Part III
Multimedia Communications and Networking

Multimedia places great demands on networks and systems. Driven by an insatiable appetite for bandwidth on the Internet, advances in digital media compression technologies, and accelerating user demand, multimedia communication and content sharing over the Internet has quickly risen to become a mainstream "killer" application over the past two decades. As well, we are witnessing a convergence of conventional telephone networks and television networks on the global Internet, and numerous new-generation multimedia-based applications have been developed over the Internet, e.g., Skype and YouTube.

The Internet, however, was not initially designed for multimedia content distribution and there are significant challenges to be addressed. Multimedia applications generally start playback before downloads have completed, i.e., in a *streaming* mode. In the early time period, research attention was mostly focused on new streaming protocols, such as the Real-time Transport Protocol (RTP) and its Control Protocol (RTCP). There was also great effort toward multicast in the network layer as well as resource reservation protocols for large-scale multimedia content distribution.

Over the past decade, Content Distribution Networks (CDNs) and Peer-to-Peer (P2P) media streaming received a substantial amount of attention and were widely applied for both live and on-demand media streaming. Recently, Web-based HTTP video streaming allows users to play videos directly from their Web browsers, rather than having to download and install dedicated software.

Meanwhile, advances in wireless mobile networking and the emergence of sleek and smart portable devices are driving the revolution further. The dream of "anywhere and anytime" multimedia communication and content sharing has now become reality.

This Part examines the challenges and solutions for efficient multimedia communication and content sharing over computer networks, particularly over the wired Internet and wireless mobile networks. In Chap. 15, we look at the basic Internet service models and protocols for multimedia communications, and in

Chap. 16, we go on to consider multimedia content distribution mechanisms. Chapter 17 further provides a quick introduction to the basics of wireless mobile networks and issues related to multimedia communication over such networks.