CHAPTER 2

Network Models

Solutions to Review Questions and Exercises

Review Questions

1. The Internet model, as discussed in this chapter, include ***physical***, ***data link***, ***network***, ***transport***, and ***application*** layers.
2. The network support layers are the ***physical***, ***data link***, and ***network*** layers.
3. The ***application*** layer supports the user.
4. The *transport layer* is responsible for ***process-to-process*** delivery of the entire message, whereas the network layer oversees ***host-to-host*** delivery of individual packets.
5. ***Peer-to-peer processes*** are processes on two or more devices communicating at a same layer
6. Each layer calls upon the ***services*** of the layer just below it using interfaces between each pair of adjacent layers.
7. ***Headers*** and ***trailers*** are control data added at the beginning and the end of each data unit at each layer of the sender and removed at the corresponding layers of the receiver. They provide source and destination addresses, synchronization points, information for error detection, etc.
8. The *physical layer* is responsible for transmitting a bit stream over a physical medium. It is concerned with
   a. ***physical characteristics of the media***
   b. ***representation of bits***
   c. ***type of encoding***
   d. ***synchronization of bits***
   e. ***transmission rate and mode***
   f. ***the way devices are connected with each other and to the links***
9. The *data link layer* is responsible for
   a. ***framing data bits***
   b. ***providing the physical addresses of the sender/receiver***
   c. ***data rate control***

d. ***detection and correction of damaged and lost frames***

10. The *network layer* is concerned with delivery of a packet across multiple networks; therefore its responsibilities include
    a. ***providing host-to-host addressing***
    b. ***routing***
11. The *transport layer* oversees the process-to-process delivery of the entire message. It is responsible for
    a. ***dividing the message into manageable segments***
    b. ***reassembling it at the destination***
    c. ***flow and error control***
12. The *physical address* is the local address of a node; it is used by the data link layer to deliver data from one node to another within the same network. The ***logical address*** defines the sender and receiver at the network layer and is used to deliver messages across multiple networks. The port address (service-point) identifies the application process on the station.
13. The *application layer services* include ***file transfer***, ***remote access***, ***shared database management***, and ***mail services***.
14. The ***application***, ***presentation***, and ***session*** layers of the OSI model are represented by the *application* layer in the Internet model. The lowest four layers of OSI correspond to the Internet model layers.

Exercises

15. The ***International Standards Organization***, or the ***International Organization of Standards***, (**ISO**) is a multinational body dedicated to worldwide agreement on international standards. An ISO standard that covers all aspects of network communications is the ***Open Systems Interconnection*** (**OSI**) model.
16.
    a. Route determination: ***network*** layer
    b. Flow control: ***data link*** and ***transport*** layers
    c. Interface to transmission media: ***physical*** layer
    d. Access for the end user: ***application*** layer
17.
    a. Reliable process-to-process delivery: **transport** layer
    b. Route selection: ***network*** layer
    c. Defining frames: ***data link*** layer
    d. Providing user services: ***application*** layer
    e. Transmission of bits across the medium: ***physical*** layer
18.
    a. Communication with user's application program: ***application*** layer
    b. Error correction and retransmission: ***data link*** and ***transport*** layers
    c. Mechanical, electrical, and functional interface: ***physical layer***

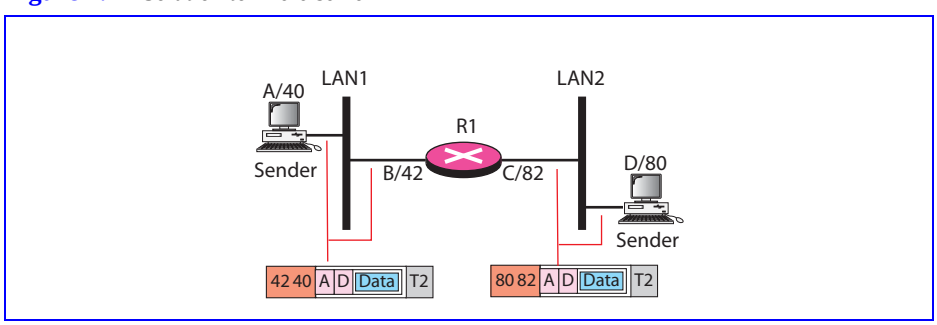
d. Responsibility for carrying frames between adjacent nodes: ***data link*** layer

19.

a. Format and code conversion services: ***presentation*** layer
b. Establishing, managing, and terminating sessions: ***session*** layer
c. Ensuring reliable transmission of data: ***data link*** and ***transport*** layers
d. Log-in and log-out procedures: ***session*** layer
e. Providing independence from different data representation: ***presentation*** layer

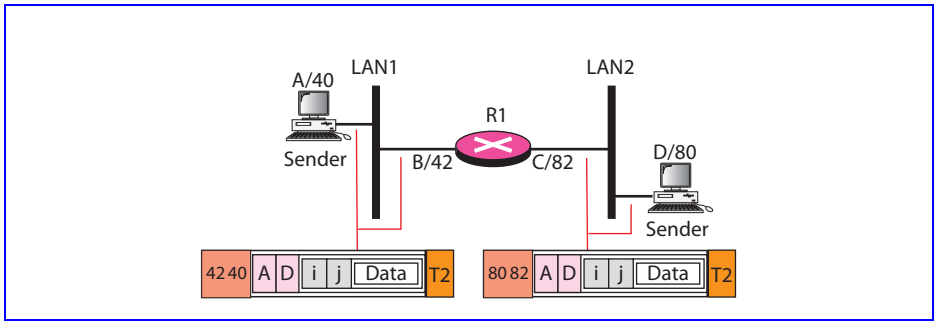
20. See Figure 2.1.

Figure 2.1 *Solution to Exercise 20*



21. See Figure 2.2.

Figure 2.2 *Solution to Exercise 21*



22. If the corrupted destination address does not match any station address in the network, the packet is lost. If the corrupted destination address matches one of the stations, the frame is delivered to the wrong station. In this case, however, the error detection mechanism, available in most data link protocols, will find the error and discard the frame. In both cases, the source will somehow be informed using one of the data link control mechanisms discussed in Chapter 11.

23. Before using the destination address in an intermediate or the destination node, the packet goes through error checking that may help the node find the corruption (with a high probability) and discard the packet. Normally the upper layer protocol will inform the source to resend the packet.

24. Most protocols issue a ***special error message*** that is sent back to the source in this case.
25. The errors ***between*** the nodes can be detected by the data link layer control, but the error ***at*** the node (between input port and output port) of the node cannot be detected by the data link layer.