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LS - WJ (ETH)

# TCP/IP Protocol Stack (11) ①

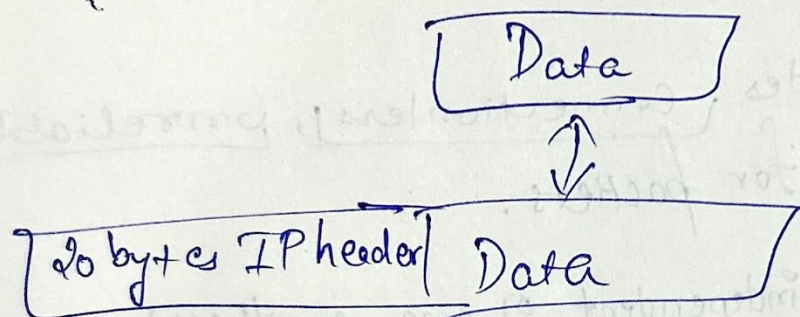
## Concepts Covered

- IP Datagram
- IP Header files.
- IP layer provides connectionless, unreliable delivery system for packets.
- Each packets is independent of one another.
- - ↳ IP layer ~~needs~~ doesn't maintain any history.
  - ↳ Each IP packet contains the source & destination.
  - ↳ IP layer do not guarantee delivery of packets.
    - because when packet is received to receiver it sends the (ACK) ~~ack~~.



## IP layer encapsulation

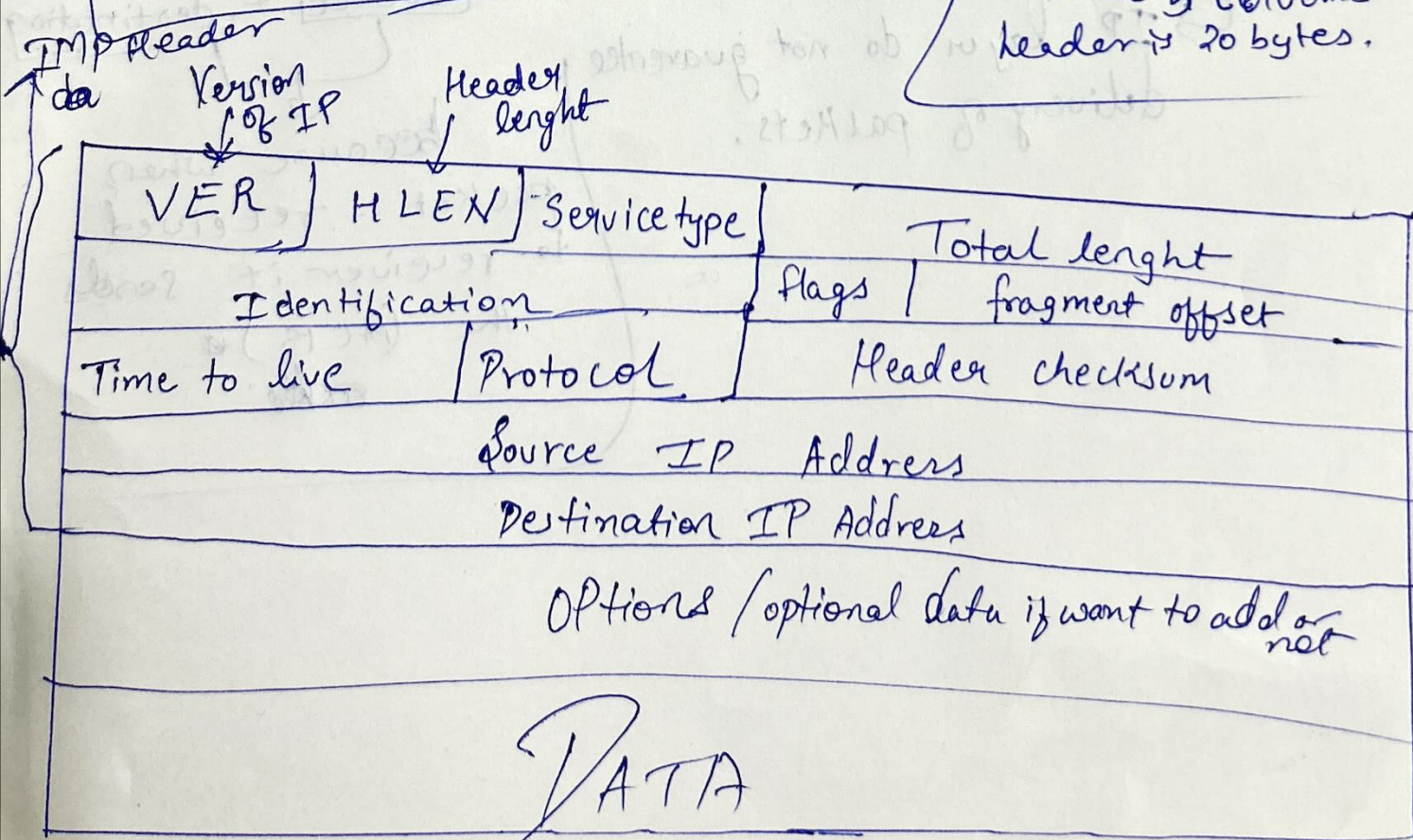
- Receives a data chunk from the higher layer
- Prepares a header of minimum 20 bytes,
  - (TCP or UDP)
  - Containing ~~the~~ relevant information for handling routing & flow control.



## Format of IP Datagram

32 bits = 4 bytes

total 5 columns header is 20 bytes.





## header ~~files~~ fields

②

- VER (4 bits)

↳ Version

of IP protocol in use (Here we talk about IPv4)

- HLEN (4 bits)

• length of header, expressed as the number of 32-bit words.

• Minimum of 5 & maximum of 15.

- Total length.

• length in bytes of the datagram, including headers.

• Maximum datagram size  $\because 2^{16} = 65536$  bytes.

- Service Type (8 bits).

• Allows packets to be assigned a priority

• Router can use this field to route packets.

- Time to live (8 bits).

• prevents a packet from travelling in a loop.

• Sender sets a value, that is decremented at each hop.

• if it reaches zero, packet is discarded.

- Protocol (8 bits)

• identifies the higher protocol being used.



## ◦ Source IP Address (32 bits)

- internet address of sender.

## ◦ Destination IP Address (32 bits)

- internet address of Destination.

## ◦ Identification, flags, fragment offset.

- used for handling fragmentation

## ◦ options (Variable Width).

- Can be given provided router supports.

- Source routing, for example.

## ★ Header checksum

### ◦ Covers only the IP Header

### ◦ How it's been computed?

↳ Header is treated as a sequence of 16bit integers.

↳ The header are all added using ones complement arithmetic

↳ Ones complement of the final sum is taken as the checksum.

its a very small kind of arithmetic

Calculation done by computer hardware automatically.

◦ A mismatched in checksum causes datagram to be discarded



## Viewing IP packets.

(5)

• we can use packet sniffers to view IP packets

• Some of them are

• Wireshark

• Windump

• tcpdump

• Tshark

• Solar Winds.