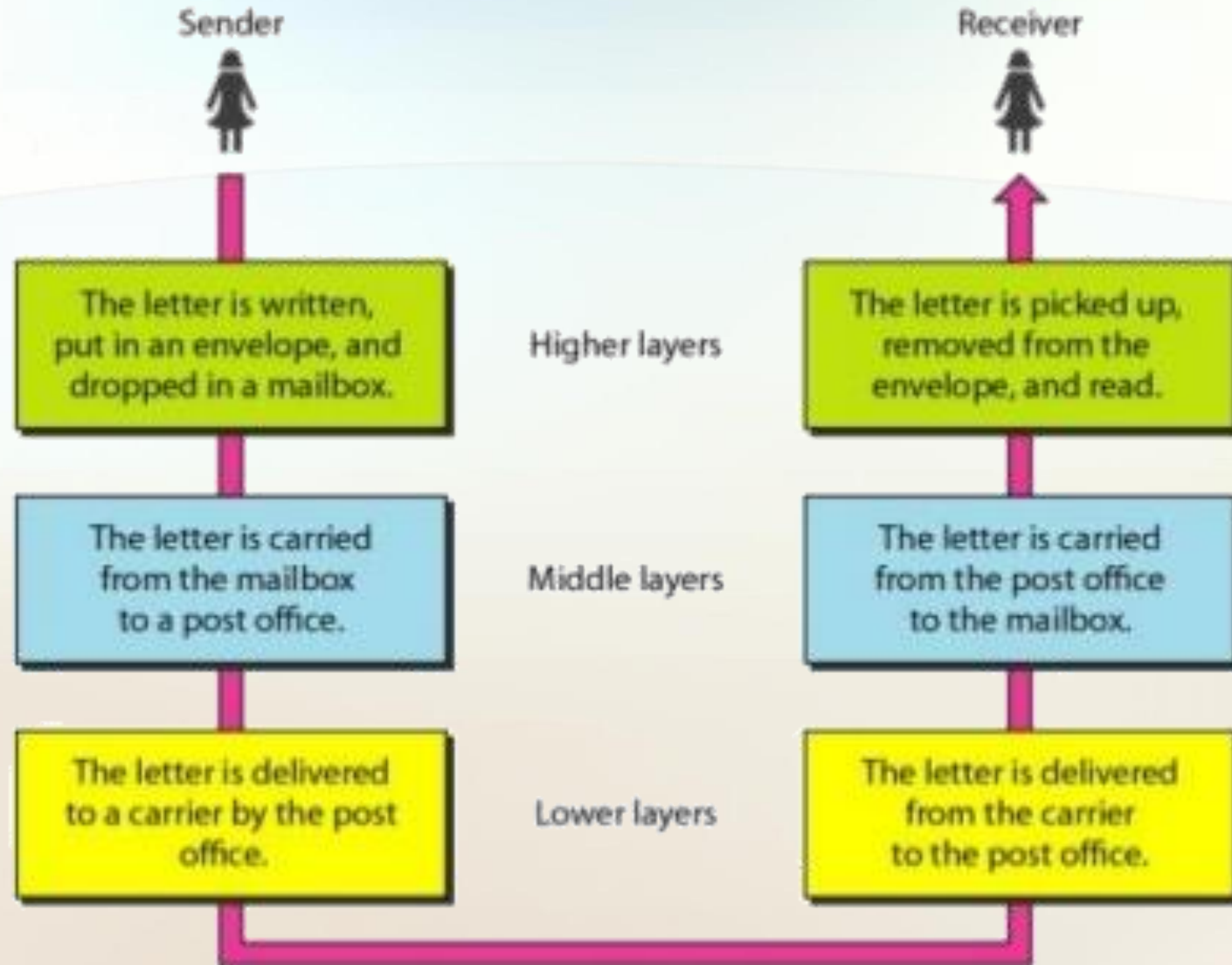


Network Models



- Network is combination of hardware and software .
- Hardware consists of the physical equipment .
- Software consists of instruction sets
- Higher levels & low levels
- Sending an e-mail.

LAYERED TASKS

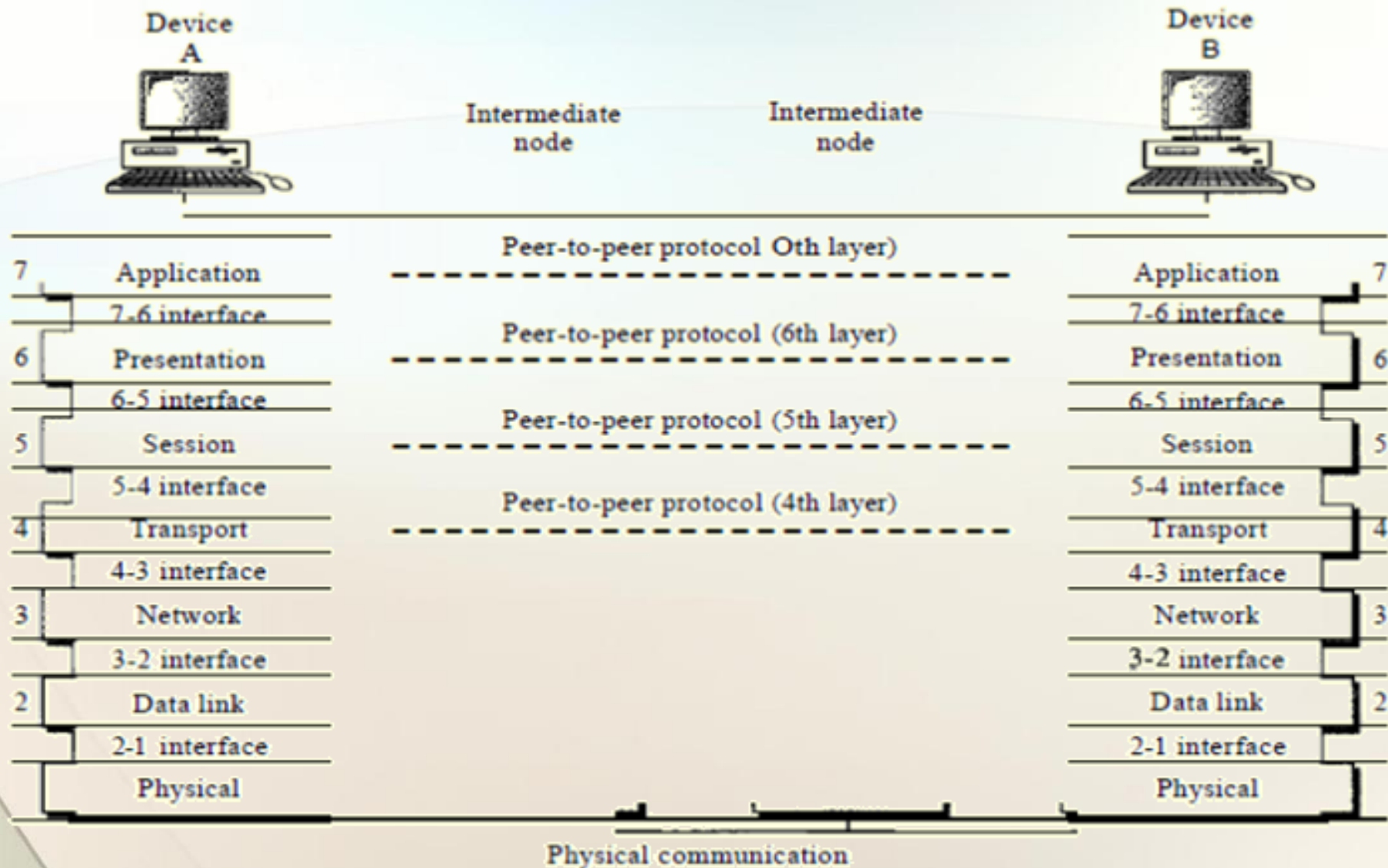


Open Systems Interconnection OSI

- Introduced in the late 1970s by ISO
- How to facilitate communication
- OSI is model for understanding and designing a network
 - ✓ Flexible network
 - ✓ Robust network
 - ✓ Interoperable network

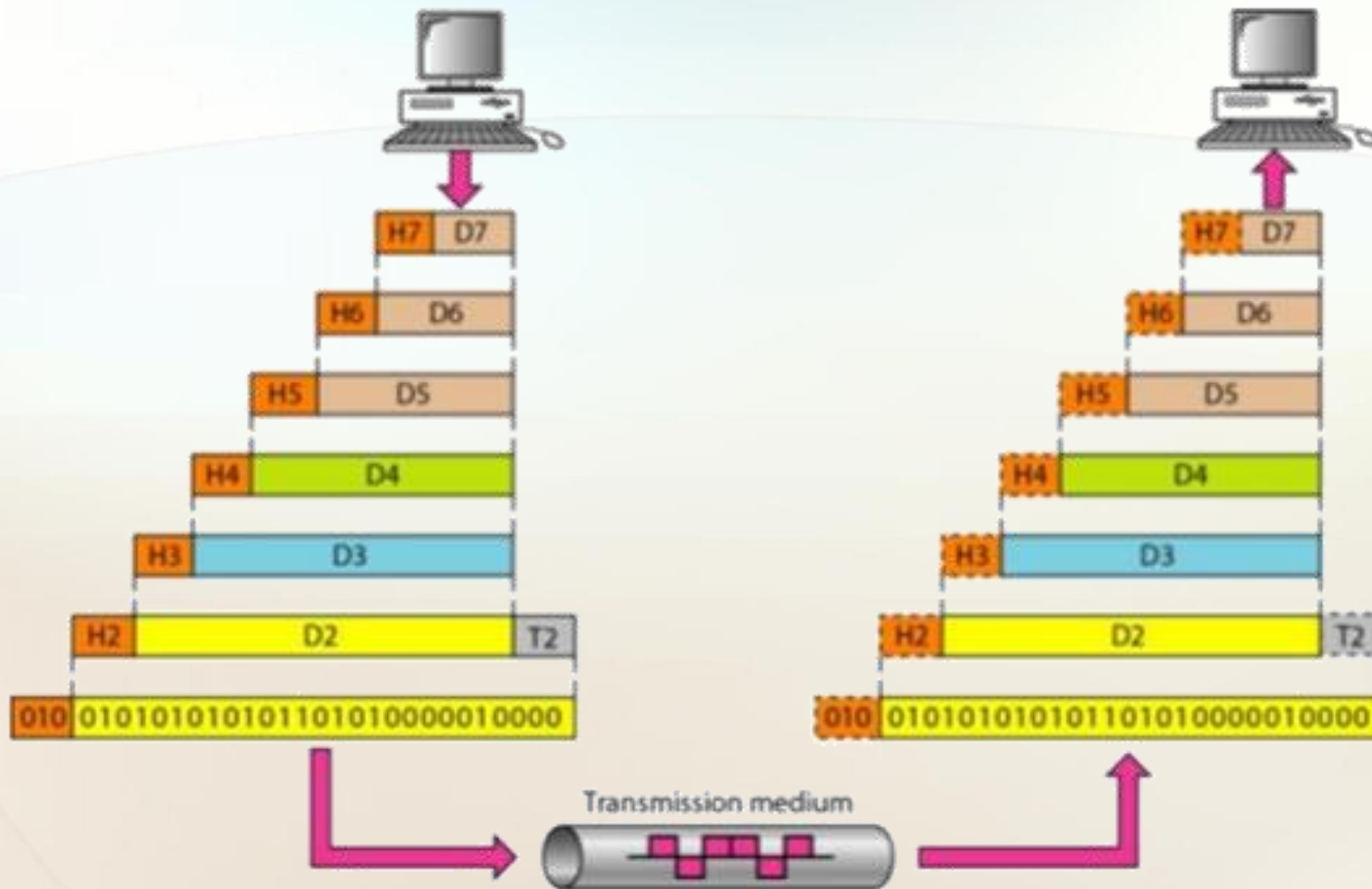
- OSI is layered framework for the design of network systems
- Consists of seven layers
 - ✓ Application layer
 - ✓ Presentation layer
 - ✓ Session layer
 - ✓ Transport layer
 - ✓ Network layer
 - ✓ Data link layer
 - ✓ Physical layer

Peer – to - Peer

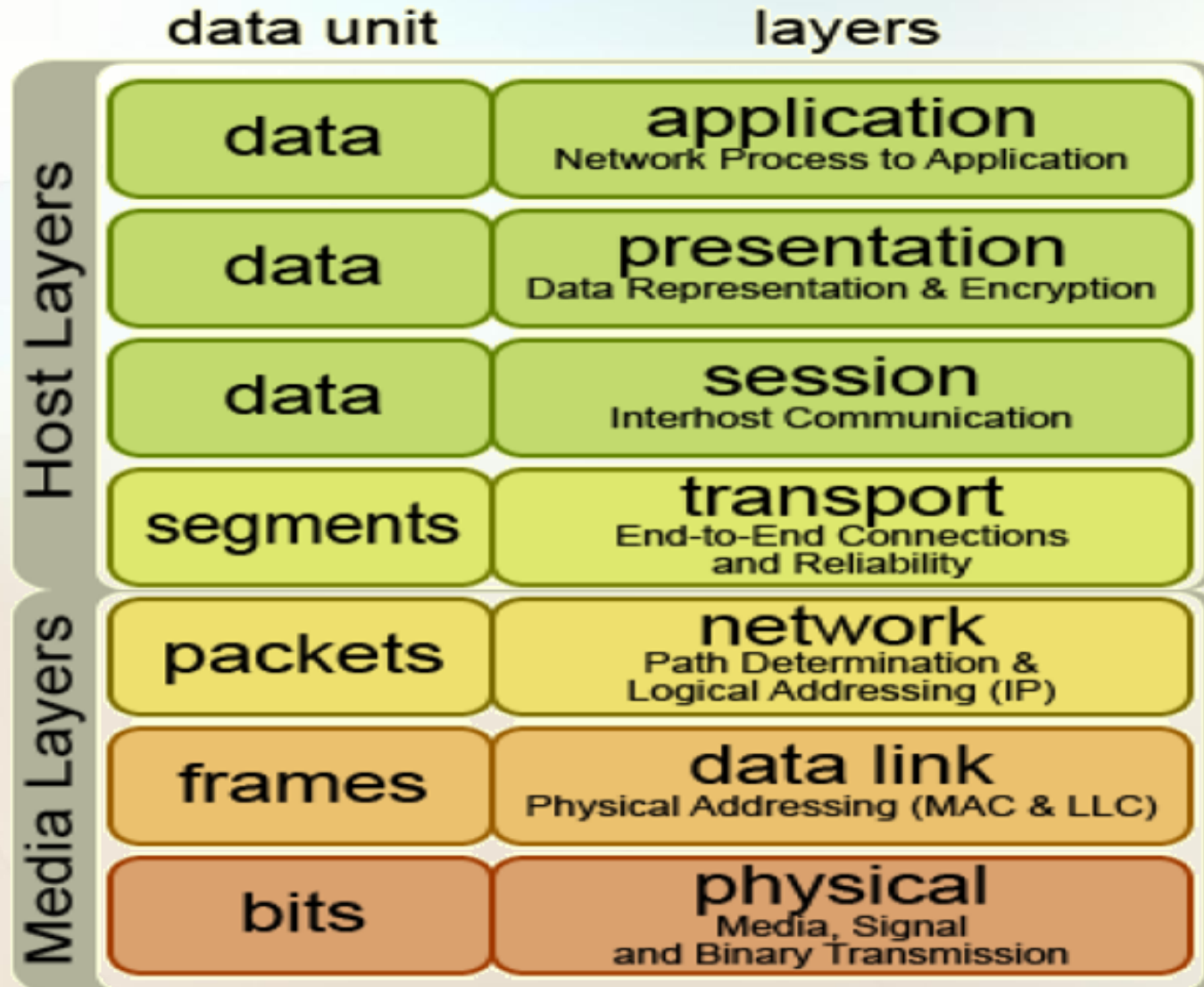


- layer defines a family of functions
- Each layer in the sending device adds its own information
- Interfaces Between Layers ?
- Encapsulation ?

An exchange using the OSI model



Layers in the OSI Model

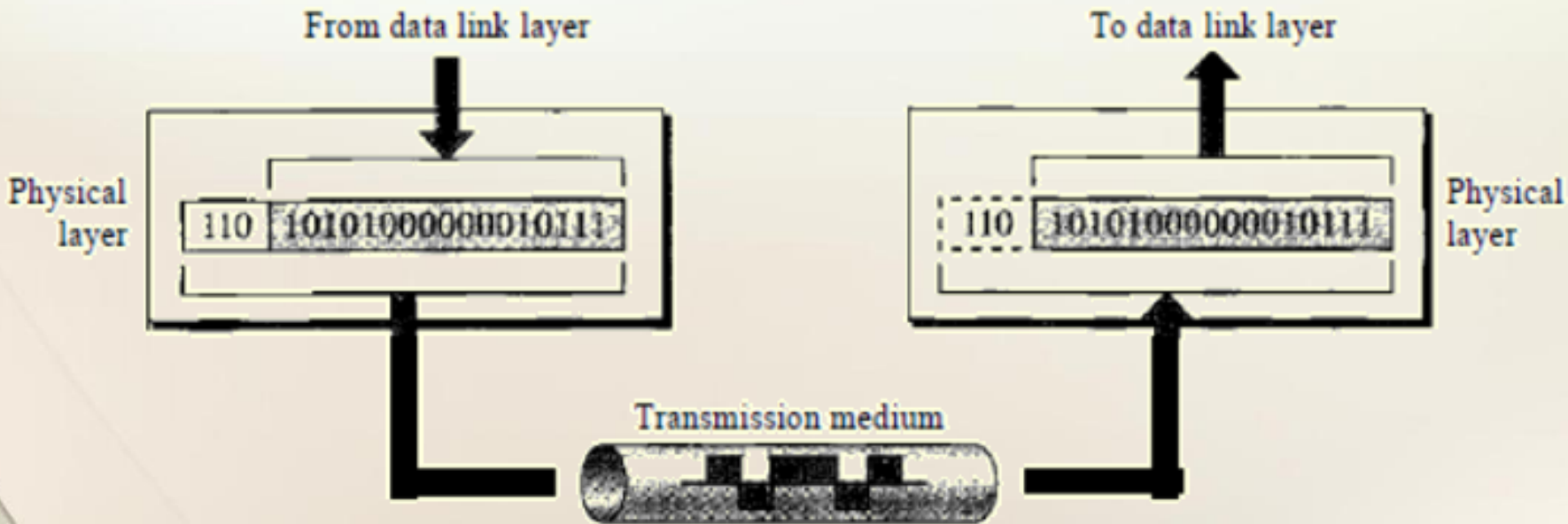


❖ Physical Layer

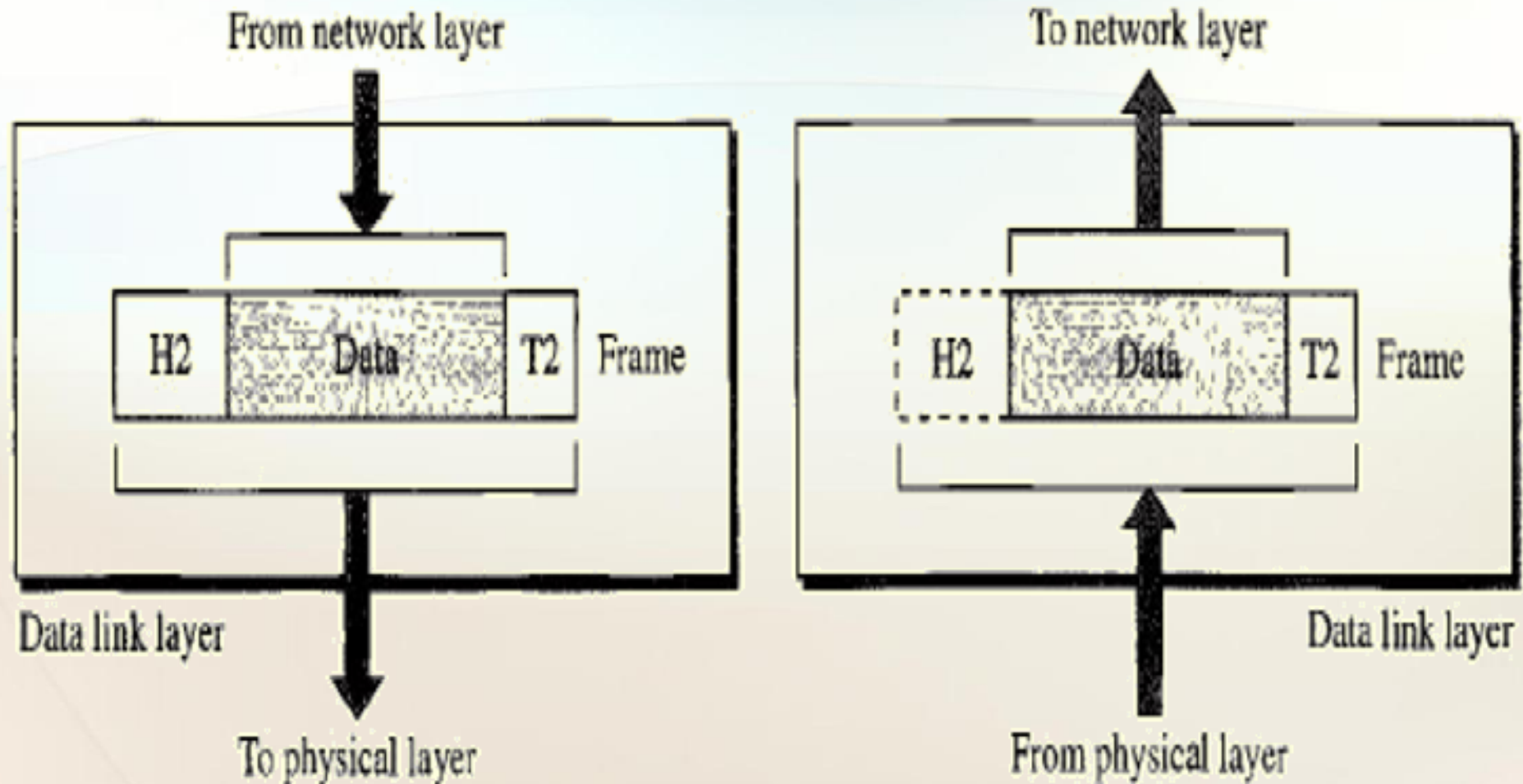
- Coordinates function to carry bit stream over link
- Deals with the mechanical and electrical
- Defines the procedures and functions

- Physical characteristics of interfaces and medium : define
 - ✓ characteristics of the interface between device and links
 - ✓ Type of transmission medium
- Representation of bits : encode bits to signals
- Data rate : how long bit lasts

- Synchronization of bits ?
- Line configuration : type of connection?
- Physical topology ?
- Transmission mode: data flow ?

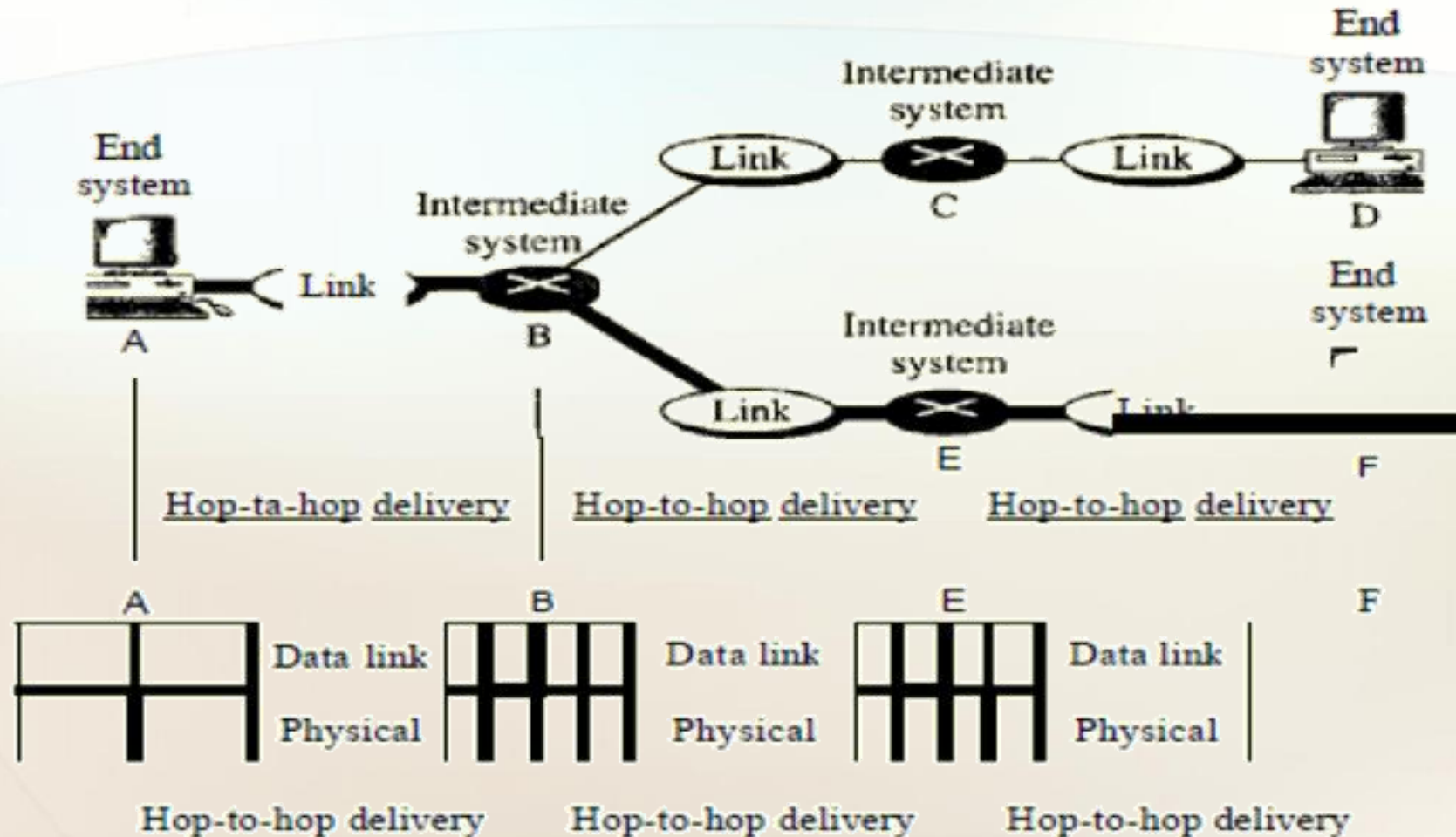


❖ Data Link Layer



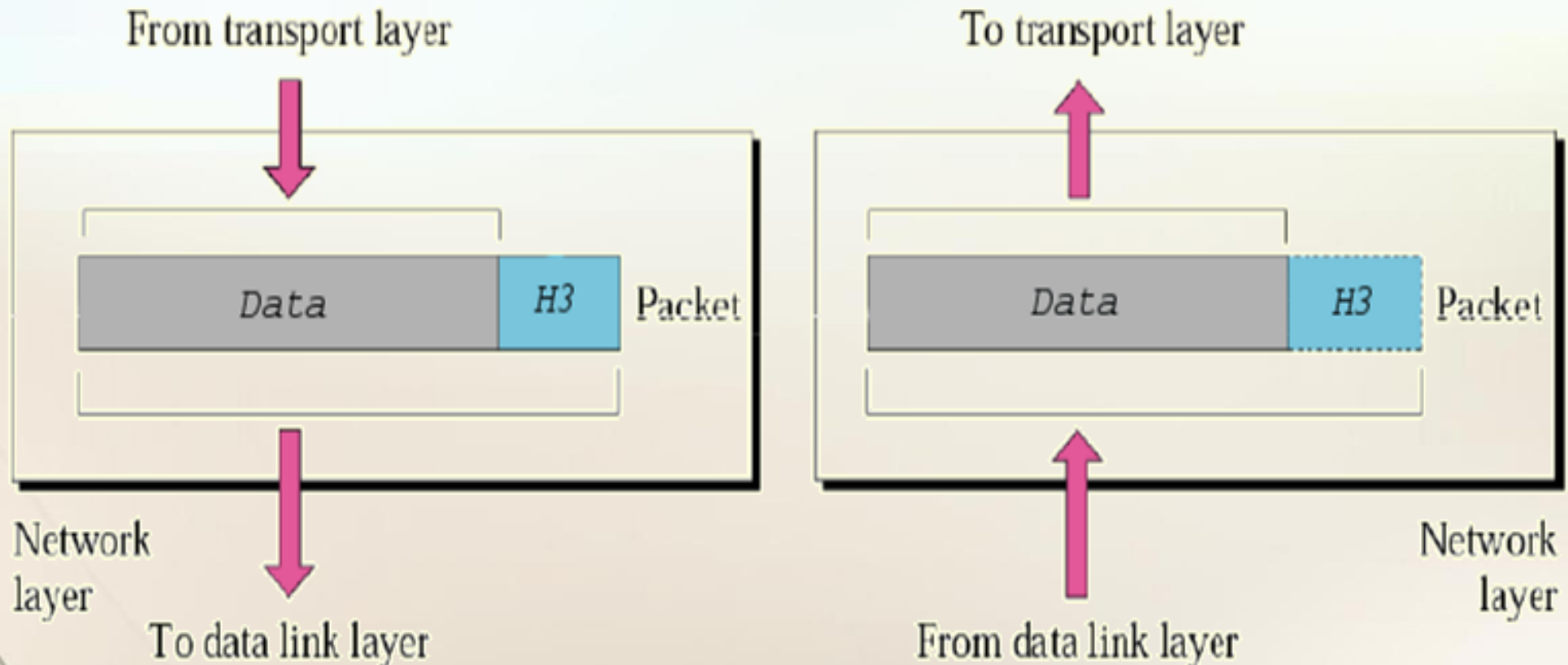
- Framing : divides the stream of bits received into manageable data units
- Physical addressing
- Flow control : when data at receiver less than data that sent
- Error control :
 - ✓ When loss or duplicated frames
 - ✓ Achieved through a trailer

- Access control : when two devices connected to the same link ?

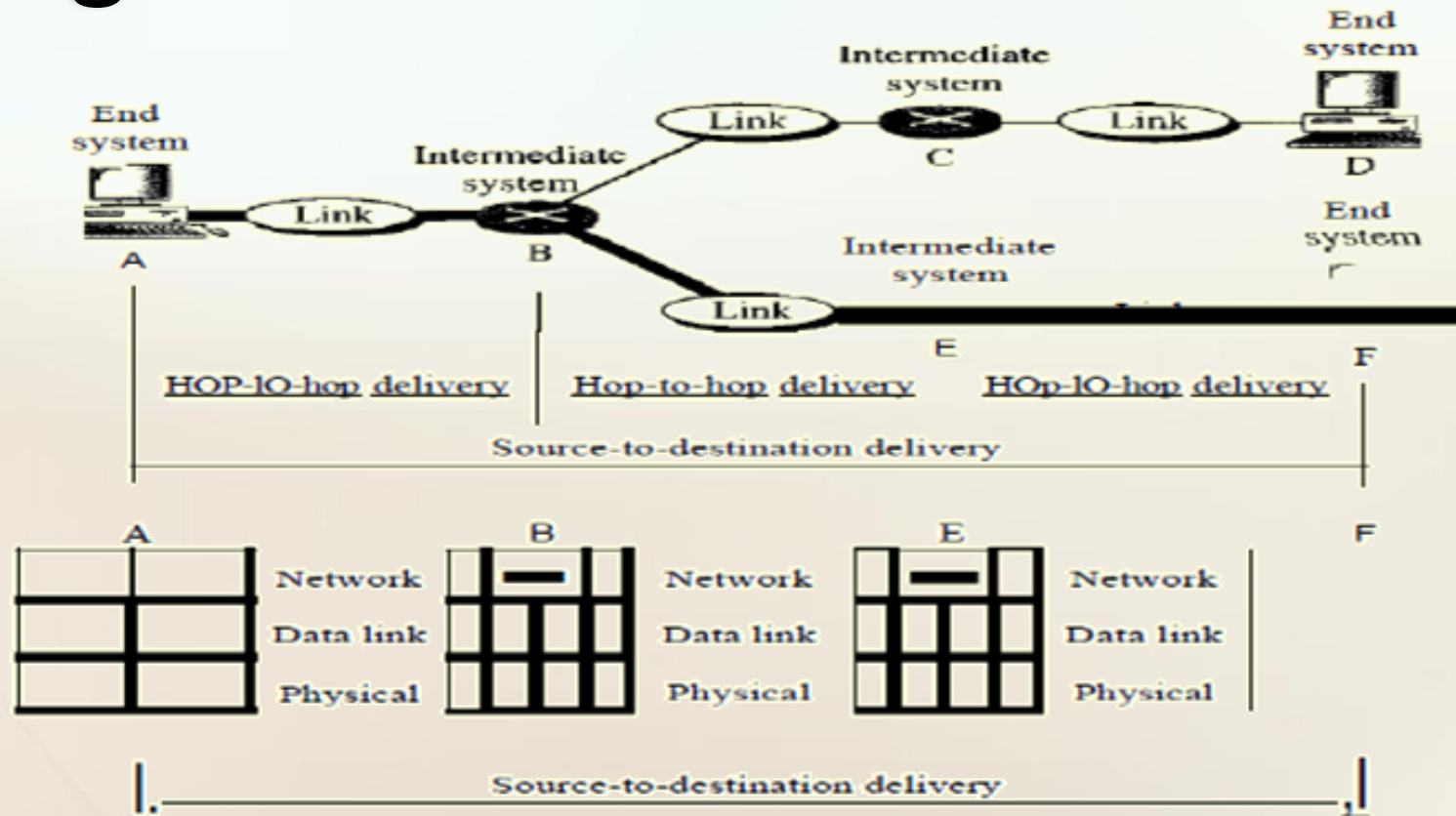


❖ Network Layer

- Responsible for the source-to-destination delivery of a packet

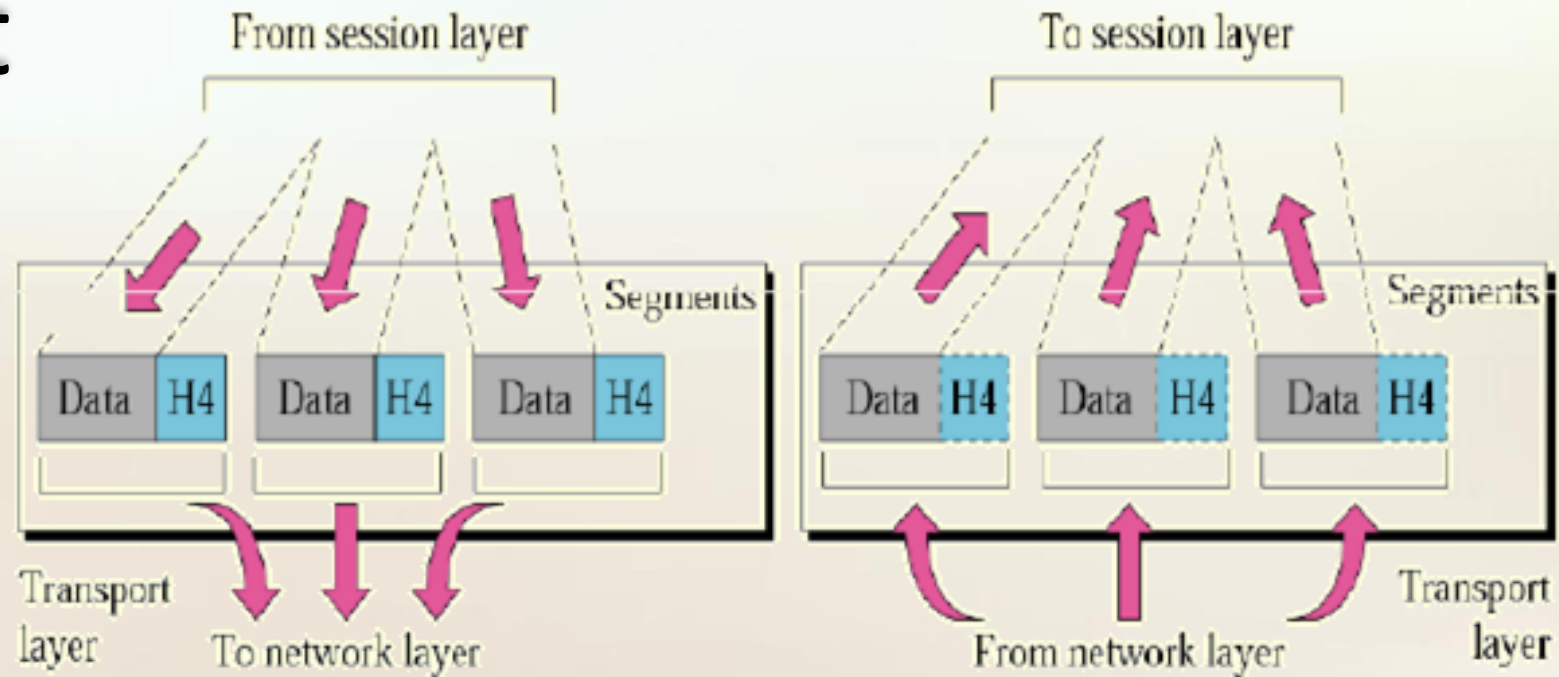


- Logical addressing
 - ✓ logical addresses of the sender and receiver
- Routing



❖ Transport Layer

- Responsible for process-to-process delivery of the entire message
- A process is an application program running on a host

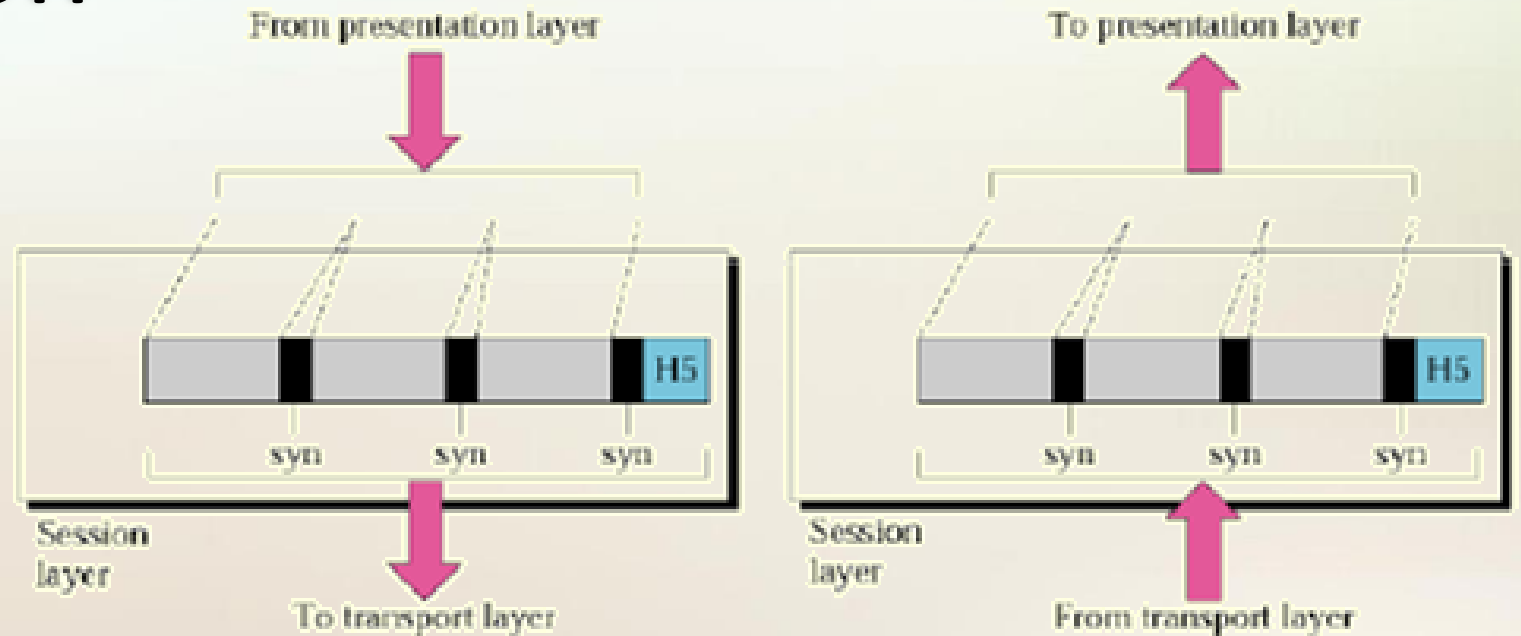


- Service-point addressing
 - ✓ port address
- Segmentation and reassembly
 - ✓ segment containing a sequence number
- Connection control :
 - ✓ connectionless or connection oriented ?
- Flow control
- Error control
 - ✓ process-to –process
 - ✓ Error correction is usually achieved through retransmission.

❖ Session Layer

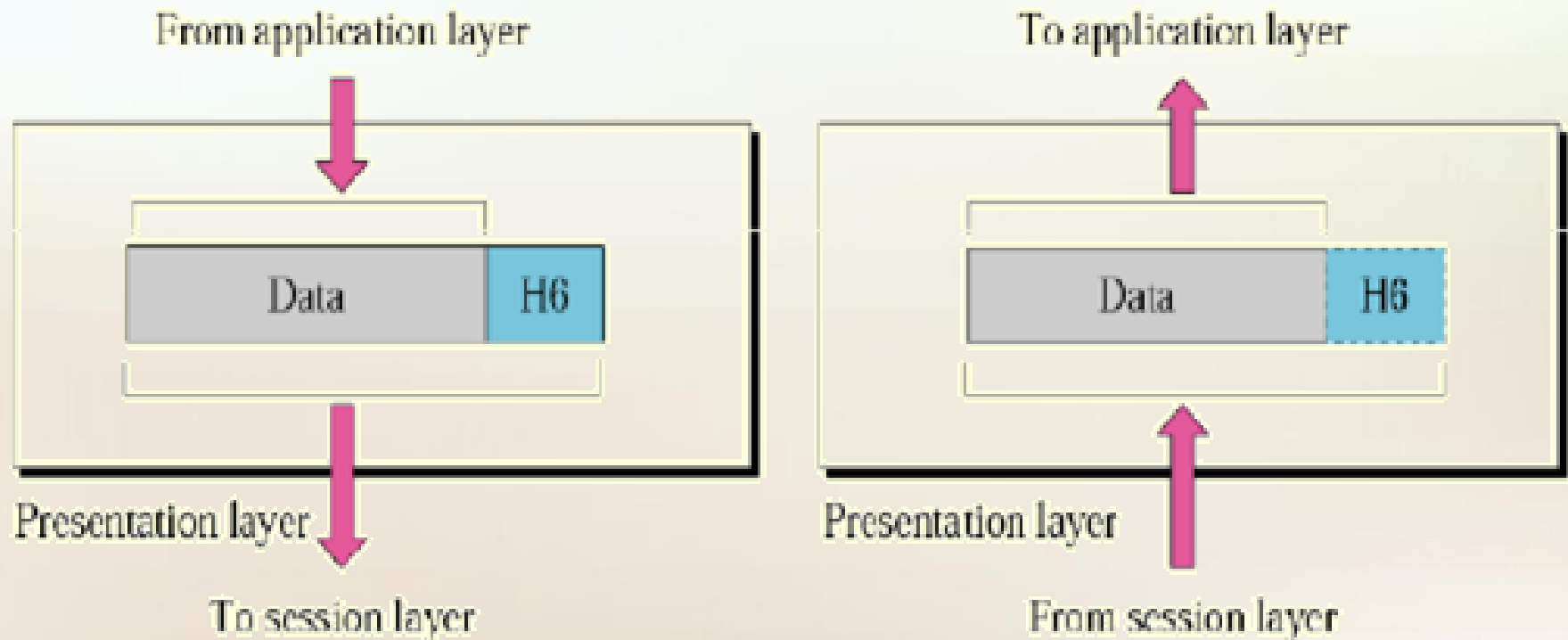
Establishes, maintains, and synchronizes the interaction among communicating systems

- Dialog control
- Synchronization



❖ Presentation Layer

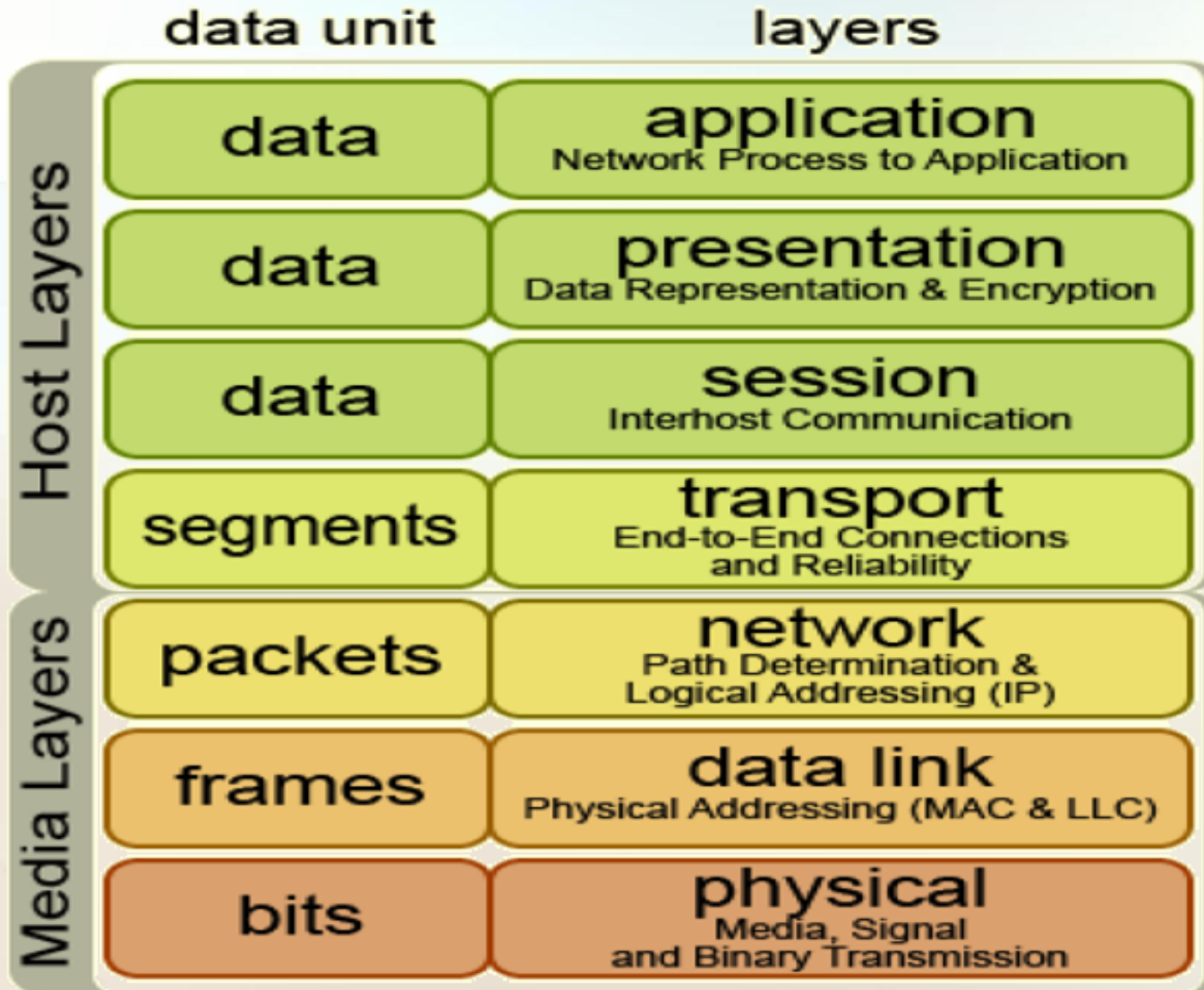
- Translation
- Encryption : (Encryption & Decryption)
- Compression : (reduces the number of bits)



❖ **Application Layer**

- Network virtual terminal
- File transfer, access & management
- Mail services
- Directory services

Layers in the OSI Model



Transmission Control Protocol / Internet Protocol TCP/IP

OSI Model Layers

Application Layer

Presentation Layer

Session Layer

Transport Layer

Network Layer

Data-Link Layer

Physical Layer

TCP/IP Protocol Architecture Layers

Application Layer

Host-to-Host Transport Layer

Internet Layer

Network Interface Layer

Physical and Data Link Layers

□ Network Layer

IP ,ARP, RARP , ICMP , IGMP

❖ Internetworking Protocol (IP)

- Transmission mechanism
- Datagrams
- An unreliable
- Connectionless protocol
- Best-effort delivery service

❖ Address Resolution Protocol

ARP

❖ Reverse Address Resolution Protocol

RARP

❖ Internet Control Message Protocol

ICMP

❖ Internet Group Message Protocol

IGMP



□ Transport Layer
UDP , TCP , SCTP

❖ User Datagram Protocol UDP


- Process-to-process protocol that adds only port addresses
- Checksum
- Error control
- Length information

❖ Transmission Control Protocol TCP

- Reliable stream transport protocol
 - ✓ connection-oriented
- Segments
- Sequence number in every segment

❖ **Stream Control Transmission Protocol**

SCTP

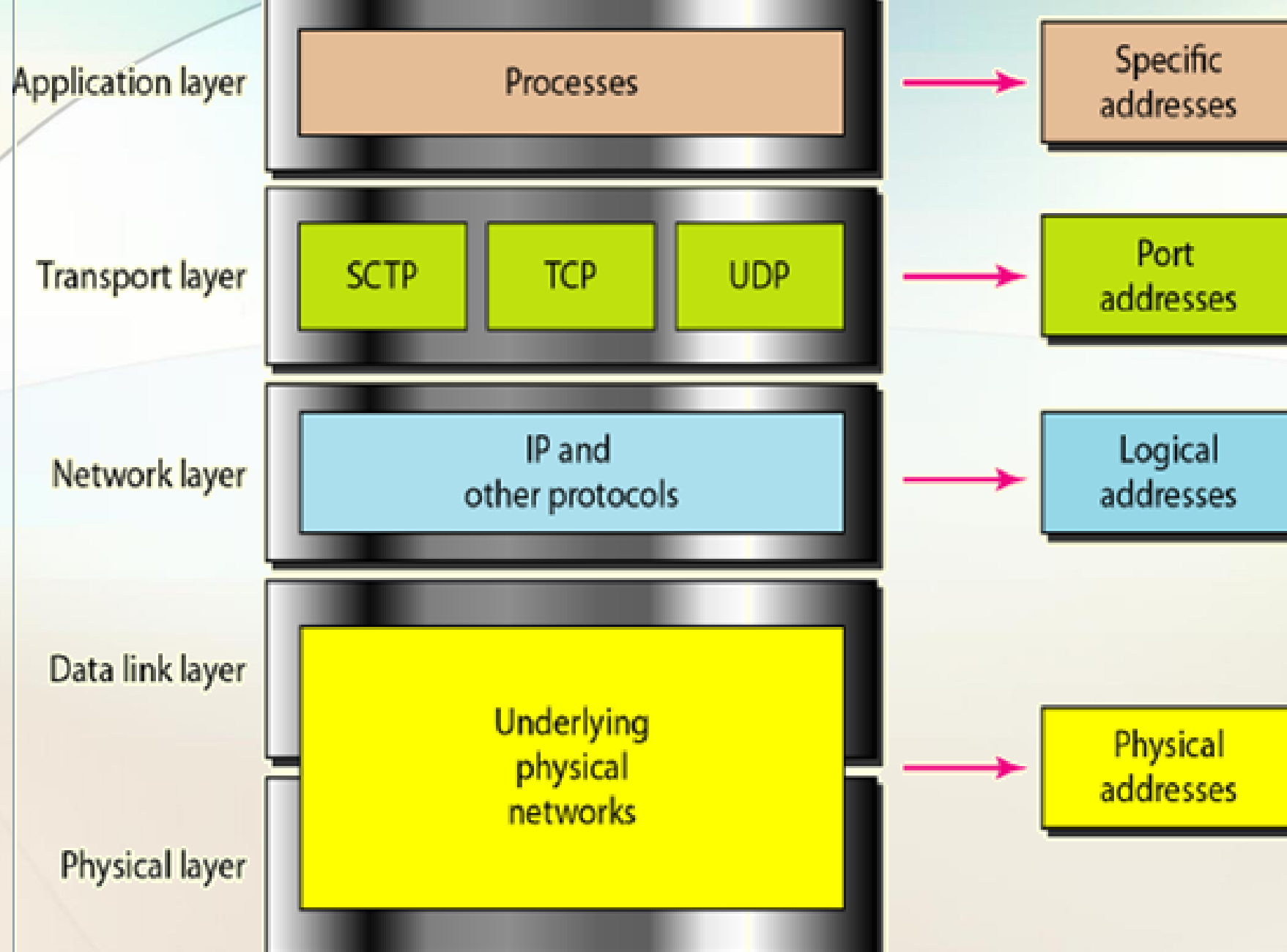


☐ Application Layer

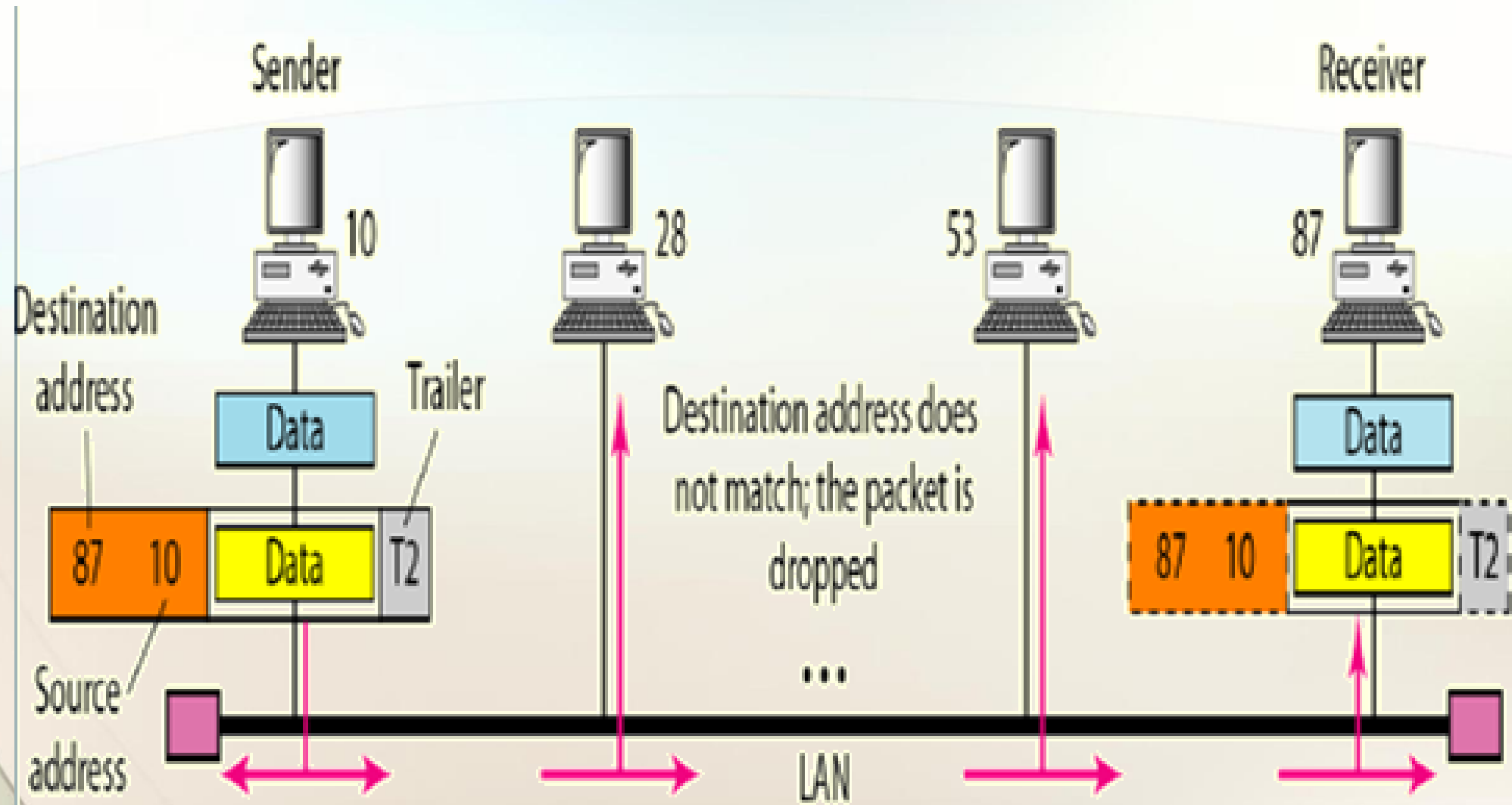
Session, Presentation, and Application

❑ ADDRESSING

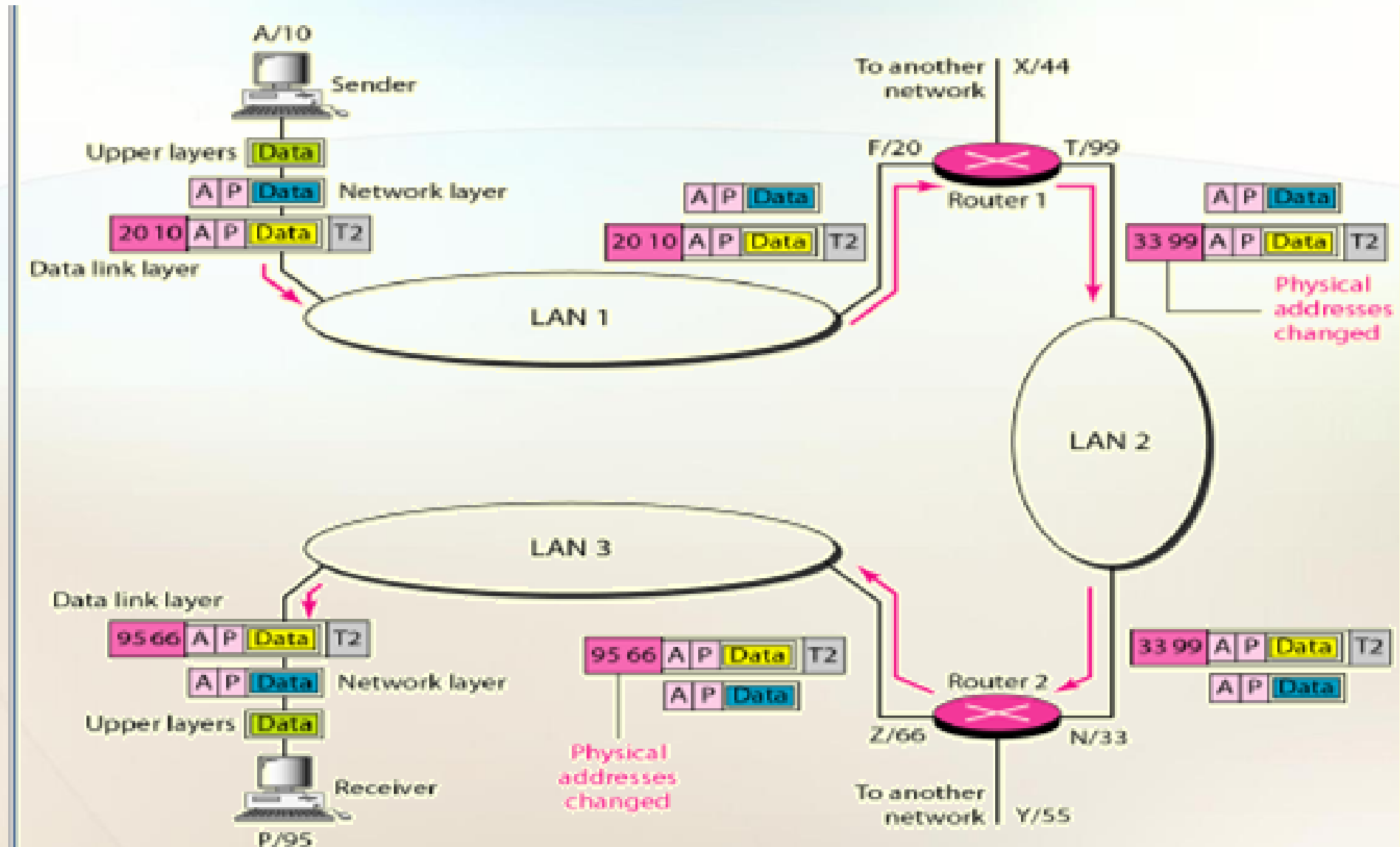
- Physical (link) addresses
- Logical (IP) addresses
- Port addresses
- Specific addresses



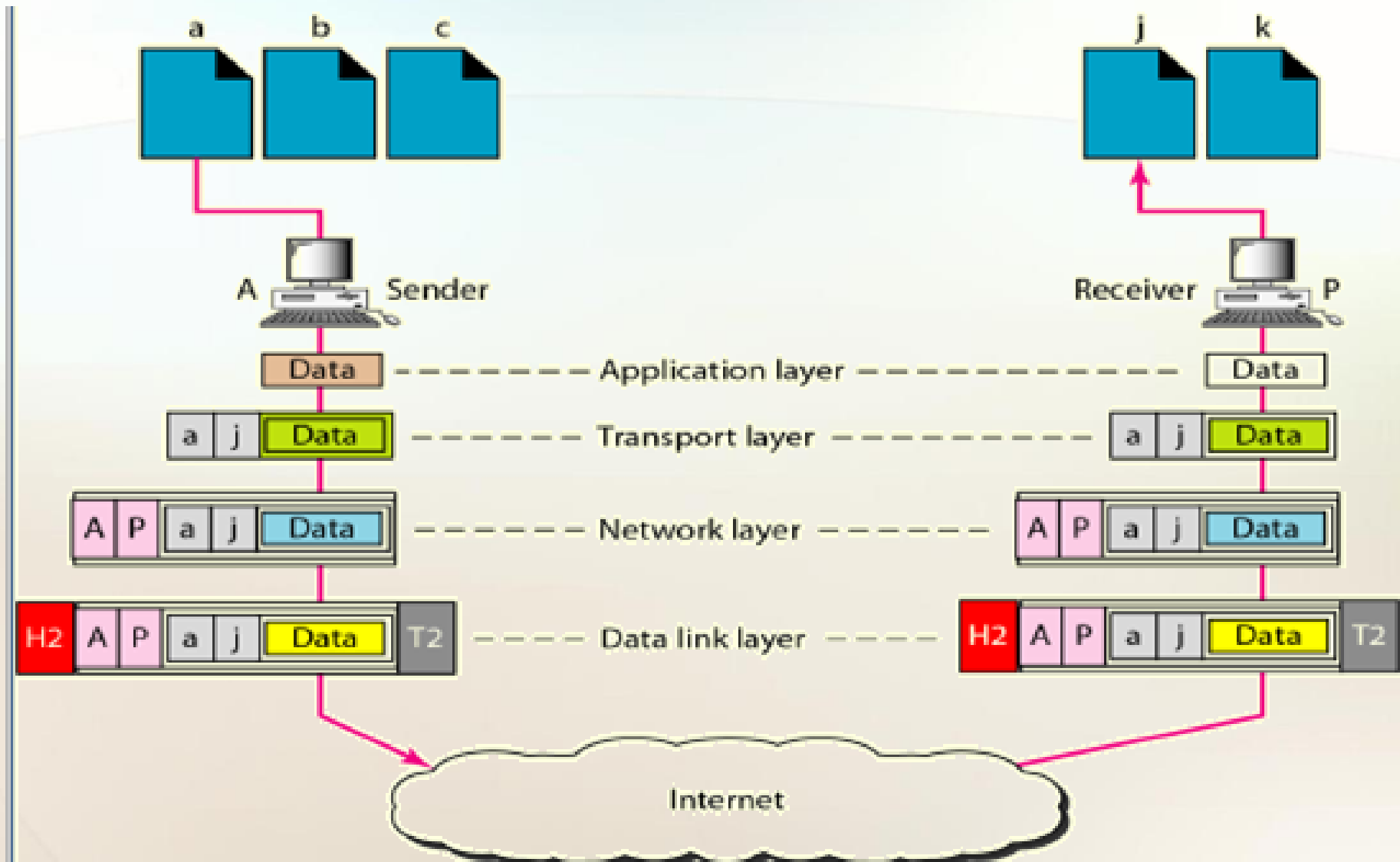
Physical addresses



IP addresses



Port addresses



Specific Addresses



Best Wishes