1.

Given that,

In CSMA/CD, after the fifth collision, what is the probability of k=8, while choosing K=8. And also asked that how many seconds are corresponded when k=8 on a 10 Mbps Ethernet.

We know that the probability is given by,

Probability = 1/32. (since after 5th collision, it will take 0 to 31 values)

And also we are asked to calculate the Delay.

Delay = (number of bits) / 10 Mbps

= (8\*512) bits/ (10 Mbps)

= 4096 / (10 \*1000000s)

= 409.6 / 1000000 seconds

= 409.6 micro seconds.

2.

image

Since we are asked to assign the IP addresses to all the interfaces. And also given hint that, we have to use the address of the form 111.111.111.xxx . and for subnet 2 the address should be of the form 122.222.222.xxx; and for subnet 3 , the address should be of the form 133.133.133.xxx.

1. I have assigned the corresponding addresses and LANs routers as in the above shown figure.

b) In this question, we are asked to assign the MAC addresses to all the adapters in the given problem figure.

Here I have assigned the MAC addresses to all the given adapters in problem figure as shown in the above drawn figure.

C.

Given that,

We are supposed to consider the sending and IP datagram from Host A to Host F. and suppose all if all of the ARP tables are upto date. Now, we are asked to enumerate all the steps as done for the single-router example.

**Host A to the Router A:**

* As Host F is not there in the same subnet, therefore the Host A knows that it should send the data to the gateway of default i.e.., 111.111.111.158 and according to the ARP table, the MAC address i.e.., 74-34-74-34-74-74 of IP Address 111.111.111.158 is added into the frame in Host A Link layer frame
* Now this whole added frame is now sent to the subnet and the Router A with the MAC address of 74-34-74-34-74-74 will receive the above frame.

**Router A to Router B:**

* The link layer header along with the MAC address will be removed before the link layer in Router A sends the datagram to Network layer and Now, the router will sends the datagram tothe network layer after the link layer header along with the MAC adress is being removed if the router with MAC address 11-11-11-11-11-01 gets the frame.
* After above steps, based on the forwarding table the router computes the interface for IP address 133.133.133.xxx and Now the router A determines the next hop i.e.., the router B of IP address 133.133.133.1 by seeing at the subnet, the data gram is then sent to link layer in router A
* Then the datagram is transferred to the interface and then the link layer sends the frame to the subnet2. Now, router A determines the next hop i.e.., the router B. This router B of MAC address 33-20-15-16-18-19 will receive the frame.

**Router B to Host F:**

* Now, in this step the link layer header will be removed before the link layer sents data to network layer and now based on the forwarding table, the interface for IP address 133.133.133.xxx will be computed by the router B.
* Now link layer will adds the MAC address 22-22-22-11-11-11 of IP address 133.133.133.3 and then to subnet 3 the frame will be sent by the link layer and then finally the frame will be received by the Host F.

d.

Given that,

By assuming that the ARP table in the ARP table in the sending host is empty, we have to repeat(c).

**HOST A to Router A :**

* Since, Host F and Host A are not in the same subnet, it should send the data to 111.111.111.158 and then it broadcasts ARP query packet, then router A receives the ARP query packet then it sends a ARP response and then Host A saves and knows the MAC address of IP address 111.111.111.158 then the MAC address 74-34-74-34-74-74 of IP address 111.111.111.158 is added to the link layer frame in Host A.

**3.**

Given that,

suppose a CSMA/CD network is running with speed of 100 Mbps over a 1-km cable with out any repeaters. and also given that the signal speed in the cable is 200,000 km/sec.

a.

we know that,

The End to End propagation delay is given by = 2d/s

Given d = 1 km and

S = 200,000 km/sec

Now End to End propagation delay is = (2\*1)/200,000

= 10 micro seconds.

b. The worst case collision detection time is 10 micro seconds.

c. The minimum frame size is given by,

L = 10 us \* 100 Mbps

= 1000 bits.

There fore, minimum frame size in this case is given by 1000 bits

**b.**  
Given that,  
suppose we increase the bandwidth from 10 Mbps to 1 Gbps.

Then there will be no effect on the End-to-End propagation Delay and on worst-case collision detection time.

This bandwidth change will only results in change of minimum frame size.

Which is given by,

When it is 10 Mbps link, The minimum frame size = 10 Mbps\*10 us= 100 bits

When it is 1 Gbps link, The minimum frame size = 1 Gbps\*10us =10000 bits.