



# TCS332 Fundamental of Information Security and Blockchain

B. Tech CSE III Semester

Instructor:

**Dr Mohammad Wazid**

**Professor, Department of CSE**

**Graphic Era (Deemed to be University), Dehradun, India**

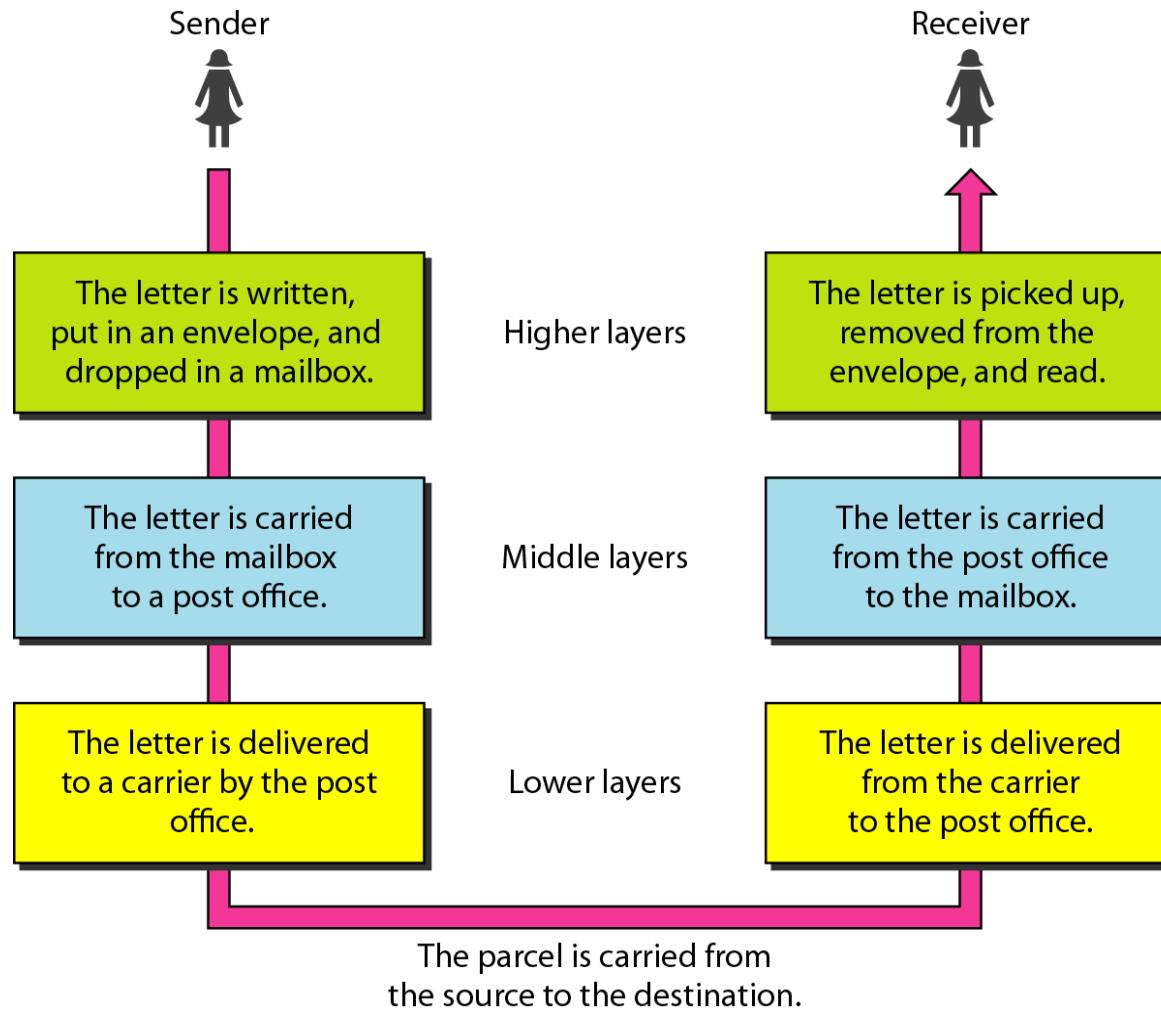
*Email: wazidkec2005@gmail.com*

*Homepage: <https://sites.google.com/site/mwazidiitih/home>*

# Transmission of data can be considered as a layered tasks

- We use the concept of **layers** in our daily life.
- For example, consider two friends who communicate through postal mail.
- The process of sending a letter to a friend would be complex if there were no services available from the post office.

## Figure 2.1 Tasks involved in sending a letter

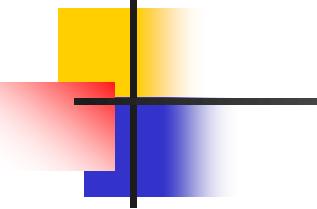


## 2-2 THE OSI MODEL

*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



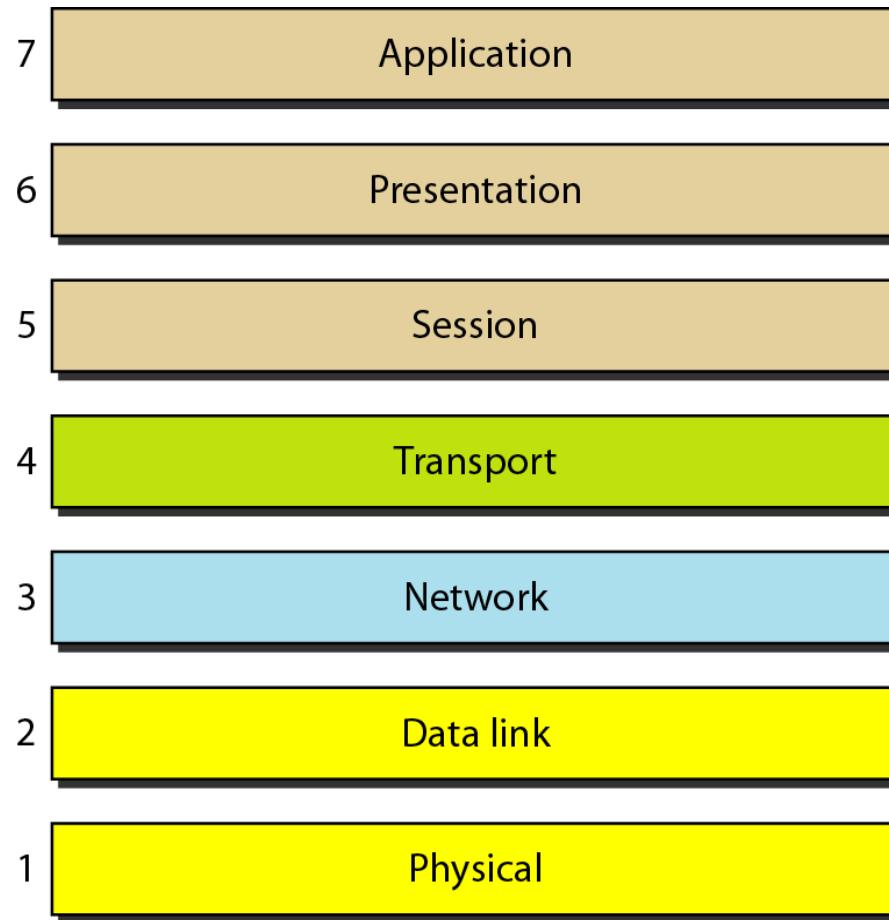
*Note*

---

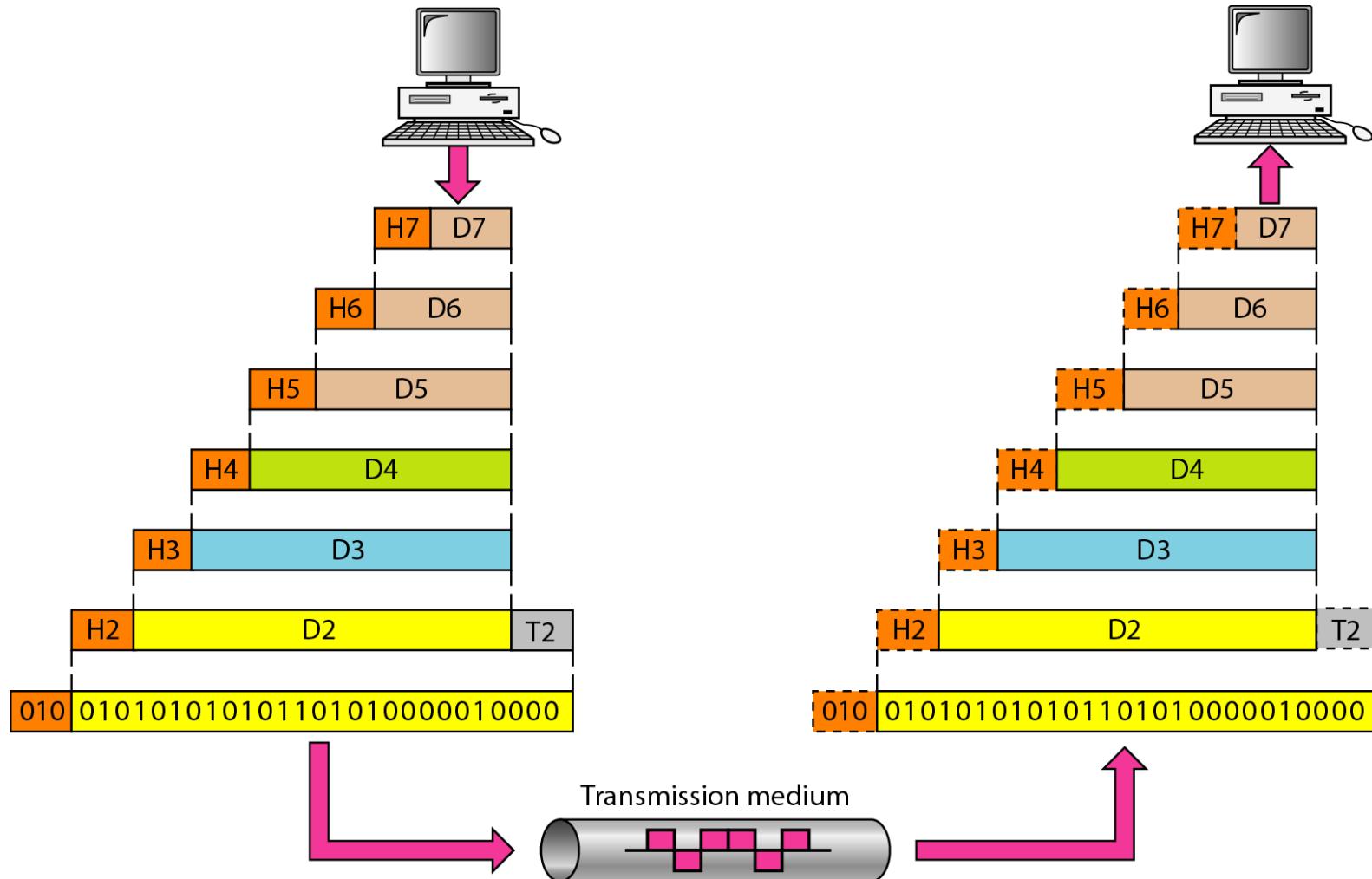
**ISO is the organization.  
OSI is the model.**

---

## 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

*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**

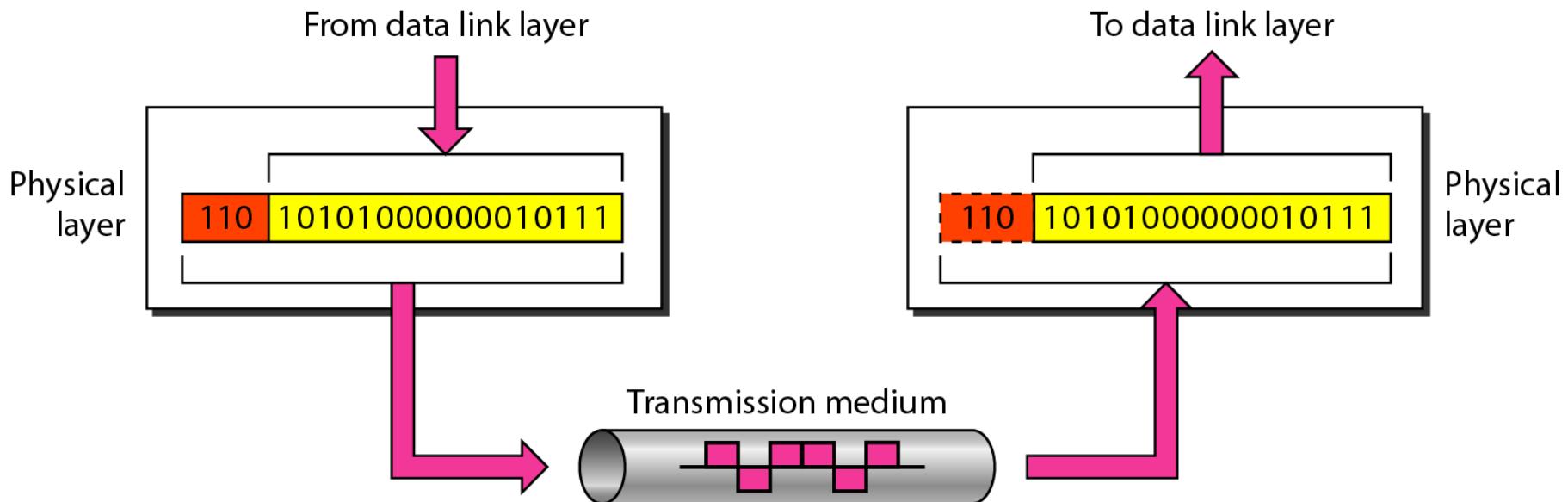
**Transport Layer**

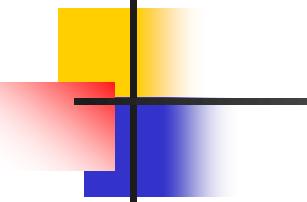
**Session Layer**

**Presentation Layer**

**Application Layer**

**Figure 2.5 Physical layer**

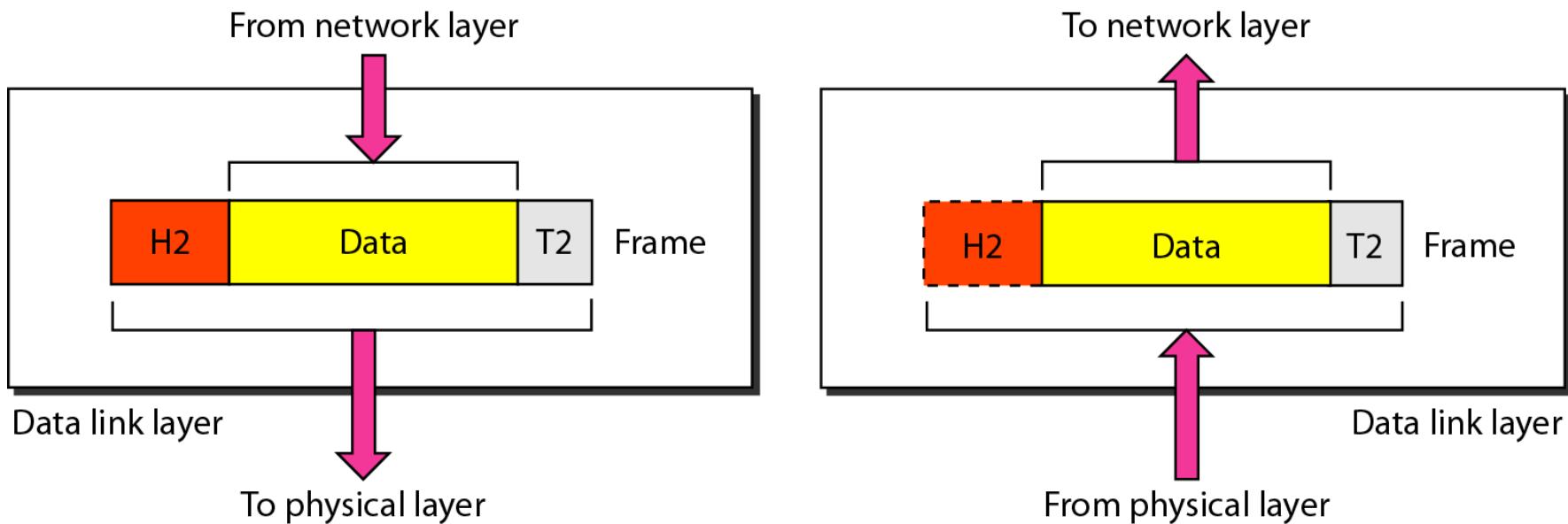


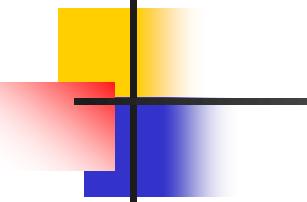


## **Note**

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

## Figure 2.6 Data link layer





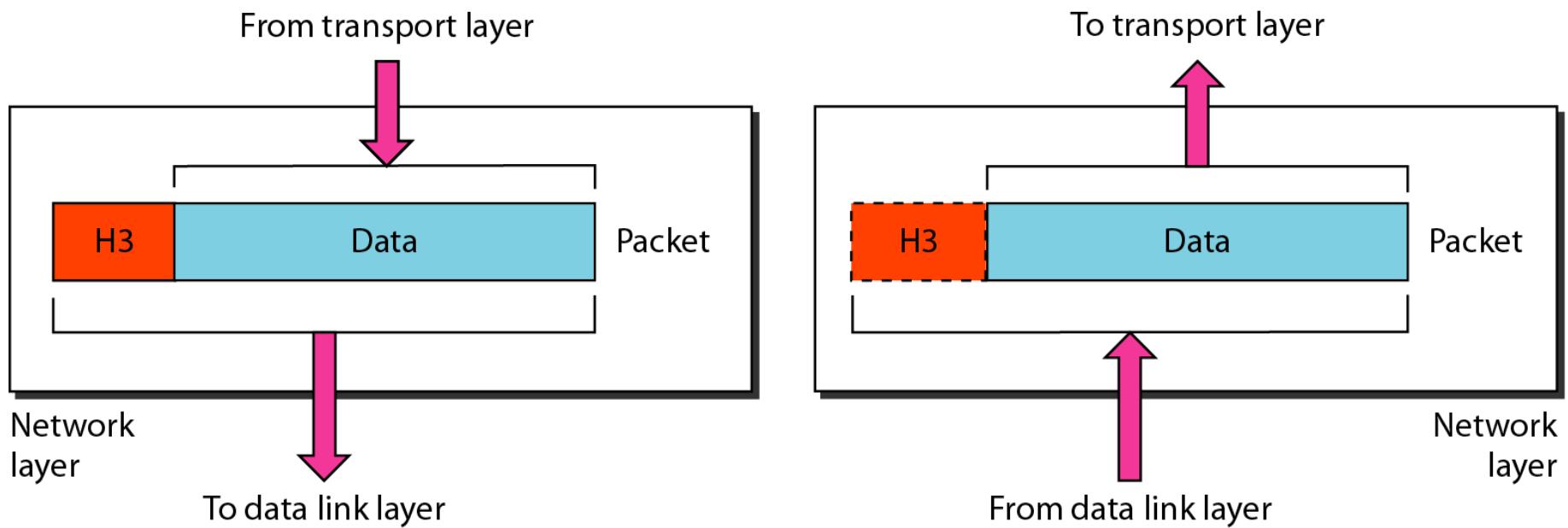
## ***Note***

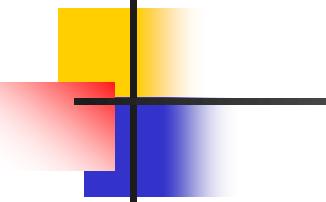
---

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

---

**Figure 2.8 Network layer**



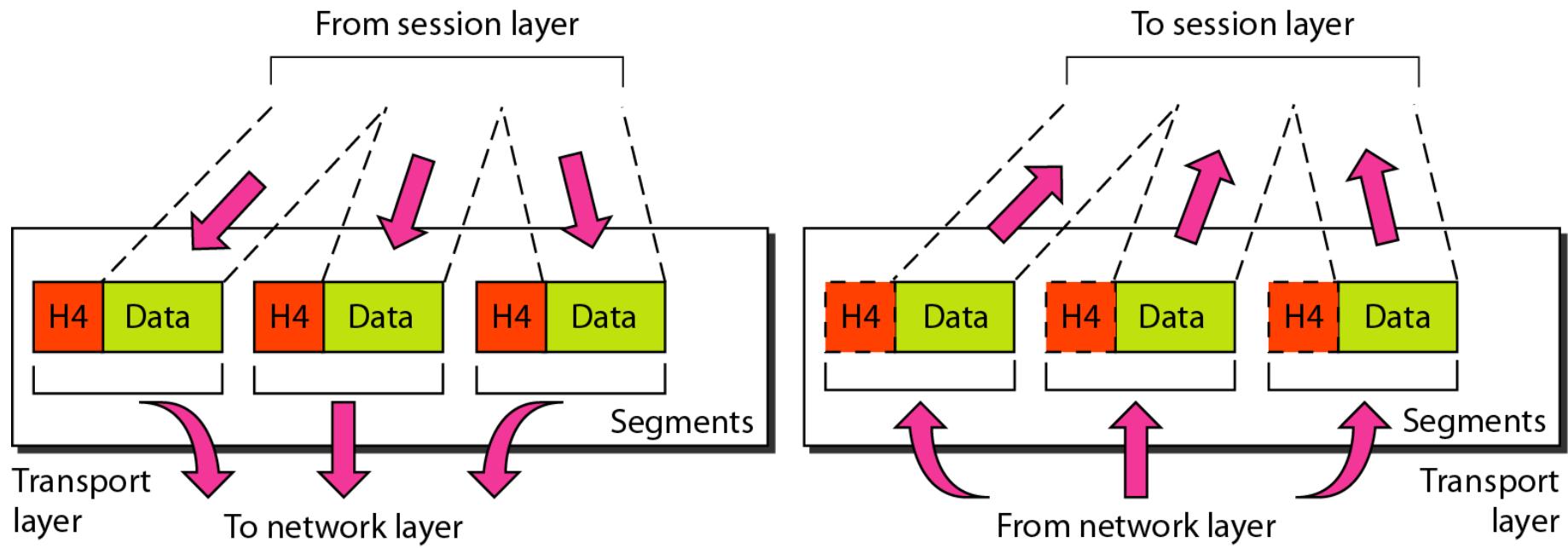


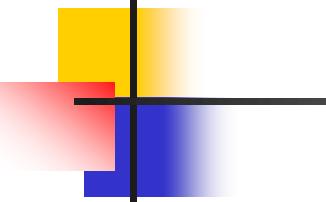
## **Note**

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

**Figure 2.10 Transport layer**

---



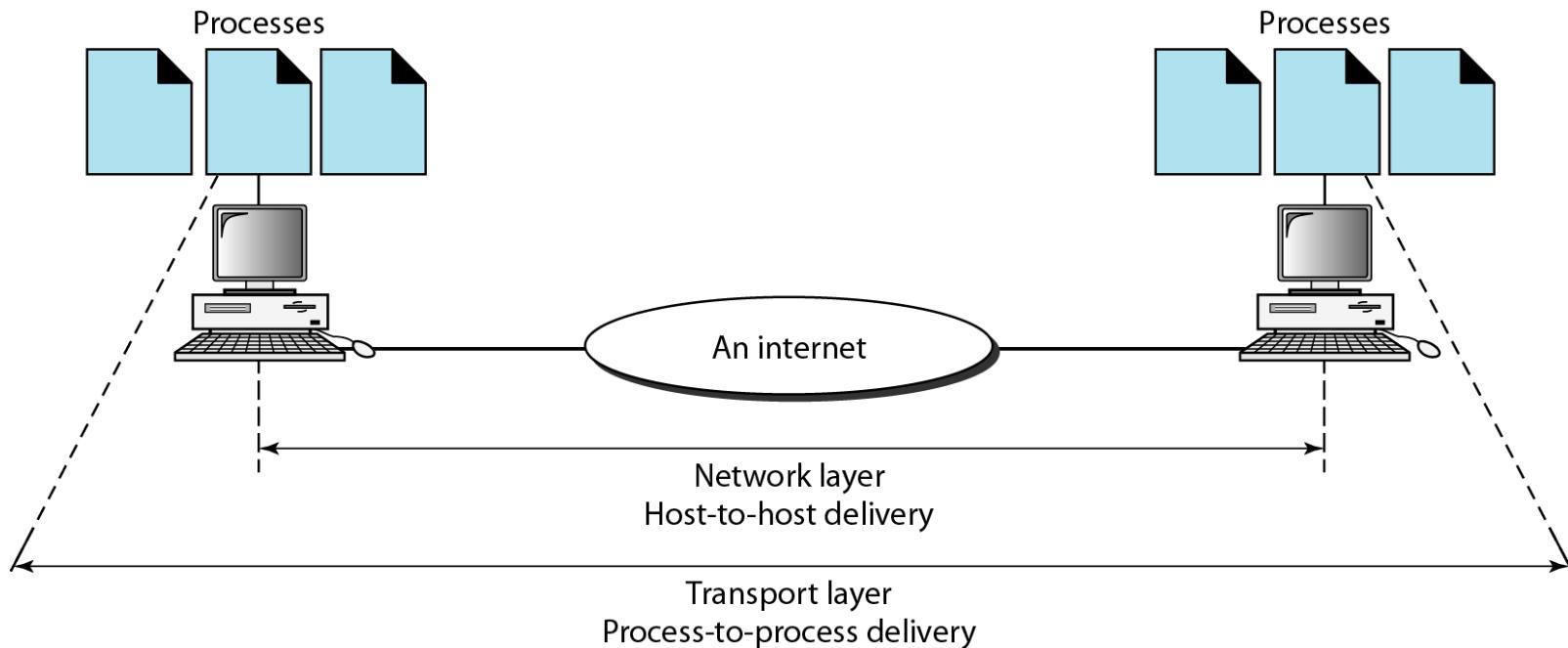


## **Note**

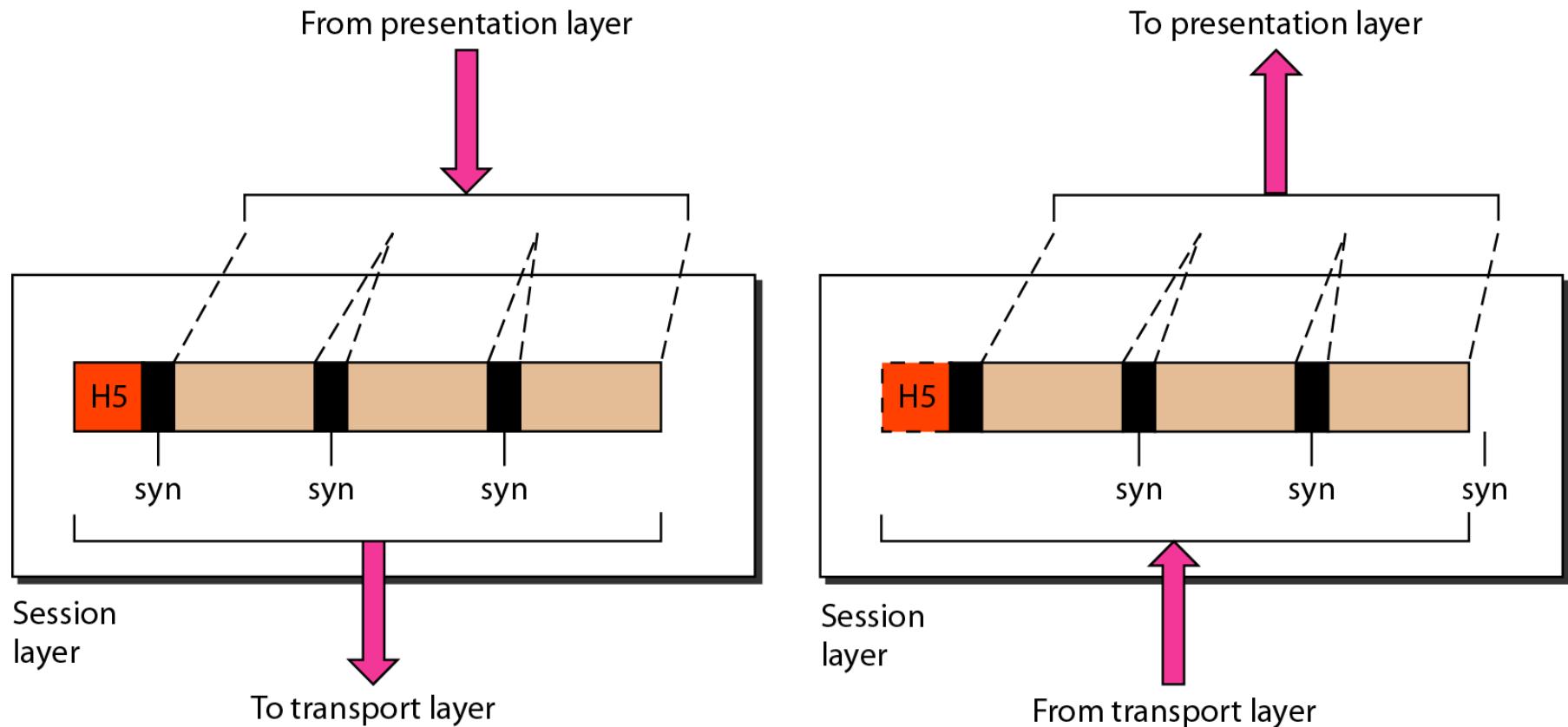
**The transport layer is responsible for the delivery  
of a message from one process to another.**

**Figure 2.11** *Reliable process-to-process delivery of a message*

---



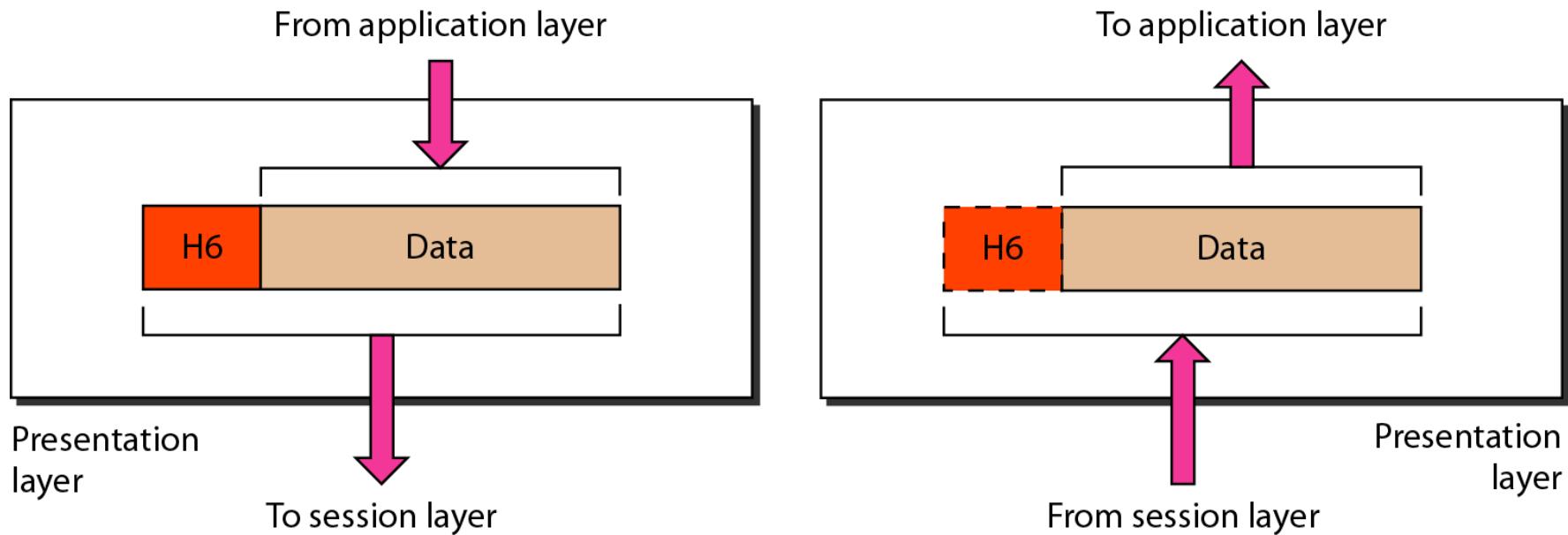
## Figure 2.12 Session layer

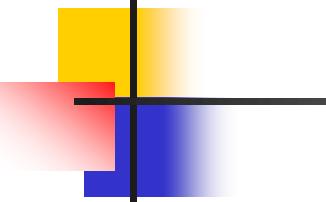


***Note***

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

**Figure 2.13** *Presentation layer*

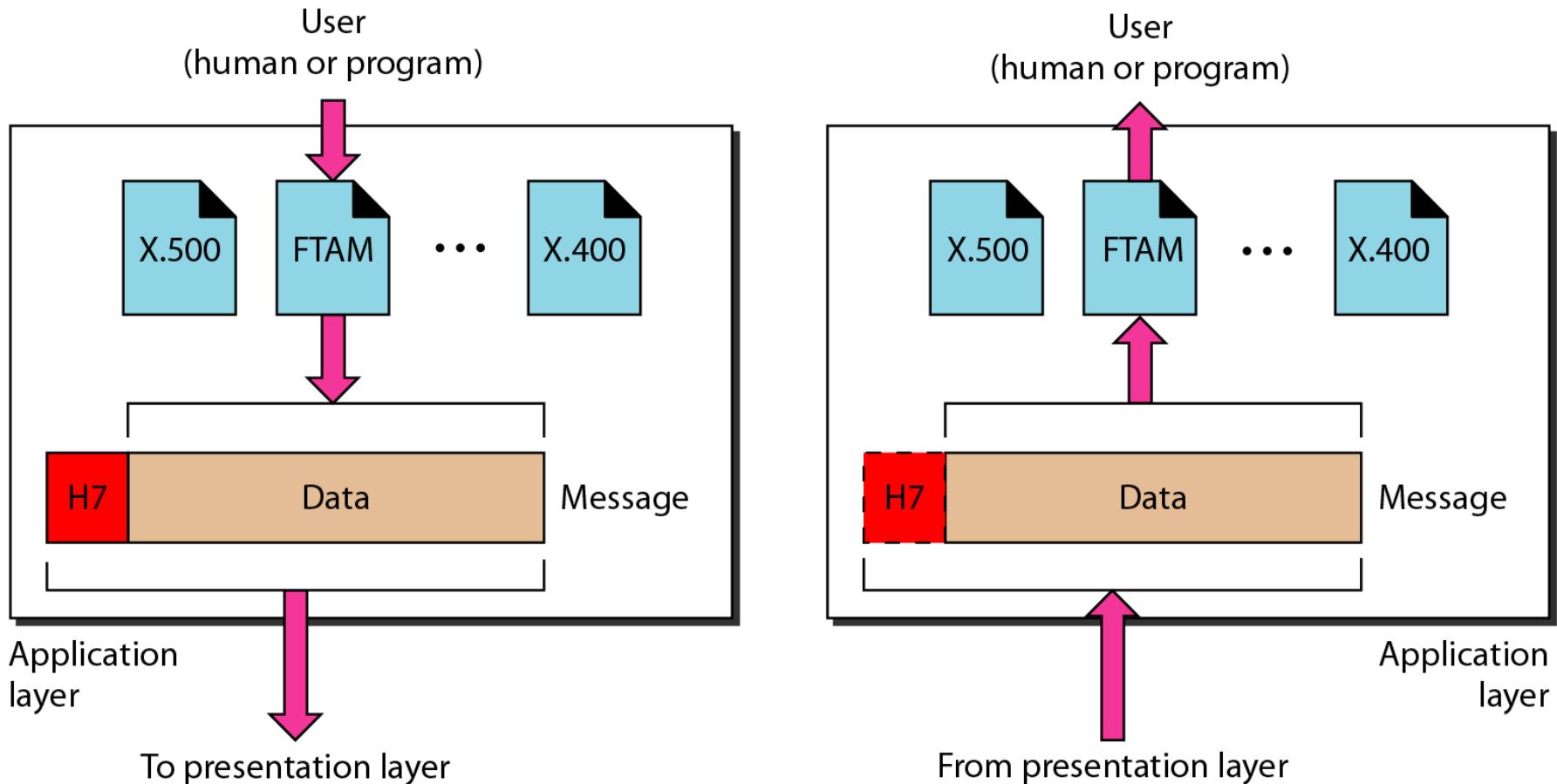


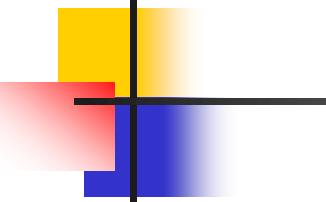


## **Note**

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

## Figure 2.14 Application layer



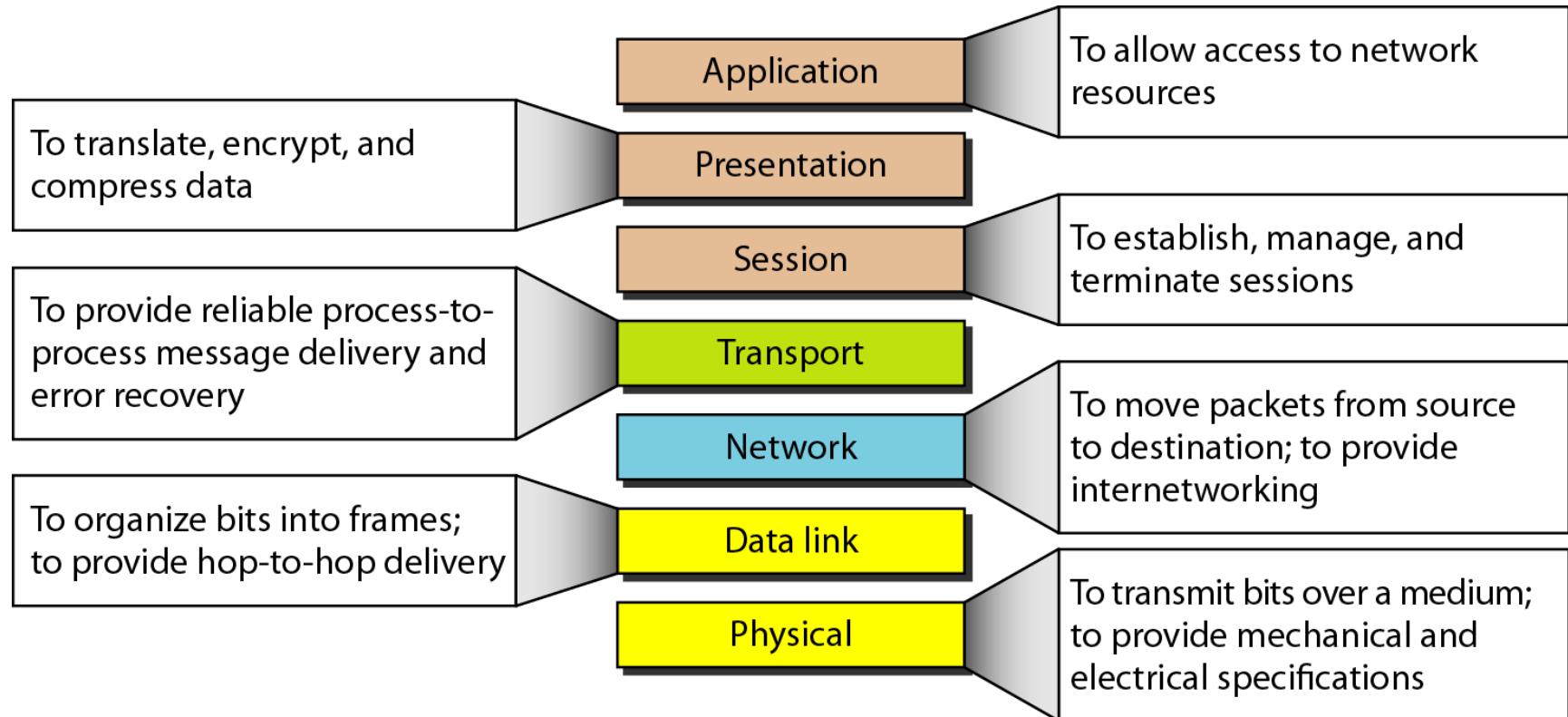


## *Note*

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

## 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:**

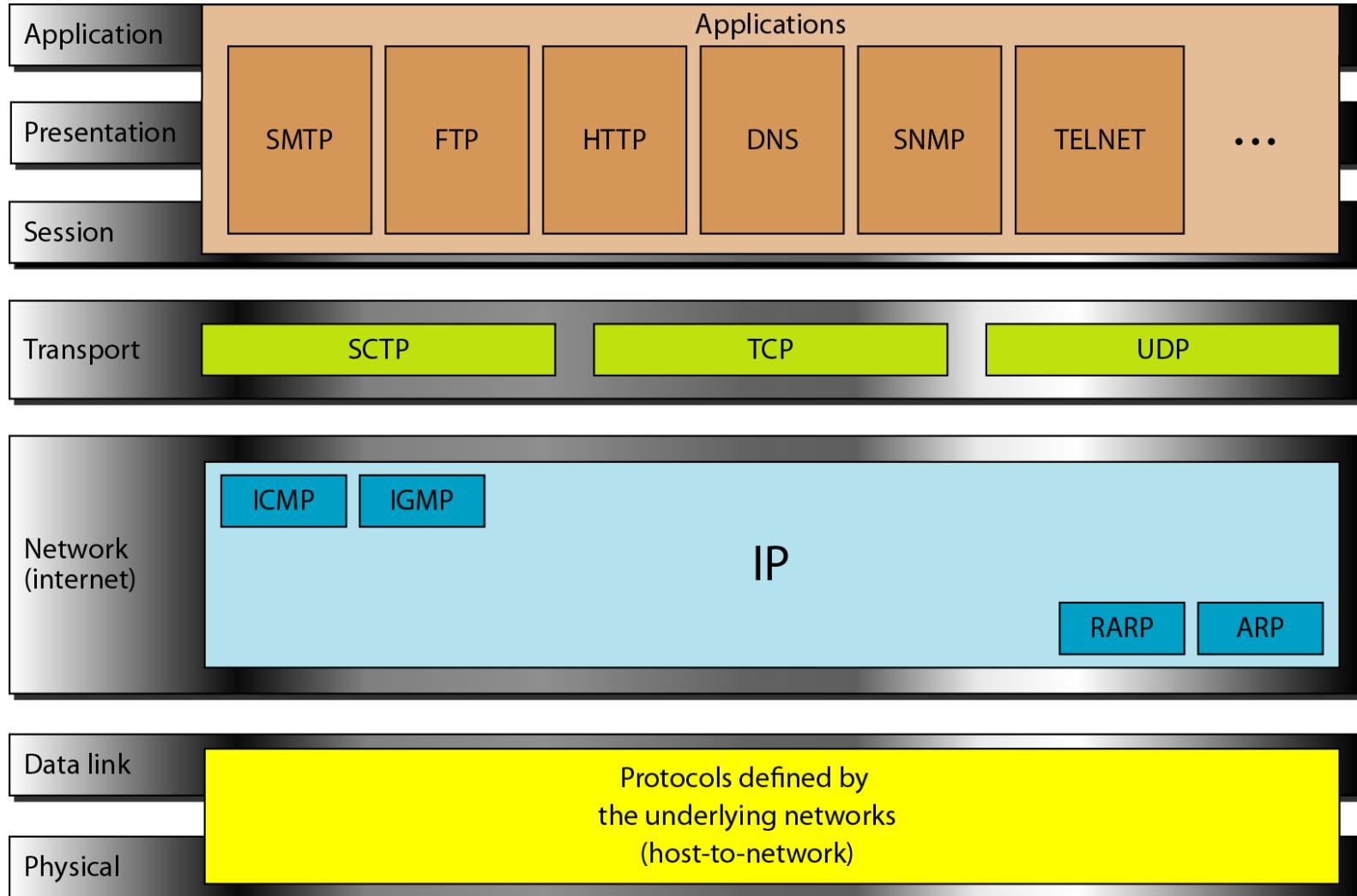
**Physical and Data Link Layers**

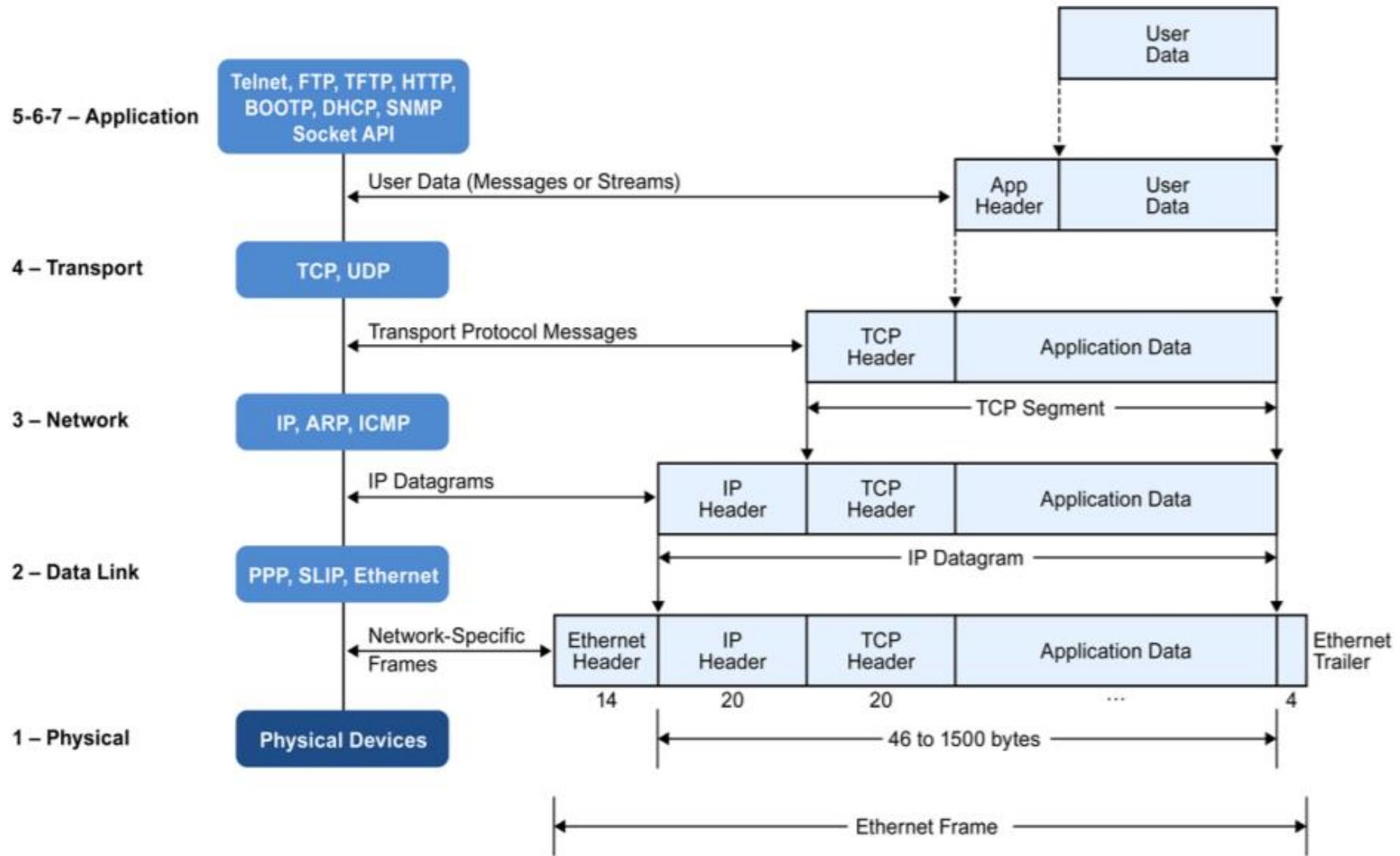
**Network Layer**

**Transport Layer**

**Application Layer**

## Figure 2.16 TCP/IP and OSI model





**Fig. Encapsulation of data in TCP/IP**

## 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

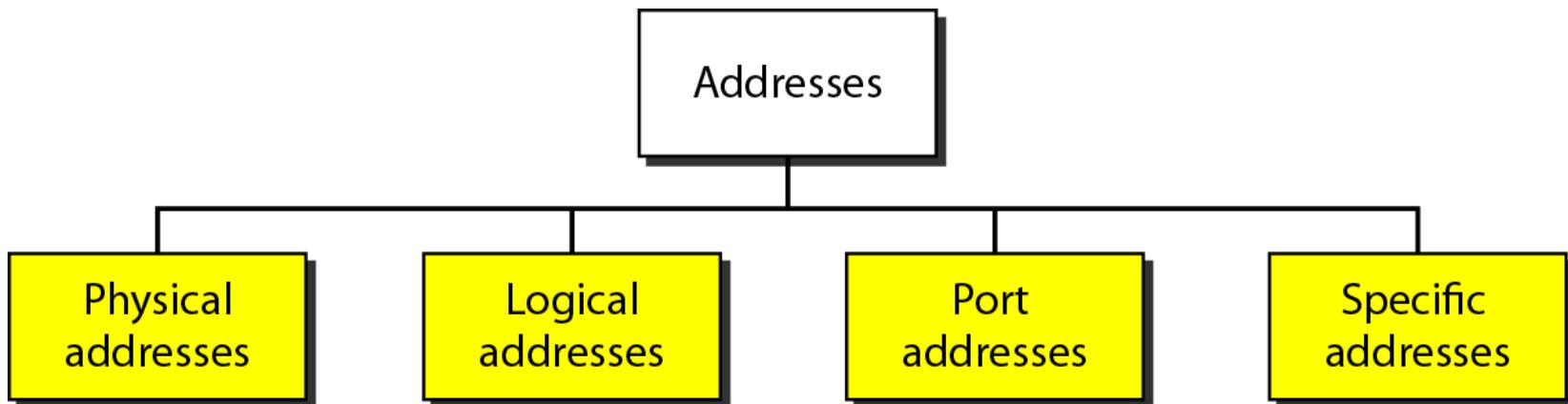
Logical Addresses

Port Addresses

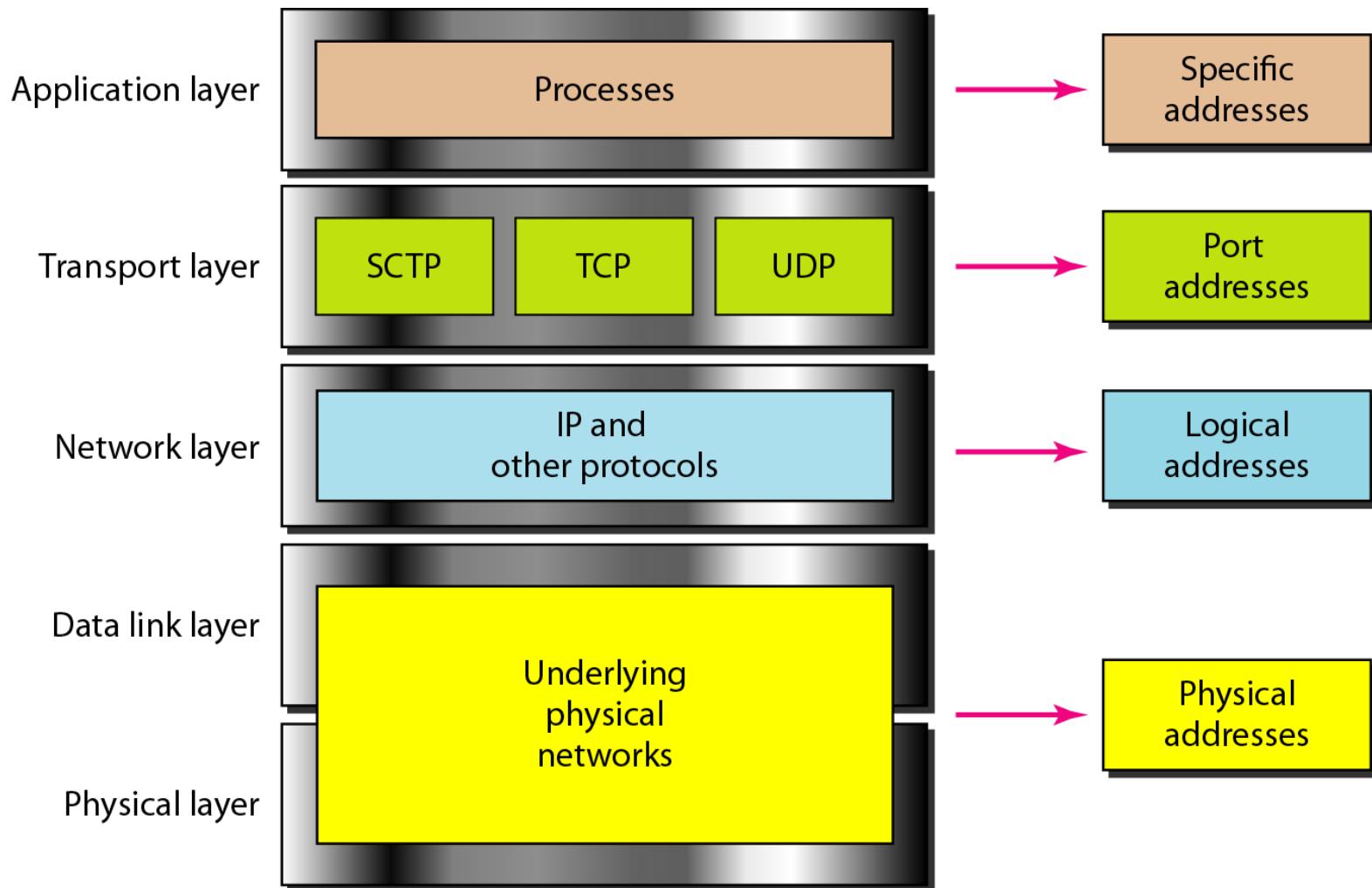
Specific Addresses

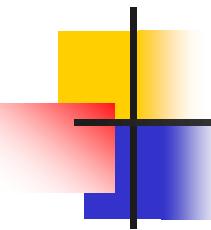
**Figure 2.17 Addresses in TCP/IP**

---



**Figure 2.18 Relationship of layers and addresses in TCP/IP**

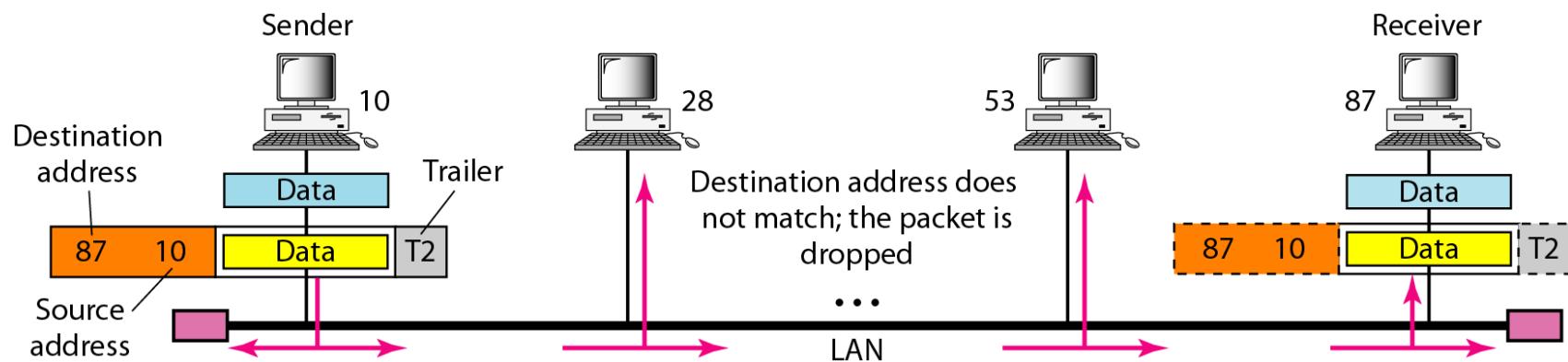


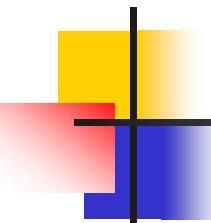


## *Example 2.1*

*In Figure 2.19 a node with physical address 10 sends a frame to a node with physical address 87. The two nodes are connected by a link (bus topology LAN). As the figure shows, the computer with physical address 10 is the sender, and the computer with physical address 87 is the receiver.*

## Figure 2.19 Physical addresses



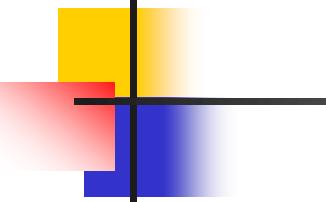


## *Example 2.2*

*Most local-area networks use a **48-bit** (6-byte) physical address written as 12 hexadecimal digits; every byte (2 hexadecimal digits) is separated by a colon, as shown below:*

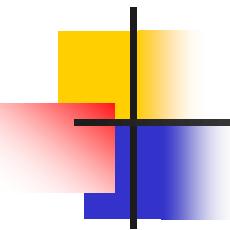
**07:01:02:01:2C:4B**

**A 6-byte (12 hexadecimal digits) physical address.**



## **Note**

**The physical addresses will change from hop to hop,  
but the logical addresses usually remain the same.**



## *Example 2.5*

*A port address is a 16-bit address represented by one decimal number as shown.*

**753**

**A 16-bit port address represented  
as one single number.**

<b>Port no.</b>	<b>Transport Layer protocol</b>	<b>Application layer protocol and service</b>
20	TCP	<b>FTP Protocol (data)</b> - port for transferring FTP data
21	TCP	<b>FTP Protocol (control)</b> - port for FTP commands and flow control
22	TCP or UDP	<b>SSH (Secure Shell)</b> - used for secure logins, file transfer
23	TCP or UDP	<b>Telnet protocol</b> - unencrypted text communication
25	TCP or UDP	<b>SMTP (Simple Mail Transport Protocol)</b> - used for email routing between email servers
80	TCP	<b>HTTP (Hypertext Transfer Protocol)</b> - used for transferring web pages
109	TCP	<b>POP, Post Office Protocol, version 2</b>
110	TCP	<b>POP3 (Post Office Protocol version 3)</b> - used for retrieving emails
123	UDP	<b>NTP (Network Time Protocol)</b> - used for time synchronization
443	TCP	<b>HTTPS</b> - HTTP Protocol over TLS/SSL (used for transferring web pages securely using encryption)

# References

**Data Communications And Networking (SIE) by Behrouz Forouzan**