Assignment 02

IP HEADER

Header information at the beginning of an IP packet

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1. IP HEADER

Header information at the beginning of an IP packet

An **IP header** is a prefix to an IP packet that contains information about the IP version, length of the packet, source and destination IP addresses, etc. It consists of the following fields:

Version (4 bits)	Header length (4 bits)	Priority and Type of Service (8 bits)	Total length (16 bits)
Identification (16 bits)		Flags (3 bits)	Fragmented offset (13 bits)
Time to live (8 bits)	Protocol (8 bits)	Header checksum (16 bits)	
Source IP address (32 bits)			
Destination IP address (32 bits)			
Options (up to 32 bits)			

Here is a description of each field:

1.1 Version

The version of the IP protocol. For IPv4, this field has a value of 4.

1.2 Header length

The length of the header in 32-bit words. The minimum value is 20 bytes, and the maximum value is 60 bytes.

1.3 Priority and Type of Service

Specifies how the datagram should be handled. The first 3 bits are the priority bits.

1.4 Total length

The length of the entire packet (header + data). The minimum length is 20 bytes, and the maximum is 65,535 bytes.

1.5 Identification

Used to differentiate fragmented packets from different datagrams.

1.6 Flags

Used to control or identify fragments.

1.7 Fragmented offset

Used for fragmentation and reassembly if the packet is too large to put in a frame.

1.8 Time to live

Limits a datagram’s lifetime. If the packet doesn’t get to its destination before the TTL expires, it is discarded.

1.9 Protocol

Defines the protocol used in the data portion of the IP datagram. For example, TCP is represented by the number 6 and UDP by 17.

1.10 Header checksum

Used for error-checking of the header. If a packet arrives at a router and the router calculates a different checksum than the one specified in this field, the packet will be discarded.

1.11 Source IP address

The IP address of the host that sent the packet.

1.12 Destination IP address

The IP address of the host that should receive the packet.

1.13 Options

Used for network testing, debugging, security, and more. This field is usually empty.