Q9-11. Why does a host or a router need to run the ARP program all of the time in the background?

Q9-12. Why does a router normally have more than one interface?

Q9-13. Why is it better not to change an end-to-end address from the source to the destination?

Q9-14. How many IP addresses and how many link-layer addresses should a router have when it is connected to five links?

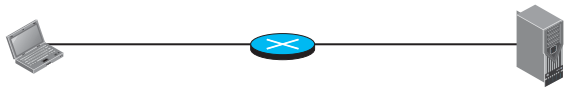
9.4.3 Problems

P9-1. Assume we have an internet (a private small internet) in which all hosts are connected in a mesh topology. Do we need routers in this internet? Explain.

P9-2. In the previous problem, do we need both network and data-link layers?

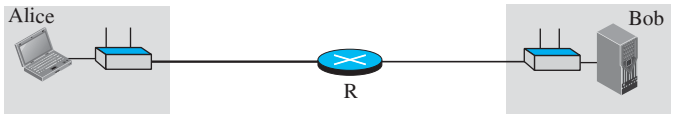
P9-3. Explain why we do not need the router in Figure 9.15.

Figure 9.15 *Problem 9-3*



P9-4. Explain why we may need a router in Figure 9.16.

Figure 9.16 *Problem 9-4*



P9-5. Is the current Internet using circuit-switching or packet-switching at the data-link layer? Explain.

P9-6. Assume Alice is travelling from 2020 Main Street in Los Angeles to 1432 American Boulevard in Chicago. If she is travelling by air from Los Angeles Airport to Chicago Airport,

a. find the end-to-end addresses in this scenario.

b. find the link-layer addresses in this scenario.

P9-7. In the previous problem, assume Alice cannot find a direct flight from the Los Angeles to the Chicago. If she needs to change flights in Denver,

a. find the end-to-end addresses in this scenario.

b. find the link-layer addresses in this scenario.

P9-8. When we send a letter using the services provided by the post office, do we use an end-to-end address? Does the post office necessarily use an end-to-end address to deliver the mail? Explain.

P9-9. In Figure 9.5, assume Link 2 is broken. How can Alice communicate with Bob?

P9-10. In Figure 9.5, show the process of frame change in routers R1 and R2.

P9-11. In Figure 9.7, assume system B is not running the ARP program. What would happen?

P9-12. In Figure 9.7, do you think that system A should first check its cache for mapping from N2 to L2 before even broadcasting the ARP request?

P9-13. Assume the network in Figure 9.7 does not support broadcasting. What do you suggest for sending the ARP request in this network?

P9-14. In Figures 9.11 to 9.13, both the forwarding table and ARP are doing a kind of mapping. Show the difference between them by listing the input and output of mapping for a forwarding table and ARP.

P9-15. Figure 9.7 shows a system as either a host or a router. What would be the actual entity (host or router) of system A and B in each of the following cases:

a. If the link is the first one in the path?

b. If the link is the middle one in the path?

c. If the link is the last one in the path?

d. If there is only one link in the path (local communication)?