1. A packet has arrived with an MF(More fragments) bit value of 1. Is this the first fragment, the last fragment, or a middle fragment?

A) First fragment   B) Last fragment
C) Middle fragment   D) More information required

Answer:(D)
Explanation:

If the M bit is 1, it means that there is at least one more fragment. This fragment can be the first one or the middle one, but not the last one. We don't know if it is the first or the middle one; we need more information (the value of the fragmentation offset). However, the original packet has been fragmented because the M bit value is 1.
MF= 0 Offset= 0 -> No fragment
MF= 0 Offset= !0 -> Last fragment
MF= 1 Offset= 0 -> First fragment
MF= 1 Offset= !0 -> Middle fragment

2. In an IPV4 packet, the value of the HLEN field is 1100 in binary. How many bytes of options field is being carried by this packet?

A) 28 byte   B) 20 byte   C) 8 byte   D) 40 byte

Answer:(A)
Explanation:

The HLEN value is 12 in decimal, which means the length of the header is $12 \times 4 = 48$ bytes. The minimum header length is 20 bytes, and the remaining will be of options filed.
Therefore, 48 - 20 = 28 bytes are the options field.

3. Internet Protocol (IPV4) uses the time-to-live (TTL) field in the IP datagram header. For which one of the following reasons uses TTL?

A) Ensure packets reach the destination within that time.
B) Discard packets that reach later than that time.
C) Discard the packet, which is in an infinite loop.

D) Limit the time for which a packet gets queued in intermediate routers.

Answer:(C)
Explanation:

Prevent the packets from being involved in an infinite loop and also prevent server crashes. That's why the TTL field is used in the IPv4 datagram field.

4. What is the maximum payload size at the Network layer and the Data link layer on the TCP/IP protocol?

A) Any size, 1480 bytes
B) 65,495 bytes, 1500 bytes
C) 65,535 bytes, 1500 bytes
D) 65,515 bytes,1500 bytes

Answer:(D)
Explanation:
Payload means only data without the header.
The application layer can forward any data size to the transport layer.
The transport layer can hold the maximum size of the data (payload) is 65,495 bytes.
The Network layer can hold the maximum size of the data, which is 65,515 bytes.
The data link layer can hold the maximum size of the data is 1500 bytes.

5. Suppose an IP packet of length 1800 bytes with minimum header size entered into a local area network of MTU (Maximum transfer unit) is 510 bytes; then how many fragments will be generated from the packet, and what is the length of the last packet?

A) 3, 300
B) 4, 336
C) 5, 320
D) 4, 316

Answer(B):
Explanation:

The minimum header size is 20 bytes in the IP header. so, HLEN Field = 5 bytes
Total data bytes in the packet = 1800 - 20(Header) = 1780
The size of data in MTU = 510 - 20(header) = 490,
But it should be a multiple of 8, so it's 488
Possible no. of fragments = ceil(1780 / 488) = 4
First fragment packet = 488(Data) + 20(Header)
Second fragment packet= 488 (Data) + 20(Header)
Third fragment packet= 488 (Data) + 20(Header)
Remaining data bytes = (1780 - 488 x 3) = 336
Hence the size of the last packet = 316 + 20 = 336

6. In TCP header SYN=0 and ACK =1 indicates [MSQ]

A) Open connection packet   B) Close connection packet
C) Data packet   D) Acknowledgement packet

Answer:(C,D)
Explanation:
SYN (synchronize) is used in conjunction with ACK to request a connection or accept a connection.
SYN= 1 and ACK = 0 indicate a connection request(Request packet).
SYN= 1 and ACK = 1 indicate a connection accepted(Reply packet)
SYN= 0 and ACK = 1 is an acknowledgement(Pure ACK packet) and Data packet
SYN= 0 and ACK = 0 not possible

7. What is the value of the acknowledgement field in a segment defined?

A) The sequence number of the next byte to be received.
B) The sequence number of the byte received previously.
C) Total number of bytes to receive.
D) The sequence of zeros and ones.

Answer:(A)
Explanation:

The acknowledgement field in a segment defines the sequence number of the byte which is to be received next i.e., the sequence number of the byte that the sender should transmit next.

8. Which of the following statements is CORRECT? [MSQ]

 A) ICMP packet is not generated if an ICMP packet is discarded
B) ICMP packets are always directed to the source IP address of the originating packet.
C) In the case of multiple fragments, only one ICMP is sent back to the sender.
D) Ping (Network utility) operates by sending ICMP echo request packets to the target host and waiting for an ICMP echo reply.

Answer:(A,B,C,D)
Explanation:

All options are the correct

Question 9. Consider an IP link with a maximum transfer unit of 700 bytes, and each datagram size to send is 2400 bytes. Assume that the datagram recently sent has an identification number of 422. What is the total number of fragments that must be sent to transfer the full datagram, and what is the offset value of the 2nd fragment from all the fragmented datagrams? Note: Consider the minimum header size of the IPV4 datagram.

A) 4, 85   B) 5, 680
C) 4, 1320   D) 1, 0

Answer:(A)
Explanation:
The Maximum transfer Unit = 700 bytes
        Each datagram size = 2400 bytes
        Minimum size of IPV4 header = 20 bytes

2400 bytes = 2380 bytes data + 20 bytes header
Then the datagram divides into multiple frames depending on MTU

680 bytes data + 20 bytes header → fragment 1

680 bytes data + 20 bytes header → fragment 2

680 bytes data + 20 bytes header → fragment 3

370 bytes data + 20 bytes header → fragment 4

⇒ Total number of fragments = 4

Offset is the number of data bytes ahead of a particular fragment.

⇒ Offset of 2nd fragment is 680/8 = 85

10. The Internetworking Protocol (IP) is a _____ protocol.

A) Reliable
B) Connection-oriented
C) Reliable and connection-oriented
D) None of the choices are correct

Answer:(D)
Explanation:

IP is a connectionless protocol. IP alone provides an unreliable service.

11. A TCP message consisting of 2800 bytes is passed to IP for delivery across two networks. The first network can carry a maximum payload of 1500 bytes per frame, and the second network can carry a maximum payload of 500 bytes per frame, excluding network overhead. Assume that the IP overhead per packet is 20 bytes. What is the total IP overhead in the second network for this transmission?

A) 140 bytes   B) 80 bytes   C) 120 bytes   D) 160 bytes

Answer:(A)
Explanation:

In the question, the maximum payload that can be transferred is given, not the maximum packet size. So, during fragmentation, we must consider only the payload, not the headers.

At first network, 2800 byte payload will be divided into 1500 byte and 1300 bytes payloads.

Because we can not fragment sizes 1500 and 1300 because these are not divisible by 8.
Fragmentation at the 1st network, 1496 and 1304

Fragmentation at the 2nd network, 1496 will be divided into 4 packets of 496,496,496 and 8 (80 bytes overhead), and 1304 will be divided into three packets of 496,496 and 312 (this gives 60 bytes overhead)

Therefore, a total of 7 fragmentations. so total IP overhead = 7 x 20=140 bytes

12: If the value in the HLEN field of the IP header is 8, then what is the header's length?

A) 8 bytes   B) 16 bytes   C) 32 bytes   D) 40 bytes

Answer:(C)
Explanation:

Length of header is 8 x 4 = 32 bytes

13. Suppose a packet of 1800 bytes with minimum header size enters a local area network with an MTU (Maximum transfer unit) of 500 bytes. Then, how many fragments will be generated from the packet, and what is the payload size of the last packet?

A) 3, 300   B) 4, 340
C) 5, 320   D) 3, 340

Answer:(B)
Explanation:

Total data bytes = 1800-20=1780
Data bytes in first fragment = 500 - 20 = 480,
Data bytes in second fragment = 500 - 20 = 480
Data bytes in third fragment = 500 - 20 = 480,
Remaining data bytes = 340
Hence size of the last packet = 340 + 20 = 360

It asks for payload size, and in the payload, only data is contained, not the header.
 i.e. 340

14. Which of the following assertions is/are TRUE about the Internet Protocol (IP) ? [MSQ]

A) It is possible for a computer to have multiple IP addresses.

B) IP packets from the same source to the same destination can take different routes in the network.

C) IP ensures that a packet is discarded if it is unable to reach its destination within a given number of hops.

D) The packet source cannot set the route of an outgoing packets; the route is determined only by the routing tables in the routers on the way.

Answer:(A,B,C)

Explanation:

A is true since a computer can have multiple IP addresses for each interface.

B is true since IP is a connectionless protocol that uses the datagram approach, which means that each datagram is handled independently and can follow a different route to the destination.

C is true since if there is ttl associated with each packet, and it means the maximum no of hops it can have. When it becomes zero, the packet is discarded by the intermediate router, and time exceeded message is sent to the source to inform it about the situation.

D is false since a source can predetermine a route for the datagram as it travels through the internet. This is done with the help of a strict source routing option.

15. Which one of the following fields of an IP header is modified by a typical IP router? [MSQ]

A) Checksum
B) Source address
C) Time to Live (TTL)
D) Length

Answer:(A,C,D)
Explanation:

Length and checksum can be modified when IP fragmentation happens. Time To Live is reduced by every router on the route to the destination. Only the Source IP address can not change,