Assignment1(Set-A)
CSE306
Marks -30
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Section-K18AW

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1)

a. Fragmentation is needed in both. Even in a concatenated virtual-circuit network, some networks along the path might accept 1024 – byte packets, and others might only accept 48-byte packets. Fragmentation is still needed.

b. New tokens are added at the rate of r bytes/sec which is 1Mbps in the given question
Capacity of the token bucket (b) = 8 Mbits
Maximum possible transmission rate (M) = 6 Mbps
So, the maximum burst time = b/(M-r) = 8/(6-1) = 1.6 seconds.

c. With 16 bytes there are 2^128 or addresses. If we allocate them at a rate of 10^6/10^-12 = 10^18 addresses per second. Therefore, it will take 3.4×10^20 seconds to run out of IP addresses, which is about 10^13 years.
This number is 1000 times the age of the universe.

d. The Protocol field tells the destination host which protocol handler to give the IP packet to. Intermediate routers do not need this information, so it is not needed in the main header.

2)

a. The upper layer packet is split into 10 frames.
So, input n=10 frames.
For each frame chance to arrive each undamaged is 80 percentage.
So, 80/100 = 0.8% of chances to get the undamaged frames
For single frame is 0.8 and for 10 frames is denoted by "p".
P = (0.8)^10
= 0.8*0.8*0.8*0.8*0.8*0.8*0.8*0.8*0.8*0.8 = 0.1074
The attempts of expected number of transmission before successful reception is given below:
E=1/p = 1/0.1074 = 9.31
Therefore, the avg attempt of expected number of transmissions before successful reception is 9.31.

b. S1: sender's lower edge
S2: sender's upper edge
R1: receiver's lower edge
R2: receiver's upper edge
W: window size
There are three main conditions that must hold among the four window edges and the window size:
1. The sender must keep track of 0 to w frames that have currently been sent but have no acknowledgment i.e. outstanding.

0 <= S2 − S1 + 1 <= W

2. The receiver will expect up to w frames.

R2 − R1 + 1 = W

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3. The receiver's sequence number must be within the sender's window

S1 <= R1 <= S2 + 1

c. MAC Addresses are unique 48-bits hardware number of a computer, which is embedded into network card (known as Network Interface Card) during the time of manufacturing. MAC Address is also known as Physical Address of a network device.

d. ARP (Address Resolution Protocol) is a network protocol used to find out the hardware (MAC) address of a device from an IP address. It is used when a device wants to communicate with some other device on a local network. The sending device uses ARP to translate IP addresses to MAC addresses.

3)

a. UDP exists to allow you to send IP-encapsulated data without the connection overhead of TCP. The advantage of UDP over simply sending raw IP packets is that UDP gives you the capability to multiplex/demultiplex on different source/destination ports.

b. Even though each datagram arrives intact, it is possible that datagrams arrive in the wrong order, so TCP has to be prepared to reassemble the parts of a message properly.

c. The entire TCP segment must fit in the 65,515-byte payload field of an IP packet. Since the TCP header is a minimum of 20 bytes, only 65,495 bytes are left for TCP data.

d. TCP: It is a connection-oriented protocol. Connection-orientation means that the communicating devices should establish a connection before transmitting data and should close the connection after transmitting the data.

UDP: It is the Datagram oriented protocol. This is because there is no overhead for opening a connection, maintaining a connection, and terminating a connection. UDP is efficient for broadcast and multicast type of network transmission.