each 200 kHz radio channel and has been deployed widely in the cellular and PCS bands by service providers in Europe, Asia, Australia, South America, and some parts of the US (in the PCS spectrum band only) [Gar99]; (b) *Interim Standard 136 (IS-136)*, also known as North American Digital Cellular (NADC) or US Digital Cellular (USDC), which supports three time slotted users for each 30 kHz radio channel and is a popular choice for carriers in North America, South America, and Australia (in both the cellular and PCS bands); (c) *Pacific Digital Cellular (PDC)*, a Japanese TDMA standard that is similar to IS-136 with more than 50 million users; and (d) the popular 2G CDMA standard *Interim Standard 95 Code Division Multiple Access (IS-95)*, also known as *cdmaOne*, which supports up to 64 users that are orthogonally coded and simultaneously transmitted on each 1.25 MHz channel. CDMA is widely deployed by carriers in North America (in both cellular and PCS bands), as well as in Korea, Japan, China, South America, and Australia [Lib99, ch. 1], [Kim00], [Gar00].

The 2G standards mentioned above represent the first set of wireless air interface standards to rely on digital modulation and sophisticated digital signal processing in the handset and the base station. As discussed in Chapter 11, second generation systems were first introduced in the early 1990s, and evolved from the first generation of analog mobile phone systems (e.g., AMPS, ETACS, and JTACS). Today, many wireless service providers use both first generation and second generation equipment in major markets and often provide customers with subscriber units that can support multiple frequency bands and multiple air interface standards. For example, in many countries it is possible to purchase a single tri-mode cellular handset phone that supports CDMA in the cellular and PCS bands in addition to analog first generation technology in the cellular band. Such tri-mode phones are able to automatically sense and adapt to whichever standard is being used in a particular market. Figure 2.2 illustrates how the world subscriber base was divided between the major 1G and 2G technologies as of late 2001. Table 2.1 highlights the key technical specifications of the dominant GSM, CDMA, and IS-136/PDC second generation standards.

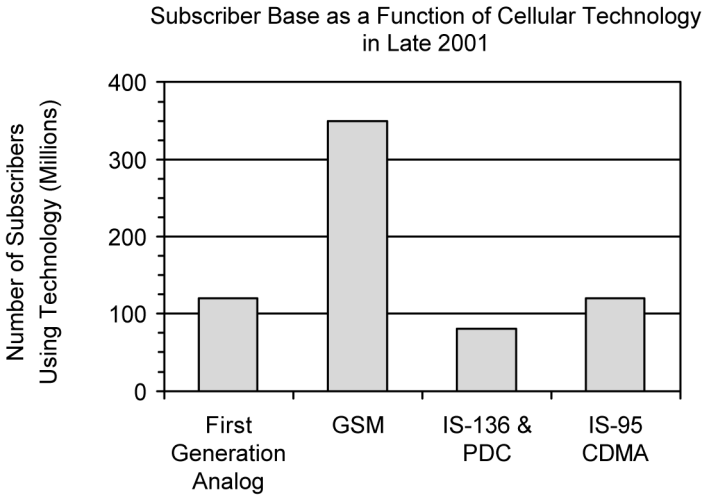

Figure 2.2 Worldwide subscriber base as a function of cellular technology in late 2001.