CHAPTER 15 (corrisponde al cap. 14 italiano)

Connecting LANs, Backbone Networks, and Virtual Networks

Solutions to Review Questions and Exercises

Review Questions

1. An ***amplifier*** amplifies the signal, as well as noise that may come with the signal, whereas a ***repeater*** regenerates the signal, bit for bit, at the original strength.
2. ***Bridges*** have access to station ***physical addresses*** and can forward a packet to the appropriate segment of the network. In this way, they ***filter*** traffic and help control congestion.
3. A ***transparent bridge*** is a bridge in which the stations are completely unaware of the bridge's existence. If a bridge is added or deleted from the system, reconfiguration of the stations is unnecessary.
4. A signal can only travel so far before it becomes corrupted. A ***repeater*** regenerates the original signal; the signal can continue to travel and the LAN length is thus extended.
5. A ***hub*** is a ***multiport repeater***.
6. A ***forwarding port*** forwards a frame that it receives; a ***blocking port*** does not.
7. In a ***bus backbone***, the topology of the backbone is a ***bus***; in a ***star backbone***, the topology is a ***star***.
8. A ***VLAN*** saves time and money because reconfiguration is done through software. Physical reconfiguration is not necessary.
9. Members of a ***VLAN*** can send broadcast messages with the assurance that users in other groups will not receive these messages.
10. A ***VLAN*** creates virtual workgroups. Each workgroup member can send broadcast messages to others in the workgroup. This eliminates the need for multicasting and all the overhead messages associated with it.
11. Stations can be grouped by ***port number***, ***MAC address***, ***IP address***, or by a combination of these characteristics.

Exercises

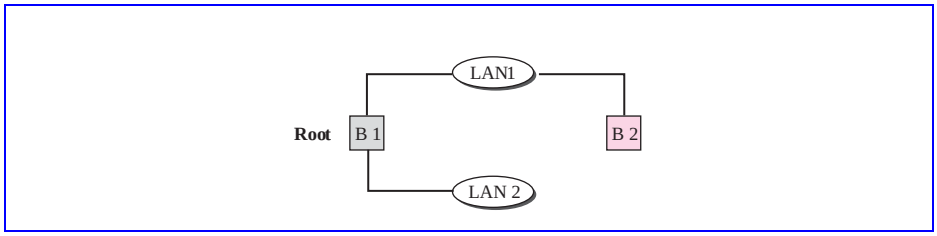
12. Table 15.1 shows one possibility. We have sorted the table based on the physical address to make the searching faster.

Table 15.1 *Solution to Exercise 12*

Address	*Port*
A	1
B	1
C	2
D	2
E	3
F	3

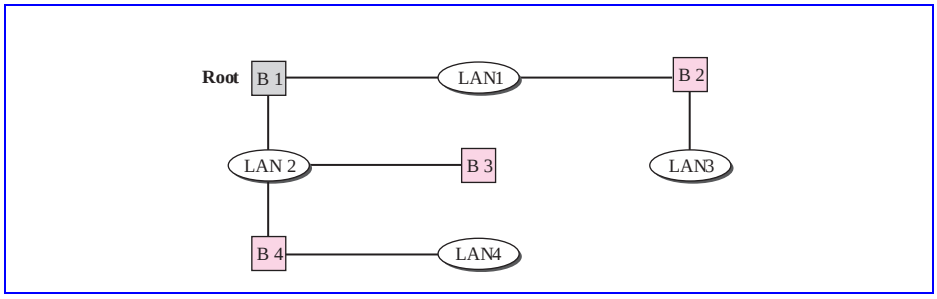
13. Figure 15.1 shows one possible solution. We made bridge B1 the root.

Figure 15.1 *Solution to Exercise 13*



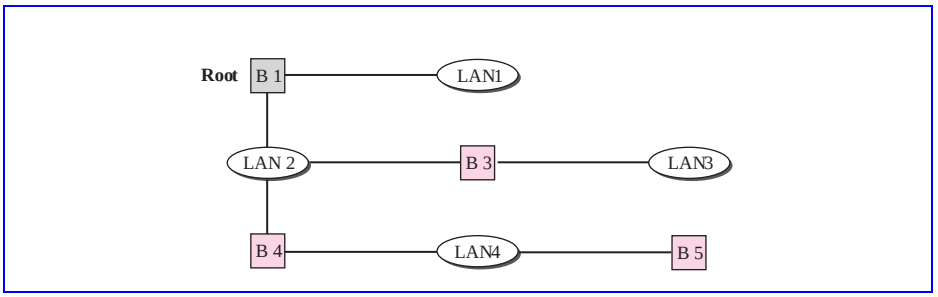
14. Figure 15.2 shows one possible solution.

Figure 15.2 *Solution to Exercise 14*



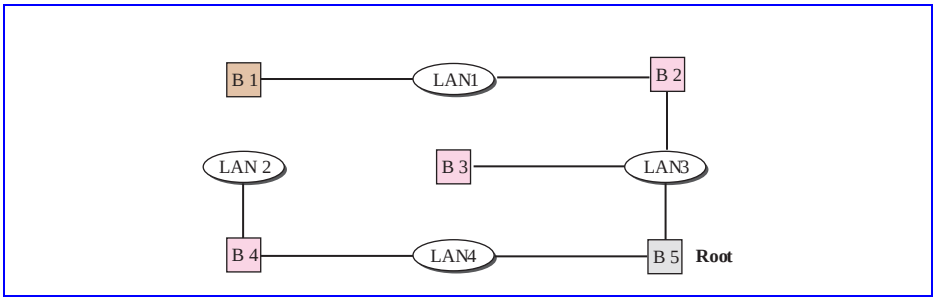
15. Figure 15.3 shows one possible solution.

Figure 15.3 *Solution to Exercise 15*



16. Figure 15.4 shows one possible solution.

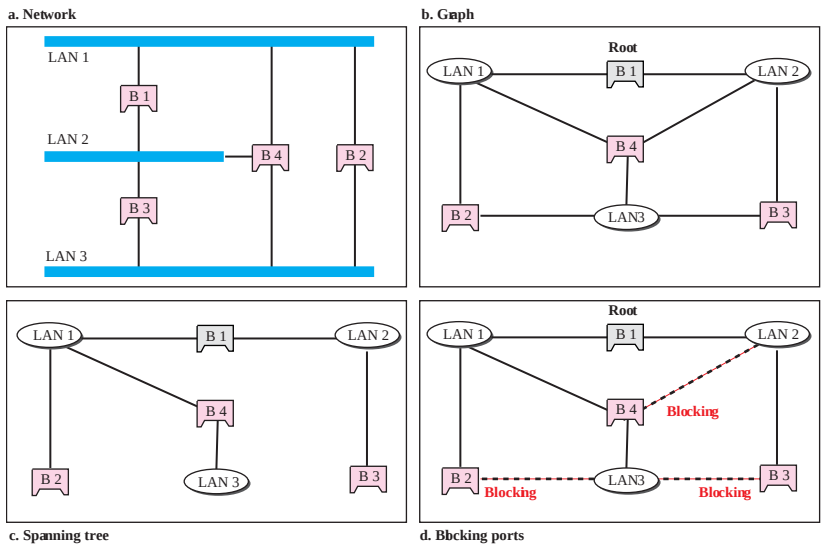
Figure 15.4 *Solution to Exercise 16*



17. Although any ***router*** is also a ***bridge***, replacing bridges with routers has the following consequences:
    a. Routers are more expensive than bridges.
    b. Routers operate at the first three-layers; bridges operates at the first two layers. Routers are not designed to provide direct filtering the way the bridges do. A router needs to search a routing table which is normally longer and more time consuming than a filtering table.
    c. A router needs to decapsulate and encapsulate the frame and change physical addresses in the frame because the physical addresses in the arriving frame define the previous node and the current router; they must be changed to the physical addresses of the current router and the next hop. A bridge does not change the physical addresses. Changing addresses, and other fields, in the frame means much unnecessary overhead.
18. A ***filtering table*** is based on ***physical addresses***; a ***routing table*** is based on the ***logical addresses***.

19. Figure 15.5 shows one possible solution. We have shown the network, the graph, the spanning tree, and the blocking ports.

Figure 15.5 *Solution to Exercise 19*



20. A ***router*** has more ***overhead*** than a bridge. A router process the packet at ***three layers***; a bridge processes a frame at only ***two layers***. A router needs to search a routing table for finding the output port based on the best route to the final destination; A bridge needs only to consult a filtering table based on the location of stations in a local network. A routing table is normally longer than a filtering table; searching a routing table needs more time than searching a filtering table. A router changes the physical addresses; a bridge does not.
21. A ***bridge*** has more overhead than a ***repeater***. A ***bridge*** processes the packet at ***two layers***; a ***repeater*** processes a frame at ***only one layer***. A bridge needs to search a table and find the forwarding port as well as to regenerate the signal; a repeater only regenerates the signal. In other words, a bridge is also a repeater (and more); a repeater is not a bridge.
22. A ***gateway*** has more overhead than a ***router***. A ***gateway*** processes the packet at ***five layers***; a ***router*** processes a packet at ***only three layers***. A gateway needs to worry about the format of the packet at the transport and application layers; a router does not. In other words, a gateway is also a router (but more); a router is not a gateway. A gateway may need to change the port addresses and application addresses if the gateway connects two different systems together; a router does not change these addresses.