Part1: Multiple-Choice Questions

1) Frequency of failure and network recovery time after a failure are measures of the _____of a network.
a. Performance
b. Reliability
c. Security
d. Feasibility

2) Which topology requires a central controller or hub?
a. Mesh
b. Star
c. Bus
d. Ring

3) Which topology requires a multipoint connection?
a. Mesh
b. Star
c. Bus
d. Ring

4) In a network with 25 computers, which topology would require the most extensivecabling?
   a. Mesh
   b. Star
   c .Bus
   d .Ring

5) A television broadcast is an example of _____ transmission.
a. Simplex
b. Half-duplex
c. Full-duplex
d. Automatic

6) A _____ connection provides a dedicated link between two devices.
   a. Point-to-point
   b. Multipoint
   c. Primary
   d. Secondary

7) In _____ transmission, the channel capacity is shared by both communicatingdevices at all times.
a. Simplex
b. Half-duplex

c. Full-duplex
d. Half-simplex

8) The Internet model TCP/IP consists of _____ layers.
a. Three
b. Five
c. Seven
d. Eight

9) The process-to-process delivery of the entire message is the responsibility of the_____layer.
a. Network
b. Transport
c. Application
d. Physical

10) The _____ layer is the layer closest to the transmission medium.
a. Physical
b. Data link
c. Network
d. Transport

11) Mail services are available to network users through the _____ layer.
a. Data link
b. Physical
c. Transport
d. Application

12) As the data packet moves from the lower to the upper layers, headers are _____
a. Added
b. Subtracted
c. Rearranged
d. Modified

13) The physical layer is concerned with the transmission of _____ over thephysical medium.
a. Programs
b. Dialogs
c. Protocols
d. Bits

14) Which layer functions as a link between user support layers and networksupport layers?
a. Network layer
b. Physical layer
c. Transport layer
d. Application layer

15) Which of the following is an application layer service?
a. Remote log-in
b. File transfer and access
c. Mail service
d. All the above

Part2: Exercises

1) Assume six devices are arranged in a mesh topology. How many cables are needed? How many ports are needed for each device?

2) For each of the following four networks, discuss the consequences if a connection fails.
   a. Five devices arranged in a mesh topology
   b. Five devices arranged in a star topology (not counting the hub)
   c. Five devices arranged in a bus topology
   d. Five devices arranged in a ring topology

3) Draw a hybrid topology with a star backbone and three ring networks.

4) Match the following to one or more layers of the TCP/IP model:
   a) Route determination.
   b) Flow control.
   c) Interface to transmission media.
   d) Provides access for the end user.
   e) Reliable process-to-process message delivery.
   f) Defines frames.
   g) Provides user services such as e-mail and file transfer.
   h) Transmission of bit stream across physical medium.
   i) Communicates directly with user's application program.
   j) Error correction and retransmission.
   k) Mechanical, electrical, and functional interface.
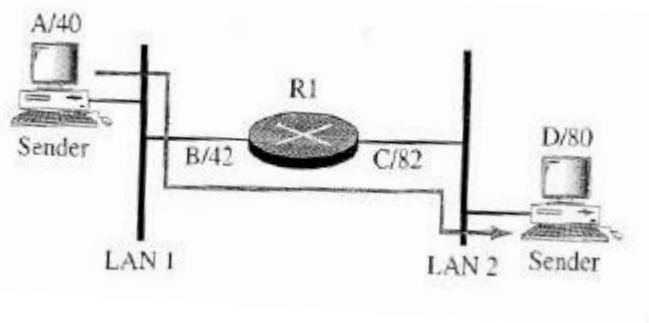   l) Responsibility for carrying frames between adjacent nodes.

Figure 1

5) In Figure 1, assume that the communication is between a process running at computer A with port address i and a process running at computer D with port address j. Show the contents of packets and frames at the network, data link, and transport layer for each hop.

What are the advantages of distributed processing?
Reliability, Security, collaboration via information sharing, Faster processing due to work being distributed among several systems.

What are the three criteria necessary for an effective and efficient network?
Performance, Reliability, Security

What are the advantages of a multipoint connection over a point-to-point connection?
Ease of installation, Low Cost. Point to point is for connecting 2 devices, whereas in multipoint more than 2 devices share the link. Therefore, multipoint connection provides more reliability.

What are the two types of line configuration?
Multipoint and point to point.

Categorize the four basic topologies in terms of line configuration.
Multipoint: Bus, Ring
Point to point: Mesh, Star

What is the difference between half-duplex and full-duplex transmission modes?

In half duplex mode, both stations can transmit and receive, but only one at a time. When one station sends a message, it cannot receive messages. In full duplex mode, both stations can transmit and receive messages simultaneously.

Name the four basic network topologies, and cite an advantage of each type.

Mesh: Robust, secure, privacy, reduced traffic

Star: Robust, less expensive than mesh

Bus: Easy to install, inexpensive, less cabling

Ring: Easy to install and reconfigure, fault isolation

For n devices in a network, what is the number of cable links required for a mesh, ring, bus, and star topology?

Mesh: $n * (n-1) / 2$

Ring: n

Bus: $n + 1$ (n for cables, 1 for backbone)

Star: n

What are some of the factors that determine whether a communication system is a LAN or WAN?

Geographical area spanned by a network determines whether it is a LAN or a WAN. A LAN, or Local Area Network, spans a relatively smaller area, whereas a WAN, or Wide Area Network, covers a much larger

area. Also, WANs have a higher propagation delay than LANs because of the large distance to be covered.

What is an internet? What is the Internet?

The internet is a general term for an interconnected network, while the Internet refers to a specific worldwide internetwork.

Why are protocols needed?

To facilitate timely and accurate communication between multiple devices with different configurations.

Why are standards needed?

Standards are needed to create and maintain an open and competitive market for manufacturers to coordinate protocol rules, and thus guarantee compatibility of data communication technologies.

What is the maximum number of characters or symbols that can be represented by Unicode?

Unicode uses 32 bits, so maximum number of characters or symbols is 2^32.

A color image uses 16 bits to represent a pixel. What is the maximum number of different colors that can be represented?

2^16

Assume six devices are arranged in a mesh topology. How many cables are needed? How many ports are needed for each device?

n * (n-1)/2 = 6 * 5 / 2 = 15 cables. Number of devices connected per device = n-1 = 5, so number of ports per device = 5.

For each of the following four networks, discuss the consequences if a connection fails.

a. Five devices arranged in a mesh topology

No major setback to the complete network, if one connection fails, others will continue to work.

b. Five devices arranged in a star topology (not counting the hub)

Connection to that particular device is lost, others can communicate

c. Five devices arranged in a bus topology

If the backbone connection fails, then all communication is over.

d. Five devices arranged in a ring topology

One failed connection will disable the entire network

You have two computers connected by an Ethernet hub at home. Is this a LAN, a MAN, or a WAN? Explain your reason.

LAN, because the geographical area spanned by the network would be very small, connects two computers locally.

In the ring topology in Figure 1.8, what happens if one of the stations is unplugged?

If one station is unplugged, then the whole system would be disconnected (if no measures are in place to bypass a station).
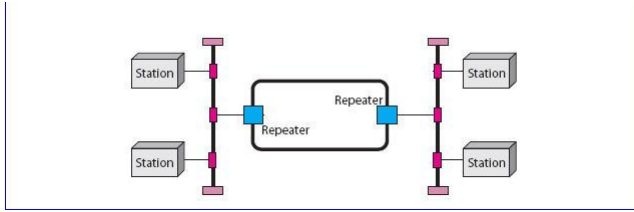
In the bus topology in Figure 1.7, what happens if one of the stations is unplugged?

Connection to only that station will be affected.

Draw a hybrid topology with a star backbone and three ring networks.
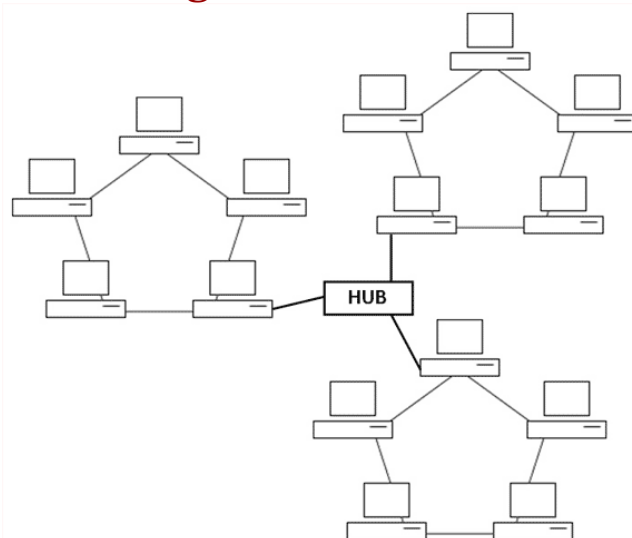
Draw a hybrid topology with a ring backbone and two bus networks.

Performance is inversely related to delay. When you use the Internet, which of the following applications are more sensitive to delay?
a. Sending an e-mail : Not highly sensitive to delay, once a message is sent, it remains in the inbox for a while
b. Copying a file : Not very sensitive to delay either.
c. Surfing the Internet : It is sensitive to delay, as it is an interactive application and users demand immediate results.

When a party makes a local telephone call to another party, is this a point-to-point or multipoint connection? Explain your answer.
Point to point because it is a local call between only two parties.

Compare the telephone network and the Internet. What are the similarities? What are the differences?
Similarities: 2-way communication, wired/wireless capabilities.
Differences: Internet has file sharing system, voice and video chat, telephone enables only voice

communication. Telephone-circuit switched network, Internet-packet switched network