



SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution



Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A++' Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

19ECT301- COMMUNICATION NETWORKS

III YEAR/₁V SEMESTER

UNIT 1 – INTRODUCTION TO NETWORKS AND LAYERED ARCHITECTURE

TOPIC – PROTOCOL LAYERS AND SERVICE MODELS OSI



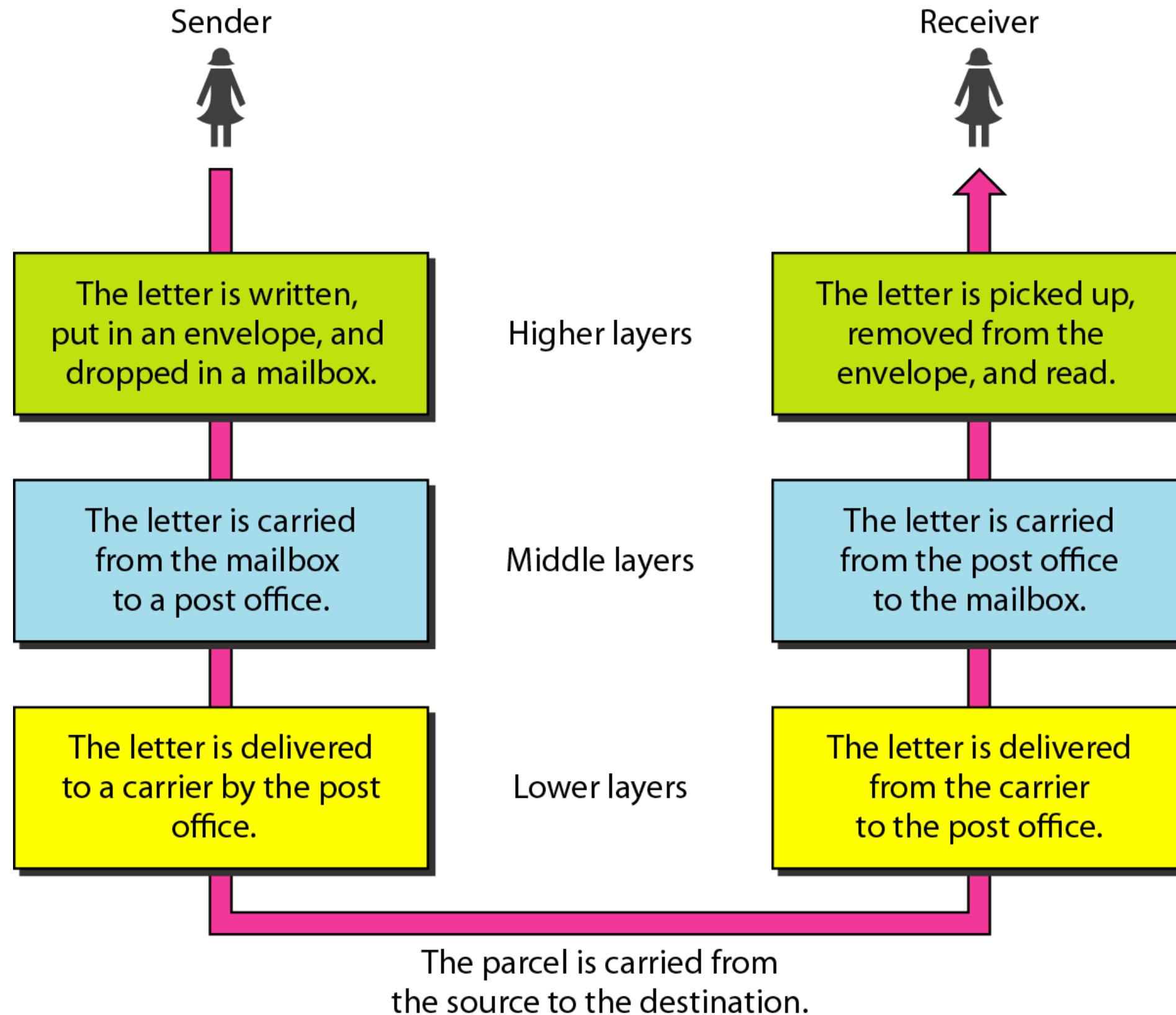
PROTOCOL LAYERS



The concept of **layers** in our daily life. As an example, let us 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.



TASKS INVOLVED IN SENDING A LETTER





THE OSI MODEL

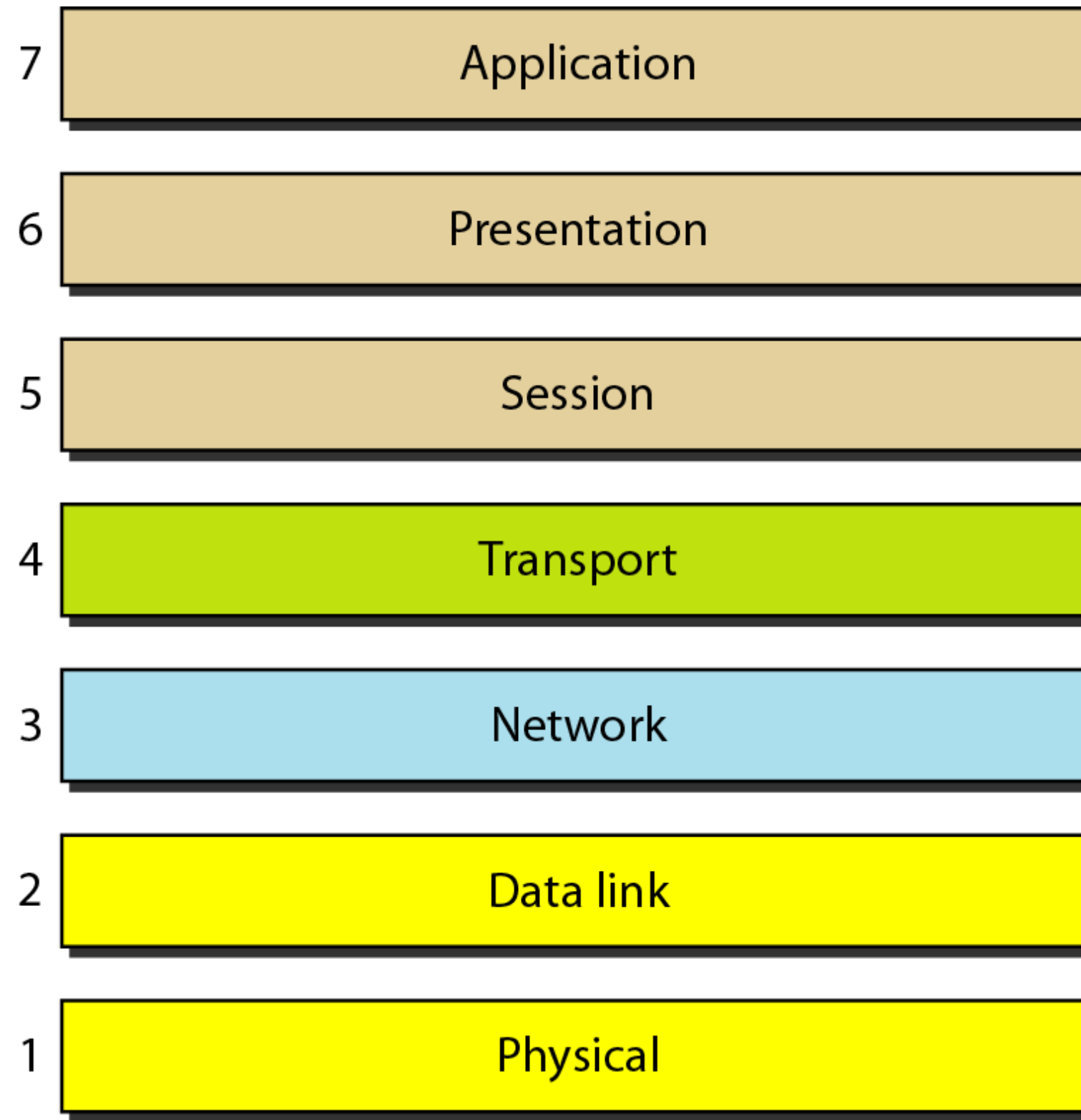


Established in 1947, the International Standards Organization (**ISO**) is a multinational body dedicated to worldwide agreement on international standards. An ISO standard that covers all aspects of network communications is the Open Systems Interconnection (**OSI**) model. It was first introduced in the late 1970s.

ISO is the organization.
OSI is the model.

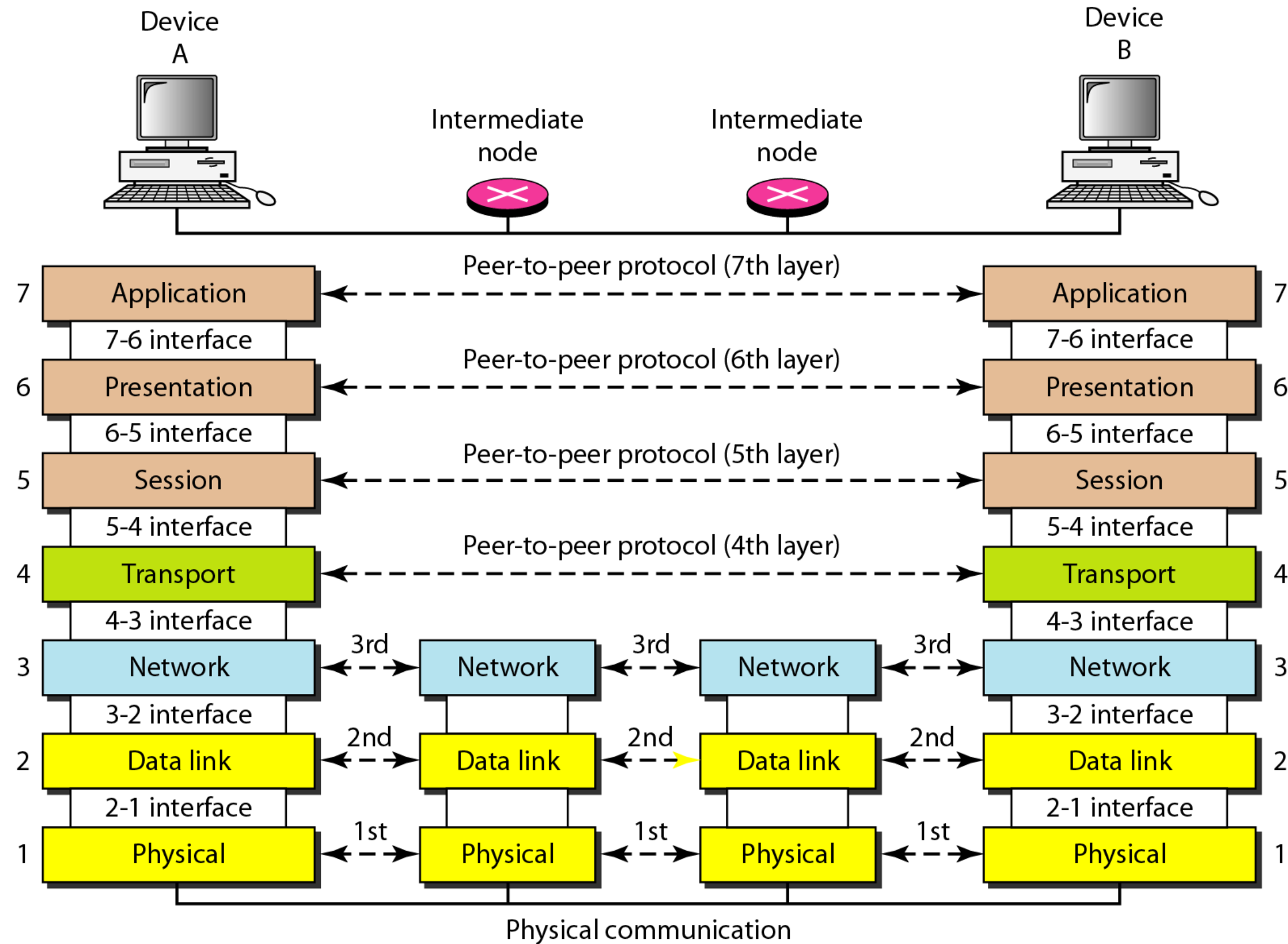


SEVEN LAYERS OF THE OSI MODEL



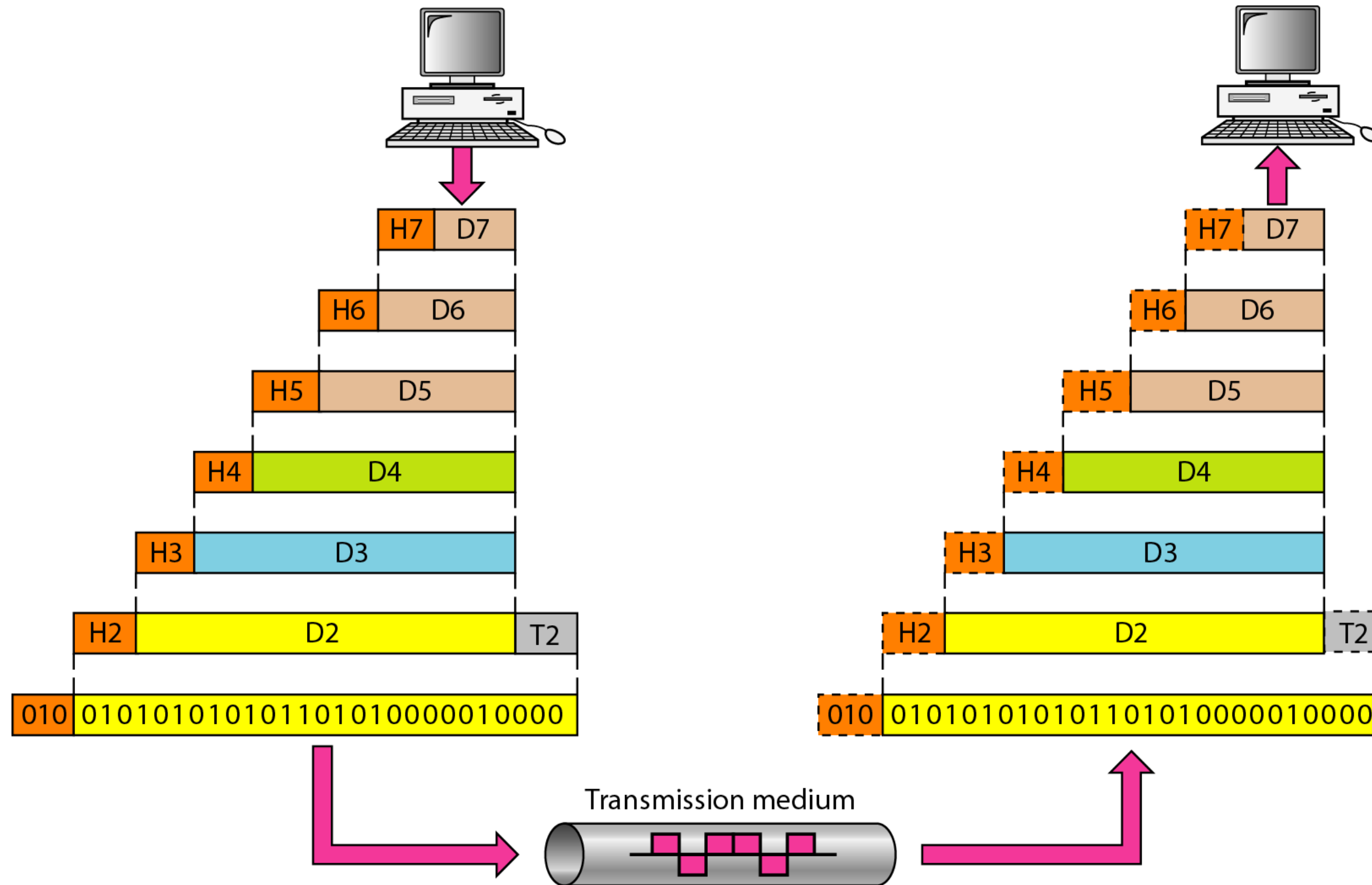


THE INTERACTION BETWEEN LAYERS IN THE OSI MODEL





AN EXCHANGE USING THE OSI MODEL





LAYERS IN THE OSI MODEL



In this section we briefly describe the functions of each layer in the OSI model.

1. Physical Layer
2. Data Link Layer
3. Network Layer
4. Transport Layer
5. Session Layer
6. Presentation Layer
7. Application Layer



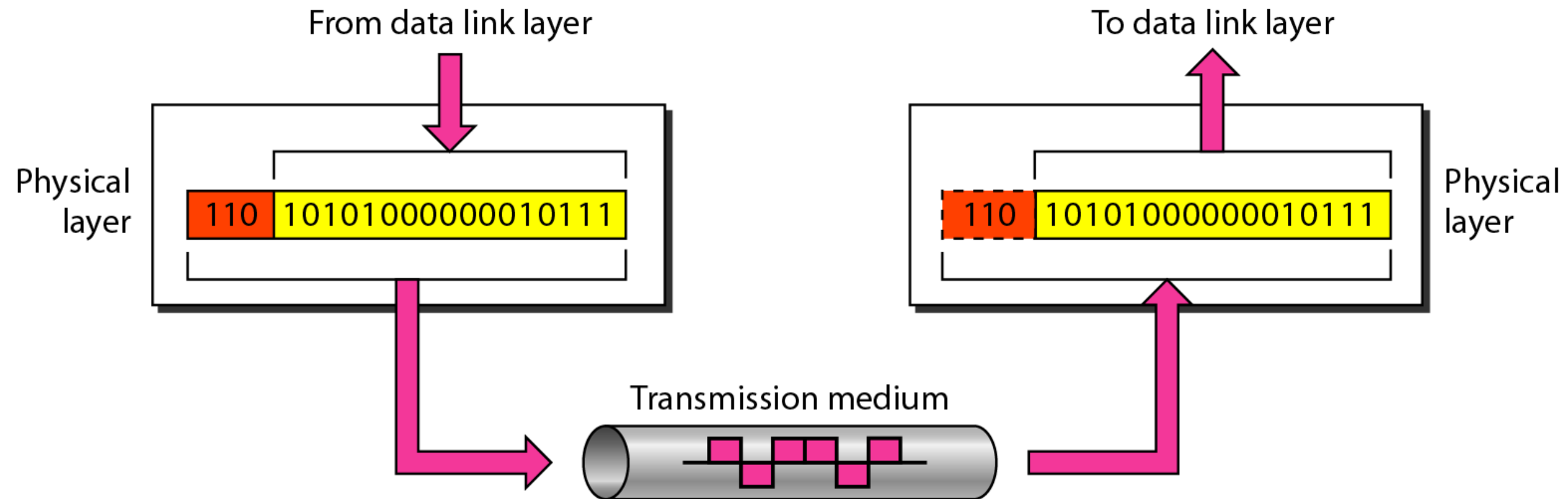
PHYSICAL LAYER



- The physical layer coordinates the functions required to carry a bit stream over a physical medium
- Defines rules by which bits are passed from one system to another on a physical communication medium.
- Covers all - mechanical, electrical, functional and procedural - aspects for physical communication.
- Includes characteristics as voltage levels, timing of voltage changes, physical data rates, maximum transmission distances, physical connectors, and other similar attributes are defined by physical layer specifications.



PHYSICAL LAYER



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



PHYSICAL LAYER



Physical layer is also concerned with the following:

- physical characteristics of interfaces and medium
- representation of bits
- Data rate (no. of bits sent each second or duration of a bit)
- Synchronization of bits
- Line configuration
- Physical topology
- Transmission mode



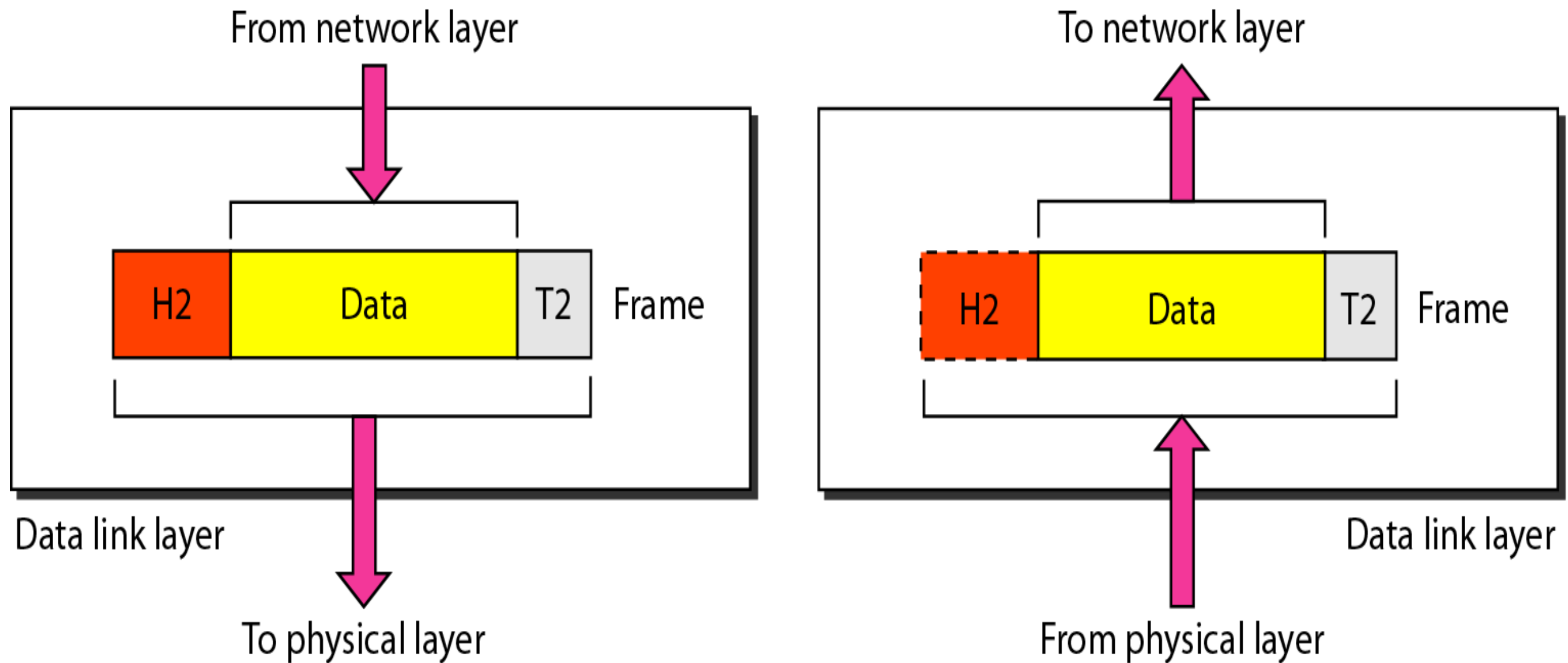
DATA LINK LAYER



- Data link layer attempts to provide reliable communication over the physical layer interface.
- It makes the physical layer appear error-free to the upper layer.
- Breaks the outgoing data into frames and reassemble the received frames. - **Framing**
- Create and detect frame boundaries, adds header to the frame - **Physical addressing.**
- Handle errors by implementing an acknowledgement and retransmission scheme – trailer is added for this purpose. - **Error control.**
- Implement **flow control.**
- Supports points-to-point as well as broadcast communication.
- Supports simplex, half-duplex or full-duplex communication.
- **Access control**-which device has control over link at a given time.

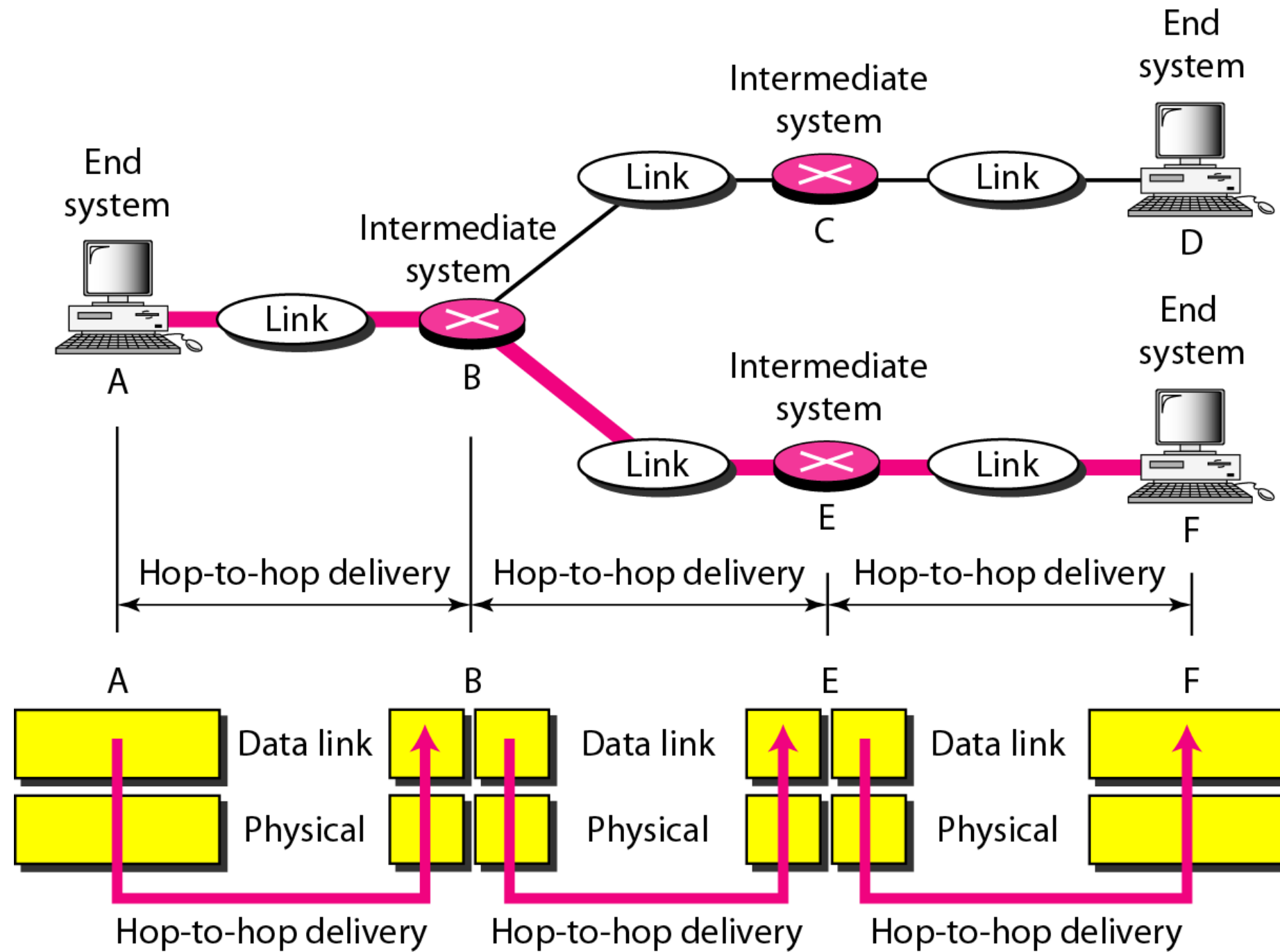


DATA LINK LAYER





HOP TO HOP DELIVERY





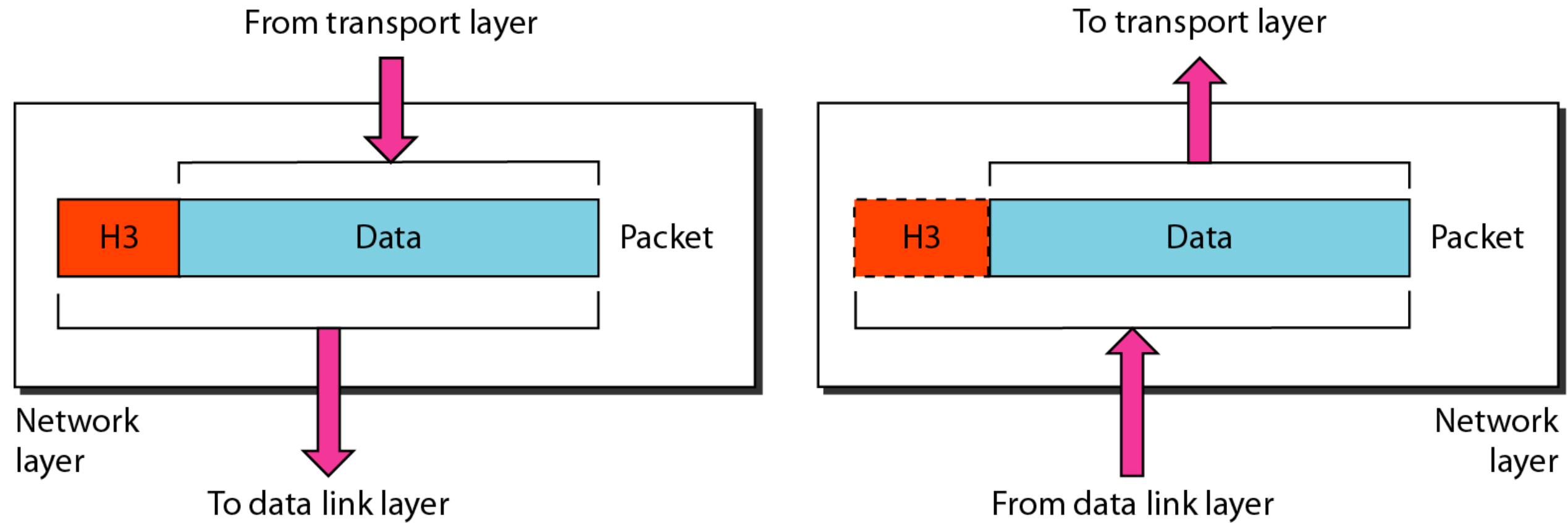
NETWORK LAYER



- Implements routing of frames (packets) through the network (**source to destination delivery** across multiple networks)
- Defines the most optimum path the packet should take from the source to the destination.
- the network layer ensures that each packet gets from its point of origin to its final destination.
- Defines **logical addressing** so that any endpoint can be identified.
- Handles congestion in the network.
- Facilitates interconnection between heterogeneous networks (Internetworking).
- **Routing**



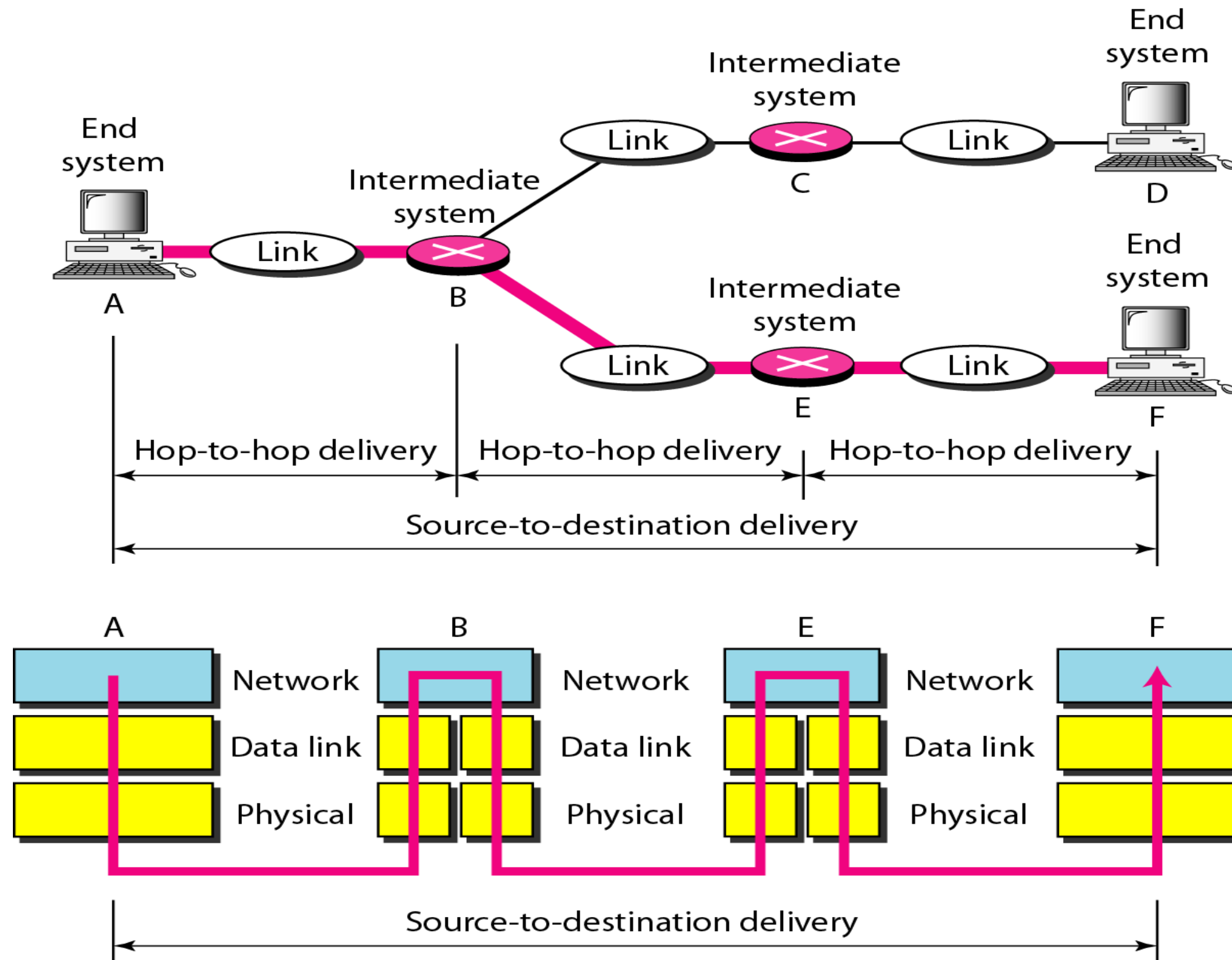
NETWORK LAYER



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



SOURCE-TO-DESTINATION DELIVERY





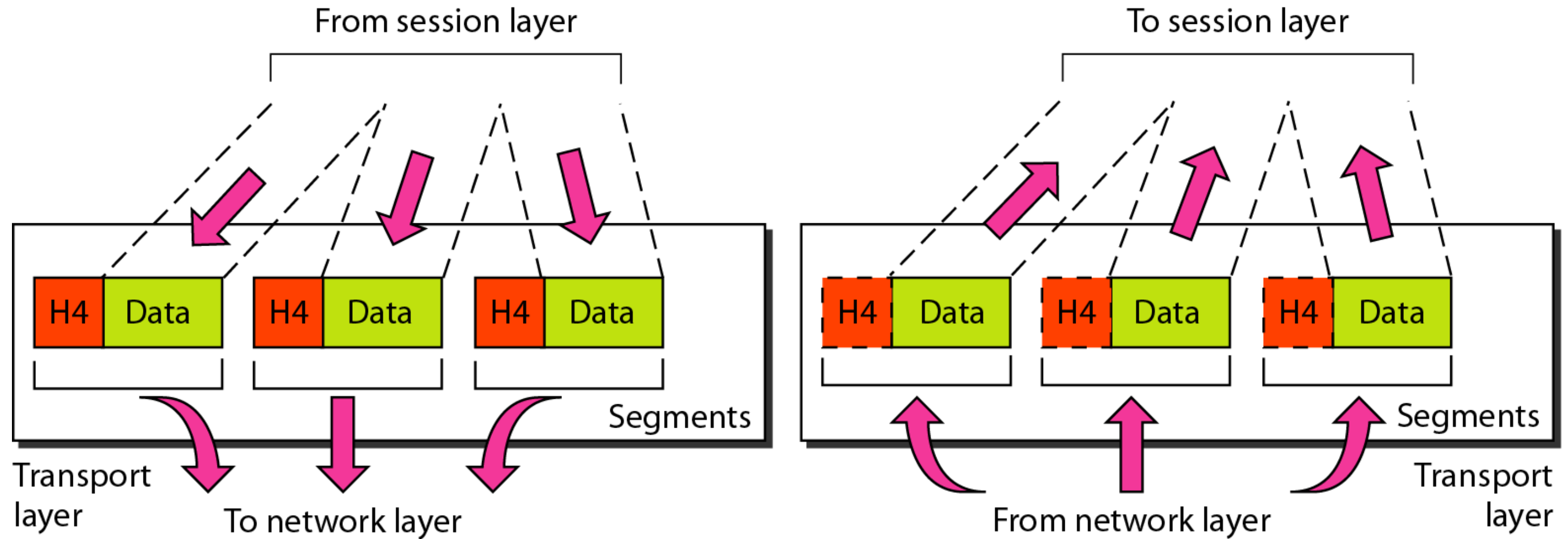
TRANSPORT LAYER



- Purpose of this layer is to provide a reliable mechanism for the exchange of data between two processes in different computers. (**process to process delivery**)
- **Service point addressing** - The network layer gets each packet to the correct computer; the transport layer gets the entire message to the correct process on that computer.
- **Segmentation and reassembly**
- **Error control** - Ensures that the data units are delivered error free - Ensures that there is no loss or duplication of data units.
- Error correction is usually achieved through retransmission.
- **Connection control**-Provides connectionless or connection oriented service.
- **Flow control**



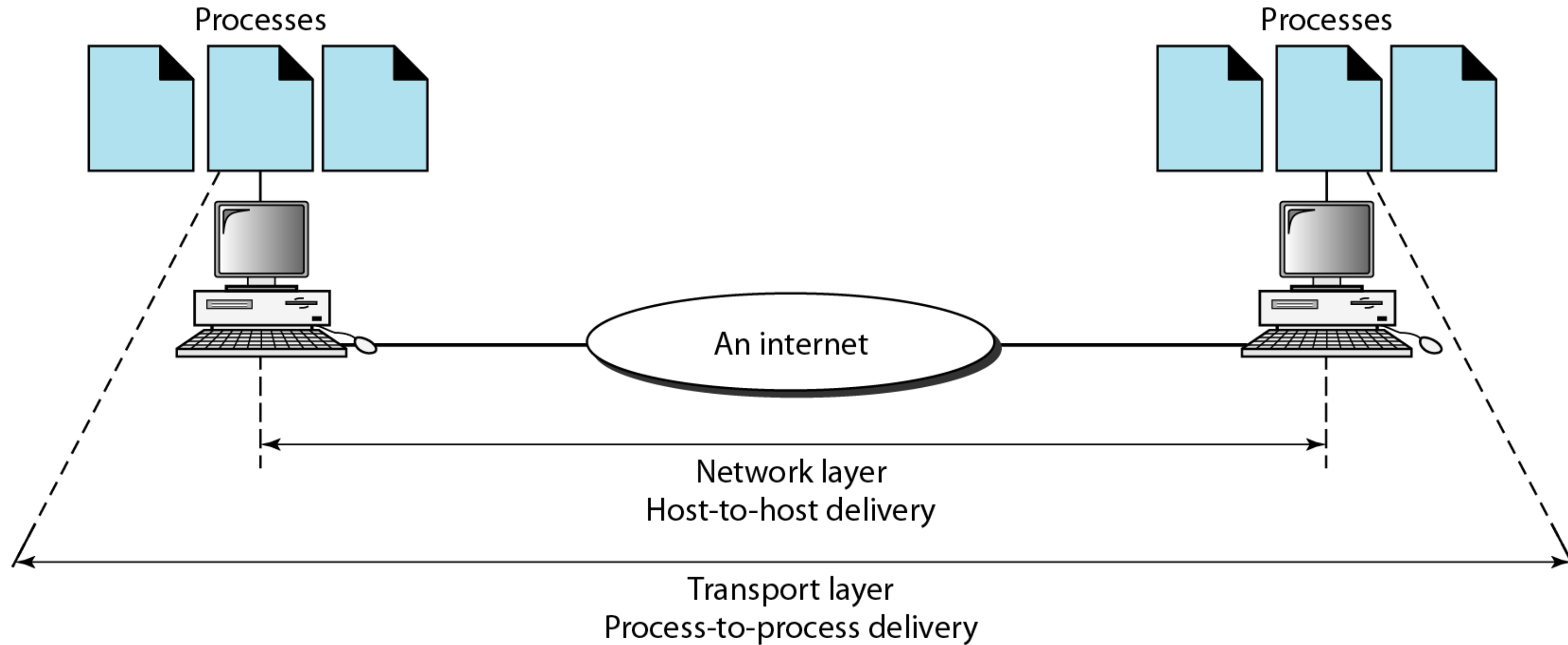
TRANSPORT LAYER



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



RELIABLE PROCESS-TO-PROCESS DELIVERY OF A MESSAGE





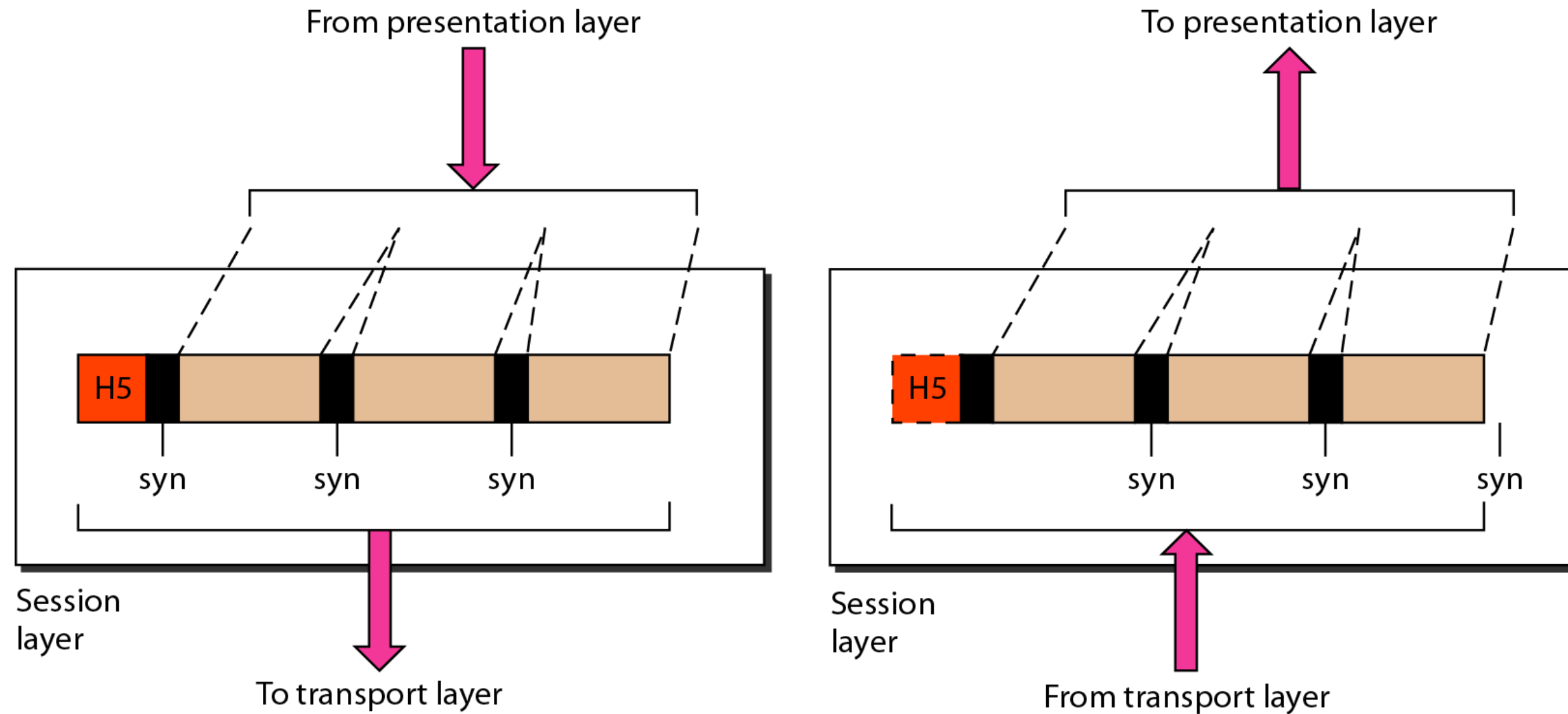
SESSIONS LAYER



- 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.
- It establishes, maintains and synchronizes the interaction among communicating systems. - **network dialog controller**
- **Dialog control**- The session layer allows two systems to enter into a dialog.
- This layer provides services like dialogue discipline which can be full duplex or half duplex.
- **Synchronization** - provide check-pointing mechanism such that if a failure of some sort occurs between checkpoints, all data can be retransmitted from the last checkpoint.



SESSIONS LAYER



The session layer is responsible for dialog control and synchronization.



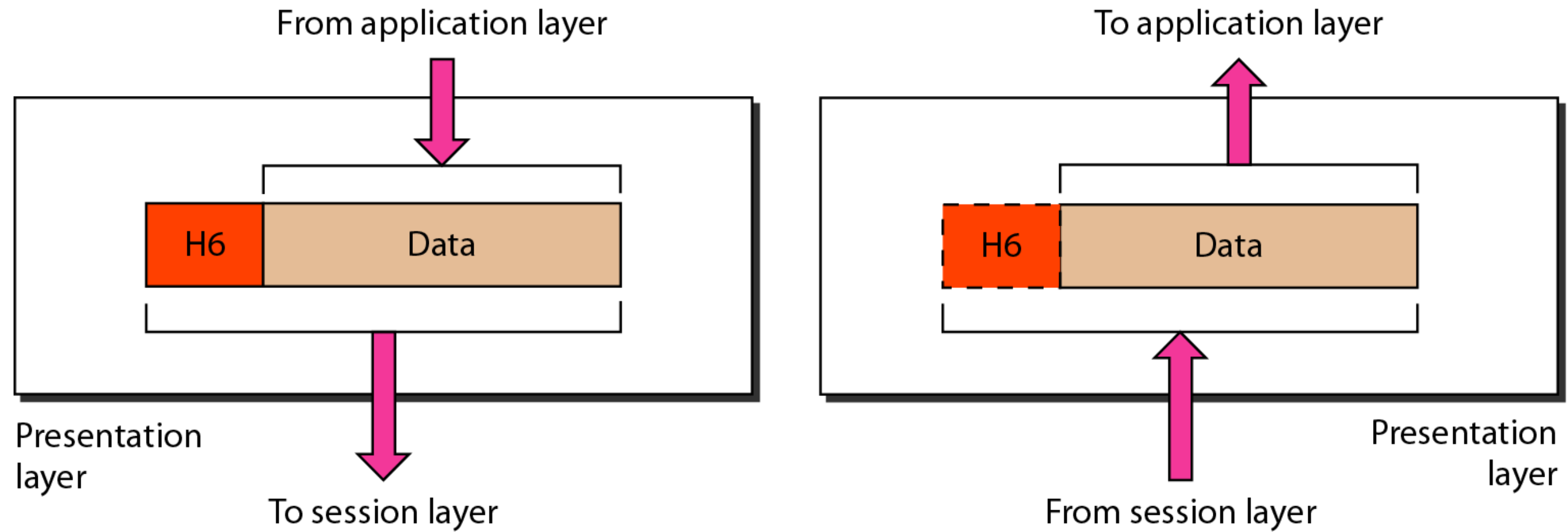
PRESENTATION LAYER



- Presentation layer defines the format in which the data is to be exchanged between the two communicating entities.
- It is concerned with the syntax and semantics of the information exchanged between two systems.
- Also handles data compression and data encryption (cryptography).
- **Translation**- The presentation layer at the sender changes the information from its sender-dependent format into a common format. The presentation layer at the receiving machine changes the common format into its receiver-dependent format.
- **Encryption**.
- **Compression** - Data compression reduces the number of bits contained in the information



PRESENTATION LAYER



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



APPLICATION LAYER



- **Application layer interacts with application programs and is the highest level of OSI model.**
- **The application layer enables the user, whether human or software, to access the network.**
- **It provides user interfaces and support for services such as electronic mail, remote file access and transfer, shared database management, and other types of distributed information services.**



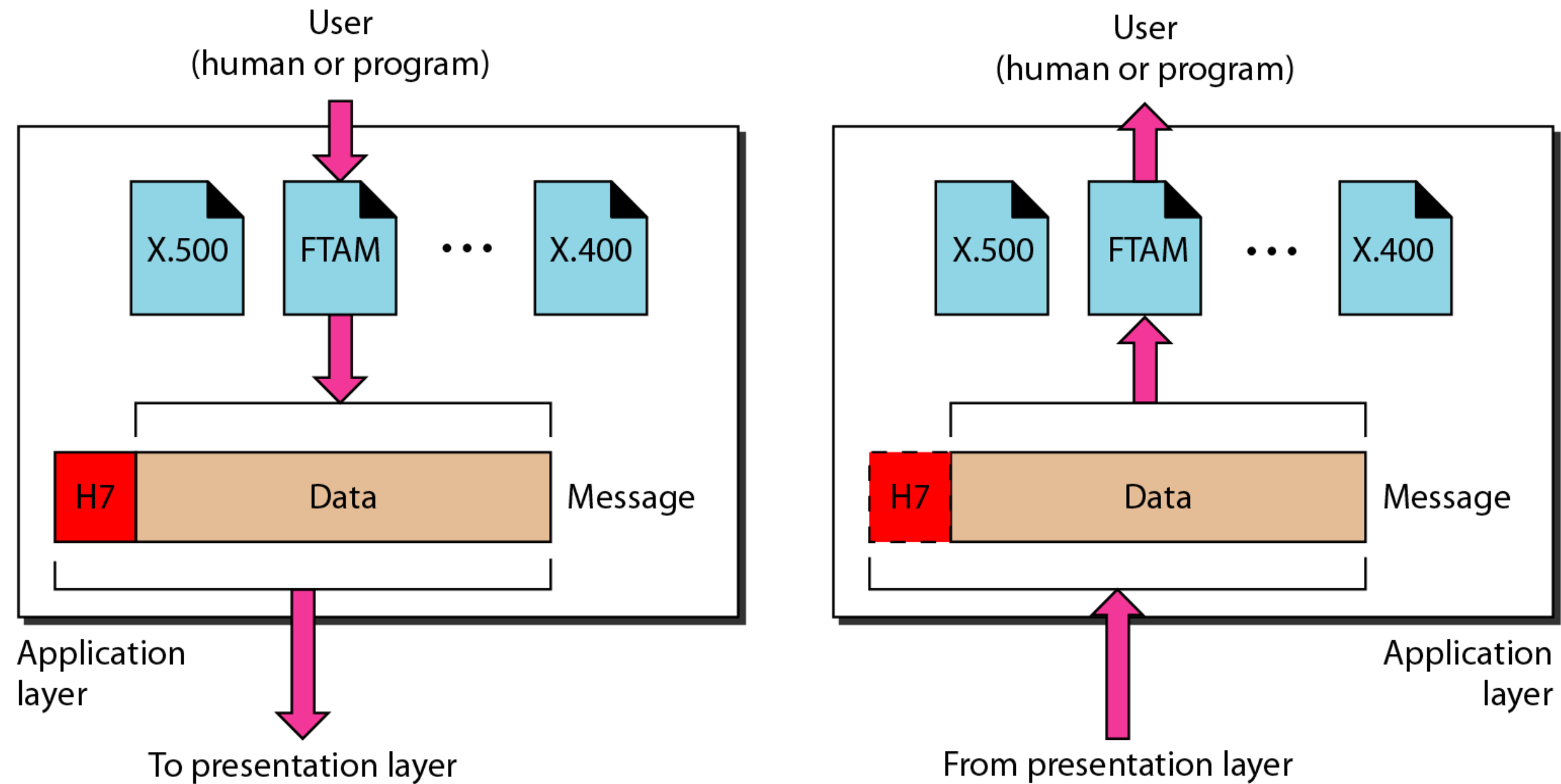
Specific Services provided by Application Layer



- **Network Virtual Terminal** – software version of physical terminal to allow a user to log on to a remote host.
- creates a software emulation of a terminal at the remote host
- **File transfer, Access and management** - allows a user to access, retrieve, manage or control the files in remote host locally
- **Mail Services** - provides the basis for e-mail forwarding and storage.
- **Directory Services** - provides distributed database sources and access for global information about various objects and services



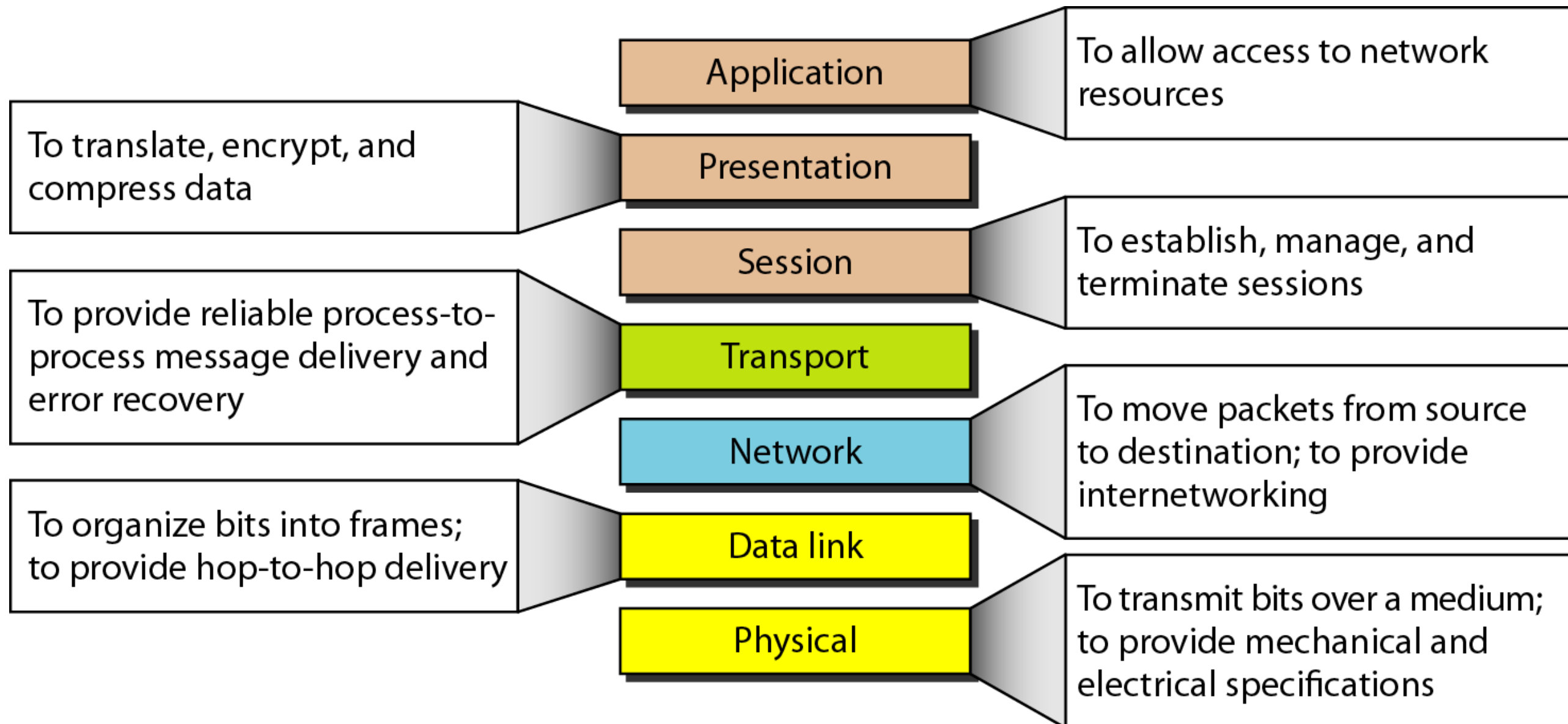
APPLICATION LAYER



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

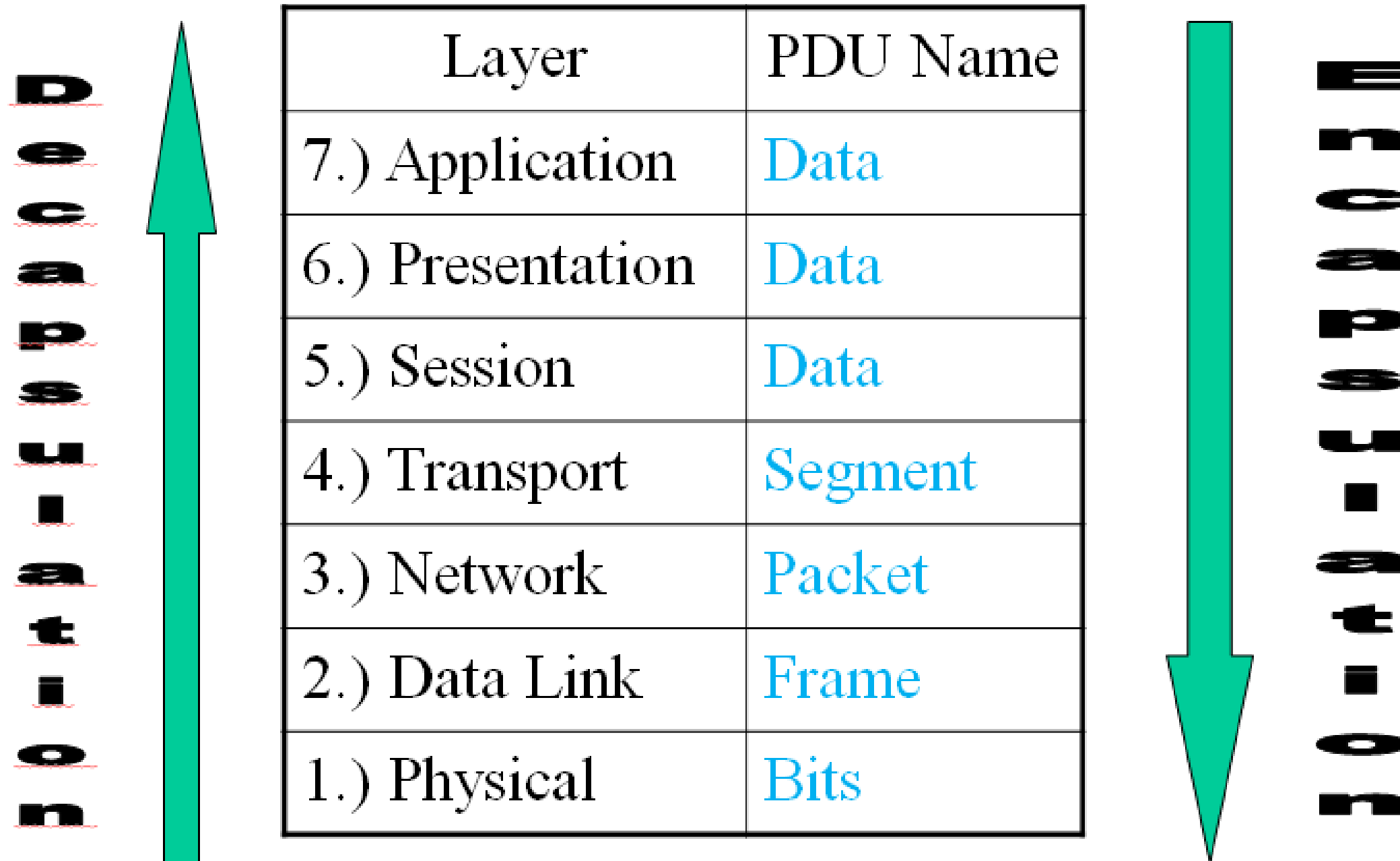


SUMMARY OF LAYERS





SUMMARY OF LAYERS





THANK YOU