



# PART 1 : Overview

## Lecture1\_V2

### Introduction

### Reference



**Data Communications  
and Networking** Fourth Edition

**Forouzan**

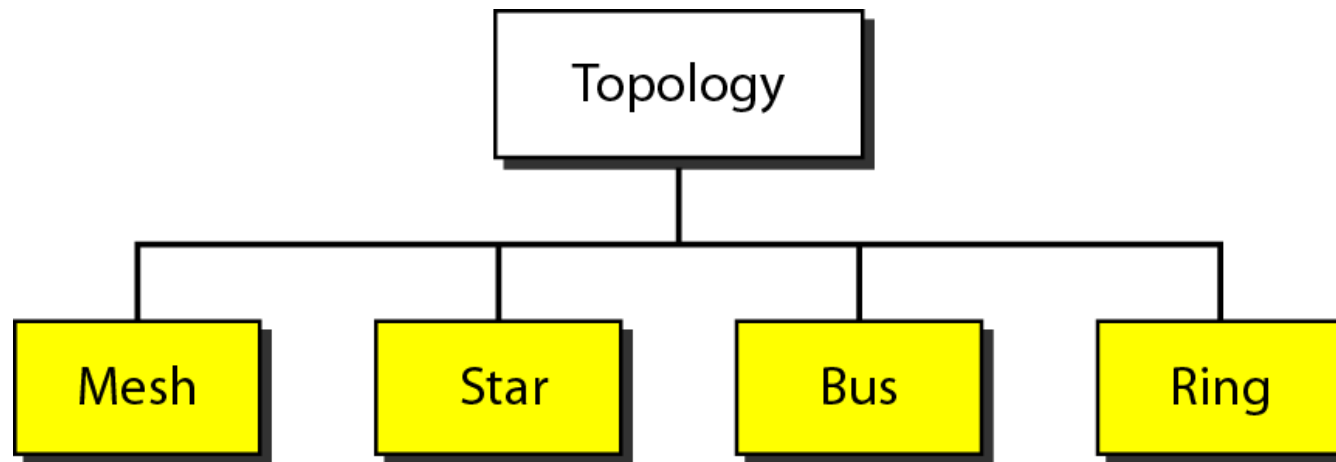


## ■ Contents

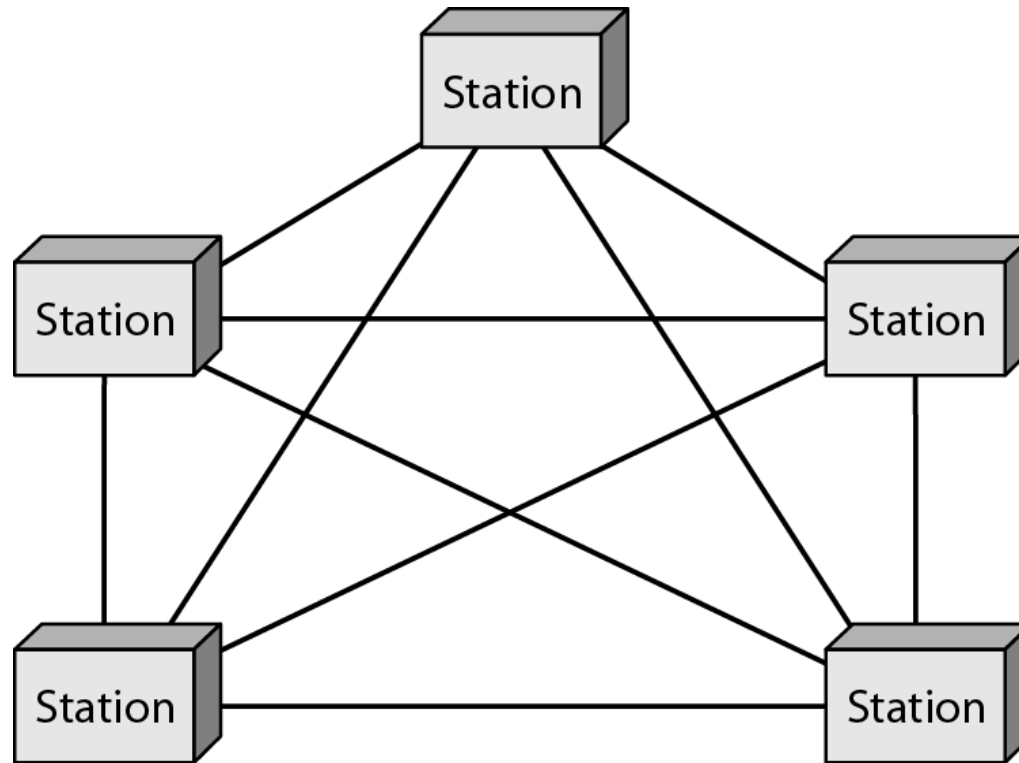
- This Lecture addresses four issues:
  - data communications,
  - Networks
  - the Internet
  - protocols and standards.



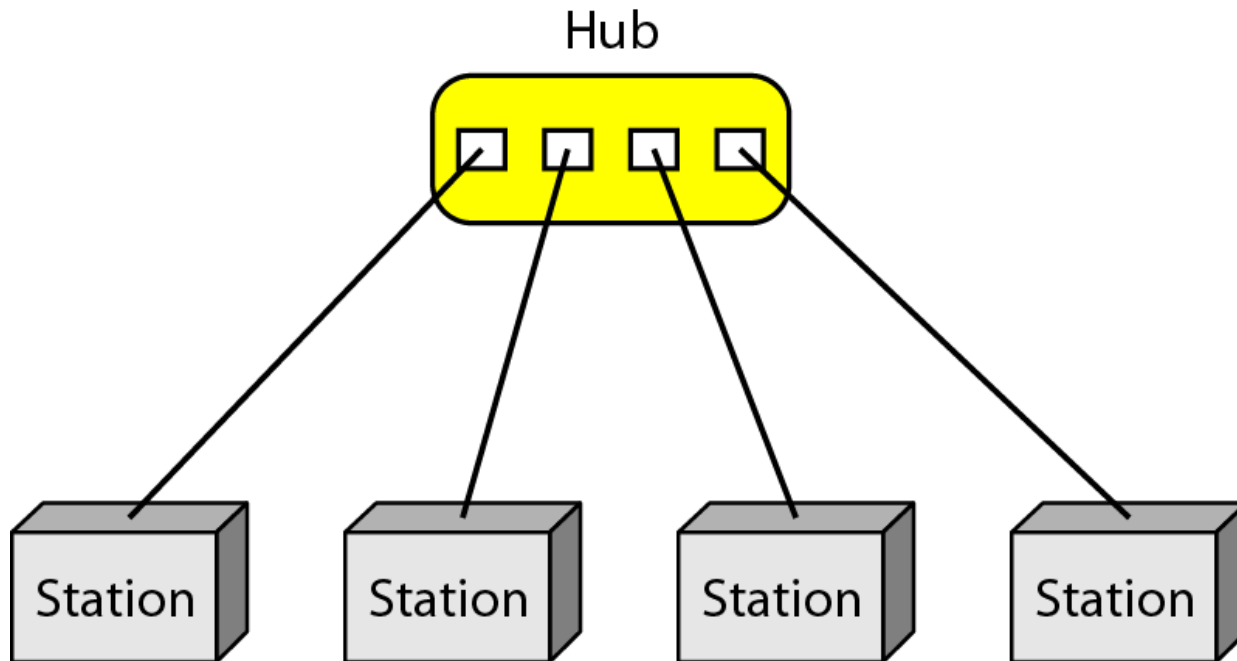
**Figure 1.4** *Categories of topology*



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



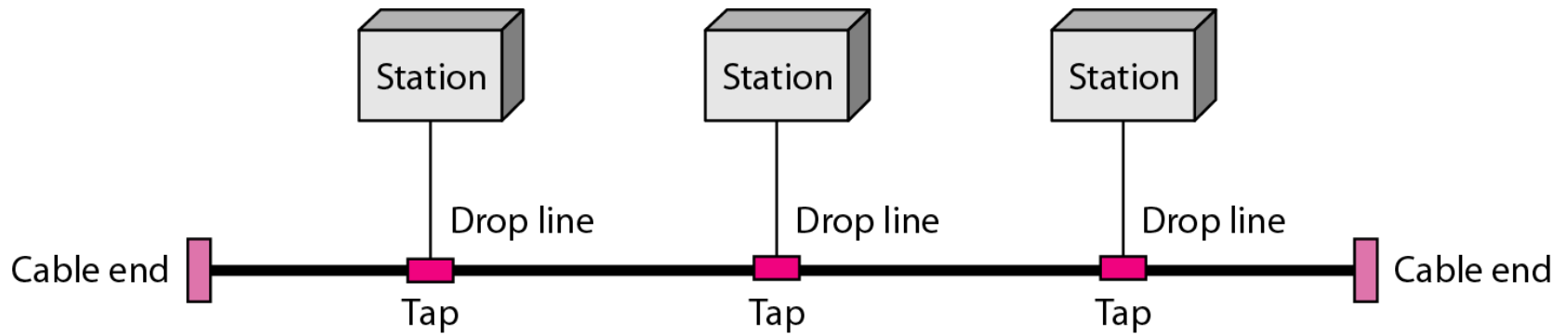
**Figure 1.6** *A star topology connecting four stations*



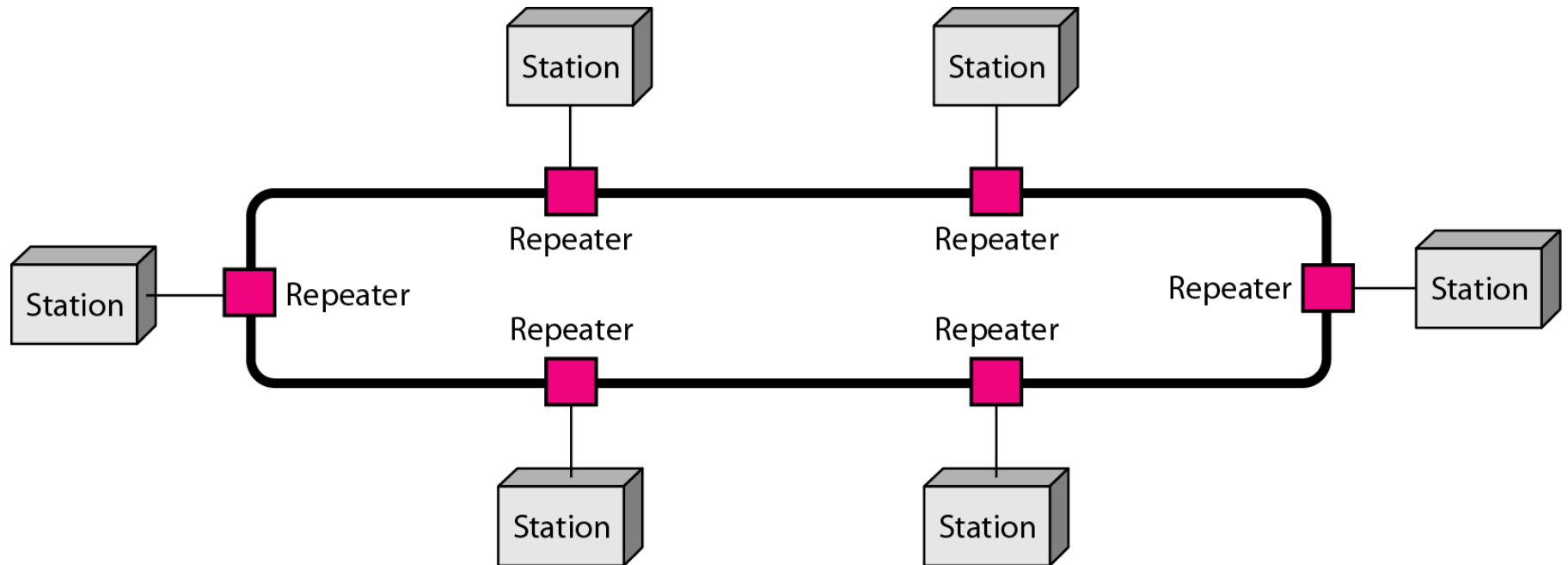
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**Figure 1.7** *A bus topology connecting three stations*

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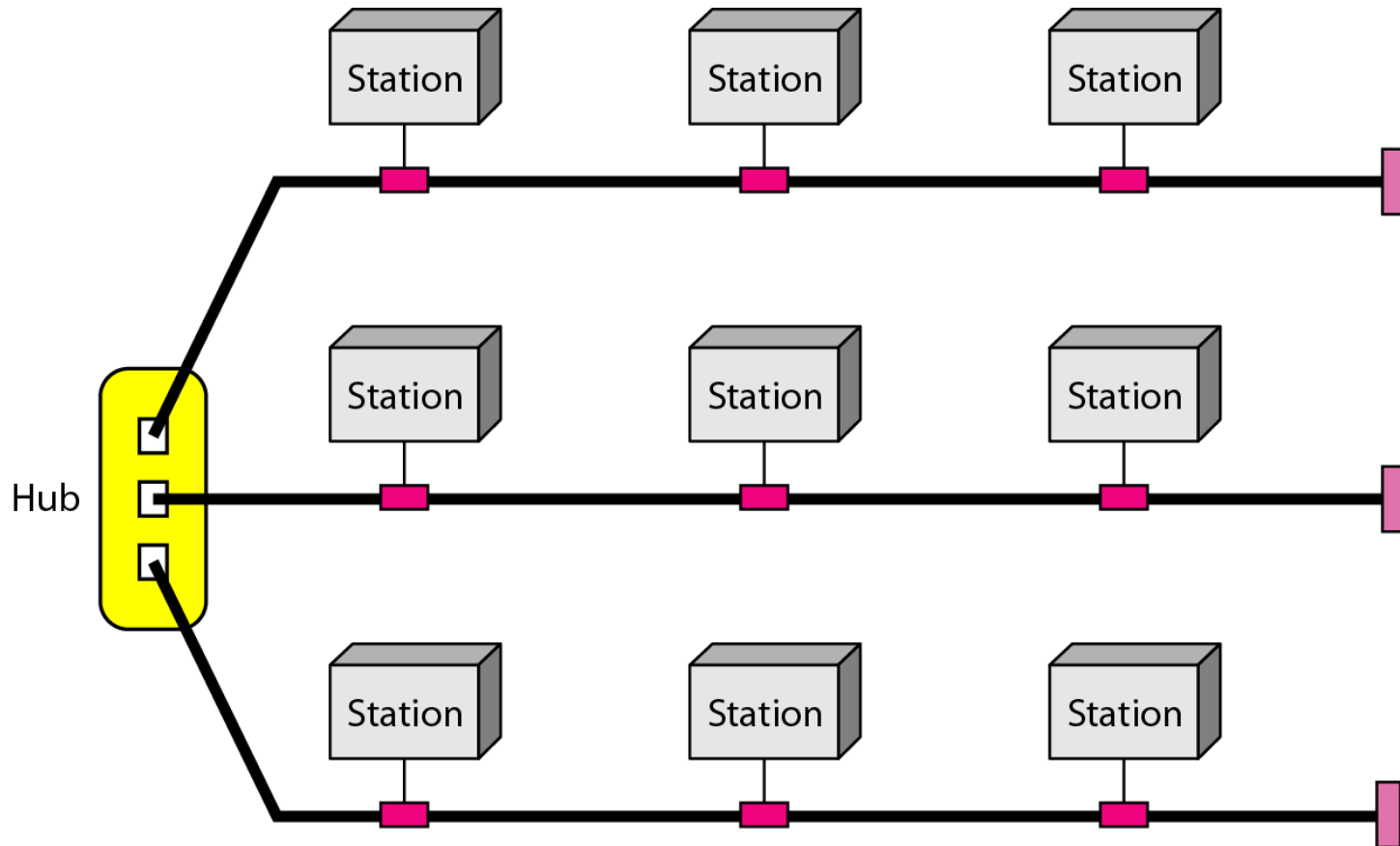


**Figure 1.8** *A ring topology connecting six stations*





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



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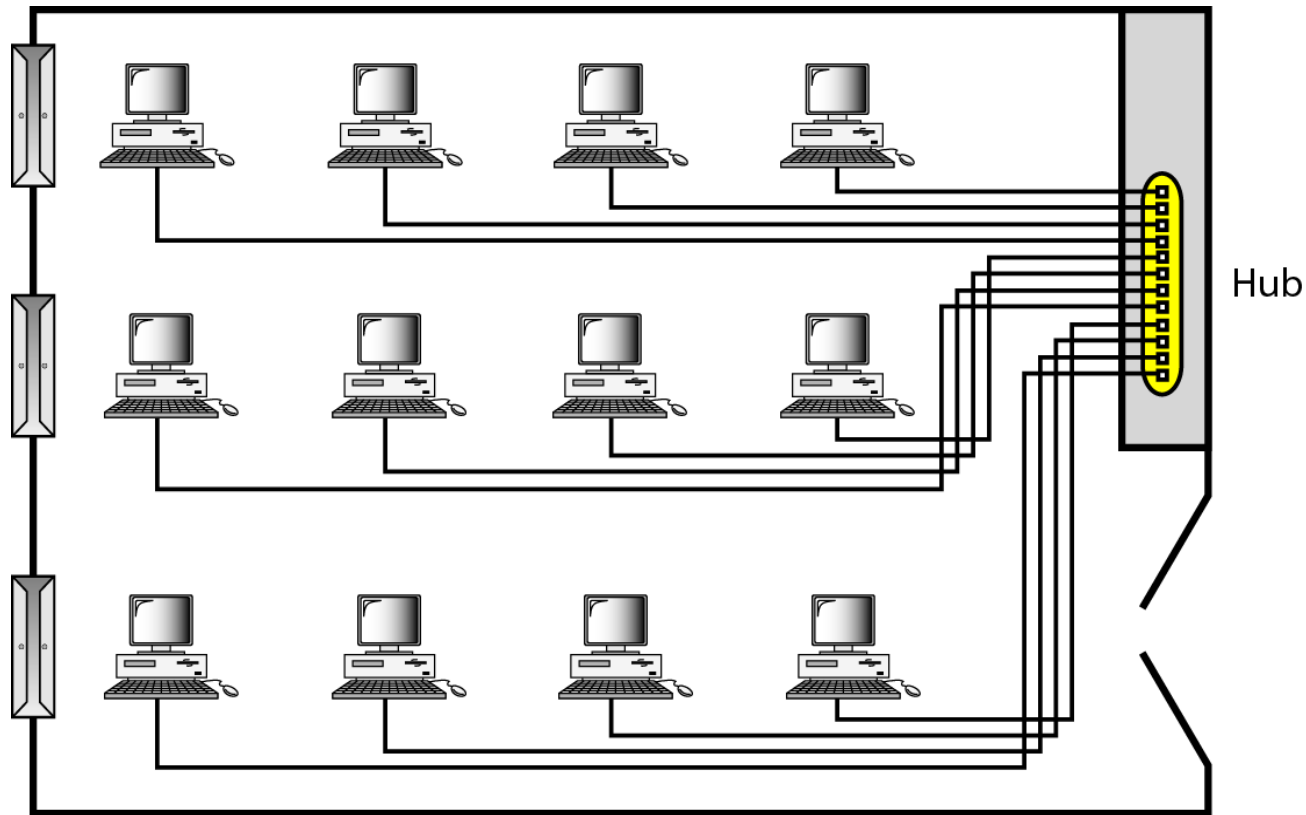
# □ Categories of Networks

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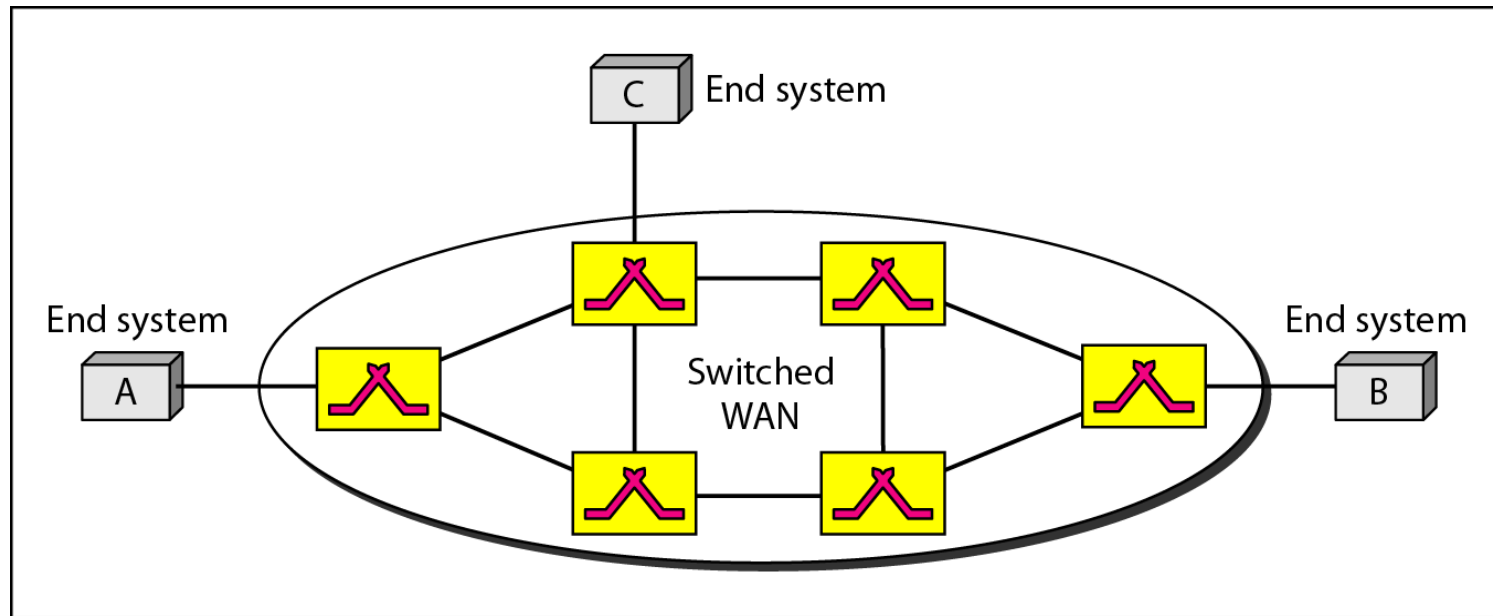
- **Local Area Networks (LANs)**
  - Short distances
  - Designed to provide local interconnectivity
- **Wide Area Networks (WANs)**
  - Long distances
  - Provide connectivity over large areas
- **Metropolitan Area Networks (MANs)**
  - Provide connectivity over areas such as a city, a campus



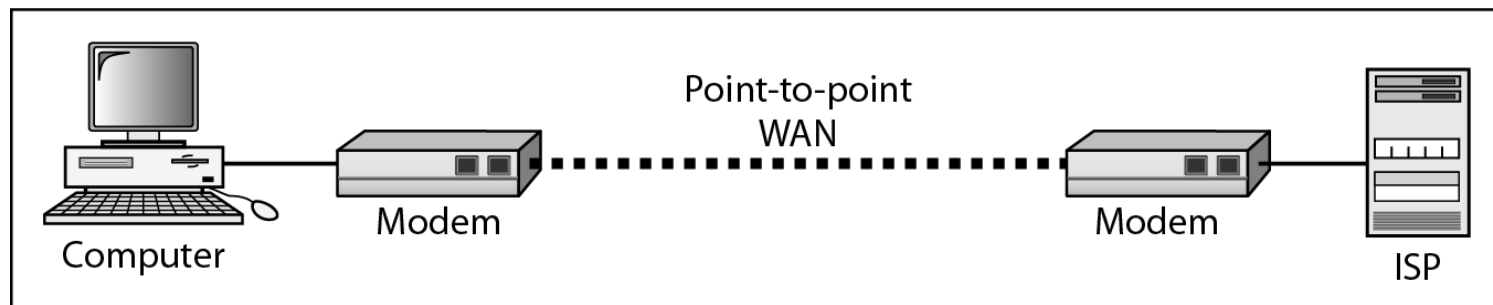
**Figure 1.10** *An isolated LAN connecting 12 computers to a hub in a closet*



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



a. Switched WAN

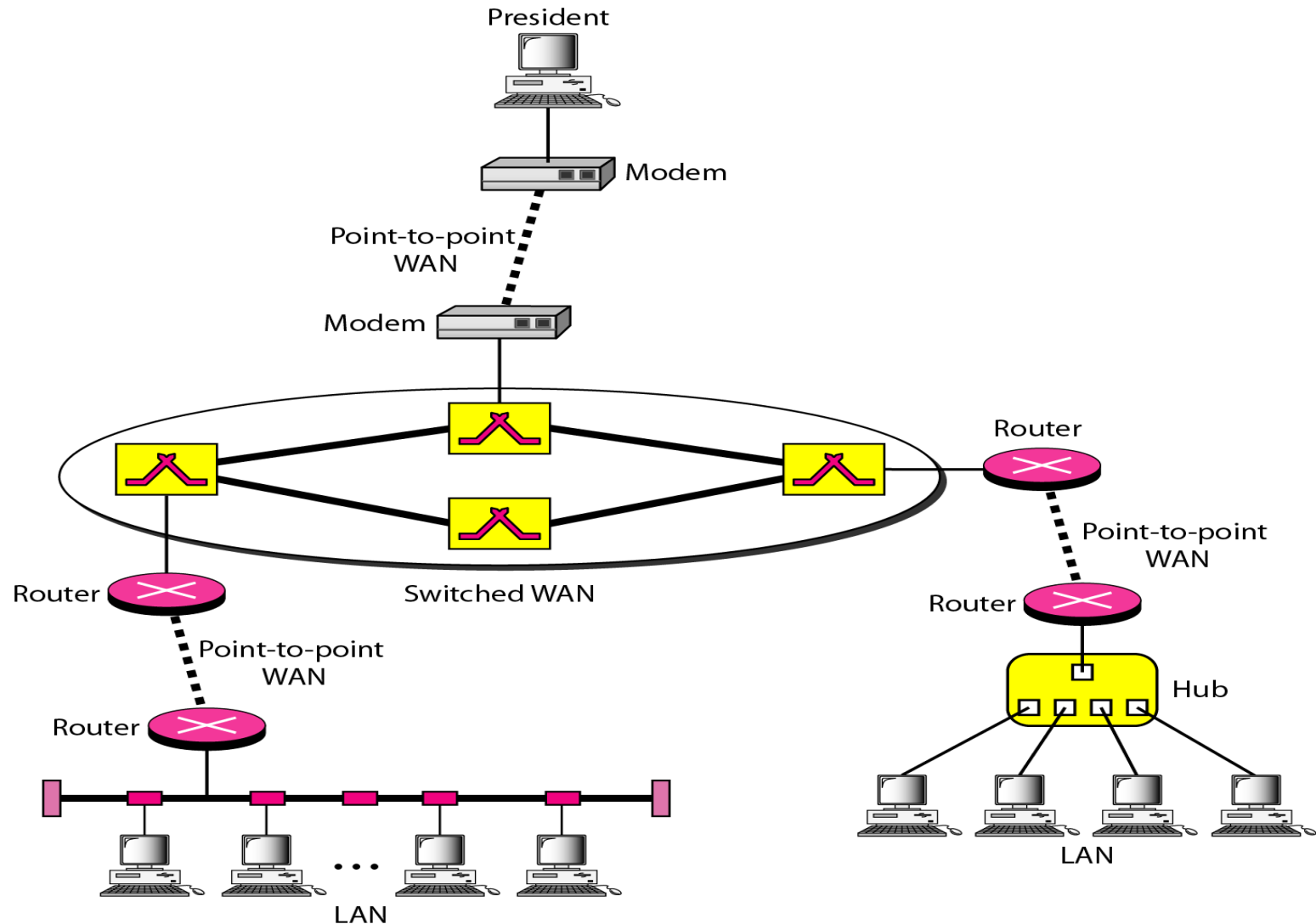


b. Point-to-point WAN



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

شبكة غير متجانسة مكونة من أربع شبكات WAN وشبكتين LAN



## 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:*

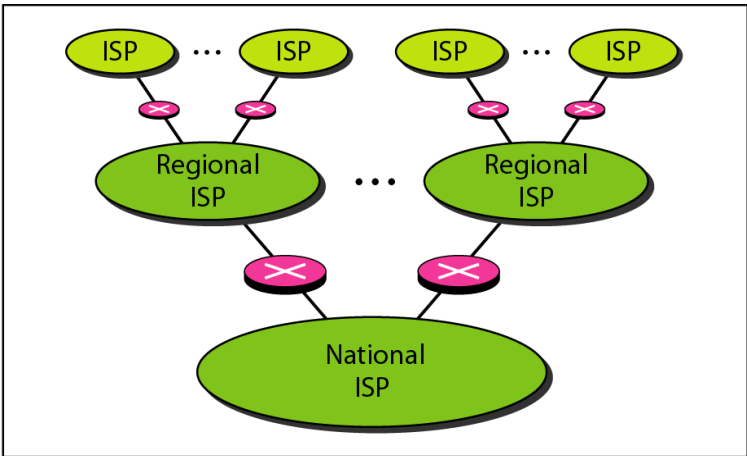
Organization of the Internet

Internet Service Providers (ISPs)

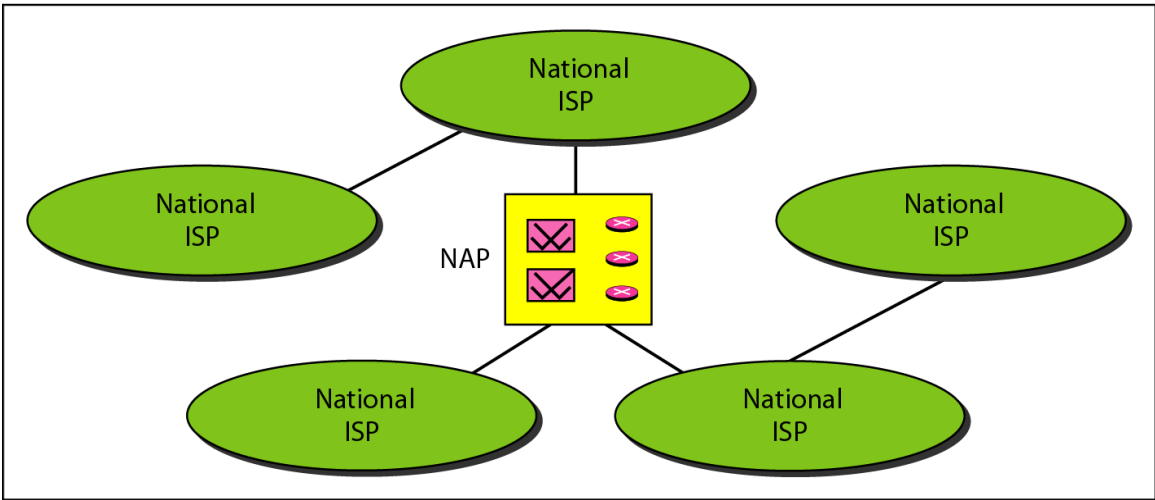


**Figure 1.13** *Hierarchical organization of the Internet*

التنظيم الهرمي للإنترنت



a. Structure of a national ISP



b. Interconnection of national ISPs



# 1-4 PROTOCOLS

*A protocol is synonymous with rule. It consists of a set of rules that govern data communications. It determines what is communicated, how it is communicated and when it is communicated. The key elements of a protocol are syntax, semantics and timing*

## Topics discussed in this section:

- Syntax
- Semantics
- Timing





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# □ Elements of a Protocol

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- **Syntax**
  - Structure or format of the data
  - Indicates how to read the bits - field delineation
- **Semantics**
  - Interprets the meaning of the bits
  - Knows which fields define what action
- **Timing**
  - When data should be sent and what
  - Speed at which data should be sent or speed at which it is being received.

