CSE316
Assignment 1 Solutions

Chapter - 1

Q1-1. The five components of a data communication system are the sender, the receiver, the transmission medium, the message, and the protocol.

Q1-5. We can divide line configuration in two broad categories:

a. Point-to-point: mesh, star, and ring.

b. Multipoint: bus

Q1-12. A link-layer switch is designed not to broadcast messages. This means that it should have the link-layer address of each station to forward the packet to that particular station, not to others.

Q.1-13. Each LAN should be connected to (n − 1) LANs, which means that we will have n × (n − 1) connections. However, if each connection can be used in both directions, we need only [n × (n − 1)]/2 connections.

P.1-4.

a. Mesh topology: If one connection fails, the other connections will still be working.

b. Star topology: The other devices will still be able to send data through the hub; there will be no access to the device which has the failed connection to the hub.

c. Bus Topology: All transmission stops if the failure is in the bus. If the dropline fails, only the corresponding device cannot operate.

d. Ring Topology: The failed connection may disable the whole network unless it is a dual ring or there is a by-pass mechanism.

P.1-10. The telephone network was originally designed for voice communication; the Internet was originally designed for data communication. The two networks are similar in the fact that both are made of interconnections of small networks. The telephone network, is mostly a circuit-switched network; the Internet is mostly a packet-switched network.

Chapter - 2

Q.2-11.

a. At the application layer, we normally use a name to define the destination computer name and the name of the file we need to access. An example is something@somewhere.com.

b. At the network layer, we use two logical addresses (source and destination) to define the source and destination computers. These addresses are unique universally.

c. At the data-link layer, we use two link-layer addresses (source and destination) to define the source and destination connections to the link.

Q.2-12. The answer is no. Multiplexing/demultiplexing at the transport layer does not mean combining several upper-layer packets (from the same or different applications) into one transport-layer packet. It only means that each of the transport-layer protocols (such as TCP or UDP) can carry a packet from any application-layer protocol that needs its service. However, a transport-layer packet can carry one, and only one, packet from an application-layer protocol. For example, UDP can carry a message from FTP in one user datagram and a message from HTTP in another user datagram**.**

Q.2-15. We do not need a router in this case because a router is needed when there is more than one path between the two hosts; the router is responsible for choosing the best path at each moment.

P.2-4. The system transmits 150 bytes for a 100-byte message. The efficiency is 100/150 or 66.66%.

P.2-5. The advantage of using large packets is less overhead. When using large packets, the number of packets to be sent for a huge file becomes small. Since we are adding three headers to each packet, we are sending fewer extra bytes than in the case in which the number of packets is large. The disadvantage manifests itself when a packet is lost or corrupted during the transmission; we need to resend a large amount of data.

P.2-15. The following shows the layers and the flow of data. Note that each host is involved in five layers, each switch in two layers, and each router in three layers.