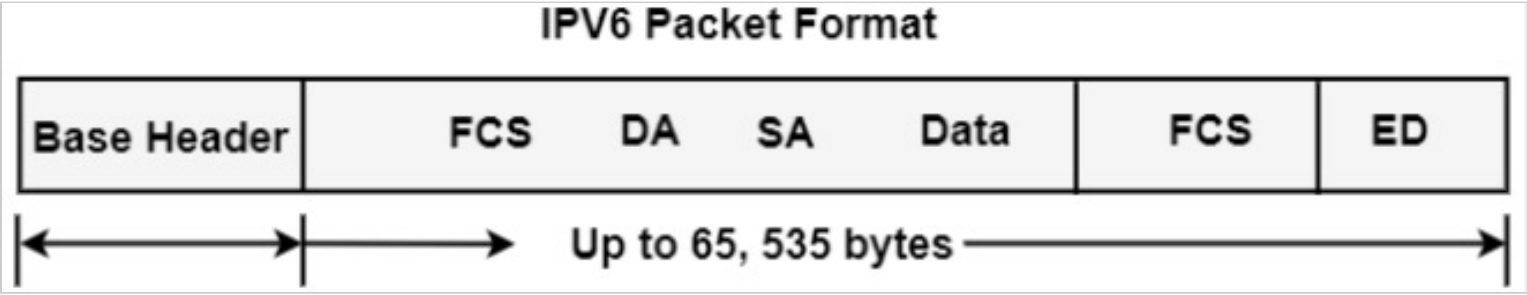
Features of IPV6

There are various features of IPV6, which are as follows–

- **Larger address space:** An IPV6 address is 128 bits long. It is compared with the 32-bit address of IPV4. It will allow for unique IP-addresses up to 3.4×10^{38} whereas IPV4 allows up to 4.3×10^{8} unique address.
- **Better Header format:** New header form has been designed to reduce overhead. It is done by moving both non-essential fields and optional fields to extension field header that are placed after the IPV6 header.
- **More Functionality:** It is designed with more options like priority of packet for control of congestion, Authentication etc.
- **Allowance for Extension:** It is designed to allow the extension of the protocol if required by new technologies.
- **Support of resource allocation:** In IPV6, the type of service fields has been removed, but a new mechanism has been added to support traffic control or flow labels like real-time audio and video.

IPV6 Packet Format

It is a compulsory base header followed by the payload. The payload includes two parts (1) optional extension headers and data called payload from the upper layer.



The base header occupies 40 bytes, and extension headers and data from the upper layer usually contain up to 65, 535 bytes of data.

Base Header has 8 fields which are as follows–

- **Version:** It is a four-bit field that defines the version number of the IP. IP6 version is 6, IP4 version is 4.
- **Priority:** It is a 4-bit priority field that defines the priority of the packet with respect to traffic congestion that a packet is to reject or not.
- **Flow Label:** It is three bytes or 24-bit field designed to provide special handling for a particular flow of data to speed flow on an already flowing packet path.
- **Payload Length:** It is a two-byte payload length field that defines the total length of the IP datagram, excluding the base header.
- **Next Header:** It is an 8-bit field that defines the header that follows the base header in the datagram. In IPV4, this field is called a protocol. Some of the values in this field indicate options that are

Code	Next Header
0	Hop by Hop Option
2	ICMP
6	TCP
17	UDP
43	Source Routing
44	Fragmentation
50	Authentication
59	Null
60	Destination Option

- **Source Address:** This field is 16-byte which specifies the original source of the datagram destination address. This is a 16-byte internet address that usually identifies the final destination of the datagram.
- **Priority:** IPV6 divides traffic into two broad categories, which are as follows:

Congestion Control Traffic: If a source adopts itself to traffic showdown when there is congestion. In TCP protocol, congestion-control data is assigned priority 0 to 7, such as 0 for lowest and 7 for highest in congestion.

Priority	Meaning
0	There is no specific traffic
1	Background data
2	Unattended data traffic
3	Reserved

Priority	Meaning
4	Attended Bulk data traffic
5	Reserved
6	Interactive Traffic
7	Control Traffic

Non-Congestion Traffic: In this type of traffic packet is expected to arrive at the receiver by minimum delay. In this, packets are not discarded because the source doesn't send a packet on a congested or congested path.

An example of non-congestion traffic is Real-time audio & video. In this packets are given priority 8 to 15. Priority 8 packet means data with most redundancy & priority 15 means data with least redundancy.