10.12 Modem Hardware For Modulation And Demodulation

A hardware mechanism that accepts a sequence of data bits and applies modulation to a carrier wave according to the bits is called a *modulator*; a hardware mechanism that accepts a modulated carrier wave and recreates the sequence of data bits that was used to modulate the carrier is called a *demodulator*. Thus, transmission of data requires a modulator at one end of the transmission medium and a demodulator at the other. In practice, most communication systems are full duplex communication, which means each location needs both a modulator, which is used to send data, and a demodulator, which is used to receive data. To keep cost low and make the pair of devices easy to install and operate, manufacturers combine modulation and demodulation mechanisms into a single device called a *modem* (*mo*dulator and *dem*odulator). Figure 10.9 illustrates how a pair of modems use a 4-wire connection to communicate.

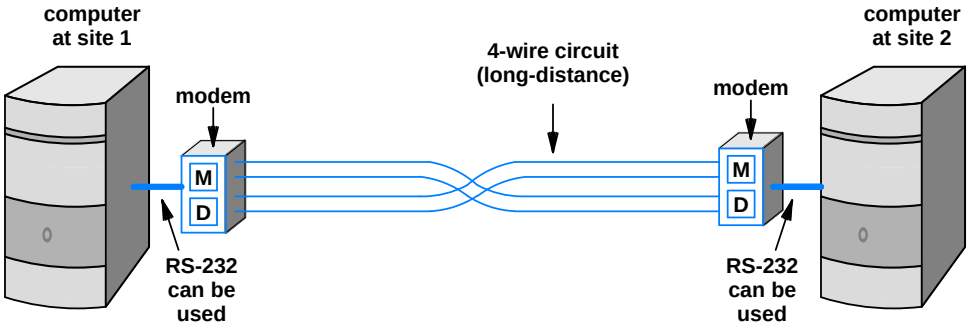

Figure 10.9 Illustration of two modems that use a 4-wire connection.

As the figure indicates, modems are designed to provide communication over long distances. A 4-wire circuit connecting two modems can extend inside a building, across a corporate campus between buildings, or between cities†.

10.13 Optical And Radio Frequency Modems

In addition to dedicated wires, modems are also used with other media, including RF transmission and optical fibers. For example, a pair of *Radio Frequency* (*RF*) modems can be used to send data via radio, and a pair of *optical modems* can be used to send data across a pair of optical fibers. Although such modems use entirely different media than modems that operate over dedicated wires, the principle remains the same: at the sending end, a modem modulates a carrier; at the receiving end, data is extracted from the modulated carrier.

†A circuit that crosses public property must be leased from a service provider, usually a telephone company.