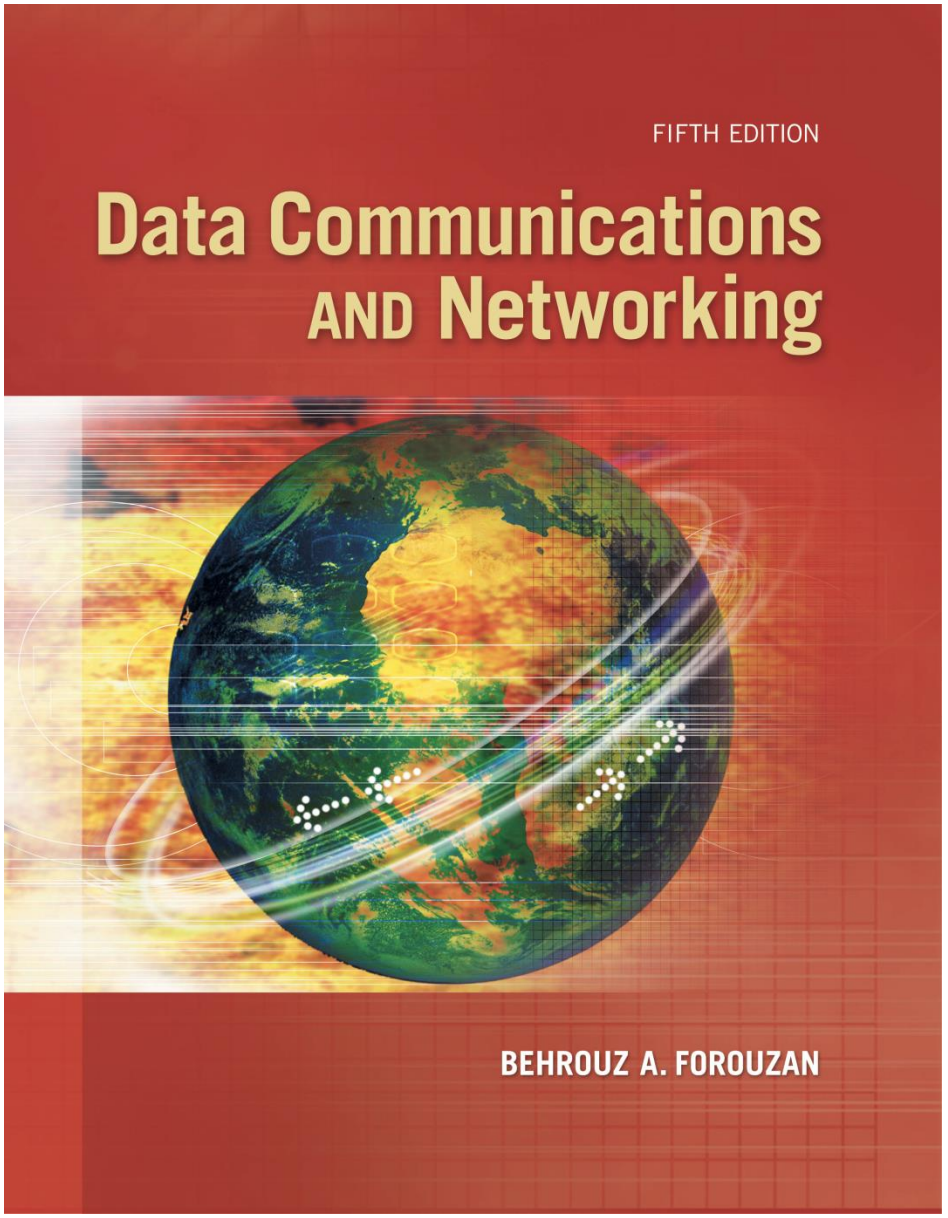
Chapter 1

Introduction



Chapter 1: Outline

1.1 Data Communications

1.2 Networks

1.3 Network Types

1-1 DATA COMMUNICATIONS

- ***The term telecommunication:***

which includes telephony, telegraph, and television, means communication at a distance.

- ***Data communications:***
- ***are the exchange of data between two devices via some form of transmission media.***

The effectiveness of a data communications system depends on Four fundamental characteristics:

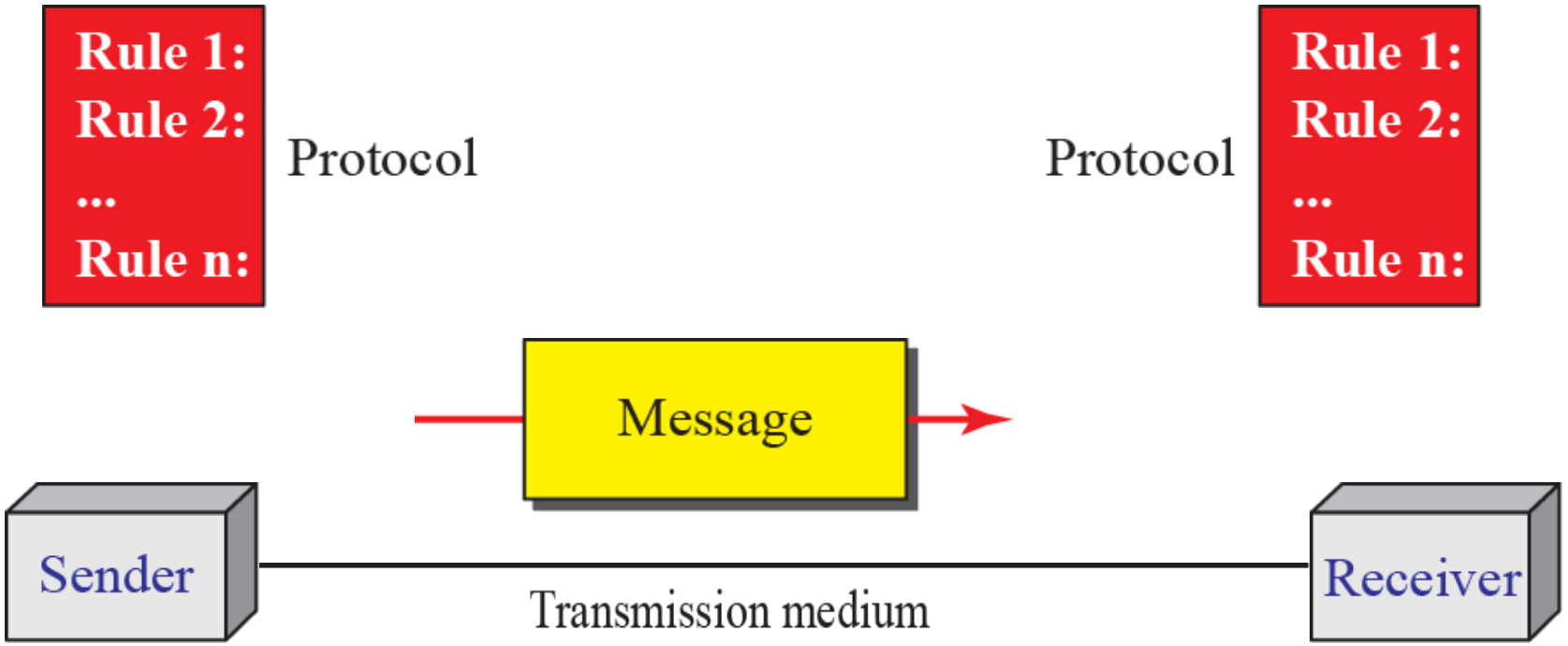
- ***Delivery:*** *the system must deliver the data to the correct destination.*

- ***Accuracy:*** *the system must deliver the data accurately.*

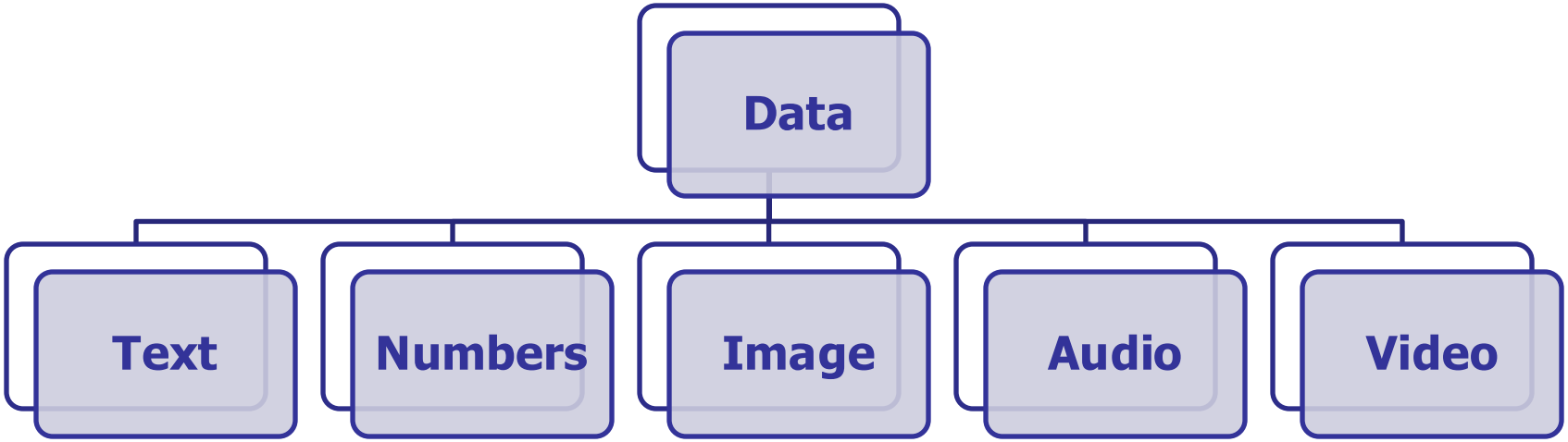
- ***Timeliness:*** *the system must deliver the data in a timely manner. "real-time data"*

- ***Jitter:*** *the variation in the packet arrival time.*

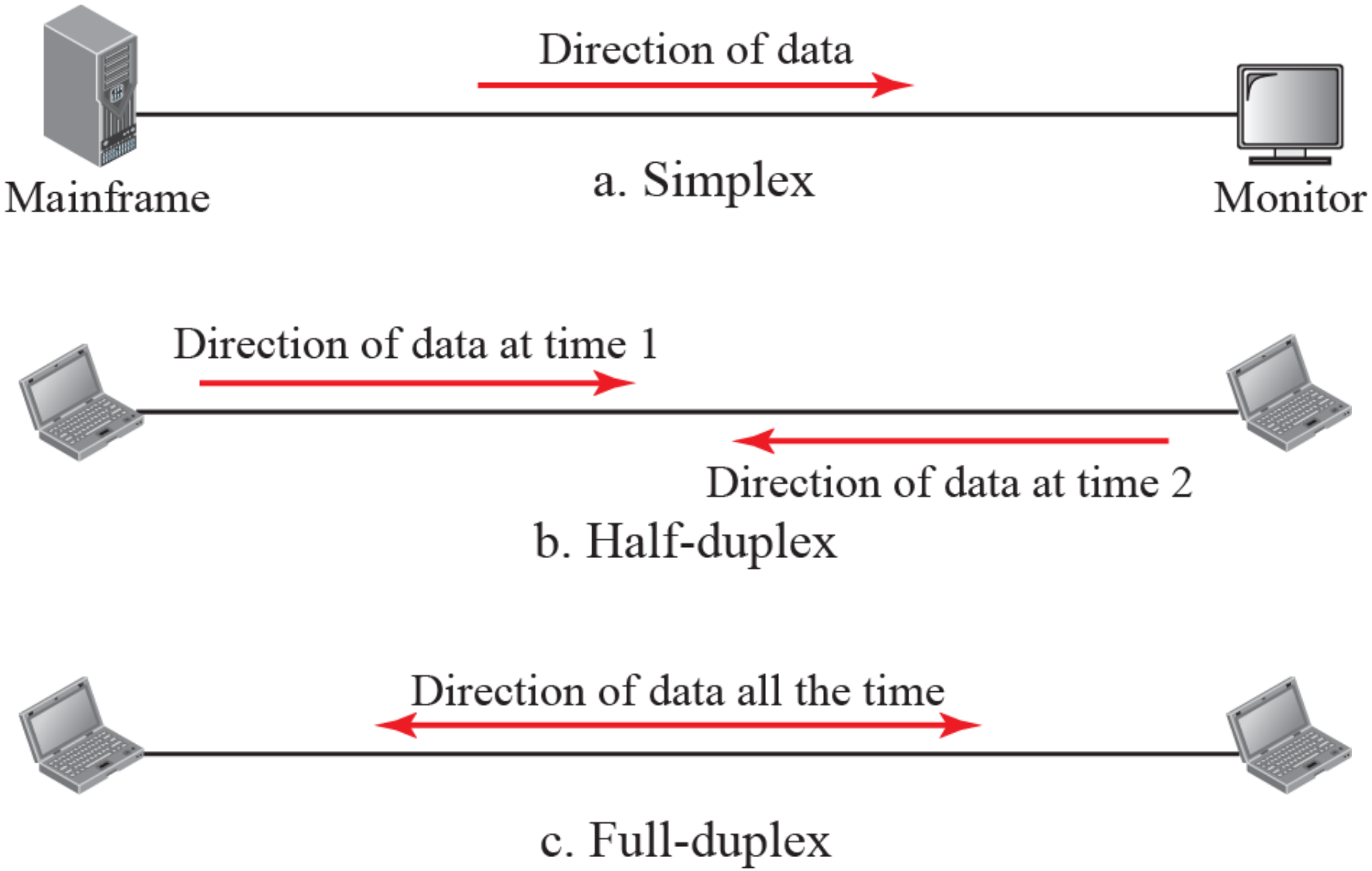
1.1.1 Components



1.1.2 Data Representation



1.1.3 Data Flow

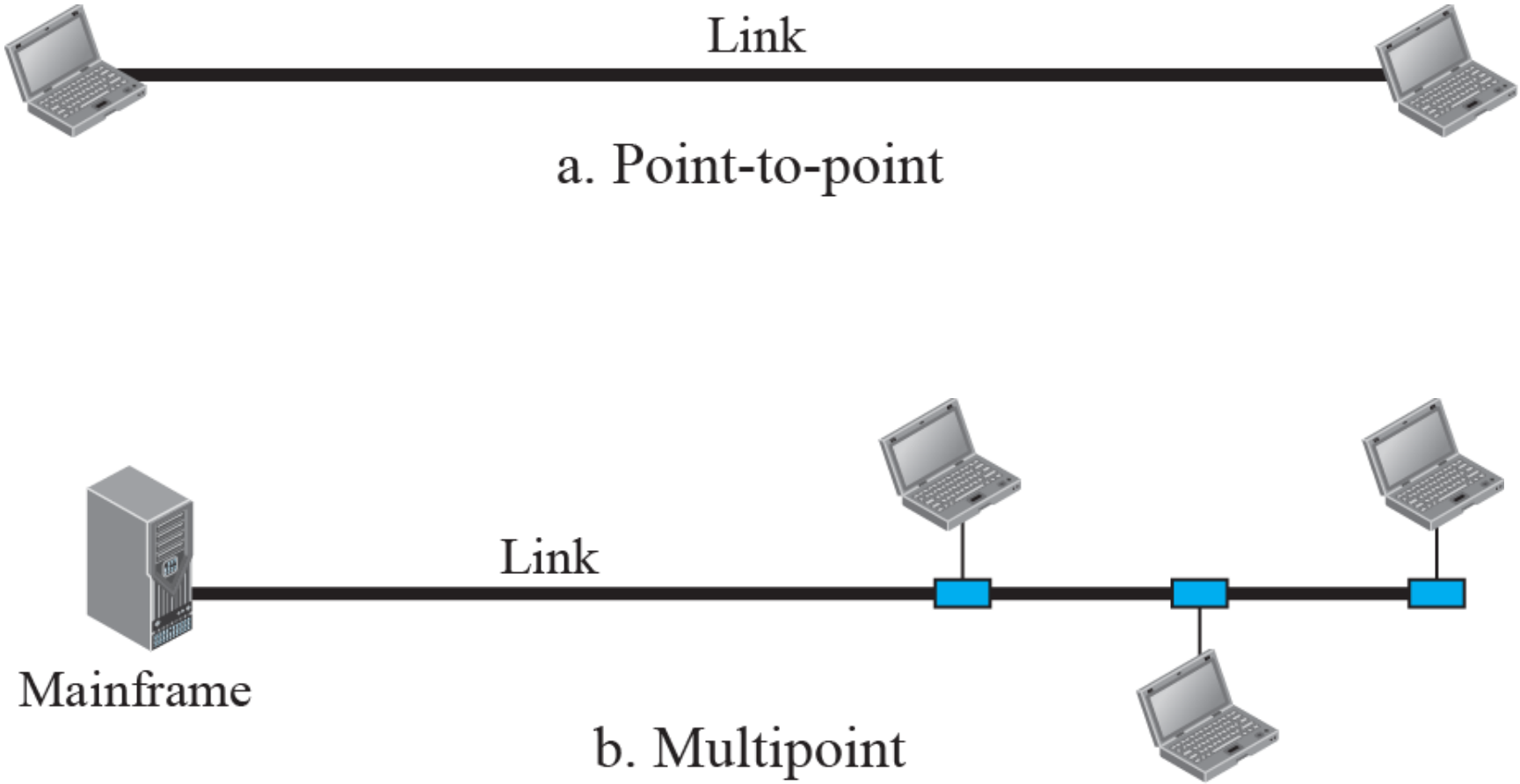


1-2 NETWORKS

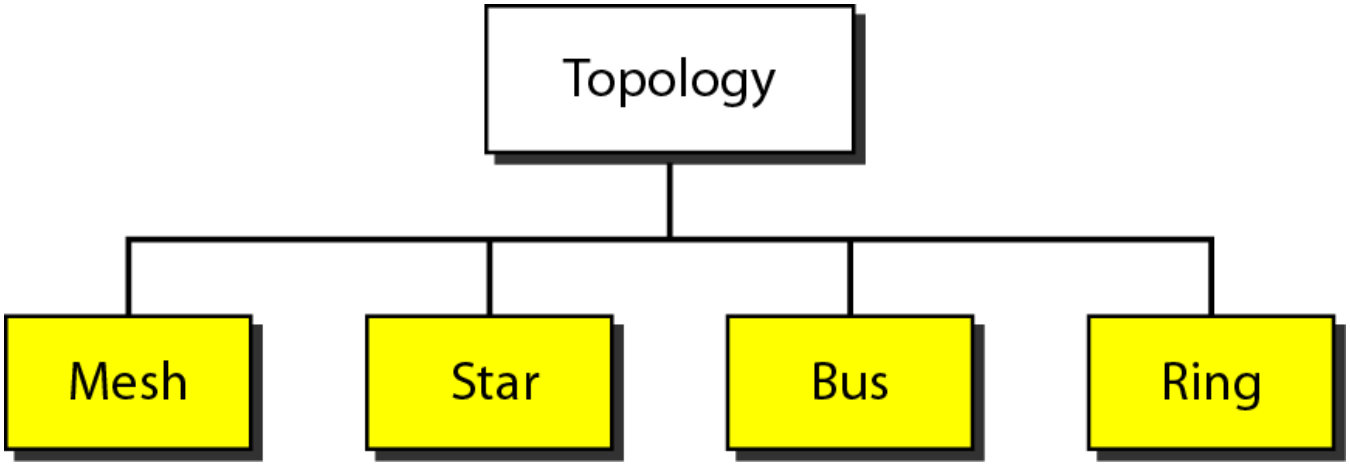
A network is the interconnection of a set of devices capable of communication.

In this definition, a device can be a host such as a large computer, desktop, laptop, workstation, cellular phone, or security system. A device in this definition can also be a connecting device such as a router a switch, a modem that changes the form of data, and so on.

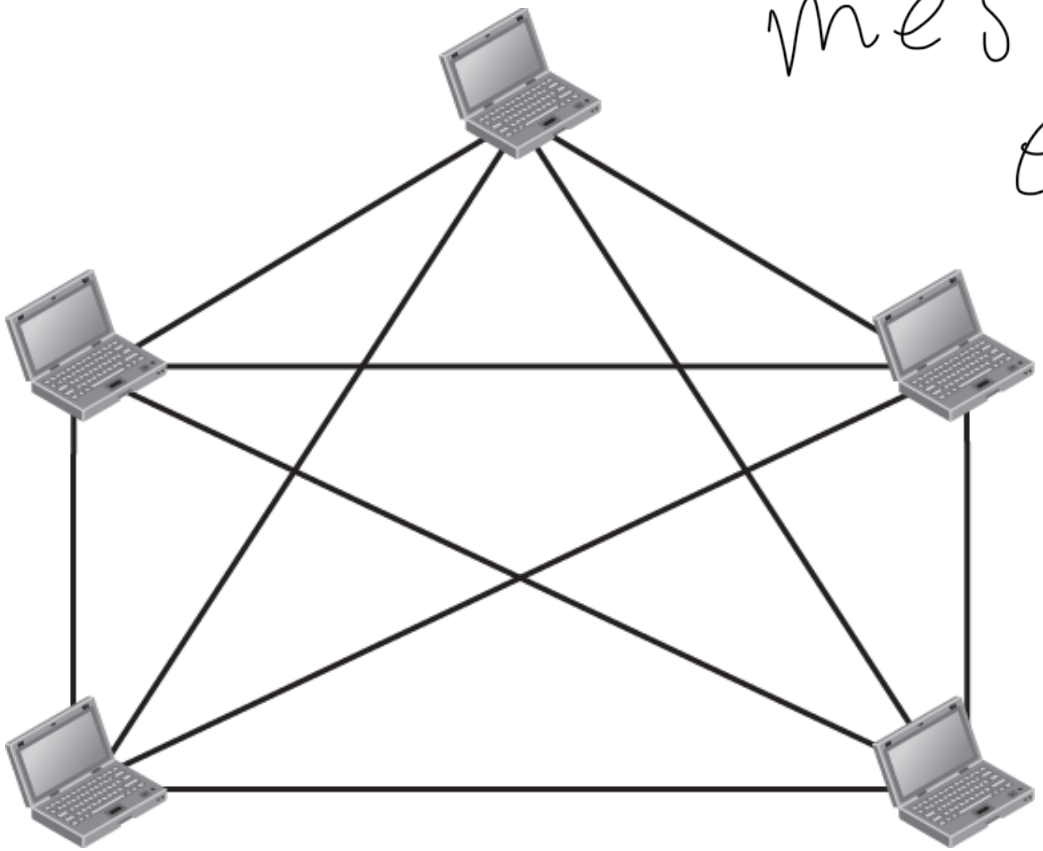
1.2.1 Physical Structures – types of links



1.2.1 Physical Structures – Topologies



1.2.1 Physical Structures – Topologies



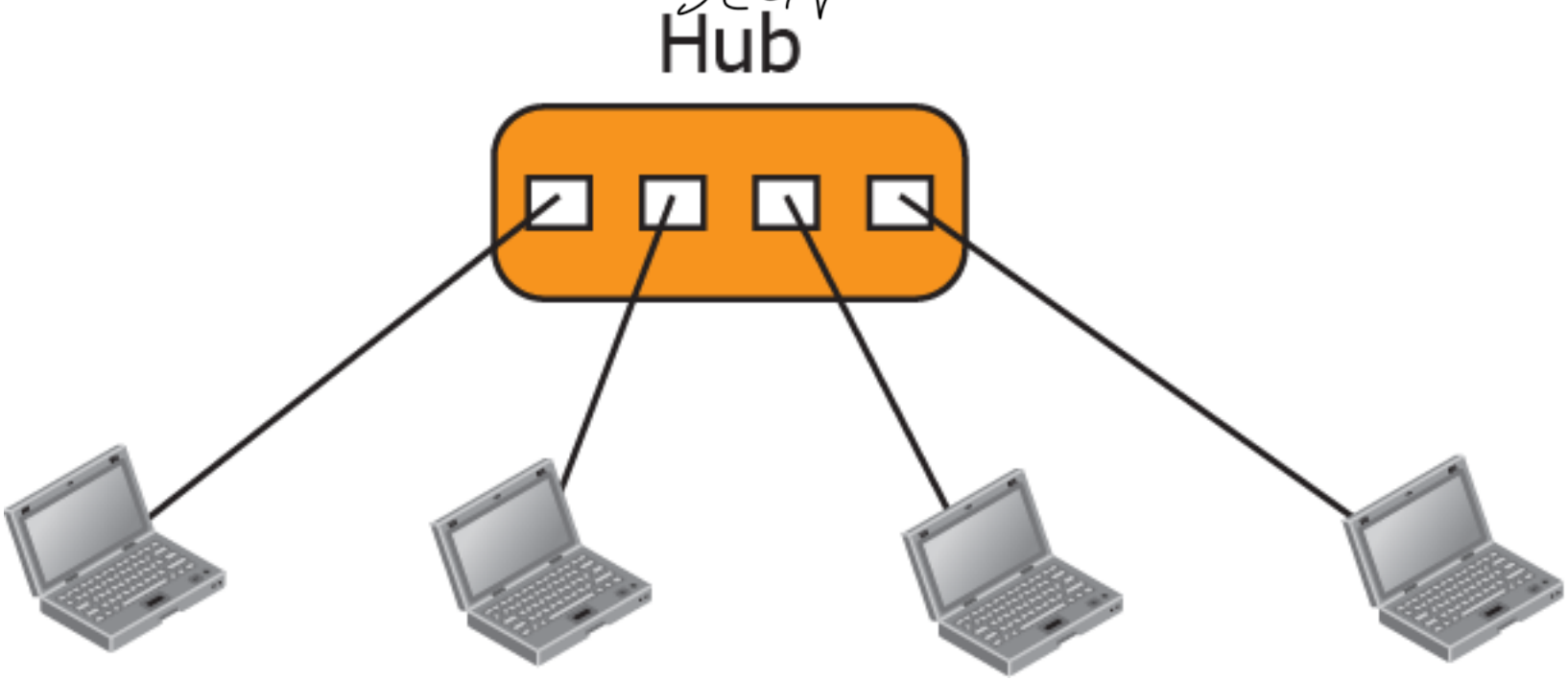
mesh

each to all

1.2.1 Physical Structures – Topologies

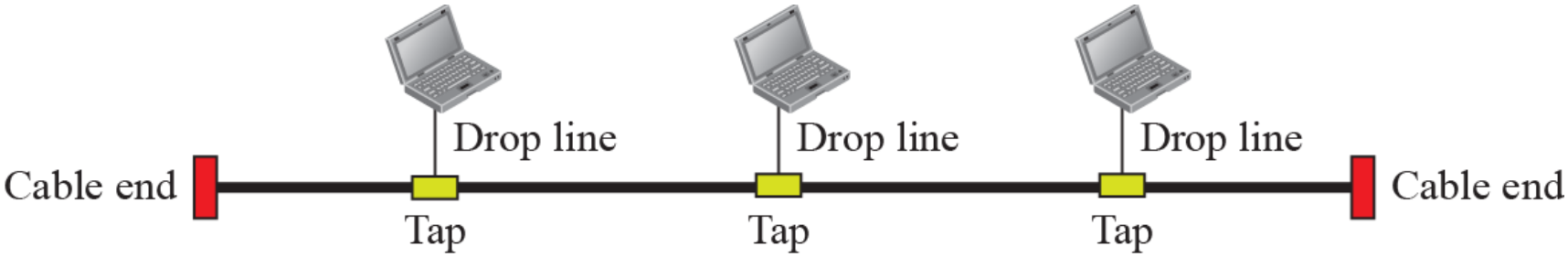
all get same message

Star



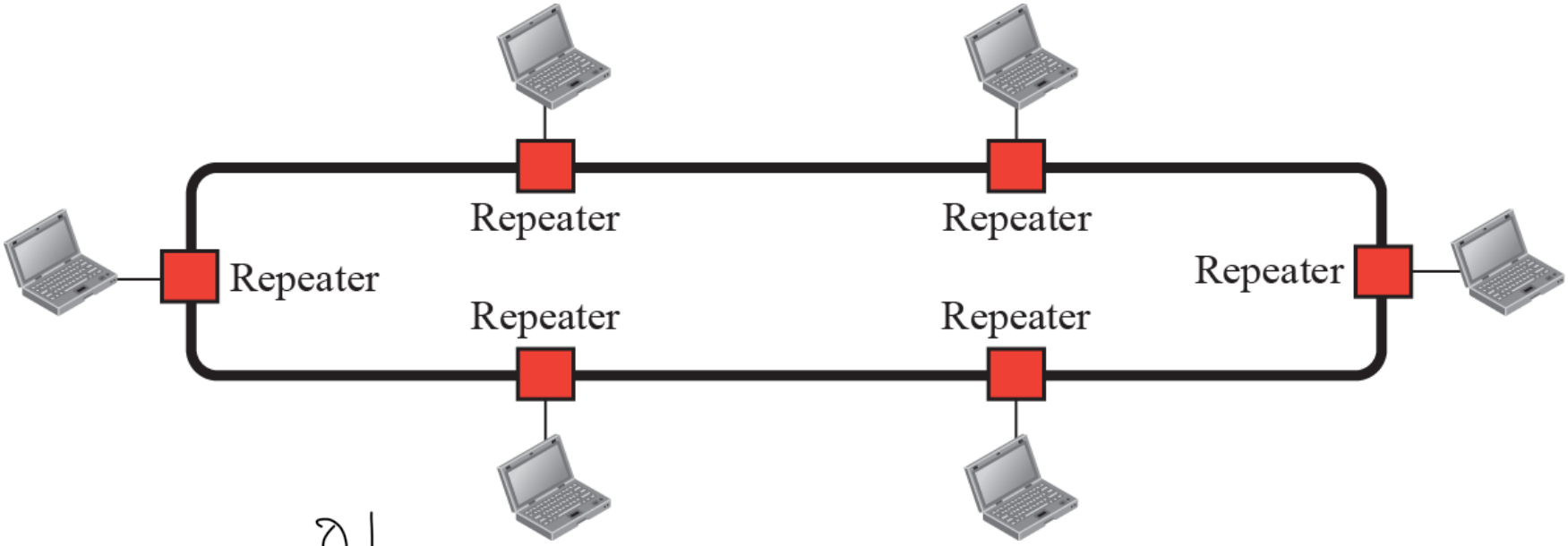
1.2.1 Physical Structures – Topologies

Bus



1.2.1 Physical Structures – Topologies

ring



or

Token

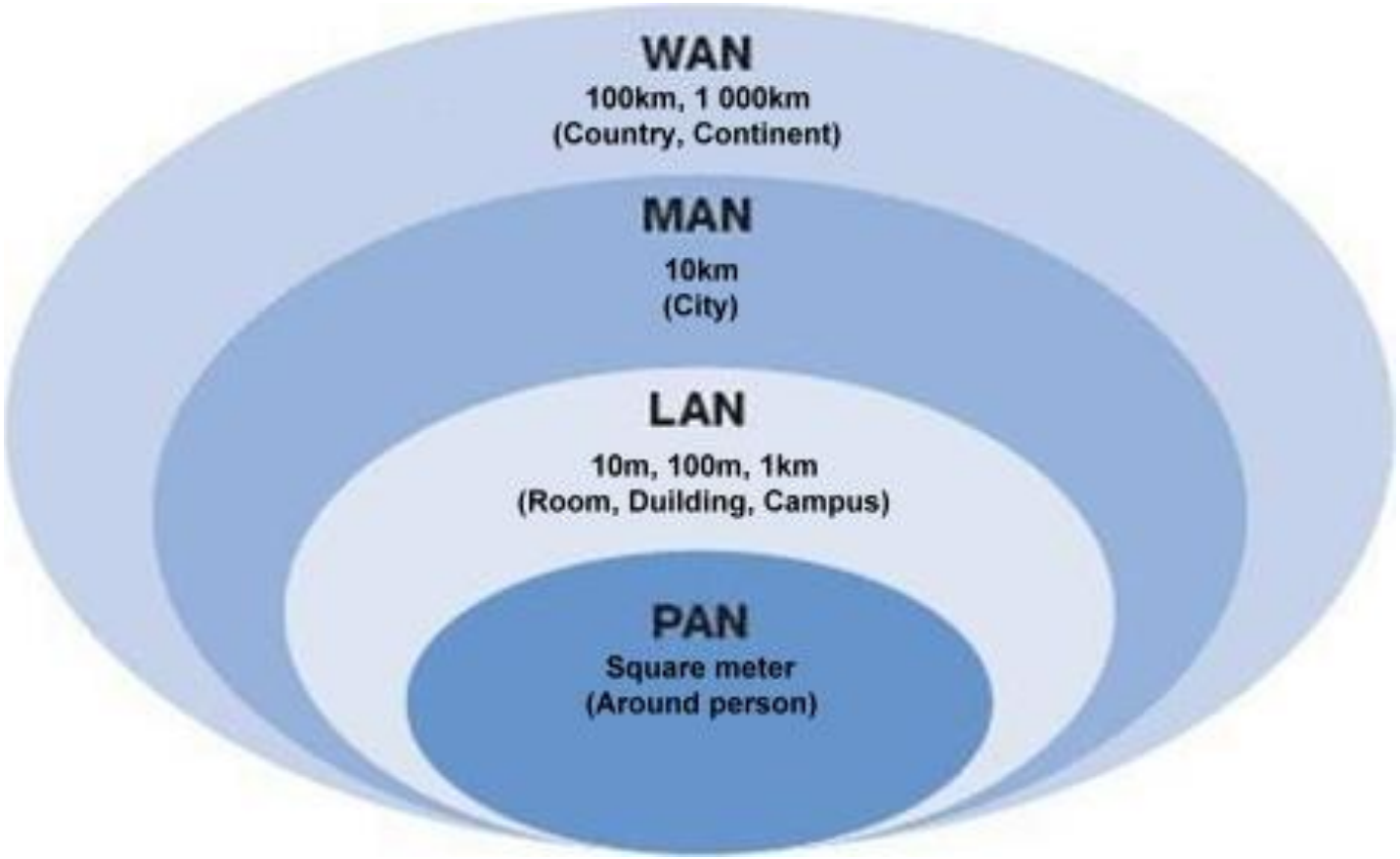
1-3 NETWORKS TYPES

After defining networks in the previous section and discussing their physical structures, we need to discuss different types of networks we encounter in the world today. 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 NETWORKS TYPES

- Personal Area Network (1-10m)
- Local Area Network (10m – 1 km)
- Metropolitan Area Network (city coverage)
- Wide Area Network (cities or country)
- Global Area Network (across countries)

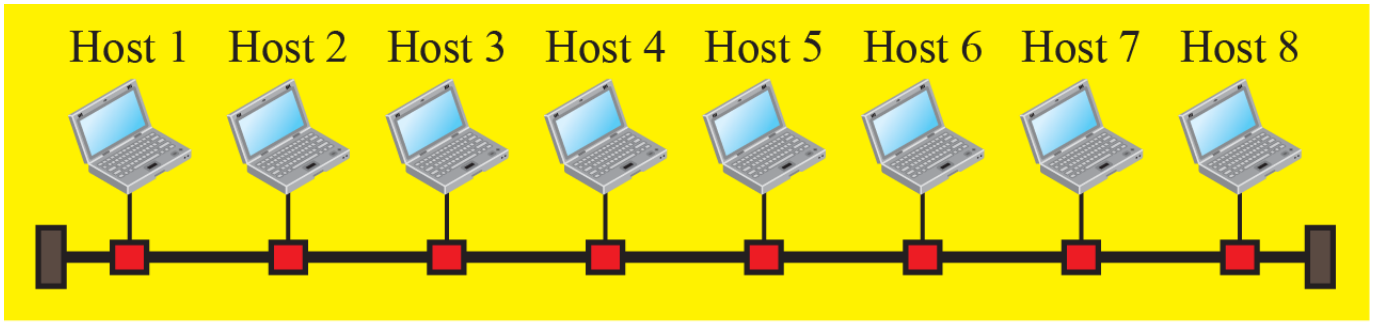
1-3 NETWORKS TYPES



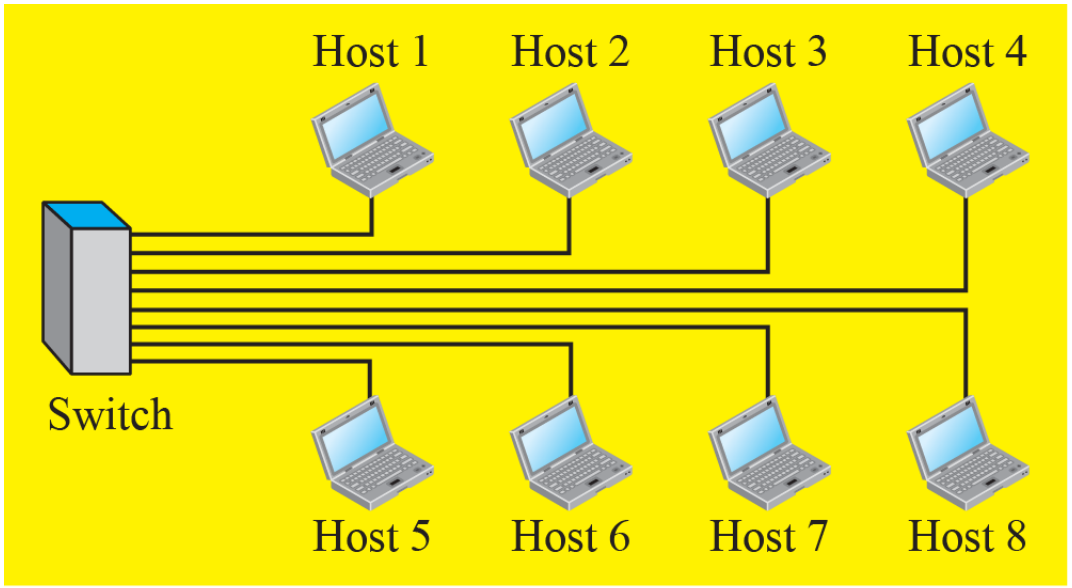
1.3.1 Local Area Network

- *A local area network (LAN) 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 someone's 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 sent by a host to another host carries both the source host's and the destination host's addresses.*

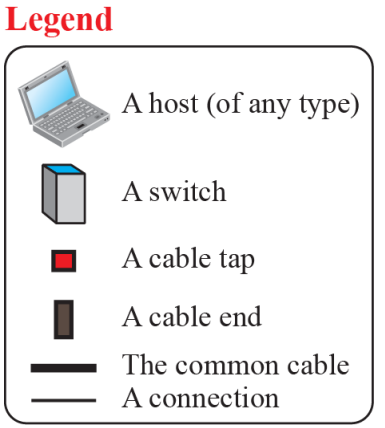
1.3.1 Local Area Network



a. LAN with a common cable (past)



b. LAN with a switch (today)



1.3.2 Wide Area Network

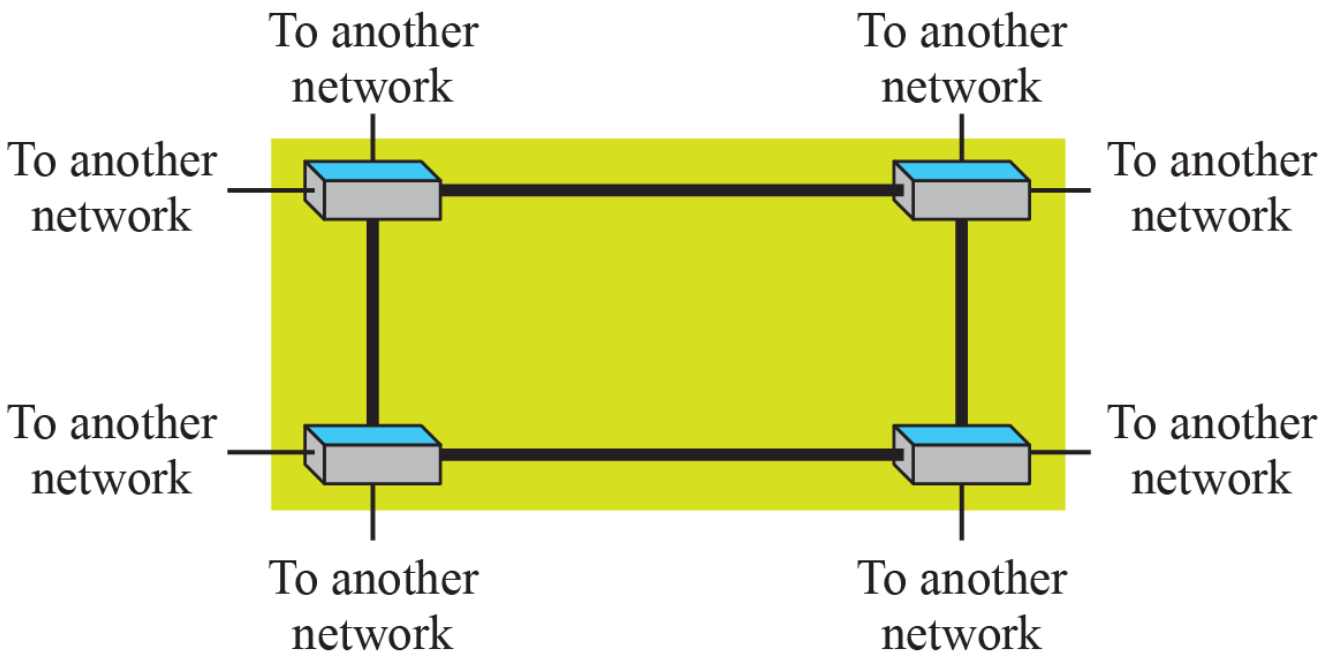
- *A wide area network (WAN) is also an connection of devices capable of communication.*
- *However, there are some differences between a LAN and a WAN.*
  - *A LAN is normally limited in size; a WAN has a wider geographical span, spanning a town, a state, a country, or even the world.*
  - *A LAN interconnects hosts; a WAN interconnects connecting devices such as switches, routers, or modems.*
  - *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.*

1.3.2 Wide Area Network

A Point-to-Point WAN

1.3.2 Wide Area Network

A Switched WAN



1.3.2 Wide Area Network

An internetwork made of two LANs and one WAN