



# Chapter 1

## Introduction

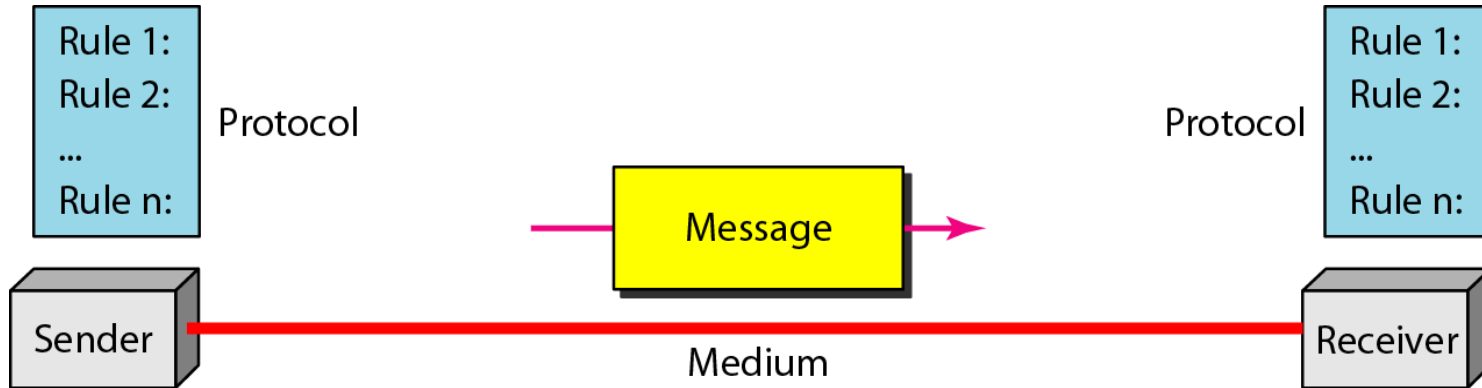
# 1-1 DATA COMMUNICATIONS

*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.*

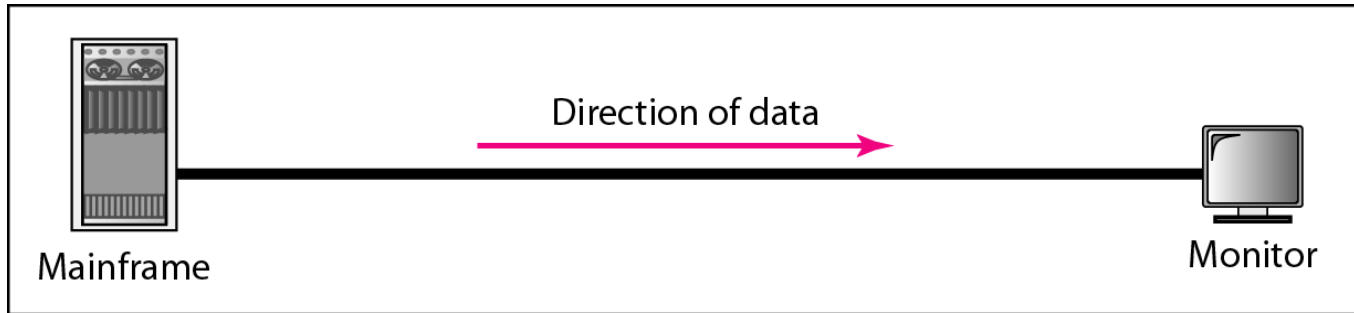
## *Topics discussed in this section:*

- Components of a data communications system
- Data Flow

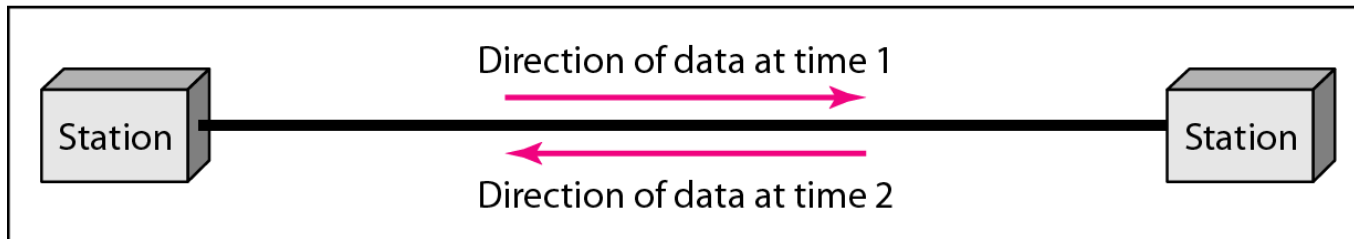
**Figure 1.1** *Components of a data communication system*



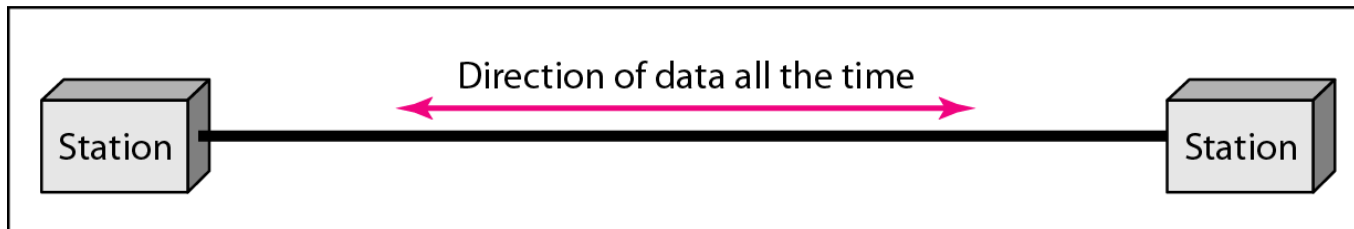
**Figure 1.2** *Data flow (simplex, half-duplex, and full-duplex)*



a. Simplex



b. Half-duplex

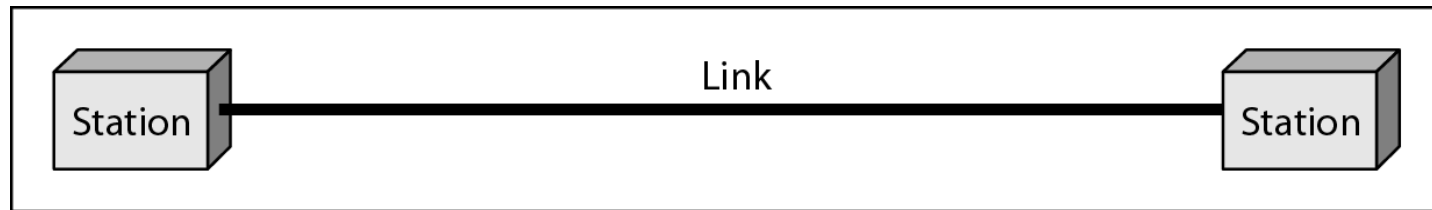


c. Full-duplex

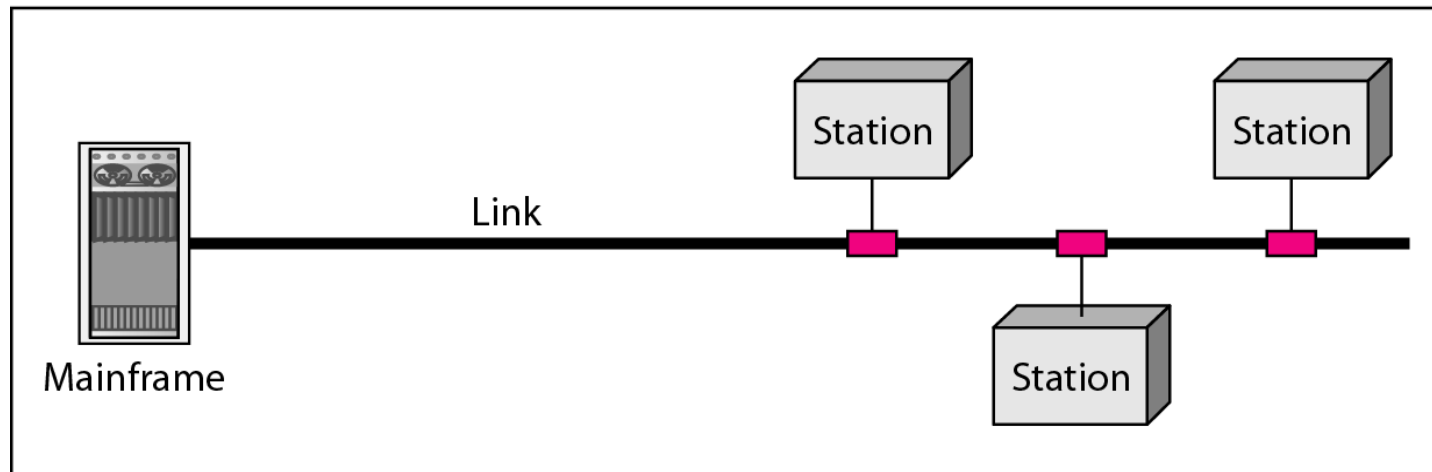
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**Figure 1.3** *Types of connections: point-to-point and multipoint*

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a. Point-to-point

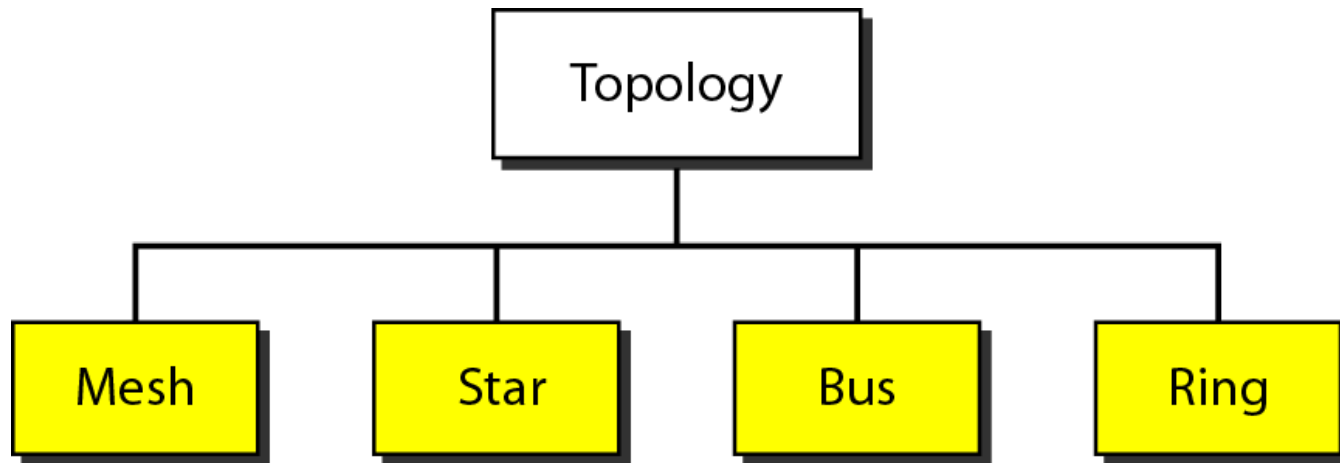


b. Multipoint

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**Figure 1.4** *Categories of topology*

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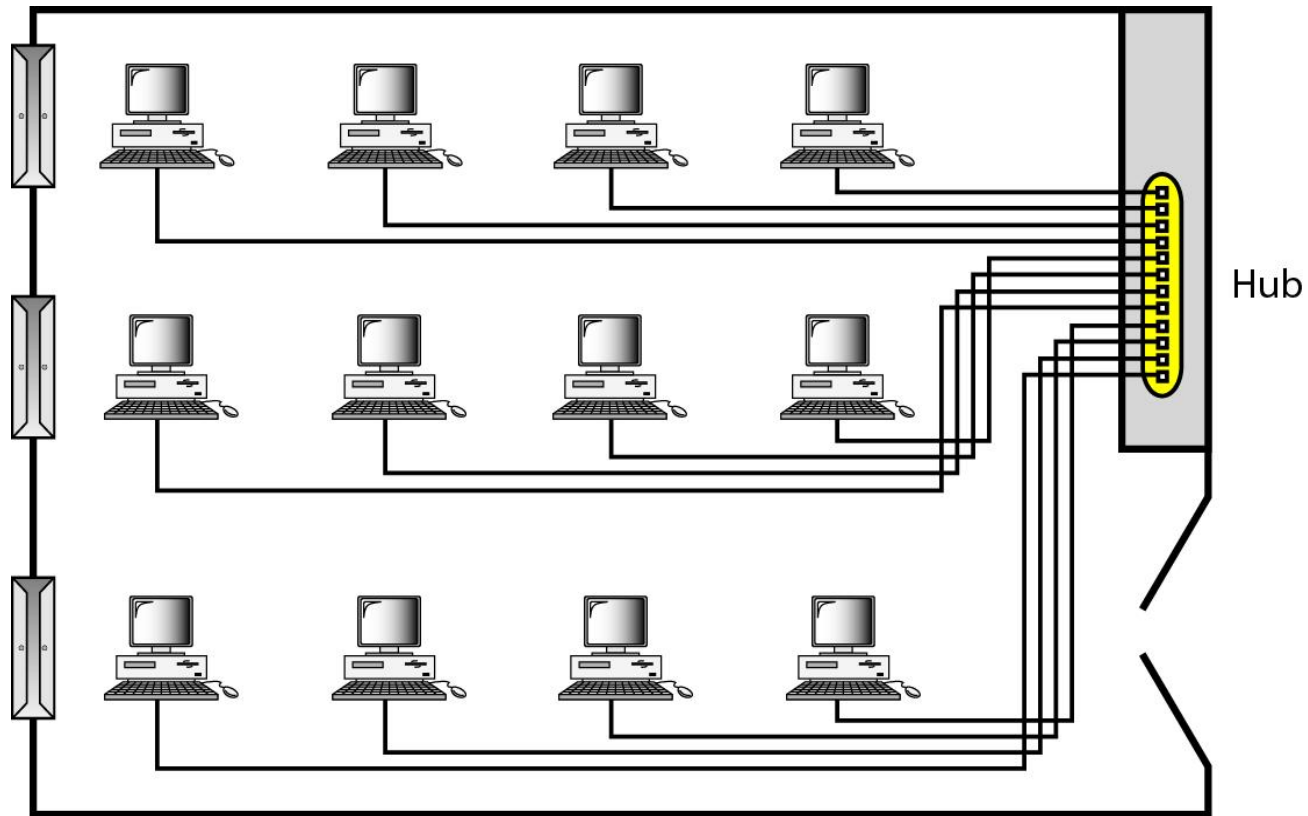
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# □ Categories of Networks

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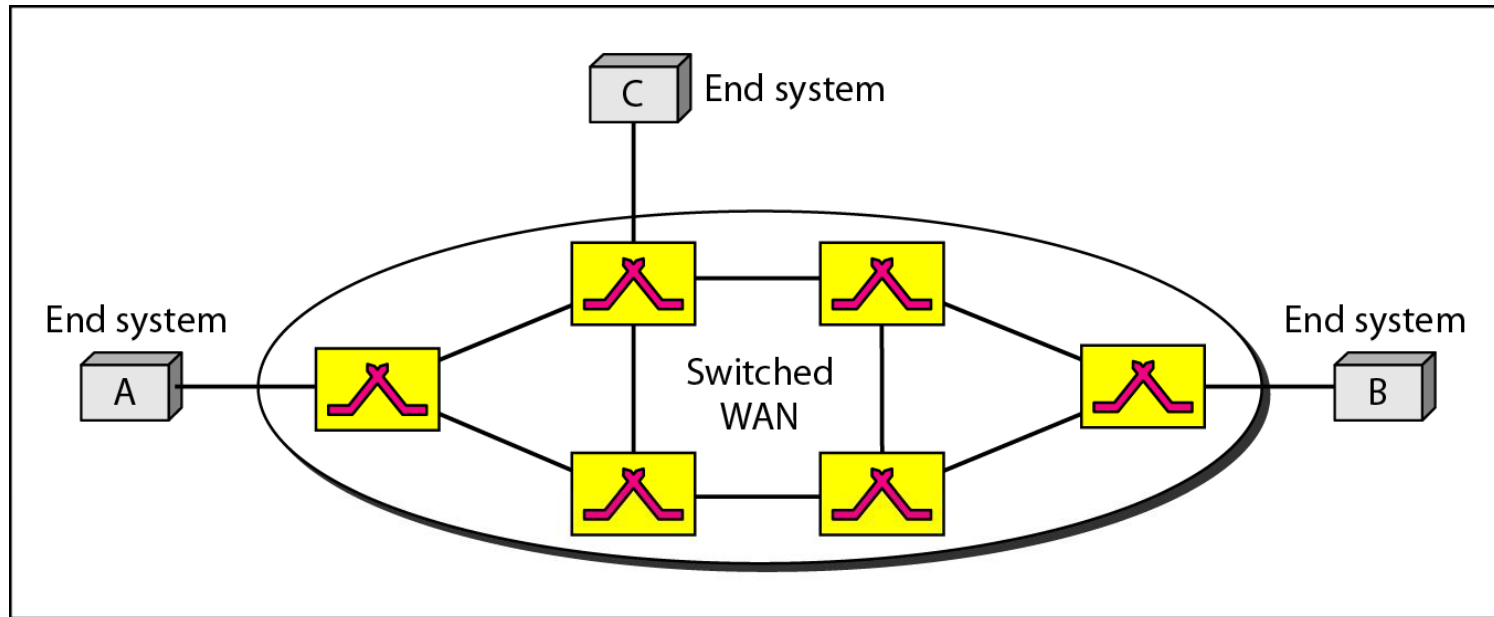
- **Local Area Networks (LANs)**
  - Short distances
  - Designed to provide local interconnectivity
- **Wide Area Networks (WANs)**
  - Long distances
  - Provide connectivity over large areas
- **Metropolitan Area Networks (MANs)**
  - Provide connectivity over areas such as a city, a campus

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

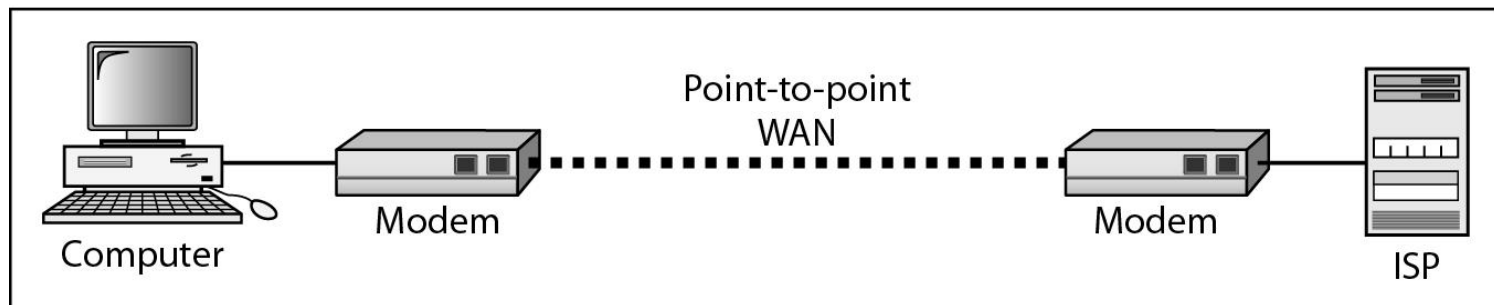




**Figure 1.11** *WANs: a switched WAN and a point-to-point WAN*

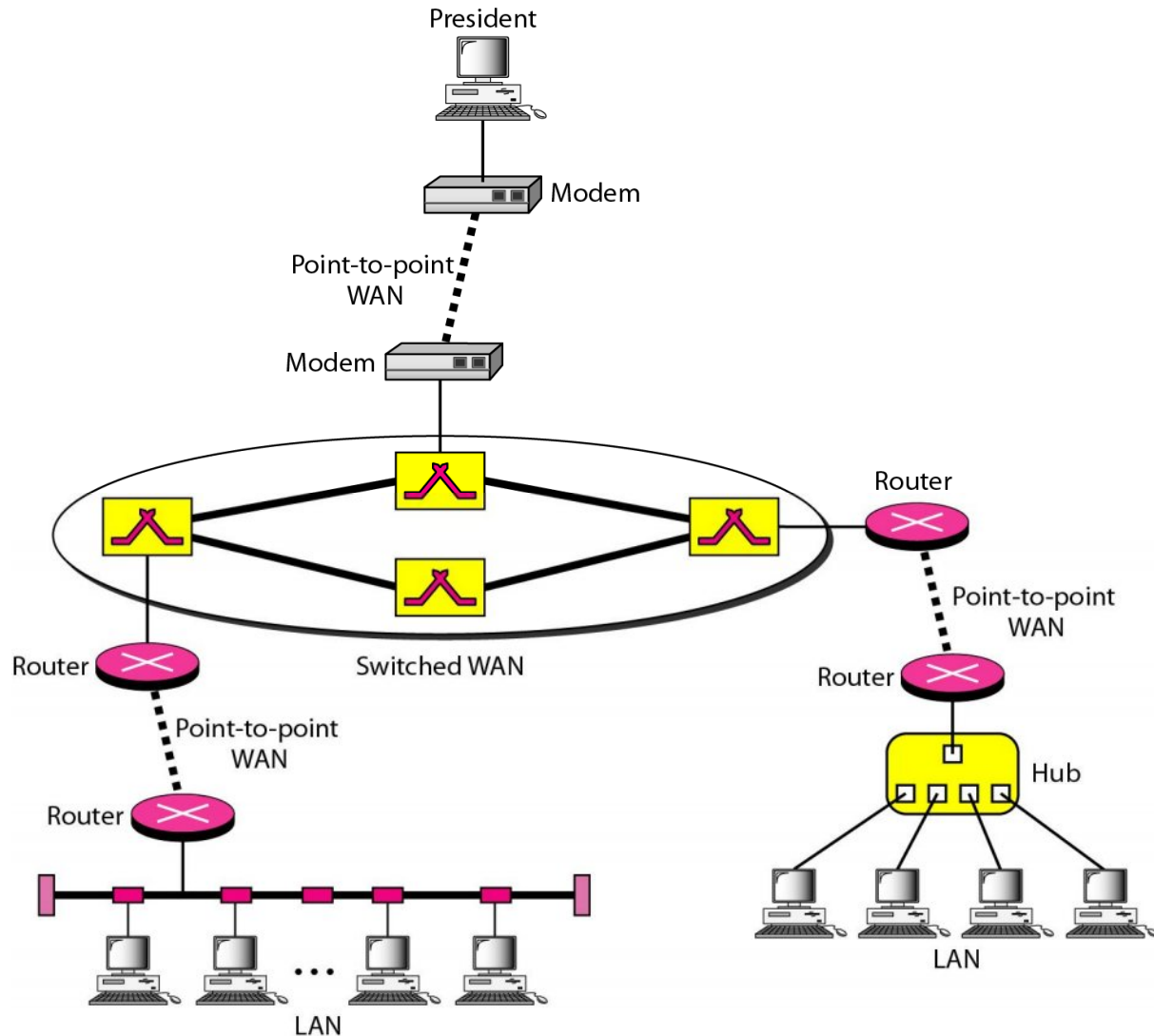


a. Switched WAN



b. Point-to-point WAN

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



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# □ Elements of a Protocol

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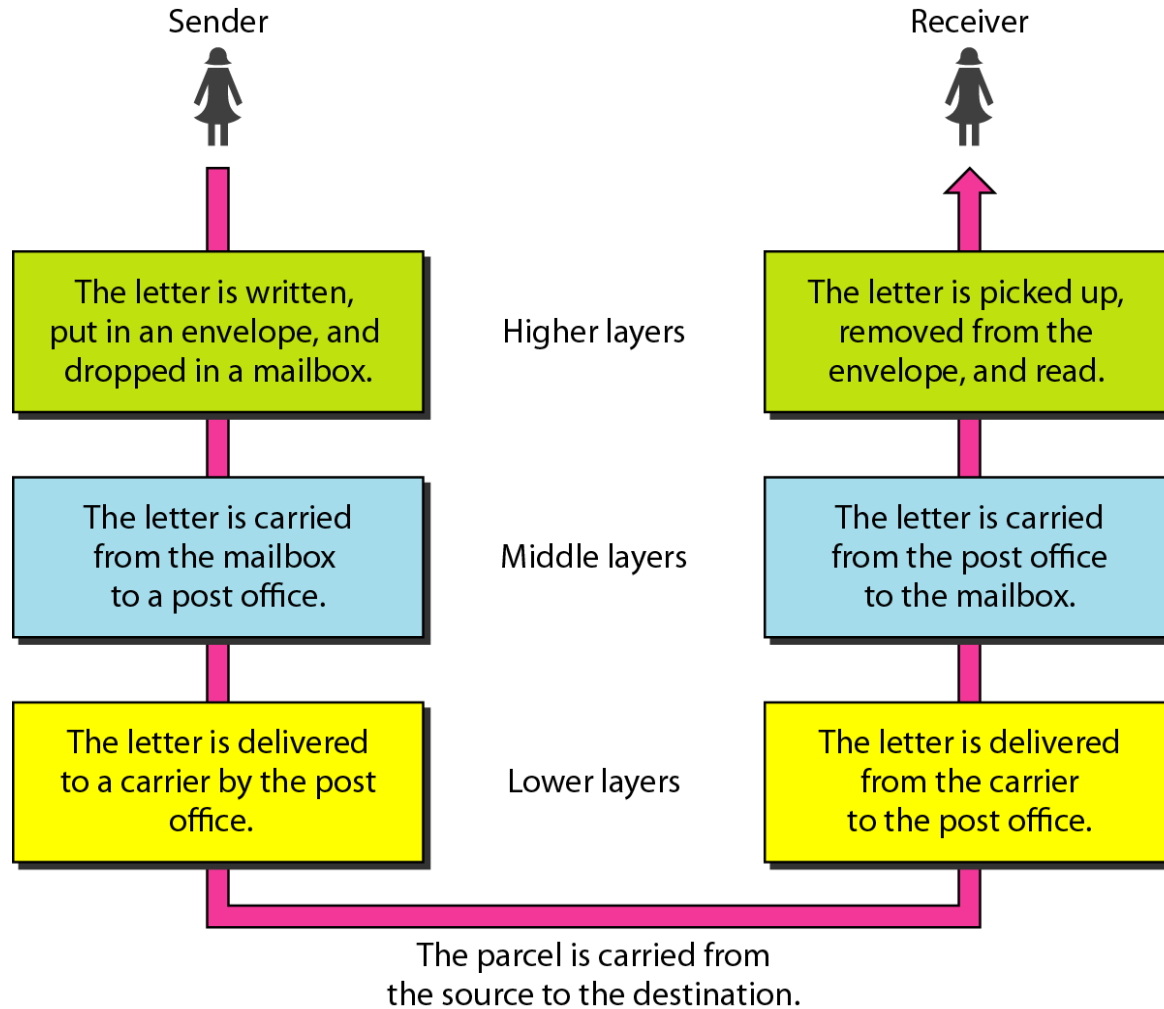
- **Syntax**
  - Structure or format of the data
  - Indicates how to read the bits - field delineation
- **Semantics**
  - Interprets the meaning of the bits
  - Knows which fields define what action
- **Timing**
  - When data should be sent and what
  - Speed at which data should be sent or speed at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



# Chapter 2

## Network Models

# Figure 2.1 Tasks involved in sending a letter



## 2-2 THE OSI MODEL

***Established in 1947, the International Standards Organization (ISO) is a multinational body dedicated to worldwide agreement on international standards. An ISO standard that covers all aspects of network communications is the Open Systems Interconnection (OSI) model. It was first introduced in the late 1970s.***

### **Topics discussed in this section:**

**Layered Architecture**

**Peer-to-Peer Processes**

**Encapsulation**



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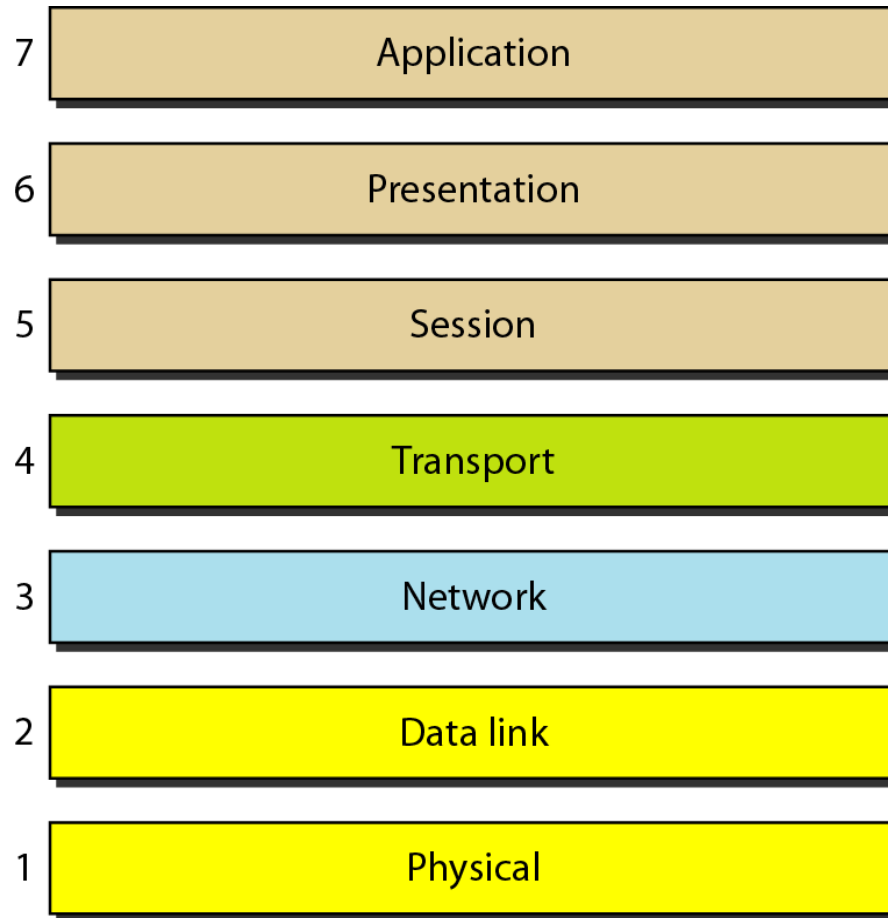
**Note**

**ISO is the organization.  
OSI is the model.**

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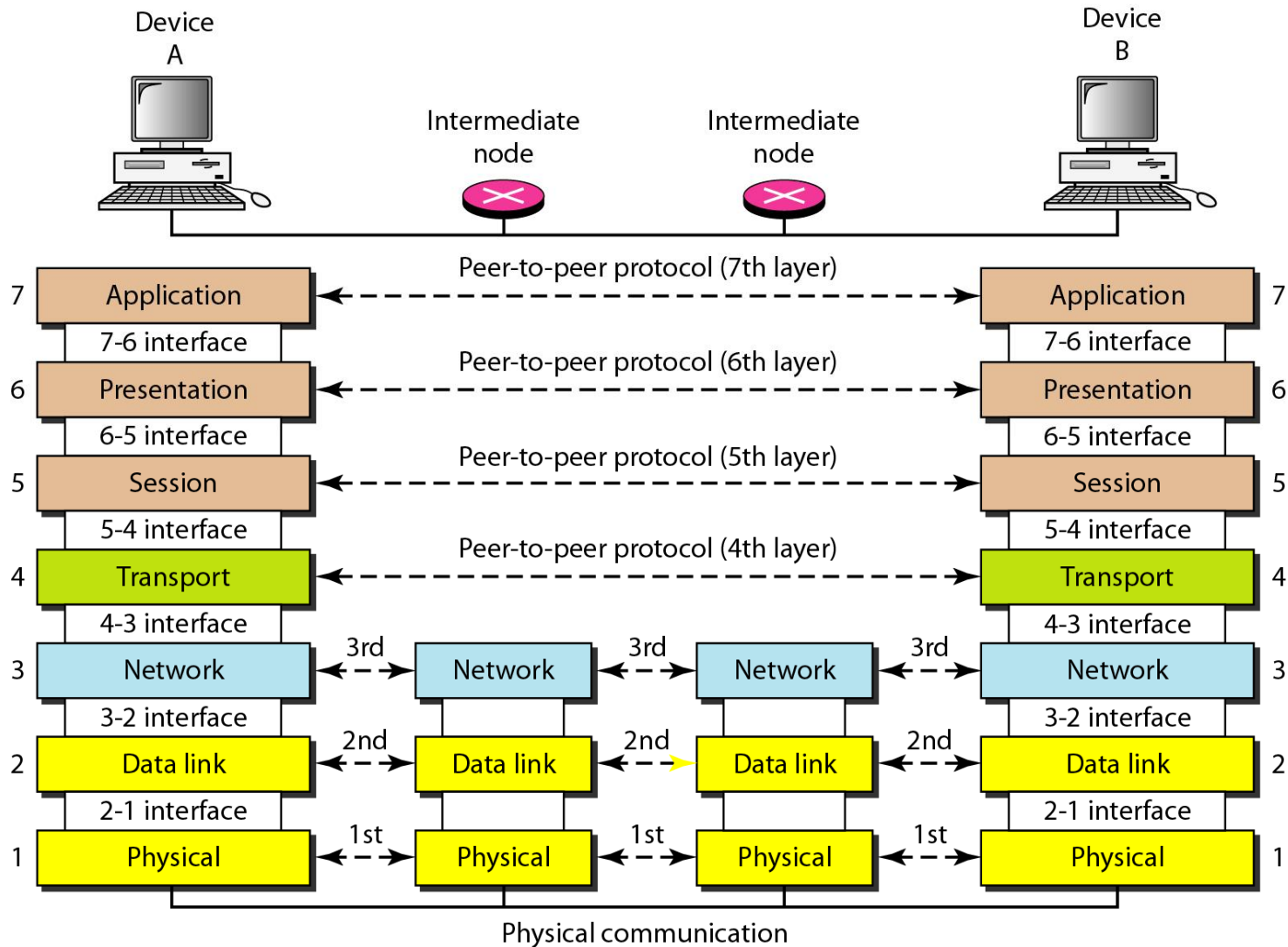
## Figure 2.2 *Seven layers of the OSI model*

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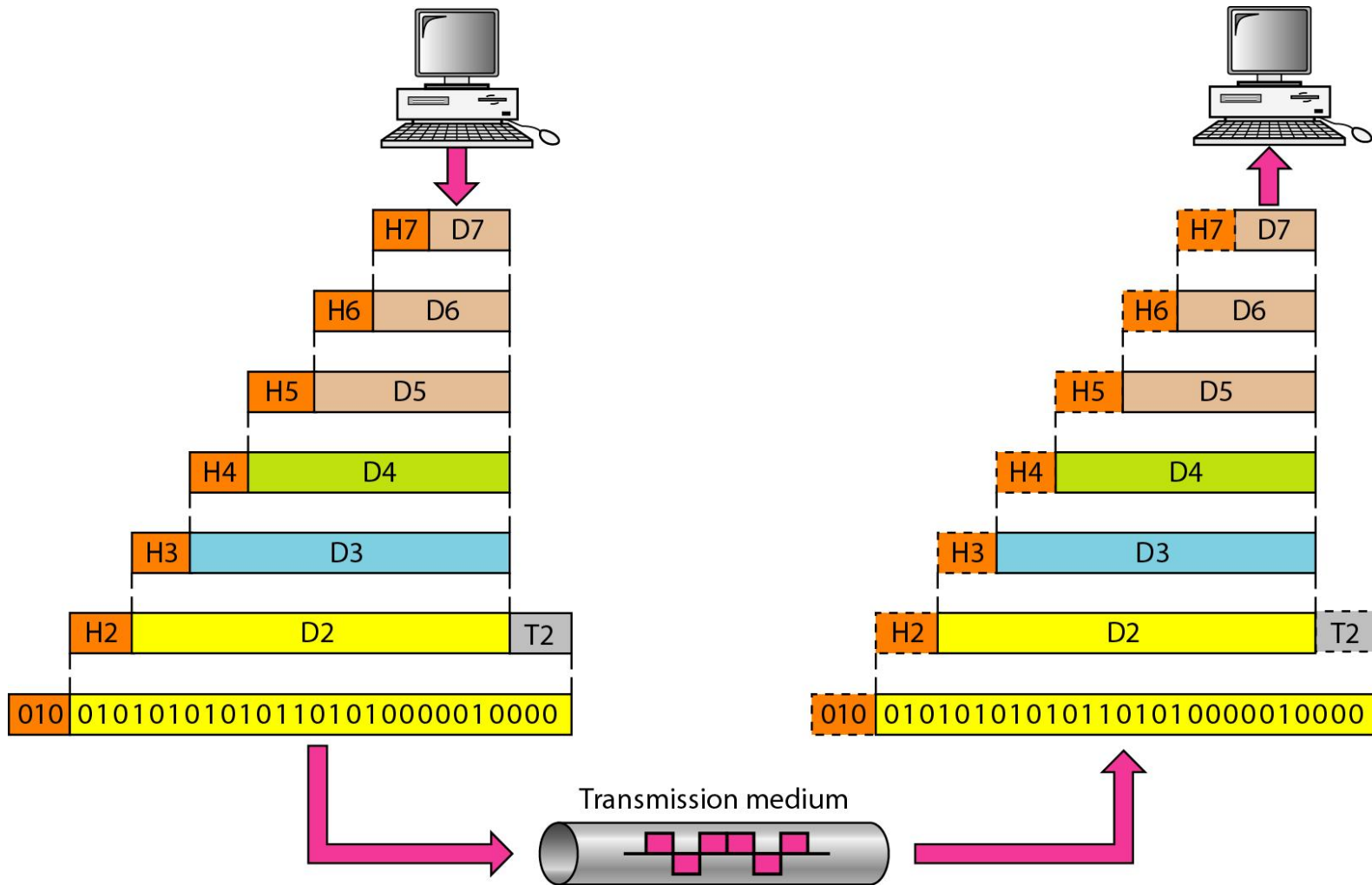




**Figure 2.3** *The interaction between layers in the OSI model*



**Figure 2.4** *An exchange using the OSI model*



## 2-3 LAYERS IN THE OSI MODEL

*In this section we briefly describe the functions of each layer in the OSI model.*

### *Topics discussed in this section:*

Physical Layer

Data Link Layer

Network Layer

Transport Layer

Session Layer

Presentation Layer

Application Layer



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**Note**

**The physical layer is responsible for movements of individual bits from one hop (node) to the next.**



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**Note**

**The data link layer is responsible for moving frames from one hop (node) to the next.**

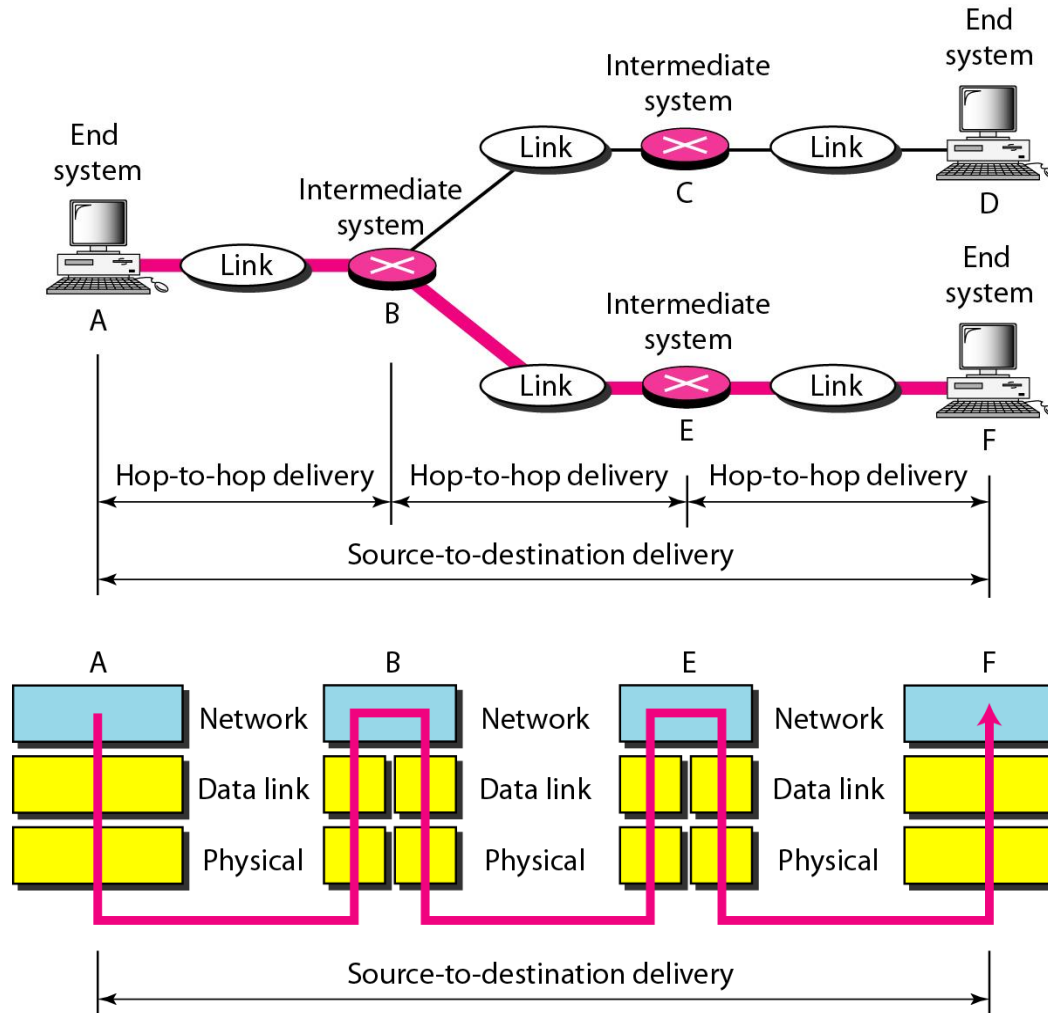


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**Note**

**The network layer is responsible for the delivery of individual packets from the source host to the destination host.**

# Figure 2.9 Source-to-destination delivery





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**Note**

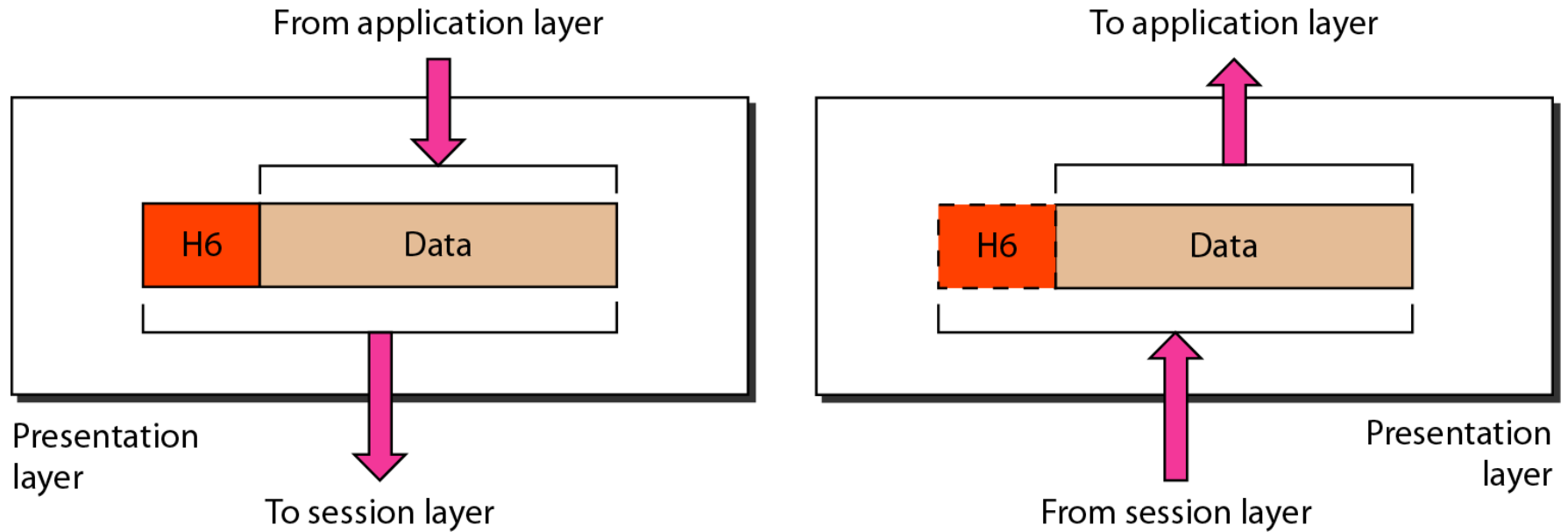
**The transport layer is responsible for the delivery of a message from one process to another.**



**Note**

**The session layer is responsible for dialog control and synchronization.**

**Figure 2.13** *Presentation layer*



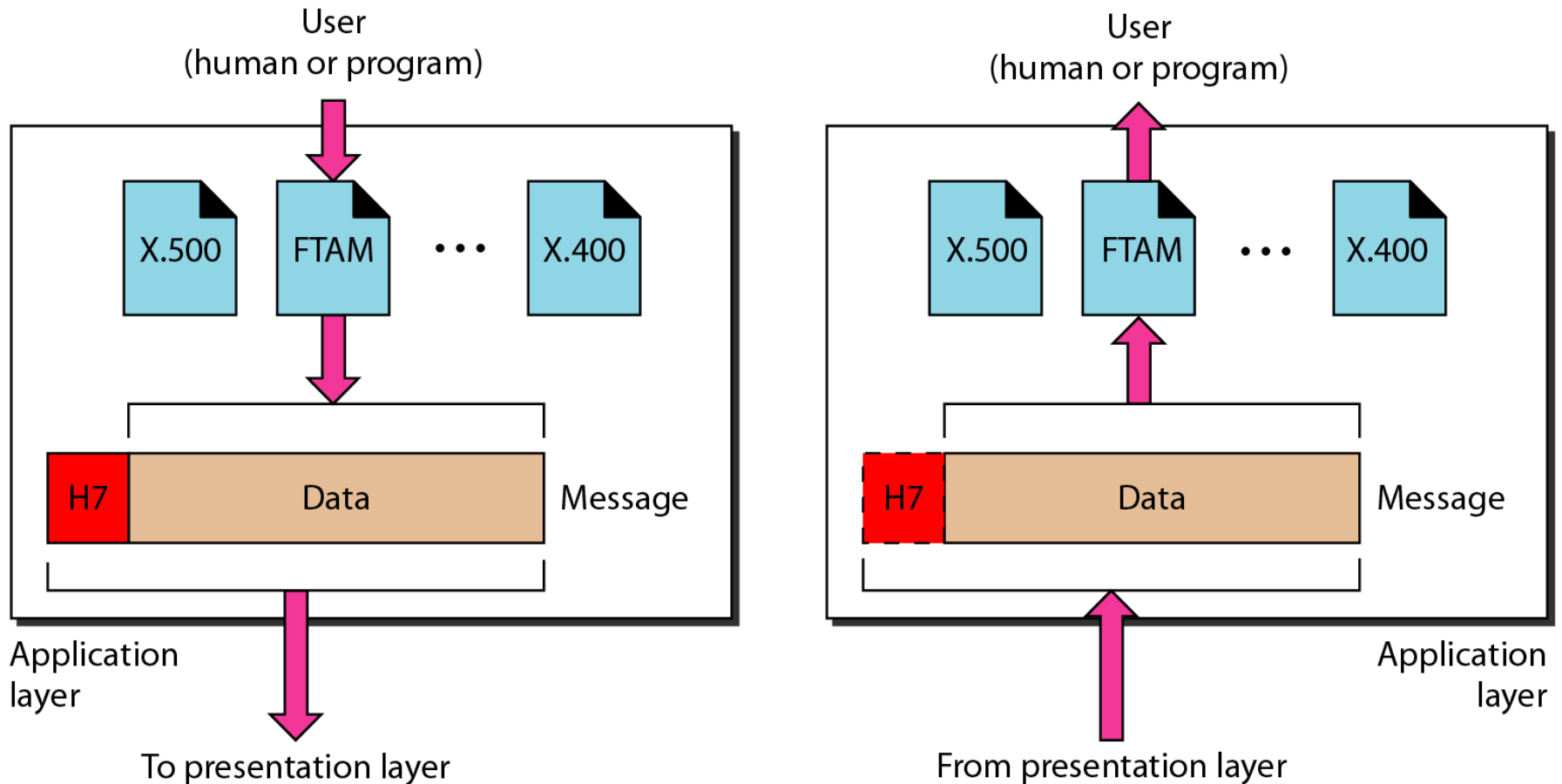


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**Note**

**The presentation layer is responsible for translation, compression, and encryption.**

**Figure 2.14** *Application layer*



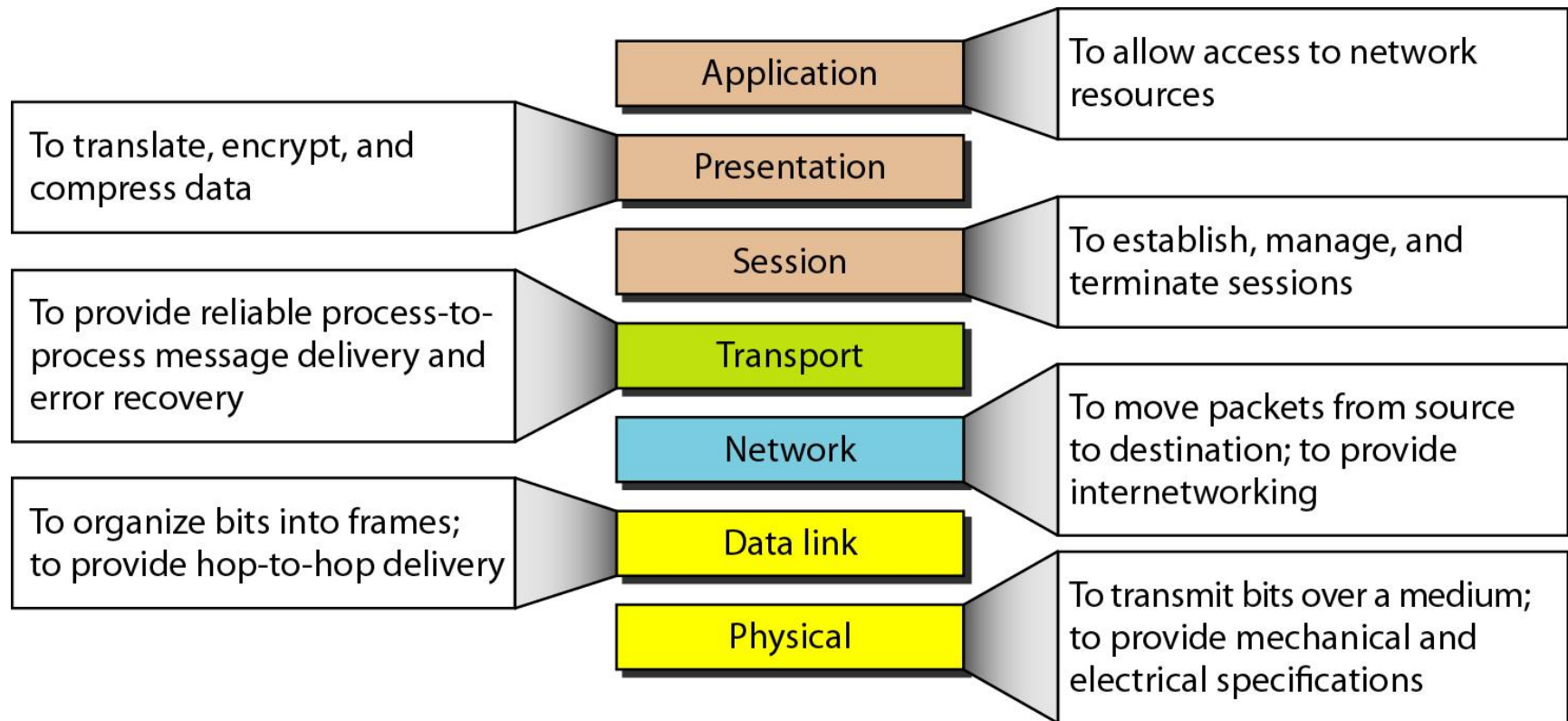


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**Note**

**The application layer is responsible for providing services to the user.**

**Figure 2.15** *Summary of layers*



## 2-4 TCP/IP PROTOCOL SUITE

*The layers in the **TCP/IP protocol suite** do not exactly match those in the OSI model. The original TCP/IP protocol suite was defined as having four layers: **host-to-network**, **internet**, **transport**, and **application**. However, when TCP/IP is compared to OSI, we can say that the TCP/IP protocol suite is made of five layers: **physical**, **data link**, **network**, **transport**, and **application**.*

### **Topics discussed in this section:**

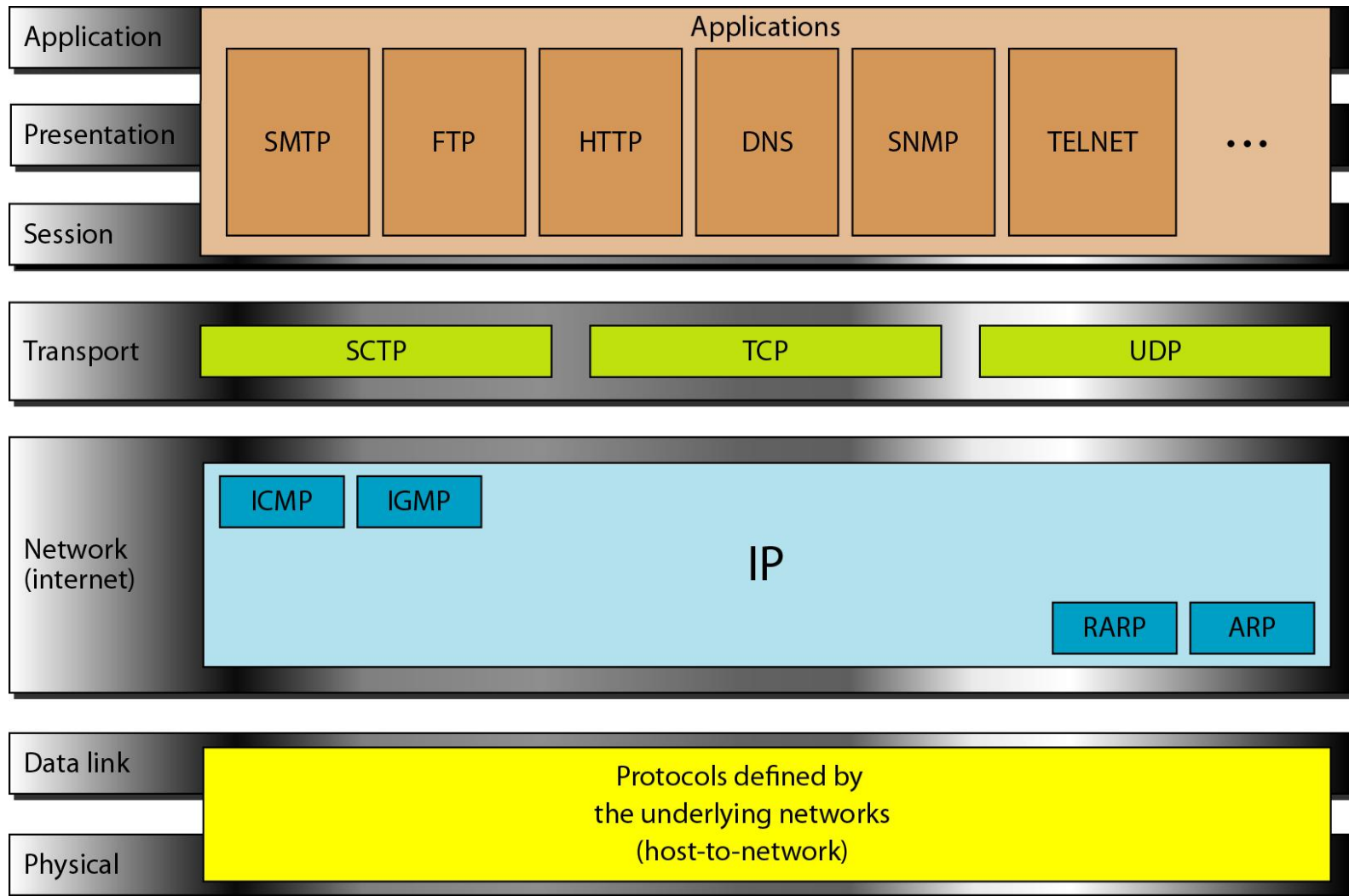
**Physical and Data Link Layers**

**Network Layer**

**Transport Layer**

**Application Layer**

**Figure 2.16** *TCP/IP and OSI model*





## 2-5 ADDRESSING

*Four levels of addresses are used in an internet employing the TCP/IP protocols: **physical**, **logical**, **port**, and **specific**.*

### *Topics discussed in this section:*

Physical Addresses

Logical Addresses

Port Addresses

Specific Addresses

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## Figure 2.17 *Addresses in TCP/IP*

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