



Assignment No. 02

1. Write a short Note on ICMPv6.

1. It is a Internet control message protocol versions.
2. It is more complicated than ICMPv4, some new messages added into it to make it more useful.
3. ICMPv6 is message oriented it uses messages to report errors, to get information probe a neighbour or manage multicast communication.

Types of ICMPv6 :-

1. Error message
2. Informational message
3. Neighbor discovery message
4. Group membership message

① Error message :-

Main function of error message is to report the errors. These are four types of error messages -

1. Destination Unreachable :-

When router cannot forward a datagram or a host cannot deliver content of the datagram to the upper layer protocol, the router or host discards the datagram & sends destination-unreachable error message to the source host.



	Type : 1	Code : 0 to 6	checksum
	Unused (All 0's)		
	As much of received datagram as possible without exceeding the maximum IPv6 MTU		
	fig. destination unreachable.		
	2. <u>Packet - Too - Big Message</u> :-		
	i> This is new type of msg, added to version 6		
	ii> IPv6 does not fragment at the router, if a router receives a datagram that is larger than the max. transmission unit (MTU) size of the network through which the datagram should pass two things are happen		
	① Router discard the datagram		
	② ICMP error packet send message to the source, message is, a packet is too big.		
	Type : 2	Code : 0	checksum
	MTU		
	As much of received datagram as possible without exceeding the max. IPv6 MTU		



3. Time Exceeded Message :

It is generated in two cases when the time to live value becomes zero & when not all fragments of a datagram have arrived in the time limit. format of the time exceeded msg are same as to IPv4, only type value is changed.

0 8 16 31

Type : 3	code 0 or 1	checksum
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Unused (All 0's)

As much of received datagram as possible without exceeding the maximum IPv6 MTU.

fig. time exceeded message

4. Parameter Problem Message :

0 8 16 31

Type : 4	code : 0, 1, 2	checksum
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offset Pointer

As much of received datagram as possible without exceeding the maximum IPv6 MTU

code 0 → Errorneous header field

code 1 → Unrecognized next header type

code 2 → Unrecognized IPv6 option



2. Information Message :

There are two types of information message

i> echo request

ii> echo reply

Both are designed to check if two devices in the Internet can communicate with each other a host another host the receiving computer or router can reply using the echo response message.

i> Echo - Request Message

It is same as the one in version 4. The only type value is changed.

Type: 128	code 0	checksum	31
Identifier		Sequence number	

optional data

Sent by the request message ;
repeated by the reply message

ii> Echo reply message

Type: 129	code 0	checksum	31
Identifier		Sequence number	

optional data

Sent by the request message ; repeated
by the reply message

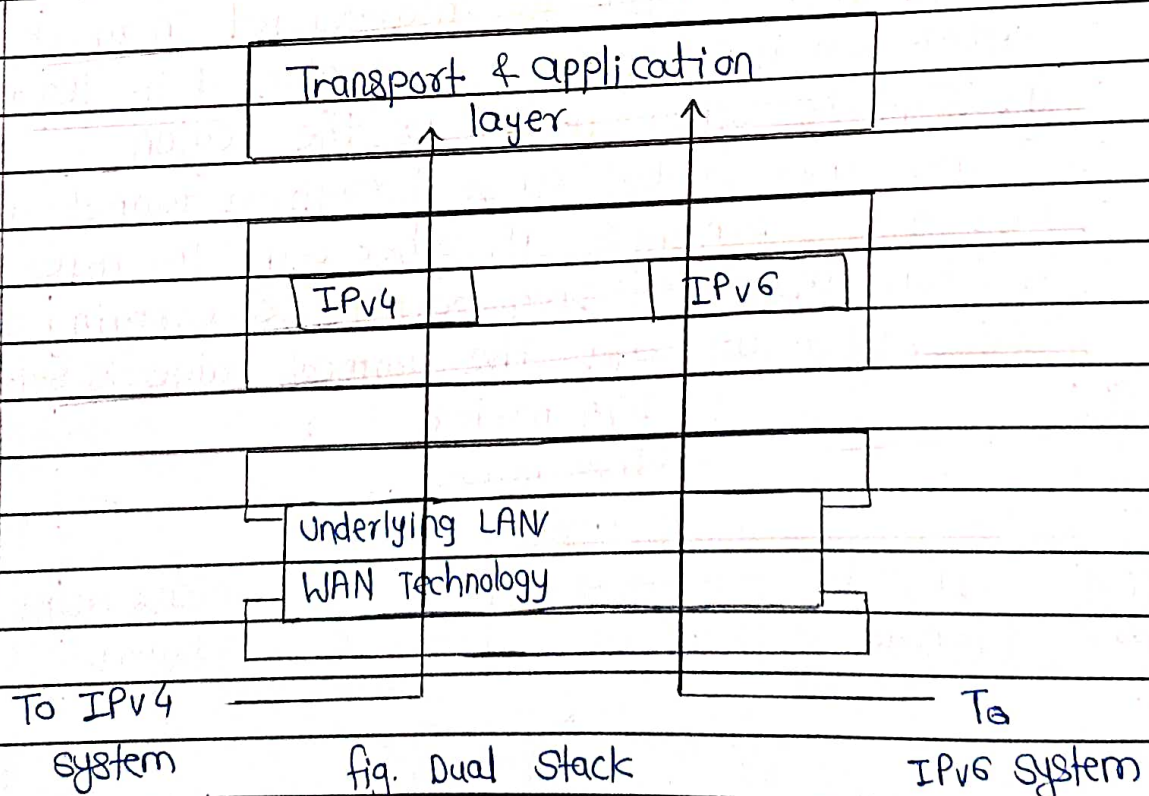


2. Explain in detail about Transition from IPv4 to IPv6

- Transition from IPv4 to IPv6 can't happen suddenly because of the huge no. of systems on the internet.
- There are 3 strategies are used for transition from IPv4 to IPv6.

1) Dual Stack :

- It is recommended that all hosts before migrating completely to version 6 have a dual stack of protocol
- Station must run IPv4 & IPv6 simultaneously until all the internet uses IPv6

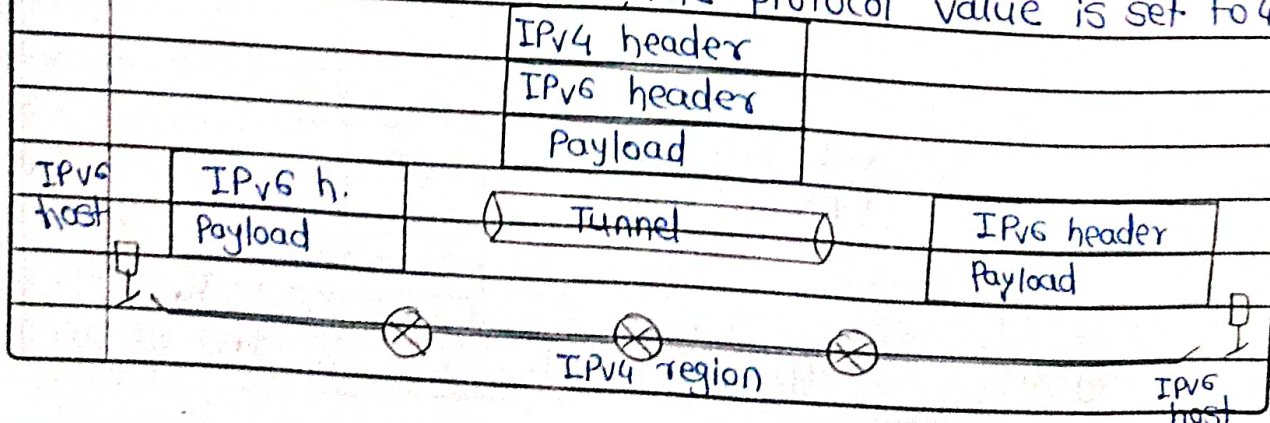




- To understand which version to use when sending packet to a destination, the source host queries the DNS
- If the DNS returns an IPv4 address, the source host sends an IPv4 packet.
- If the DNS returns an IPv6 address the source host send an IPv6.

2] Tunneling :-

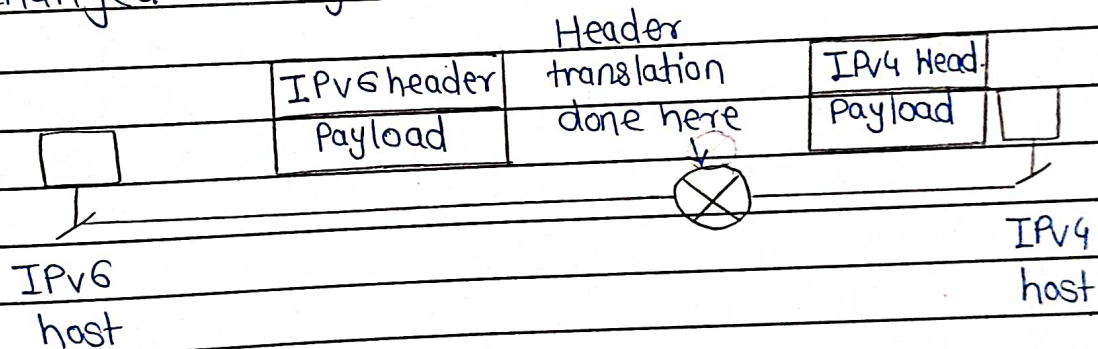
- It is a strategy used when two computers using IPv6 want to communicate with each other & the packet must pass through a region that uses IPv4.
- To pass through this region, the packet must have an IPv4 address
- So the IPv6 packet is encapsulated in an IPv4 packet when it enters the region & it leaves its capsule when it exists the region.
- If the IPv6 packet goes through a tunnel at one end & emerges at other end. To make it clear that the IPv4 packet is carrying an IPv6 packet as data, the protocol value is set to 41





3] Header Translation :-

- It is necessary when the majority of the internet has moved to IPv6 but some systems still use IPv4.
- The sender wants to use IPv6, but receiver does not understand IPv6.
- Tunneling does not work in this limitation because the packet must be in the IPv4 format to be understood by the receiver.
- In this case the header format must totally changed through header translation.



Header translation uses the mapped address to translate an IPv6 address to an IPv4 address. The following lists some rules used in transforming an IPv6 packet header to an IPv4 packet header.

- 1) The IPv6 mapped address is changed to an IPv4 address by extracting the right most 32 bits.
- 2) The value of the IPv6 priority field is discarded.
- 3) The type of service field in IPv4 is set to zero.



- 4> The checksum for IPv4 is calculated & inserted in the IPv4 header. Some may have to be dropped.
- 5> The IPv6 flow label is ignored.
- 6> Compatible extension headers are converted to options & inserted in the IPv4 header.
- 7> The length of IPv4 header is calculated & inserted into the corresponding field.
- 8> The total length of the IPv4 packet is calculated & inserted in the corresponding field.