TCP PROTOCOL TYPES

OBJECTIVES:

- To discuss the OSI model and its layer architecture and to show the interface between the layers.
- To briefly discuss the functions of each layer in the OSI model.
- To introduce the TCP/IP protocol.
- To show the functionality of each layer in the TCP/IP Model.
- To show the functionality of each layer in the TCP/IP Model.
- Similarities and Comparison between OSI & TCP/IP Model.

Network Model:

- A method of describing and analyzing data communication networks by breaking the entire set of communication process into a number of layers.

- Each layer has a specific function.

The OSI Model:

- International standard organization (ISO) established a committee in 1977 to develop an architecture for systems communication.
- Open System Interconnection (OSI) reference model is the result of this effort.
- This model allows any two different systems to communicate regardless of their underlying architecture.

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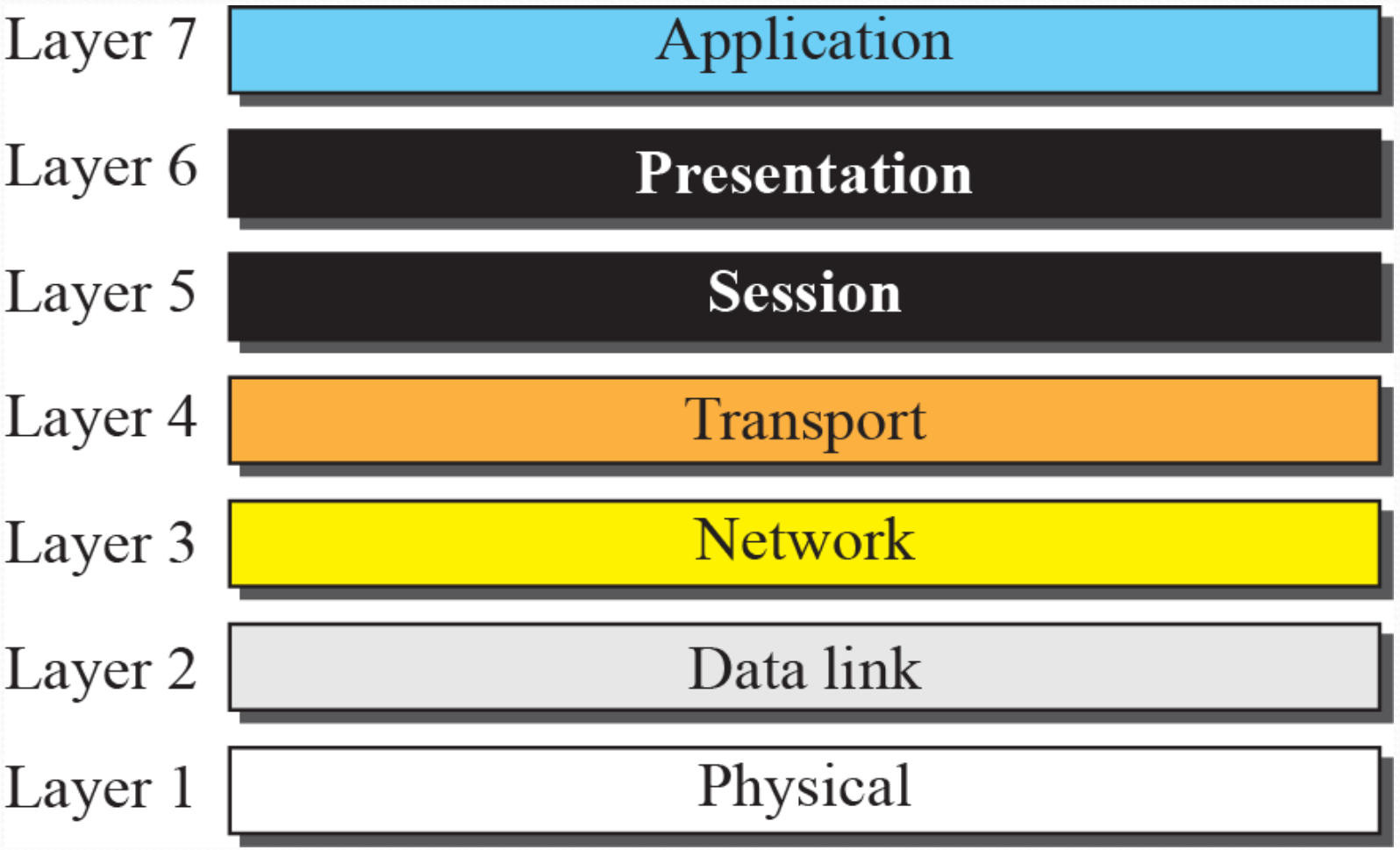
- The OSI model describes how data flows from one computer, through a network to another computer.
- The OSI model is not a protocol; it is a model for understanding and designing a network architecture that is flexible and robust.
- The OSI model consists of seven separate but related layers, each of which defines a part of the process of moving information across a network.

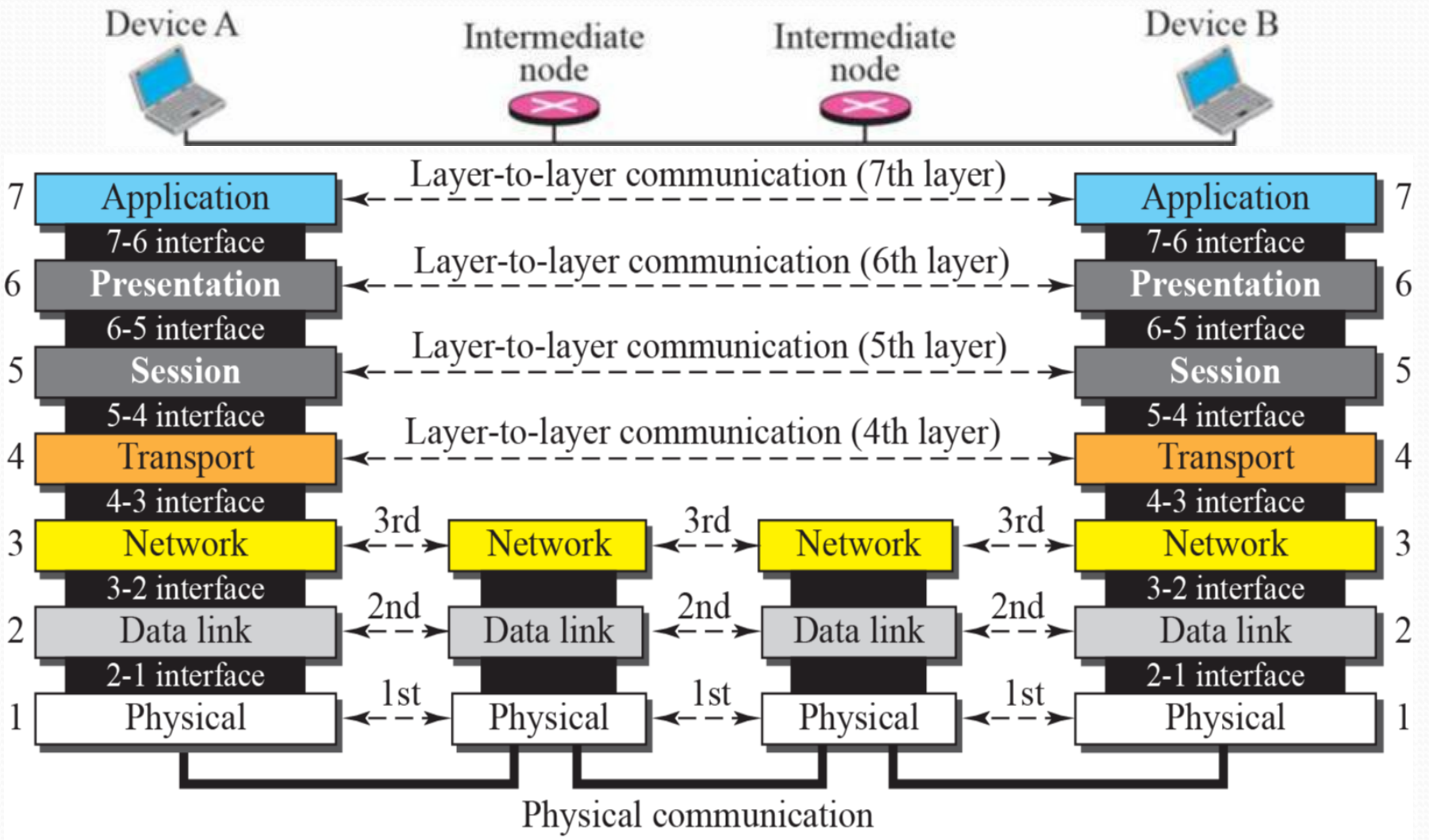
Seven layers of the OSI model:



Why so many layers?

- To reduce the complexity, networks are organized as a stack of layers, one below the other.
- Each layer performs a specific task,. It provides services to an adjacent layer.

OSI Layers:


Device A
Intermediate node
Intermediate node
Device B
Layer-to-layer communication (7th layer)
Layer-to-layer communication (6th layer)
Layer-to-layer communication (5th layer)
Layer-to-layer communication (4th layer)
7
Application
7-6 interface
6
Presentation
6-5 interface
5
Session
5-4 interface
4
Transport
4-3 interface
3
Network
3-2 interface
2
Data link
2-1 interface
1
Physical
3rd
2nd
1st
Physical communication

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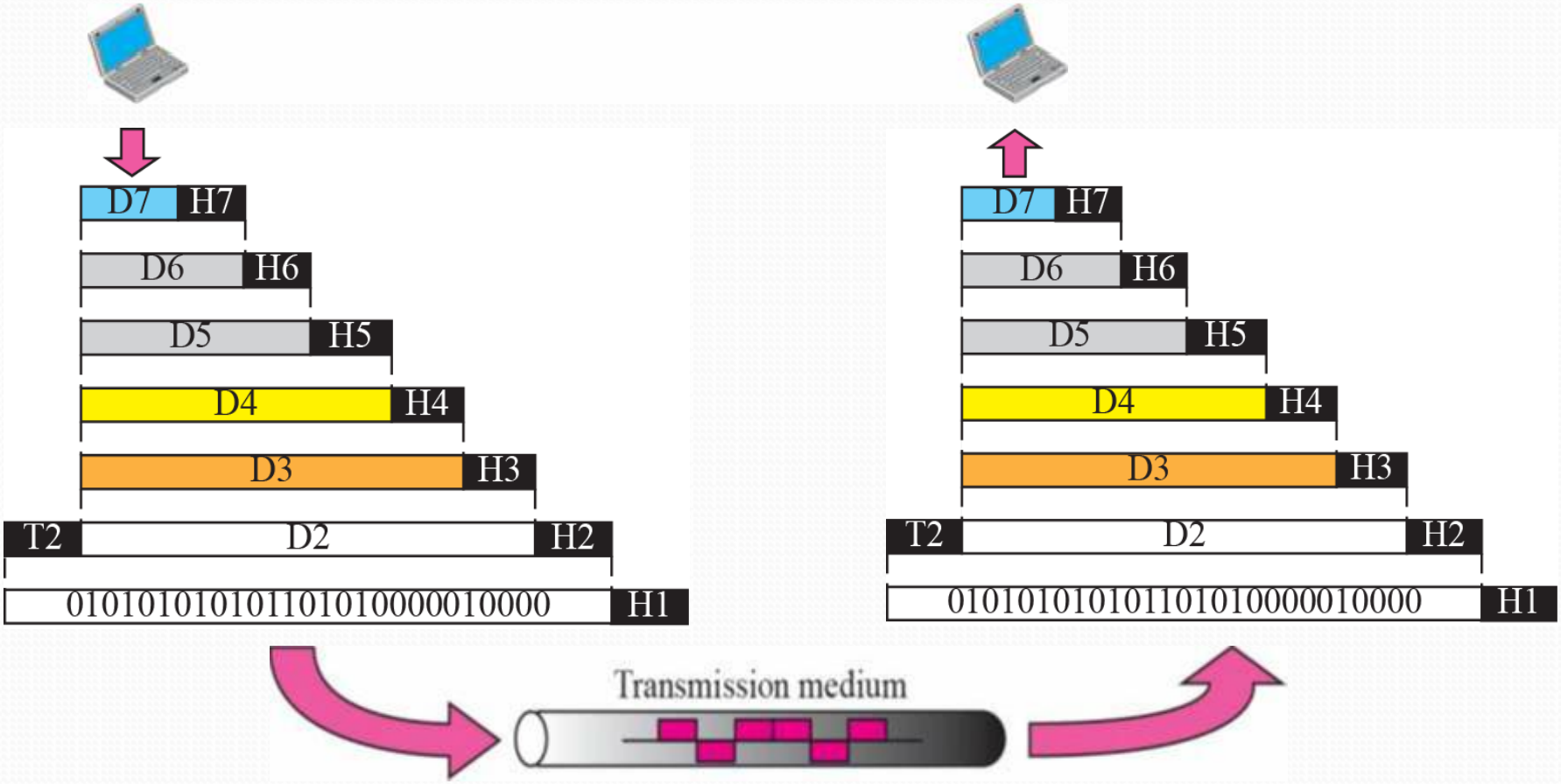
- Layers 1,2, 3- physical, data link and network are network support layers.
- Layer 4, the transport layer, links the two subgroups.
- Layers 5,6,7- session, presentation, and application are user support layers.

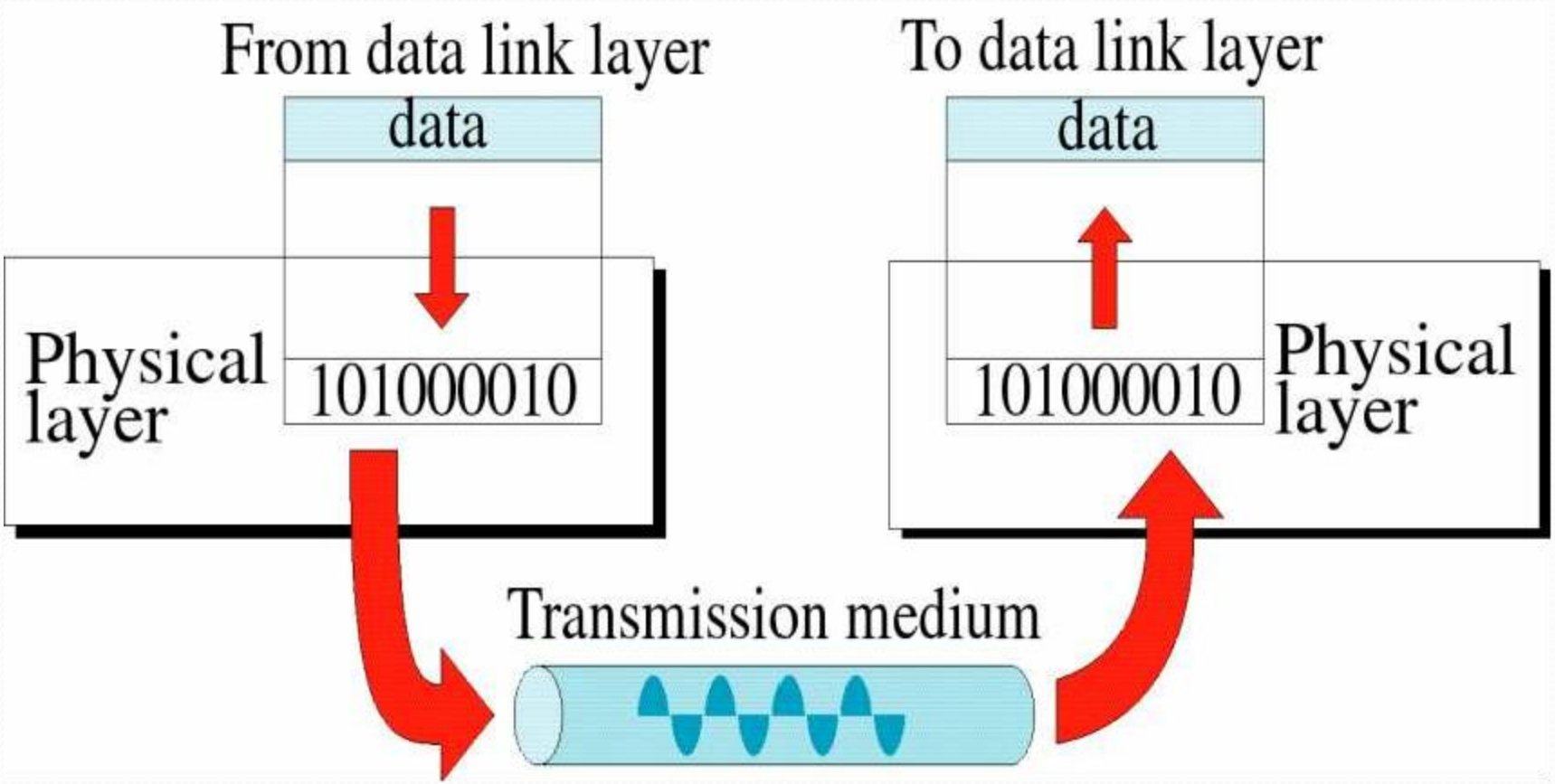
An exchange using the OSI model:



Physical Layer:

- Physical layer is the bottom(layer 1) of OSI model.
- It is responsible for the actual physical connection between the devices.
- The physical layer is responsible for movements of individual bits from one node to next.

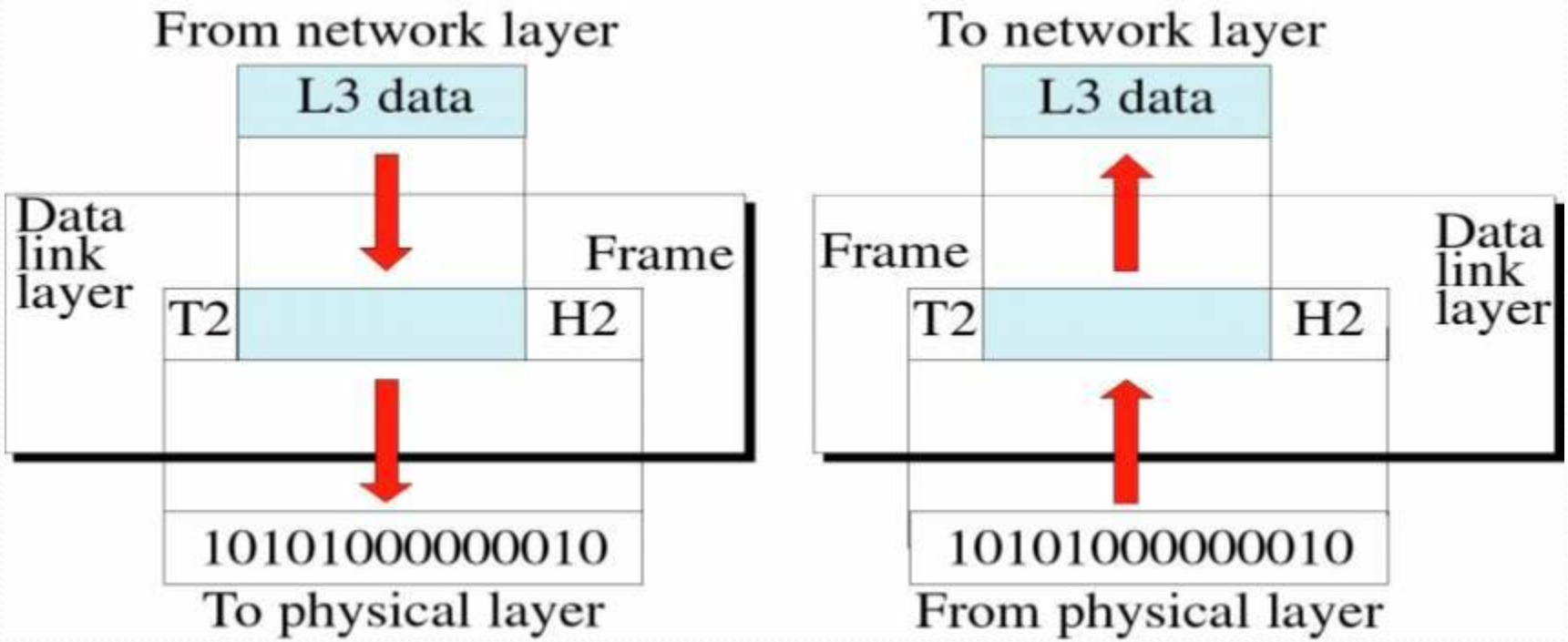
Physical layer



Functions of Physical Layer:

- Convert bits to signals
- Bit synchronization
- Manage physical connection
- Bit rate control
- Line configuration
- Physical topology
- Transmission mode
- Multiplexing
- Switching

Data Link Layer:

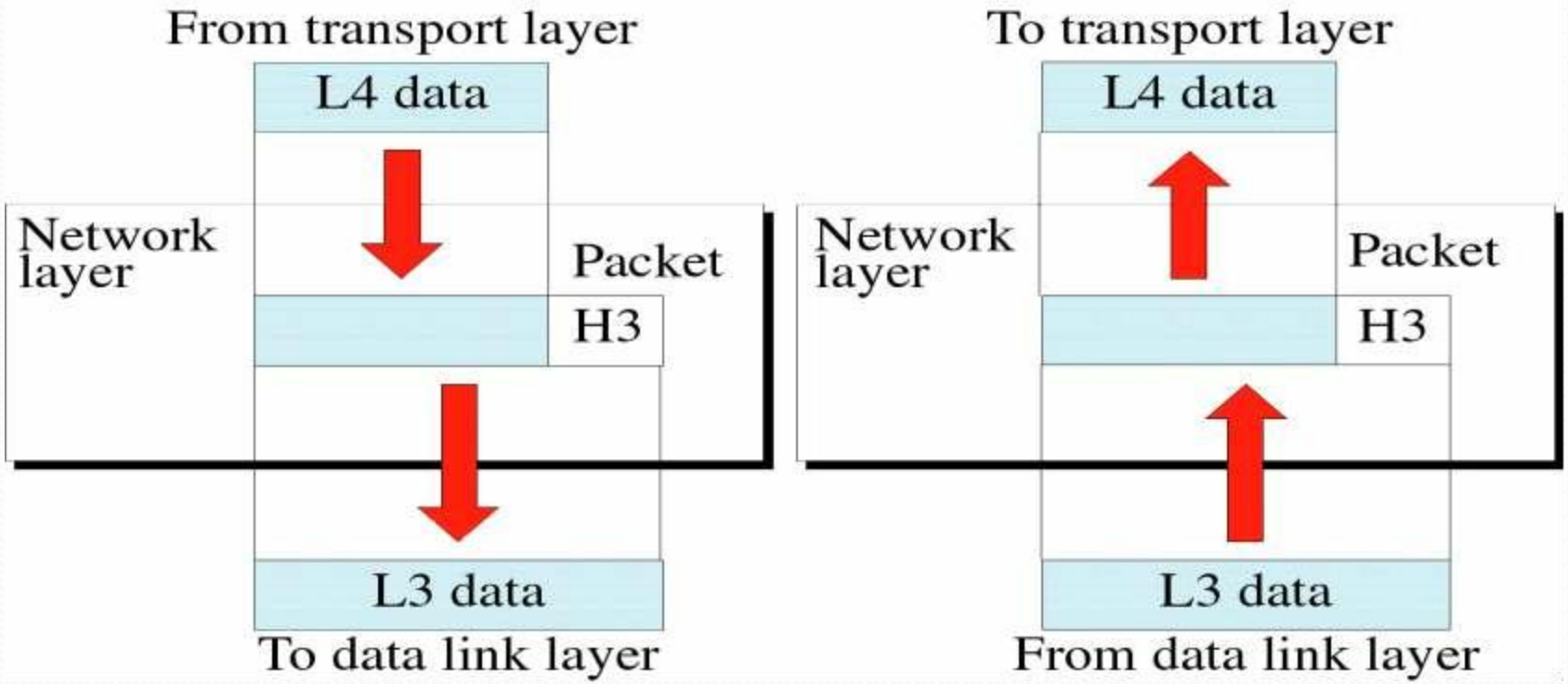


- The data link layer is responsible for moving frames from one node to the next.

Functions of Data Link Layer:

- Framing:- divides the data from N/W layer into frames.
- Physical Addressing:- Add a header to the frame to define the physical address of the source and the destination machines.
- Flow Control:- It is the traffic regulatory mechanism implemented by Data Link layer that prevents the fast sender from drowning the slow receiver.
- Error Control:- It provides the mechanism of error control in which it detects and retransmits damaged or lost frames.
- Feedback:- after transmitting the frames, the system waits for the feedback.

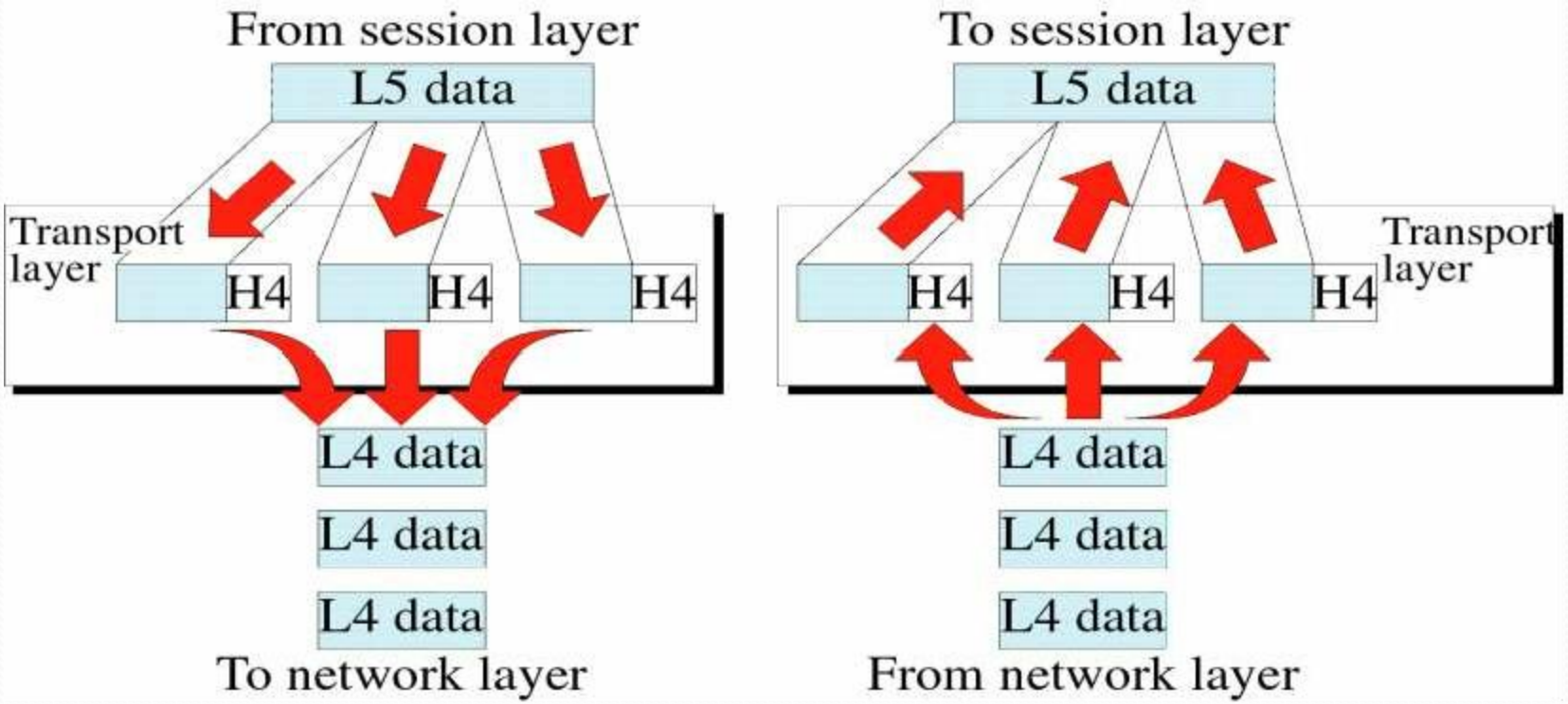
Network Layer:



Functions of Network layer:

- It is responsible for the source to destination delivery of a packets across multiple networks.
- Routing:- Provide mechanism to transmit data over independent networks that are linked together.
- Logical addressing:- Adds Logical addresses of sender and Receiver.

Transport Layer:



- It is responsible for source process to destination process delivery of entire message.

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- Transport layer provides two types of services:

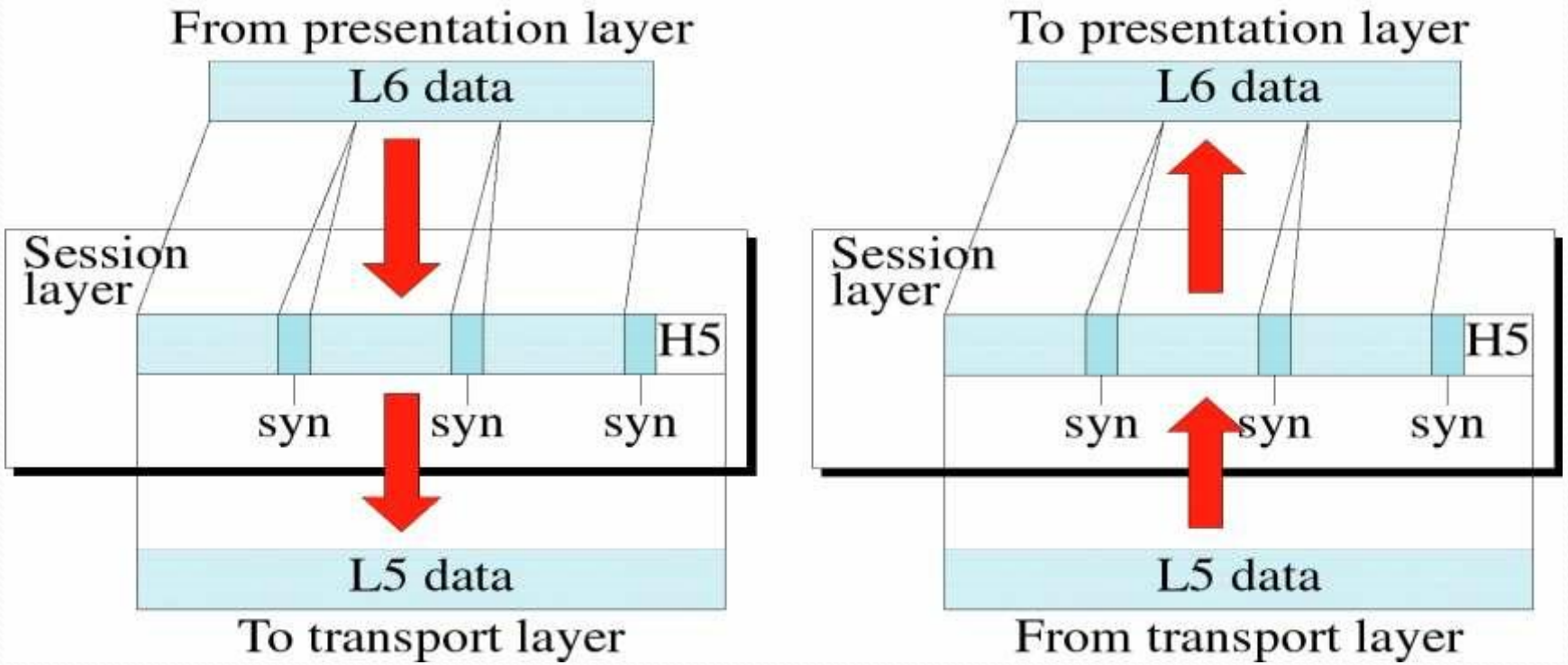
1) Connection Oriented Transmission: In this type of transmission the receiving device sends an acknowledgment back to the source after a packet or group of packet is received.

2) Connectionless Transmission: In this type of transmission the receiver does not acknowledge receipt of a packet.

Functions of Transport Layer:

- Segmentation and Reassembly: Divide the message received from Session layer into Segments and number them to make a sequence for reassembly at the receiving side.
- Service point addressing: Transport layer makes sure that the message is delivered to the correct process on destination machine.
- Error Control: Make sure that the entire message arrives without errors else retransmit.
- Flow Control: Transport layer makes sure that the sender

Session Layer:



- It is responsible for beginning, maintaining & ending the communication between two devices, which is called session.

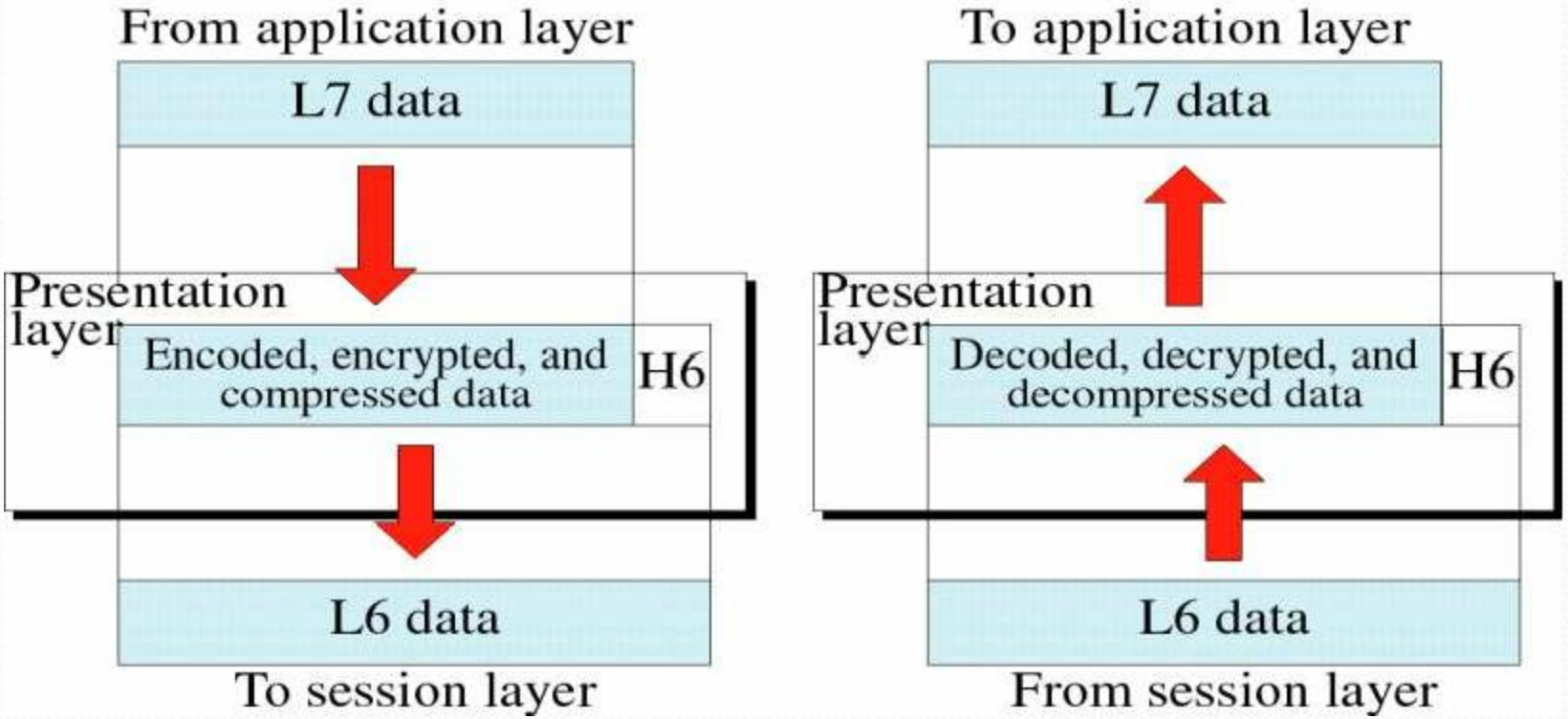
Functions of Session Layer:

- Establishment, maintaining and ending a session:
  - Sends SYN packet – establish request
  - Receives ACK & SYN- established
  - To end – Sender sends ACK

- Dialog Control: The session layer allows two systems to enter into a dialog.

- Synchronization: Allows a process to add checkpoints to a stream of data.

Presentation Layer:



- This layer is concerned with the syntax and semantics of the information exchanged between two systems.

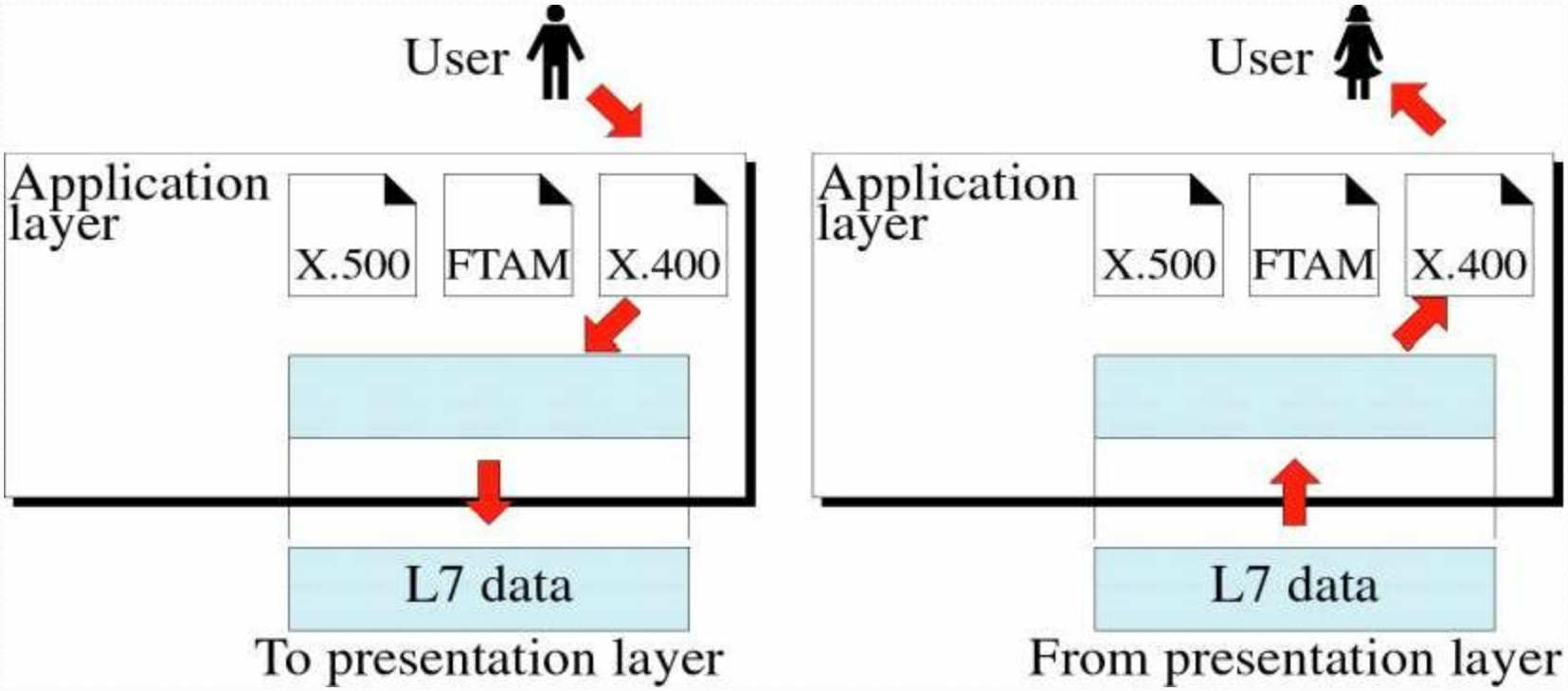
Functions of Presentation Layer:

- Data Translation: Encoding and Decoding
  Sender to Common format on Sending side
  Common to Receiving format on Receiver side

- Data Encryption: For security and privacy purpose.

- Data Compression: Data compression reduces the number of bits contained in the information.

Application Layer:



- Provides User interfaces and support for Services, like e-mail, file transfer.

Functions of Application Layer:

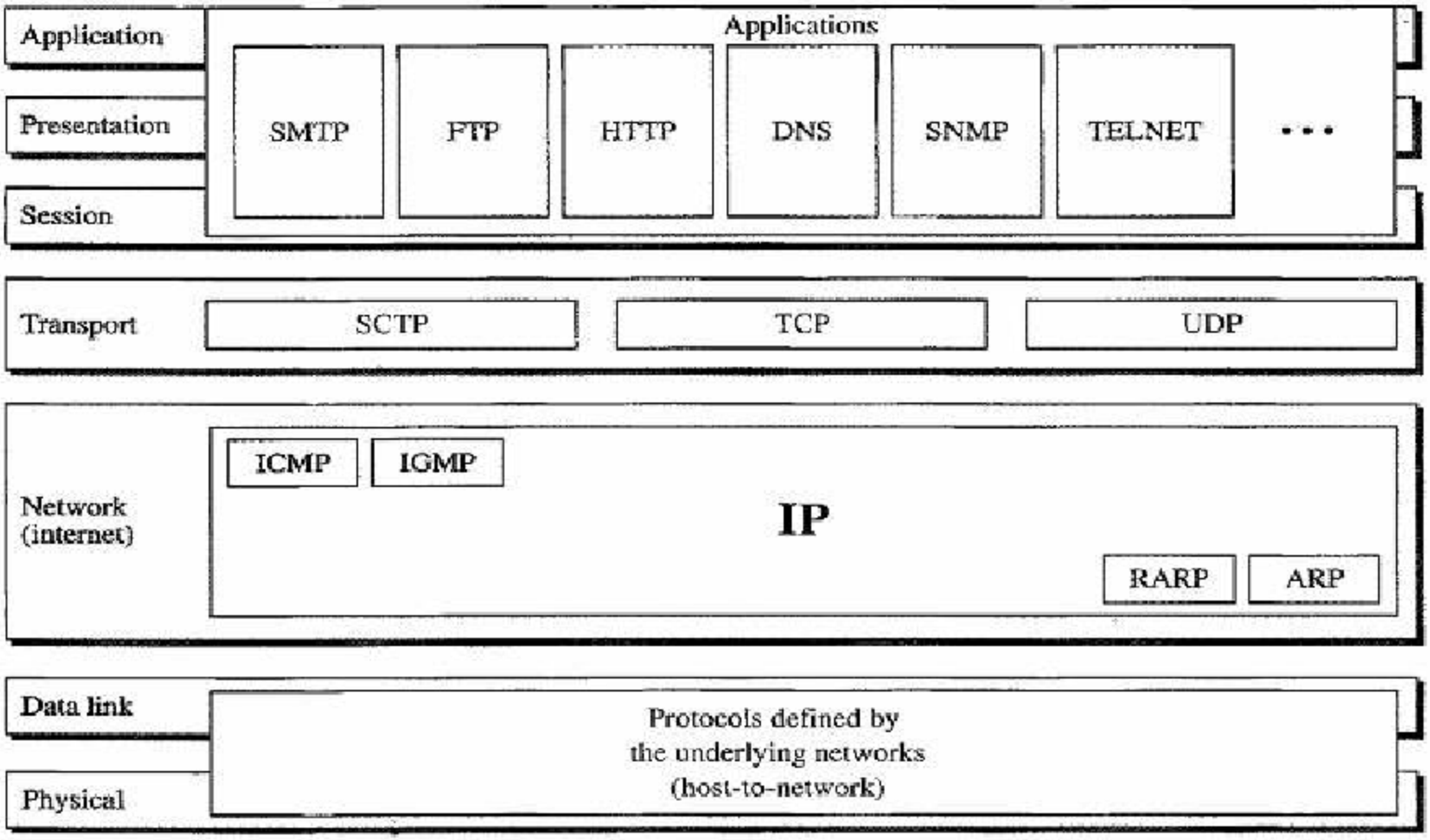
- Network Virtual terminal: It allows a user to log on to a remote host.
- File Transfer Access, and Management: This application allows a user to access files in a remote host.
- Mail Services: This application provides various e-mail services.
- Directory Services: This application provides the distributed database sources and access for global information about various objects and services.

TCP/IP Model:

- TCP/IP forms the base of present day internet.
- TCP and IP are two protocols of this model.
- This model was initially used by ARPANET.
- The TCP/IP protocol suite was defined as having four layers:

1) Host-to-network
2) Internet
3) Transport
4) Application

TCP/IP and OSI Model



Host to Network Layer:

- It is the bottom layer of TCP/IP model also known as Network interface layer.
- The purpose of this layer is to connect the host to the network.

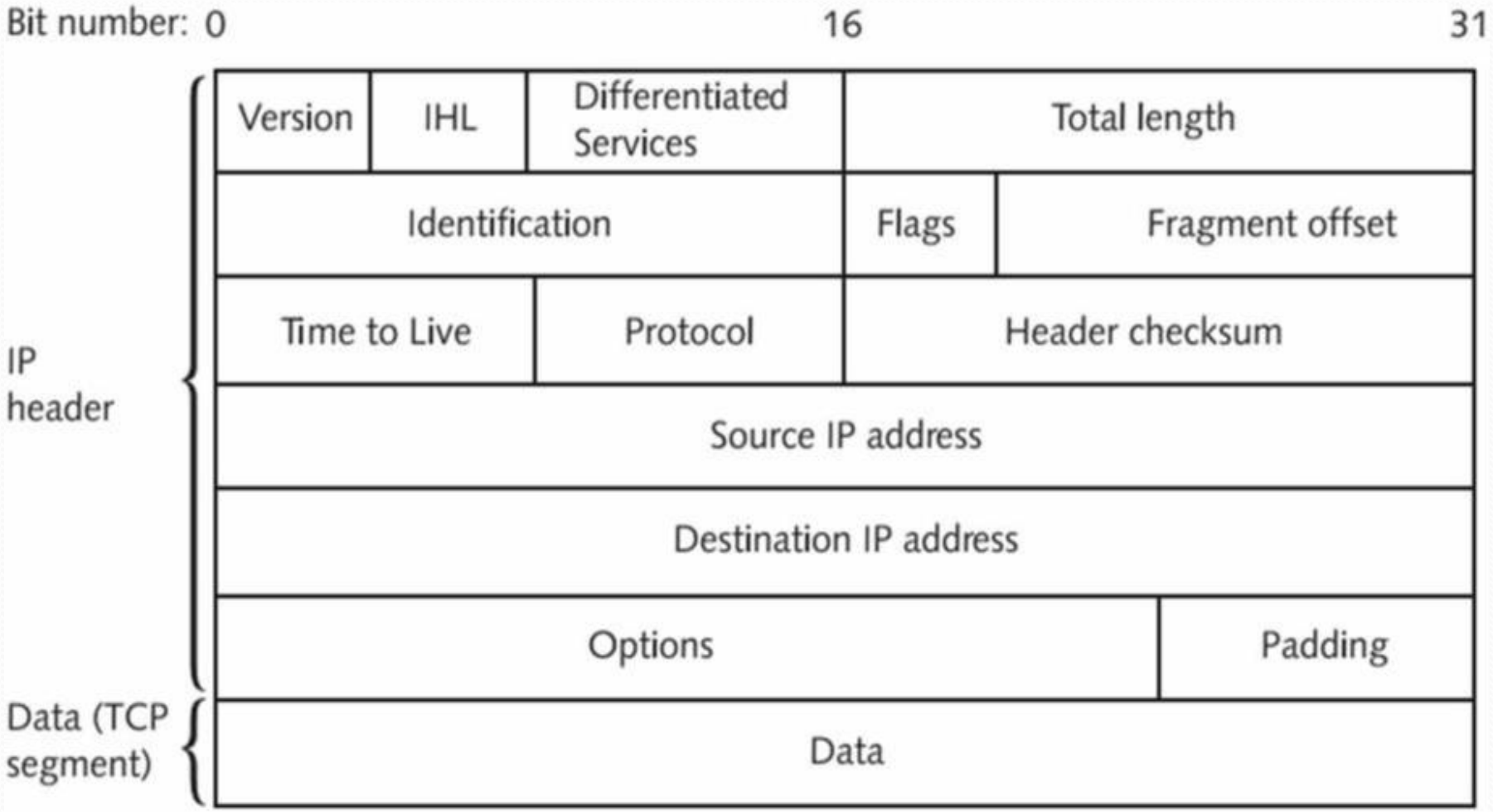
Internet Layer:

- Internet layer is similar to network layer of OSI model in functionality.
- This layer is responsible for delivering IP packets to their destinations.
- An important protocol of this layer is IP(Internet Protocol).

Internet Protocol(IP):

- It is an unreliable and connectionless protocol.
- IP transports data in packets called datagrams.
- IP does not keep track of the routes.

IP Datagram:


Bit number: 0
16
31
IP header
Version
IHL
Differentiated Services
Total length
Identification
Flags
Fragment offset
Time to Live
Protocol
Header checksum
Source IP address
Destination IP address
Options
Padding
Data (TCP segment)
Data

Transport Layer:

- Transport layer is similar in functionality to transport layer of OSI model.

- Transport layer of TCP/IP model also provides connection oriented and connectionless services.

1) Connection Oriented – TCP(Transmission Control Protocol)
2) Connection Less – UDP(User Datagram Protocol)

1) TCP:

- Transport layer used TCP for reliable connection oriented service.

- The various functions of TCP are:

1) Error Control
2) Flow Control
3) Sequencing

2)UDP:

- Transport layer used this protocol for unreliable connectionless service.
- No assurance that packet reached.
- No sequencing & No error checking
- Useful in real time data transfer and quick transfer of large data.
- It follows that delivery is more important than accurate delivery.

Application Layer:

- This layer is the combination of Application, Presentation and Session layer of the OSI model.
- This layer provides various services to different user applications.

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- Application layer includes several high-level protocols that are used for wide variety of applications like:

- TELNET(Terminal Network): Used for remote login.

- FTP(File Transfer Protocol): For transfer of file from one system to another.

- HTTP(Hyper Text Transfer Protocol): For fetching web pages on world wide web.

Similarities between OSI & TCP/IP

- Both are based on the concept of a stack of independent protocols.
- Functionality of layers is roughly similar.
- Up to Transport – network oriented.
- Above – User oriented

Differences between OSI & TCP/IP:

- OSI model has seven layers.
- TCP/IP has four layers.

- OSI model provides clear distinction between services, interfaces and protocols.
- TCP/IP doesn't provide clearly distinguish between services, Interfaces and protocols.

- In OSI model transport layer is connection oriented.
- In TCP/IP transport layer is both connection oriented and connectionless.

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- In OSI Data Link layer and Physical layer are separate layers.
  - In TCP Data Link layer and Physical layer are combined as one in Host-to-Network layer.

- Protocols do not fit well into the OSI model.
  - Protocols fit well in TC/IP model.

- Minimum size of OSI header is 5 bytes.
  - In TCP/IP minimum size of the header is 20 bytes.


THANK YOU