

# Lecture 6

## OSI Layers

# Topics Covered

- Network layer
- Responsibilities included by the n/w layer
- Routing
- Transport layer
- Session layer
- Presentation layer
- Application layer
- Applications

# NETWORK LAYER

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- This layer is responsible for the src to destination delivery of packets across the networks

# Responsibilities included by the n/w layer

## ■ Logical Addressing:

- Physical addressing is implemented by the DLL handles the addressing problem locally.
- If the packet passes boundary we needed logical addressing to distinguish the src and destination
- The network layer adds header to the packets received from upper layer which defines the logical address of the sender and receiver

# Ex:

- A wants to send some data to D
- Path to be followed is A-F-G-D
- Logical address will remain the same while moving from A-f-G-D
- PHYSICAL ADDRESS WILL CHANGE
  - A-F
  - F-G
  - G-D

# Routing

- The **network layer controls the operation of the subnet**
- A key design issue is determining how packets are routed from source to destination
- Routes can be dependent upon many things like current network load or on static tables
- The control of congestion also belongs to the network layer.
- It is up to the network layer to allow heterogeneous networks to be interconnected.

# Network Layer

## Functions

- Routing: means to identify best shortest path b/w source & destination.  
Static routing- path is known in advance.  
Dynamic routing- path is dynamic.
- Congestion control
- Interconnection of heterogeneous n/w

## Network Devices:

- Routers
- Brouters
- Layer 3 switches.



# TRANSPORT LAYER

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- The basic function of the **transport layer** is to **accept data from above, split it** up into smaller units if need, pass these to the network layer, and ensure that the pieces all arrive correctly at the other end.
- The transport layer also determines what type of service to provide to the session layer, and, ultimately, to the users of the network
- The most popular type of transport connection is an error-free point-to-point channel that delivers messages or bytes in the order in which they were sent..

- Transport layer is responsible for process to process delivery of the entire message
- It treats each packets independently, as though each piece is a separate message.
- Transport layer on the receiving side ensures that whole message arrives intact and in order overseeing error control and flow control at the source to destination level
- Network layer gets each packet to the correct computer
- Transport layer gets the entire message on that computer

## ■ Segmentation

- Message is divided into transmittable segments, with each segment containing a sequence numbers

# Session Layer

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- The main functions of the session layer are to establish, maintain and synchronize the interaction between two communicating hosts
- Ex: A wants to send a document of 1000 pages to another user B
  - A session was established
  - After first 105 pages have been sent the connection between two hosts is broken for some reason
  - Question is:-
    - When the connection is restored after some time transmission must start from the first page or 106<sup>th</sup> page.
    - THESE ISSUES ARE THE CONCERNS OF THE SESSION LAYER

- To avoid these issues
  - Session layer could create sub-sessions
  - After each sub-session is over , a checkpoint can be taken
  - Say after 10 pages
  - So in this retransmission will be from 101<sup>st</sup> page

- In some cases checkpoint is not reqd where the data is small
- When when the session layer receives the data from presentation layer it adds a header which among other things also contains information as to whether there is any checkpoiting and if there is then at what point



- Session layer checks and establishes connection between hosts of two different users.
- Users might need to enter identification information such as LOGIN AND Password
- and finally SESSION CLOSURE
  - That is the session between the hosts is closed gracefully

# PRESENTATION LAYER

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# Translation

- SENDER AND RECEIVER might be using different coding standards and character sets for representing data.
- Sender is using ASCII code
- Receiver is using EBCDIC
- Presentation layer has to take care fo such differences

- Then other responsibilities includes:-
  - Encryption and Decryption
  - Compression

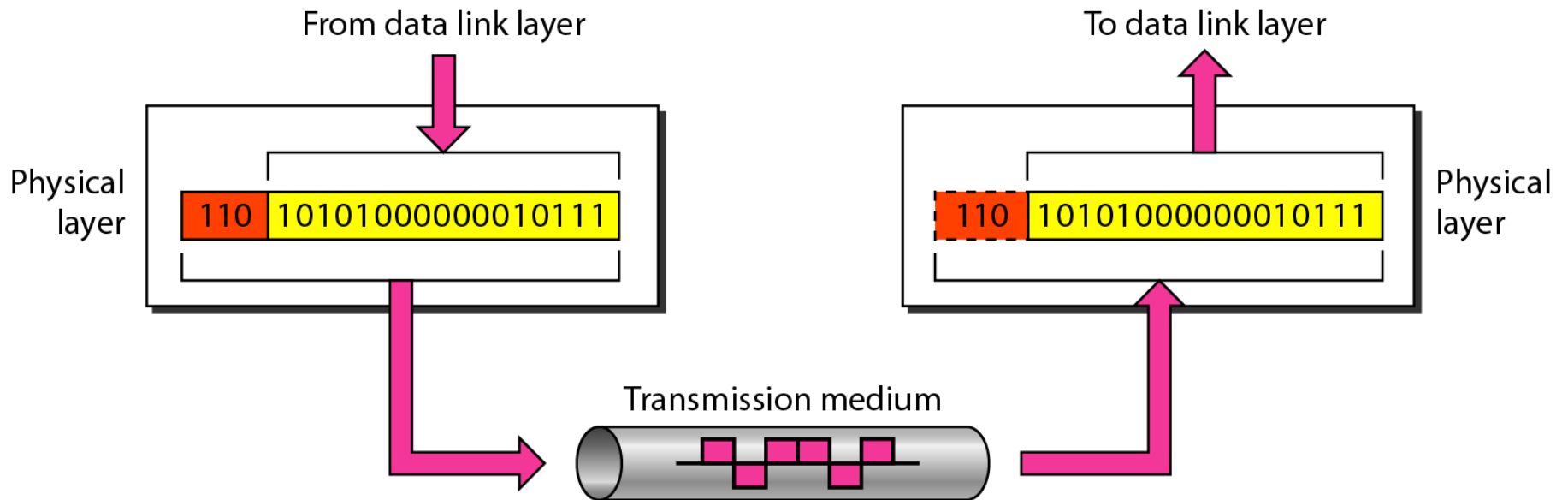
# Application Layer

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- Application layer enables the user to access the network
- Application programs which uses the networks services also reside at this layer
- Like--- telnet----www----ftp etc.....

# Summarize OSI Model

**Figure 2.5** *Physical layer*





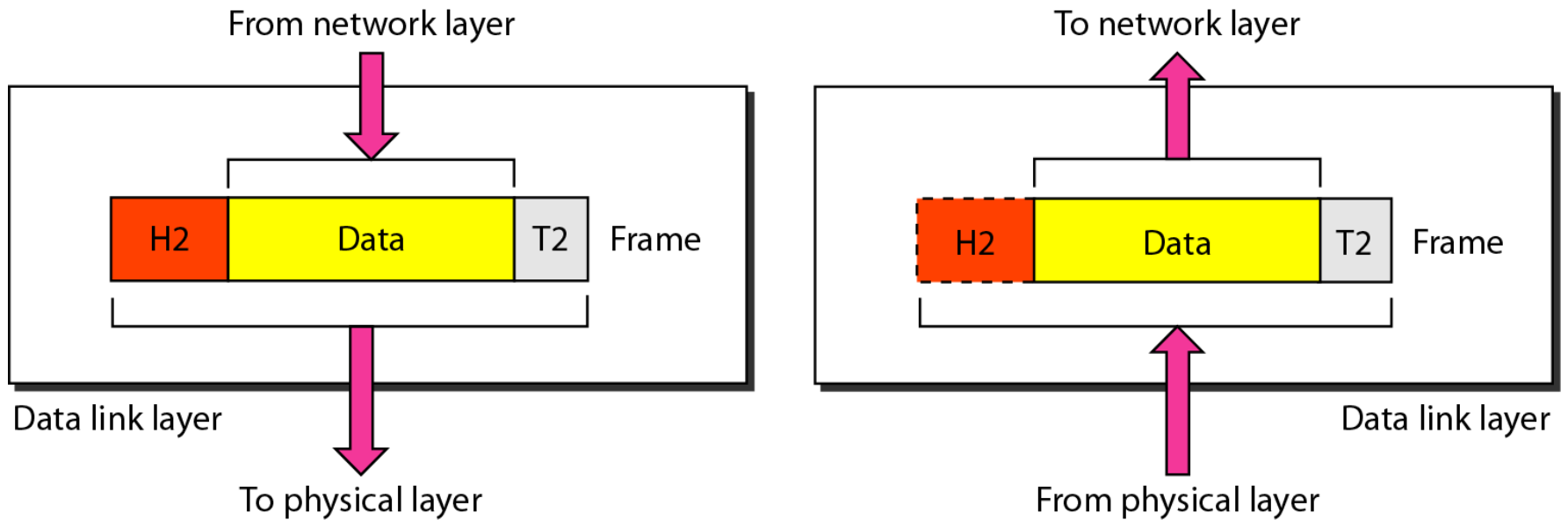


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*Note*

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

**Figure 2.6** *Data link layer*



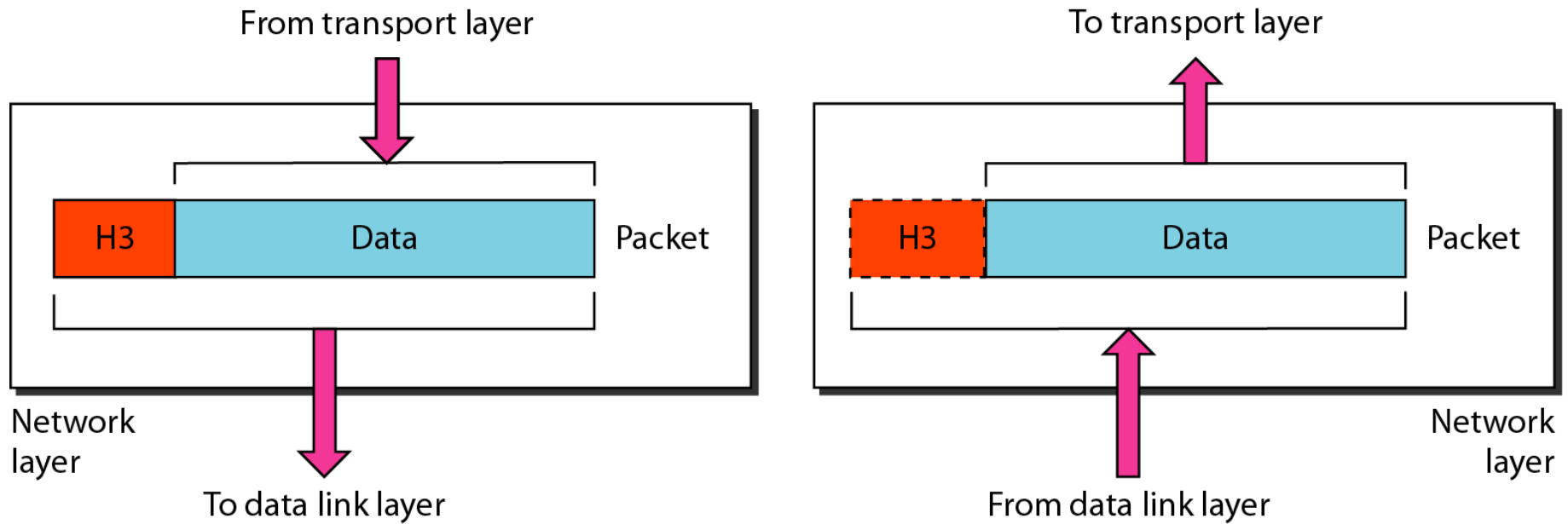


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*Note*

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

**Figure 2.8** *Network layer*





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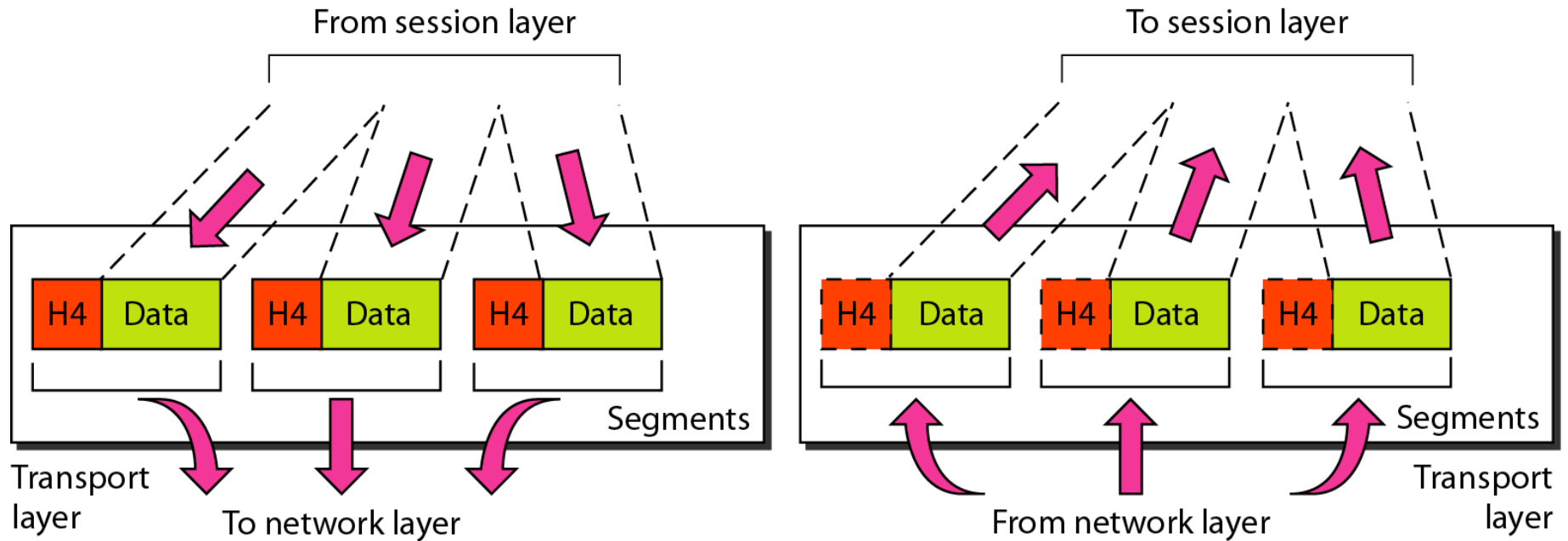
*Note*

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

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**Figure 2.10** *Transport layer*



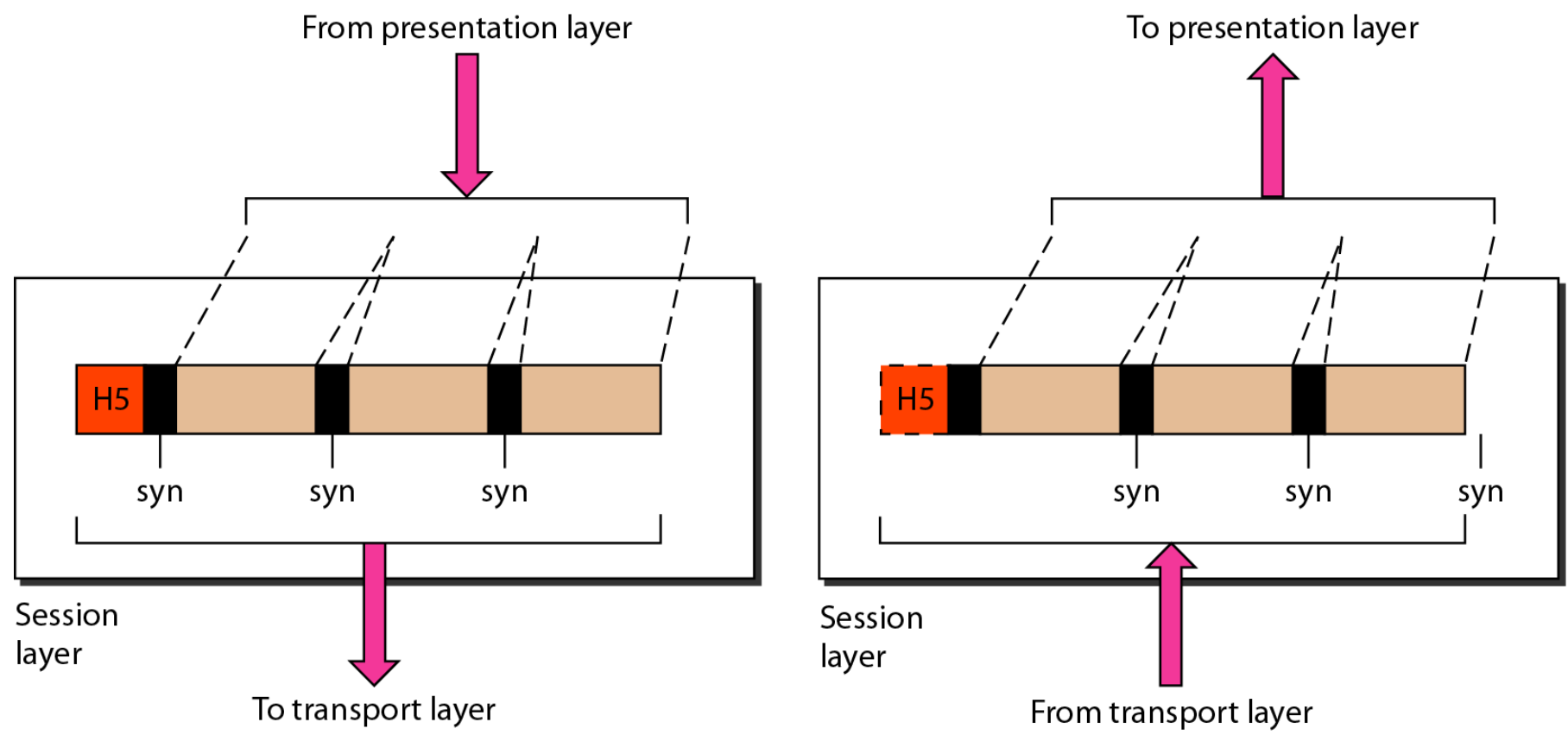


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*Note*

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

**Figure 2.12** *Session layer*

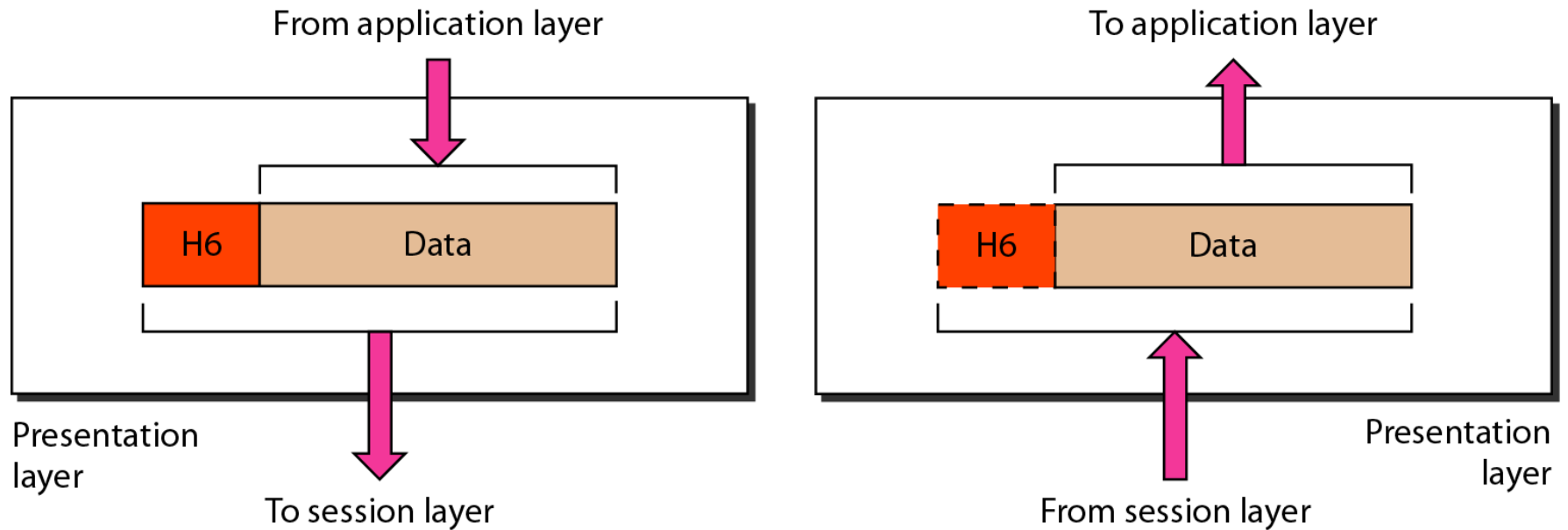




*Note*

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

**Figure 2.13** *Presentation layer*

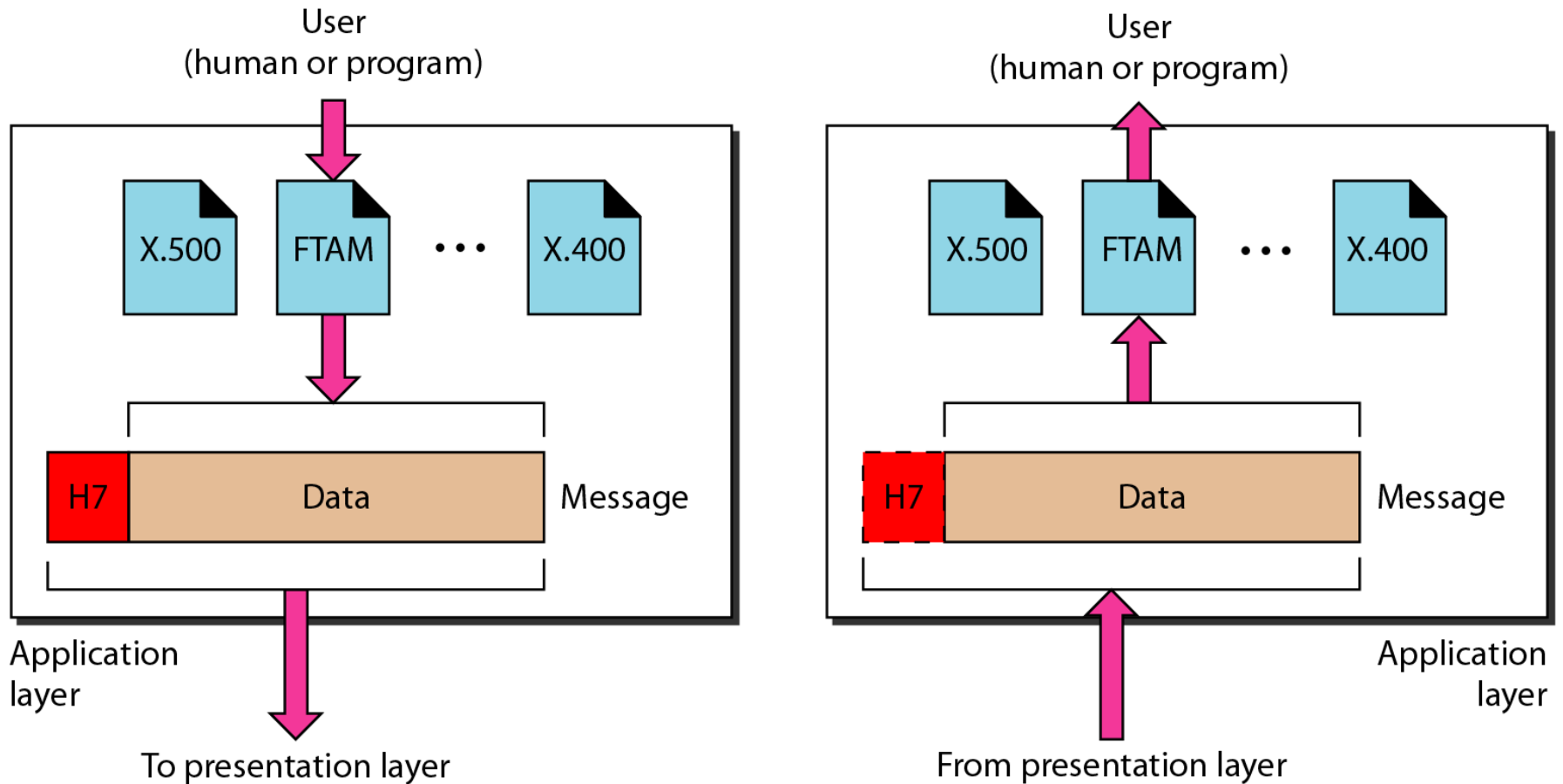




*Note*

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

**Figure 2.14** *Application layer*

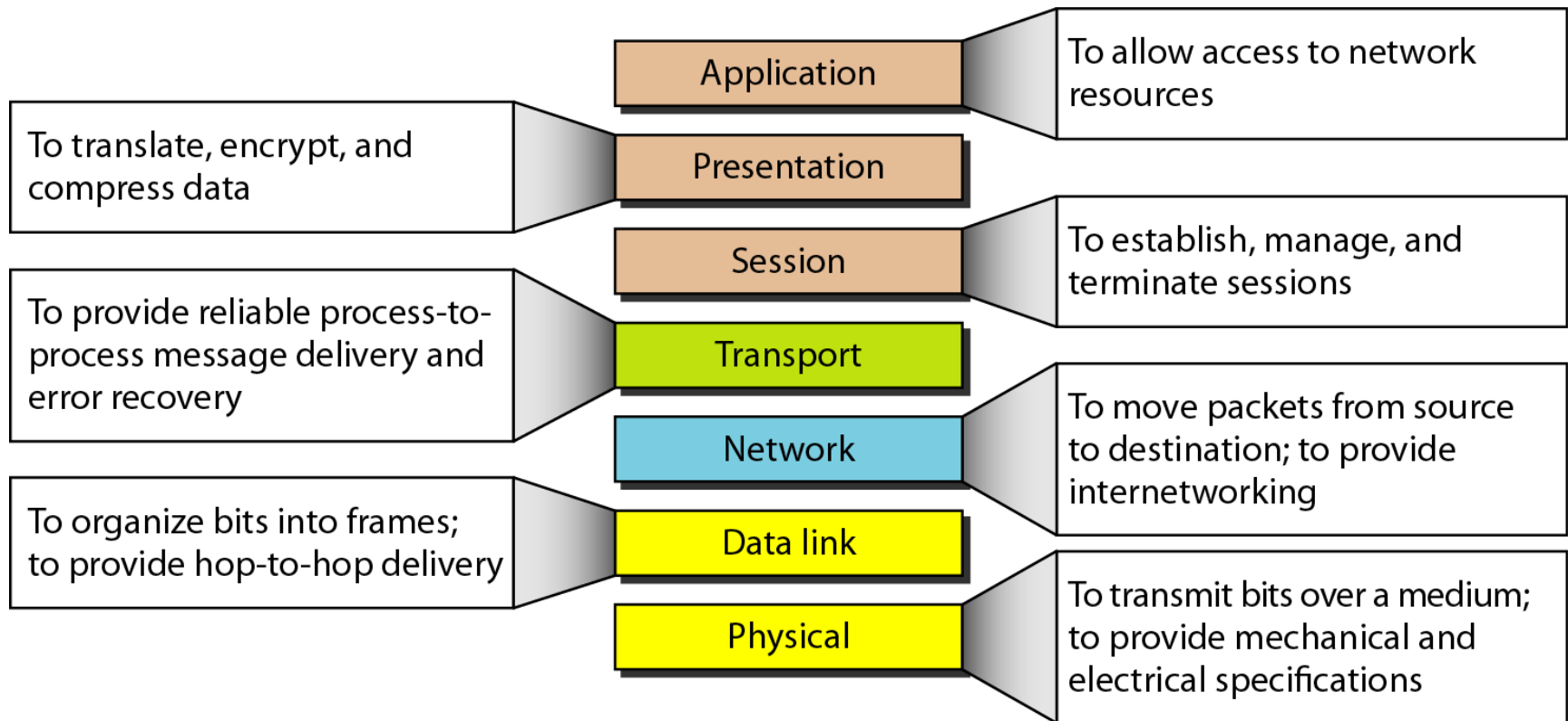




*Note*

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

**Figure 2.15** *Summary of layers*



# Application

- ISO-OSI Network model is a standard given by ISO but is never implemented in practice till date. It is only helpful to understand the whole data communication process layer wise.
- Network model which is practically implemented is TCP/IP model.

# Scope of Research

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- Cross layer architecture
- Security in network model