

1) How long is an IPV6 header? What are the different fields on header? What is the purpose of each header field?

➔ The IPv6 header has a fixed length of 40 bytes (320 bits).

➔ The different header field and the purposes of each of their header fields are as follows:

- **Version (4 bits):** Indicates the IP version (always 6 for IPv6)
- **Traffic Class (8 bits):** Used for quality of service (QOS) marking to prioritize certain types of traffic. It consists of two subfields:

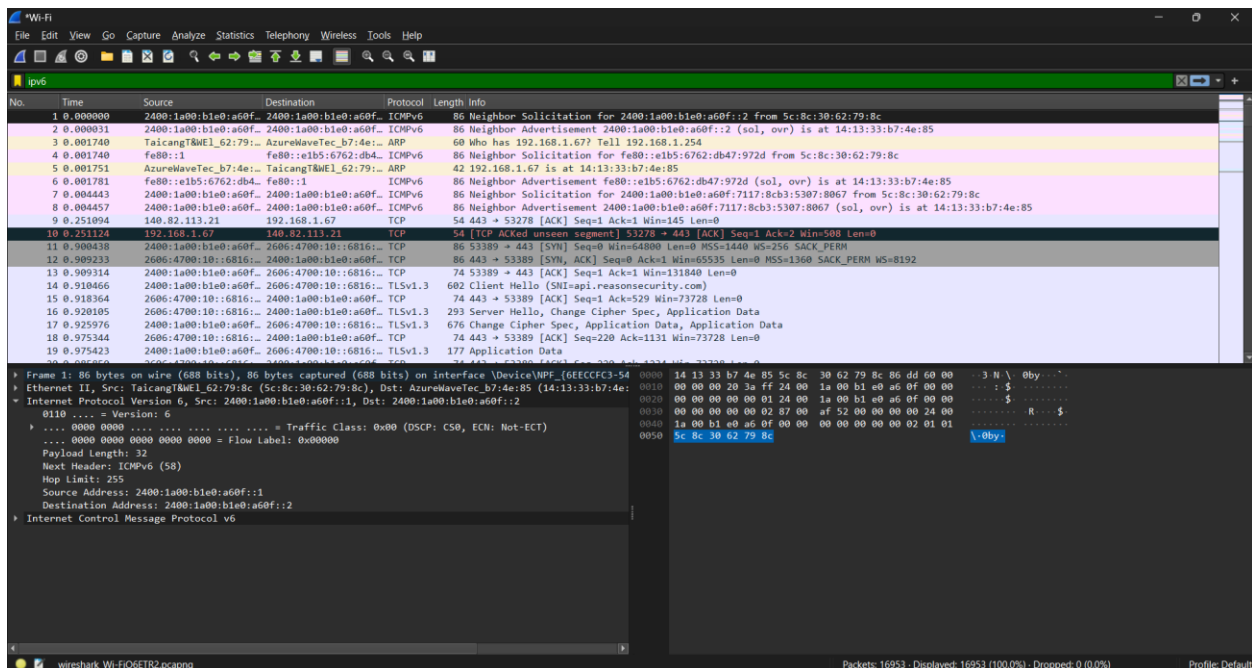
**Differentiated Services (DS) field:** 6 bits for traffic classification.

**Explicit Congestion Notification (ECN) field:** 2 bits for indicating network congestion.

- **Flow Label (20 bits):** Helps identify packets belonging to the same flow, useful for real-time applications and maintaining packet order.
- **Payload Length (16 bits):** Specifies the size of the data (payload) following the header, excluding the header itself.
- **Next Header (8 bits):** Indicates the type of the next header (e.g., TCP, UDP, or an extension header).
- **Hop Limit (8 bits):** Decrements at each router; if it reaches zero, the packet is discarded, preventing endless loops.

- **Source Address (128 bits):** The IPv6 address of the sending host.
- **Destination Address (128 bits):** The IPv6 address of the receiving host or the next-hop router.

2) In Wireshark locate an IPv6 packet and discuss the header present.



## IPv6 Header Fields

### 1. Version (4 bits)

- **Value:** 6
- **Explanation:** This field indicates the version of the IP protocol. The value 6 signifies that this is an IPv6 packet.

## 2. Traffic Class (8 bits)

- **Value:** 0x00 (DSCP: CS0, ECN: Not-ECT)
- **Explanation:** This field is used for QoS (Quality of Service) and congestion control. DSCP (Differentiated Services Code Point) is set to 0, indicating default forwarding. ECN (Explicit Congestion Notification) is not used (Not-ECT).

## 3. Flow Label (20 bits)

- **Value:** 0x000000
- **Explanation:** The Flow Label field is used for labeling packets belonging to the same flow. In this case, the value is 0, indicating no special flow handling.

## 4. Payload Length (16 bits)

- **Value:** 32
- **Explanation:** This field indicates the length of the payload (data) in bytes. The value 32 means that the payload of this IPv6 packet is 32 bytes long.

## 5. Next Header (8 bits)

- **Value:** 58 (ICMPv6)
- **Explanation:** The Next Header field specifies the type of the header immediately following the IPv6 header. The value 58 corresponds to ICMPv6 (Internet Control Message Protocol for IPv6).

## 6. Hop Limit (8 bits)

- **Value:** 255
- **Explanation:** This field is analogous to the TTL (Time to Live) field in IPv4. It indicates the maximum number of hops (routers) the packet can pass through before being discarded. The value 255 is the maximum possible value,

meaning this packet can travel through up to 255 routers.

**7. Source Address (128 bits)**

- **Value:** 2400:1a00:b1e0:a60f::1
- **Explanation:** This is the IPv6 address of the originator of the packet.

**8. Destination Address (128 bits)**

- **Value:** 2400:1a00:b1e0:a60f::2
- **Explanation:** This is the IPv6 address of the intended recipient of the packet.