CHAPTER 9

PRACTICE SET

Questions

Q9-1. Communication at the network layer is *host-to-host*; communication at the data-link layer is *node-to-node*.

Q9-3. Two hosts in two different networks can theoretically have the same link-layer address because a link-layer address has only local jurisdiction. However, the tendency is to avoid this for the future development of the Internet. Even today, manufacturers of network interface cards (NIC) use different set of link-layer addresses to make them distinguished.

Q9-5. ARP Packet Size = 2 + 2 + 1 + 1 + 2 + 6 + 4 + 6 + 4 = 28 bytes (Figure 9. 8).

Q9-7. Station A does not know the link-layer address of station B yet. It uses an all-zero address to define that this address is desired.

Q9-9. The source hardware address defines the link-layer address of station B.

Q9-11. A host does not know when another host sends an ARP request; it needs to be ready all of the time to respond to an ARP request.

Q9-13. If an end-to-end address is changed during the packet journey, it is not guarantee that the packet arrives at its destination.

Problems

P9-1. Theoretically, we do not need IP addresses because the global communication is one to one. If a station has a packet to send to another station, it uses the link-layer address of the destination host (or even port number related to the destination) to send a packet. However, if the internet uses the TCP/IP protocol suite, then messages pass through the network layer and IP address come to the picture.

P9-3. A router is need when we have more than one paths for the packet to travel from the source to destination. In Figure 9.15 (in the text) there is only path in each direction. We need no router.

P9-5. The current Internet is using packet-switching at the data-link layer. The source divides the data at the data-link layer into frames and each frame is independent.

P9-7. We can think of one journey with four links in this case: home-to-airport, airport-to-airport, and airport-to-home

a. End-to-end addresses (the whole journey)
Source: 2020 Main Street, Los Angeles
Destination: 1432 American Boulevard, Chicago

b.

First Link
Source: 2020 Main Street
Destination: Los Angeles Airport

Second Link
Source: Los Angeles Airport
Destination: Denver Airport

Third Link
Source: Denver Airport
Destination: Chicago Airport

Fourth Link
Source: Chicago Airport
Destination: 1432 American Boulevard

P9-9. The communication is impossible unless router R1 can reach router R2 using another path (not shown in the figure).

P9-11. The packet cannot be delivered unless system A broadcast it and system B receive it. In this case, all stations receive the packet. Other stations should drop it.

P9-13. Two approaches can be used. In the first approach, system A has a table to match the network-layer addresses to data-link addresses, it can use the table to find the data-link address of system B. In the second approach, system A has only the list of all data-link layer addresses, it can send unicast ARP packet to all stations to find out the one which matches the network-layer address. None of the approaches are practical because a host may change its data-link layer address without notice (by changing NIC as we see in Chapter

13). Some networks support tunneling, in which the network encapsulates a broadcast or multicast packet in a unicast packet and send them to all stations.

P9-15.

a.	A: host	B: router
b.	A: router	B: router
c.	A: router	B: host
d.	A: host	B: host