**A COMMUNICATION AND NETWORKING ASSIGNMENT ONE**

**Q1**

**Telephone model simulation for an own private line to end office using fiber instead of copper cable:**

Yes, it is possible to use the 10Gbps TV cable to provide a private line to the end office for everyone.

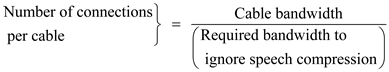
• Usually, to ignore the speech compression, the digital pulse code modulation (PCM) telephone requires 64 kbps.

**Possible number of telephone houses hooked up in a single fiber:**

• If the future TV cable fiber bandwidth is 10Gbps then dividing it by 64 kbps will provide how many numbers of houses can connect in fiber per cable.

Consider the following formula to find the number of possible connections in a single fiber cable:

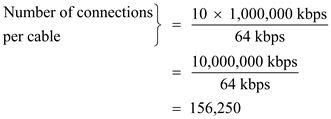
Consider the following formula to find the number of possible connections in a single fiber cable:

 …… (1)

Substitute the “Cable bandwidth” value as “10Gbps” and “Required bandwidth to ignore the speech compression” value as “64 kbps” in Equation (1).



One “Gbps” is equal to “1,000,000 kbps” to convert the “Gbps” value into “Kbps”, multiply the value with “1,000,000”.



Therefore, **156,250**houses can be connected with single 10 Gbps cable and the current system connects with hundreds of houses per cable.

**Q2.**

**Client-server system:**

Server is a computer program in a machine which is used to serve other computers; it contains all data about particular stream in an organization.

• A system which contains the server program is called as server system.

• The other systems which request for any data to the server are called as clients.

• The interaction among the server and the client is represented as client-server system.

• The client machines always “requests” the data to the server.

• The server machine always “responds” or “replies” to the client’s request.

• This client-server system uses any network for interaction.

**Packets in the network:**

While sending data through network, the receiver machine should send the return message as acknowledgment.

• If the sending data is large, then the data will be split into small packets.

• Then, each packet will be sequentially sent through the network.

**Discussion about two approaches:**

• Based on the reliability of the network, the suitable approach will be chosen.

• In the two kinds of approaches,

* One is sending acknowledgment for each packet.
* Another is sending acknowledgment once for the whole packet at the end of receiving.

• If the network has the possibility of losing packets (i.e., not reliable), then the first approach of sending acknowledgement for each packet is better.

* This is because, when sending each packet one of the packets is lost or corrupted, and then the sender can send only the missing packet.
* For example,

• If the sender sends 10 packets of data, then receiver receives each packet one by one; if any of the packet is not received, then the receiver will not send acknowledgement, so the sender will resend the missing packet.

• If the network is reliable, then second approach of sending acknowledgement at end of entire transfer will be appreciated.

* his is because, the network is more reliable to transfer the whole packet safely, so avoiding acknowledgment for each packet will save the bandwidth of the network and also the speed of the process will be increased.
* For example, consider if the size of an is 10 kb, then sending acknowledgement for sending 10 packets will take 100 kb of bandwidth. So, the acknowledgement will be sent at the end of the entire transfer.

**Therefore**: In case, any one of the packets is lost while sending, then the receiver will not send acknowledgement, then the sender should send all packets again.

**Q3.**

Determine the total wastage overhead in protocol 6 (Selective Repeat) and Calculate the frame size:

 Data bit is 3,960 bits and a header bit is 40 bits. Then, add the data bit to header bit to calculate the frame size.



Calculate the NAK and retransmitted frame:

• For 1 percentage of error rates for 4,000 bits of frame.



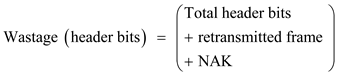
• Then, 40 bits of frame is Negative acknowledgement (NAK) and then retransmit 40 frames of data to receiver.

Here, one frame is lost out of 100 frames. Then, 40 frames lost out of 4,000 frames.

• Total header size is .

• Total frame size (header and data bits) is.

Formula to determine the total wastage for header bits is given below:

 …… (1)

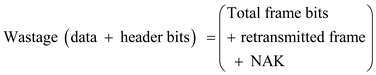
Where,

“NAK” denotes the negative acknowledgement.

Substitute the value of “Total header bits” as “”, “retransmitted frame” bits as “4,000 bits”, and “NAK” bit as “40 bits” in Equation (1). Then,



Formula to determine the total wastage for frame (both data and header bits) is given below:

 …… (2)

Where,

“NAK” denotes the negative acknowledgement.

Substitute the value of “Total frame bits” as “”, “retransmitted frame” bits as “4,000 bits”, and “NAK” bit as “40 bits” in Equation (2). Then,

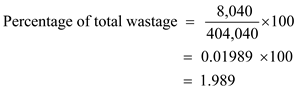


Then, formula to determine the total wastage of overhead is given below:



 …… (3)

Substitute the values of “Header wastage” as “8,040” and “Frame wastage” as “404,040” in Equation (3). Then,



Therefore, the total wastage percentage using protocol 6 (selective repeat) is .

**Q4.**

**Maintenance of minimum frame size of 64 bytes in fast Ethernet:**

The Fast Ethernet is the simpler and it remains with the same frame formats, interfaces and procedural rules followed by the Ethernet.

The only difference in the fast Ethernet is that it reduces the bit time from “100” nanoseconds to “10” nanoseconds; because, the fast Ethernet can exhibit the output ten times faster than the Ethernet and it reduces the maximum length of the cable by a factor of “10”.

Thus, it meets the maximum wire delay as “” (one-tenth) in fast Ethernet which is as long as in Ethernet.

This advantage makes possible for the fast Ethernet to copy “10Mbps” classic Ethernet with maximum wire delay by a factor of “10”.

Hence, the fast Ethernet also uses the same “64 byte” minimum frame size during the transmission.

Therefore, due to the maximum wire delay in fast Ethernet is “” (one-tenth) which is as long as in case of the Ethernet, the fast Ethernet can maintain minimum “64 byte” frame size.