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

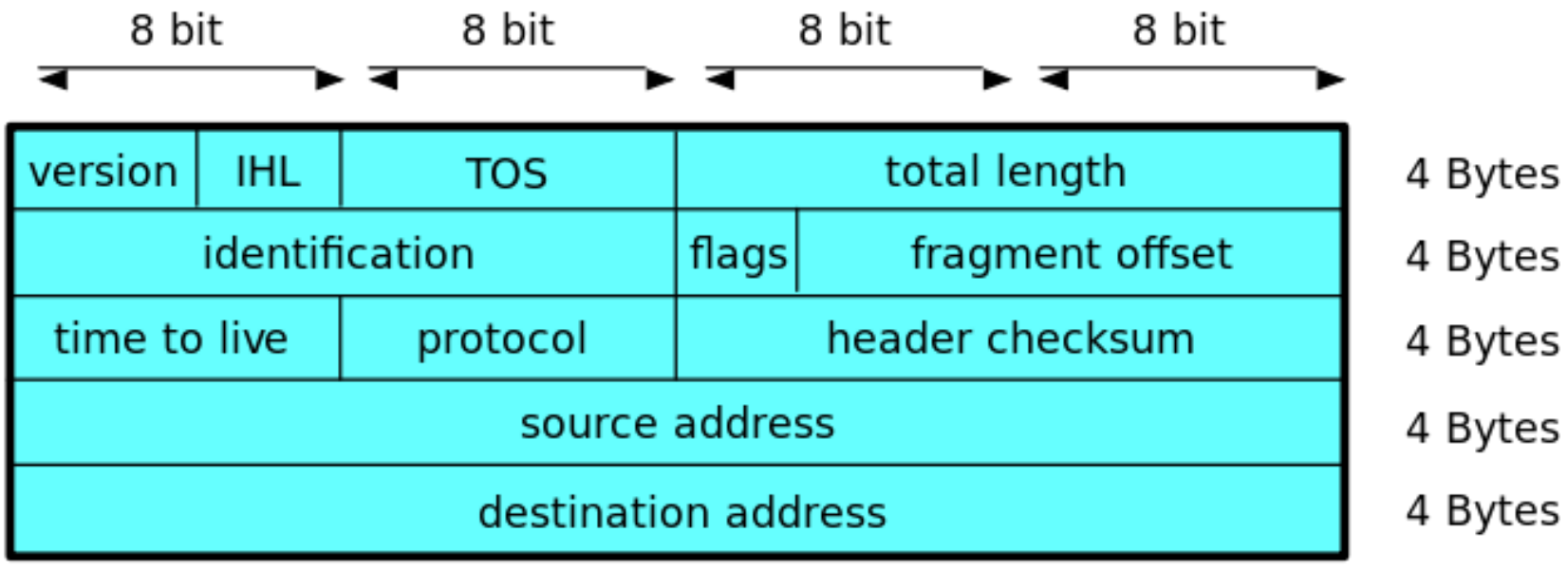

Figure 1: IPv4 Header

IPv4 Packet Header

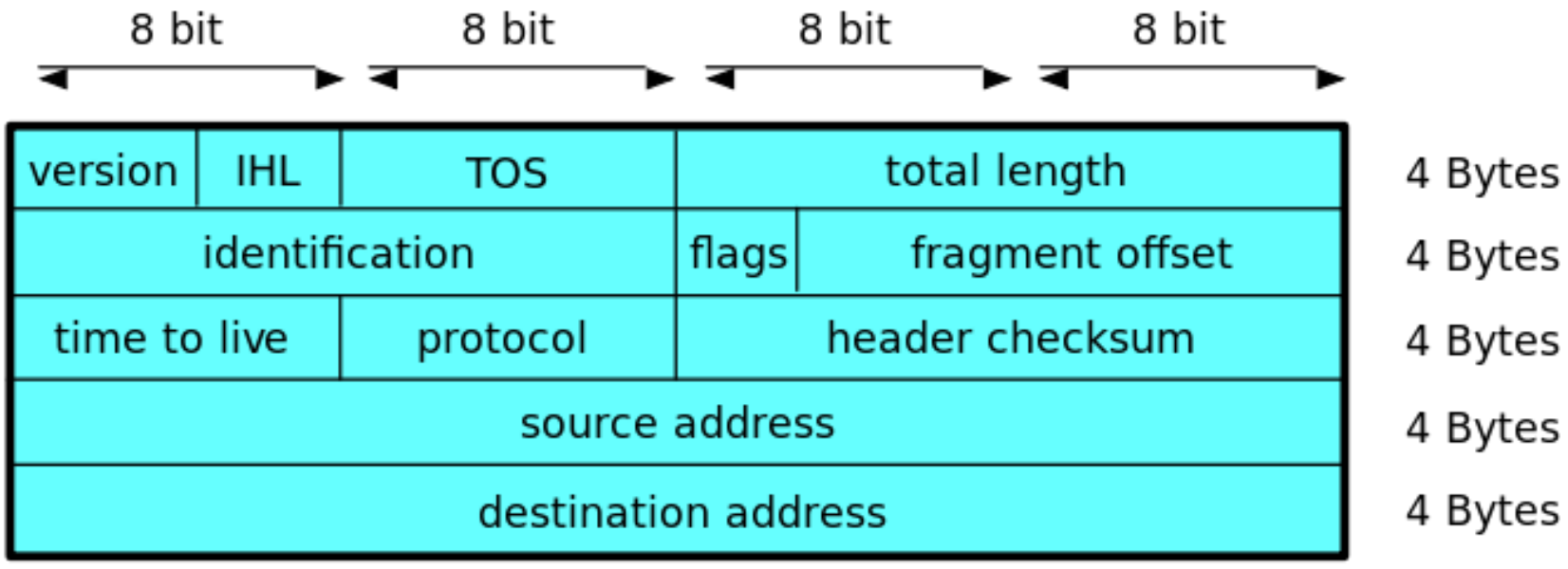

Figure 2: Version

- 4 bit field - always 4 for IPv4

IPv4 Packet Header

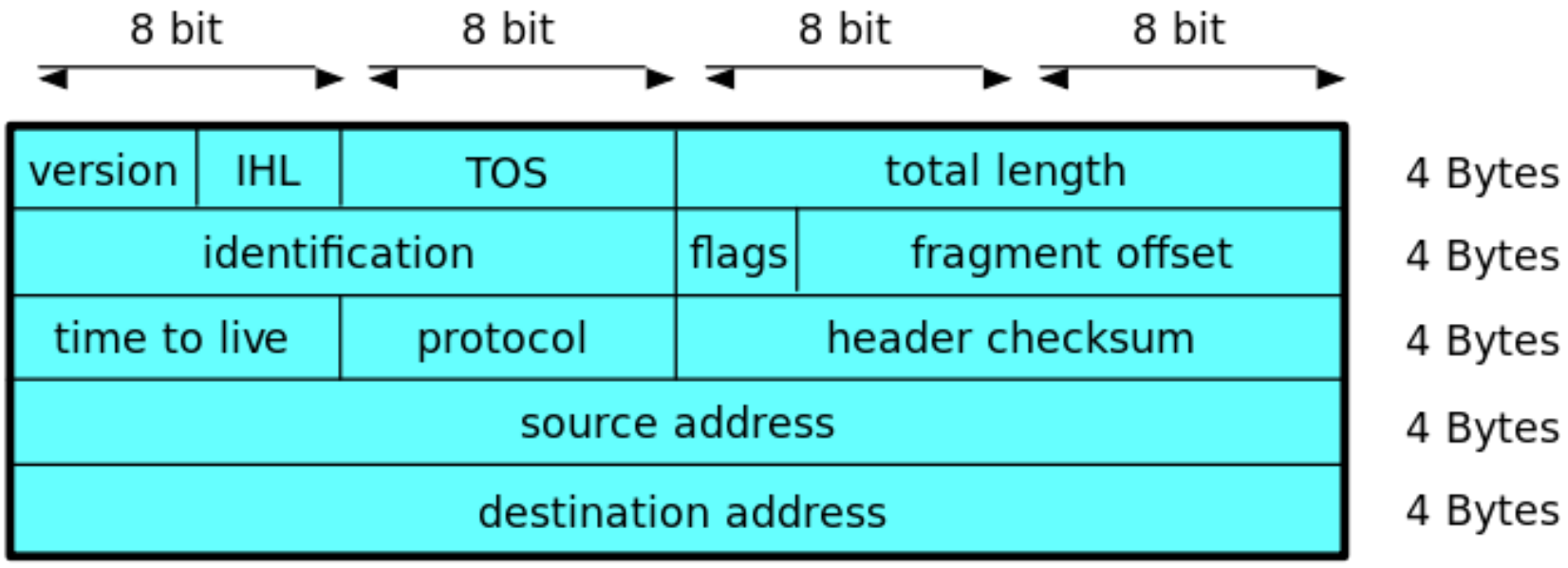

Figure 3: IHL

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

IPv4 Packet Header

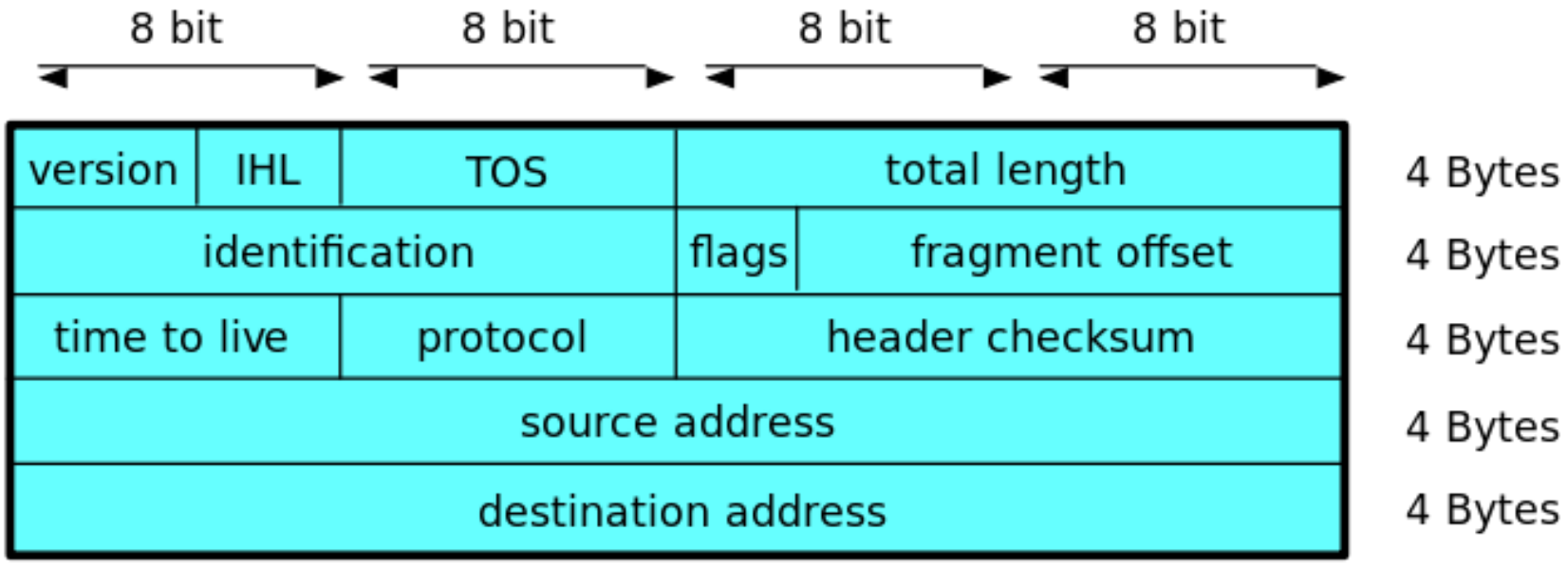

Figure 4: TOS

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

IPv4 Packet Header

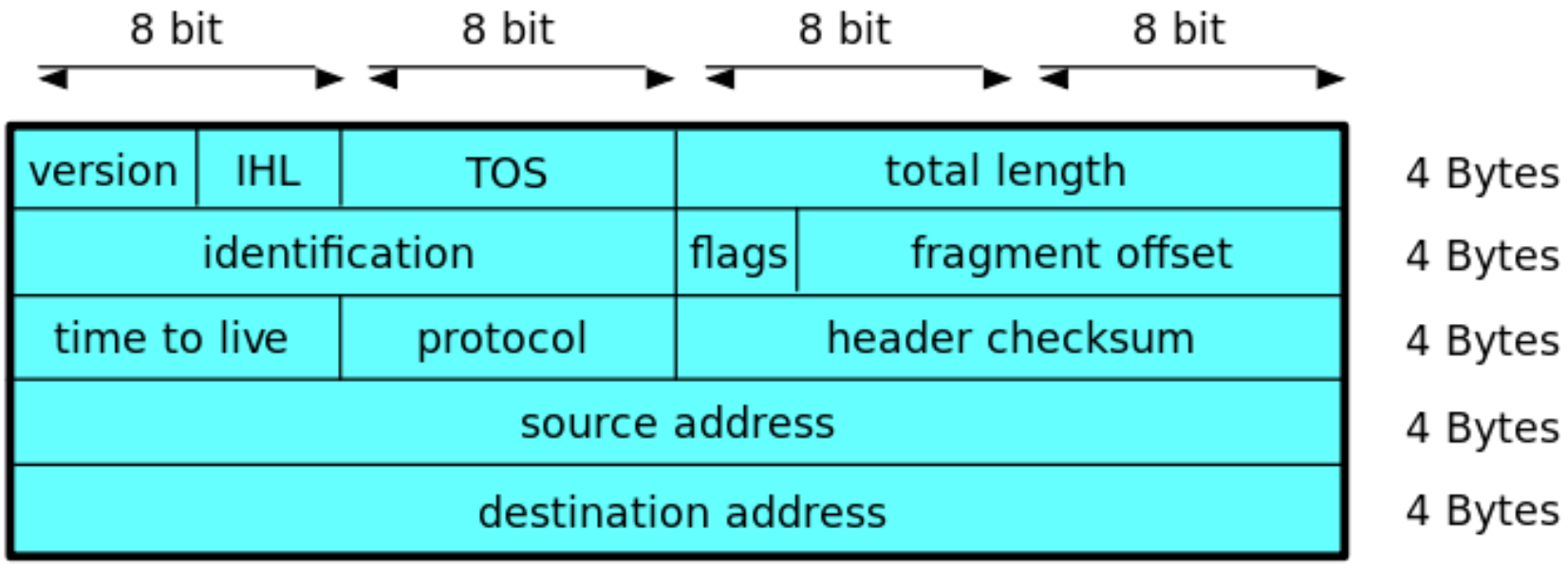

Figure 5: Total Length

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

IPv4 Packet Header

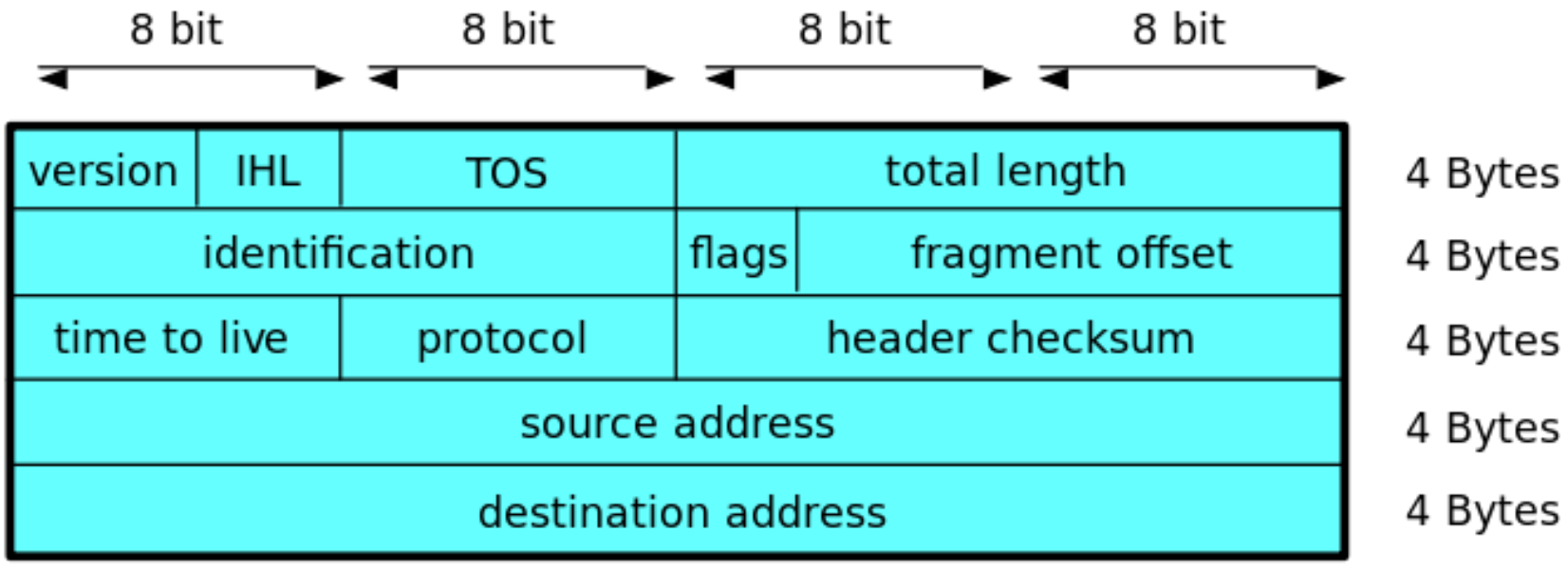

Figure 6: Identification

- 16 bit field - Used for fragment identification

IPv4 Packet Header

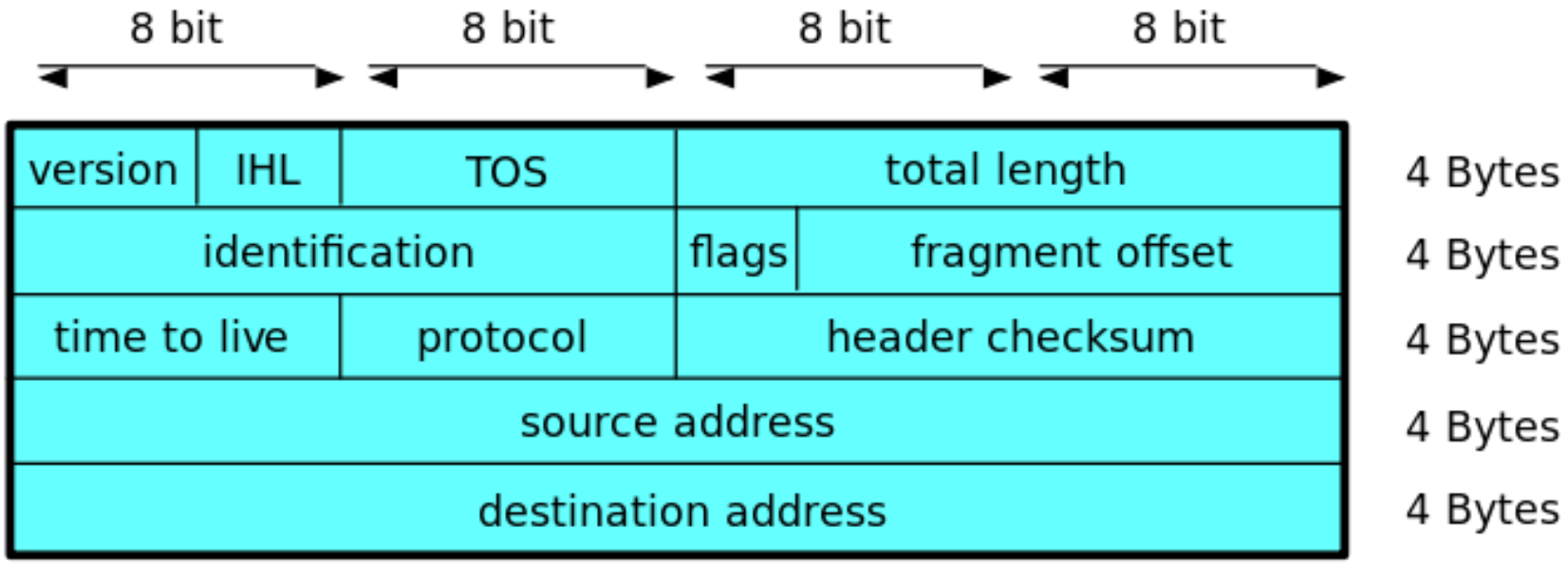

Figure 7: Flags

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

IPv4 Packet Header

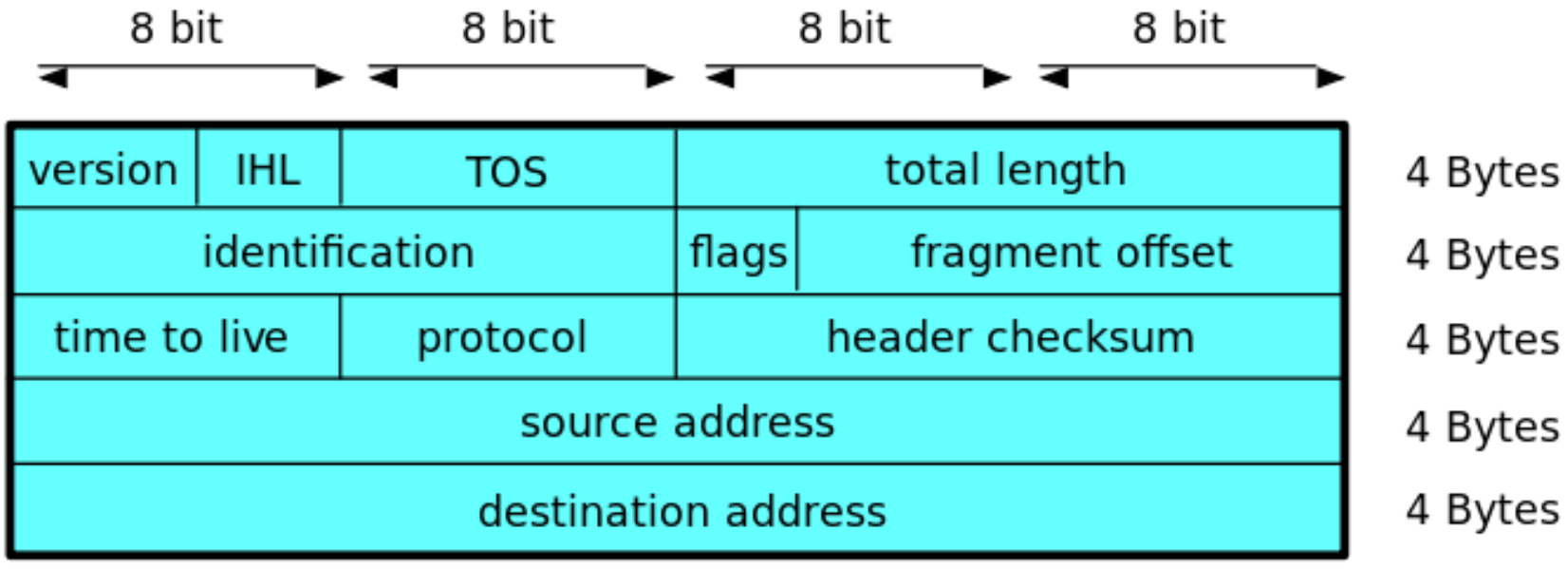

Figure 8: Fragment Offset

- 13 bits
- Measures fragment offset in 8 byte increments

IPv4 Packet Header

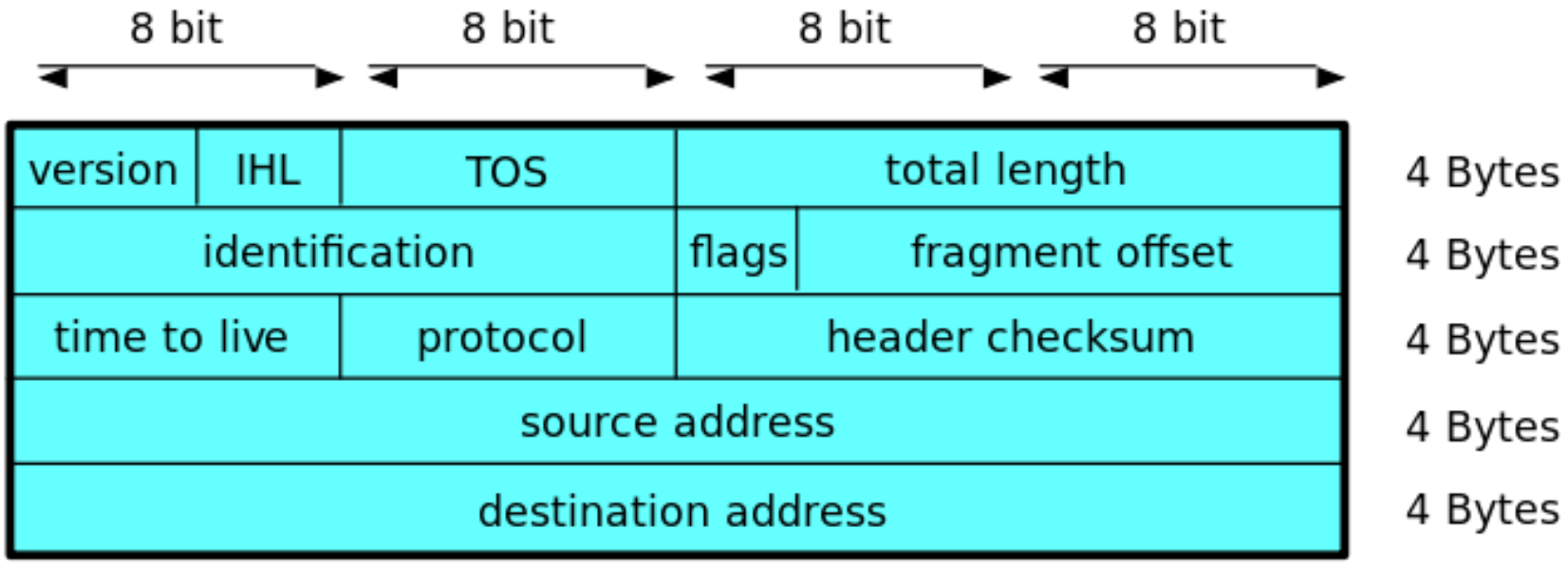

Figure 9: TTL

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

IPv4 Packet Header

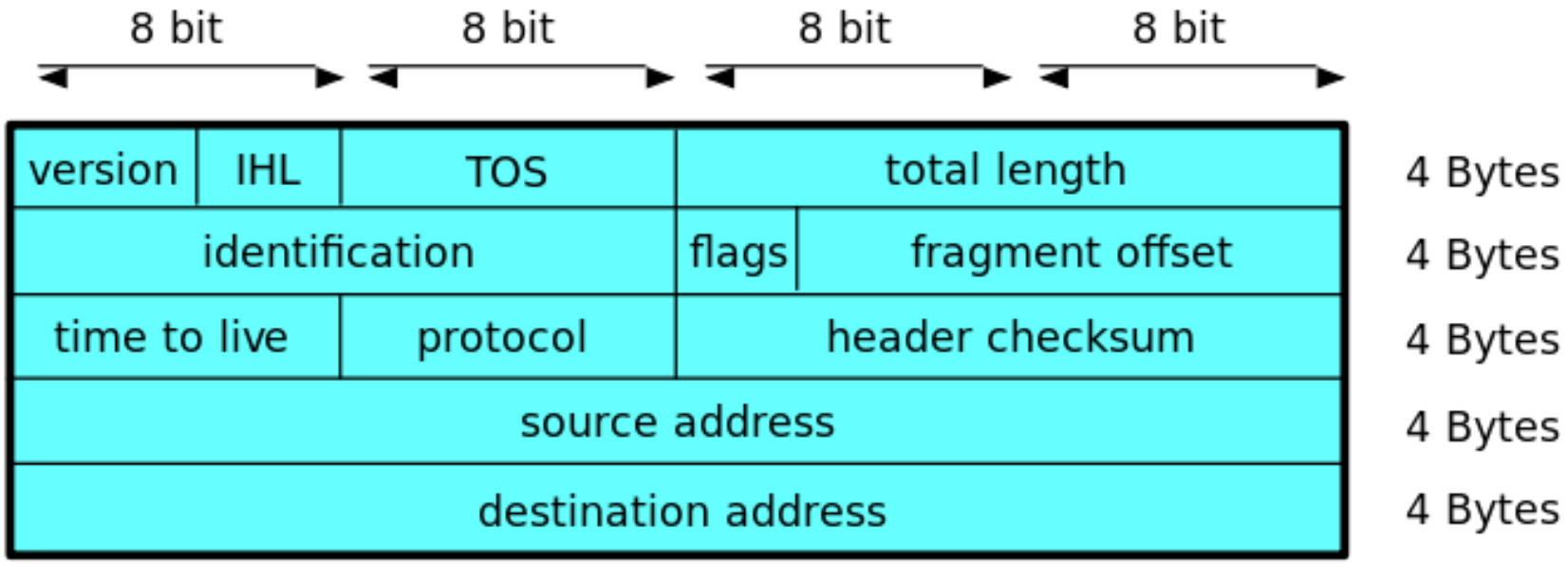

Figure 10: Protocol

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

IPv4 Packet Header

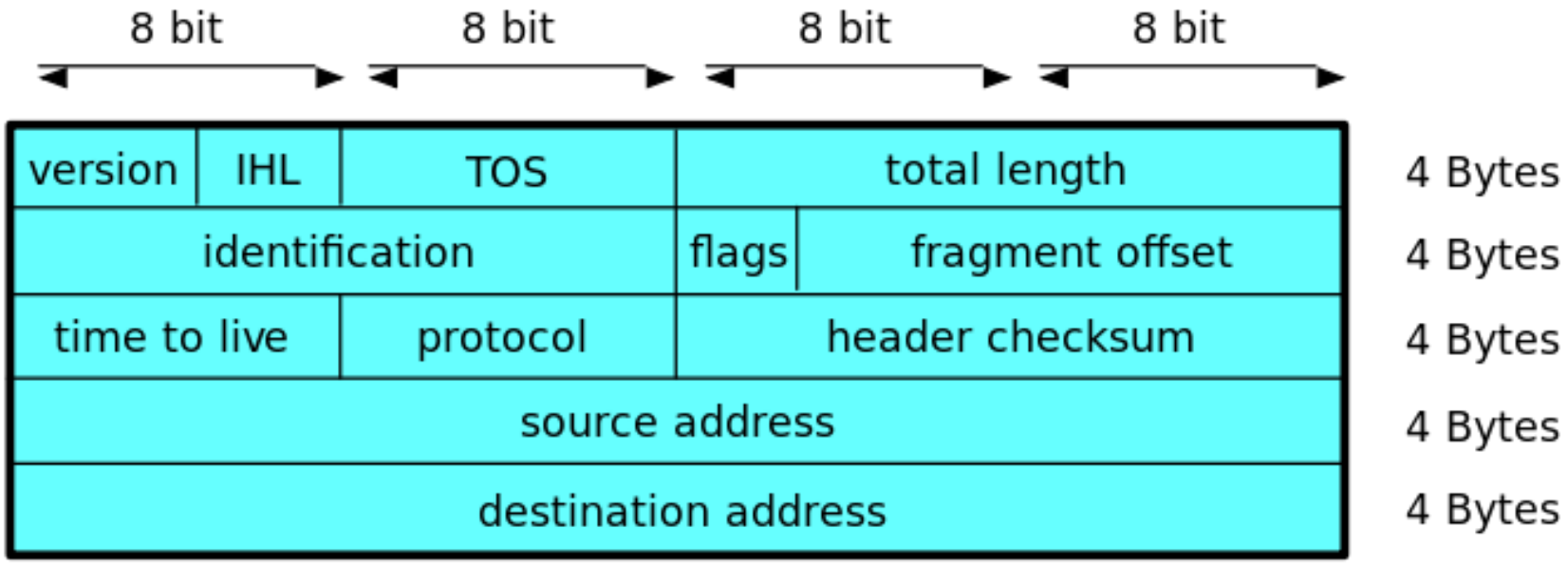

Figure 11: Checksum

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

IPv4 Packet Header

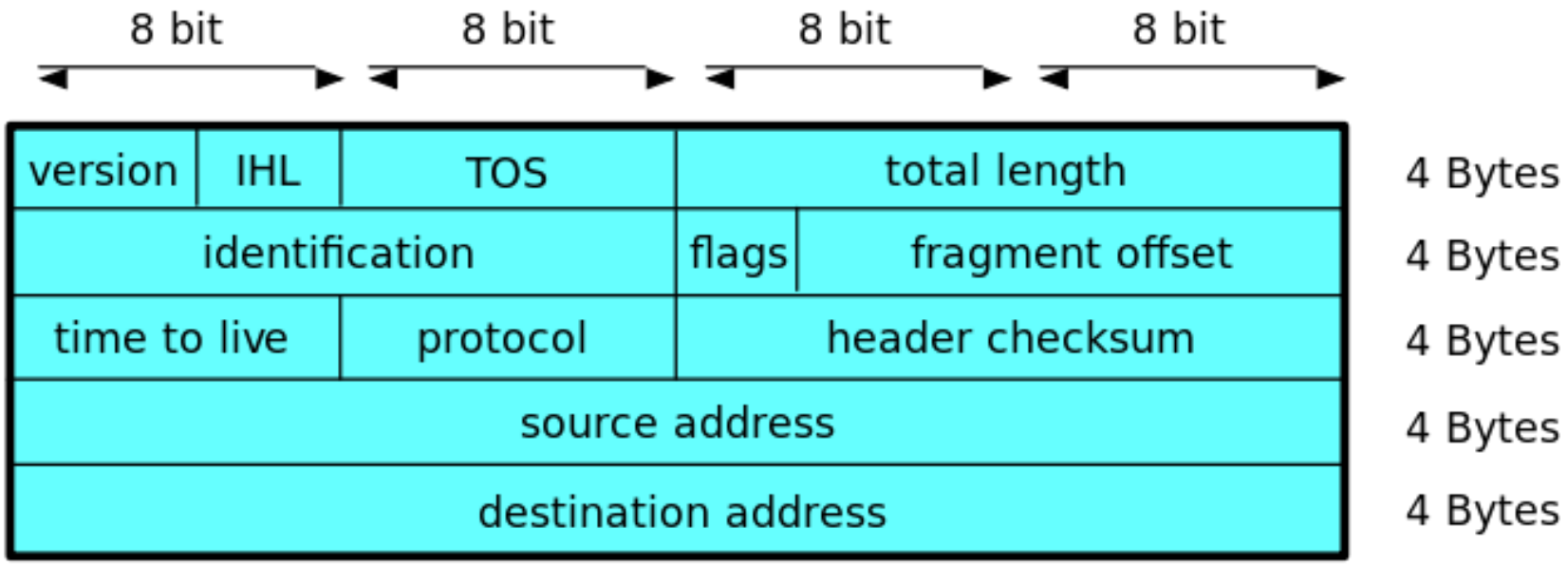

Figure 12: Source Address

- 32 bit
- Source address

IPv4 Packet Header

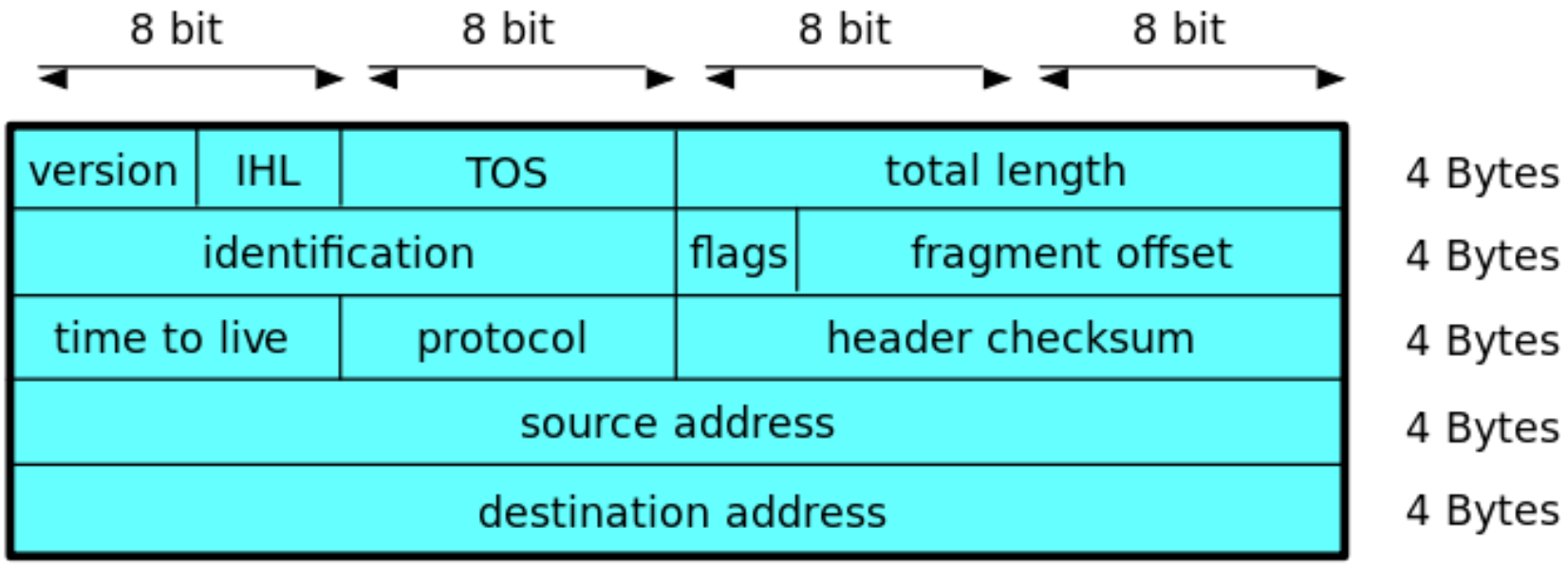

Figure 13: Destination Address

- 32 bit
- Destination address

IPv4 Packet Header

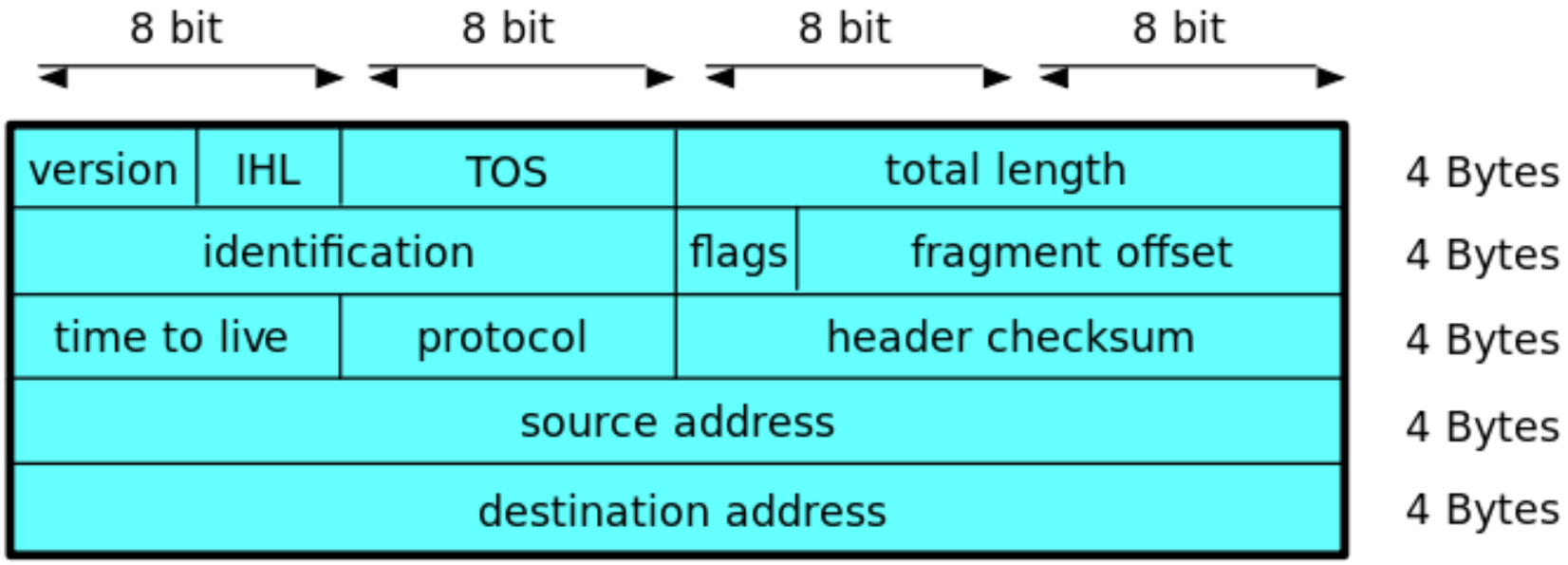

Figure 14: Options

- 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 seperate 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