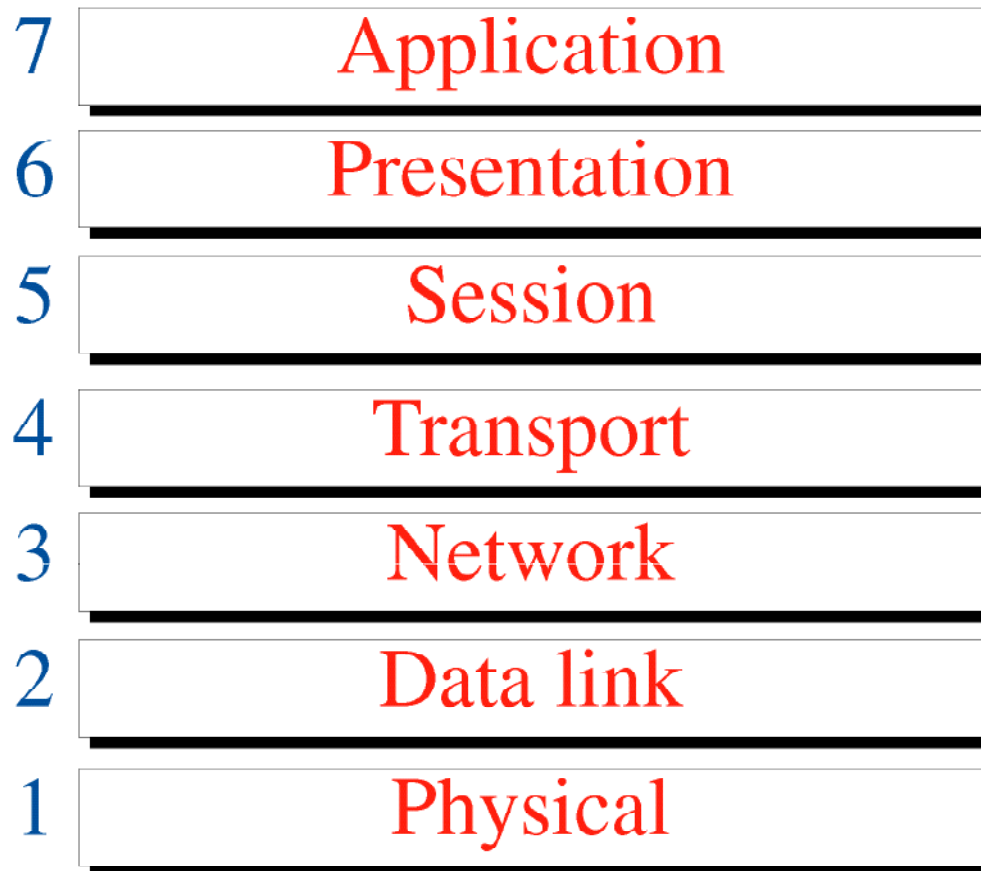# Lecture 4
OSI Reference Model

Open Systems Interconnection (OSI) Model

- International standard organization (ISO) established a committee in 1977 to develop an architecture for computer communication.

- Open Systems Interconnection (OSI) reference model is the result of this effort.

- In 1984, the Open Systems Interconnection (OSI) reference model was approved as an international standard for communications architecture.

- Term "open" denotes the ability to connect any two systems which conform to the reference model and associated standards.

Figure 3-1

OSI Model
Layered Architecture

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

Benefits of layered Architecture

- Layer architecture simplifies the network design.

- It is easy to debug network applications in a layered architecture network.

- The network management is easier due to the layered architecture.

- Network layers follow a set of rules, called protocol.

- The protocol defines the format of the data being exchanged, and the control and timing for the handshake between layers.

Organization of the Layers

The Seven layer can be belong from three Subgroups.

Layer 1 (Physical Layer)
Layer 2 (Data Link Layer) ⎤— Network support layers
Layer 3 (Network Layer)

Layer 4 (Transport Layer)
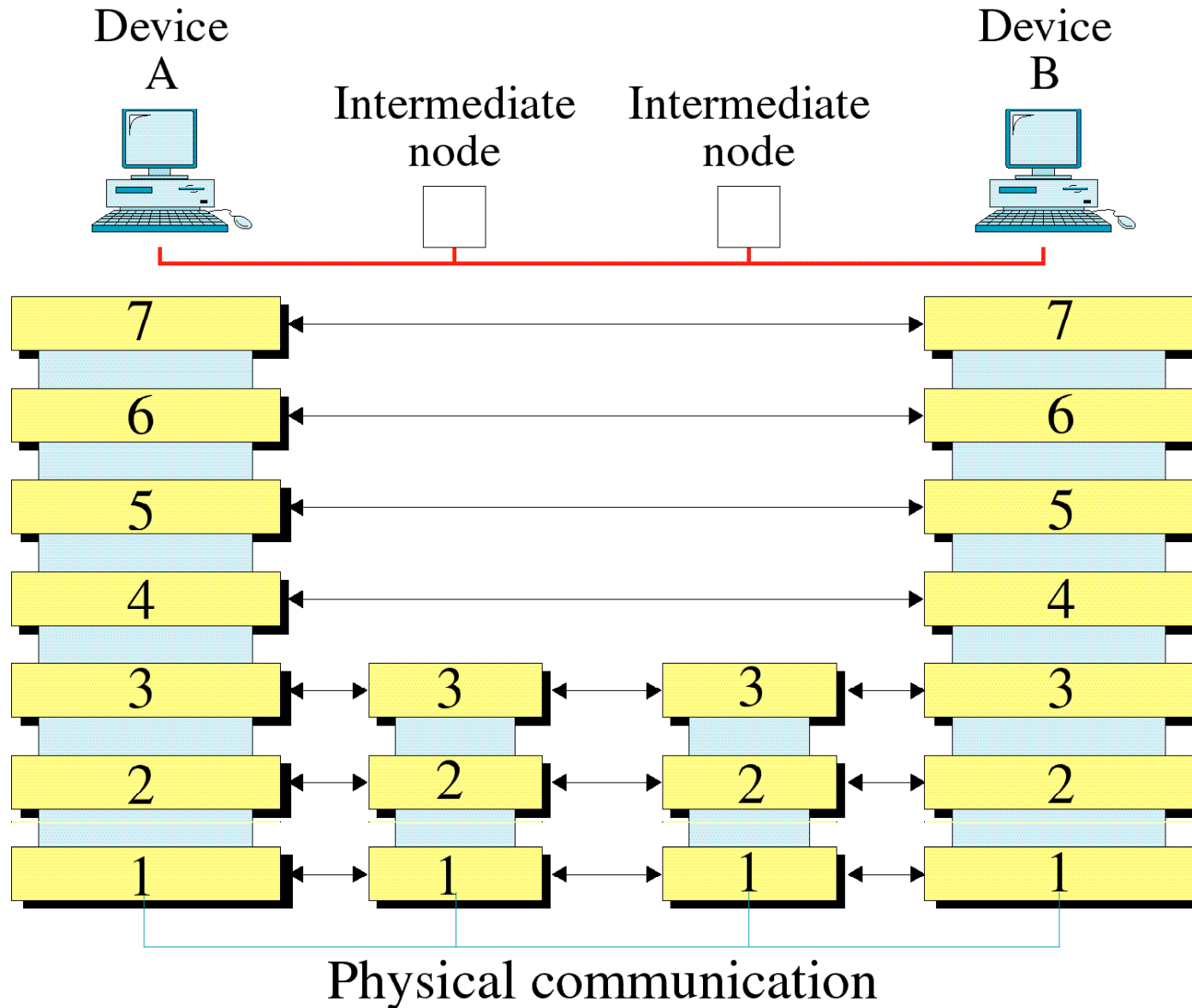
Layer 5 (Session Layer)
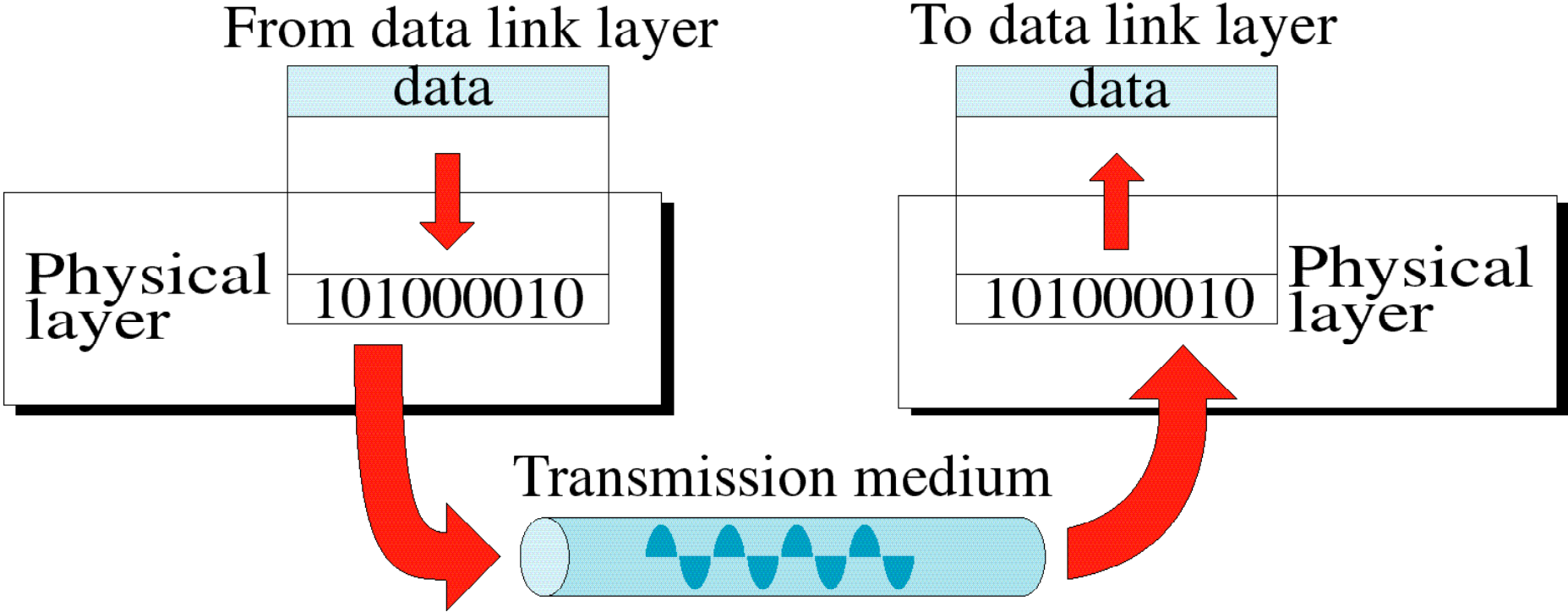Layer 6 (Presentation Layer) ⎤— User support layers
Layer 7 (Application Layer)

The interaction b/w layers in the OSI mode

Physical communication

An Exchange Using the OSI Model

Physical Layer

From data link layer

data

Physical
layer

101000010

To data link layer

data

101000010
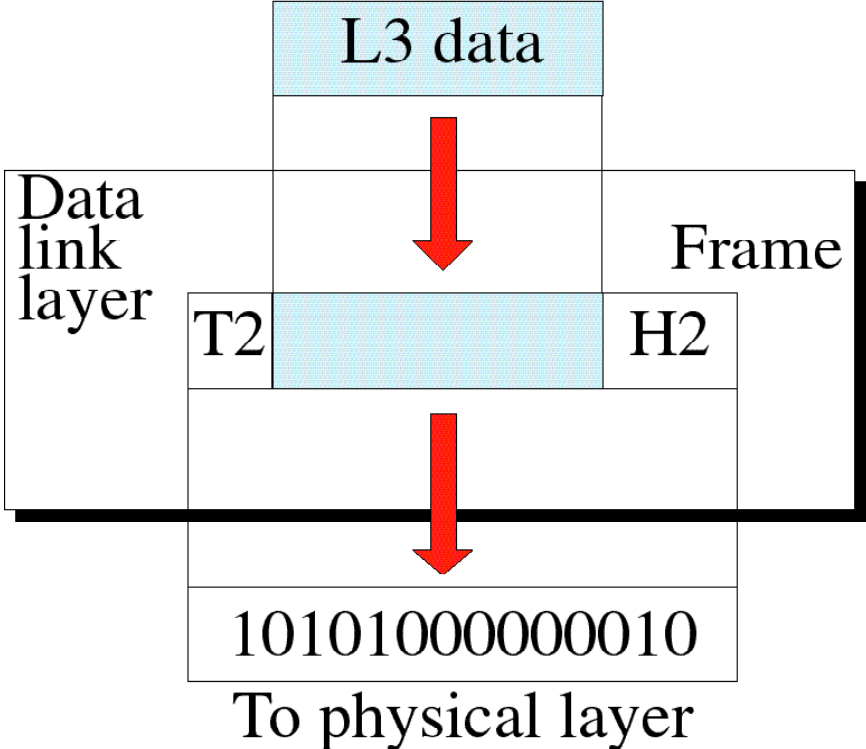
Physical
layer

Transmission medium
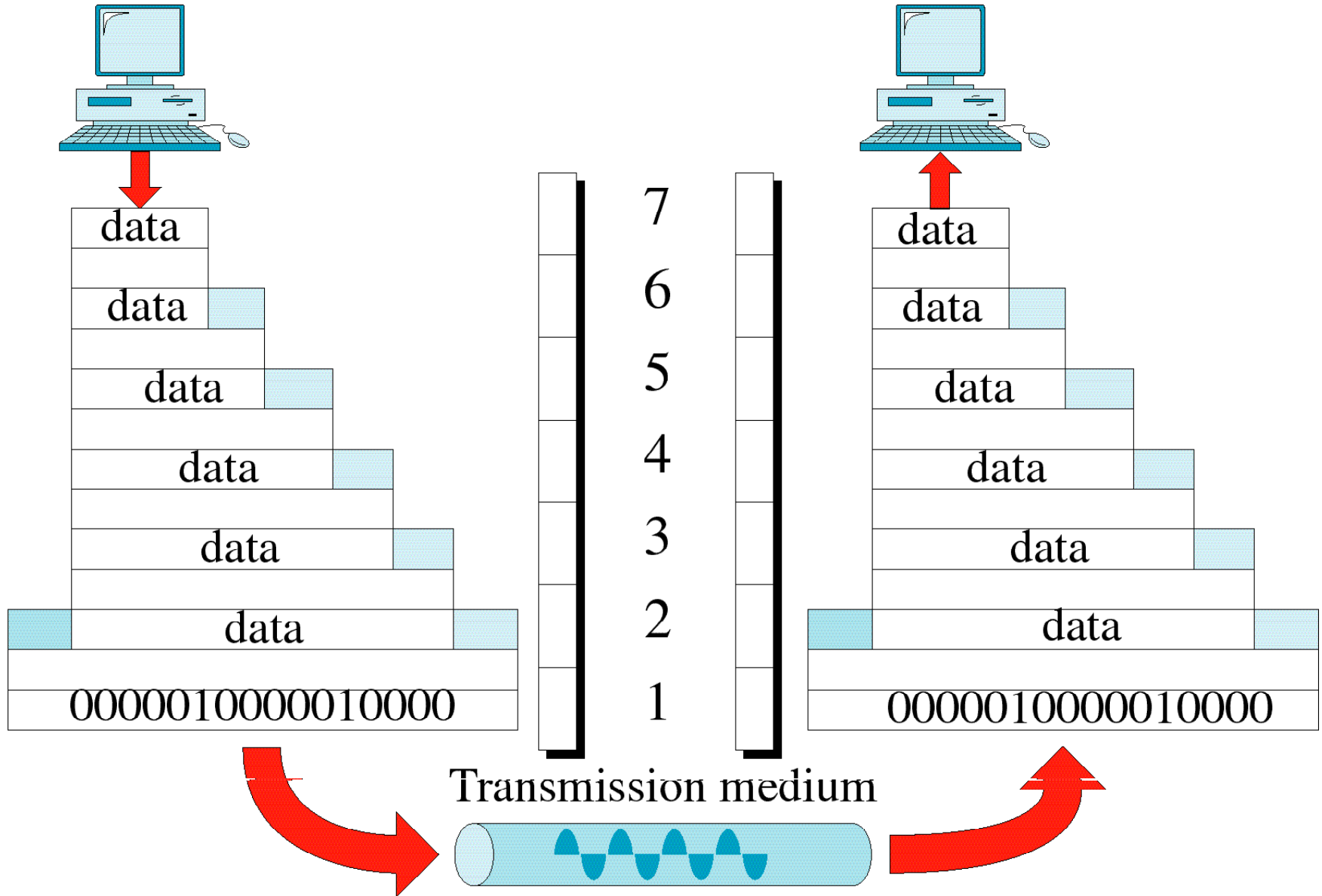
Physical Layer

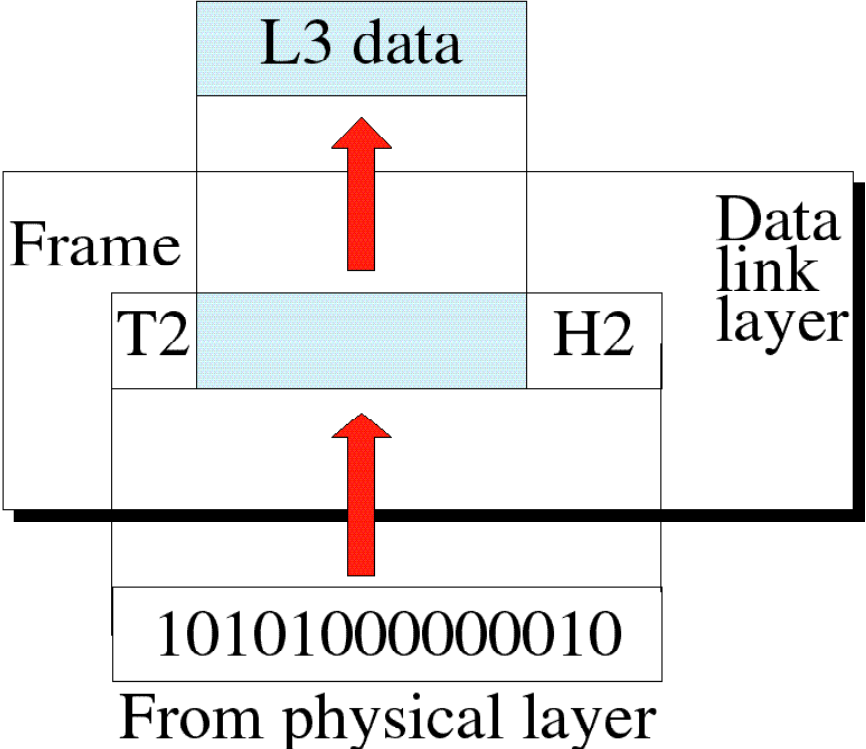The physical layer is concerned with the following

1. Physical characteristics of interface and medium
2. Representation of bit
3. Data Rate
4. Synchronization of bits
5. Line configuration (Type of connection)
6. Physical topology
7. Transmission mode

Data Link Layer

From network layer

L3 data

Data link layer

T2   Frame   H2

10101000000010

To physical layer

To network layer

L3 data

Frame

T2   Data link layer   H2

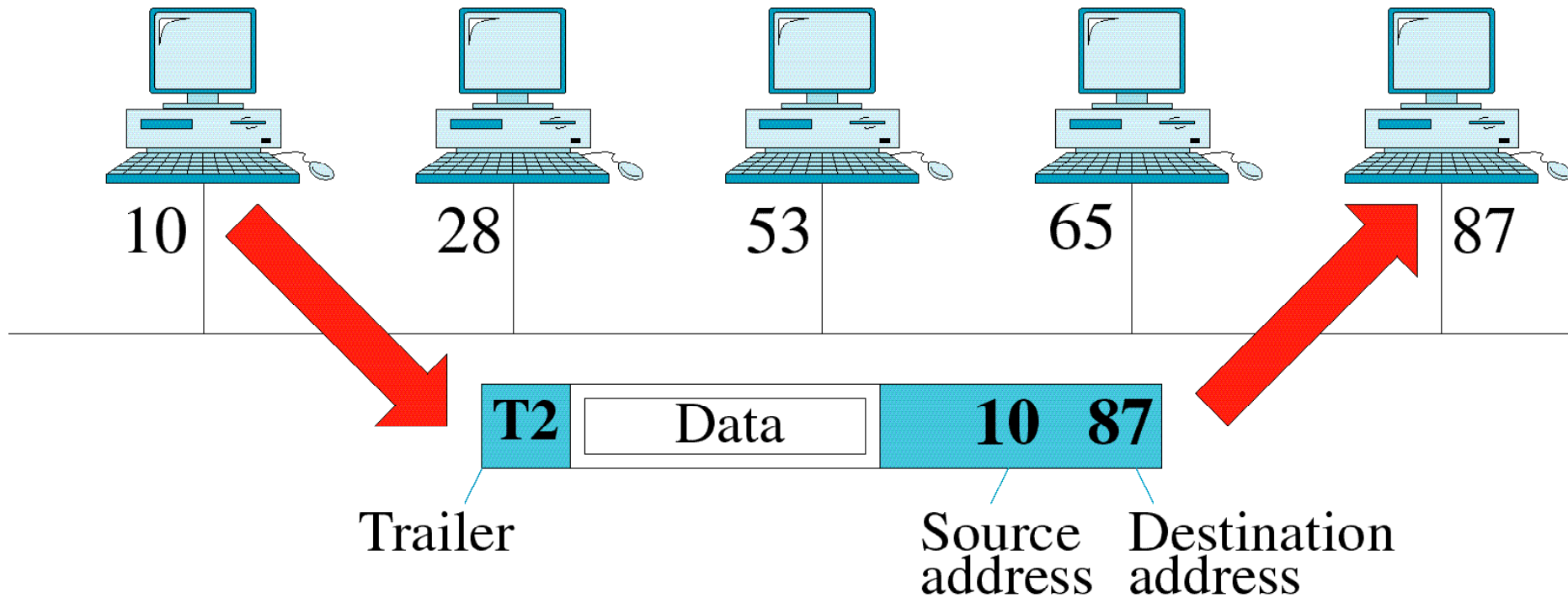10101000000010

From physical layer
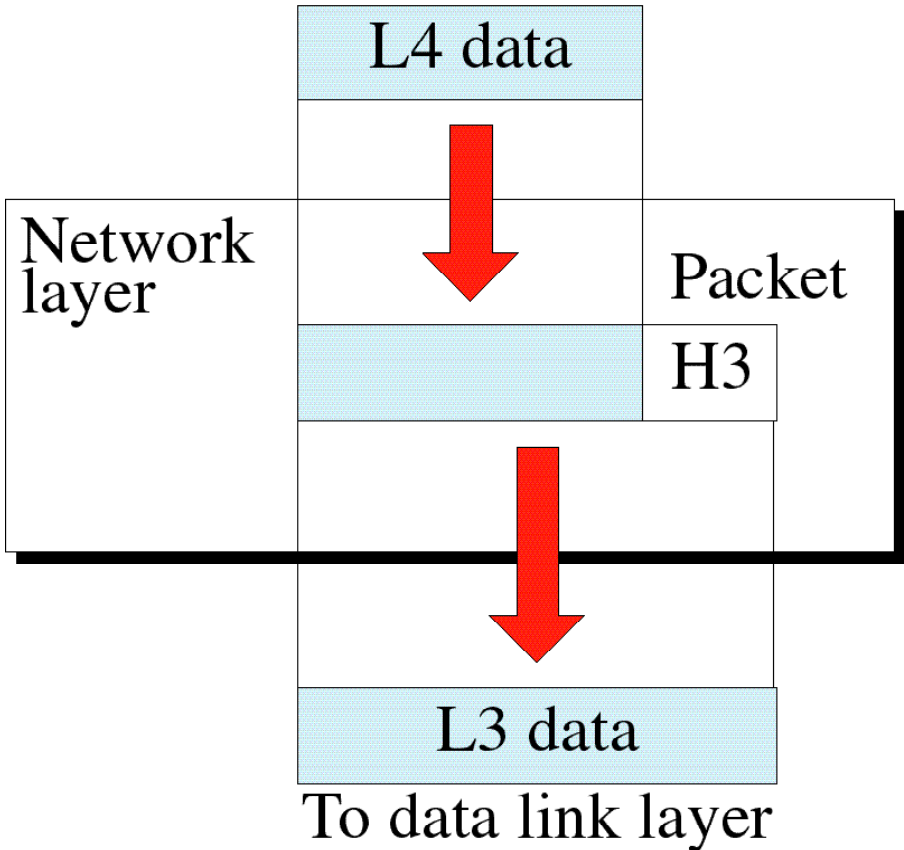
Data Link Layer

Responsibilities of data link layer

1. Framing
2. Physical address
3. Flow Control
4. Error Control
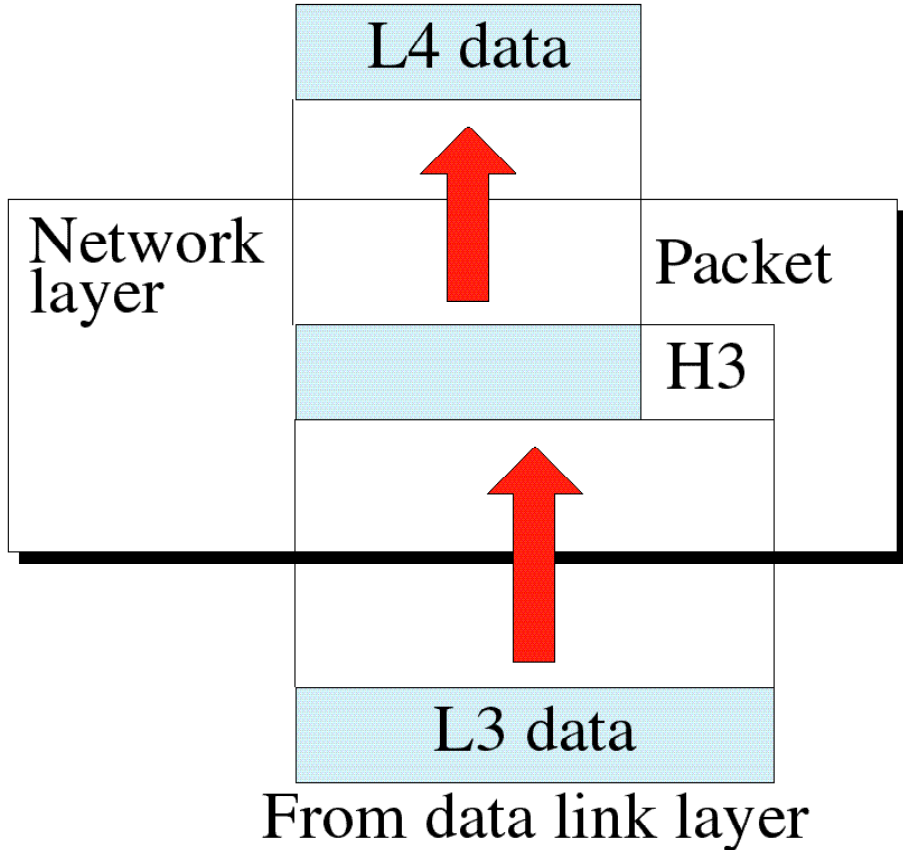5. Access control

# Data Link Layer Example

Network Layer

Network Layer

Responsibility of the network layer

▪Implements routing of frames (packets) through the network.

▪Defines the most optimum path the packet should take from the source to the destination

▪Defines logical addressing so that any endpoint can be identified.

▪Handles congestion in the network.

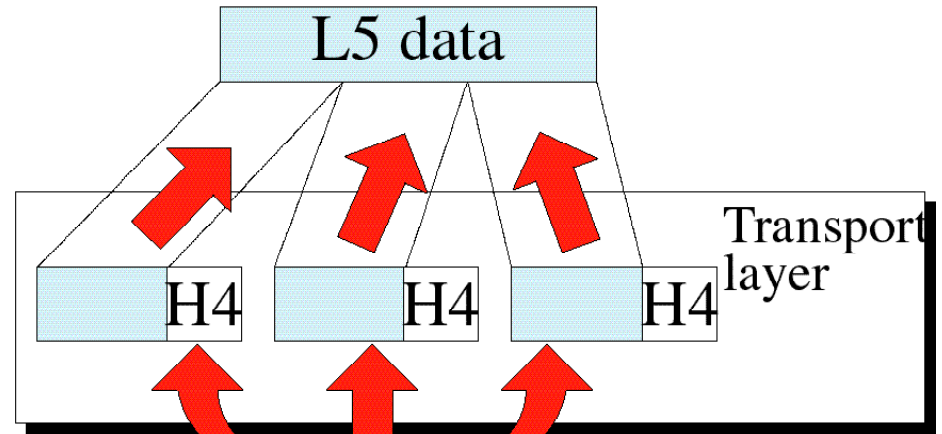▪The network layer also defines how to fragment a packet into smaller packets to accommodate different media.
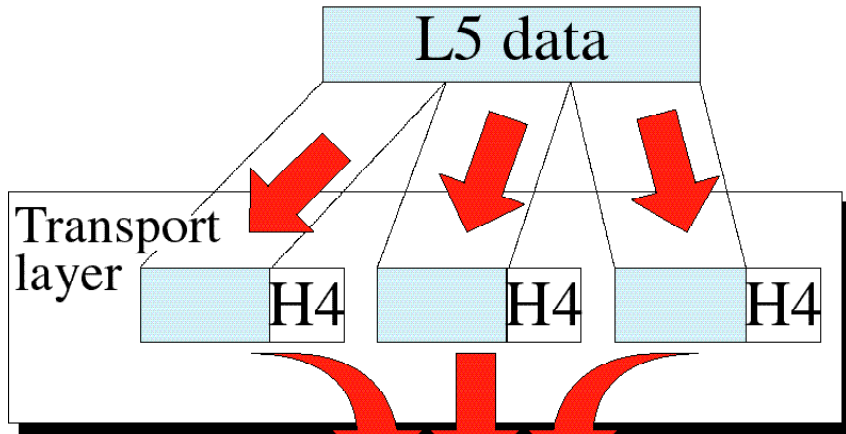
Transport Layer

Transport Layer

Responsibility of transport layer

Purpose of this layer is to provide a reliable mechanism for the exchange of data between two processes in different computers.

Segmentation and Reassembly

Ensures that the data units are delivered error free.

Ensures that data units are delivered in sequence.

Ensures that there is no loss or duplication of data units.
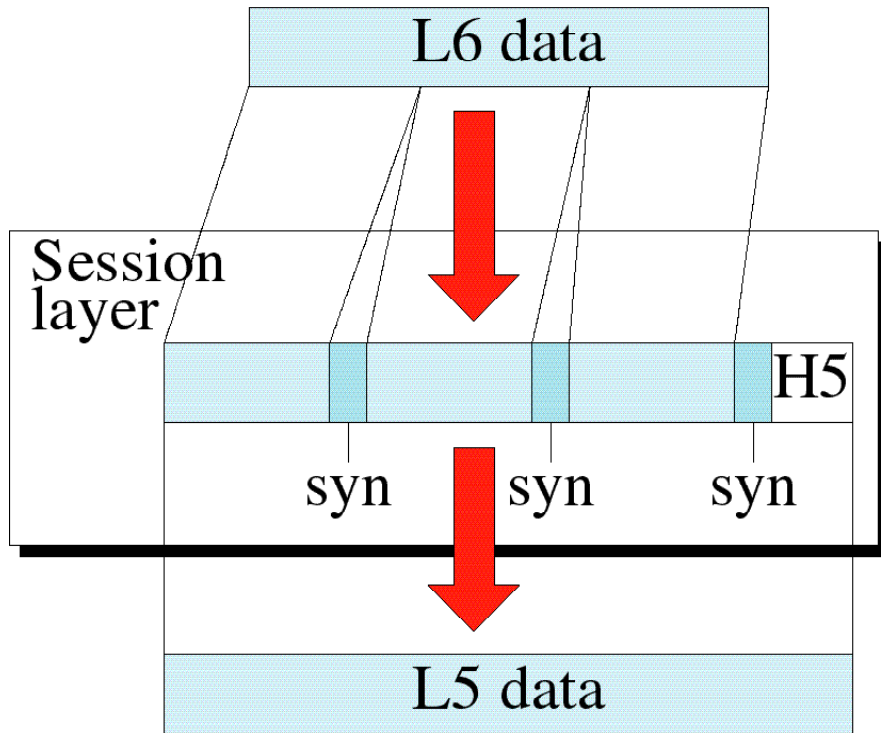
Provides connectionless or connection oriented service.

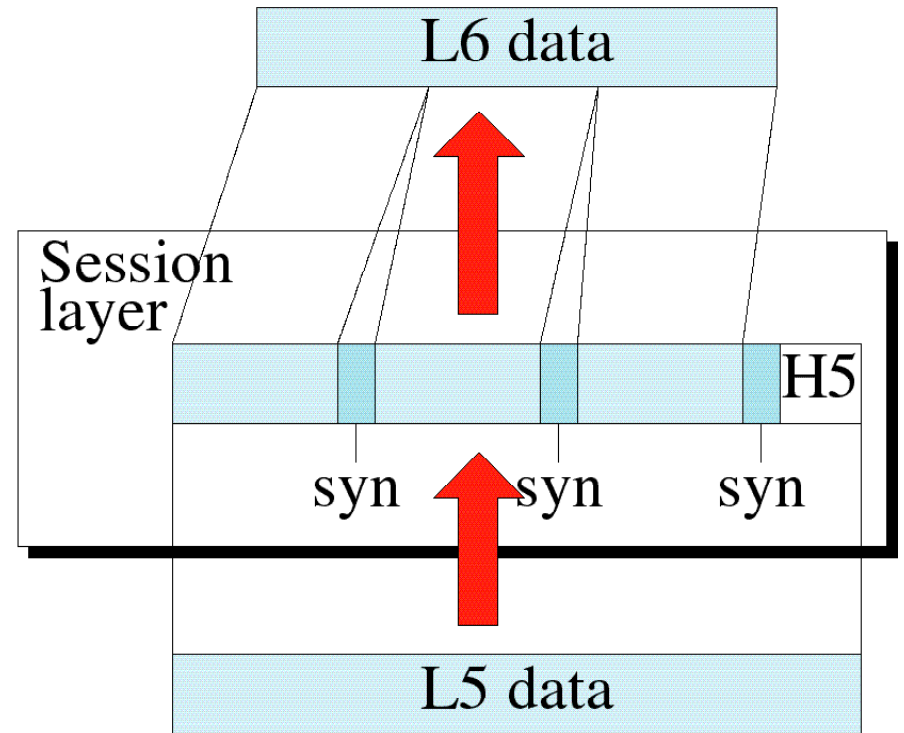# Transport Layer Example
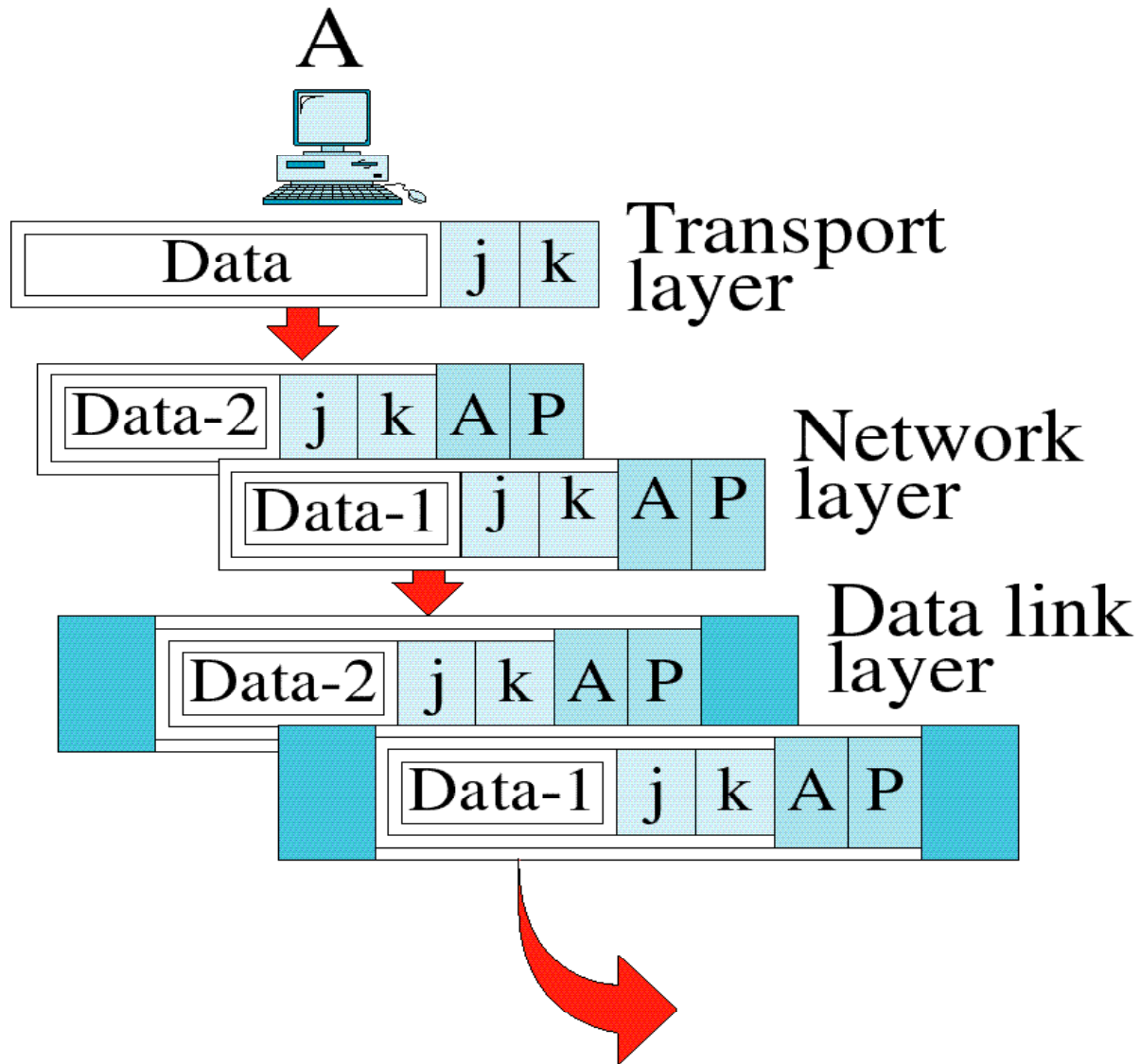
Transport Layer Example

Session Layer
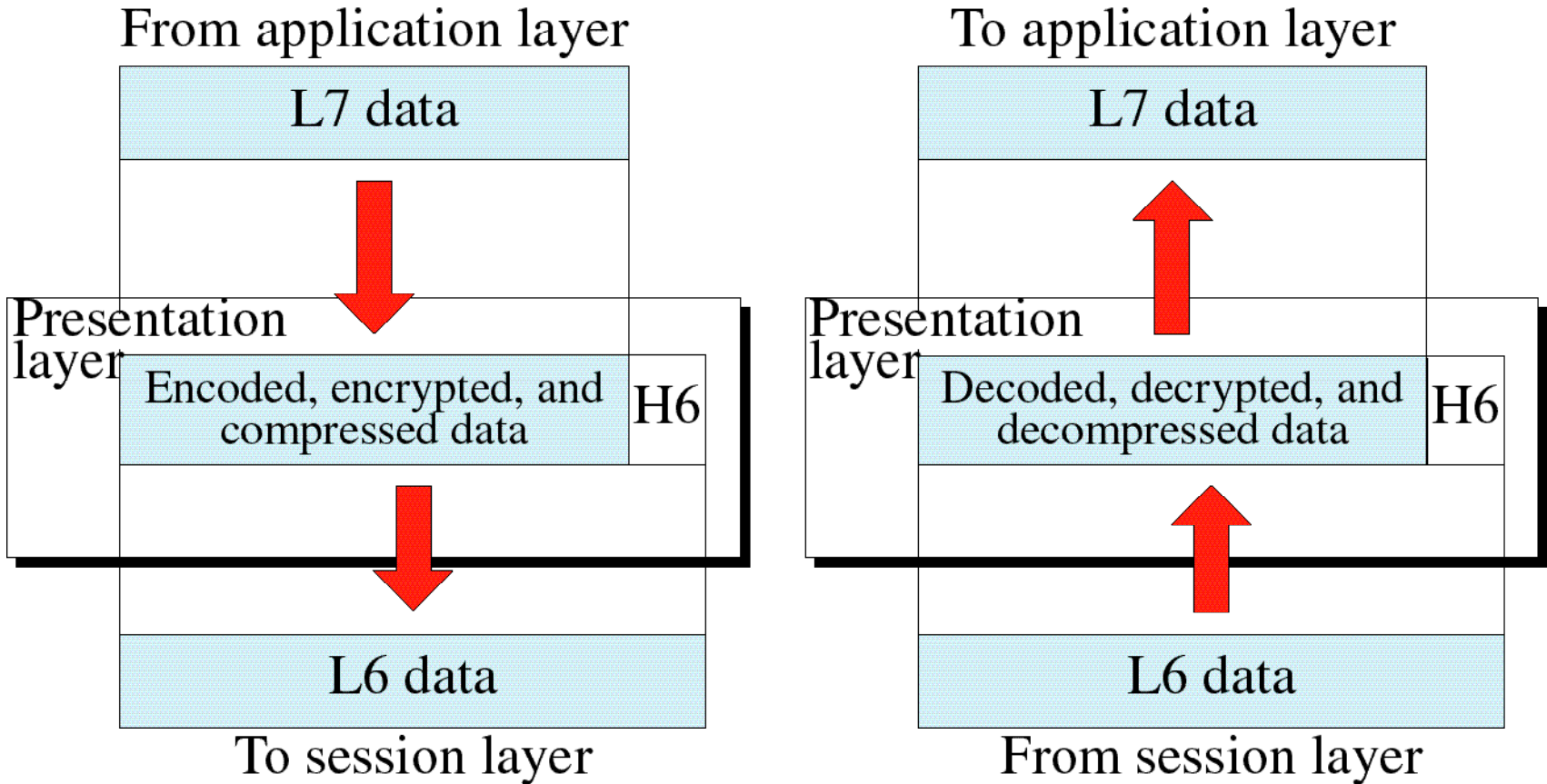
Session Layer

Responsibility of Session layer

- Session layer provides mechanism for controlling the dialogue between the two end systems. It defines how to start, control and end conversations (called sessions) between applications.

- This layer requests for a logical connection to be established on an end-user's request.
- Any necessary log-on or password validation is also handled by this layer.
- Session layer is also responsible for terminating the connection.
- This layer provides services like dialogue discipline which can be full duplex or half duplex.
- Session layer can also provide check-pointing mechanism such that if a failure of some sort occurs between checkpoints, all data can be retransmitted from the last checkpoint.
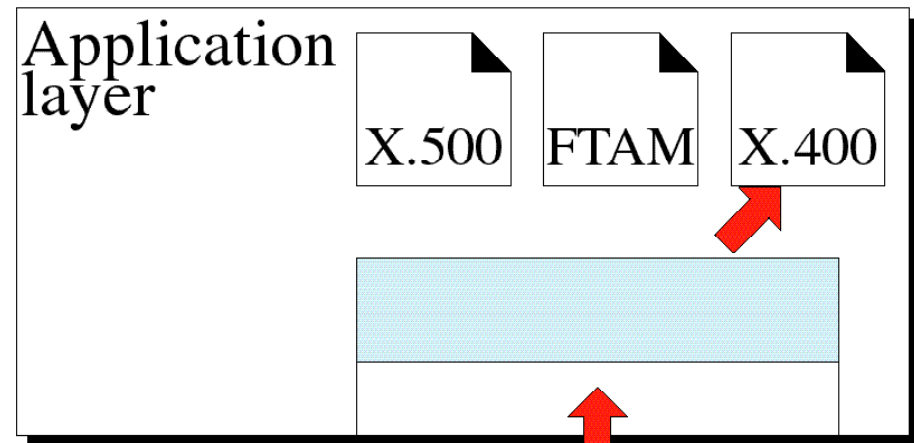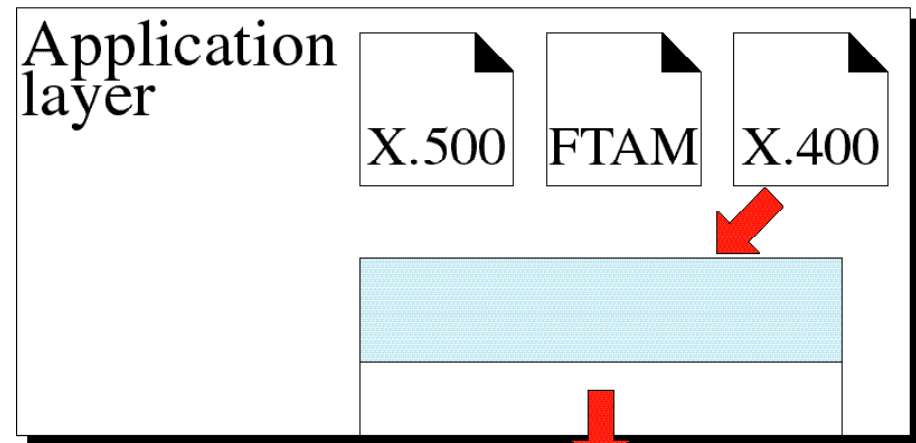
Presentation Layer

Presentation Layer

Responsibility of Presentation layer

- **Presentation layer defines the format in which the data is to be exchanged between the two communicating entities.**

- **Also handles data compression and data encryption (cryptography).**

Application Layer

Application Layer

Responsibility of Application layer

- Application layer interacts with application programs and is the highest level of OSI model.

- Application layer contains management functions to support distributed applications.

- Examples of application layer are applications such as file transfer, electronic mail, remote login etc.

Summary of Layer Functions

	Application — To allow access to network resources
To translate, encrypt, and compress data	**Presentation**
	Session — To establish, manage, and terminate sessions
To provide end-to-end message delivery and error recovery	**Transport**
	Network — To move packets from source to destination; to provide internetworking
To organize bits into frames; to provide node-to-node delivery	**Data link**
	Physical — To transmit bits; to provide mechanical and electrical specifications