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## CHAPTER 8

# *Circuit Switching and Telephone Network*

### Review Questions

1. Circuit switching, packet switching, and message switching.
3. A crosspoint is a microswitch at the junction of an input and an output line in a crossbar switch.
5. In a single crossbar switch, every combination of input and output has its own individual crosspoint. Therefore blocking does not occur.
7. In a space-division switch, the path from one device to another is spatially separate from other paths. The inputs and the outputs are connected using a grid of electronic microswitches. In a time-division switch, the inputs are divided in time using TDM. A control unit sends the input to the correct output device.
9. A TSI consists of RAM with several memory locations. The size of each location is equal to the size of a single time slot (TDM). There are as many locations as input devices. The RAM fills up with incoming data from the time slot in the order received. The control unit in the TSI sends out the slots to the correct output device. In a TDM bus, the input and output lines are connected to a high-speed bus through input and output gates. The control unit opens and closes the gates according to switching needed.
11. Space division is instantaneous, which means there are no delays when processing a connection.
13. The three main components of a telephone system are the local loops, the trunks, and the switching offices.
15. 4000 Hz
17. The carrier that provided services before 1996 owns the cabling system and is called the ILEC. The new carrier that can provide services is called a CLEC.
19. The services between LATAs are handled by IXCs.
21. In an 800 service, the callee pays for the call. In a 900 service, the caller pays for the call.
23. The DSU changes the rate of the digital data created by the subscriber's device to 56 Kbps and encodes it in the format used by the service provider.

### Multiple-Choice Questions

- 25. d
- 27. c
- 29. a
- 31. d
- 33. a
- 35. a
- 37. c
- 39. d

### Exercises

- 41. 1,000,000 crosspoints
- 43.  $20 \times 20 = 400$  crosspoints
- 45. Three users connected to each first stage switch can access the system at the same time (if their final destination is not the same). Twelve users can access the whole system at the same time. Three users per first stage switch and four first stage switches are used;  $3 \times 4 = 12$
- 47. The number of simultaneous users are 12, 18, 24, and 3. Therefore, the third switch (c) has a better performance.
- 49.
  - Output line 1: C
  - Output line 2: D
  - Output line 3: A
  - Output line 4: B
- 51. Figure 8.1 shows one solution.

**Figure 8.1** Exercise 51

