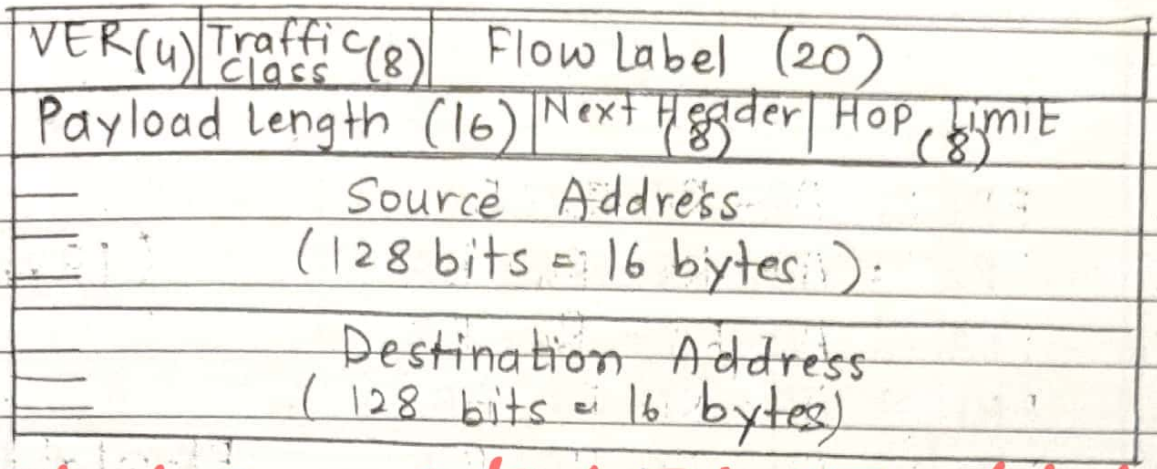
IPV6 is an improvement over IPV4 with size of 128 bits.

IPV6 Header :-

IPV6 Header is of 40 bytes and features like options, fragmentation feilds are shifted to extension header.



IPV6 Header
(128 bits)

VER (Version)

Same as IPV4

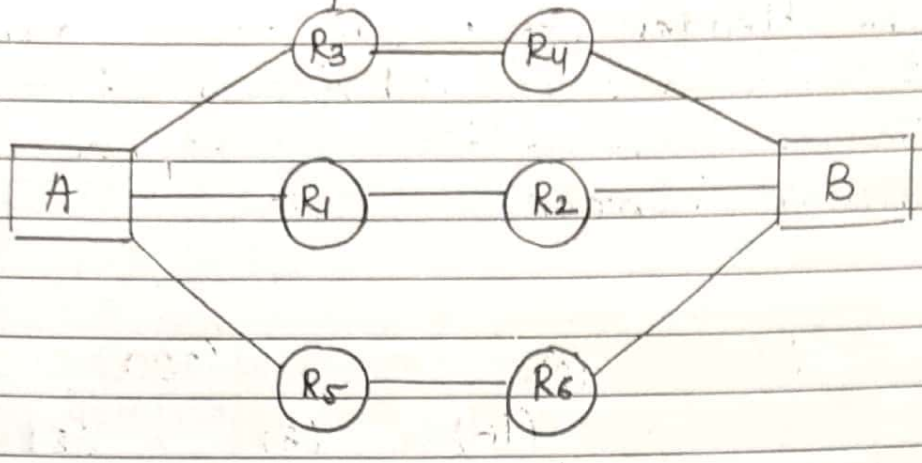
Traffic Class

Same as DS of IPV4

Flowlabel

In case of IPV4 every packet will not follow the same path to reach to destination and hence order of sending and receiving is never same.

In case some packets need to follow same path, set their flow label value to x, so all packets whose flowlabel value is x will follow same path



P1 : A - R1 - R2 - B		(IPV4)
P2 : A - R3 - R4 - B		
P3 : A - R5 - R6 - B		
P1 : A - R1 - R2 - B		Flowlabel = x
P2 : A - R1 - R2 - B		(IPV6)
P3 : A - R1 - R2 - B		

Payload Length
Same as Total length of IPV4

Next Header
Same as protocol of IPV4

Hop Limit
Same as TTL of IPV4

Source IP and Destination IP
128 IP address of sender and receiver

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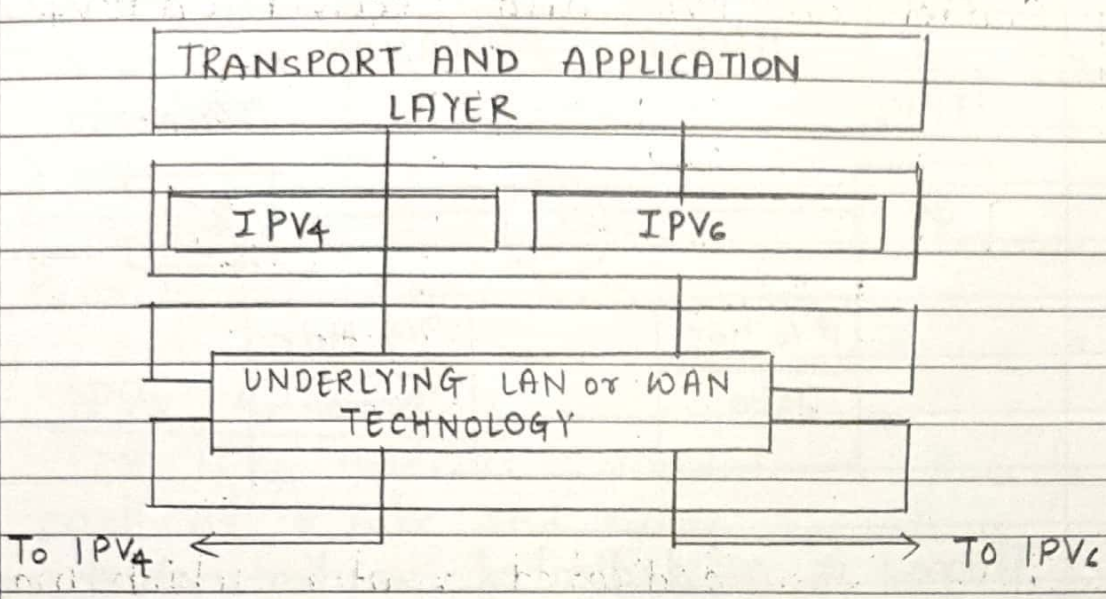
Transition Strategies :-

Since majority of n/w today are IPV4 and only some on IPV6
So a need of smooth transition from src to IPV6 is required which would done using following strategies :-

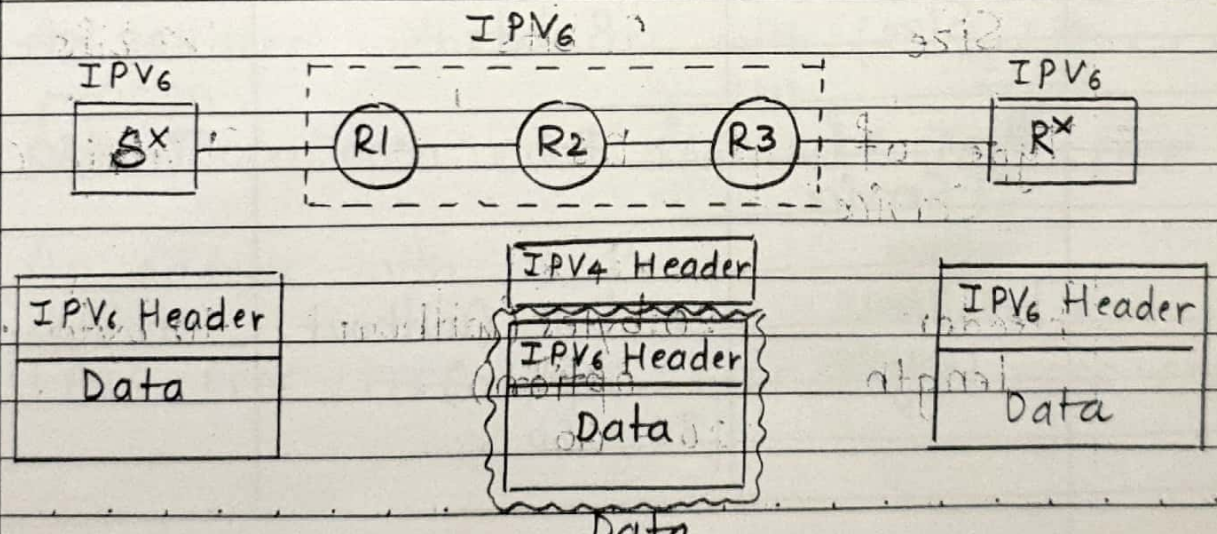
(1) Dual Stack :-

This will support both IPV4 and IPV6 version



(2) Tunneling :-

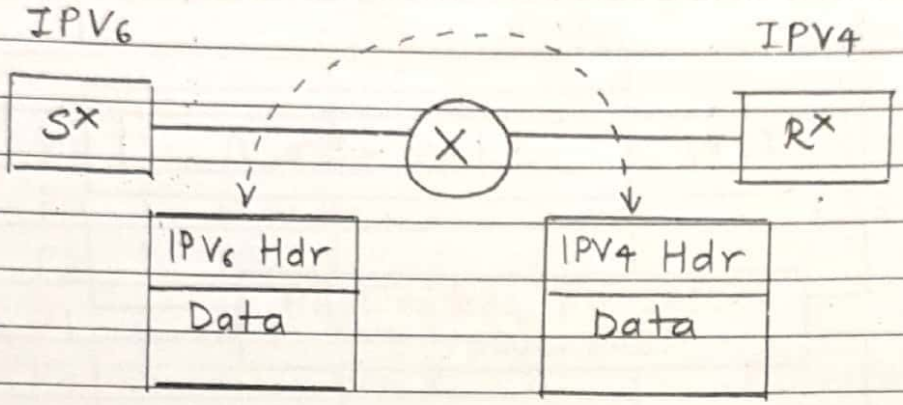
Sendar and Receiver is on IPV6 and connecting n/w on IPV4



(2) Header As shown in the diagram sender creats IPV6 packet which is treated as data by IPV4 n/w, on which IPV4 header is encapsulated and on receiving end IPV4 header is depcapsulated and receiver receives IPV6 packet.

(3) Header Translation :-
Sender on IPV6 and Receiver on IPV4

HEADER TRANSLATION



There is a dedicated router which maps IPV4 to IPV6 and vice versa.

IPV4 VS IPV6

Size	32 bits	128 bits
Type of Service	DS	Traffic Class
Header length	20 bytes (without option) 20 - 60	40 bytes fixed

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Options	Part of Header	Part of Extens^n Header
Fragment^n field	Part of Header	Part of Ex. Header
Flowlabel	Not Present	Newly added, to make some packets to follow same pa:
No. of Router Limitat^n	TTL	Hop limit
IP Address Representat^n	Binary, Decimal, Hexadecimal	Hexadecimal

IPV6 Addressing :-

128 IPV6 Address is divided into 8 parts each of 16 bits and every 16 bits is represented using 4 bigits of hexadecimal value each of 4 bits.

Eg:- 1) An address with 128 zeros

0000

0000:0000:0000:0000:0000:0000:0000:0000

2) An address with 64 0's with followed by 64 1's

0000 ... FFFF

0000:0000:0000:0000:FFFF:FFFF:FFFF:FFFF

3) An address with 128 1's

FFFF:FFFF:FFFF:FFFF:FFFF:FFFF:FFFF:FFFF

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An address with 128 alternate 1's and 0's

1010

AAAA:AAAA:AAAA:AAAA:AAAA:AAAA:AAAA:AAAA

An address with 64 0's and 1's followed by 64 two consecutive 1's and 0's.

0101

5555:5555:5555:5555:CCCC:CCCC:CCCC:CCCC

1100

An address with 32 bit of 3 1's followed by 0 64 bits of 2 0's followed by 2 1's and 32 bit alternate 1's and 0's.

1110 0011 1010

EEEE:EEEE:3333:3333:3333:3333:AAAA:AAAA