



# SLIIT

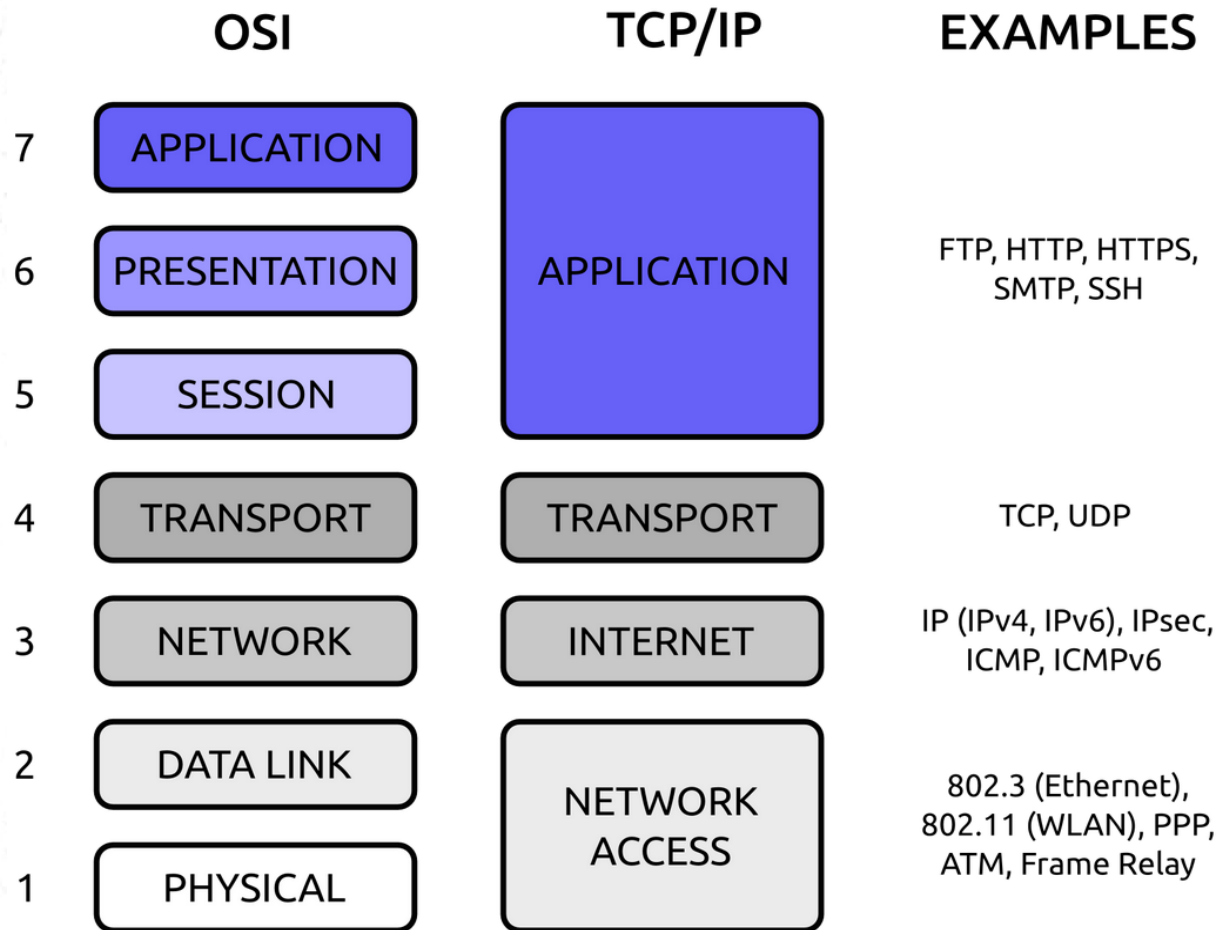
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## IT2050 –Computer Networks

### Tutorial 05 - IP



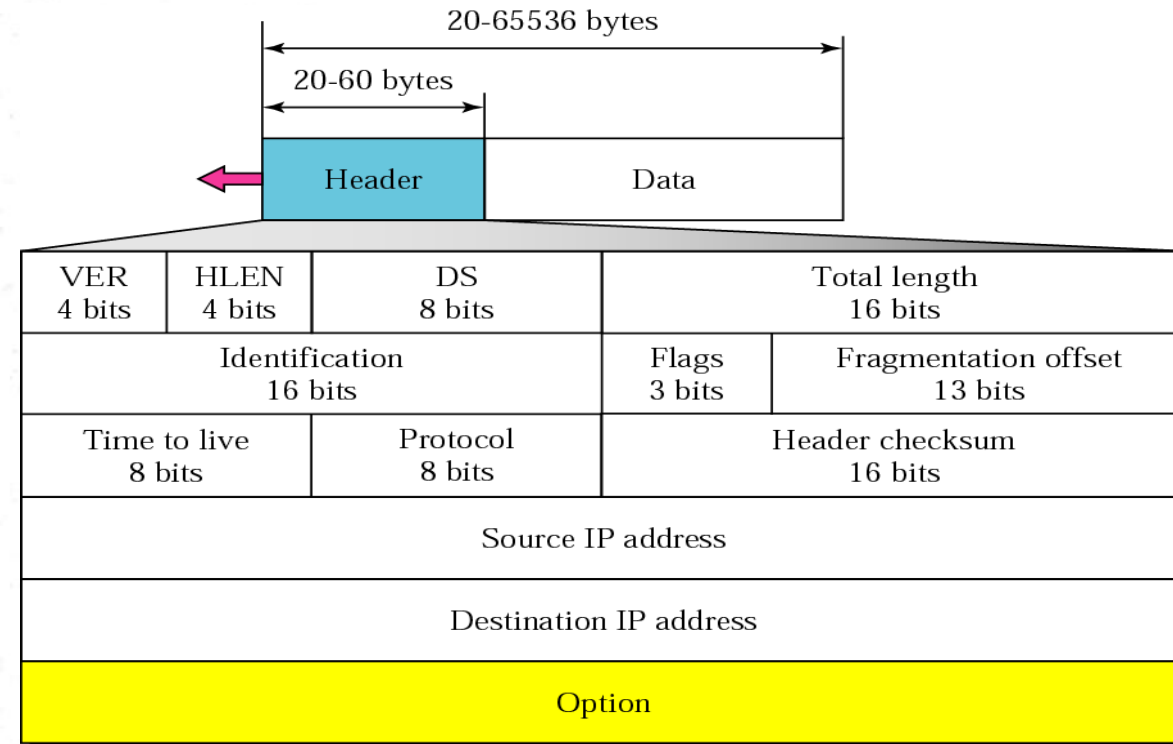
1. Explain the TCP/IP model corresponds with the layers of OSI model. Use a diagram. Show the protocols running on each TCP/IP layers.



1. An HLEN value of decimal 12 means,
- What is the header length in bytes?
  - What is the length of 'options' field?

**Actual header length = HLEN X 4**  
**= 12 X 4 = 48 bytes**

**length of 'options' field = 48 - 20 = 28 bytes**



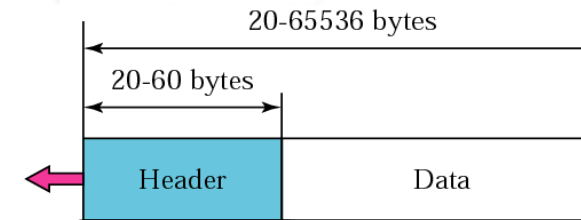
2. What is the value of the total length field if the header is 28 Bytes and data field 400Bytes?

$$\begin{aligned}\text{Total length} &= \text{Data size} + \text{Header size} \\ &= 400 + 28 \\ &= 428 \text{ bytes}\end{aligned}$$

3. What is the length of the data field when HLEN value 14 and total length value of 40000?

**Header size =  $14 * 4 = 56$**

**Data size = total length – Header size  
=  $40,000 - 56$   
= 39994 byte**

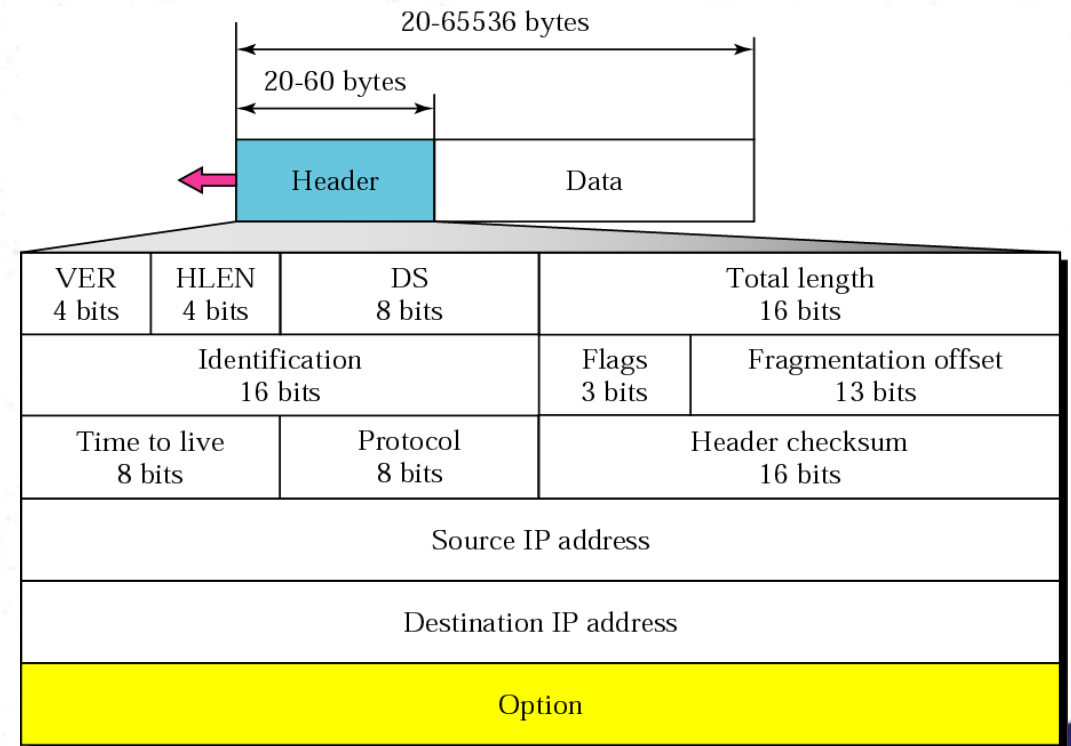


VER 4 bits	HLEN 4 bits	DS 8 bits	Total length 16 bits	
Identification 16 bits			Flags 3 bits	Fragmentation offset 13 bits
Time to live 8 bits		Protocol 8 bits	Header checksum 16 bits	
Source IP address				
Destination IP address				
Option				



## 4. Which fields of the IP header change from router to router?

**Time to live**  
**Header checksum**



5. Calculate the HLEN value if the total length is 1200 Bytes, 1176 of which is data from the upper layers.

$$\begin{aligned}\text{Header length} &= \text{total length} - \text{data length} \\ &= 1200 - 1176 = 24 \text{ bytes}\end{aligned}$$

$$\text{HLEN} = 24/4 = 6$$

7. Can the value of the header length be less than 20? When is it exactly 20?

**NO**

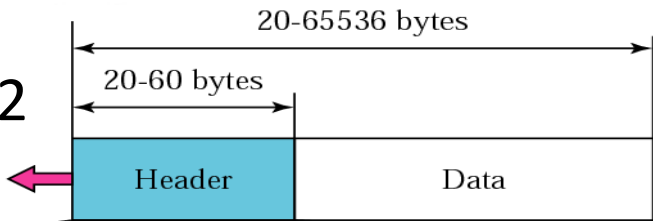


8. An IP datagram has arrived with the following information in the header (in hexadecimal):

45 00 00 54 00 03 00 00 20 06 00 00 7C 4E 03 02 B4 0E 0F 02

- i. Are there any options?
- ii. Is the packet fragmented?
- iii. What is the size of the data?
- iv. How many more routers can the packet travel to?
- v. What is the identification number of the packet?
- vi. What is the type of Service?

45 00 00 54 00 03 00 00 20 06 00 00 7C 4E 03 02 B4 0E 0F 02



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Version (4 bits ) = 4

HLEN (4 bits ) = 5 = 5\*4 = 20bytes

DS (8 bits ) = 00 → Normal service

Total length= 0054 → hex(54) = 84 bytes

Identification= 00 03 → 3

0000-> Flags & offset 000 00000000000000 → D = 0 , M =0 , offset = 0

20-> TTL = hex(20) → 32 routers

06 =Protocol → TCP

0000 =header checksum → No errors

7C4E0302 = source ip

B40E0402= destination ip

- i. Are there any options? **No**
- ii. Is the packet fragmented? **NO (M=0 and offset = 0 )**
- iii. What is the size of the data? Data size = **84-20 =64bytes**
- iv. How many more routers can the packet travel to? **32 routers**
- v. What is the identification number of the packet? **3**
- vi. What is the type of Service? **Normal**

9. A datagram is fragmented into three smaller datagrams / fragments. Which of the following is true?

- a) The *do not fragment* bit is set to 1 for all three datagrams.
- b) The *more fragment* bit is set to 0 for all three datagrams.
- c) The identification field is the same for all three datagrams.
- d) The offset field is the same for all three datagrams.
- e) None of the above.

10. If the fragmentation offset has a value of 100 (in decimal), it means that \_\_\_\_\_.

- a) The datagram has not been fragmented.
- b) The datagram is 100 Bytes in size.
- c) The first byte of the datagram is byte 100.
- d) The first byte of the datagram is byte 800.



11. The checksum in the IP packet covers \_\_\_\_\_

- a) Just the header
- b) Just the data
- c) The header and the data
- d) Just the source and the destination addresses