

CSET2200 - Lecture 7

Review/Questions

IPv4 Packet Format

- ▶ Header
 - ▶ Length Variable
 - ▶ Minimum length 5 32 bit words (20 bytes)
 - ▶ Max length 15 words (60 bytes)
- ▶ Followed by data (Not included in checksum)

IPv4 Packet Header

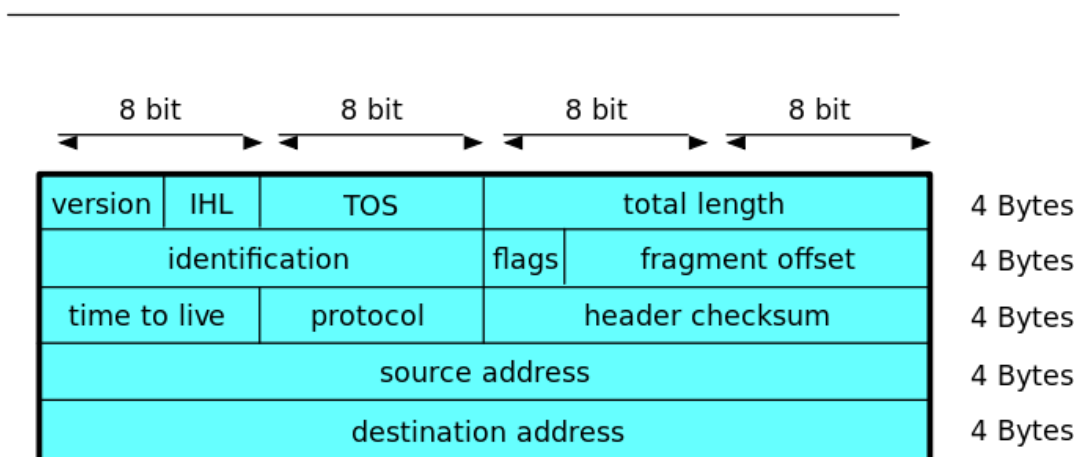


Figure 1: IPv4 Header

IPv4 Packet Header

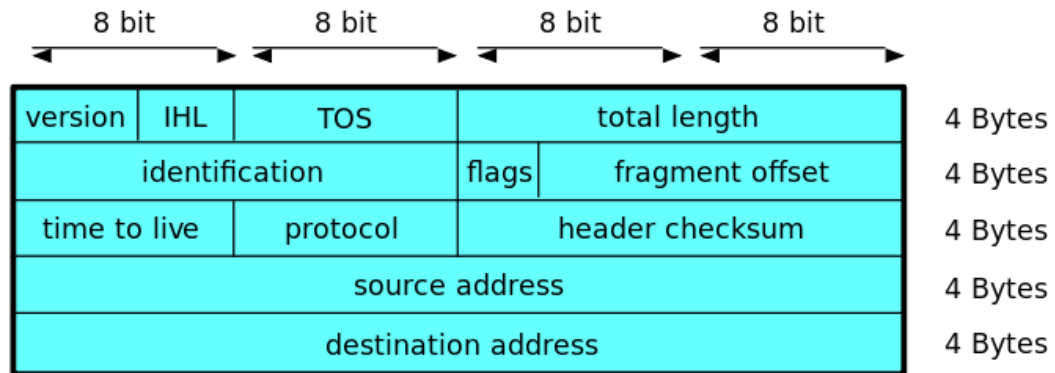


Figure 2: Version

- ▶ 4 bit field - always 4 for IPv4

IPv4 Packet Header

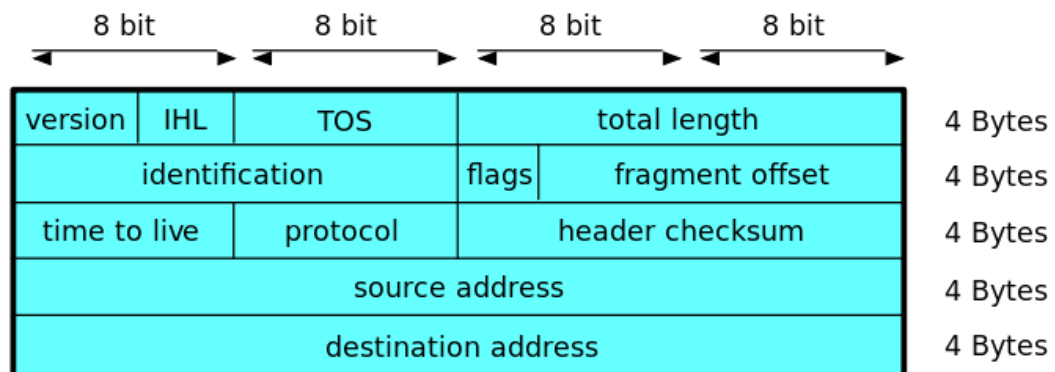


Figure 3: IHL

- ▶ Internet Header Length - length of header in words
- ▶ 4 bits
- ▶ Min 5, max 15

IPv4 Packet Header

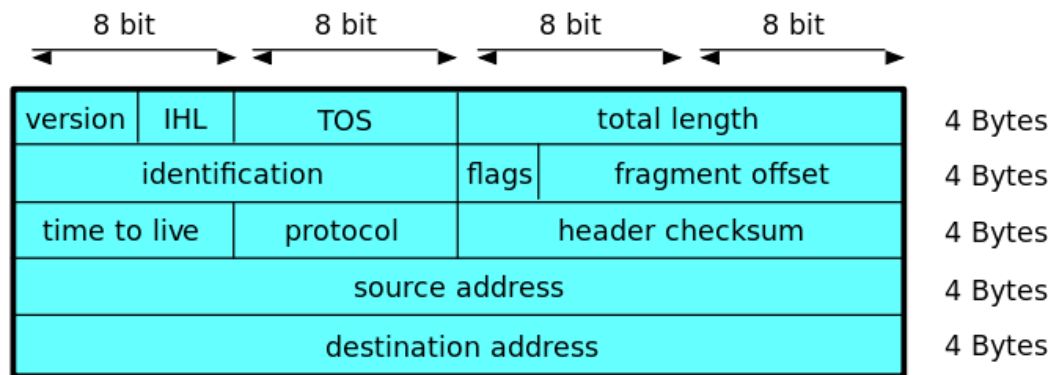


Figure 4: TOS

- ▶ 8 bit field - Type of Service
- ▶ Used by Quality of Service

IPv4 Packet Header

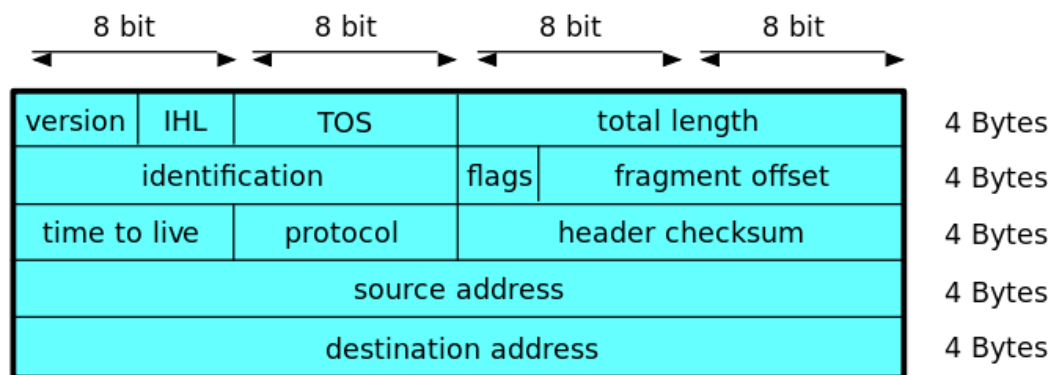


Figure 5: Total Length

- ▶ 16 bit field - Total packet length
- ▶ Min 20, Max 65535

IPv4 Packet Header

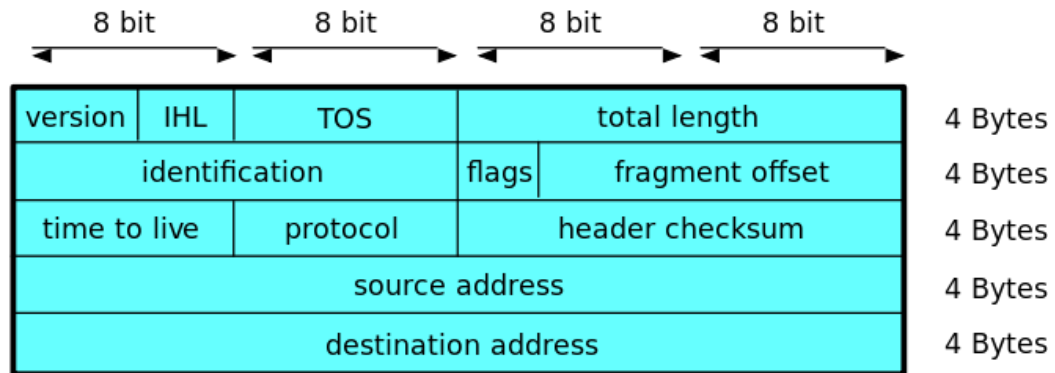


Figure 6: Identification

- ▶ 16 bit field - Used for fragment identification

IPv4 Packet Header

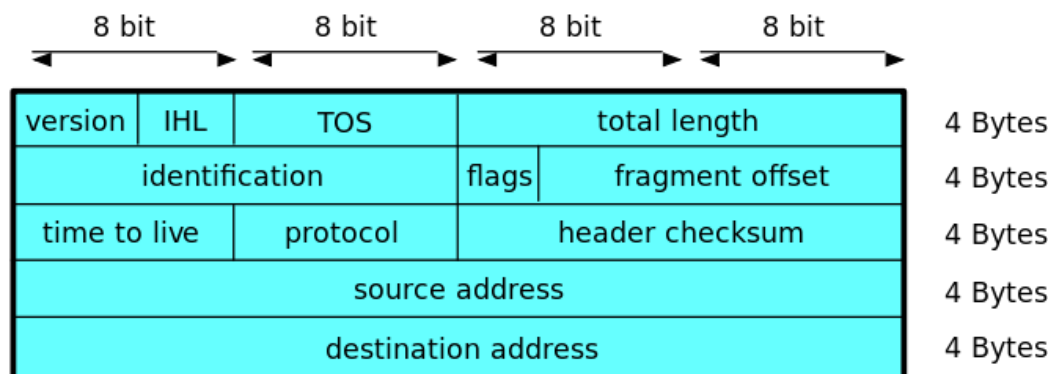


Figure 7: Flags

- ▶ 3 bits - bit 1 always 0
- ▶ bit 2 Do Not Fragment
- ▶ bit 3 More Fragments

IPv4 Packet Header

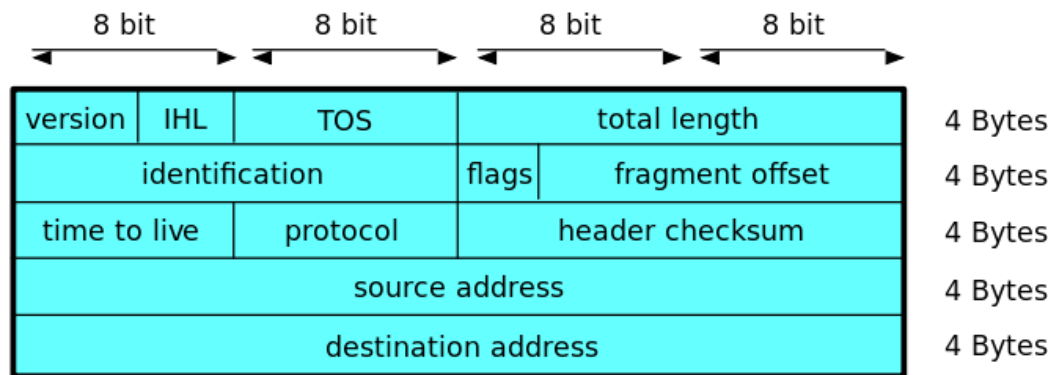


Figure 8: Fragment Offset

- ▶ 13 bits
- ▶ Measures fragment offset in 8 byte increments

IPv4 Packet Header

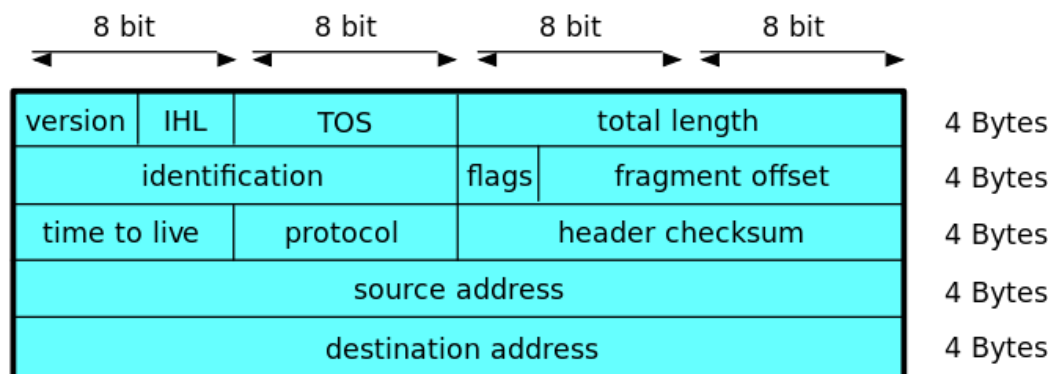


Figure 9: TTL

- ▶ 8 bits - Time to Live
- ▶ Decrements 1 with each hop
- ▶ Helps prevent loops

IPv4 Packet Header

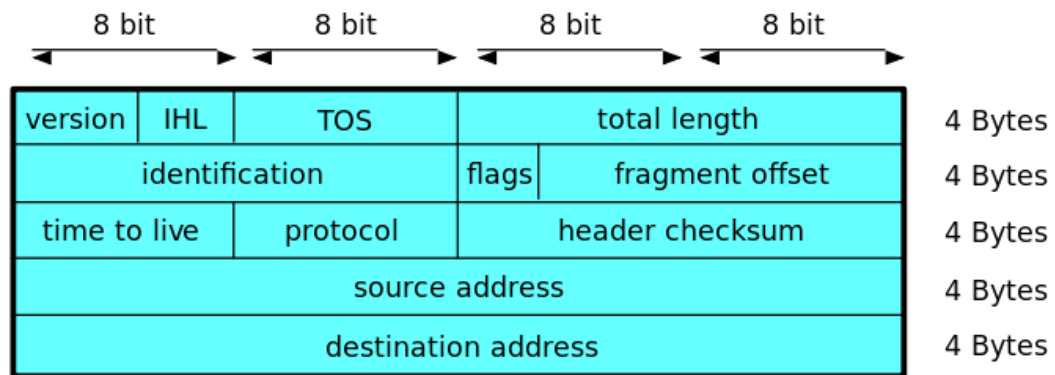


Figure 10: Protocol

- ▶ 8 bits
- ▶ Represents protocol on top of IP
- ▶ List maintained by IANA

IPv4 Packet Header

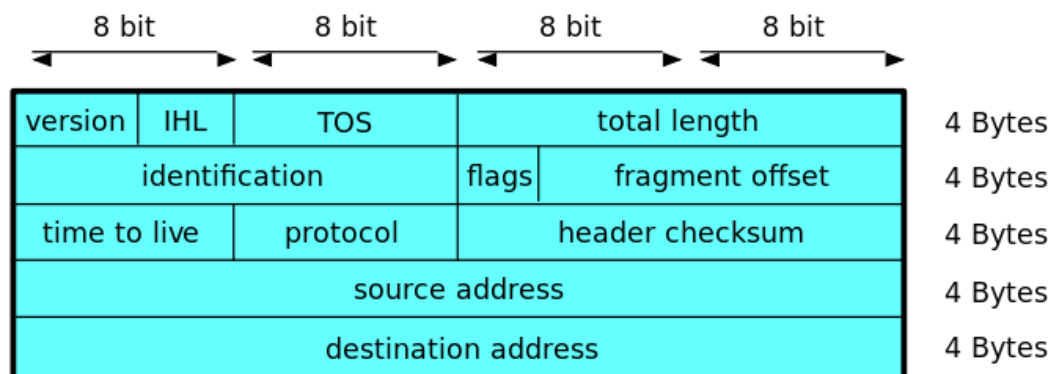


Figure 11: Checksum

- ▶ 16 bits
- ▶ Only calculated on header
- ▶ Due to TTL, rewritten every hop

IPv4 Packet Header

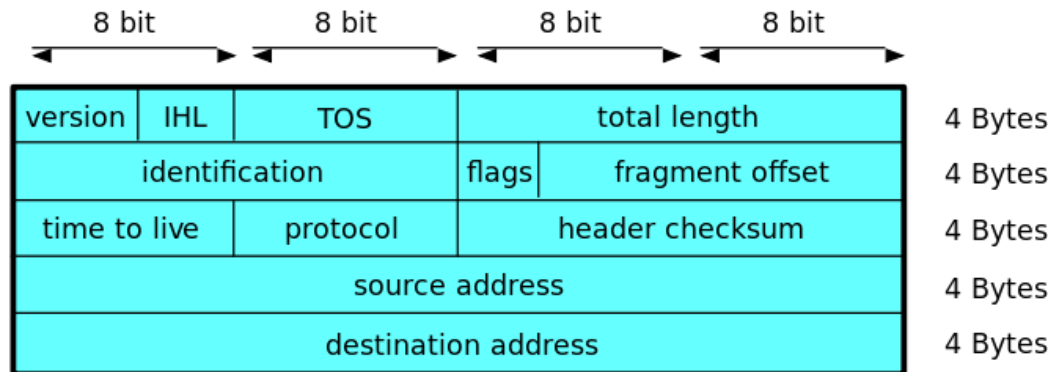


Figure 12: Source Address

- ▶ 32 bit
- ▶ Source address

IPv4 Packet Header

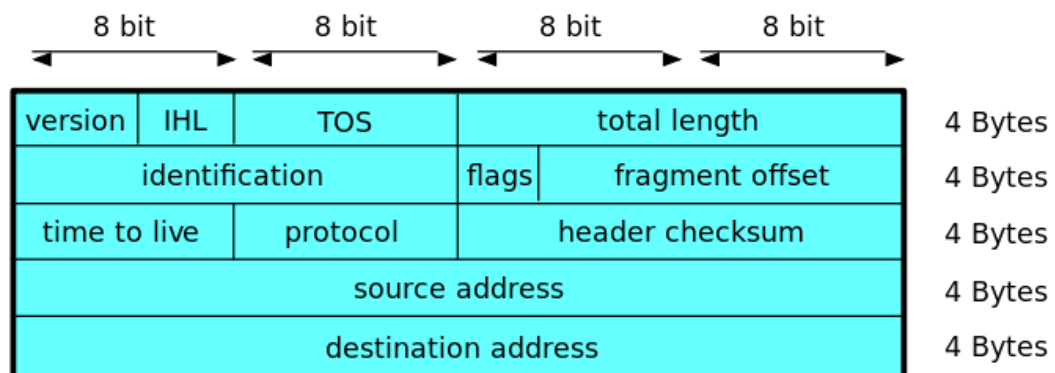


Figure 13: Destination Address

- ▶ 32 bit
- ▶ Destination address

IPv4 Packet Header

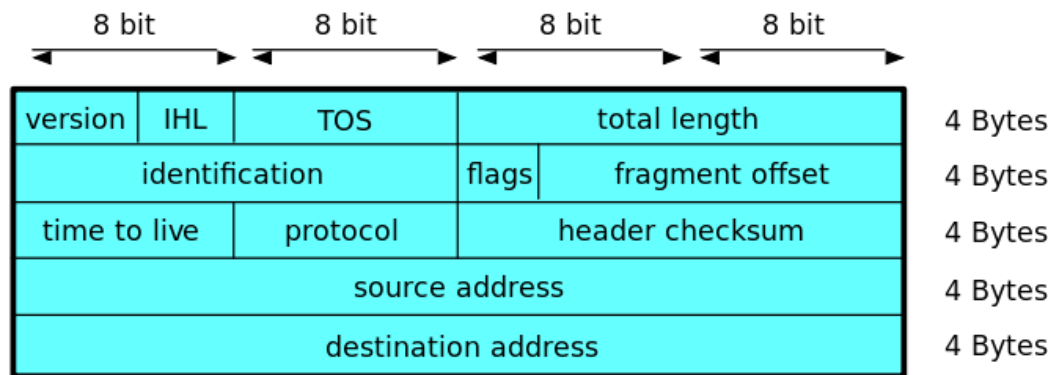


Figure 14: Options

- ▶ Varied length depending on IHL
- ▶ Rarely used
- ▶ Many Routers block

Examples packets

Subnets

- ▶ “Host” section labels host
- ▶ “Network” section labels networks
- ▶ Use a subnet mask to separate the two

Subnet Masks

- ▶ Binary Mask shows network vs host
- ▶ 1 indicates network
- ▶ 0 host
- ▶ Also written as dotted quad

Subnet Mask Examples

- ▶ 255.255.255.0 - Class C
- ▶ 11111111 11111111 11111111 00000000
- ▶ 255.255.0.0 - Class B
- ▶ 11111111 11111111 00000000 00000000
- ▶ 255.0.0.0 - Class A
- ▶ 11111111 00000000 00000000 00000000

Written Examples - Questions

Networks and Hosts

- ▶ Hosts all on the same local logical layer 2
- ▶ Networks are collections of hosts
- ▶ How do we connect them

Routing

- ▶ Process of getting packets between networks
- ▶ Performed by routers
- ▶ L3 Switches are a type of router

Example

- ▶ DIAGRAM HERE

Route Tables

- ▶ Contain networks and destinations
- ▶ ex: 192.168.50.0 255.255.255.0 -> 192.168.49.1
- ▶ Default written as 0.0.0.0 with a mask of 0.0.0.0

Route tables (contd)

- ▶ Built manually (called static)
- ▶ May also be built by a routing protocol
- ▶ We won't focus on routing protocols but may touch

Examples

Questions

Next - VLSM Part 1 - Chapter 21