

Chapter 1

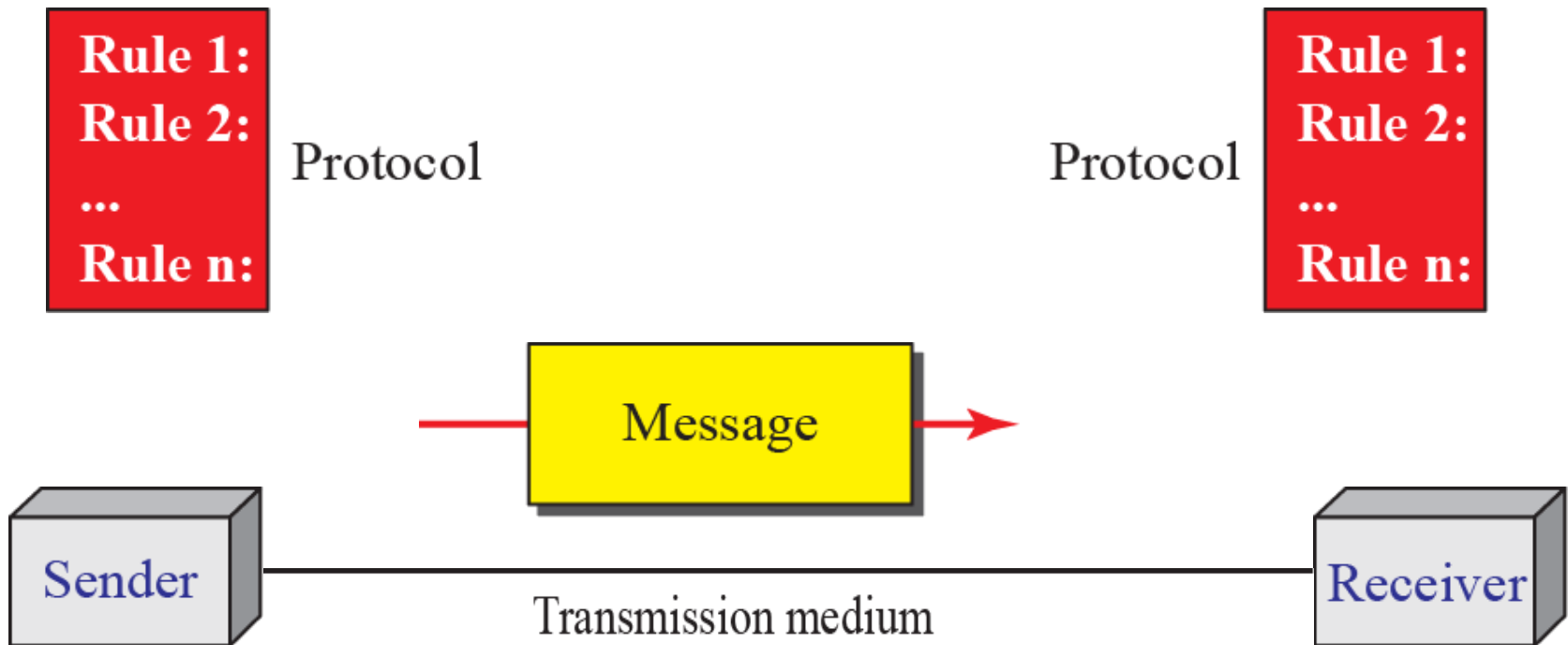
Introduction

1-1 DATA COMMUNICATIONS

- *When we communicate, we are sharing information → local or remote*
- *The **telecommunication** means communication at a distance*
- ***Data communications** are the exchange of data between two devices via some form of transmission media.*

1.1.1 Components

A data communications system has five components





1.1.2 Data Representation

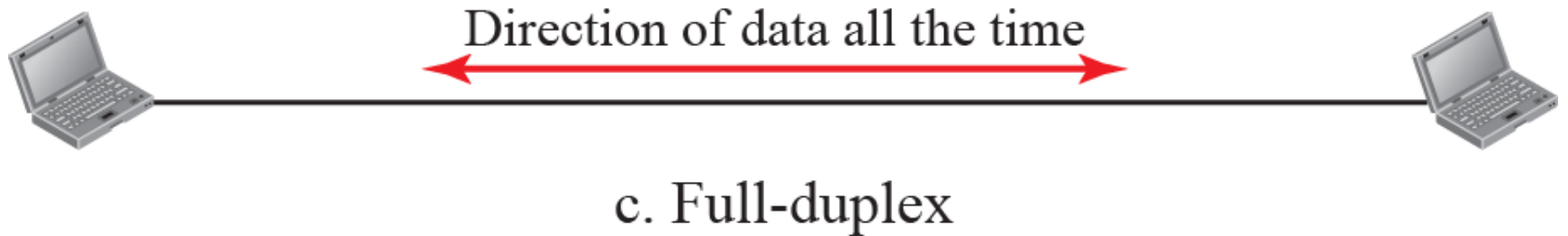
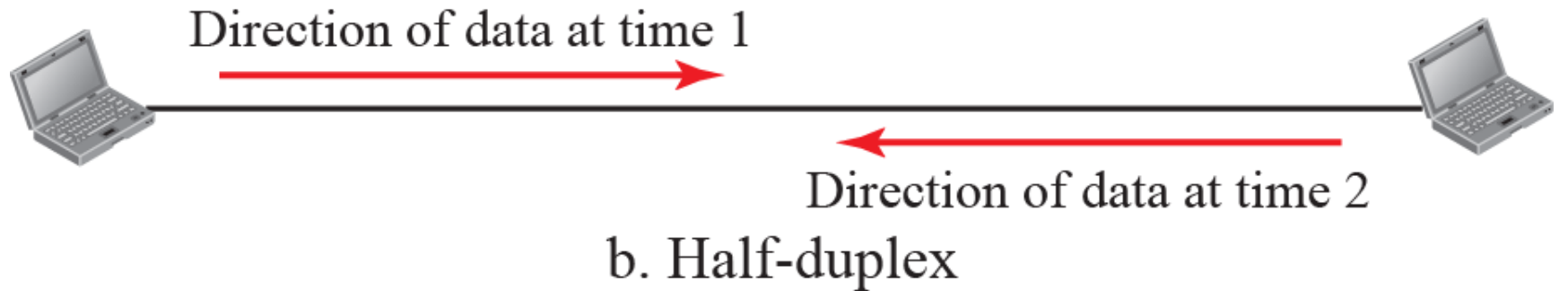
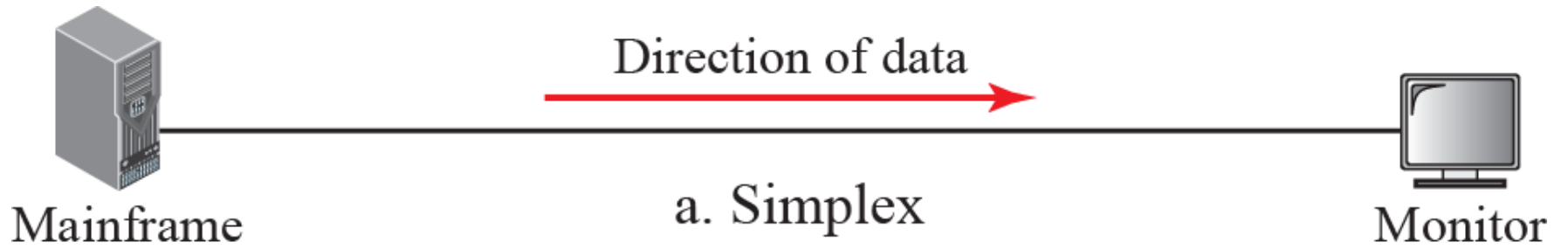
Information today comes in different forms such as text, numbers, images, audio, and video



1.1.3 Data Flow

Communication between two devices can be

- simplex*
- half-duplex*
- full-duplex*



1-2 NETWORKS

A network is the interconnection of a set of devices capable of communication.

*Examples: computer, desktop, laptop,
workstation, cellular phone, or
security system.*

router, switch, modem



1.2.1 Network Criteria

A network must be able to meet a certain number of criteria

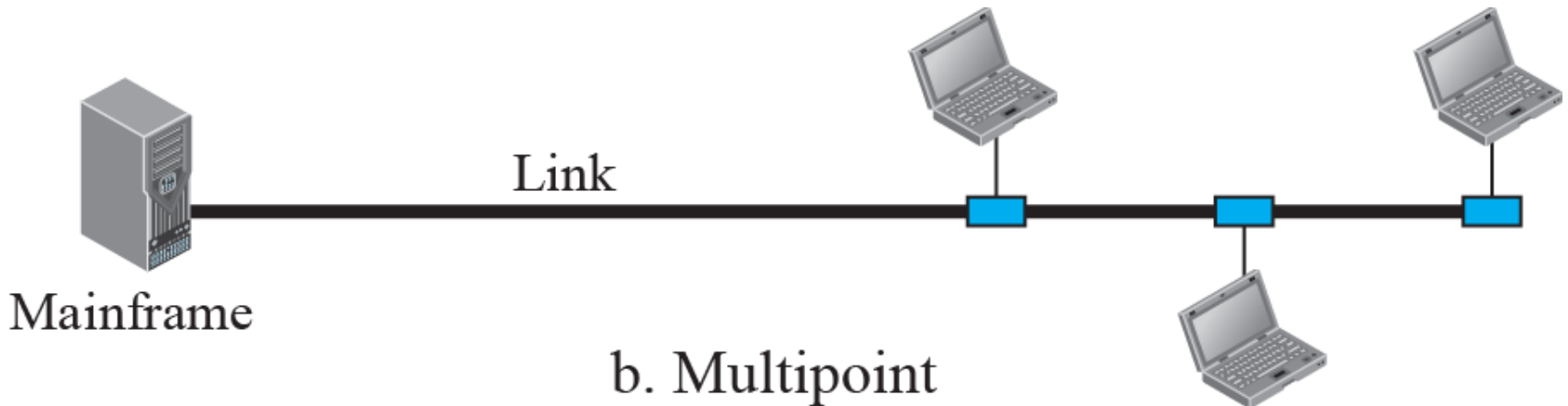
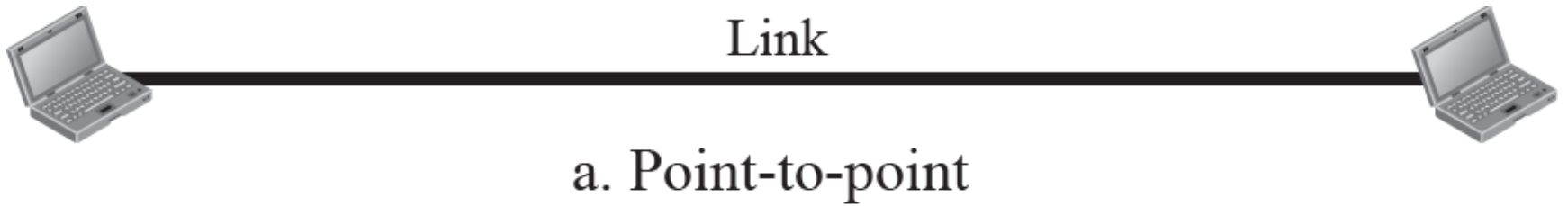
- performance***
- Reliability***
- Security.***



1.2.2 Physical Structures

Before discussing networks, we need to define some network attributes.

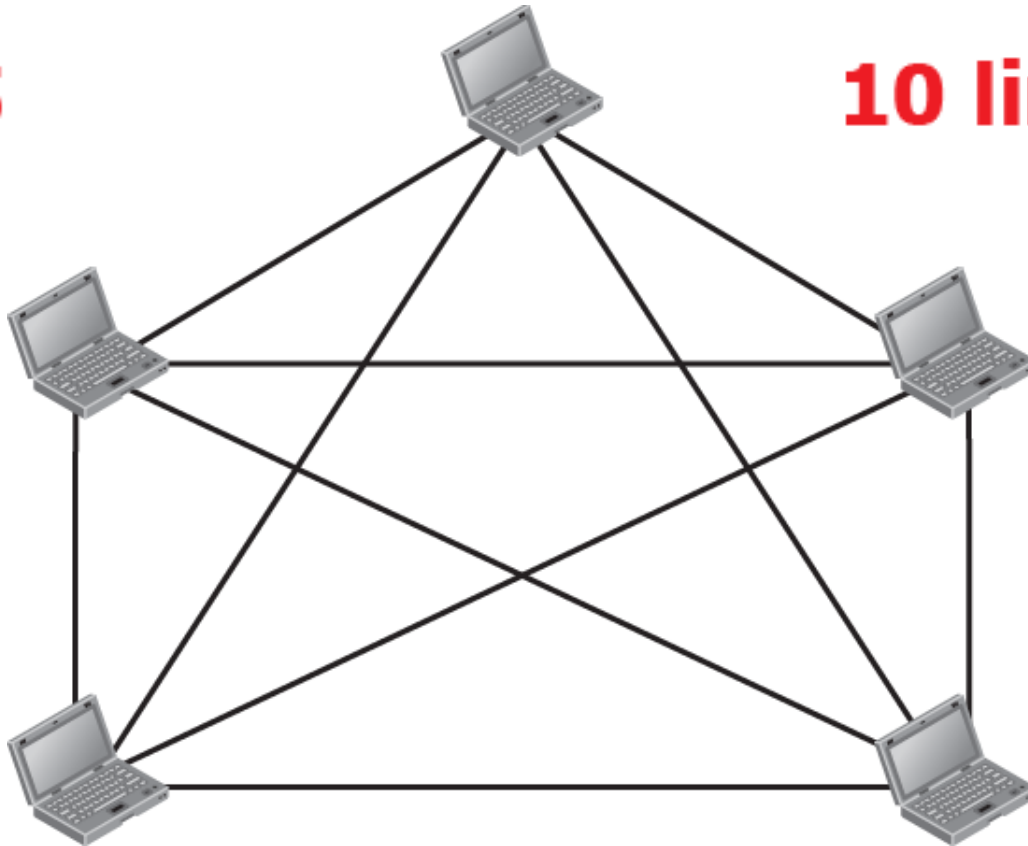
Types of connection



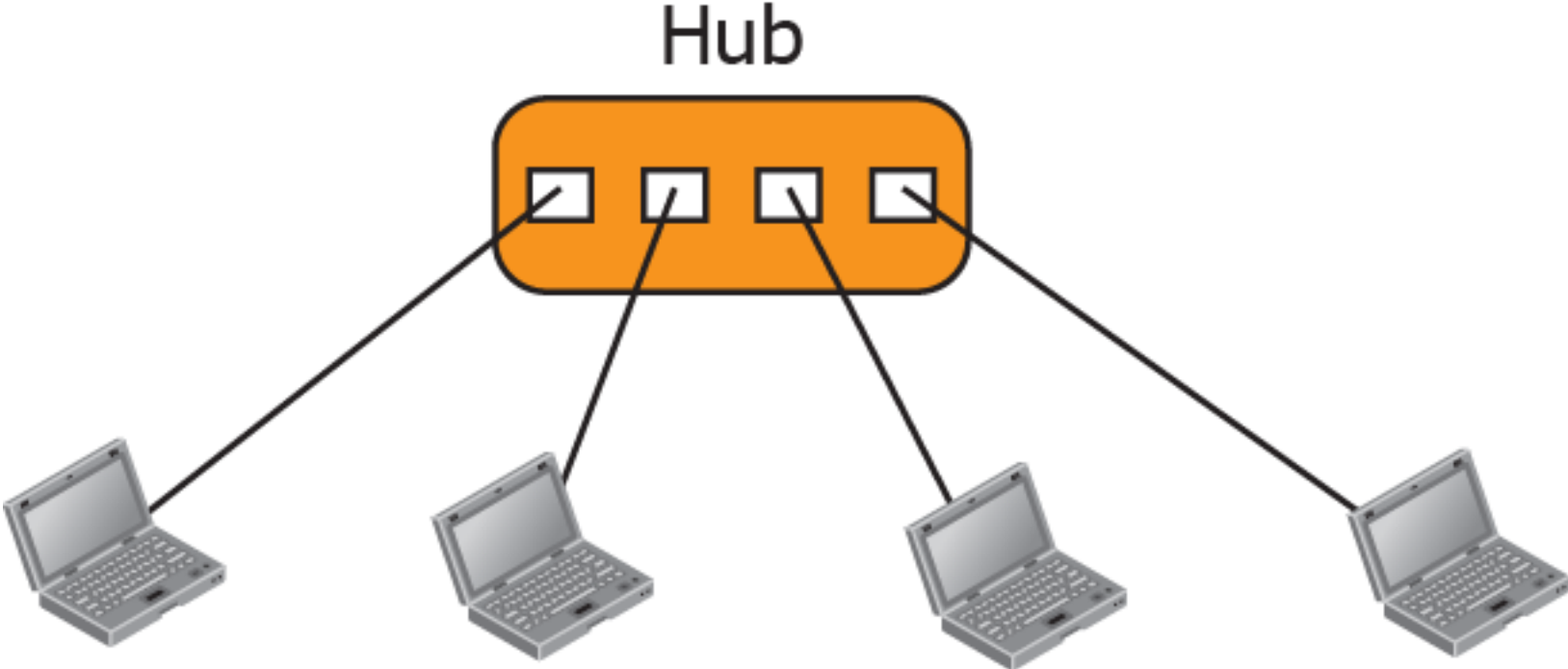
A fully-connected mesh topology

n = 5

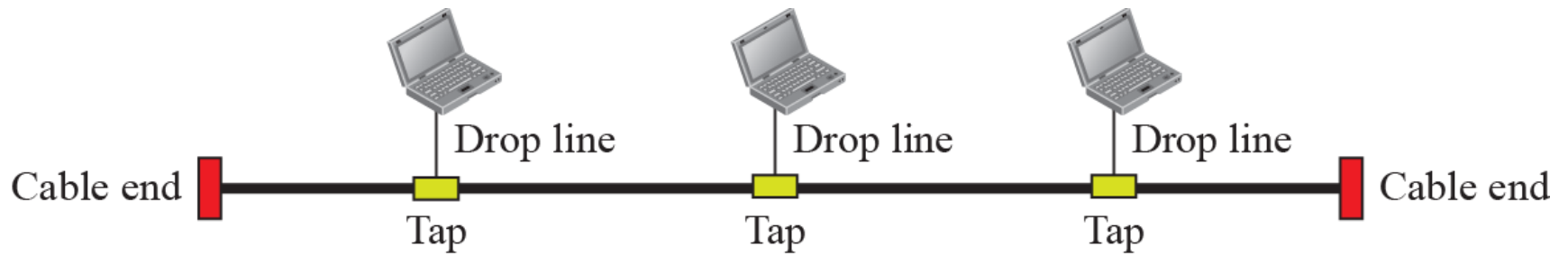
10 links



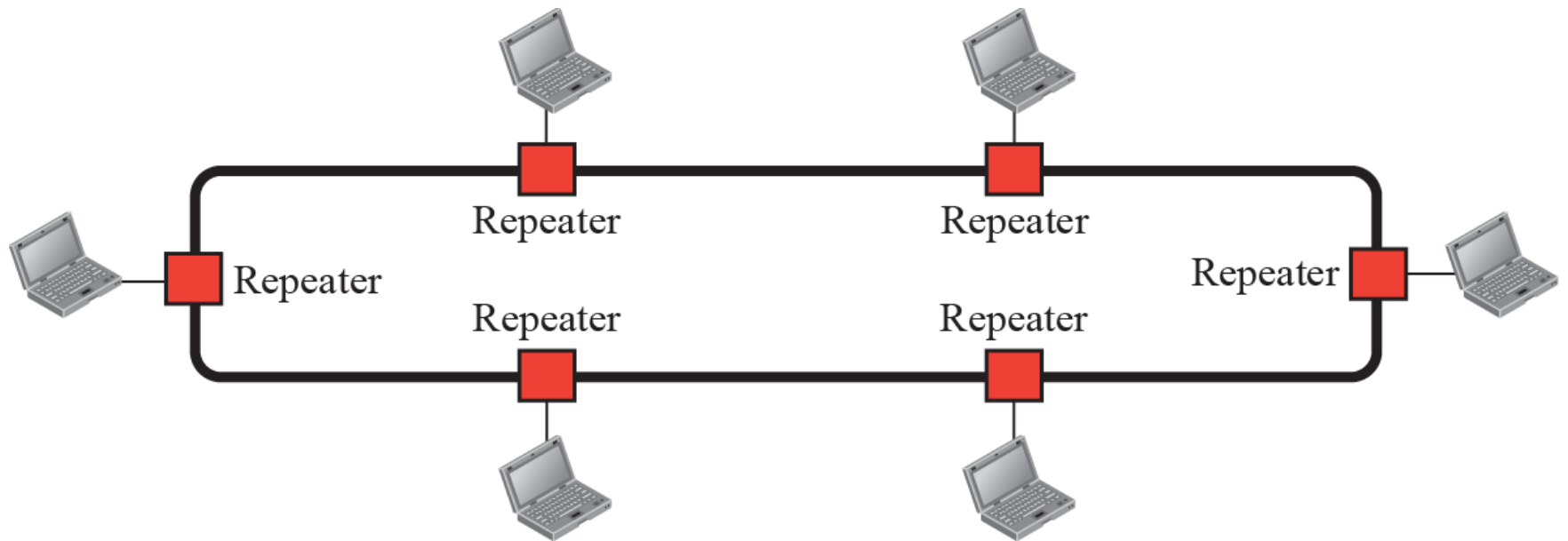
A star topology



A bus topology



A ring topology



1-3 NETWORKS TYPES

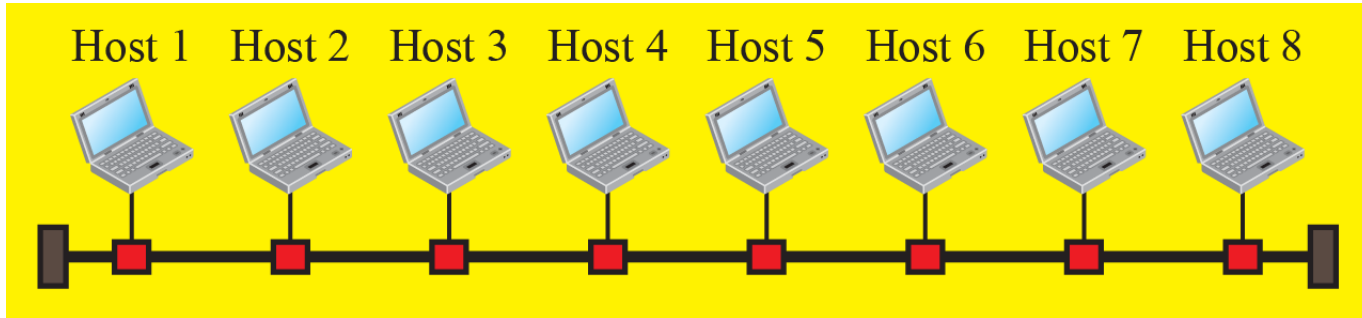
The criteria of distinguishing one type of network from another is difficult and sometimes confusing

*We use a few criteria such as **size**, **geographical coverage**, and **ownership** to make this distinction*

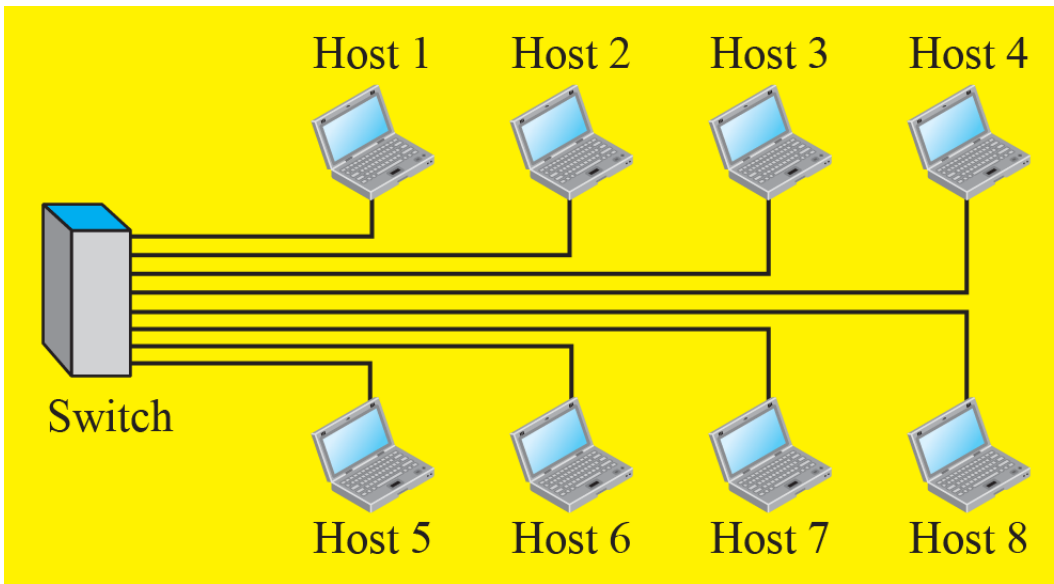
1.3.1 Local Area Network

- *is usually privately owned and connects some hosts in a single office, building, or campus*
- *Depending on the needs of an organization, a LAN can be as simple as two PCs and a printer in a home office, or it can extend throughout a company and include audio and video devices*
- *Each host in a LAN has an identifier, an address, that uniquely defines the host in the LAN.*
- *A packet carries both the source host's and the destination host's addresses.*

An Isolated LAN in the past and today

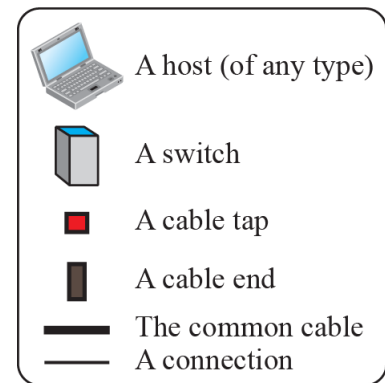


a. LAN with a common cable (past)



b. LAN with a switch (today)

Legend




1.3.2 Wide Area Network

- *is also an connection of devices capable of communication.*
- *differences between a LAN and a WAN.*
 - 1) *A LAN is normally limited in size; a WAN has a wider geographical span, spanning a town, a state, a country, or even the world*
 - 2) *A LAN interconnects hosts; a WAN interconnects connecting devices*
 - 3) *A LAN is normally privately owned by the organization that uses it; a WAN is normally created and run by communication companies and leased by an organization that uses it.*

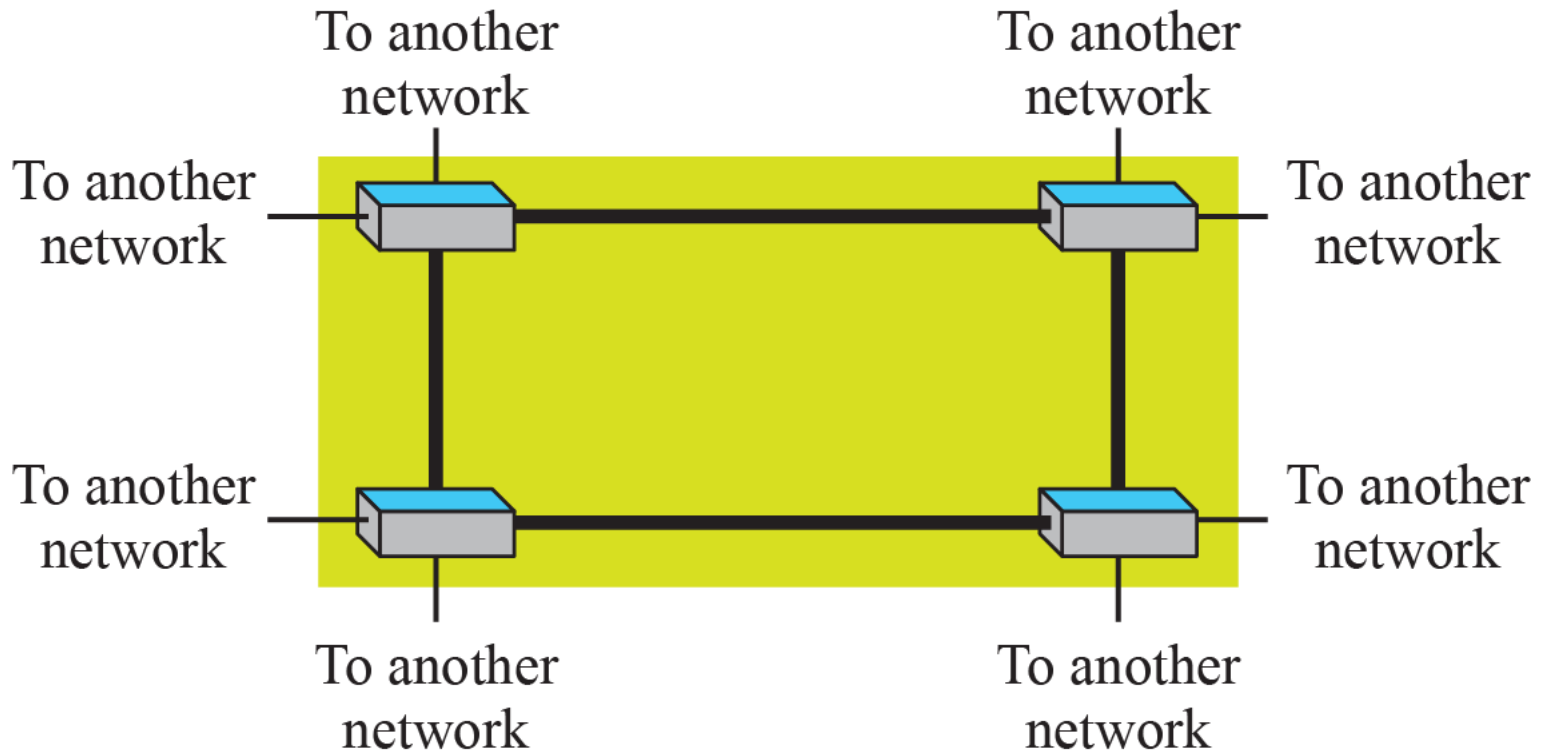
A Point-to-Point WAN



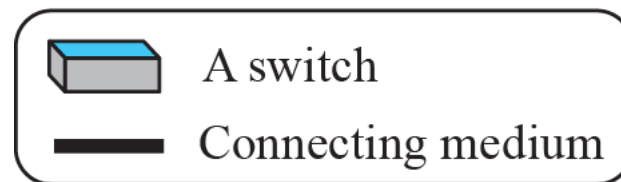
Legend

	A connecting device
	Connecting medium

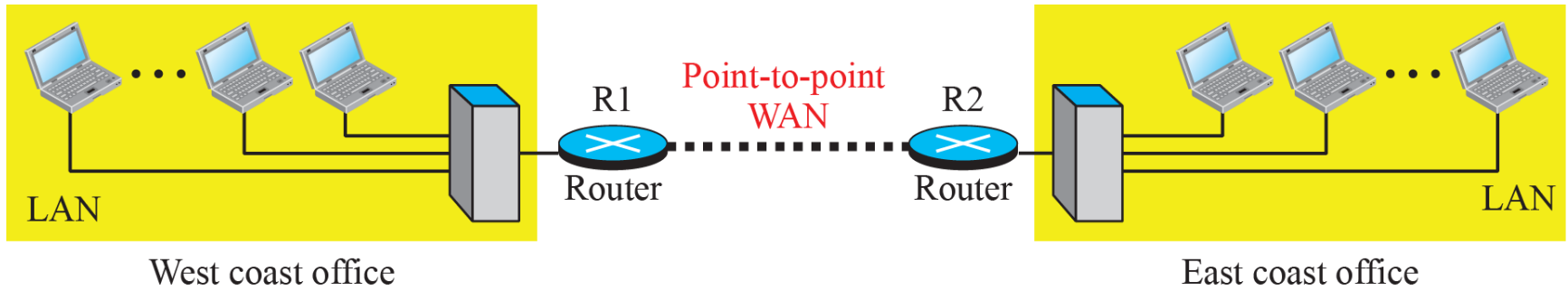
A Switched WAN



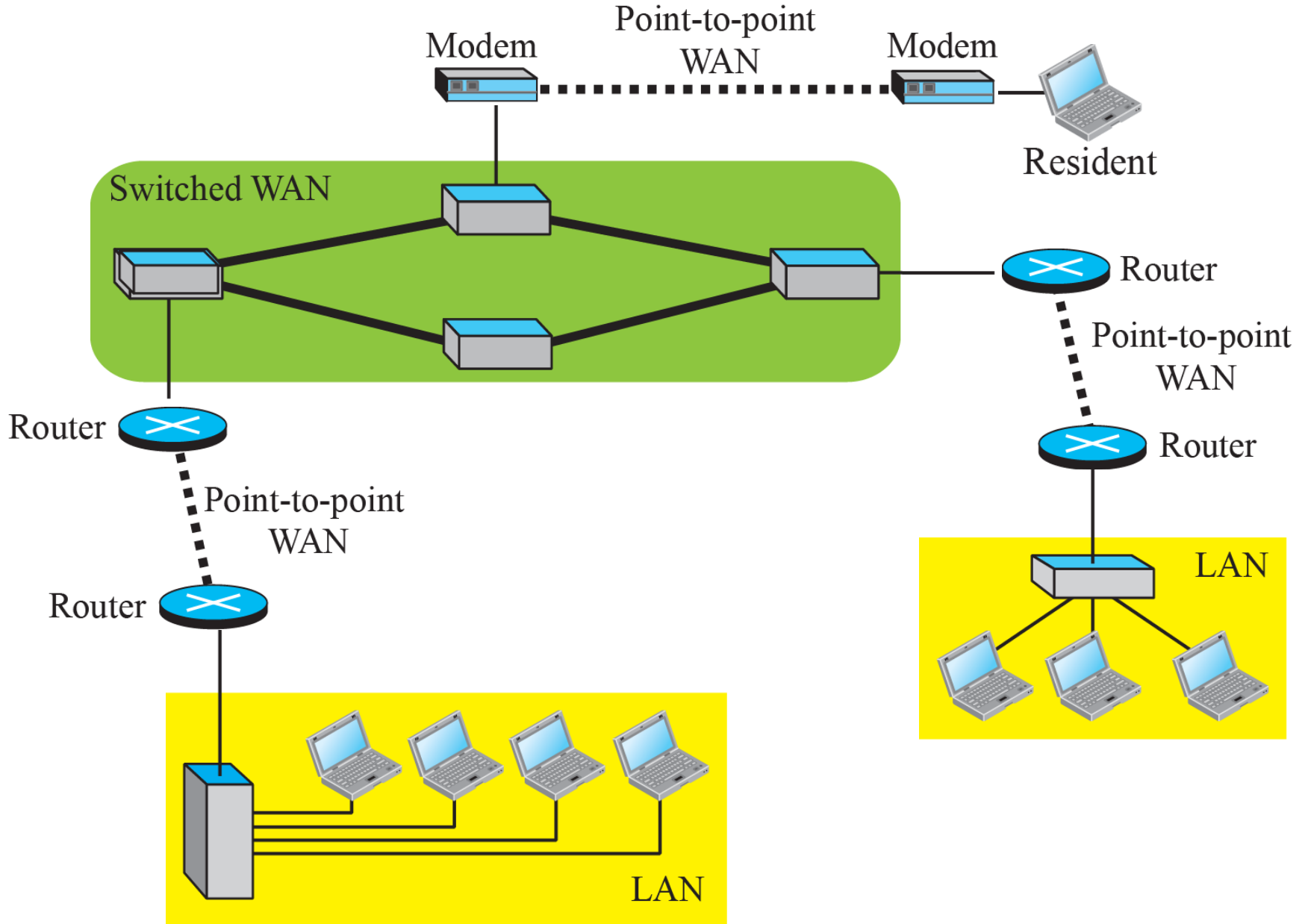
Legend



An internetwork made of two LANs and one WAN



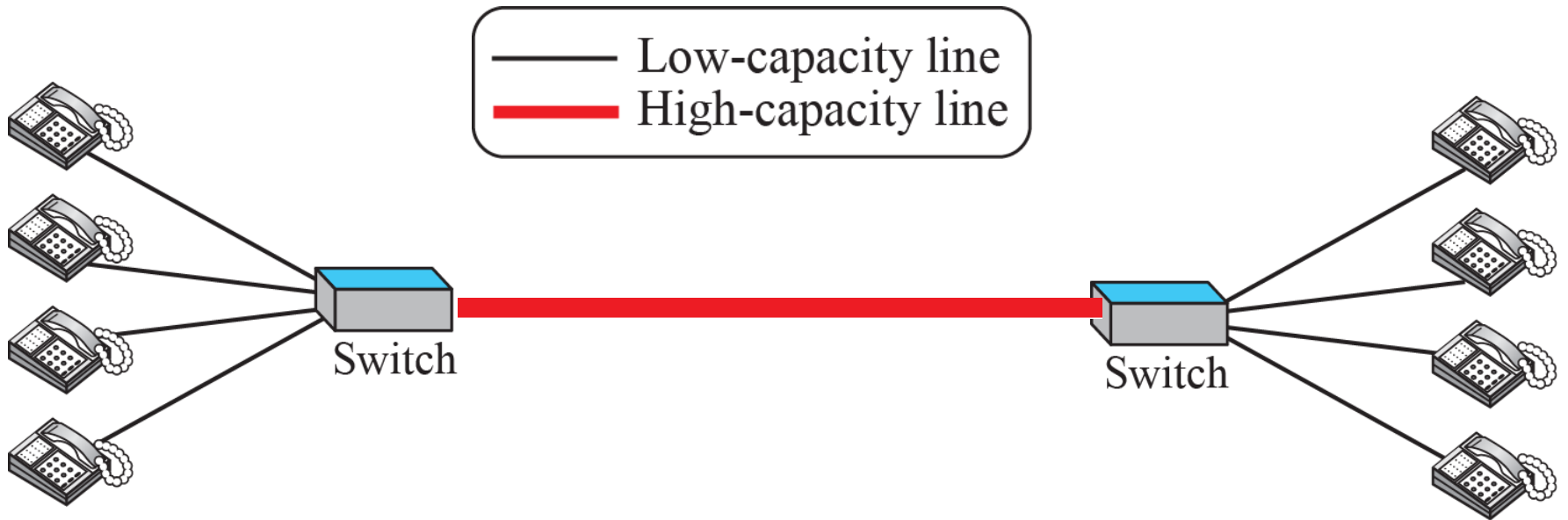
A heterogeneous network made of WANs and LANs



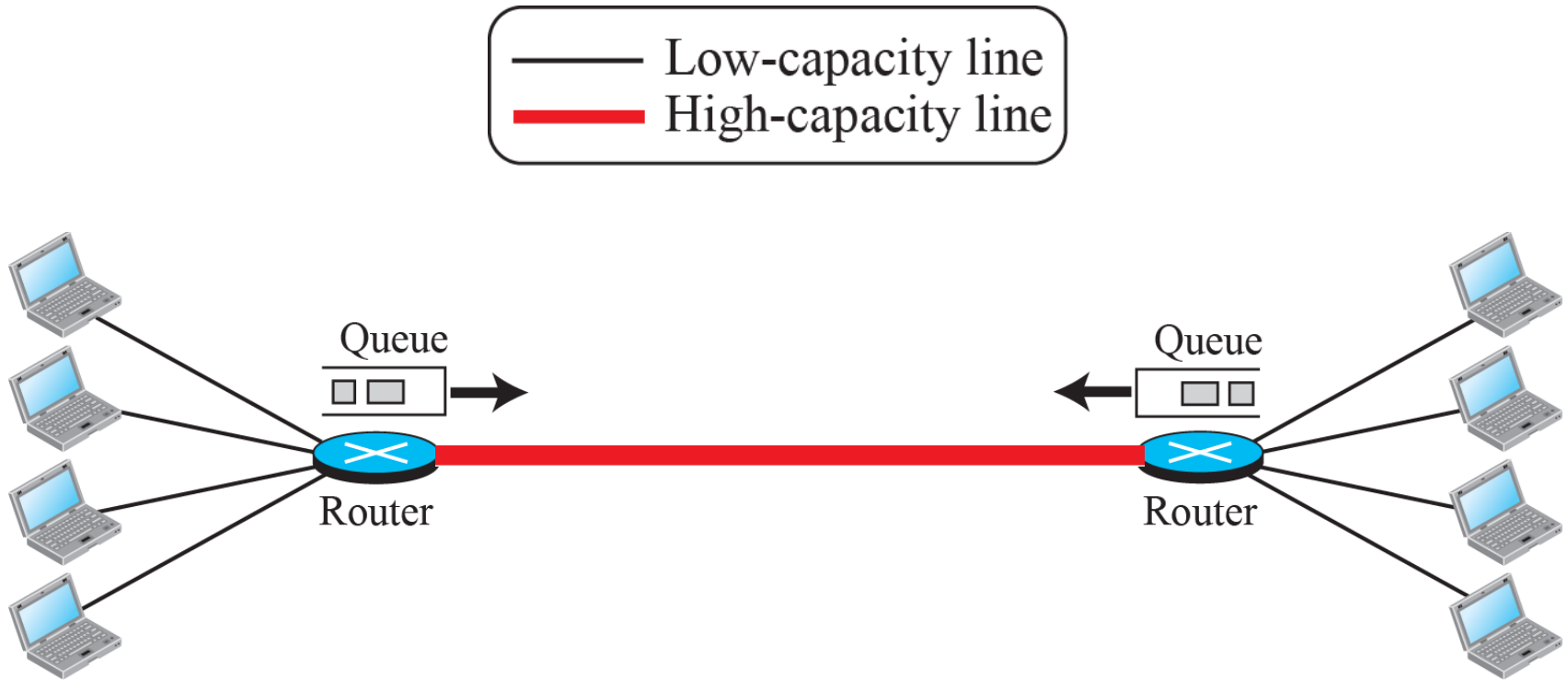
1.3.3 Switching

- *An internet is **a switched network** in which a switch connects at least two links together.*
- *A switch needs to forward data from a network to another network when required.*
- *The two most common types of switched networks*
 - 1) circuit-switched*
 - 2) packet-switched*

A circuit-switched network



A packet-switched network

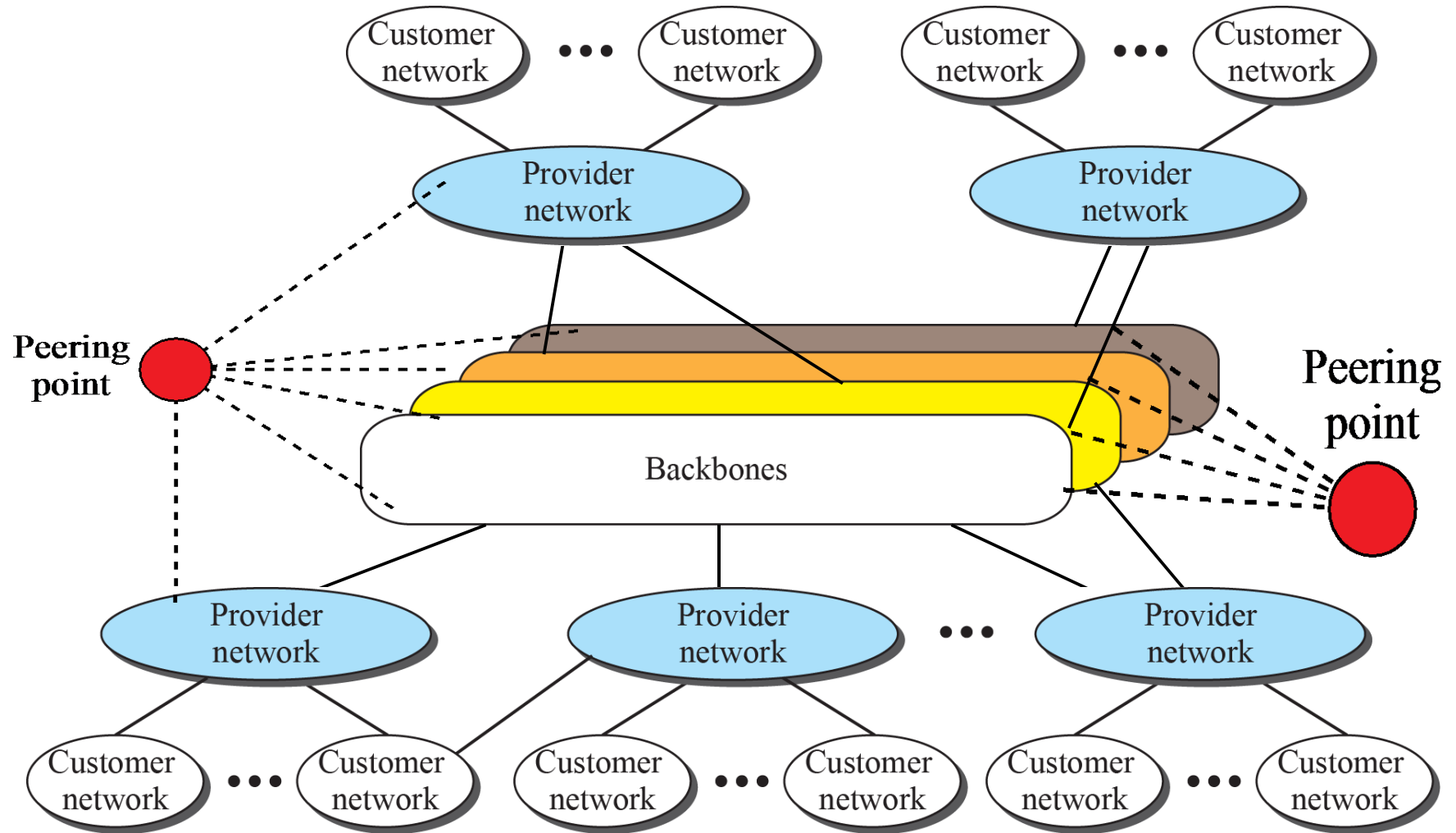




1.3.4 The Internet

- *An **i**nternet is two or more networks that can communicate with each other.*
- *The most notable internet is the **I**nternet
→ composed of thousands of interconnected networks.*
- *The figure on the next slide shows **a conceptual (not geographical) view of the Internet***

The Internet today





1.3.5 Accessing the Internet

- *is an internetwork that allows any user to become part of it.*
- *The user needs to be physically connected to an ISP. The physical connection is normally done through a point-to-point WAN.*

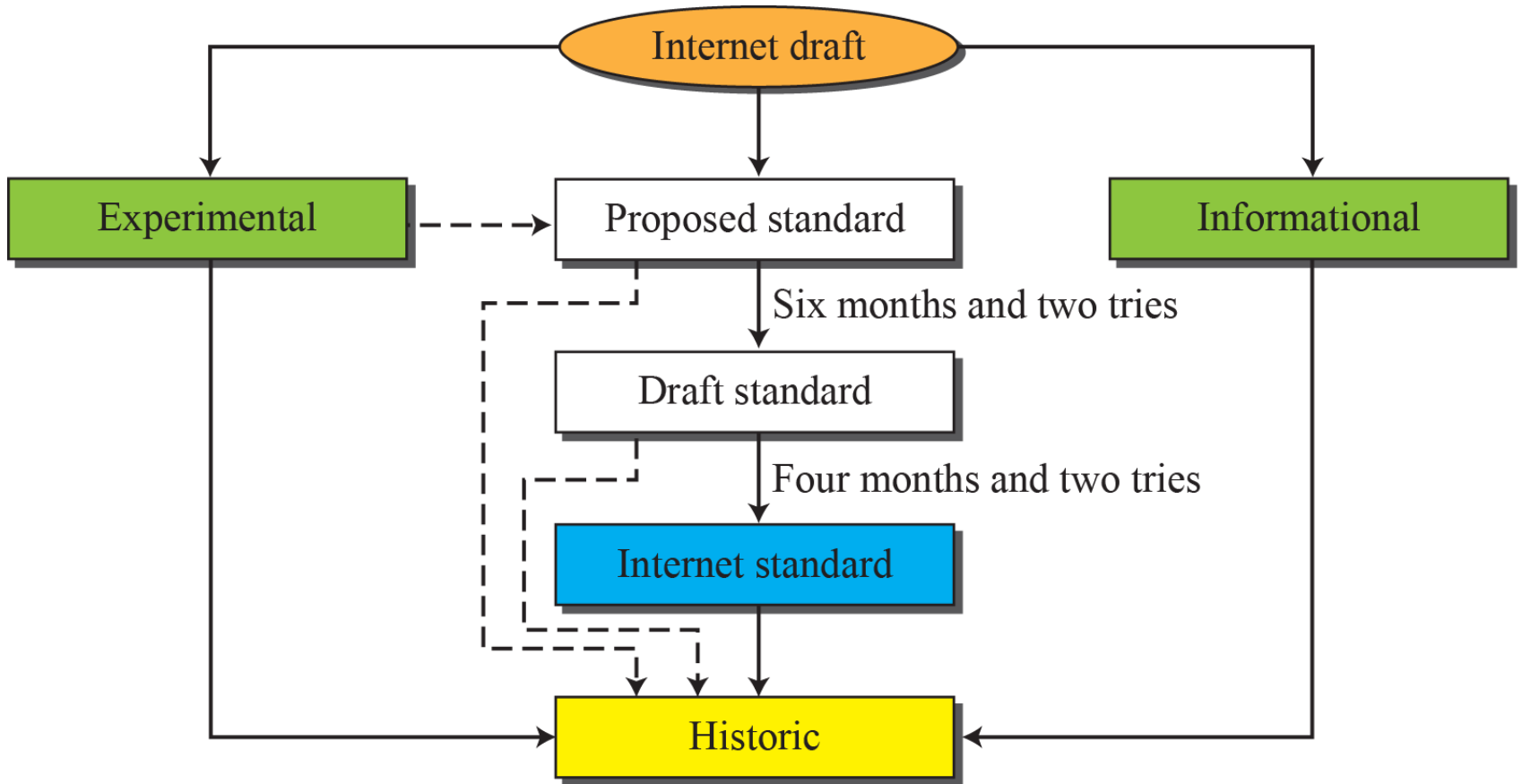
1-4 INTERNET HISTORY



1.5.1 Internet Standards

- *It is a formalized regulation that must be followed*
- *There is a strict procedure by which a specification attains Internet standard status*
- *A specification begins as an **Internet draft** a working document (a work in progress) with no official status and a six-month lifetime.*

Maturity levels of an RFC





1.5.2 Internet Administration

- *Various groups that coordinate Internet issues have guided growth and development*
- ***Appendix G** gives the addresses, e-mail addresses, and telephone numbers for some of these groups*
- *Figure on the next slide shows the general organization of Internet administration.*

Internet administration

