

Network Layer



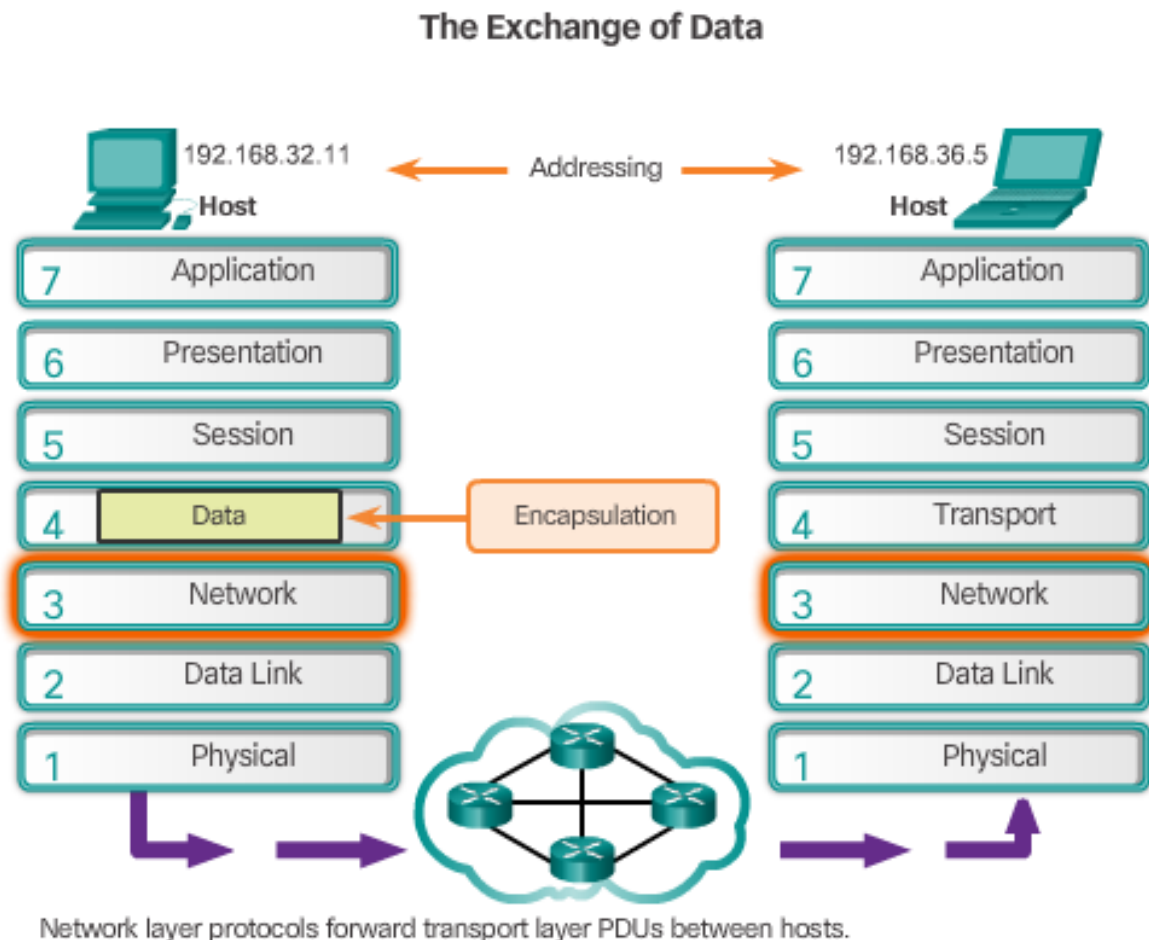
Network Layer in Communication



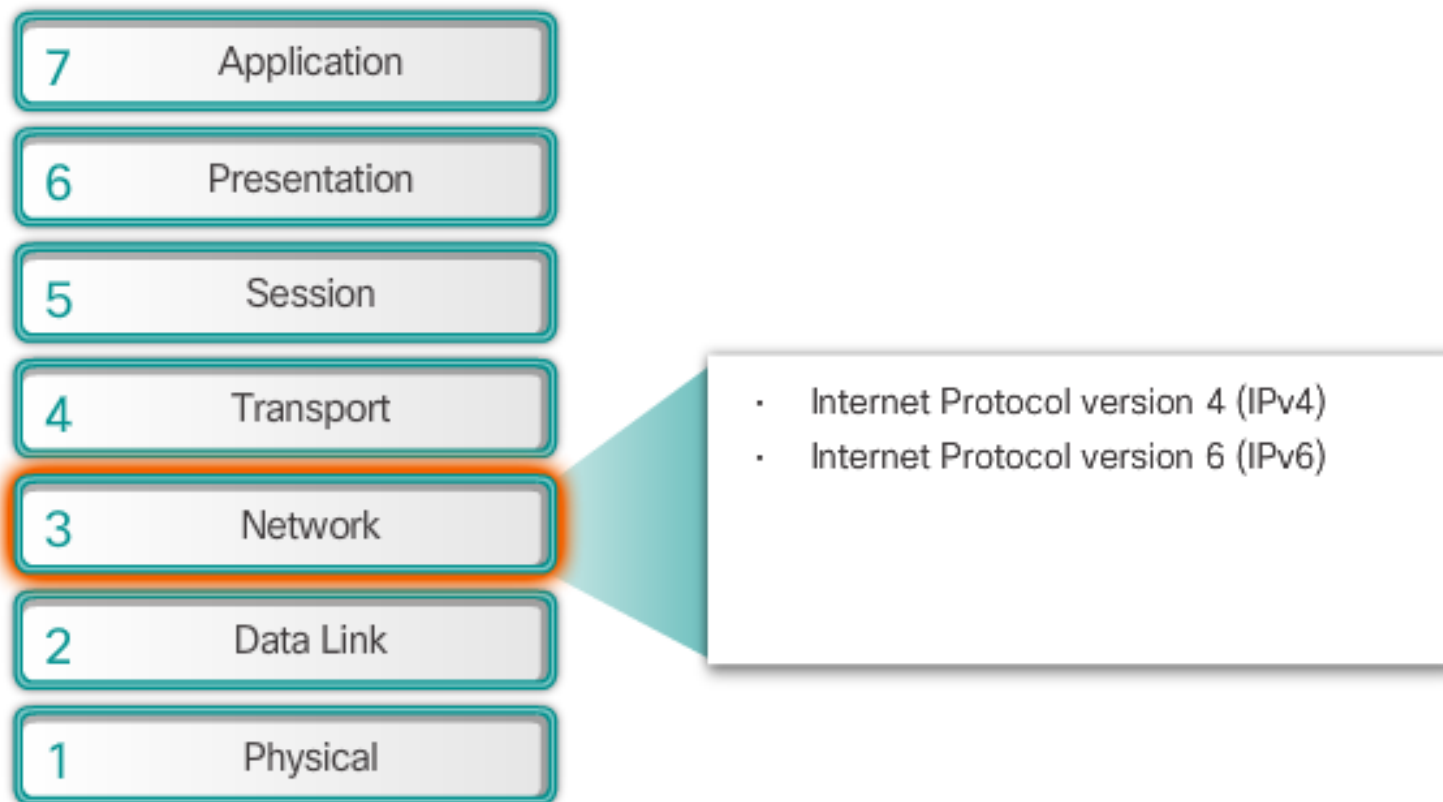
The Network Layer

End to End Transport processes

- Addressing end devices
- Encapsulation
- Routing
- De-encapsulating



Network Layer Protocols

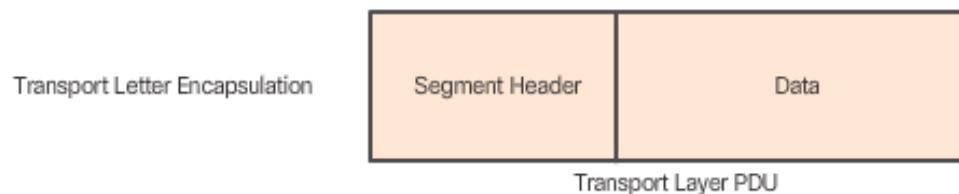


Characteristics of the IP Protocol



Encapsulating IP

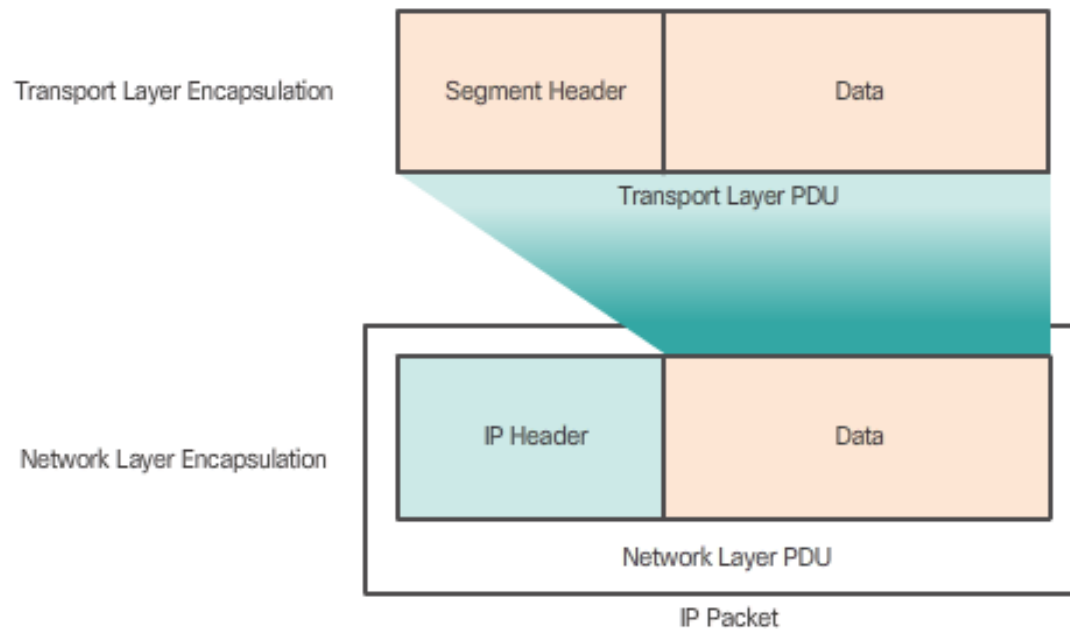
Transport Layer PDU = Segment



The transport layer adds a header so segments can be reassembled at the destination.

Encapsulating IP (cont.)

Network Layer PDU = IP Packet

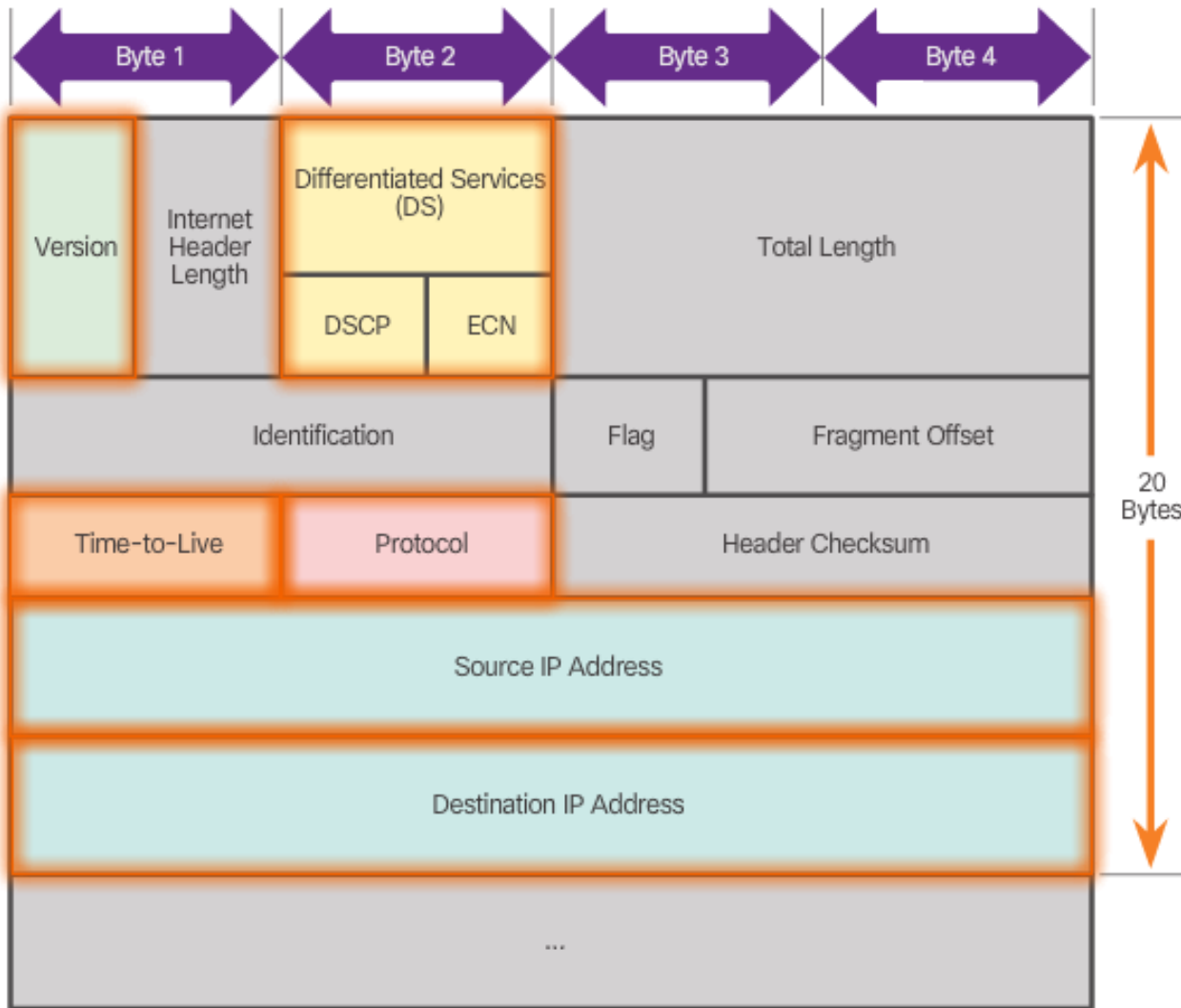


The network layer adds a header so packets can be routed through complex networks and reach their destination. In TCP/IP based networks, the network layer PDU is the IP Packet.

IPv4 Packet



IPv4 Packet Header



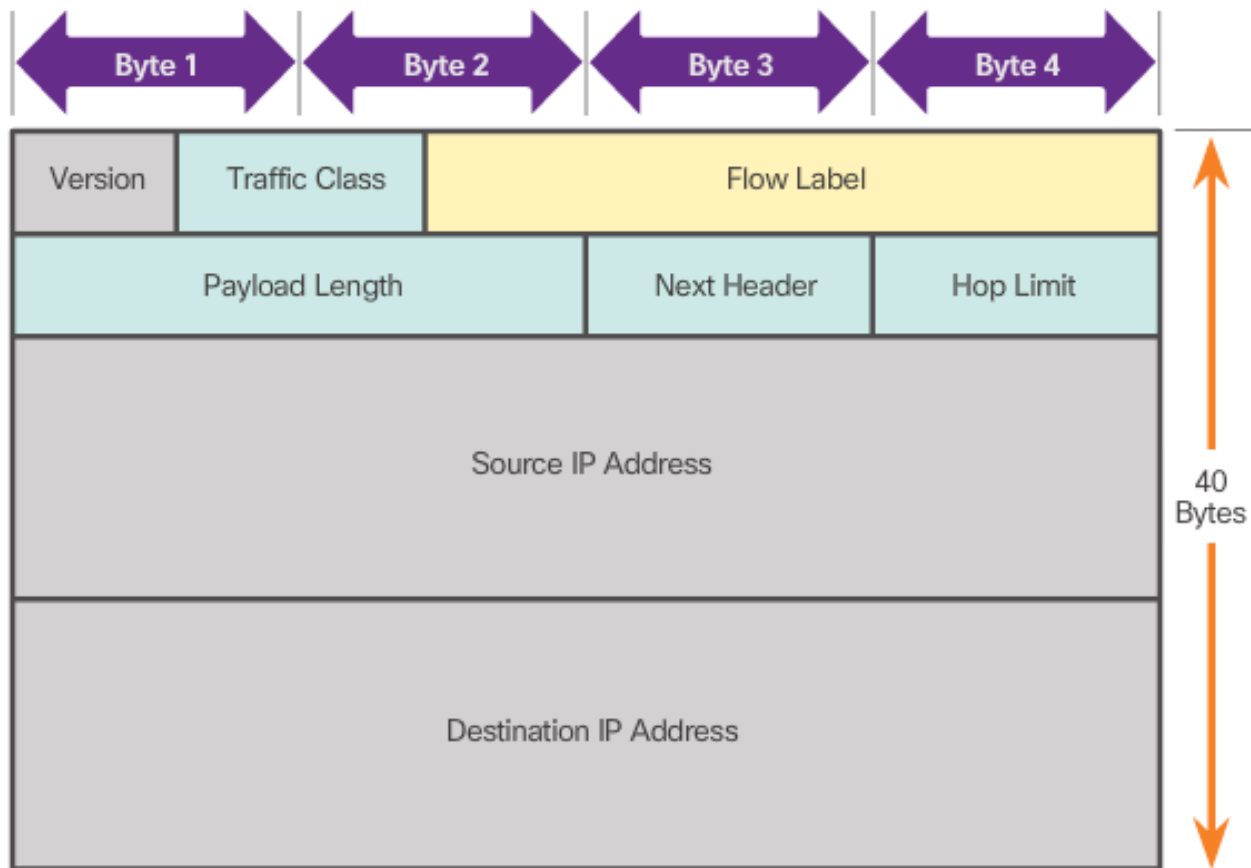
- Version = 0100
- DS = Packet Priority
- TTL = Limits life of Packet
- Protocol = Upper layer protocol such as TCP
- Source IP Address = source of packet
- Destination IP Address = destination of packet

IPv6 Packet



IPv6 Packet Header

Fields in the IPv6 Packet Header



- Version = 0110
- Traffic Class = Priority
- Flow Label = same flow will receive same handling
- Payload Length = same as total length
- Next Header = Layer 4 Protocol
- Hop Limit = Replaces TTL field

Routing

A Router is a Computer/Router CPU and OS

Routers require:

- Central processing units (CPUs)
- Operating systems (OSs)

Memory consisting of:

- Random-access memory (RAM)
 - Read-only memory (ROM)
 - Nonvolatile random-access memory (NVRAM)
 - Flash
- The Cisco Internetwork Operating System (IOS) is the system software used for most Cisco devices regardless of the size and type of the device.

Routing Algorithms

Divided into two categories

- Static (Non adaptive)
- Dynamic (Adaptive)

Examples:

Shortest path routing

Distance vector routing

Link state routing