CHAPTER 9

Using Telephone and Cable Networks

Solutions to Odd-Numbered Review Questions and Exercises

Review Questions

1. The telephone network is made of three major components: ***local loops***, ***trunks***, and ***switching offices***.

3. A ***LATA*** is a small or large metropolitan area that according to the divestiture of 1984 was under the control of a single telephone-service provider. The services offered by the common carriers inside a LATA are called intra-LATA services. The services between LATAs are handled by interexchange carriers (IXCs). These carriers, sometimes called long-distance companies, provide communication services between two customers in different LATAs.

5. Telephone companies provide two types of services: ***analog*** and ***digital***.

7. Telephone companies developed ***digital subscriber line (DSL)*** technology to provide higher-speed access to the Internet. DSL technology is a set of technologies, each differing in the first letter (ADSL, VDSL, HDSL, and SDSL). The set is often referred to as xDSL, where x can be replaced by A, V, H, or S. DSL uses a device called ***ADSL modem*** at the customer site. It uses a device called a ***digital subscriber line access multiplexer (DSLAM)*** at the telephone company site.

9. To provide Internet access, the cable company has divided the available bandwidth of the coaxial cable into three bands: video, downstream data, and upstream data. The ***downstream-only video band*** occupies frequencies from 54 to 550 MHz. ***The downstream data*** occupies the upper band, from 550 to 750 MHz. The ***upstream data*** occupies the lower band, from 5 to 42 MHz.

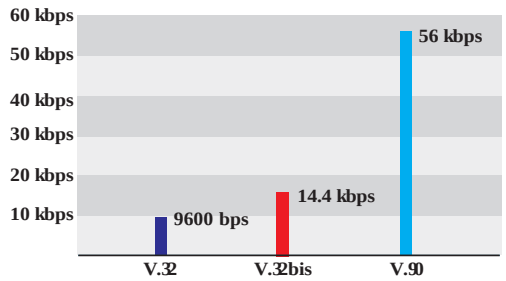
Exercises

11. ***Packet-switched*** networks are well suited for carrying data in packets. The end-to-end addressing or local addressing (VCI) occupies a field in each packet. Telephone networks were designed to carry voice, which was not packetized. A ***circuit-switched*** network, which dedicates resources for the whole duration of the conversation, is more suitable for this type of communication.

13. In a telephone network, the ***telephone numbers*** of the caller and callee are serving as source and destination addresses. These are used only during the setup (dialing) and teardown (hanging up) phases.

15. See Figure 9.1.

Figure 9.1 *Solution to Exercise 15*



17.

a. V.32 → **Time = (1,000,000 × 8) /9600** ≈ **834 s**
b. V.32bis → **Time = (1,000,000 × 8) / 14400** ≈ **556 s**
c. V.90 → **Time = (1,000,000 × 8) / 56000** ≈ **143 s**

19. We can calculate time based on the assumption of 10 Mbps data rate:

$$\textbf{Time} = (1{,}000{,}000 \times 8) / 10{,}000{,}000 \approx \textbf{0.8 seconds}$$

21. The ***cable modem*** technology is based on the ***bus*** (or rather tree) topology. The cable is distributed in the area and customers have to share the available bandwidth. This means if all neighbors try to transfer data, the effective data rate will be decreased.