



Chapter 1

Introduction

Forouzan

1-1 DATA COMMUNICATIONS

*The term **telecommunication** means communication at a distance. The word **data** refers to information presented in whatever form is agreed upon by the parties creating and using the data. **Data communications** are the exchange of data between two devices via some form of transmission medium such as a wire cable.*

Topics discussed in this section:

Components

Data Representation

Data Flow

Figure 1.1 Five components of data communication

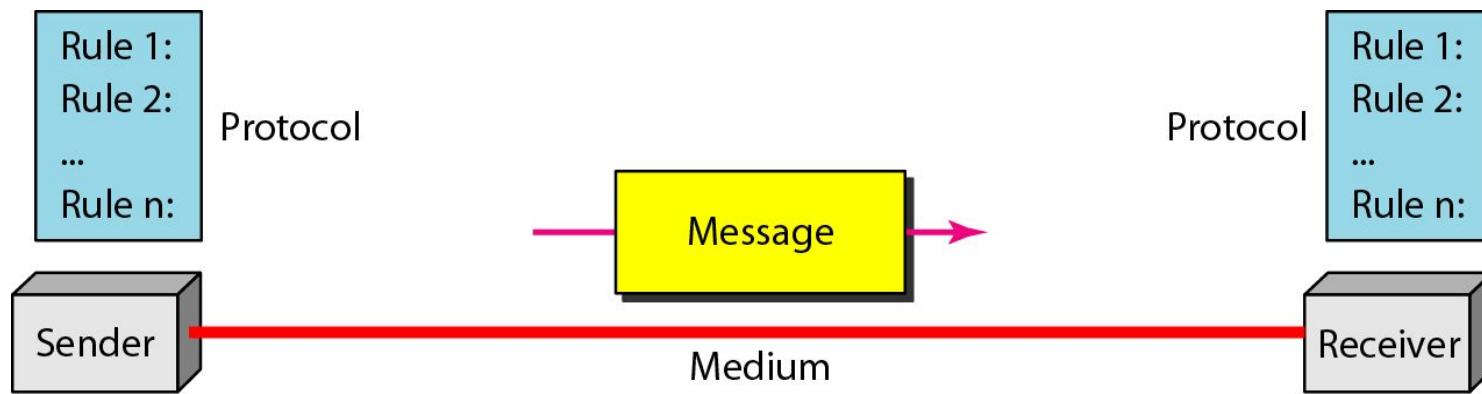
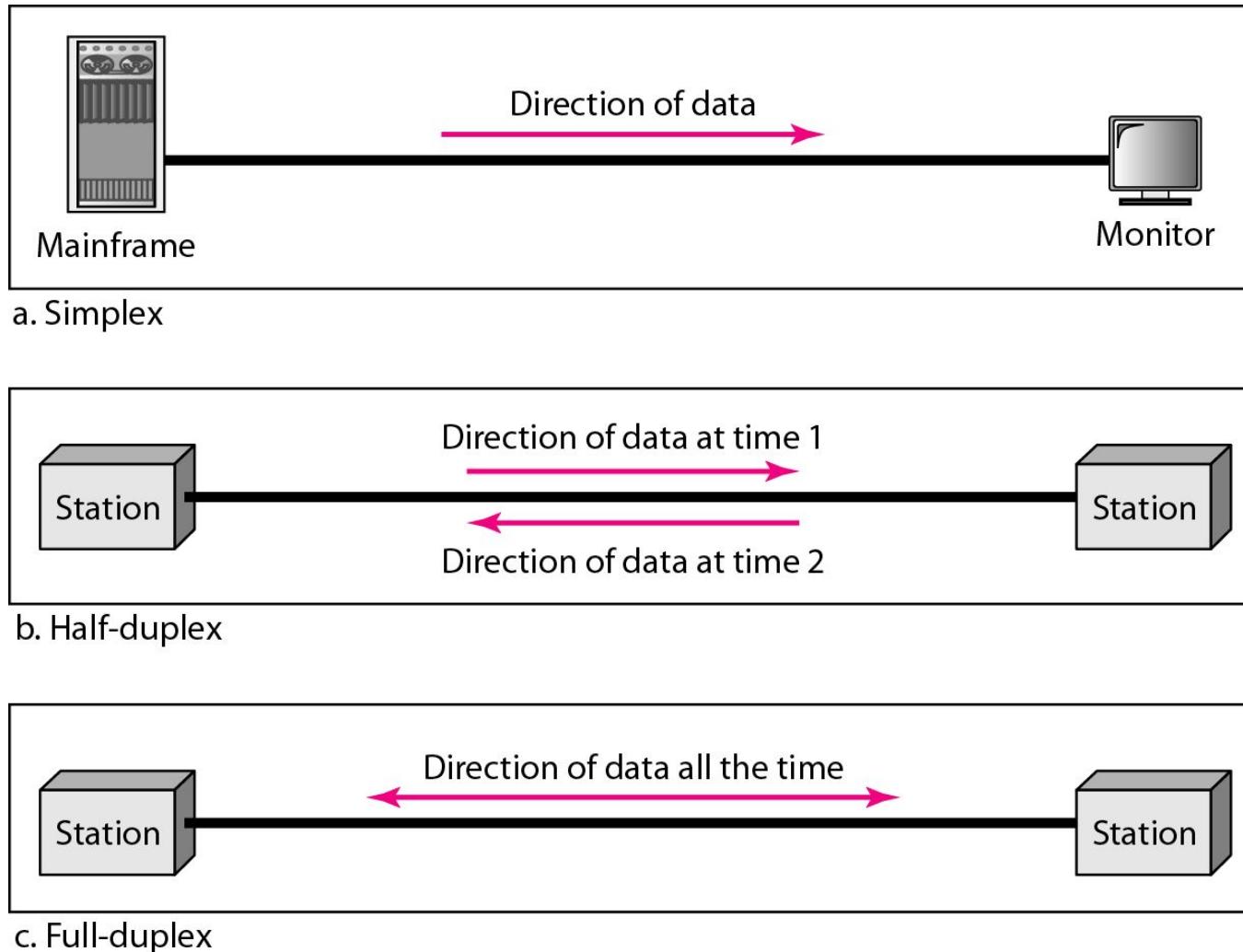


Figure 1.2 Data flow (simplex, half-duplex, and full-duplex)



1-2 NETWORKS

*A **network** is a set of devices (often referred to as **nodes**) connected by communication **links**. A node can be a computer, printer, or any other device capable of sending and/or receiving data generated by other nodes on the network.*

Topics discussed in this section:

Distributed Processing

Network Criteria

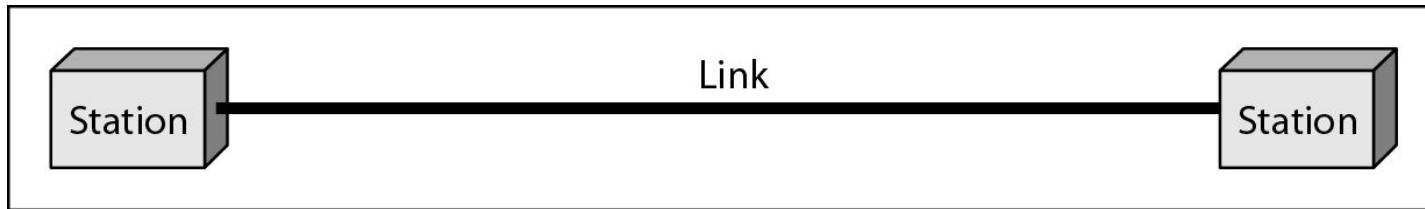
Physical Structures

Network Models

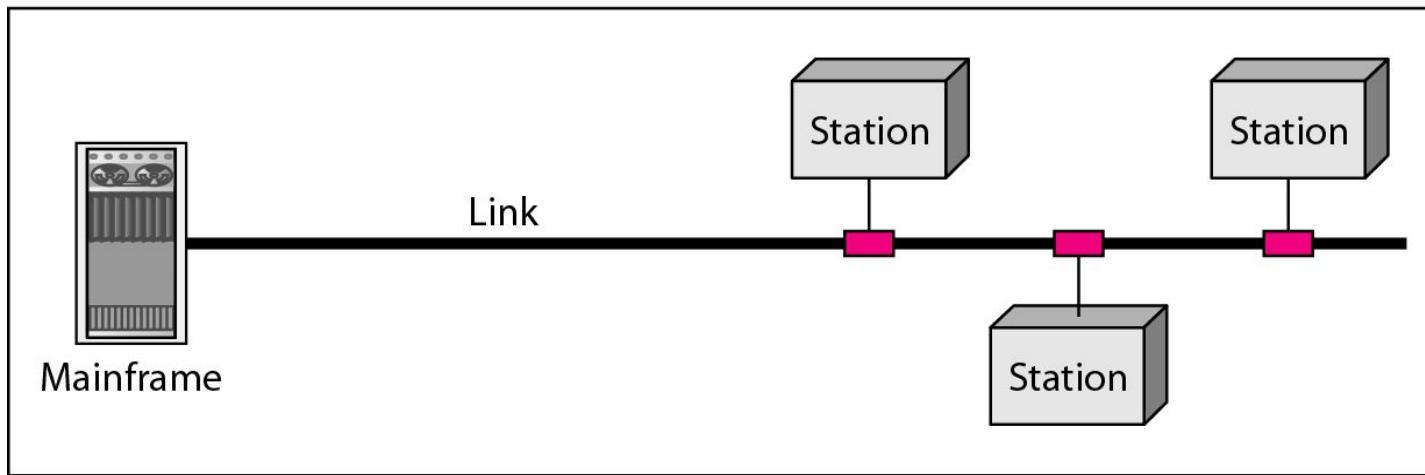
Categories of Networks

Interconnection of Networks: Internetwork

Figure 1.3 *Types of connections: point-to-point and multipoint*



a. Point-to-point



b. Multipoint

Figure 1.4 *Categories of topology*

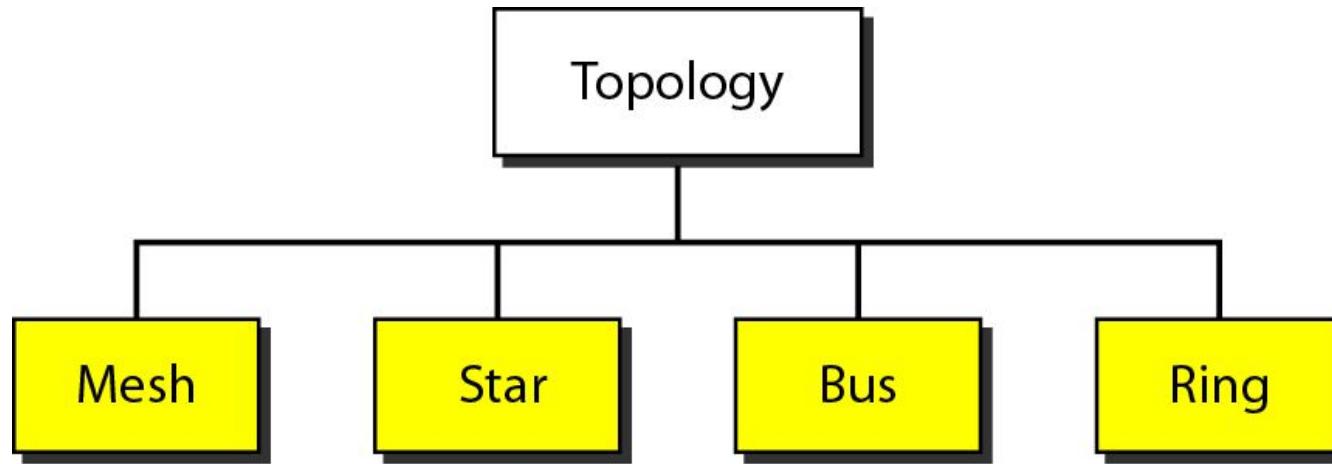


Figure 1.5 *A fully connected mesh topology (five devices)*

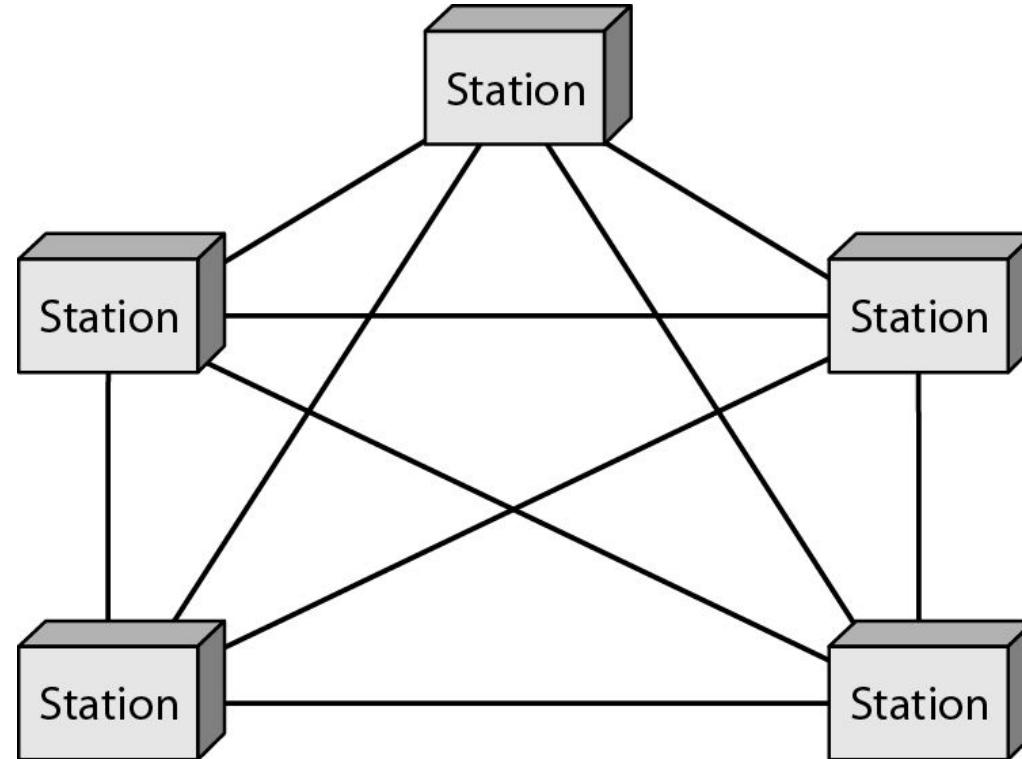


Figure 1.6 *A star topology connecting four stations*

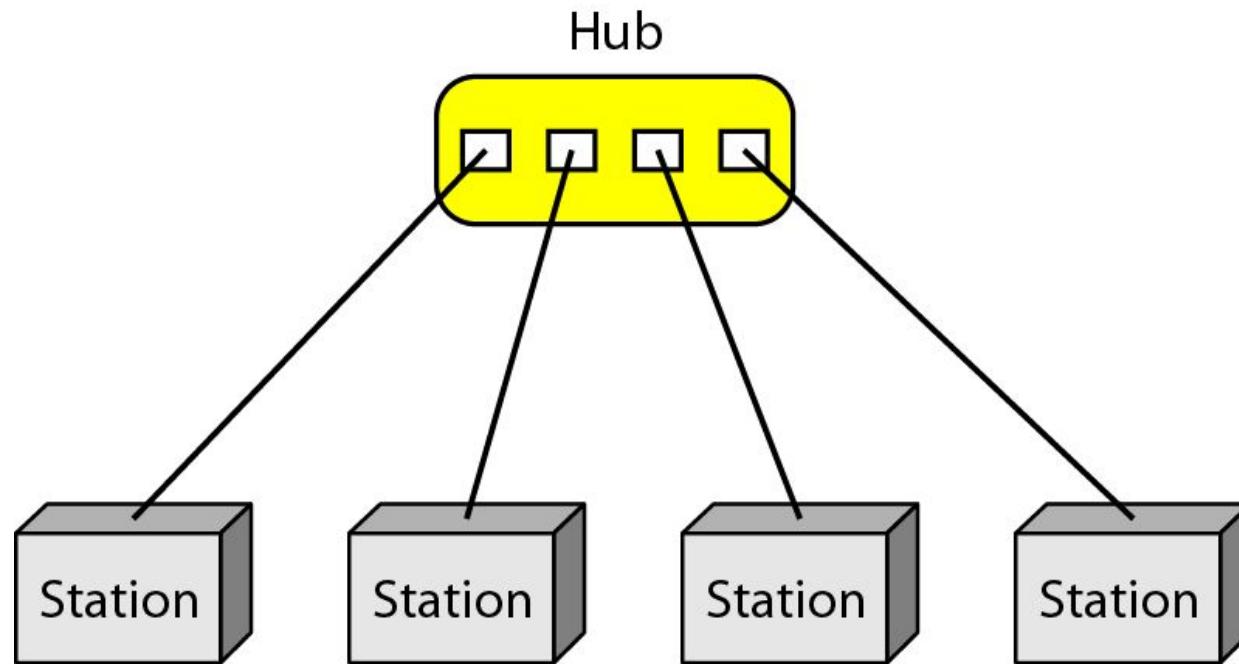


Figure 1.7 *A bus topology connecting three stations*

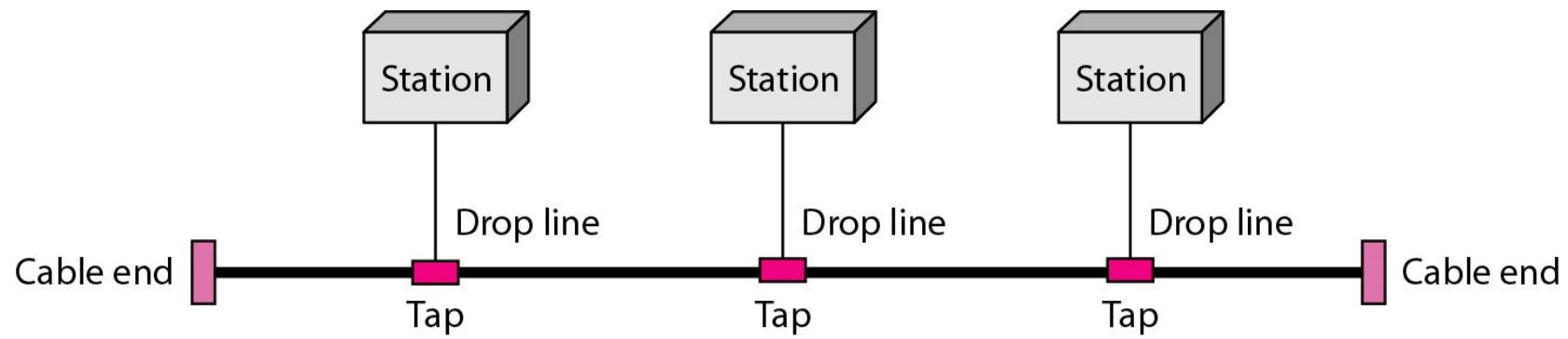


Figure 1.8 *A ring topology connecting six stations*

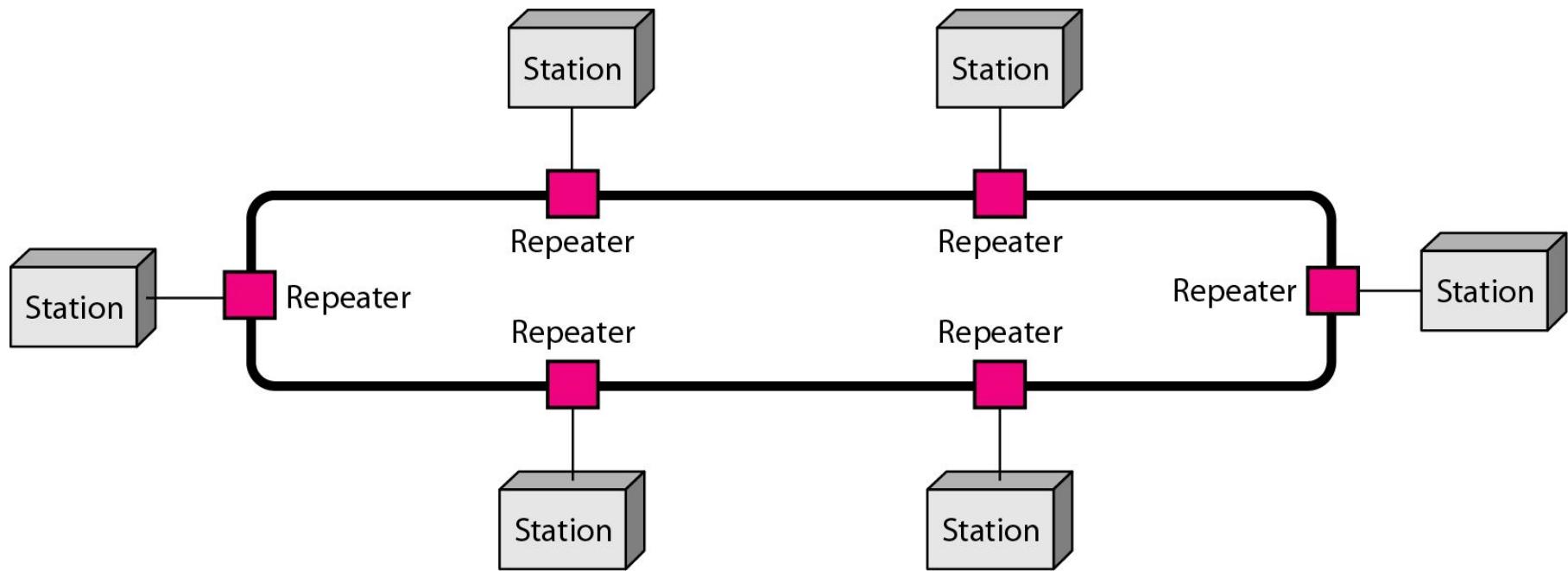


Figure 1.9 *A hybrid topology: a star backbone with three bus networks*

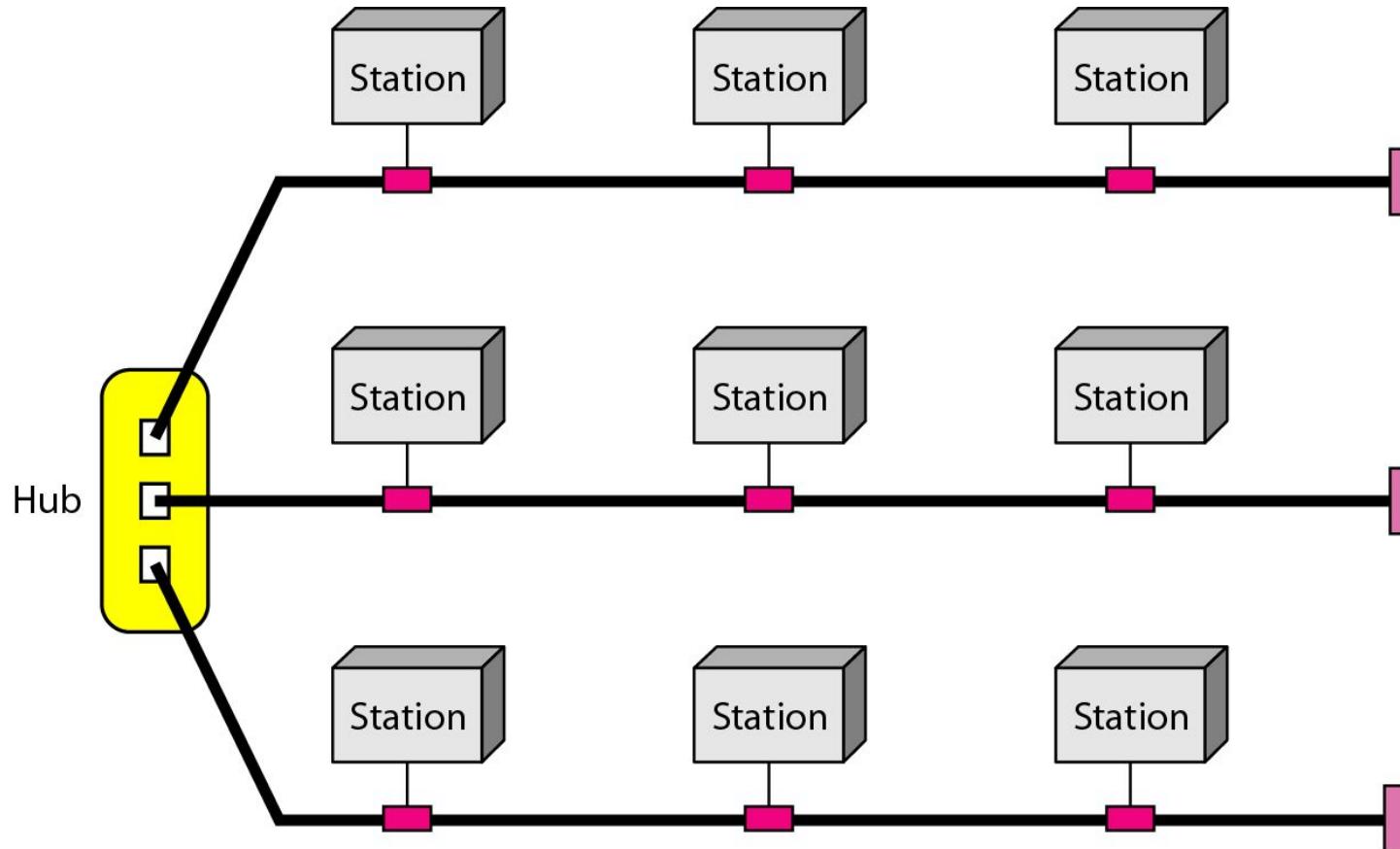


Figure 1.10 *An isolated LAN connecting 12 computers to a hub in a closet*

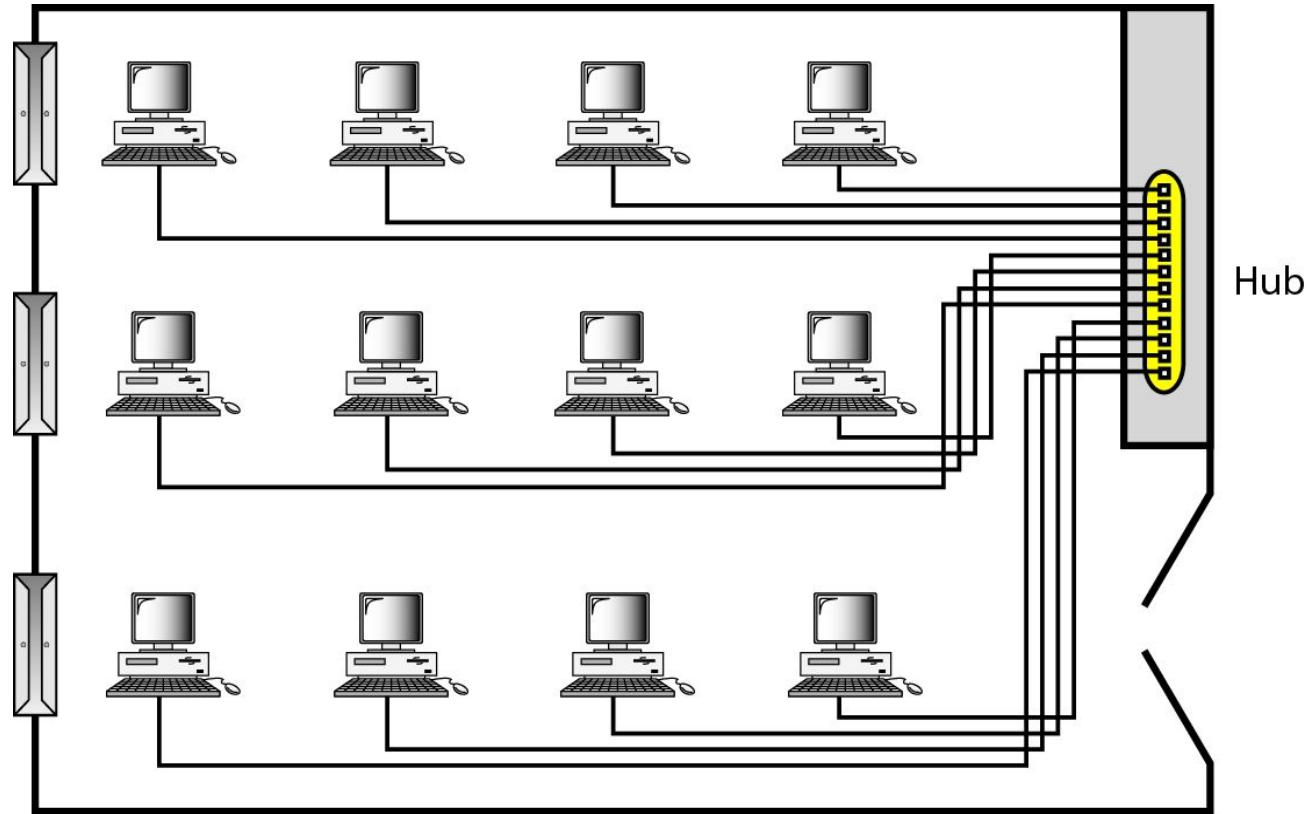
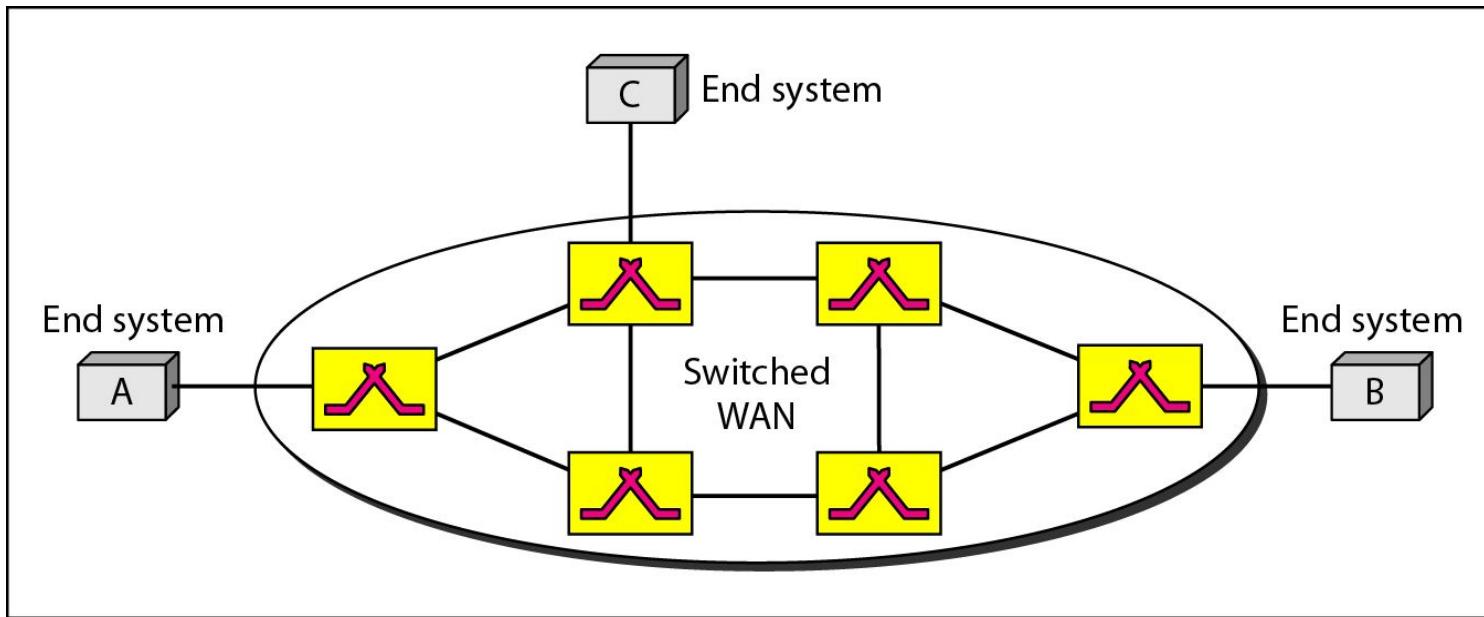
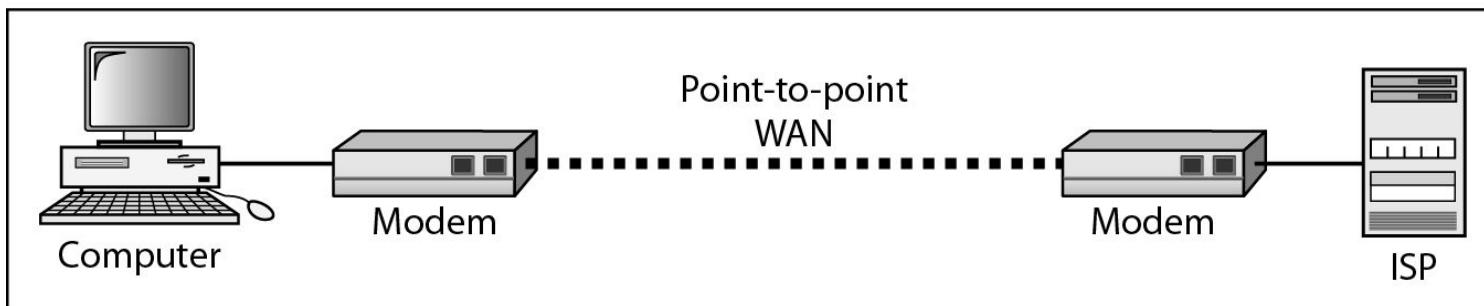


Figure 1.11 *WANs: a switched WAN and a point-to-point WAN*

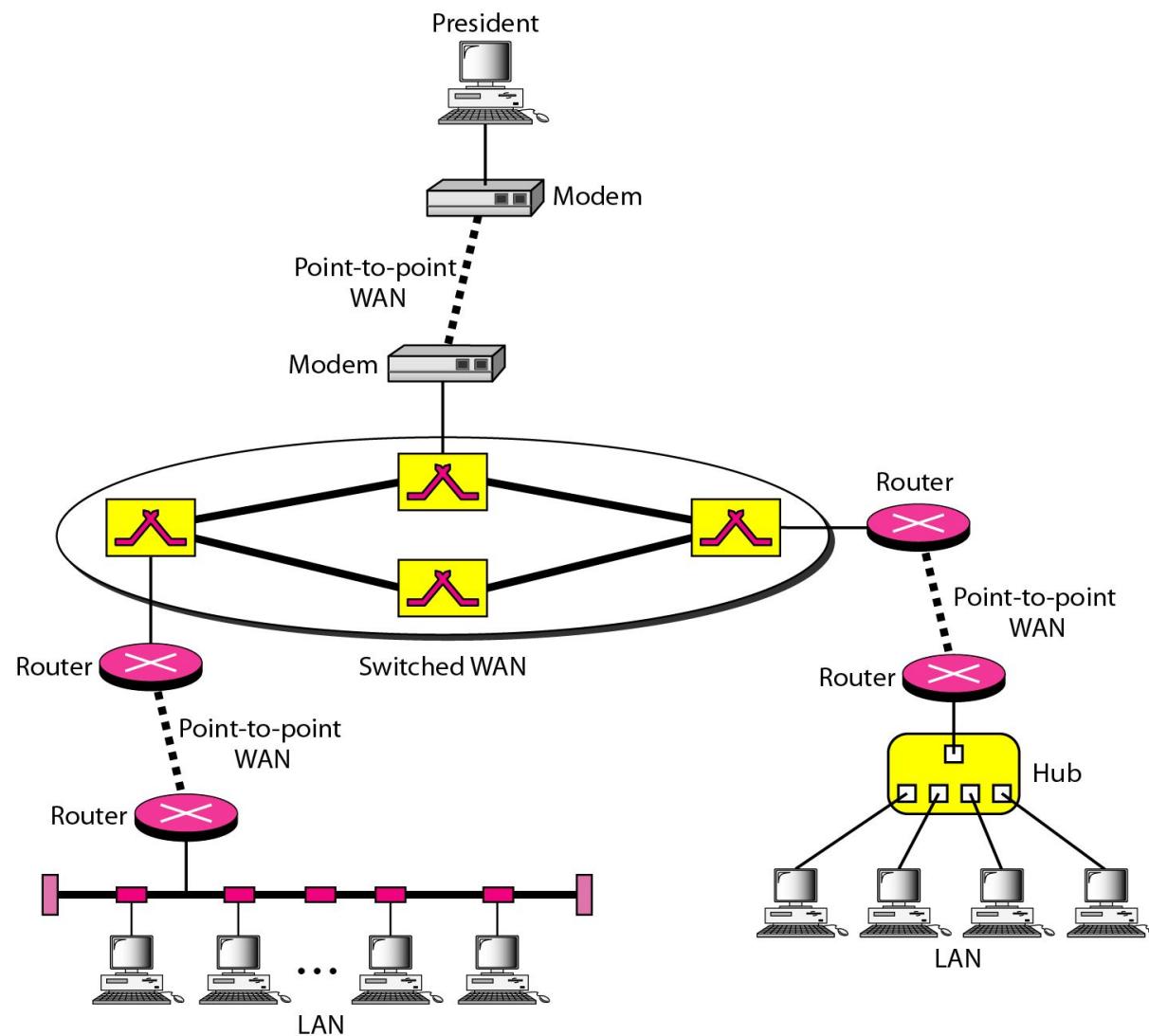


a. Switched WAN



b. Point-to-point WAN

Figure 1.12 A heterogeneous network made of four WANs and two LANs



1-3 THE INTERNET

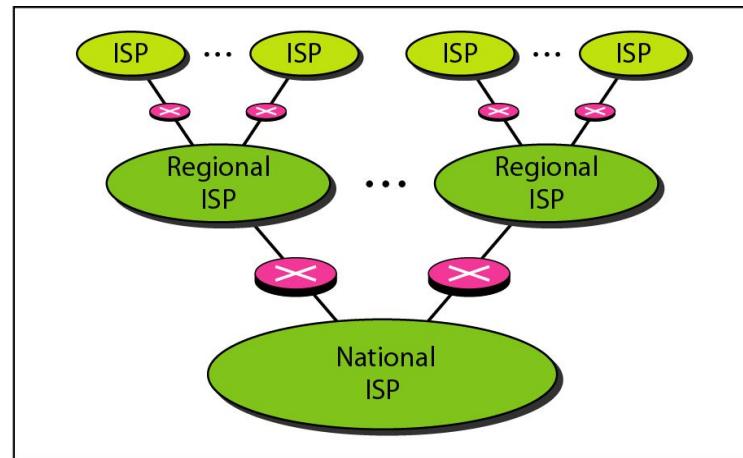
The Internet has revolutionized many aspects of our daily lives. It has affected the way we do business as well as the way we spend our leisure time. The Internet is a communication system that has brought a wealth of information to our fingertips and organized it for our use.

Topics discussed in this section:

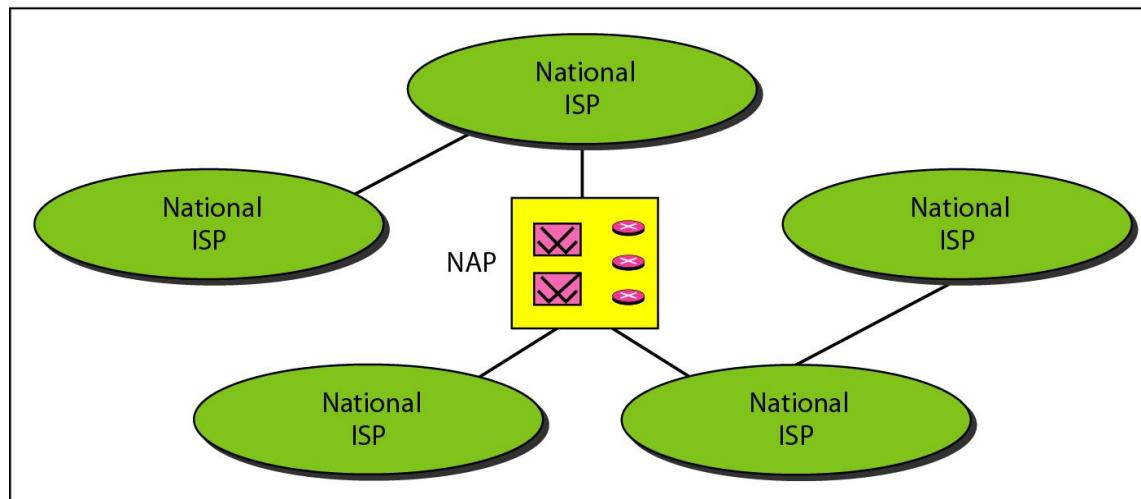
A Brief History

The Internet Today (ISPs)

Figure 1.13 *Hierarchical organization of the Internet*



a. Structure of a national ISP



b. Interconnection of national ISPs

1-4 PROTOCOLS AND STANDARDS

*In this section, we define two widely used terms: **protocols** and **standards**. First, we define protocol, which is synonymous with rule. Then we discuss standards, which are agreed-upon rules.*

Topics discussed in this section:

Protocols

Standards

Standards Organizations

Internet Standards