ITT300
Introduction to Data Communication and Networking

Chapter 2
Network Model

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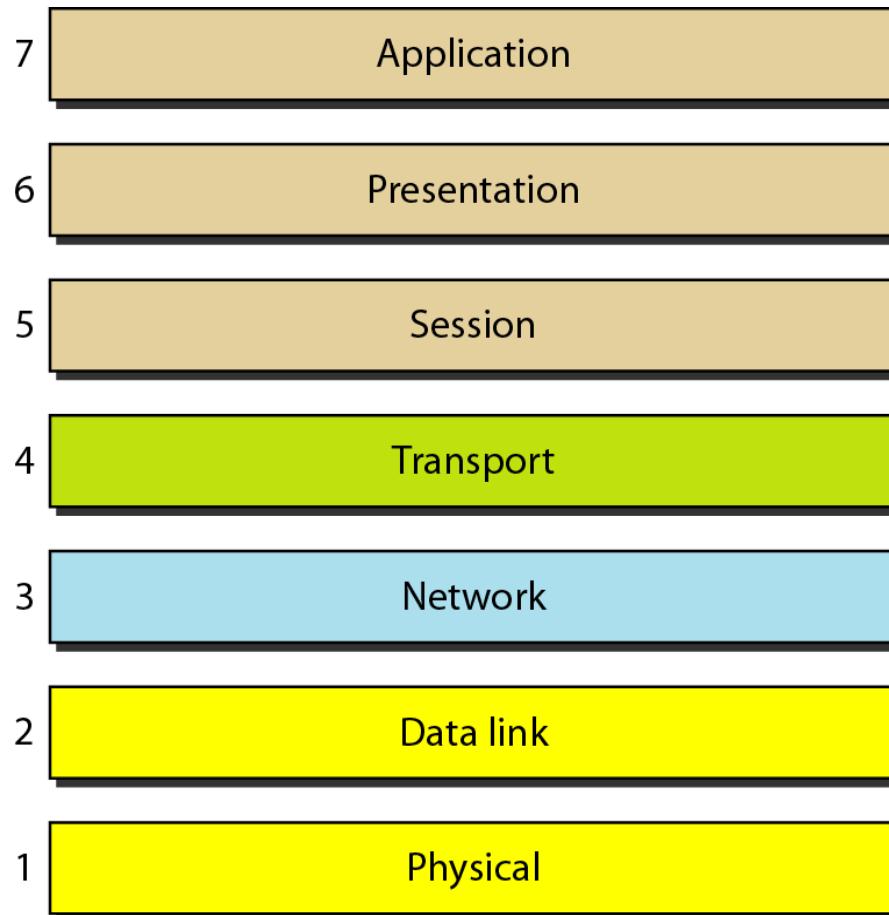
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INTRODUCTION

- A network uses a combination of hardware and software to send data from one location to another.
- The task of sending data from one point in the world to another can be broken into several tasks, performed by **separate software** (layers of software).
- At the end, data is sent from the source to the destination.

2-2   THE OSI MODEL

- Introduced in the late 1970s, OSI Model is the ISO standard that covers all aspects of network communications.

- OSI is an **open system** – a set of protocols that allows any two different systems to communicate regardless of their underlying architecture.
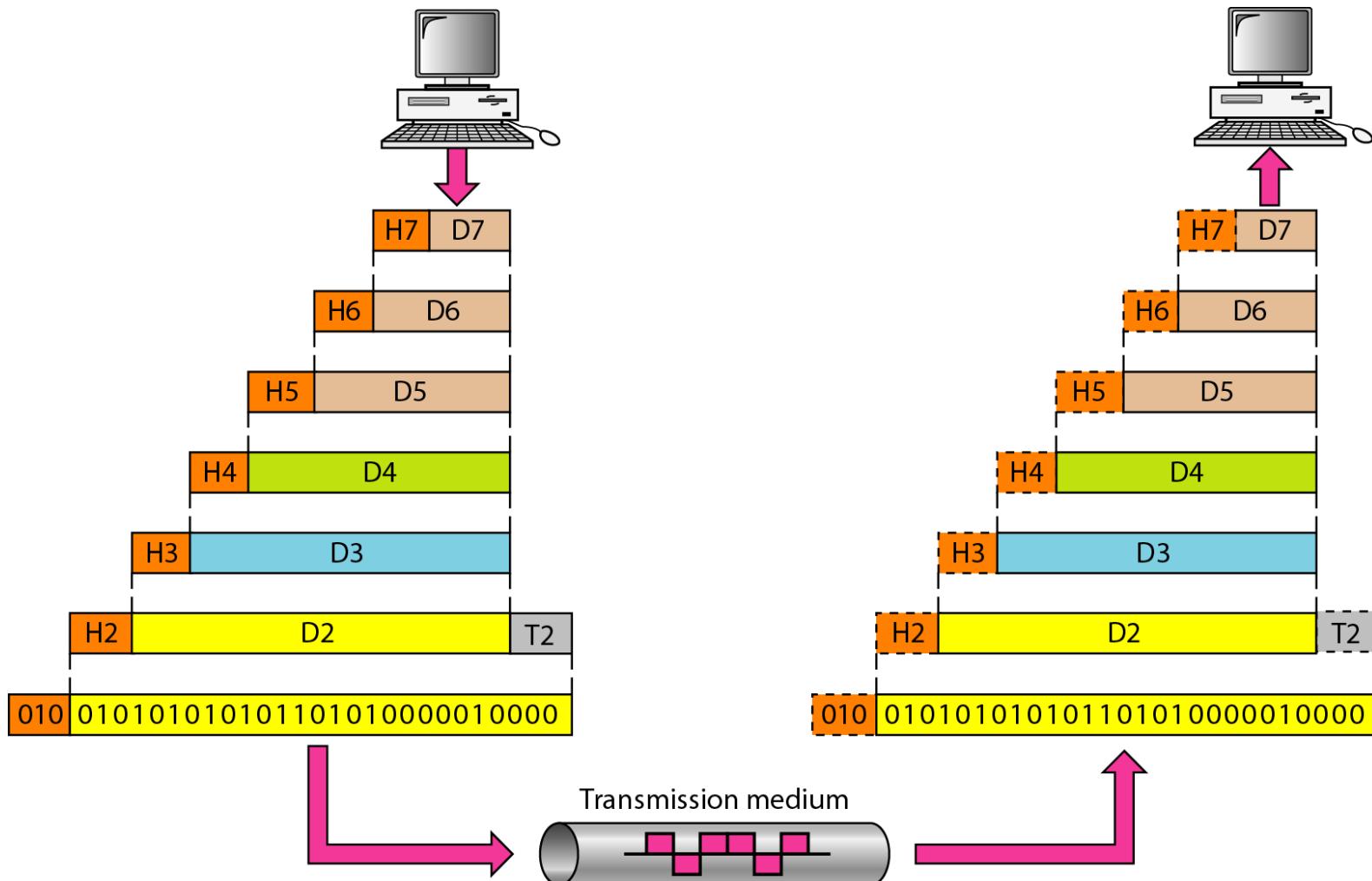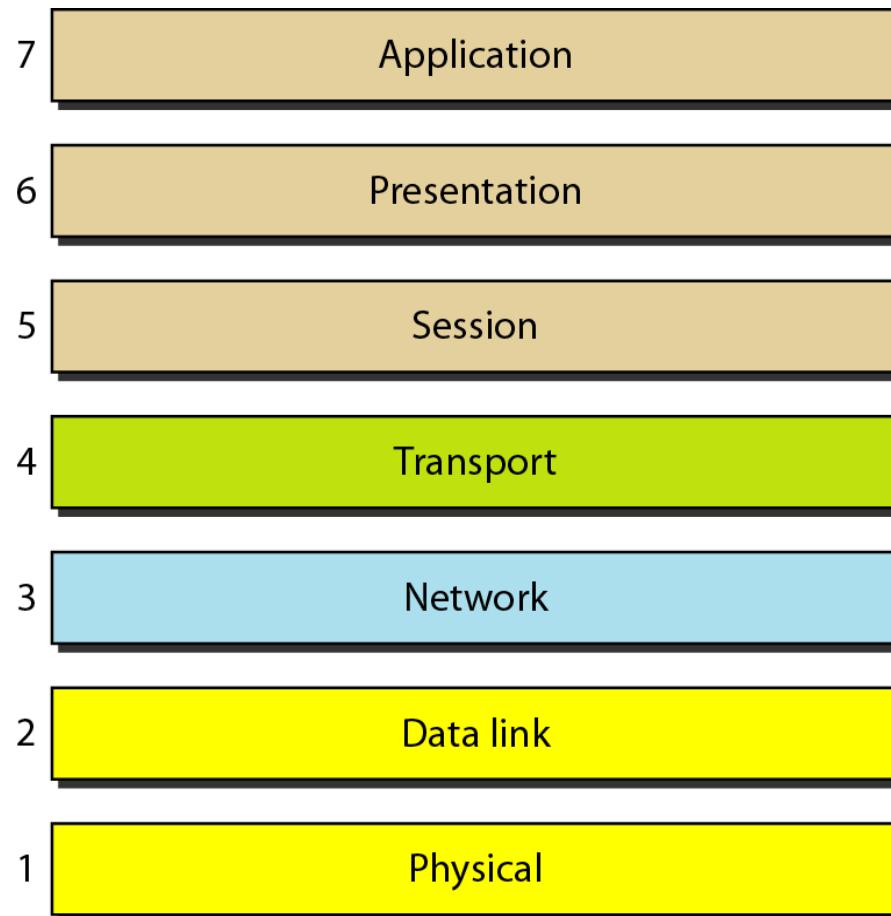
LAYERED ARCHITECTURE
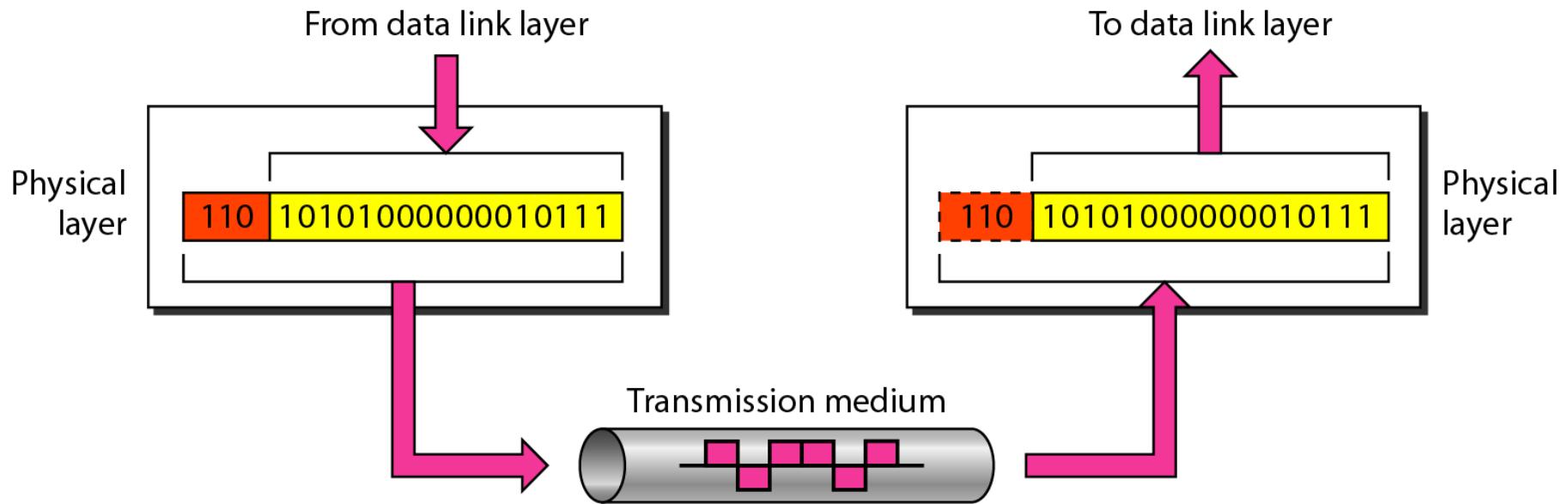

Figure 2.2 *Seven layers of the OSI model*
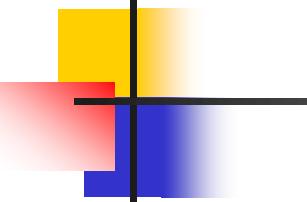
Figure 2.4 *An exchange using the OSI model*

2-3   LAYERS IN THE OSI MODEL

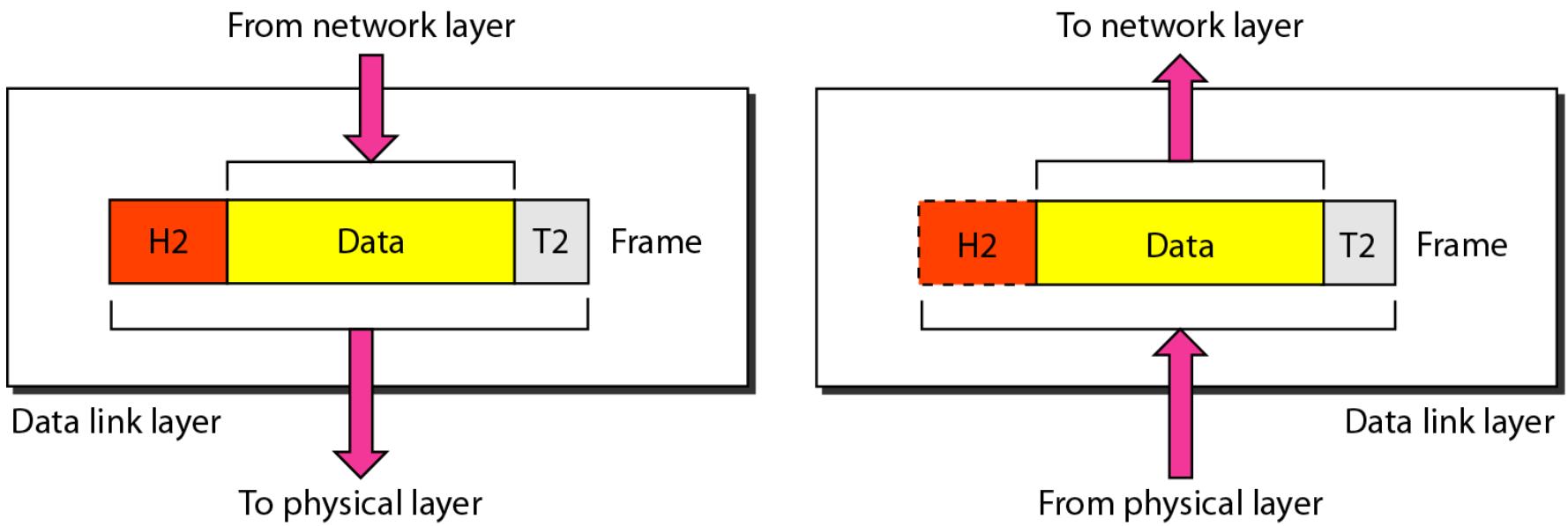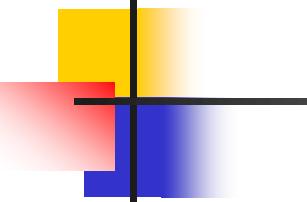|	
7	Application
6	Presentation
5	Session
4	Transport
3	Network
2	Data link
1	Physical

Figure 2.5 *Physical layer*

Note

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

2.8

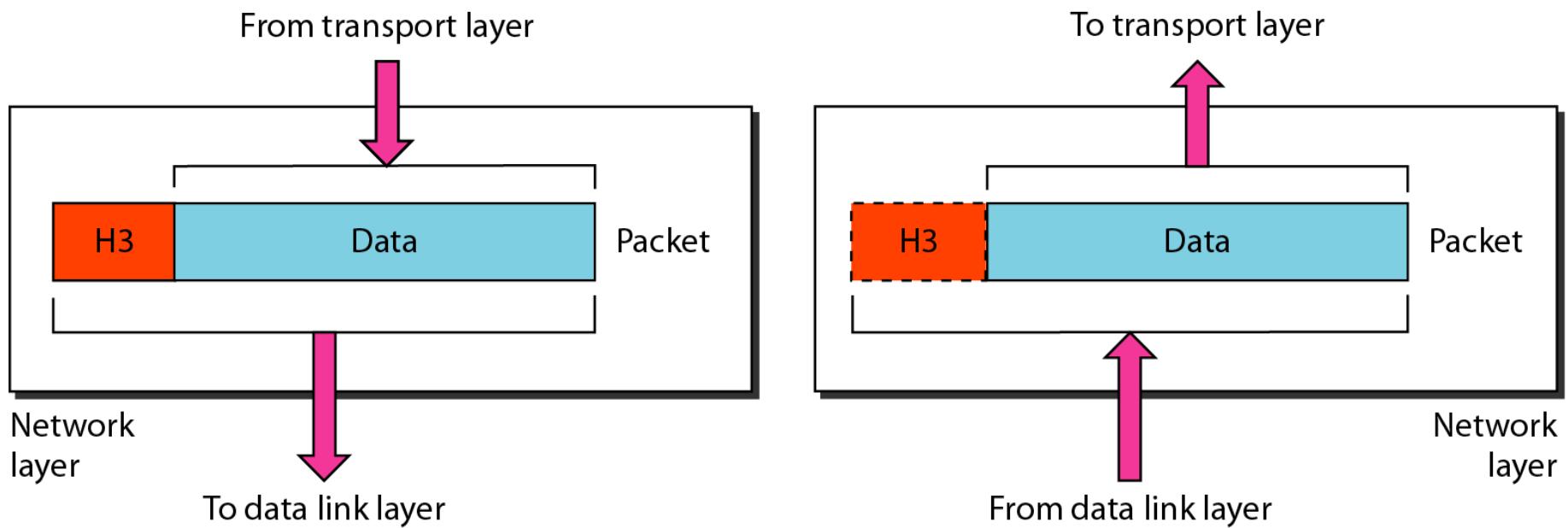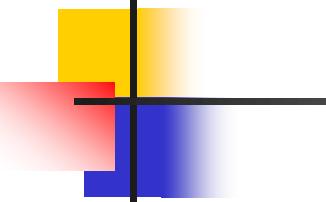**Figure 2.6** *Data link layer*

Note

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

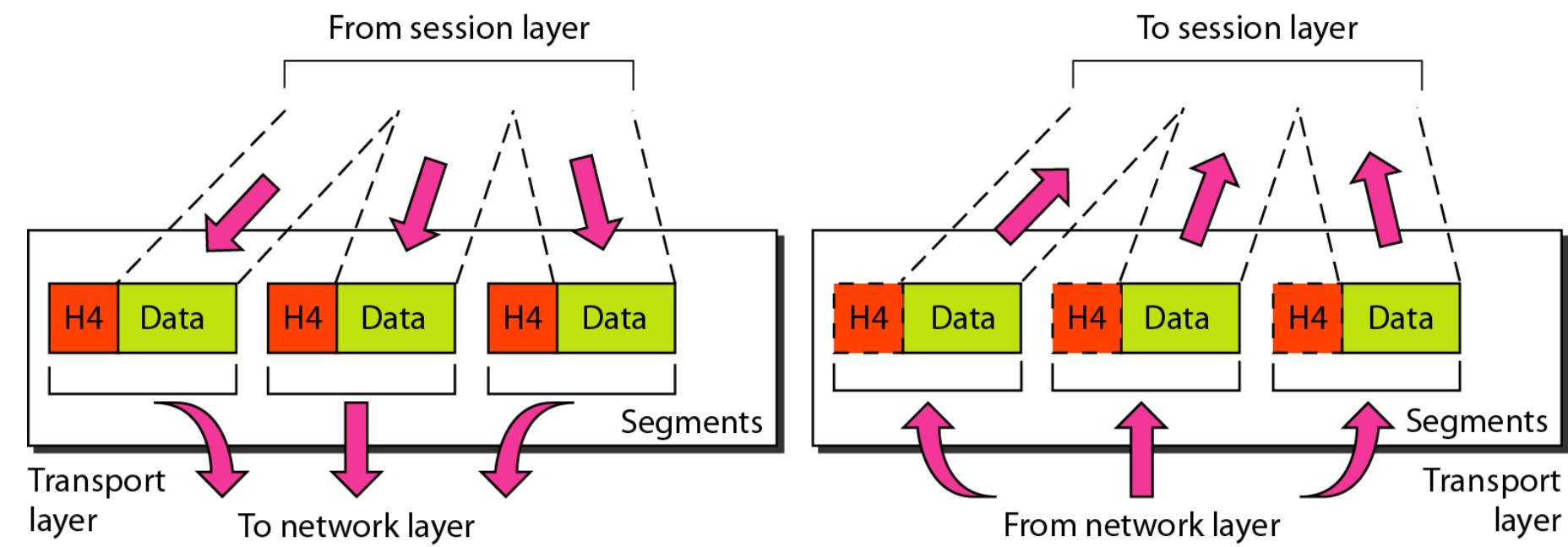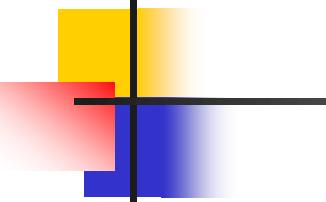# Figure 2.8 *Network layer*

Note

The network layer is responsible for the
delivery of individual packets from
the source host to the destination host.
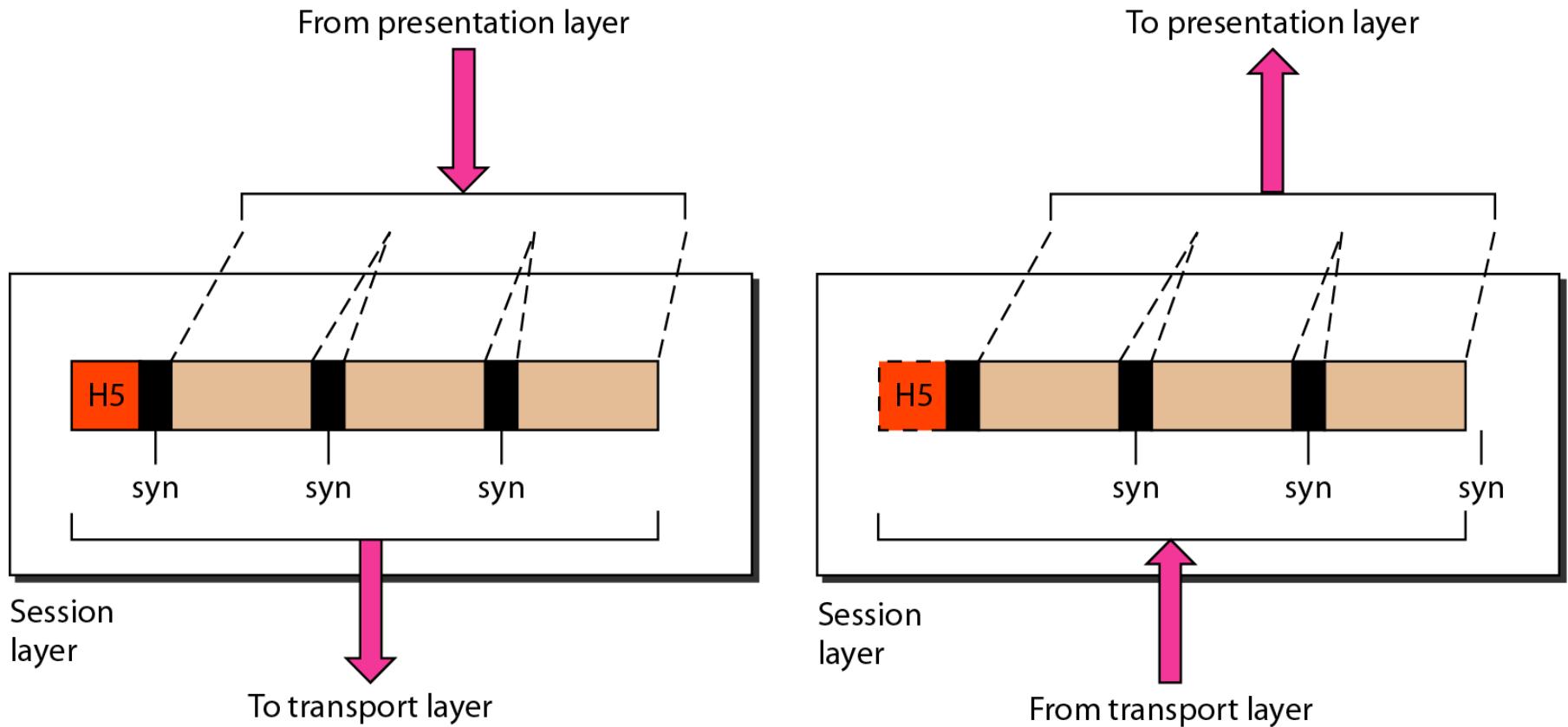
Figure 2.10 *Transport layer*

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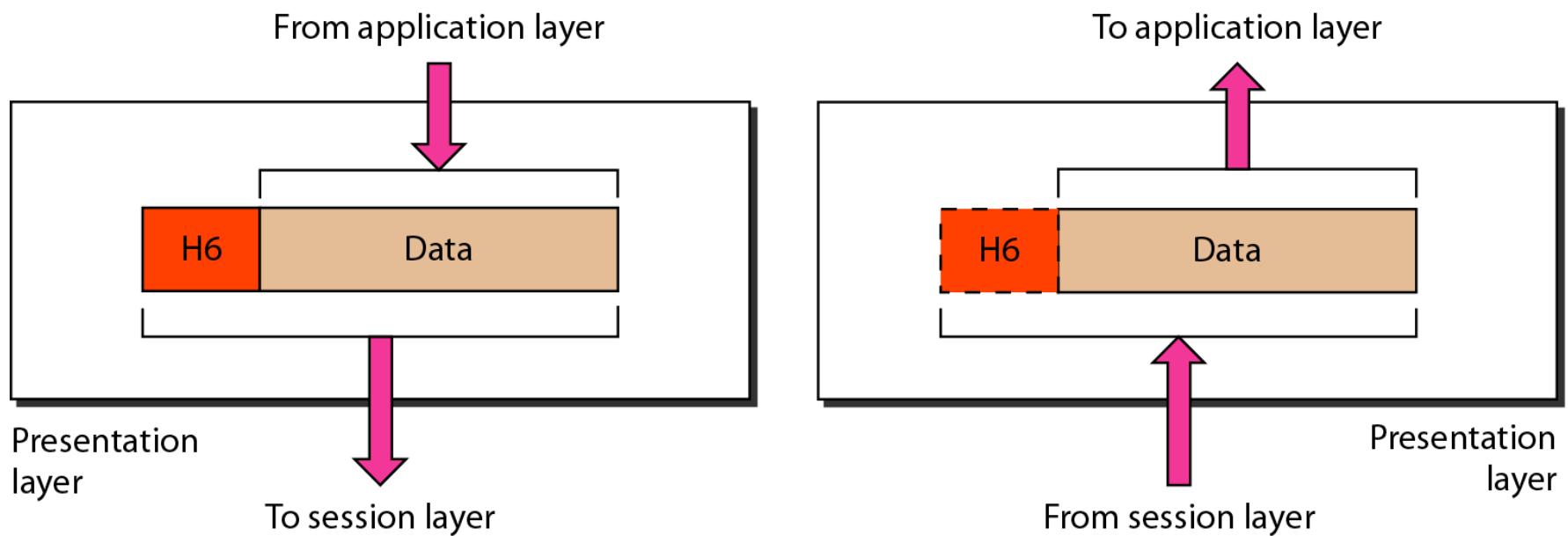
The transport layer is responsible for the delivery
of a message from one process to another.

Figure 2.12 *Session layer*

Note

The session layer is responsible for dialog
control and synchronization.

Figure 2.13 *Presentation layer*

Note

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

Figure 2.14 *Application layer*
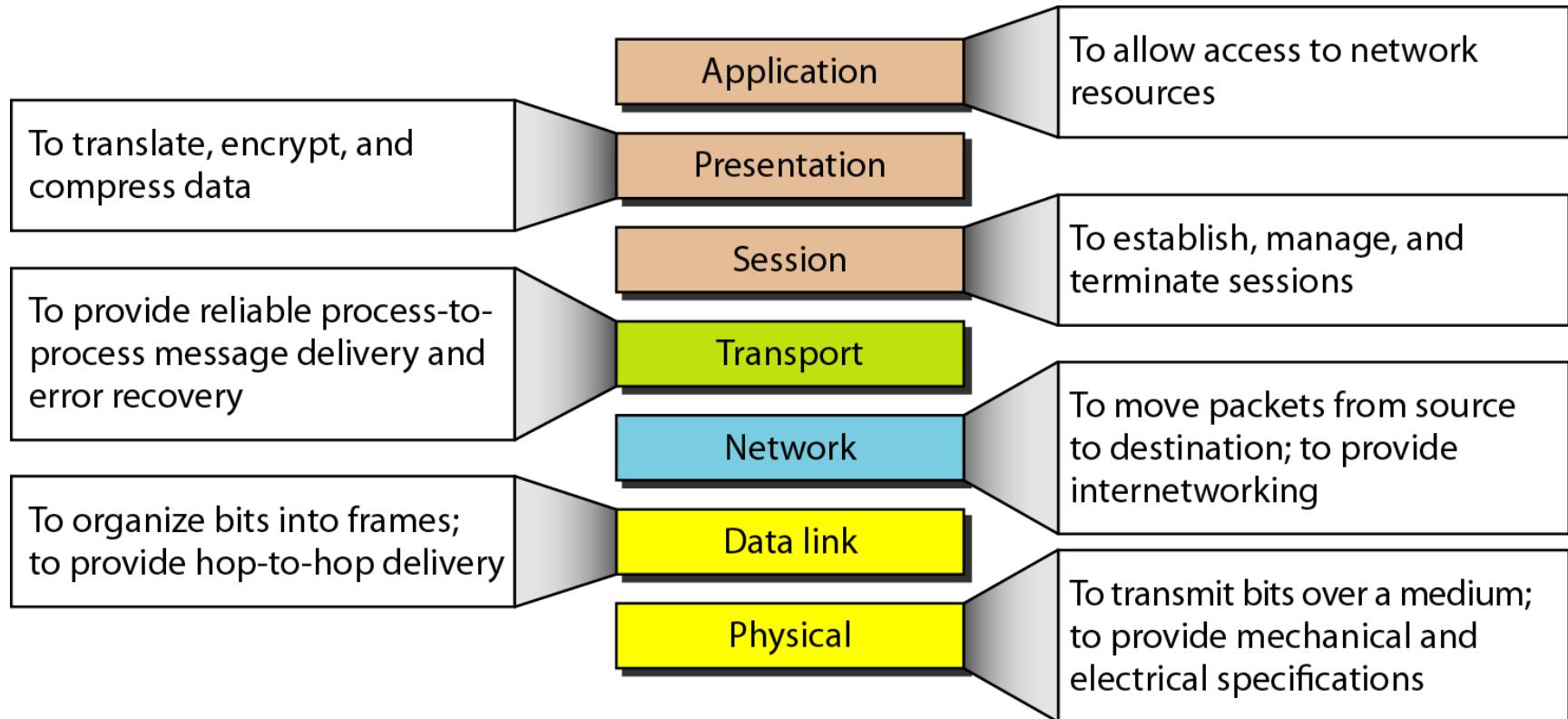
Note

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

Summary of Layers

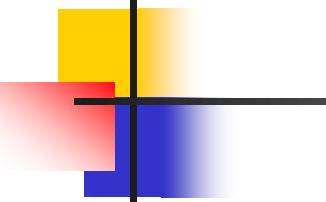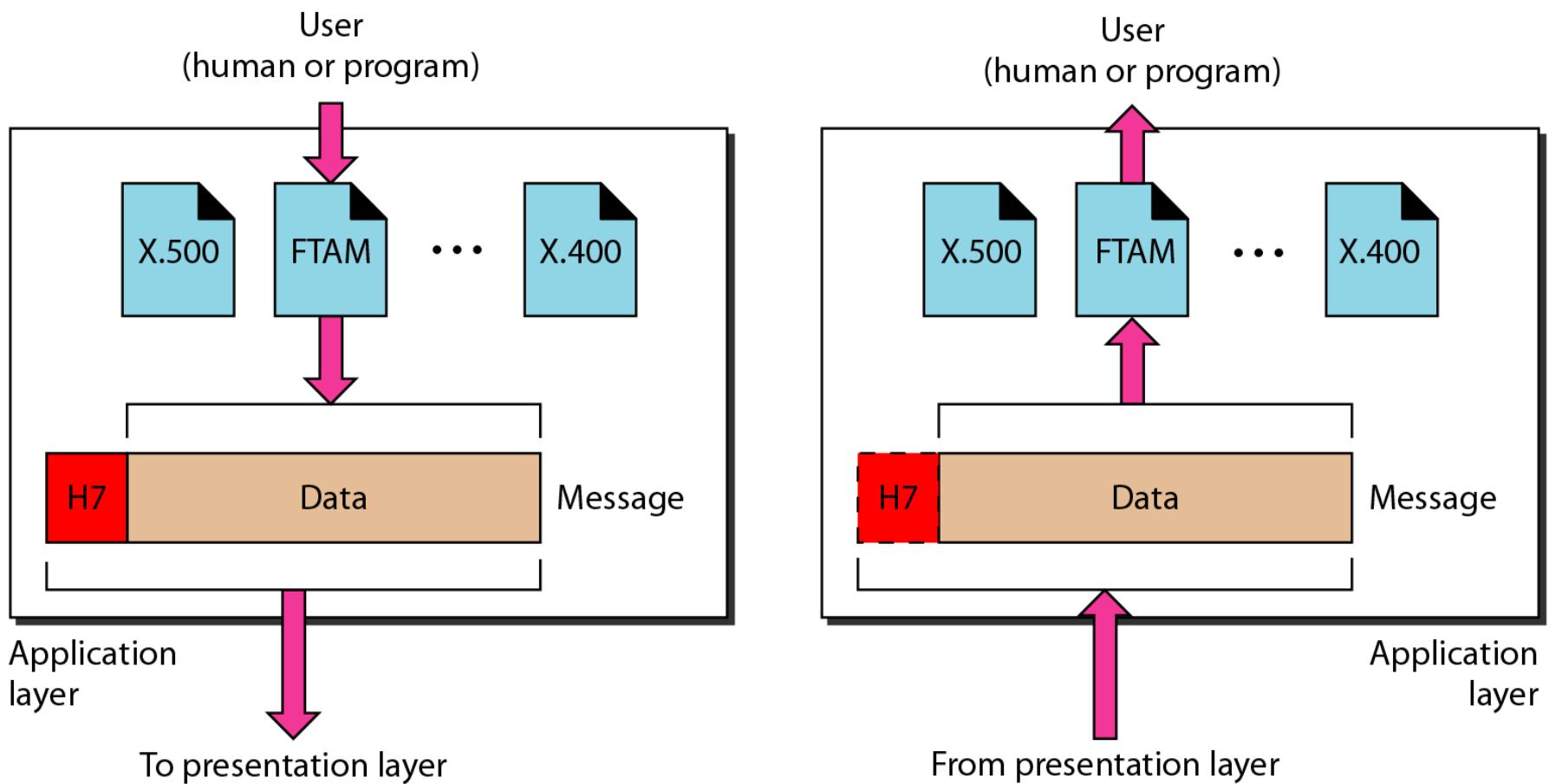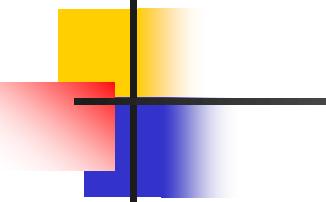To allow access to network resources

To translate, encrypt, and compress data

To establish, manage, and terminate sessions

To provide reliable process-to-process message delivery and error recovery

To move packets from source to destination; to provide internetworking

To organize bits into frames; to provide hop-to-hop delivery

To transmit bits over a medium; to provide mechanical and electrical specifications

Application

Presentation

Session

Transport

Network

Data link

Physical

Figure 2.15 *Summary of layers*

2-4 ADDRESSING

- Four levels of addresses are used in an internet employing the TCP/IP protocols:
    1. Physical (link) addresses
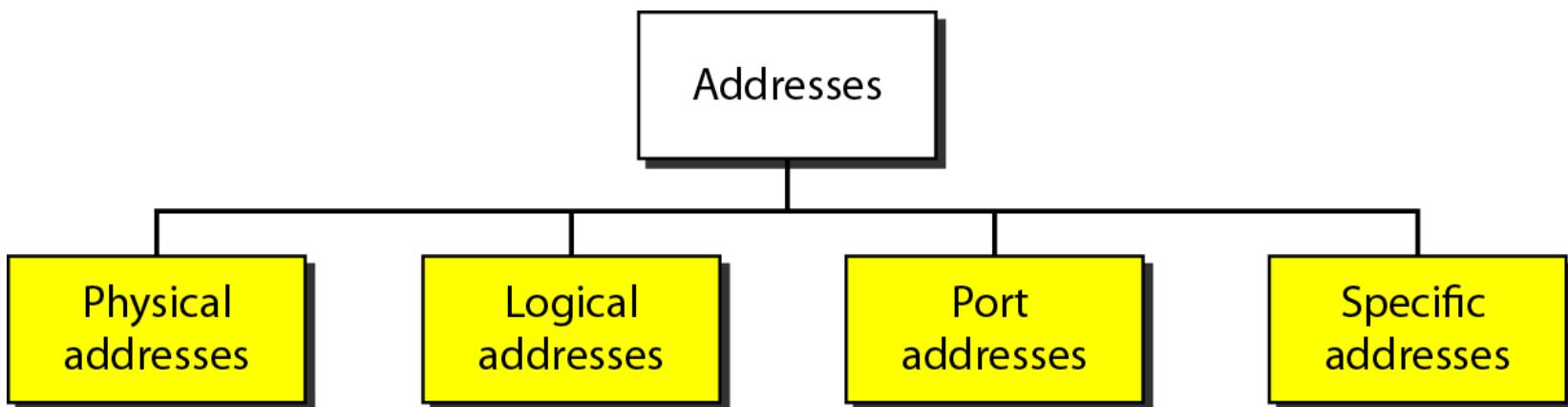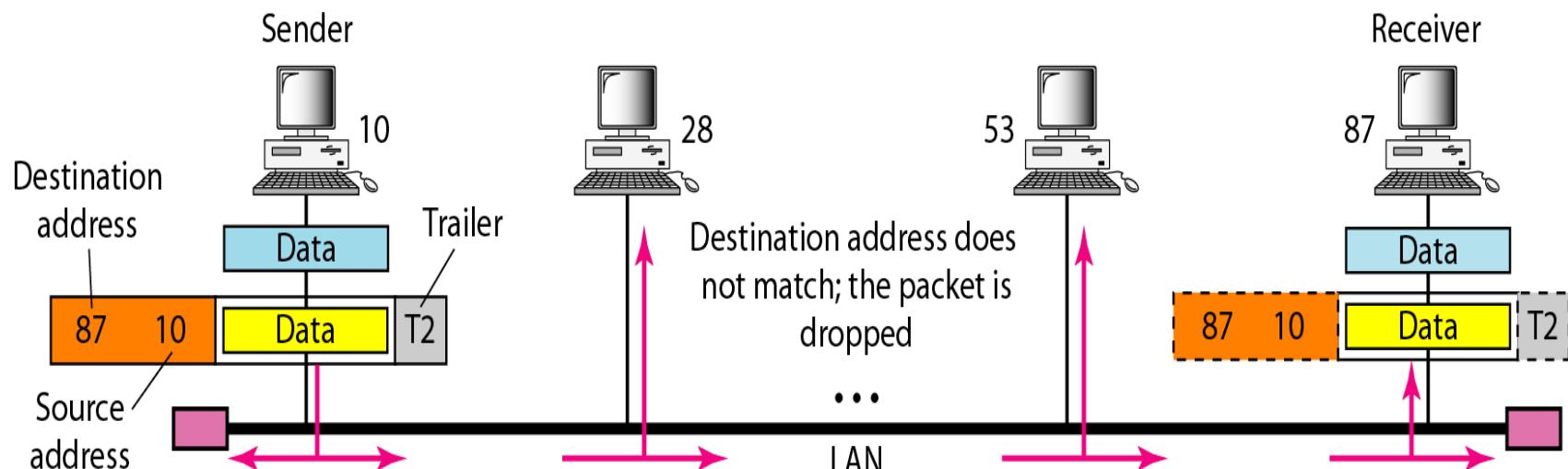   2. Logical (IP) addresses
    3. Port addresses
    4. Specific addresses

Figure 2.17 *Addresses in TCP/IP*

PHYSICAL ADDRESSES

- **Address of a node as defined by its LAN or WAN**
- Included in frame used by data link layer.
- Most local-area networks use a 48-bit (6-byte) physical address written as 12 hexadecimal digits.

- **Example:**

Figure 2.19 *Physical addresses*

LOGICAL ADDRESSES

- **Address for universal communication that are independent of underlying physical networks**.
- A universal addressing system is needed in which each host can be identified uniquely, regardless of the underlying physical network.

PORT ADDRESSES

- In the TCP/IP architecture, **the label assigned to a process** is called a port address.
- Port address in TCP/IP is 16 bits in length.

SPECIFIC ADDRESSES

- Some applications have user-friendly **addresses that are designed for that specific address.**

- Examples :
    - i. E-mail address
    - ii. Universal Resource Locator (URL)

- These addresses, however, **get changed to the corresponding port and logical addresses** by the sending computer.