## 7th Assignment

WRC078BEI048

How long is an IPv6 header?

The IPv6 header is 40 bytes long. Unlike the IPv4 header, the IPv6 header has a fixed length, which simplifies processing by network devices.

What are the different fields in the header? What is the purpose of each header field?

The IPv6 header fields and their purposes are as follows:

Version (4 bits):

Purpose: Identifies the IP protocol version. For IPv6, this field is always set to 6.

Traffic Class (8 bits):

Purpose: Used for Quality of Service (QoS) to differentiate and prioritize types of traffic, indicating the packet's priority and managing traffic congestion.

Flow Label (20 bits):

Purpose: Labels packets belonging to the same flow that require special handling by routers, such as real-time service or resource reservation.

Payload Length (16 bits):

Purpose: Specifies the length of the payload, including any extension headers, in bytes. It does not include the 40-byte base header. The maximum value is 65,535 bytes.

Next Header (8 bits):

Purpose: Identifies the type of header immediately following the IPv6 header. This could be an upper-layer protocol (like TCP, UDP) or an extension header (such as Routing, Fragmentation, or Destination Options). Values correspond to different protocols and extension headers, similar to the Protocol field in IPv4.

Hop Limit (8 bits):

Purpose: Similar to the TTL (Time to Live) field in IPv4, this field specifies the maximum number of hops the packet can traverse. Each router that forwards the packet decrements this value by one, and the packet is discarded when it reaches zero.

Source Address (128 bits / 16 bytes):

Purpose: The IPv6 address of the originating node, indicating where the packet is coming from.

Destination Address (128 bits / 16 bytes):

Purpose: The IPv6 address of the destination node, indicating where the packet is headed.

In Wireshark, locate an IPv6 packet and discuss the header fields.

IPv6 header fields with their values and purposes are:

Version (4 bits):

Value: 6/0110

Purpose: Indicates the IP version, which is IPv6 in this case.

Traffic Class (8 bits):

Value: 0x00 (DSCP: CS0, ECN: Not-ECT)

Purpose: Used for QoS (Quality of Service) to differentiate and prioritize types of traffic.

Flow Label (20 bits):

Value: 0x5f9a9 (393481 in decimal)

Purpose: Labels packets belonging to the same flow that require special handling by routers, such as real-time service or resource reservation.

Payload Length (16 bits):

Value: 76

Purpose: Specifies the length of the payload, including any extension headers, in bytes. It does not include the 40-byte base header.

Next Header (8 bits):

Value: 17 (UDP)

Purpose: Identifies the type of header immediately following the IPv6 header. In this case, it's UDP.

Hop Limit (8 bits):

Value: 1

Purpose: Specifies the maximum number of hops the packet can traverse. Each router that forwards the packet decrements this value by one, and the packet is discarded when it reaches zero.

Source Address (128 bits / 16 bytes):

Value: fe80::4319:9907:3fc7:9fa4

Purpose: The IPv6 address of the originating node.

Destination Address (128 bits / 16 bytes):

Value: ff02::fb

Purpose: The IPv6 address of the destination node