# INITIATION RESEAU
# NETWORK INITIATION

TP2 – Network Interconnection

22 MAI 2018

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Based on the work of Mme Xiaoting LI

# OVERVIEW

- NETWORK LAYER
- IP ADDRESS
- ROUTING

# OSI MODEL

- Application
- Presentation
- Session
- Transport
- Network
- Data Link
- Physical

# TCP/IP MODEL

- Application
- Transport
- Internet / Network
- Network Access / Link

# THE NETWORK LAYER

- Provides data routing paths for network communication.
- Data transmission in form of packets in an ordered format.

- Functions:
  - Logical connection setup.
  - Data forwarding.
  - Routing.
  - Delivery error reporting.

- Devices:
  - Routers
  - Bridges
  - Firewalls
  - Switches

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- Functions:
  - **Logical connection setup.**
  - Data forwarding.
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- Logical connection is abstract.
  - Virtual LAN
  - IP subnets
  - Tunnel/VPN

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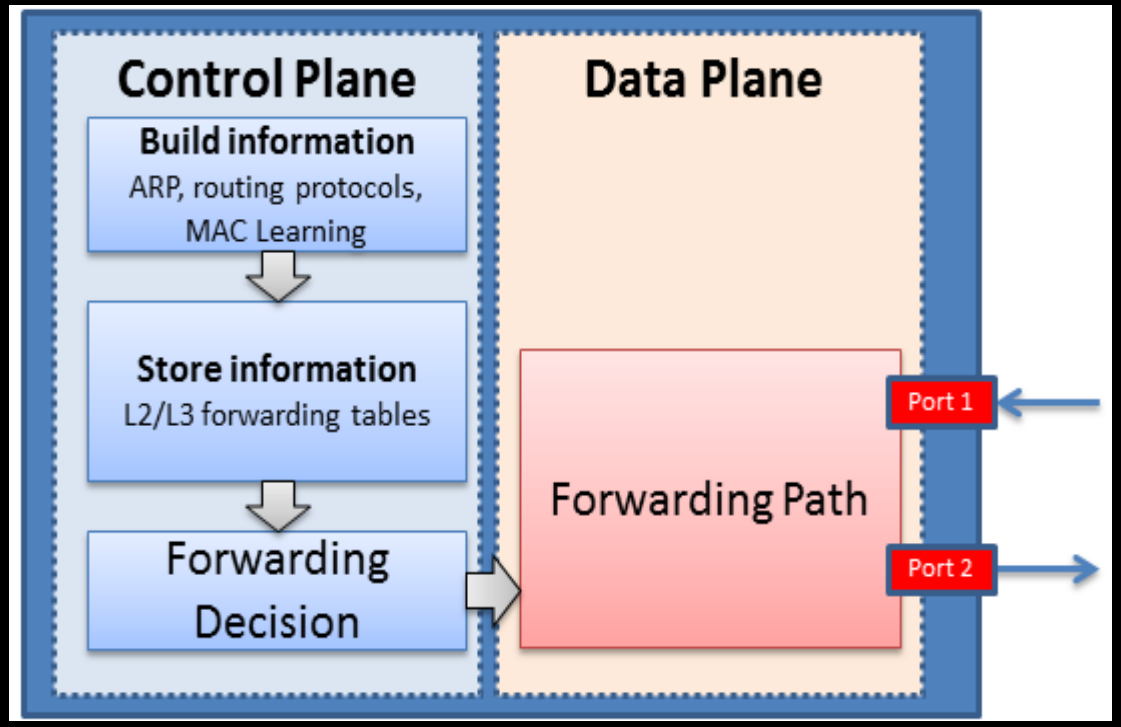

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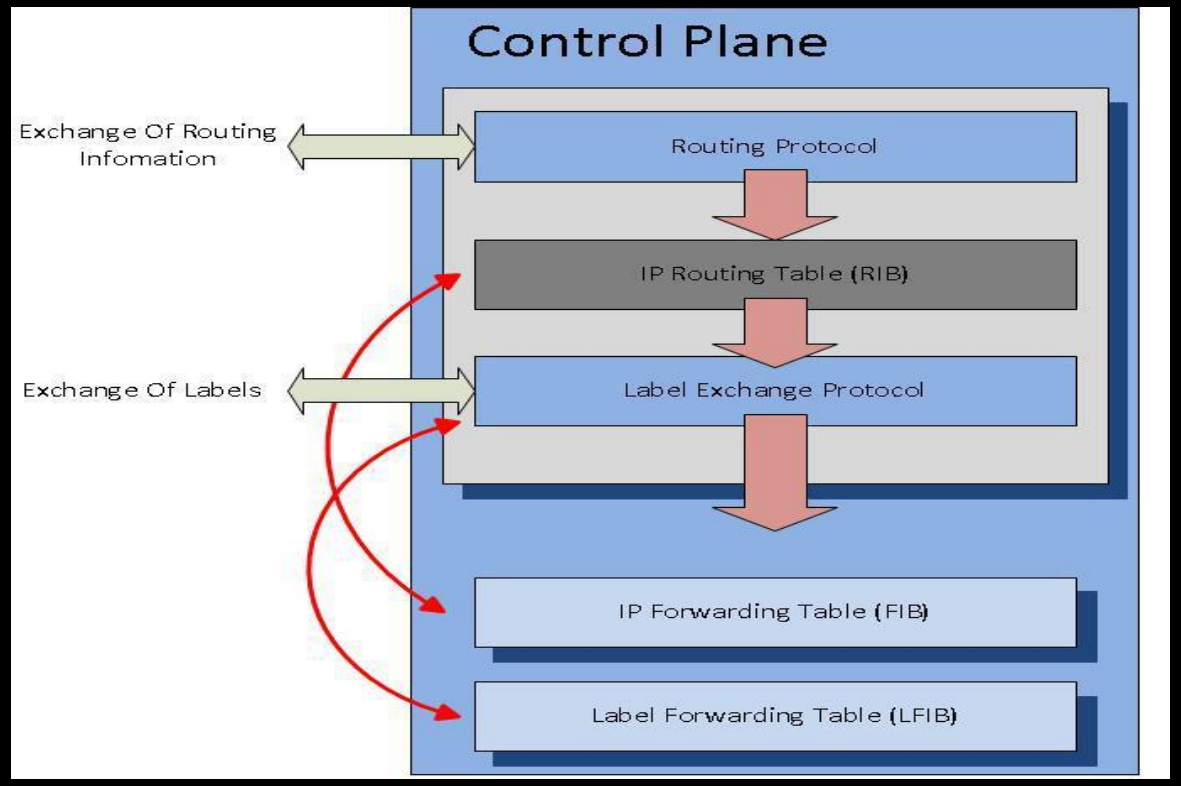

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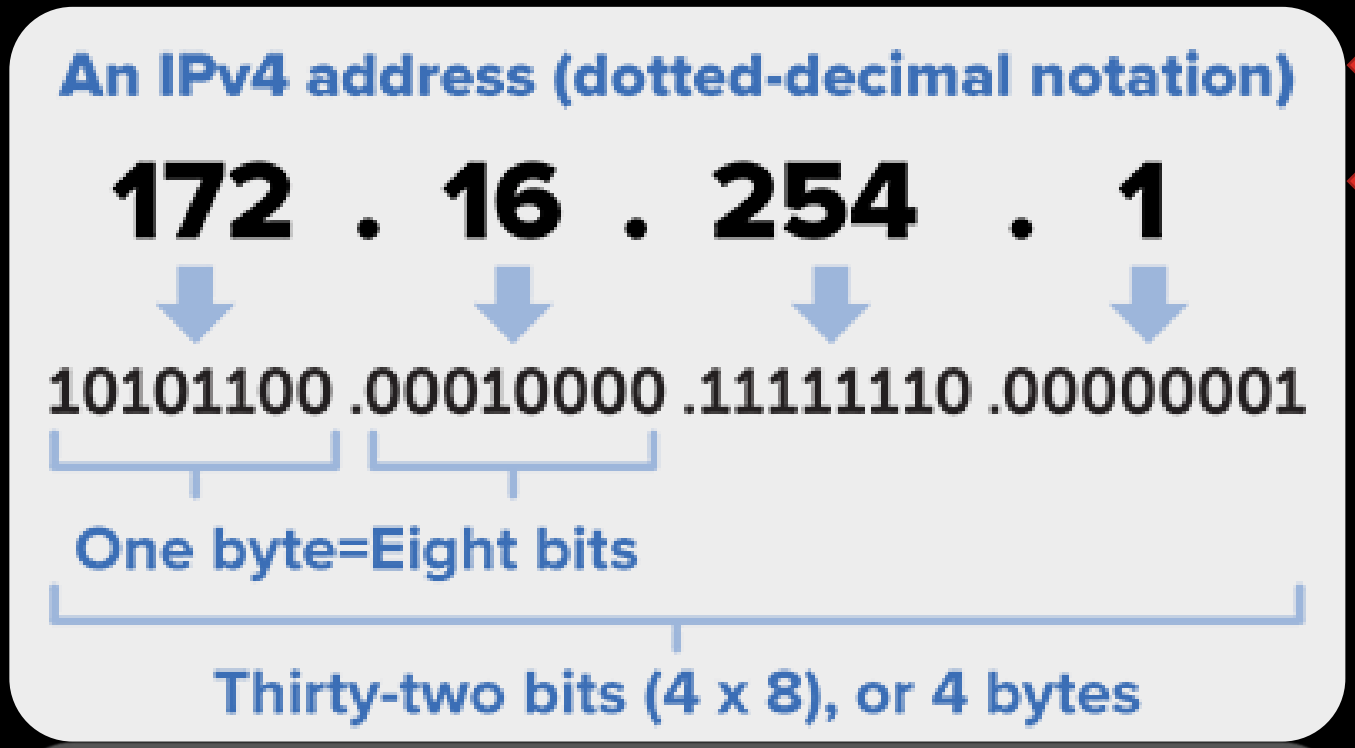
- Internet Control Message Protocol (ICMP)

# IP ADDRESS



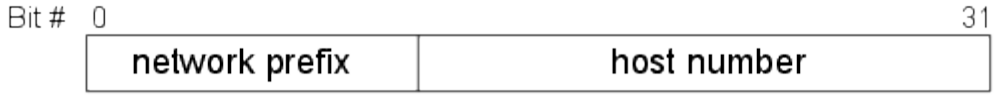

Notation

8 bit data
=> 0 to 255

32 bit long number made up of 4 octetes

# IP ADDRESS HIERARCY

X.X.X.X



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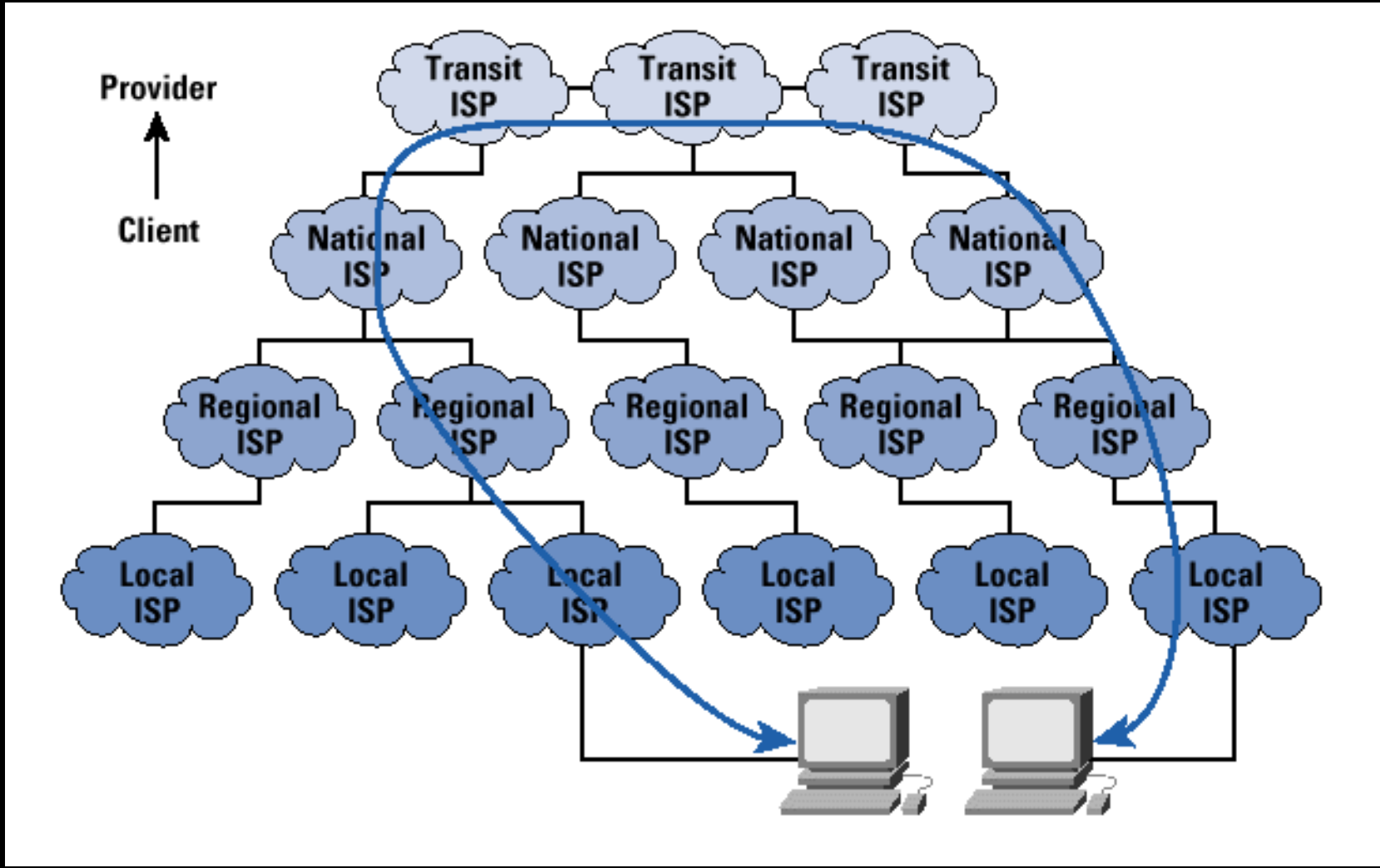

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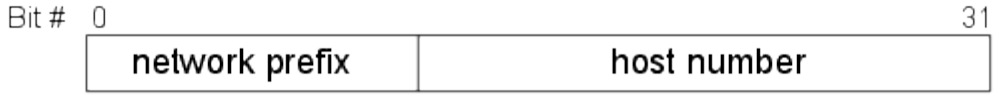


**Static** **Dynamic**

**Automatic IP address assignment: Dynamic Host Configuration Protocol (DHCP)**

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- A highly structured series of fields that are strictly defined.
- Base IP Datagram =>

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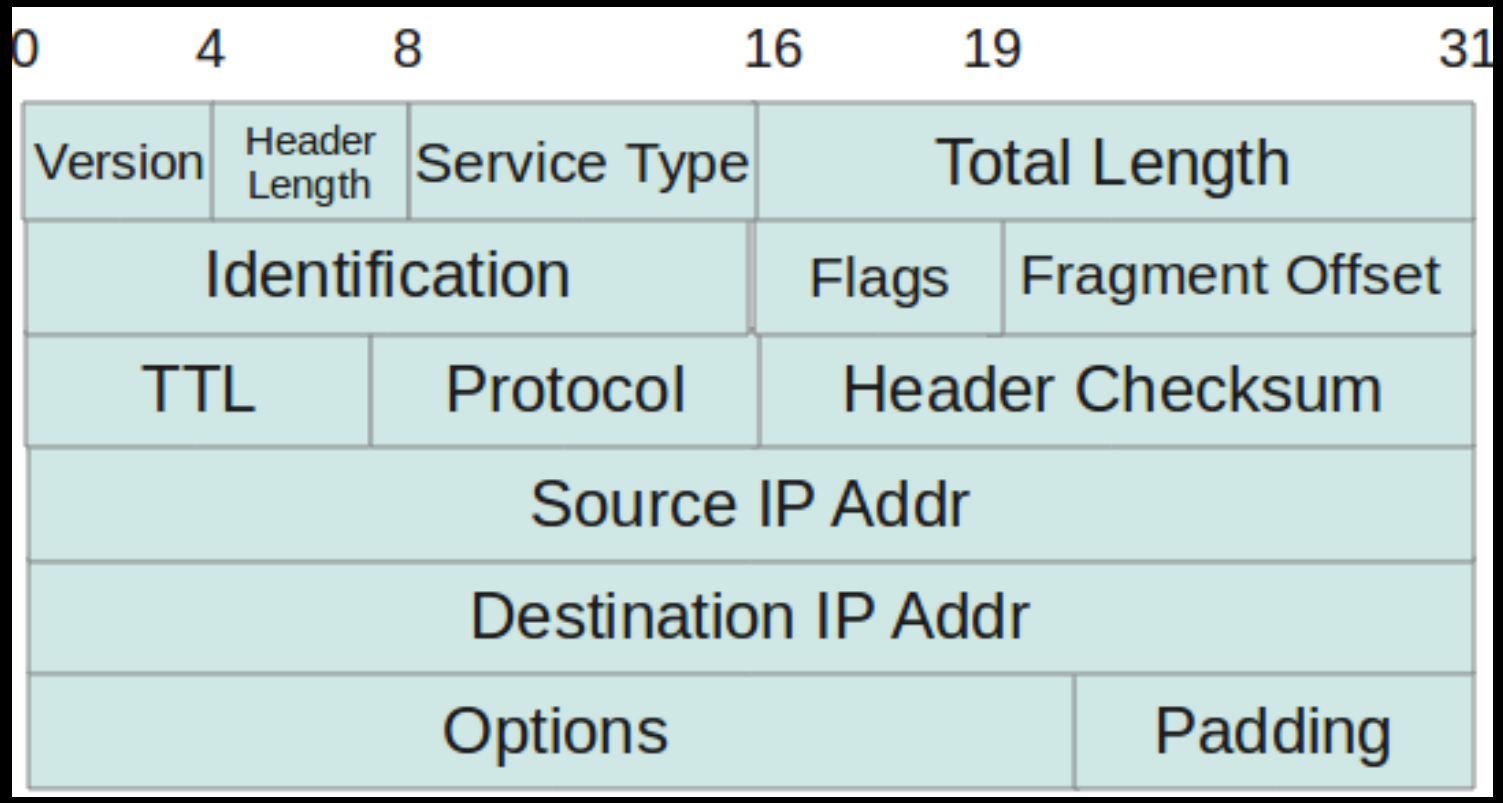

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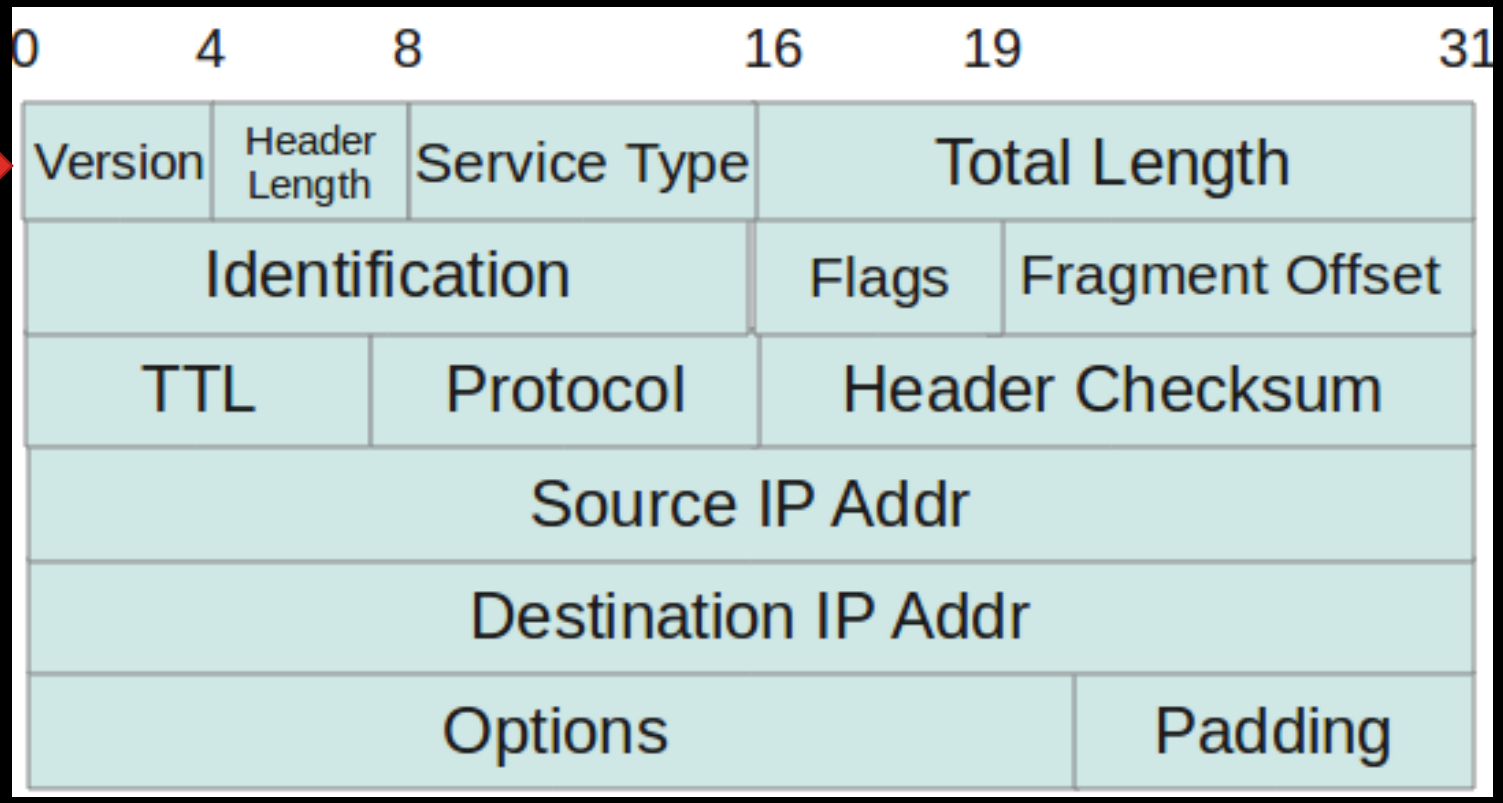
IPv4

IPv6



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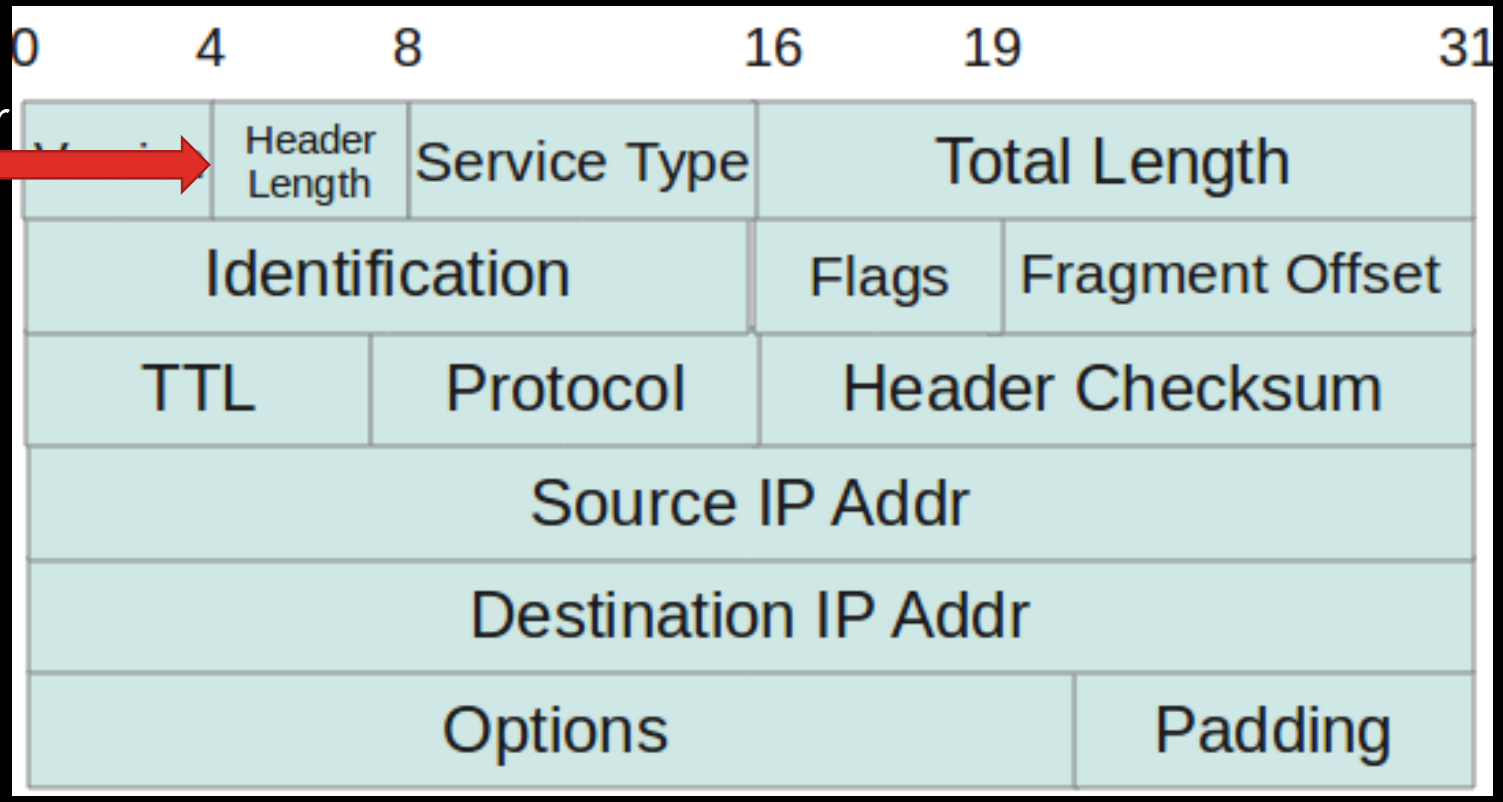
Size of header = 20 bytes (min) for IPv4



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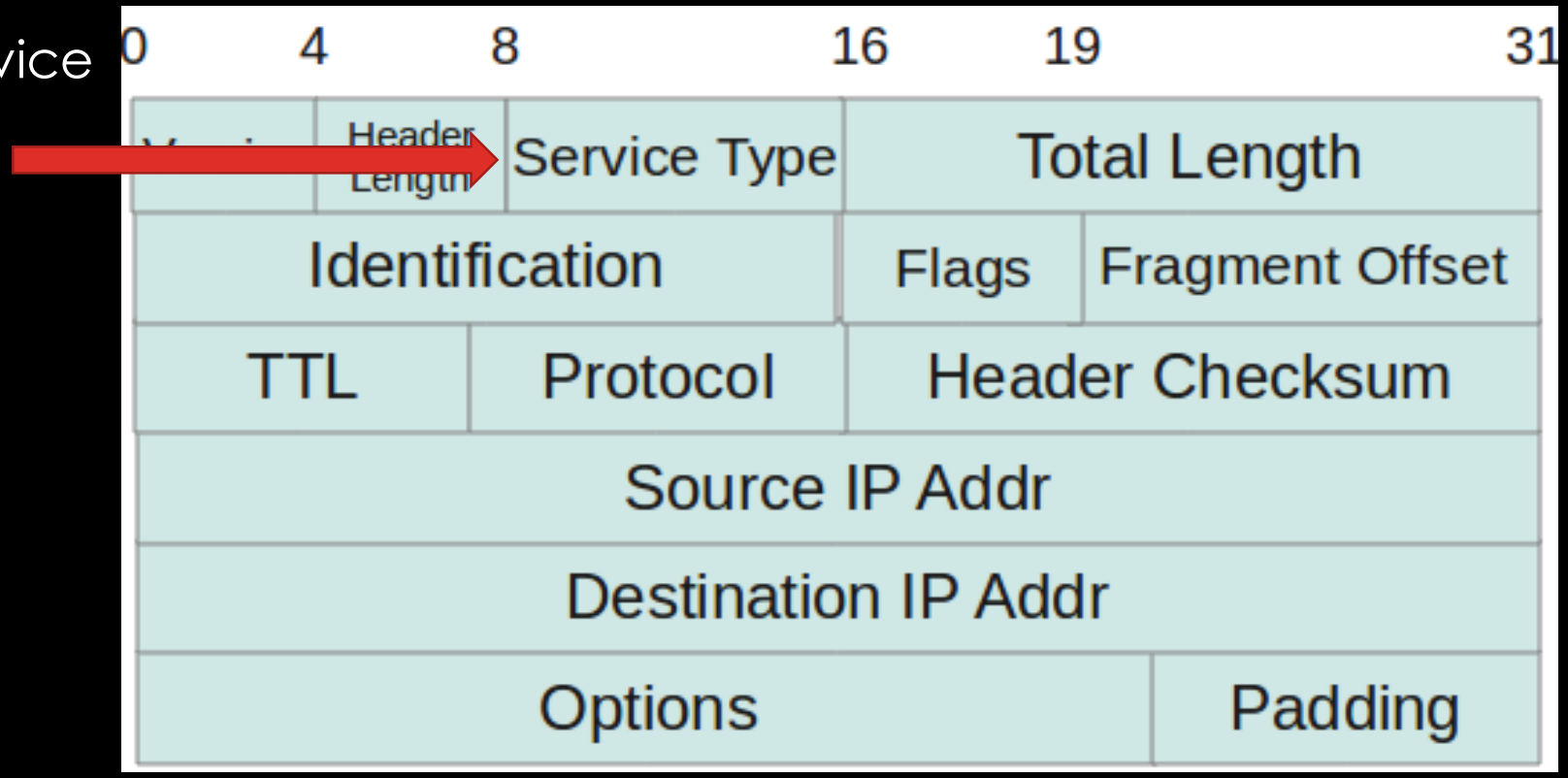
Quality of Service (QoS)



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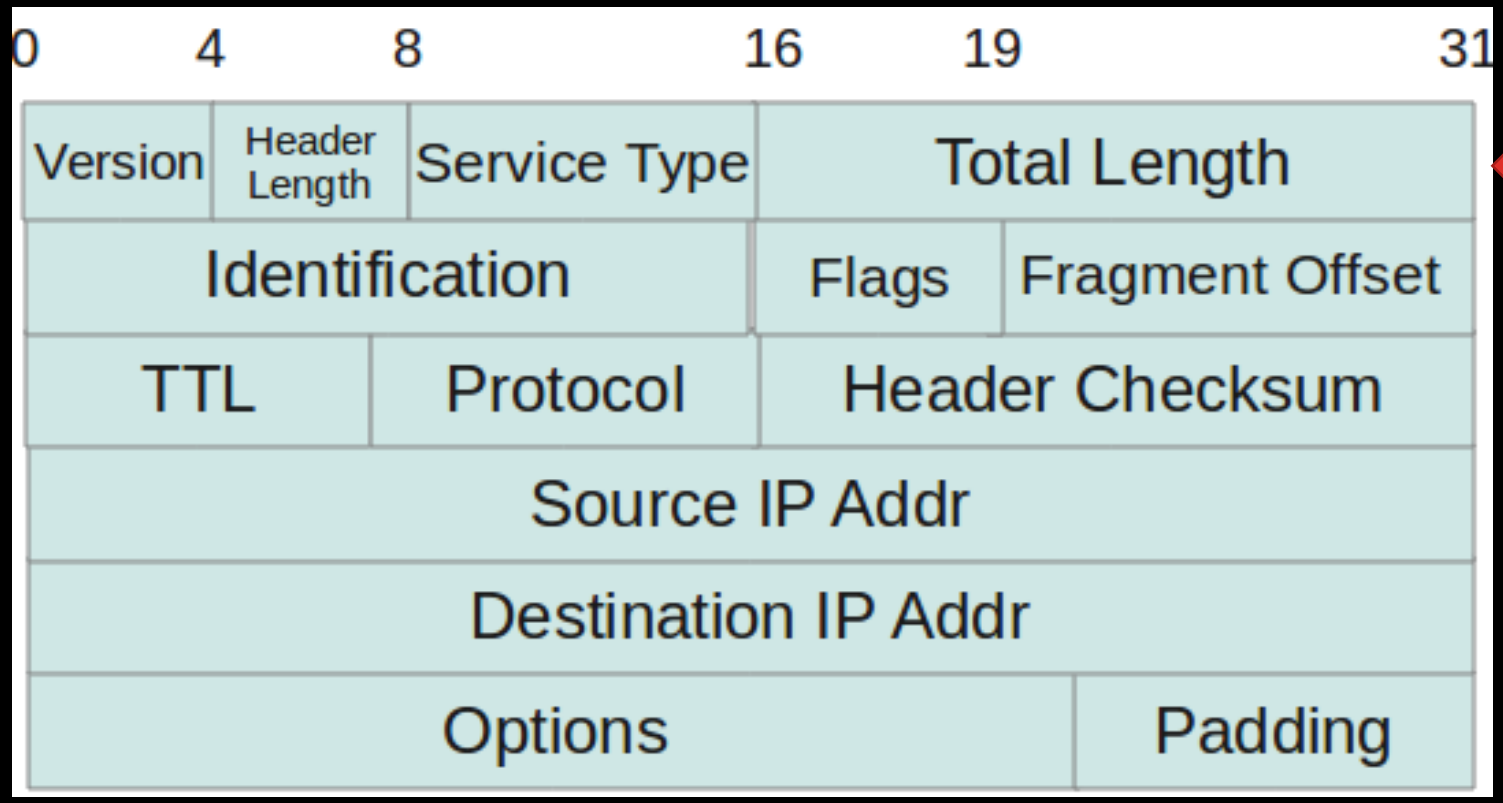


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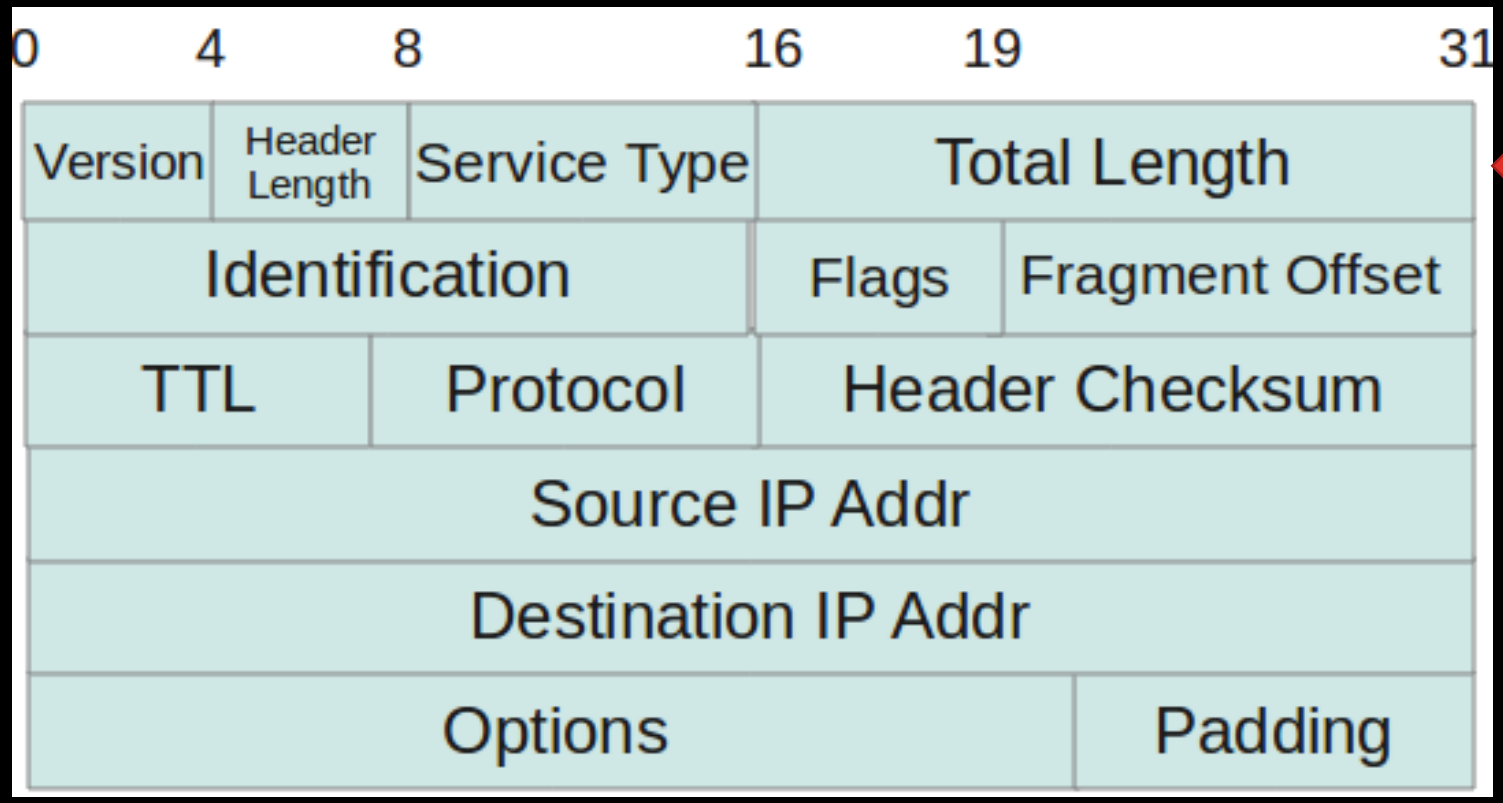


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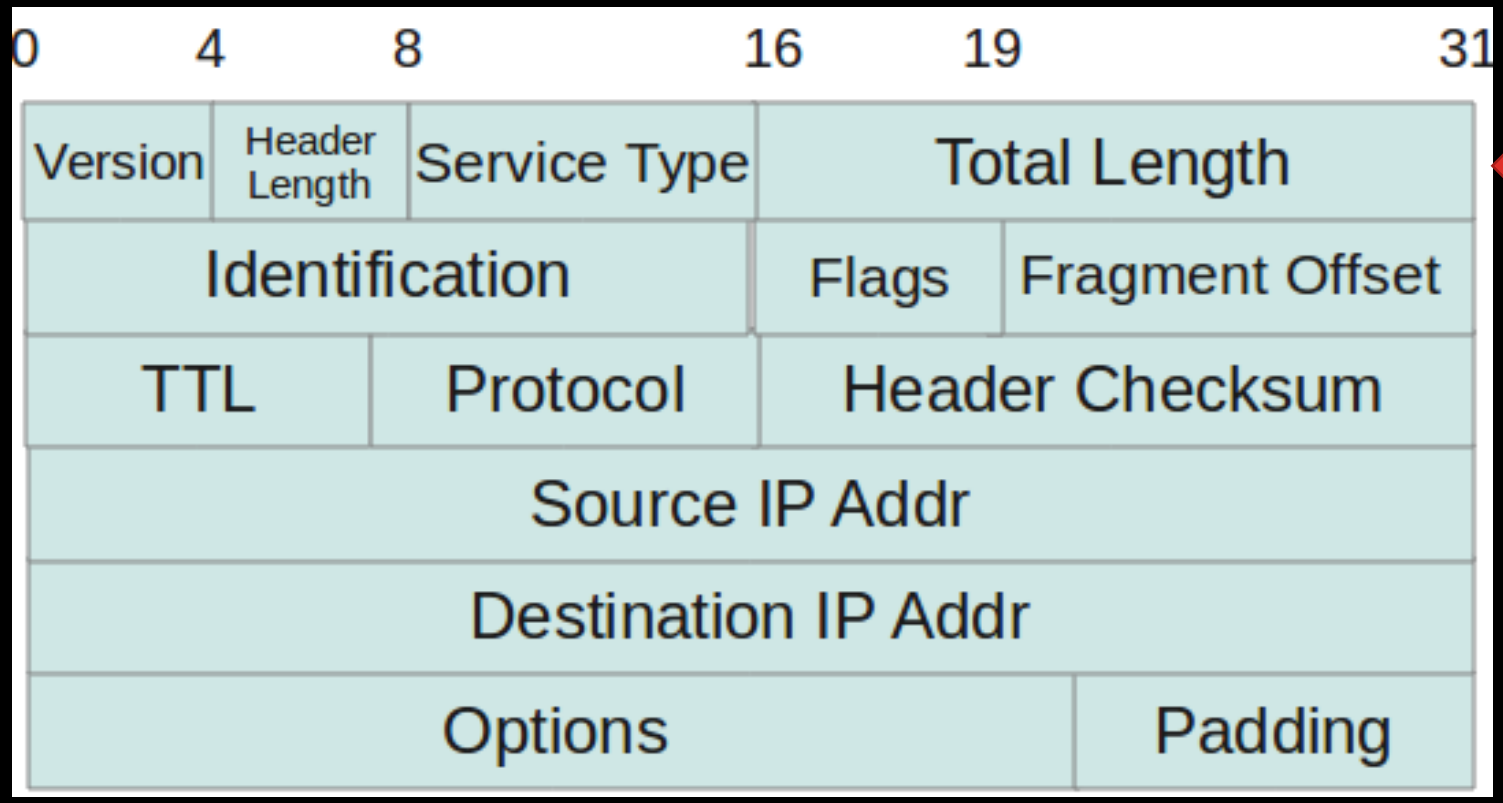


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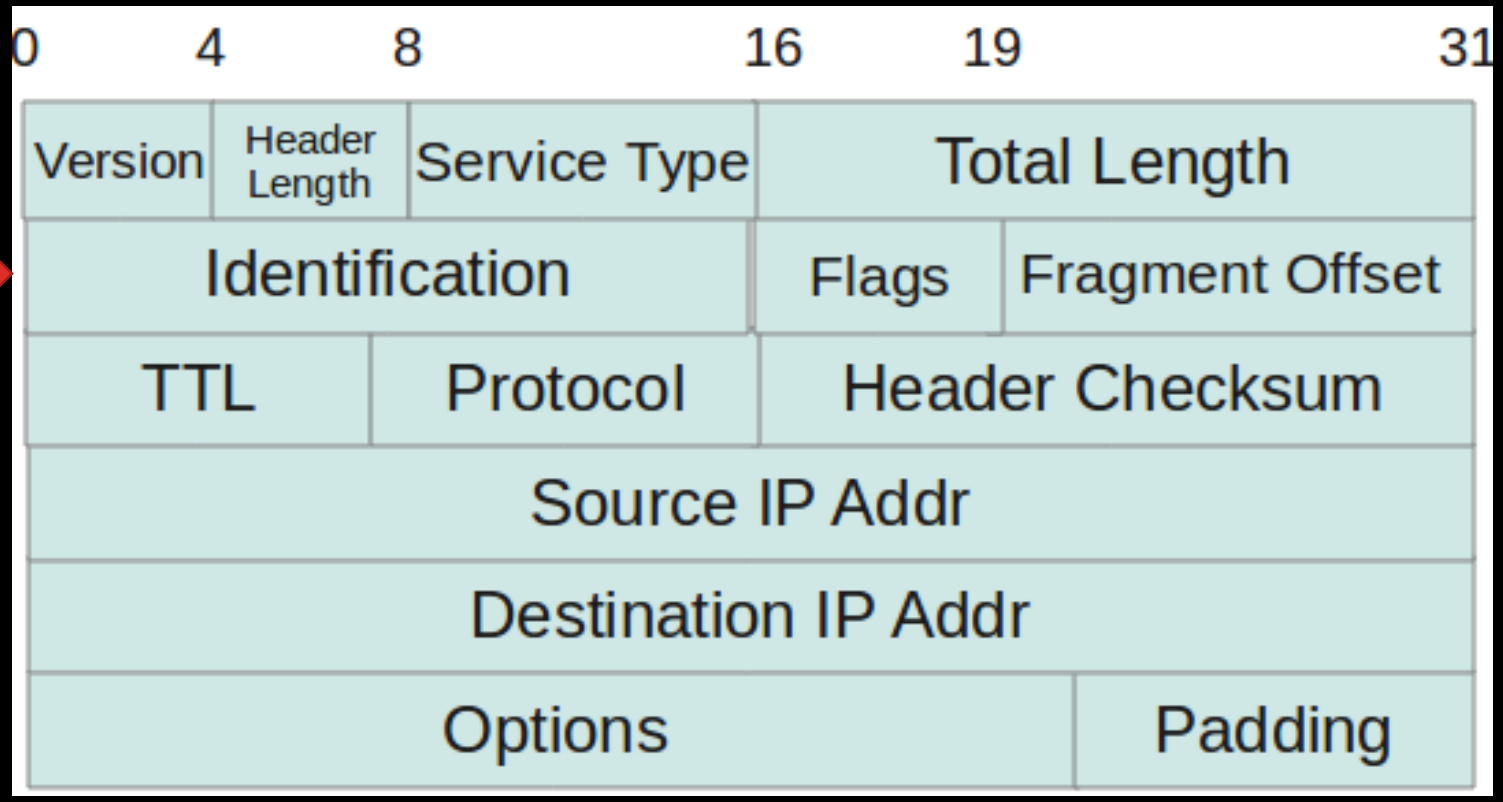
What can be the size of largest IP datagram ?

16 bit number => max 65535

# IP DATAGRAM

- A highly structured series of fields that are strictly defined.
- Base IP Datagram => Header | Data

Unique ID for group of splitted packet



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Fragmented ?

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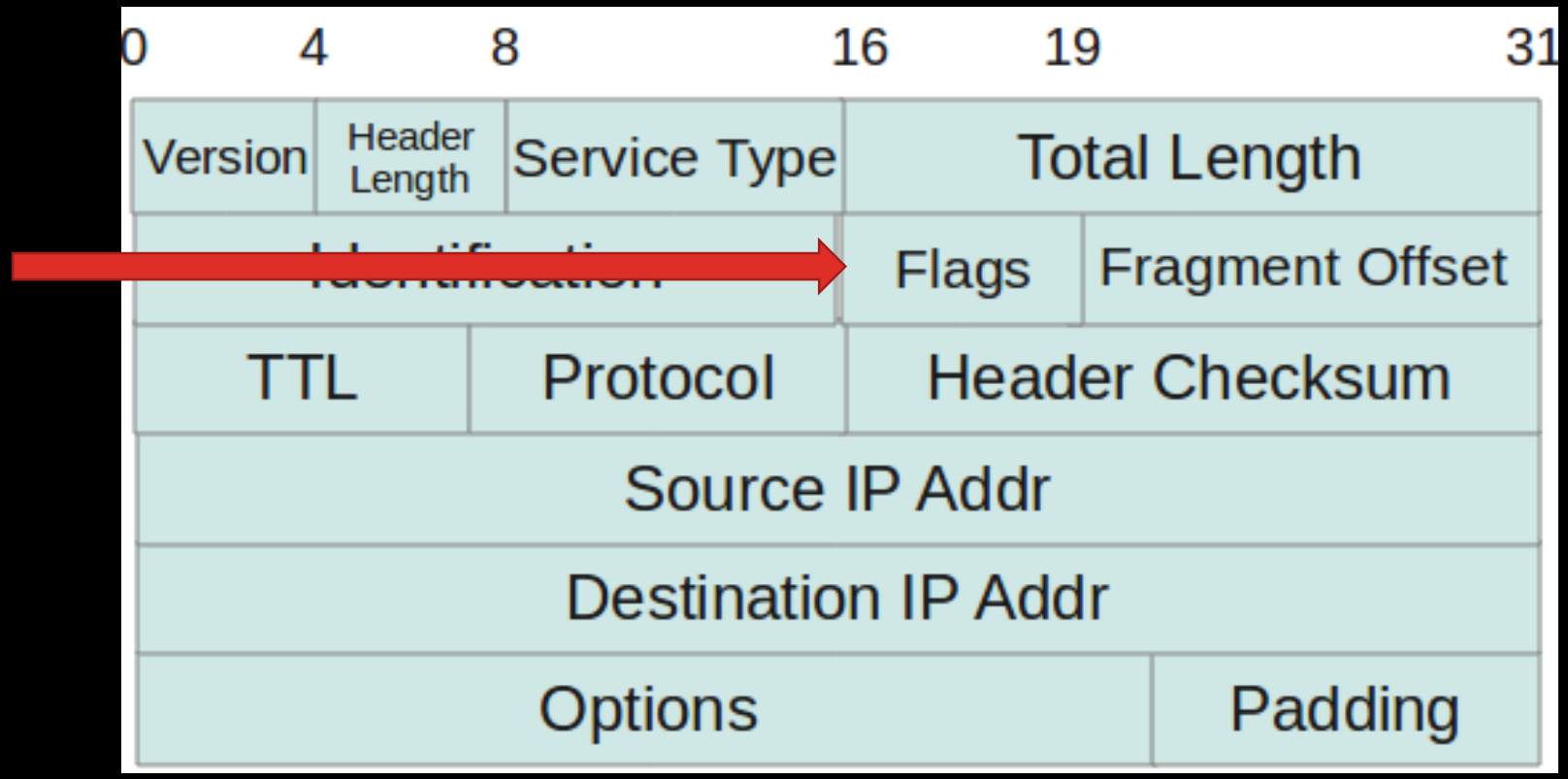

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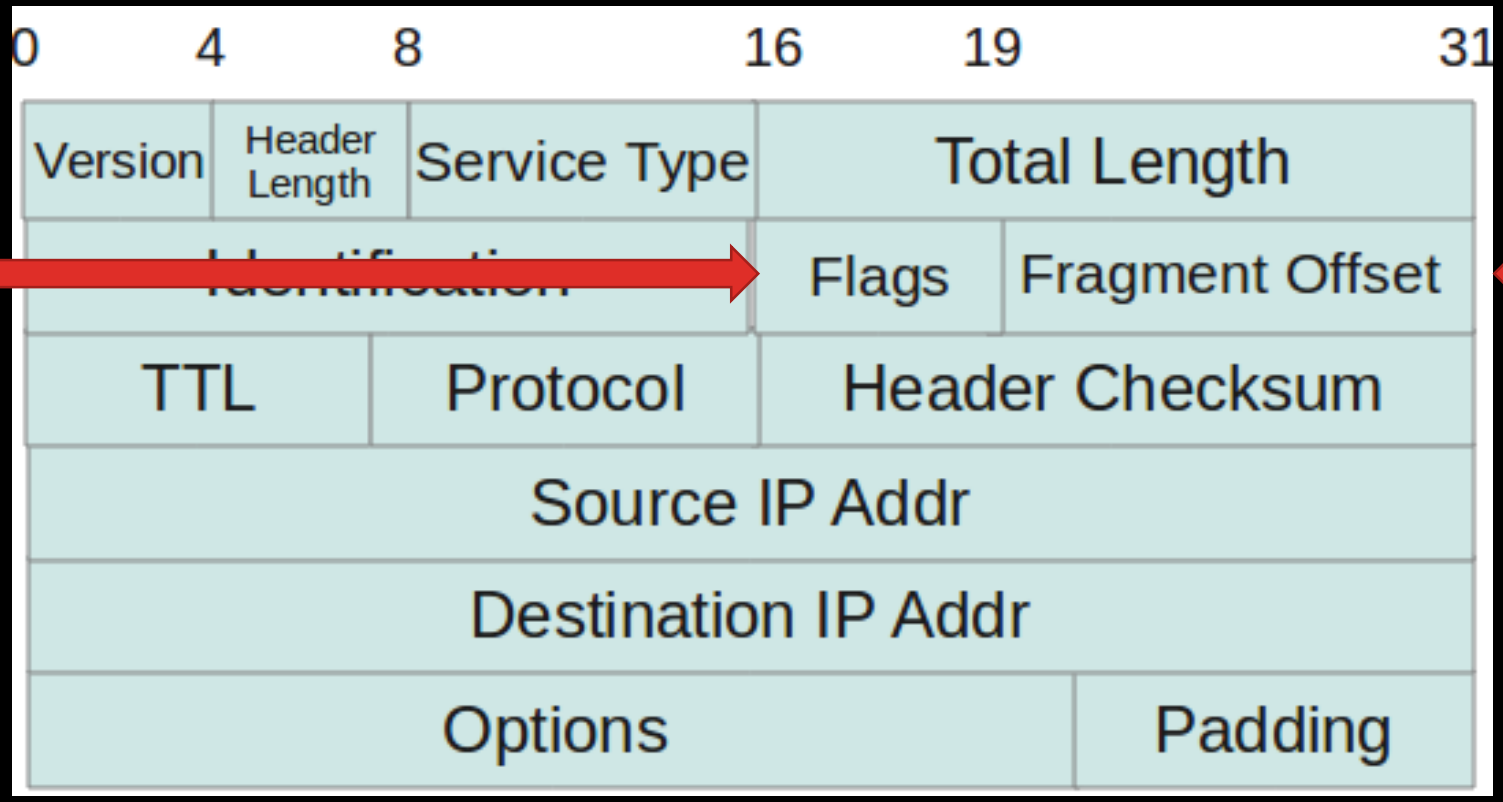


Fragmentation offset value to reassemble data.

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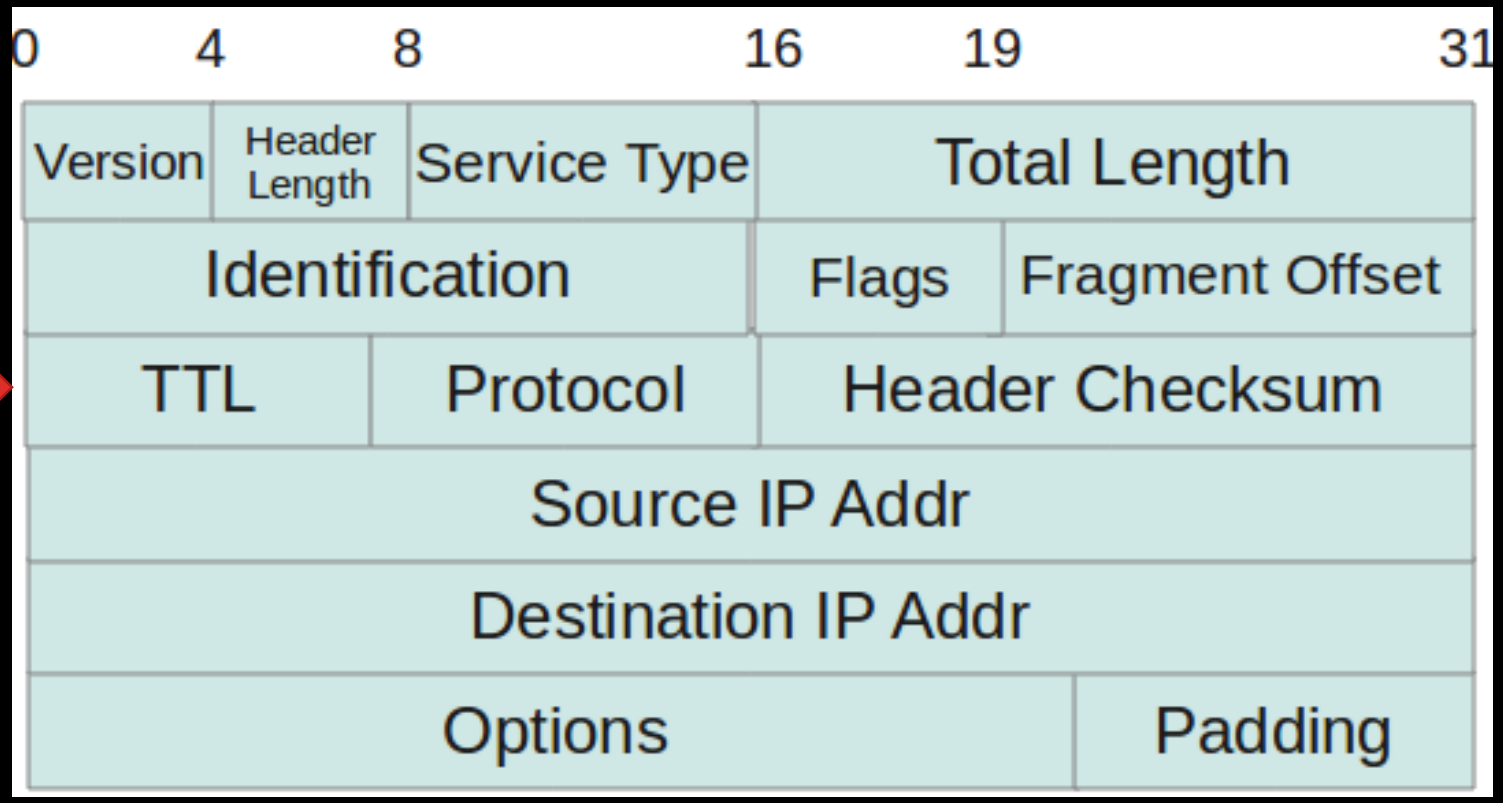
Time To Live => Number of hops allowed.



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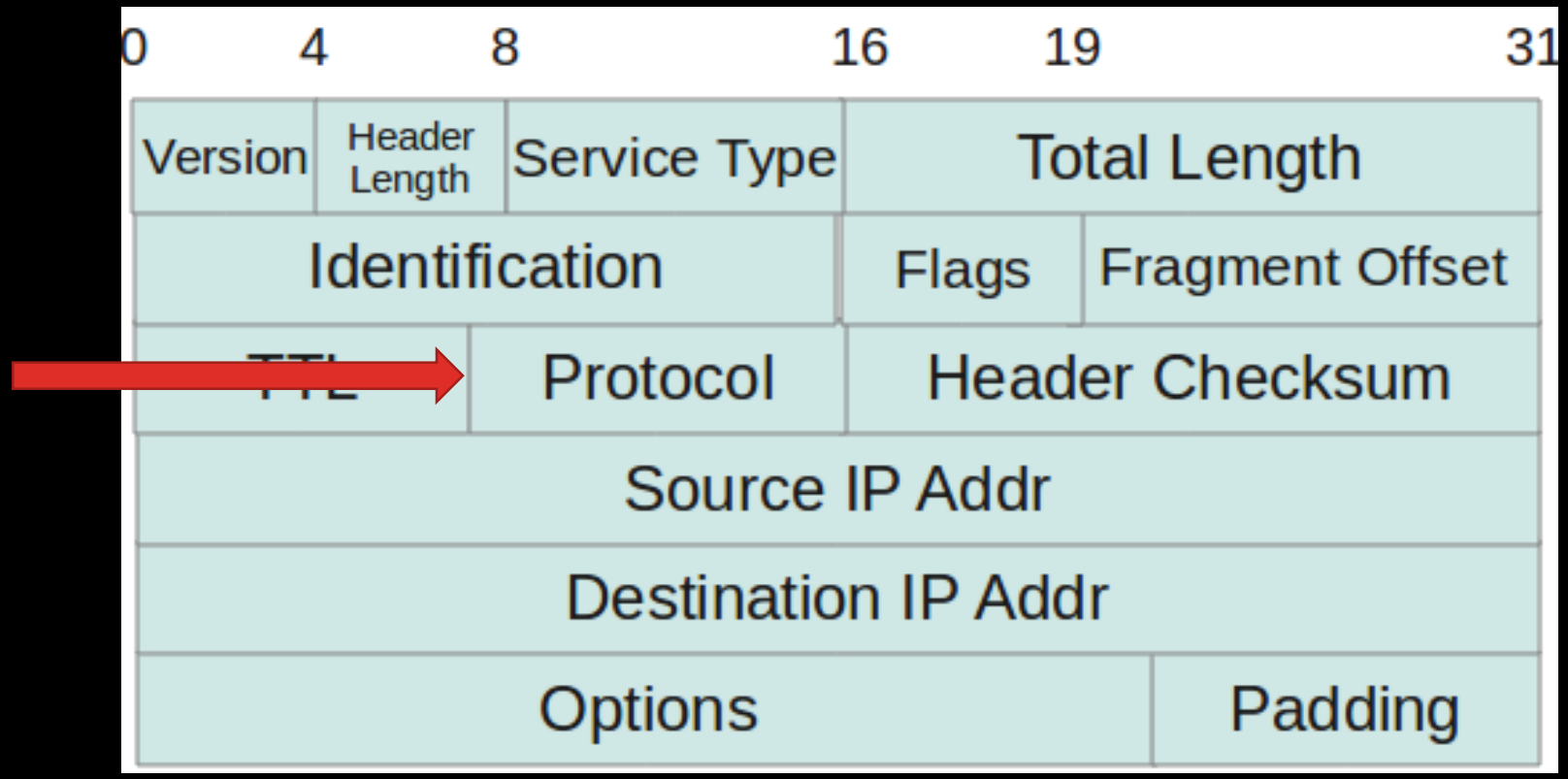
TCP

UDP



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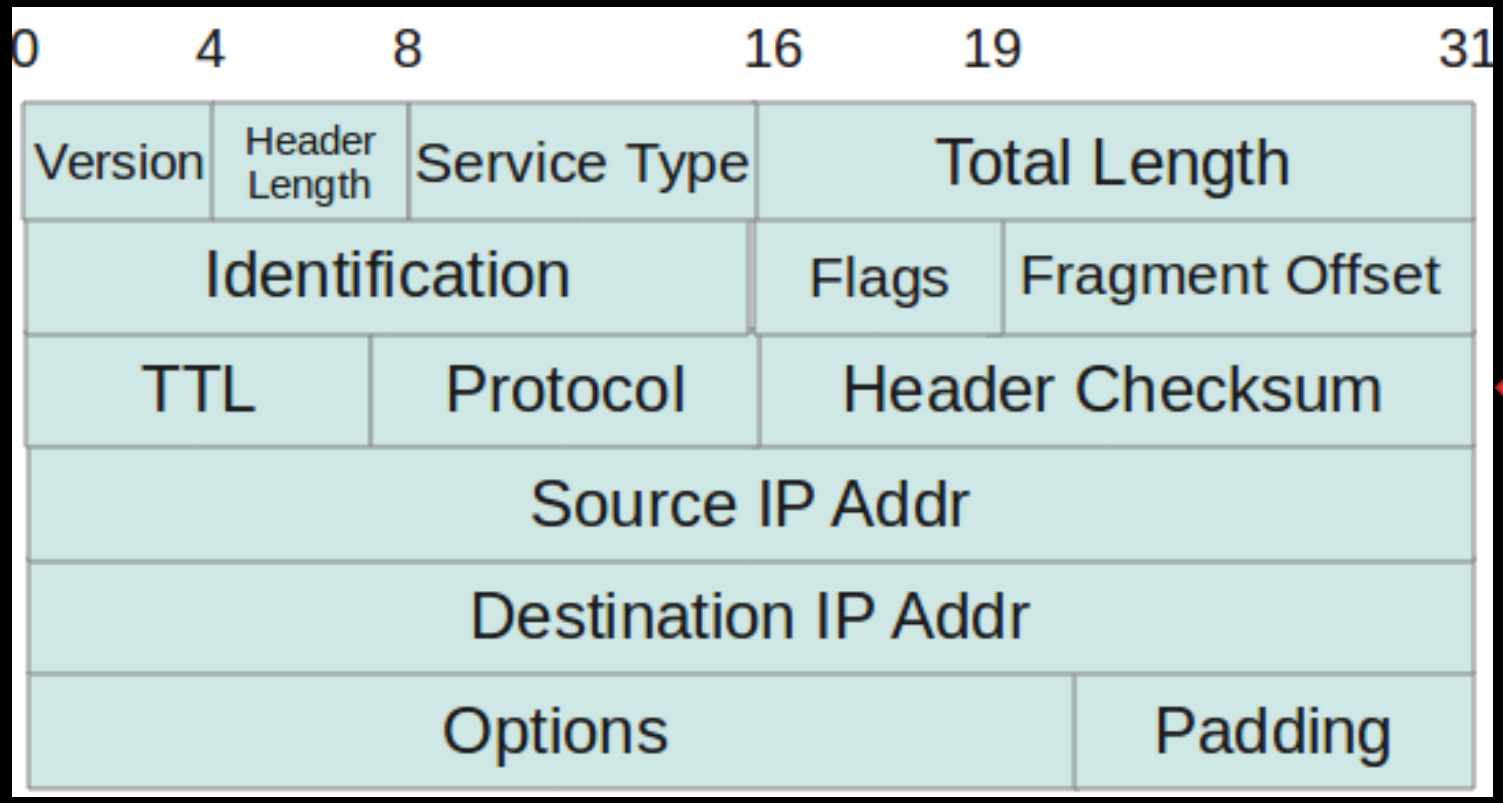


Error Detection

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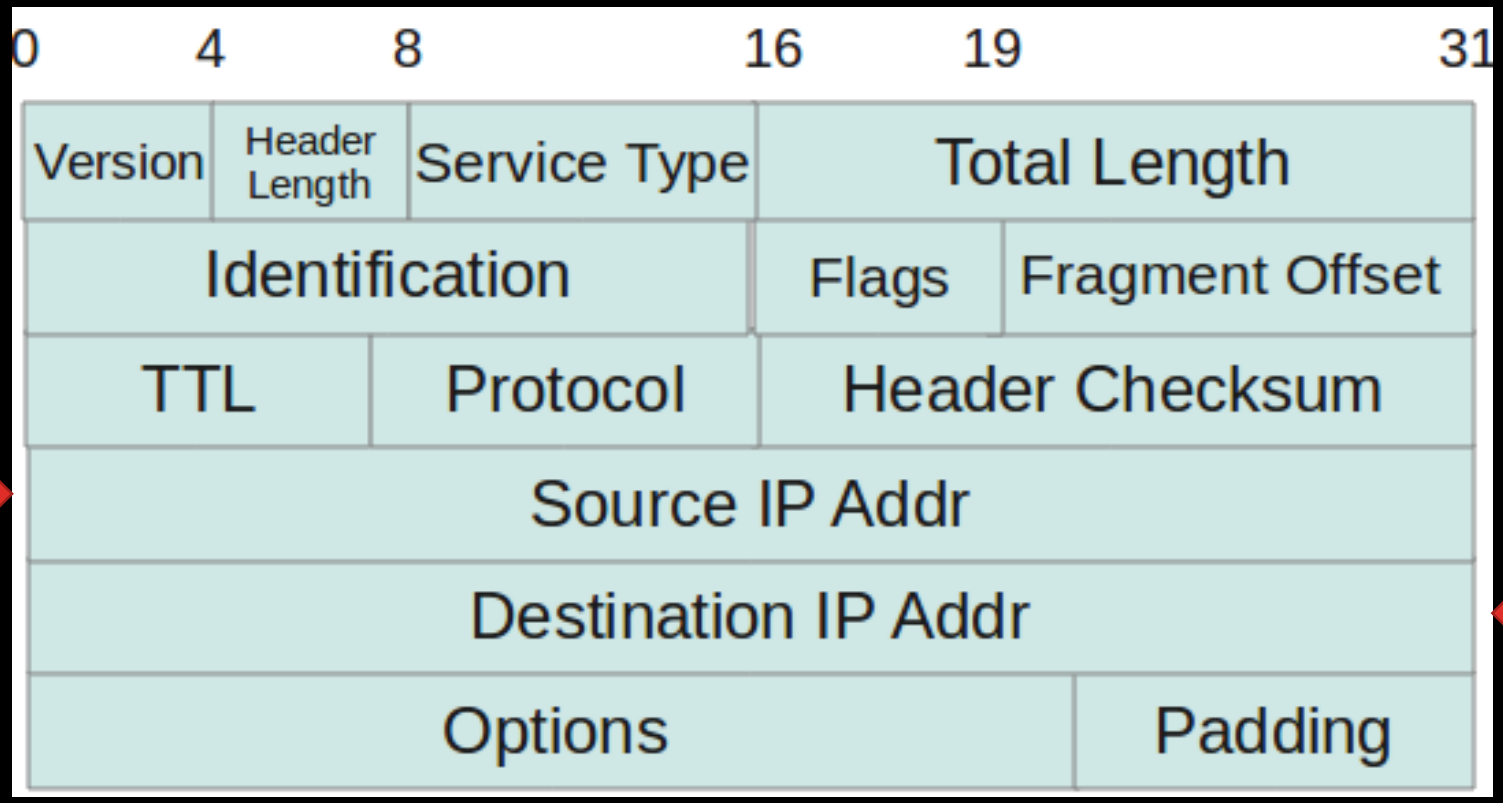


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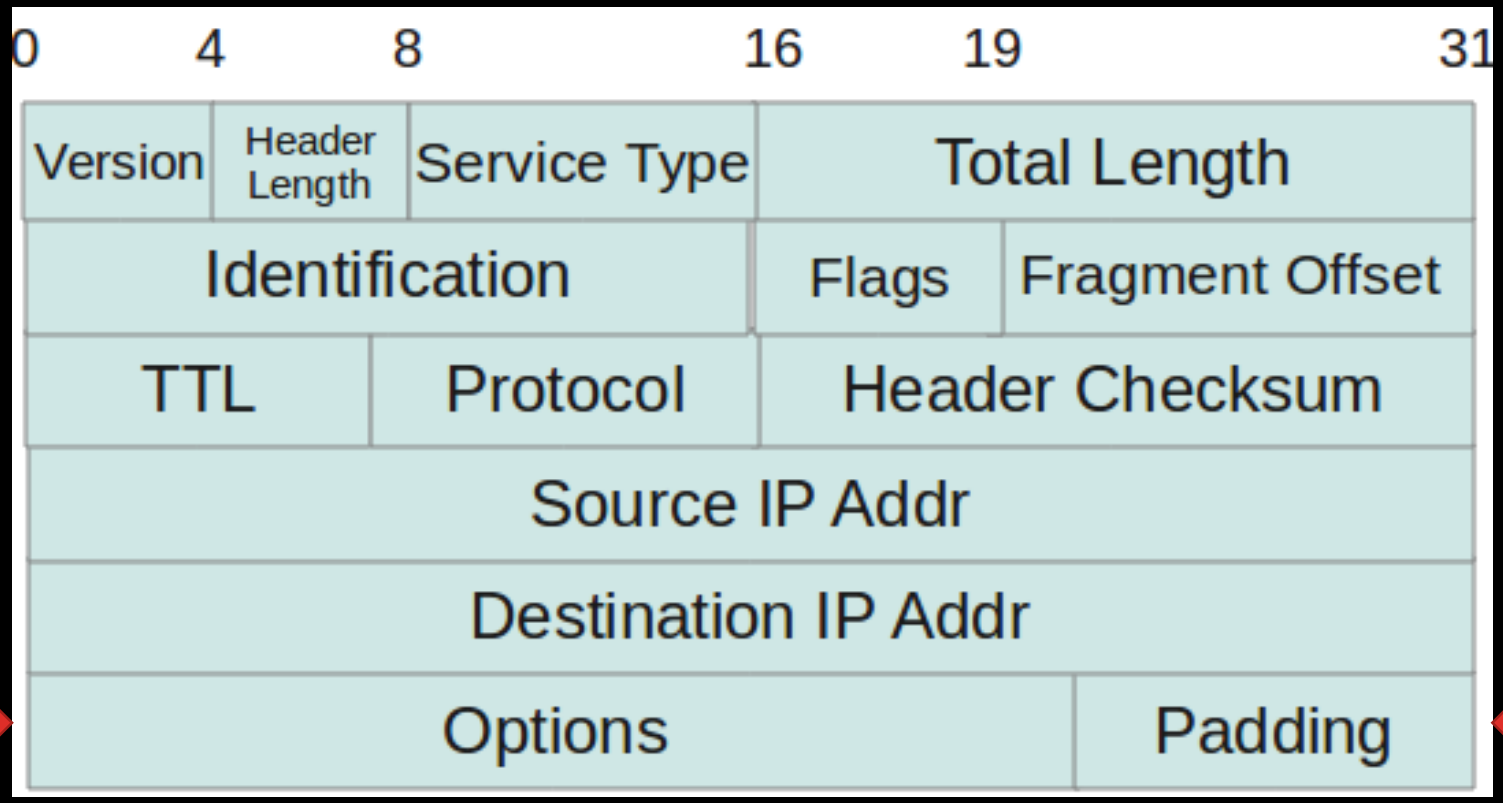


Optional flags for testing

Padding to Options field

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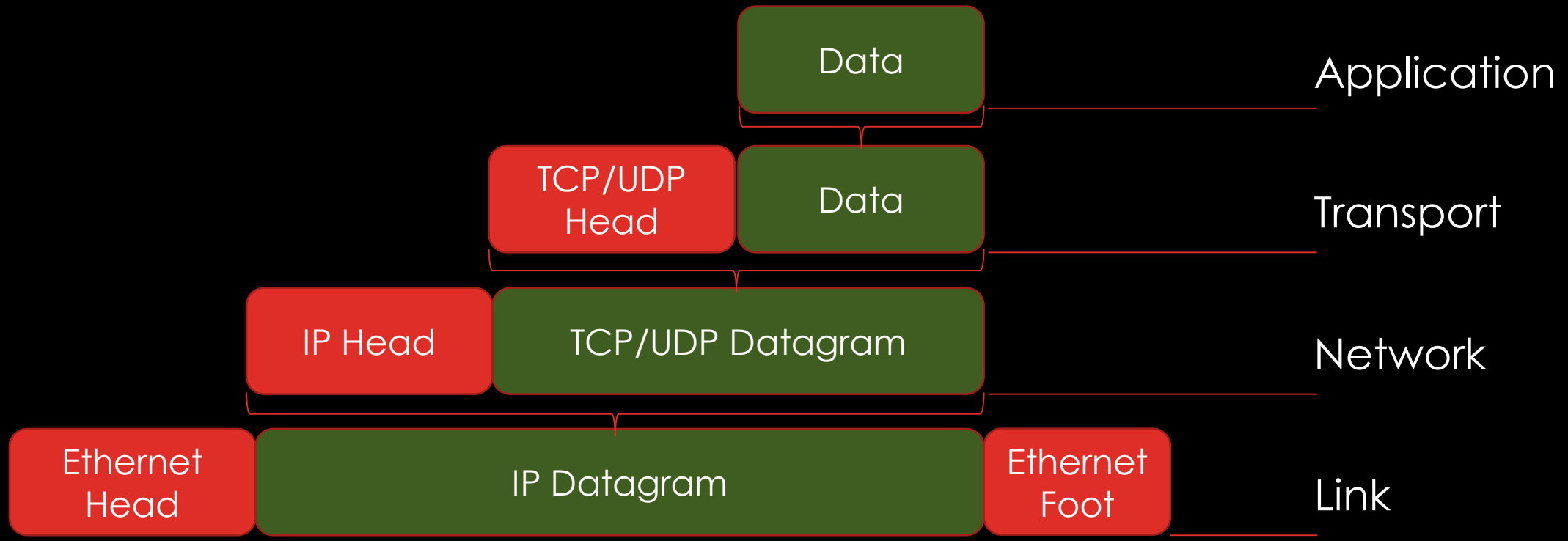
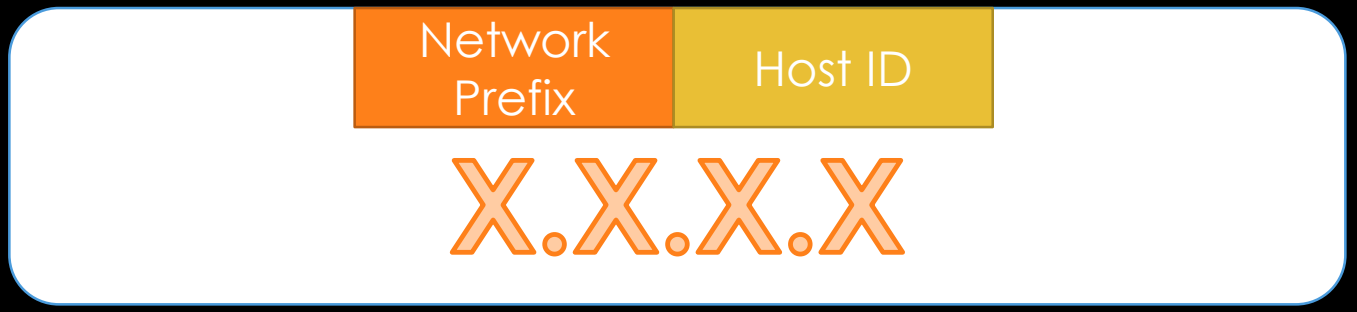


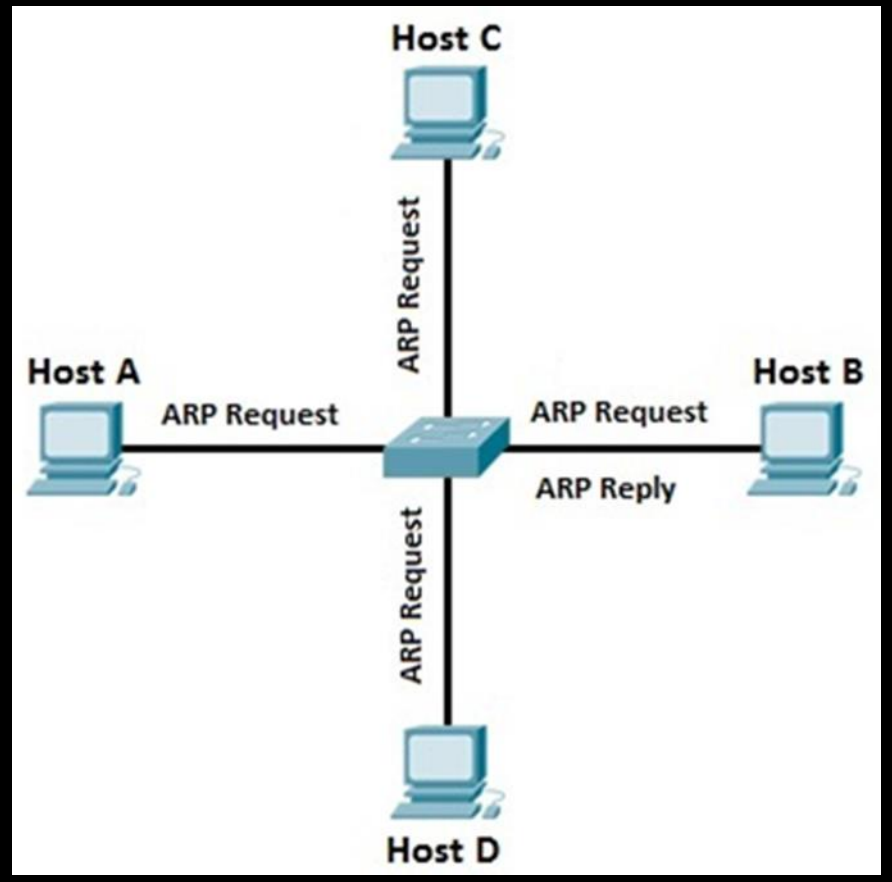
# IP ADDRESS CLASSES




| | | | |
|---|---|---|---|
| **A** | **N.H.H.H** | **0 – 126** | **16 Million** |
| **B** | **N.N.H.H** | **128 – 191** | **65000** |
| **C** | **N.N.N.H** | **192 – 223** | **254** |
| **D** | **Multicast** | **224 – 239** | **-** |
| **E** | **Testing & Research** | **240 - 255** | **-** |
| Class | IP address split | Range 1st octet | Host per network |

# HOW IP ADDRESS & MAC ADDRESS RELATES TO EACH OTHER?

- Address Resolution Protocol (ARP)



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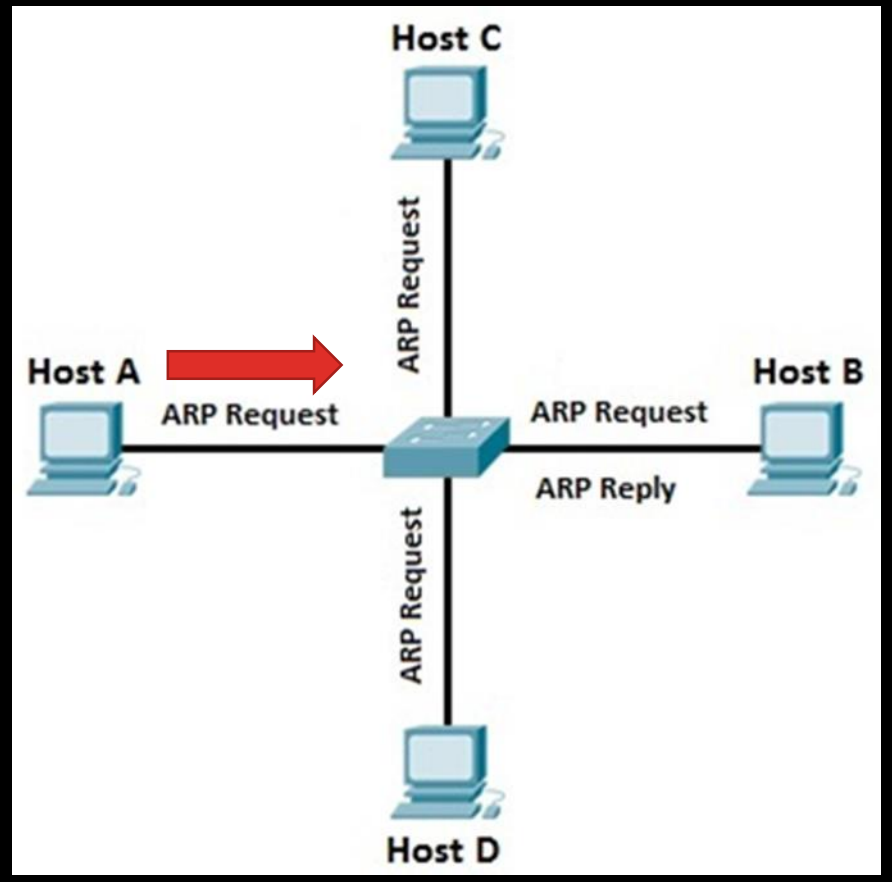


- Send ARP request

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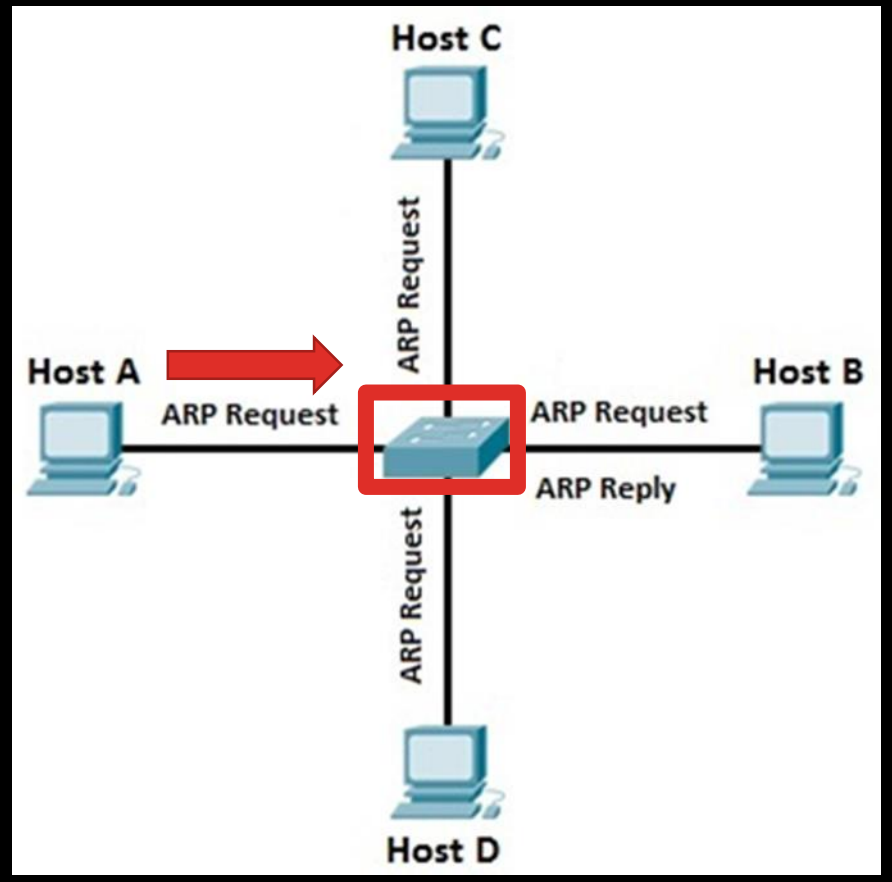


- Send ARP request
- Check ARP table.

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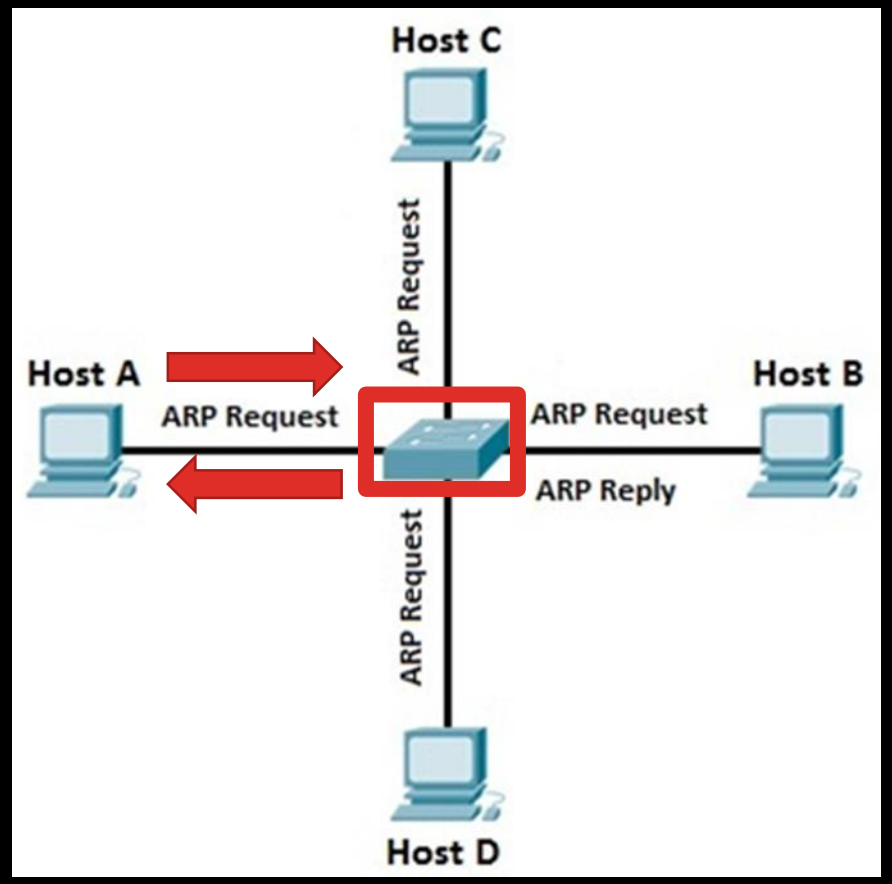


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    - Return with destination MAC address.

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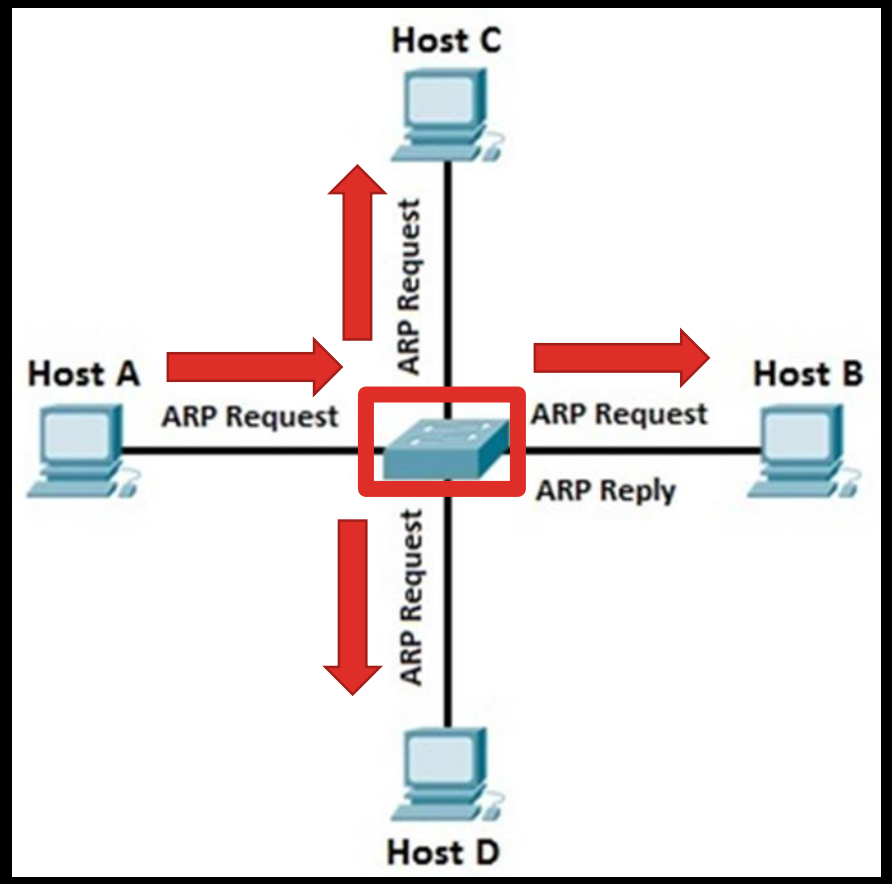


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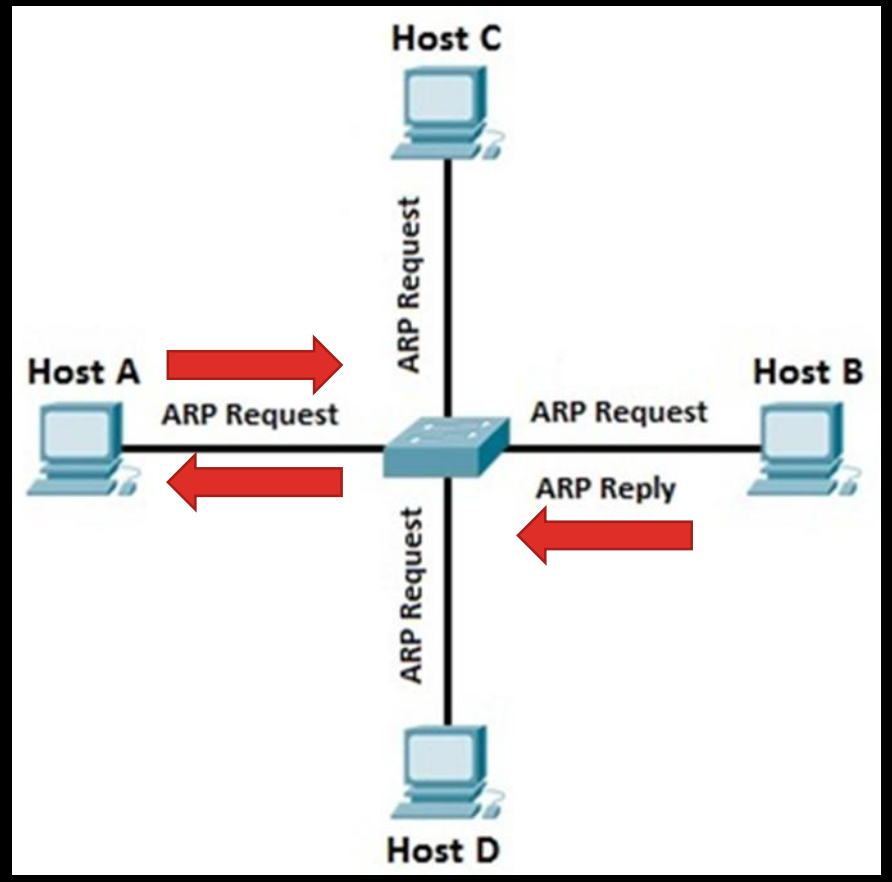


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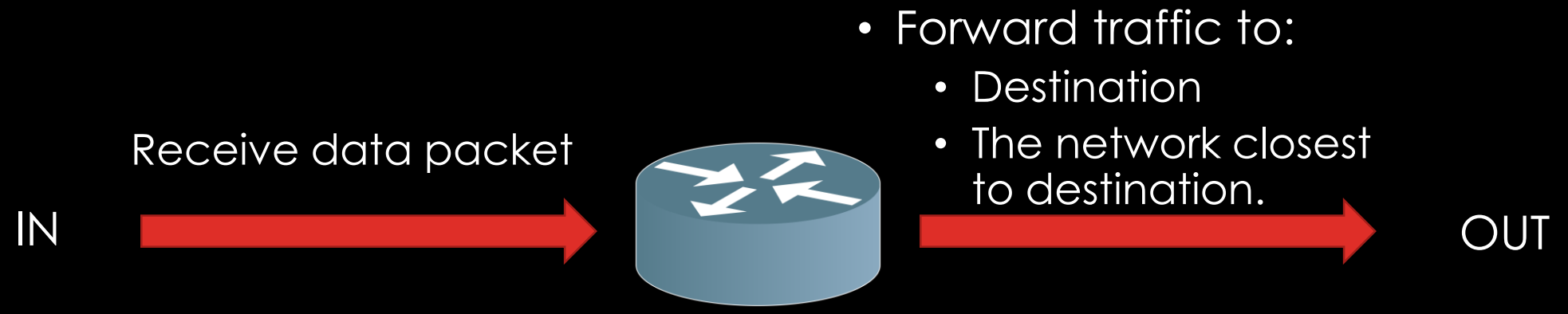
  - Otherwise
    - MAC Broadcast address (FF-FF-FF-FF-FF-FF)
- ARP response with destination MAC address.
  - Update ARP table.

# ROUTING

- Router is a network device that forwards traffic depending upon destination address of traffic.
  - Find most effective path from source to destination.




- Forward traffic to:
  - Destination
  - The network closest to destination.

- Examine destination IP.
- Look up for destination network in routing table