Our discussion of technologies will gloss over many of the hardware details be-
cause the purpose is to highlight ways in which the underlying hardware has influenced
design choices in the protocols.

2.5 Ethernet (IEEE 802.3)

Ethernet is the name given to a popular packet-switched LAN technology invented
at Xerox PARC in the early 1970s. Xerox Corporation, Intel Corporation, and Digital
Equipment Corporation standardized Ethernet in 1978; the *Institute for Electrical and
Electronic Engineers* (*IEEE*) released a compatible version of the standard using the
standard number *802.3*. Ethernet has become the most popular LAN technology; it now
appears in virtually all corporate and personal networks, and the Ethernet packet format
is sometimes used across wide area networks. The current versions of Ethernet are
known as *Gigabit Ethernet* (*GigE*) and *10 Gigabit Ethernet* (*10GigE*) because they
transfer data at 1 Gbps and 10 Gbps, respectively. Next generation technologies operate
at 40 and 100 gigabits per second. An Ethernet network consists of an *Ethernet switch*
to which multiple computers attach†. A small switch can connect up to four computers;
a large switch, such as the switches used in data centers, can connect hundreds of com-
puters. Connections between a computer and a switch consist of copper wires for lower
speeds or optical fibers for higher speeds. Figure 2.1 illustrates the topology of a small
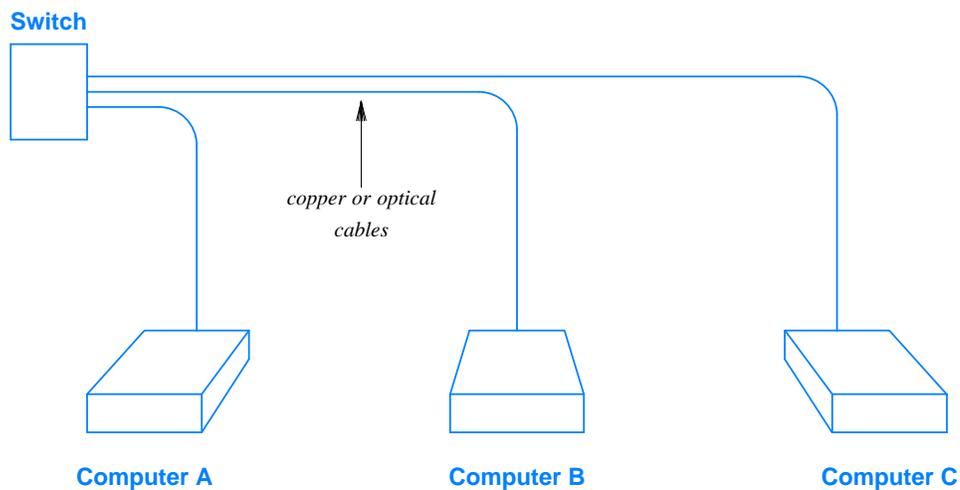Ethernet with three computers connected.

Switch

*copper or optical
cables*

Computer A   **Computer B**   **Computer C**

Figure 2.1 Illustration of the connections used with an Ethernet. Each com-
puter connects to a central switch.

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†We will describe networks as connecting computers, but they can also connect devices, such as printers,
that have network connections.