

IPv4 and IPv6

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The Network layer

IPv4 and IPv6

- Handles the routing and sending of data between different networks. The most important protocols at this layer are IP and ICMP.

#	Layer Name	Protocol	Protocol Data Unit	Addressing
5	Application	HTTP, SMTP, etc...	Messages	n/a
4	Transport	TCP/UDP	Segment	Port #'s
3	Network	IP	Packet / Datagram	IP Address
2	Data Link	Ethernet, Wi-Fi	Frames	MAC Address
1	Physical	n/a	Bits	n/a

- A numeric address.
- It's an identifier for a computer or device on a network.
- Consists of two parts : A network and a host address.

The Network layer

IPv4 and IPv6 : Address Class

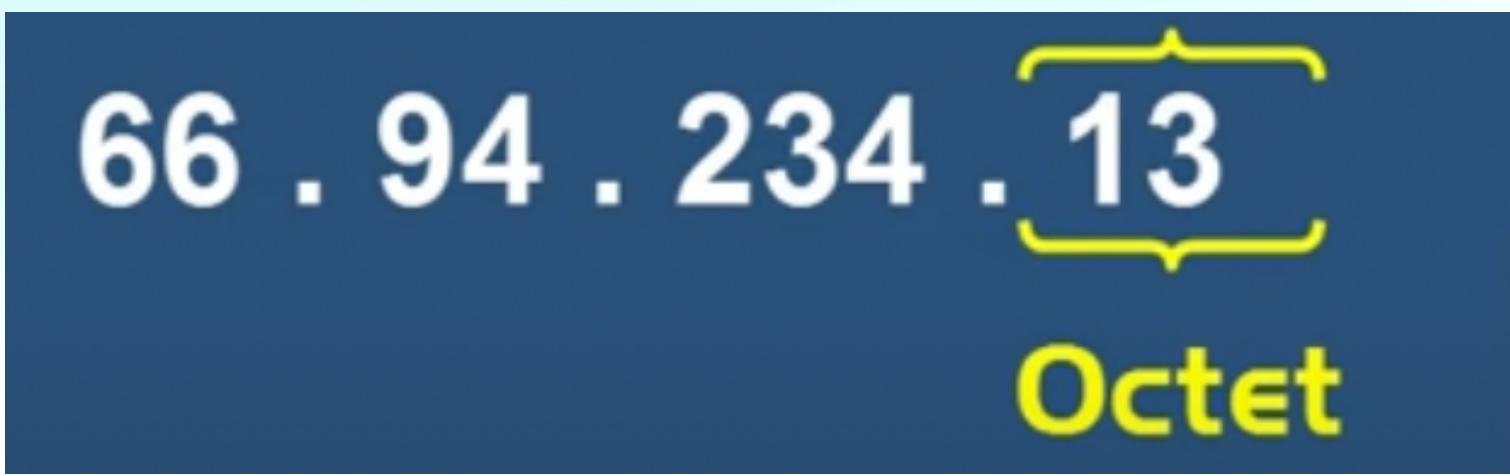
- Consists of two parts : A network and a host address.

Class	Left-most bit	Starting IP address	Last IP address
A	0xxx	0.0.0.0	127.255.255.255
B	10xx	128.0.0.0	191.255.255.255
C	110x	192.0.0.0	223.255.255.255
D	1110	224.0.0.0	239.255.255.255
E	1111	240.0.0.0	255.255.255.255

IPv4

Addressing

- IPv4 is current version (not longer) of IP ddresses.
- 32-bit numeric address written as four numbers seperated by periods.

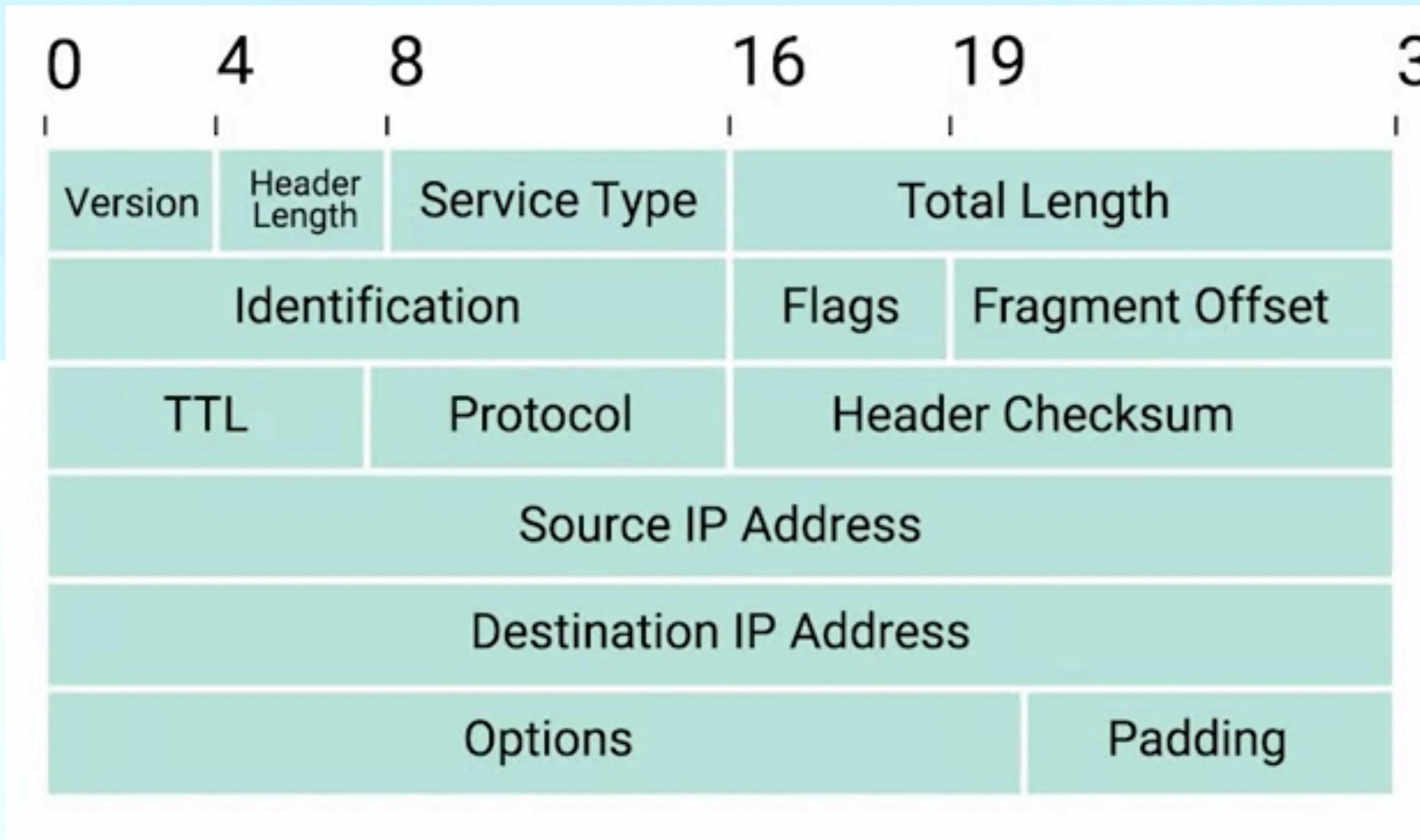


03-Octate

- The numbers range from 0-255.
- 4,294,967,296 unique IP addresses.

IPv4 Datagram and Encapsulation

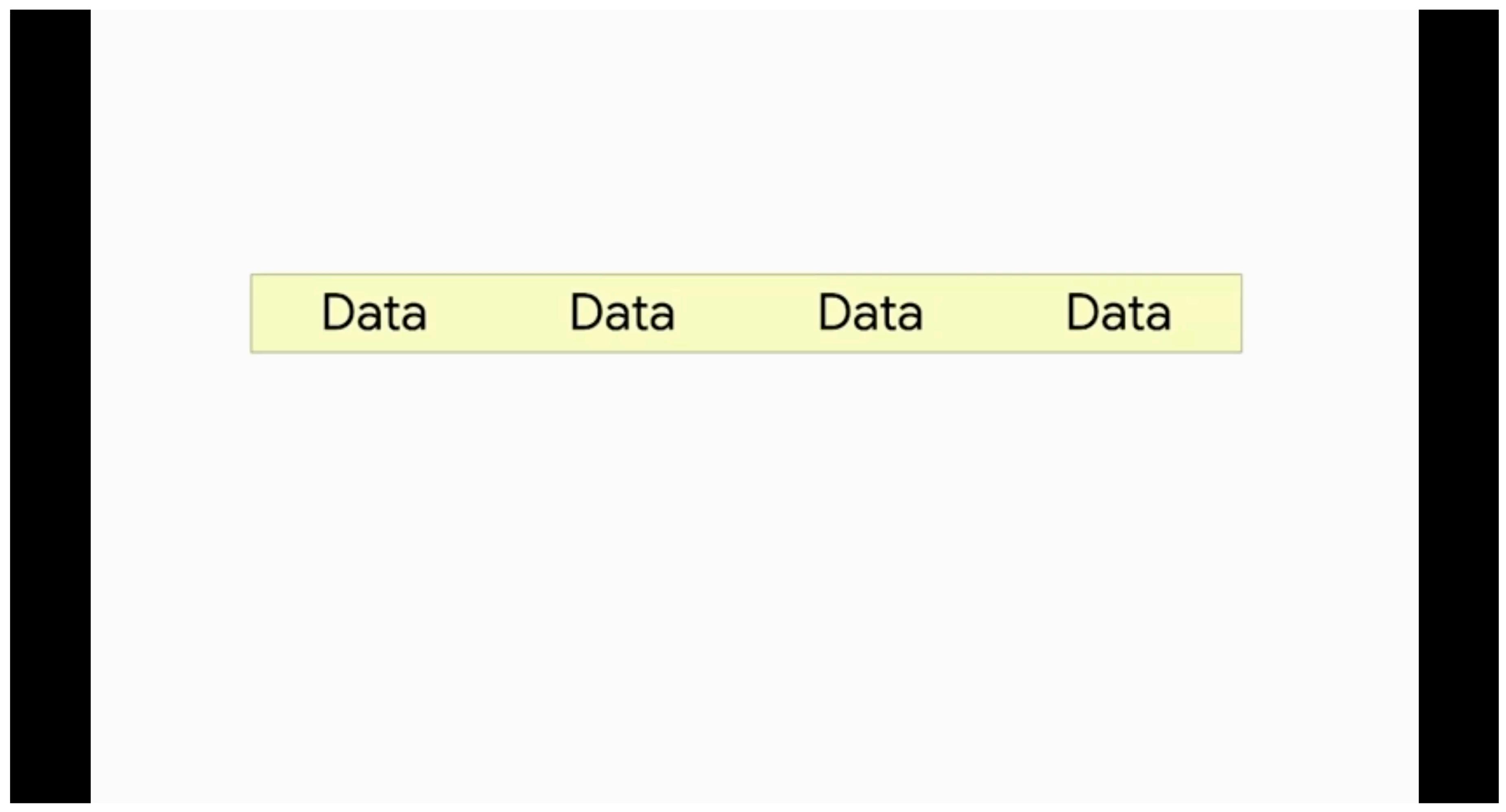
Datagram header



- 32-bit 0-31
- minimum size is 20 bytes
- The IPv4 header is like a written form of an address on an envelope, whereas the essential data is the letter, placed inside.

Encapsulation and Decapsulation

Packet-route



Data Data Data Data

IPv6

Addressing

- IPv6 is next generation of IP addressed.
- 128-bit hexadecimal address.(both numbers and alphabets)

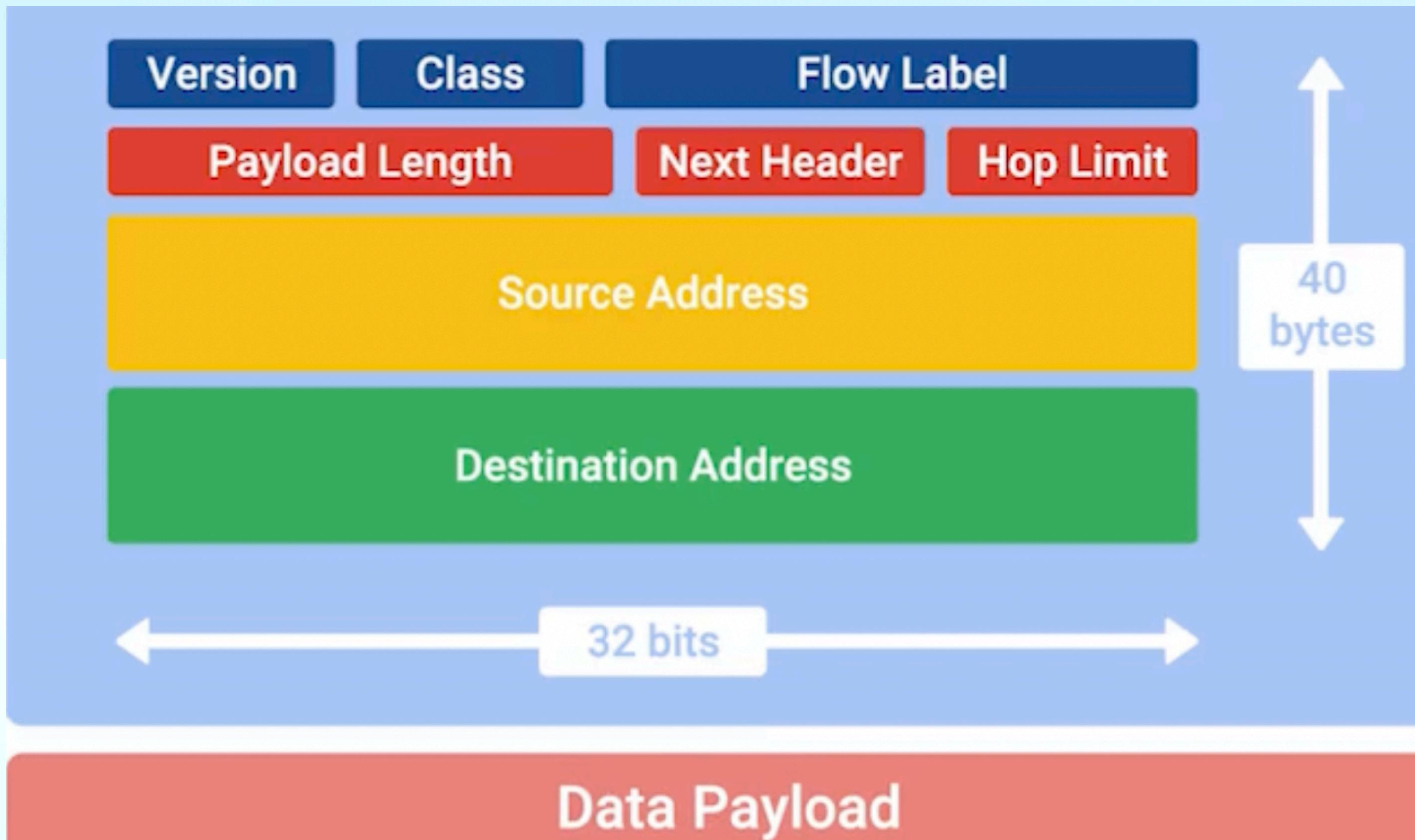
76DC:4F59:34CF:71CD:9DC6:89CD:45D6:67A2

05-addressing of IPv6

- Capable of producing over 340 undecillion addresses.

IPv6 Datagram

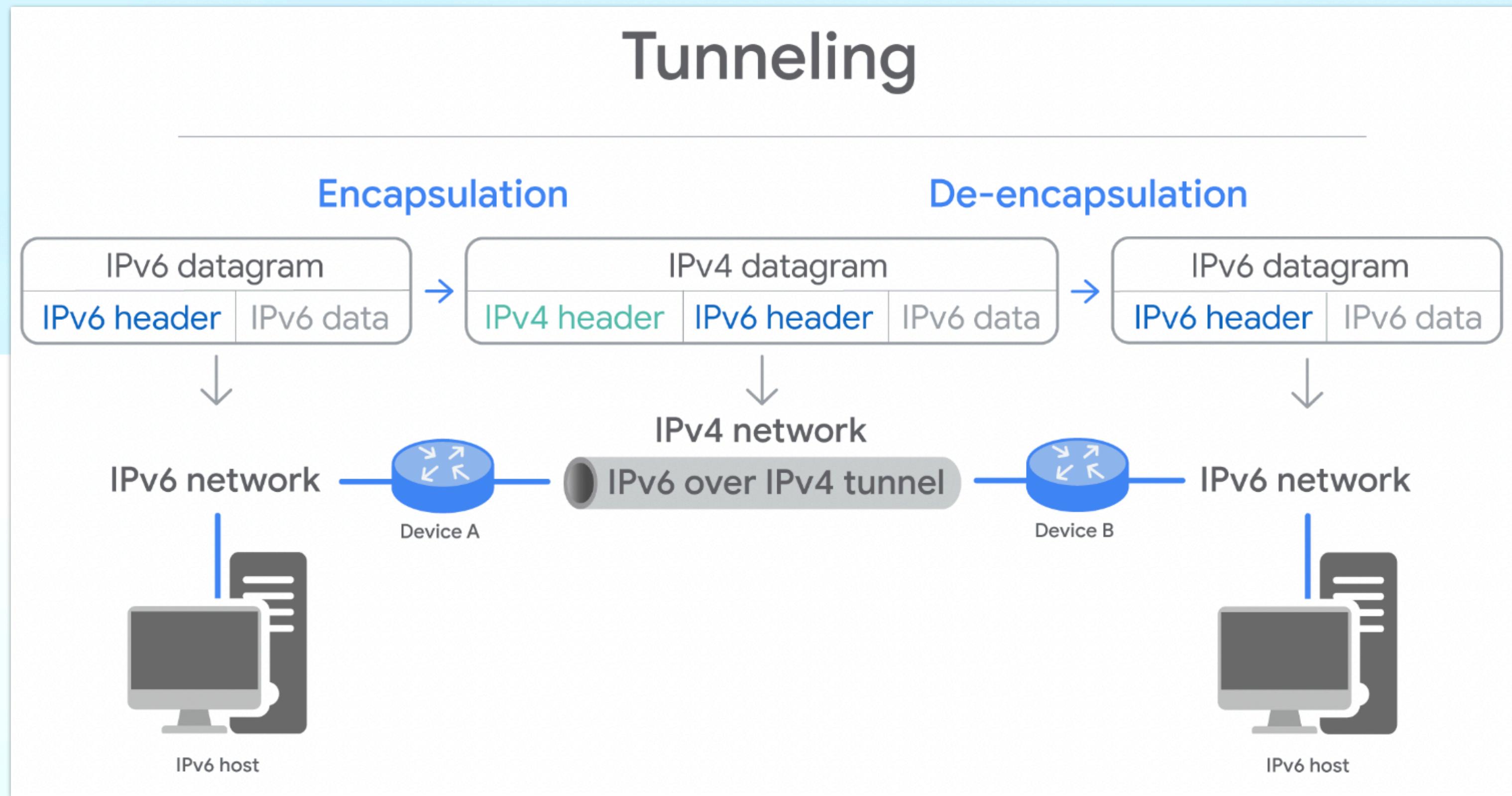
Datagram header



- 128-bit 0-127.
- minimum size is 40 bytes.
- IPv6 is the latest version of the Internet Protocol (IP). IP is a communications protocol that identifies and locates computers on networks and routes traffic across the internet.

IPv6 and IPv4 Harmony

Tunneling concept



- Tunneling is a protocol that allows data to be moved securely from one network to another
- Tunneling protocols allow users to carry IPv6 traffic across an IPv4 network.

Problem

- IPv4 and IPv6 require a different structure for each version's datagrams

Solution

- IPv6 data that's encapsulated within an IPv4 datagram can then be delivered across the IPv4 network and received by another IPv6 tunnel server.