**Data Communications Questions**

**Q1-1.**

Identify the five components of a data communications system.

**Protocol, Sender, Receiver, Message, Medium**

**Q1-2.**

What are the three criteria necessary for an effective and efficient network?

**Performance, Reliability, Security**

**Q1-3.**

What are the advantages of a multipoint connection over a point-to-point connection?

**Cost effectiveness – you need less cabling and hardware ports.**

**Simple Installation – just laying one shared cable is easier than running several cables from one device to another.**

**Efficient Capacity Use – not all devices may need constant communication, sharing a line is more efficient.**

**Q1-4.**

What are the two types of line configuration?

**Point to Point – a dedicated link between two devices.**

**Multipoint – more than two devices share a single link.**

**Q1-5.**

Categorize the four basic topologies in terms of line configuration.

**Ring – A device is connected to two devices on either side of it, in a point to point format. Each device in the ring has a repeater which regenerates the bits and passes them along.**

**Mesh – All devices are connected to eachother, in a point to point format**

**Star – Each device has a point to point link to a central hub/switch.**

**Bus – A shared multipoint link where a single long cable acts as the backbone.**

**Q1-6.**

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

**In both, devices can send and receive. In half-duplex mode, they cannot send and receive at the same time. Like walkie talkies.**

**In full duplex mode, both devices can send and receive simultaneously. Like telephony.**

**Q1-7.**

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

**Bus – Cost effective, requiring the least cabling.**

**Ring – Orderly data transfer, each device has a fair opportunity to transmit data.**

**Star – Easy to manage as you just manage from the central hub/switch.**

**Mesh – Reliable, as if one device is down, traffic can be rerouted through many other existing paths.**

**Q1-8.**

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

**For a mesh, n(n-1) / 2**

**For a ring, n**

**For a star, n**

**For a bus, 1 backbone and n drop lines**

**Q1-9.**

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

**Geographical region. A LAN is a small space, WAN is a wide space.**

**Ownership and Management. While a LAN is typically managed by a private organization, WANs can involve multiple parties, usually managed by ISPs.**

**Q1-10.**

What is an internet? What is the Internet?

**An internet(work) is the connection of two or more networks. The Internet is the largest internet(work) ever built. Composed of thousands of interconnected networks.**

**Q1-11.**

Why are protocols needed?

**In order to lay out a set of rules for proper effective communication. Without them, two devices may be connected but not able to communicate.**

**Q1-12.**

In a LAN with a link-layer switch (Figure 1.8b), host 1 wants to send a message to host 3. Because communication is through the link-layer switch, does the switch need to have an address? Explain.

**No, the message will contain the source mac address and the destination mac address.**

**Q1-13.**

How many point-to-point WANs are needed to connect n LANs if each LAN should be able to directly communicate with any other LAN?

**n(n-1) / 2. Mesh topology.**

**Q1-14.**

When a resident uses a dial-up or DLS service to connect to the Internet, what is the role of the telephone company?

**Provide a physical connection through a point to point WAN.**

**Q1-15.**

What is the first principle we discussed in this chapter for protocol layering that needs to be followed to make the communication bidirectional?

**We need to make each layer so that it is able to perform two opposite tasks, one in each direction**

**Q1-16.**

Which layers of the TCP/IP protocol suite are involved in a link-layer switch?

**Layers 1 and 2, physical and data link respectively.**

**Q1-17.**

A router connects three links (networks). How many of each of the following layers can the router be involved with?  
a. physical layer **3**  
b. data-link layer **3**  
c. network layer **1**

**Q1-18.**

In the TCP/IP protocol suite, what are the identical objects at the sender and the receiver sites when we think about the logical connection at the application layer?

**messages**

**Q1-19.**

A host communicates with another host using the TCP/IP protocol suite. What is the unit of data sent or received at each of the following layers?  
a. application layer **messages**  
b. network layer **segments or user datagrams**  
c. data-link layer **frames**

**Q1-20.**

Which of the following data units is encapsulated in a frame?  
a. a user datagram  
**b. a datagram**c. a segment

**Q1-21.**

Which of the following data units has an application-layer message plus the header from layer 4?  
a. a frame  
**b. a user datagram**  
c. a bit

**Q1-22.**

List some application-layer protocols mentioned in this chapter. **N/A**

**Q1-23.**

If a port number is 16 bits (2 bytes), what is the minimum header size at the transport layer of the TCP/IP protocol suite? **8 bytes**

**Q1-24.**

What are the types of addresses (identifiers) used in each of the following layers?  
a. application layer **Human readable addresses**  
b. network layer **Logical addresses (IPs)**  
c. data-link layer **Physical / MAC Addresses**

**Q1-25.**

Assume we want to connect two isolated hosts together to let each host communicate with the other. Do we need a link-layer switch between the two? Explain. **No. A switch is needed when connecting more than two devices together.**

**Q1-26.**

If there is a single path between the source host and the destination host, do we need a router between the two hosts? **No, A router's primary function is to forward packets between different networks. If both hosts are on the same network (e.g., they have IP addresses like 192.168.1.10 and 192.168.1.20), they can communicate directly using a switch or a direct cable connection. A router is only required when the destination host is on a different network (e.g., 10.0.0.5), and the data needs to be forwarded from one network to another.**