جامعة الحمدانية
كلية التربية
قسم علوم الحاسوب

Network Layers II

المرحلة الرابعة
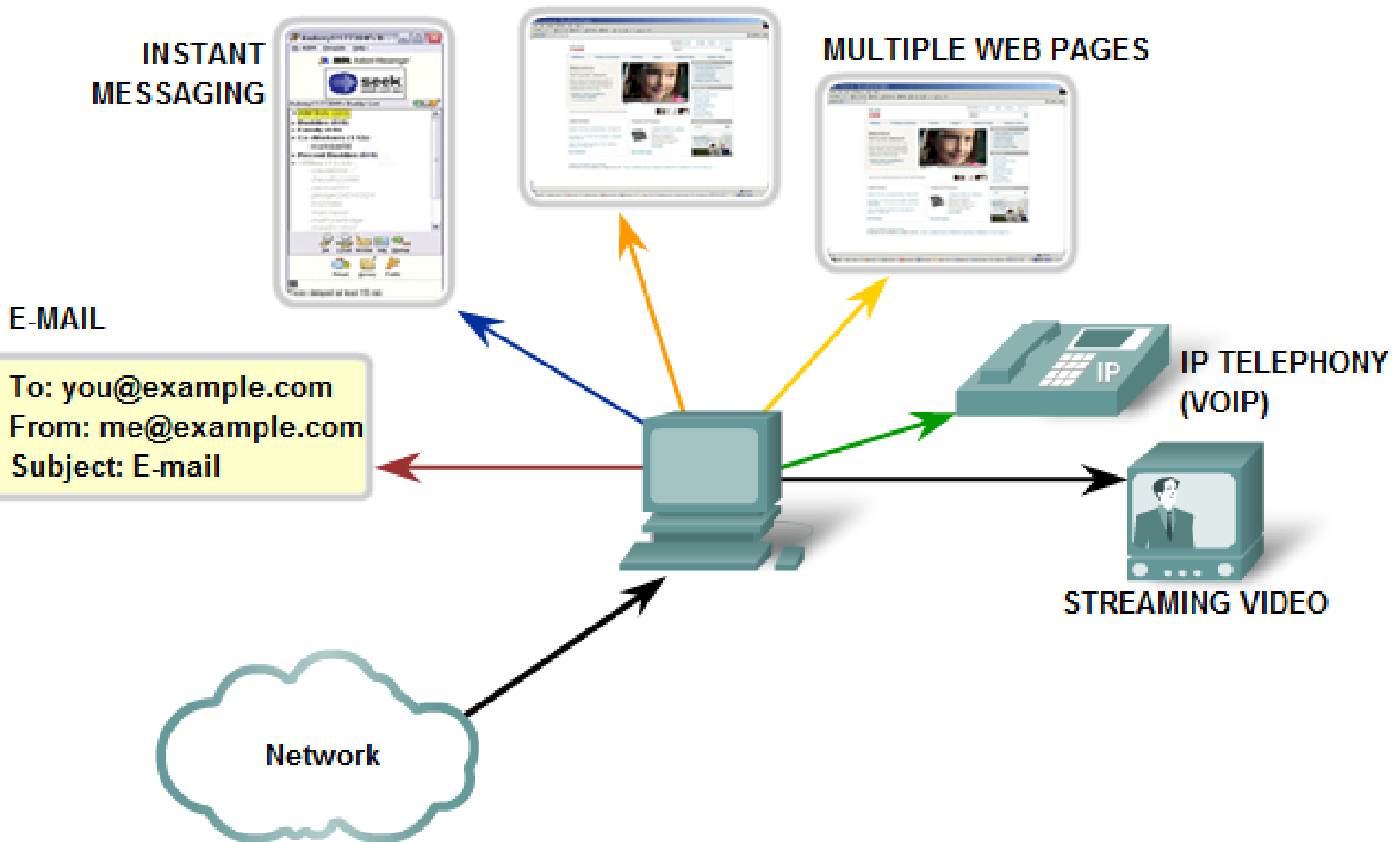ا.م.د نورس يونس السليم
المحاضرة السادسة

Transport Layer

The transport layer is responsible for process-to-process delivery of the entire message. A **process** is an application program running on a host. Whereas the network layer oversees source-to-destination delivery of individual packets, it does not recognize any relationship between those packets. It treats each one independently, as though each piece belonged to a separate message, whether or not it does. The transport layer, on the other hand, ensures that the whole message arrives intact and in order, overseeing both error control and flow control at the source-to-destination level.
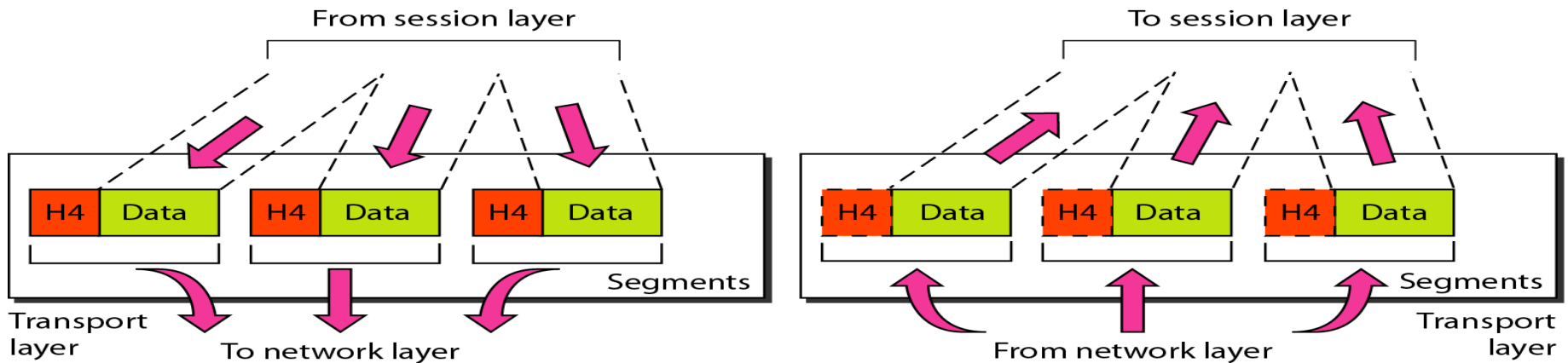
The Figure shows the relationship of the transport layer to the network and session layers

Tracking the Conversations

INSTANT MESSAGING

MULTIPLE WEB PAGES

E-MAIL

To: you@example.com
From: me@example.com
Subject: E-mail

IP TELEPHONY (VOIP)

STREAMING VIDEO

Network

The Transport layer segments the data and manages the separation of data for different applications. Multiple applications running on a device receive the correct data.

Transport Layer Services

INSTANT MESSAGING

MULTIPLE WEB PAGES

E-MAIL

To: you@example.com
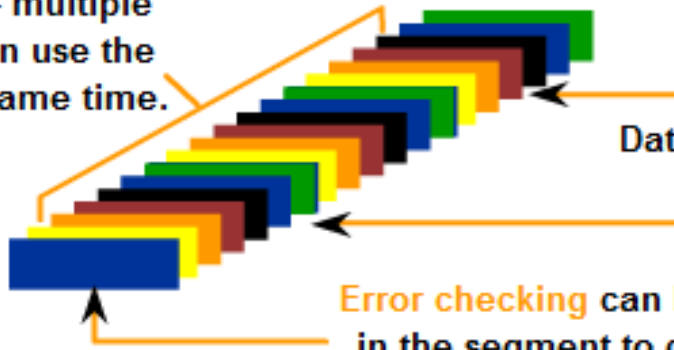From: me@example.com
Subject: E-mail

IP TELEPHONY (VOIP)

STREAMING VIDEO

gmentation allows session
ultiplexing — multiple
pplications can use the
etwork at the same time.

Data segmentation facilitates data carriage
by the lower network layers.

Error checking can be performed on the data
in the segment to check if the segment was
changed during transmission.

Transport Layer Services

INSTANT MESSAGING

MULTIPLE WEB PAGES

E-MAIL

To: you@example.com
From: me@example.com
Subject: Email

IP TELEPHONY (VOIP)

STREAMING VIDEO
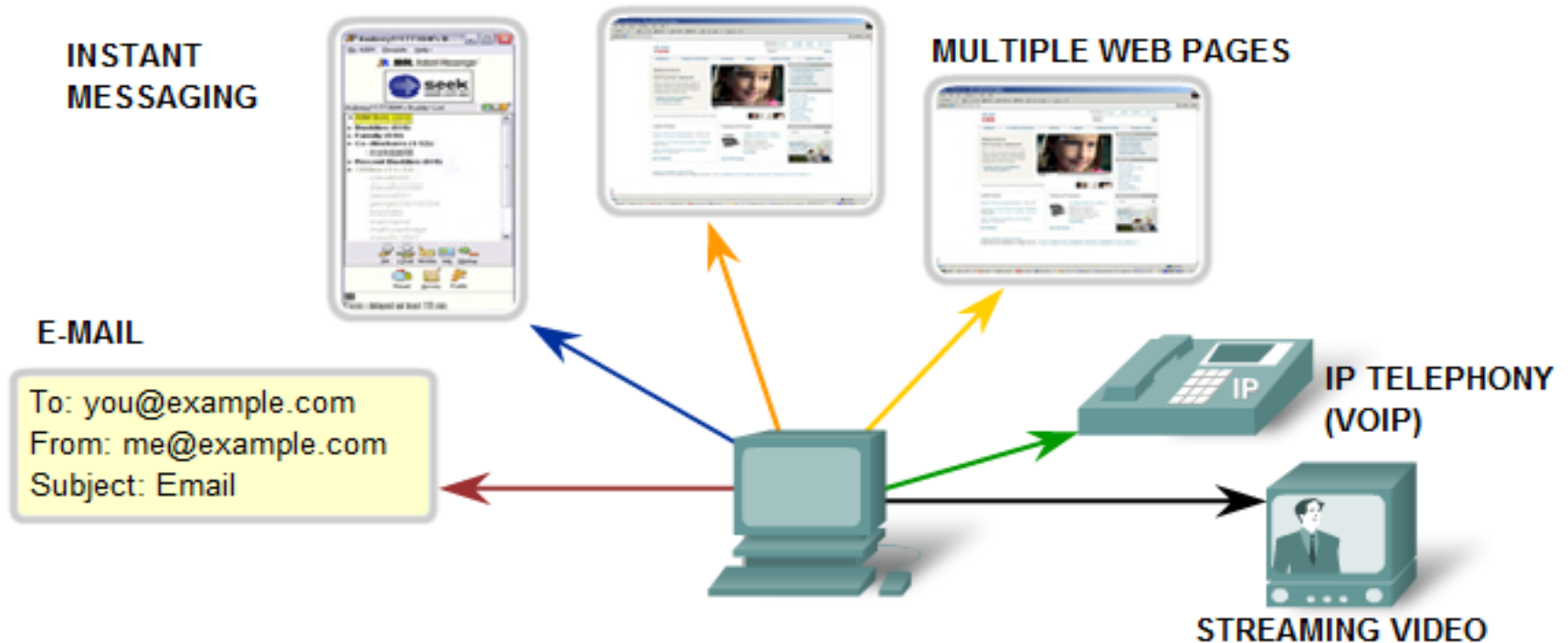
Establishing a Session ensures the application is ready to receive the data.

Reliable delivery means lost segments are resent so the data is received complete.

Same order delivery ensures data is delivered sequentially as it was sent.

Flow Control manages data delivery if there is congestion on the host.

Service-point addressing(Port Address): Computers often run several programs at the same time. For this reason, source-to-destination delivery means delivery not only from one computer to the next but also from a specific process (running program) on one computer to a specific process (running program) on the other. The transport layer header must therefore include a type of address called a *service-point address* (or port address). 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: A message is divided into transmittable segments, with each segment containing a sequence number. These numbers enable the transport layer to reassemble the message correctly upon arriving at the destination and to identify and replace packets that were lost in transmission

Connection control: The transport layer can be either connectionless or connection oriented. A connectionless transport layer treats each segment as an independent packet and delivers it to the transport layer at the destination machine. A connection oriented transport layer makes a connection with the transport layer at the destination machine first before delivering the packets. After all the data are transferred, the connection is terminated

Described in data link layer

Error control:

Flow control

- Network hosts have limited resources, such as memory or bandwidth. When Transport layer is aware that these resources are overtaxed, some protocols can request that the sending application reduce the rate of data flow. This is done at the Transport layer by regulating the amount of data the source transmits as a group. Flow control can prevent the loss of segments on the network and avoid the need for retransmission.

Session Layer

is the network *dialog controller.* It establishes, maintains, and synchronizes the interaction among communicating systems.

The session layer is responsible for dialog control and synchronization.
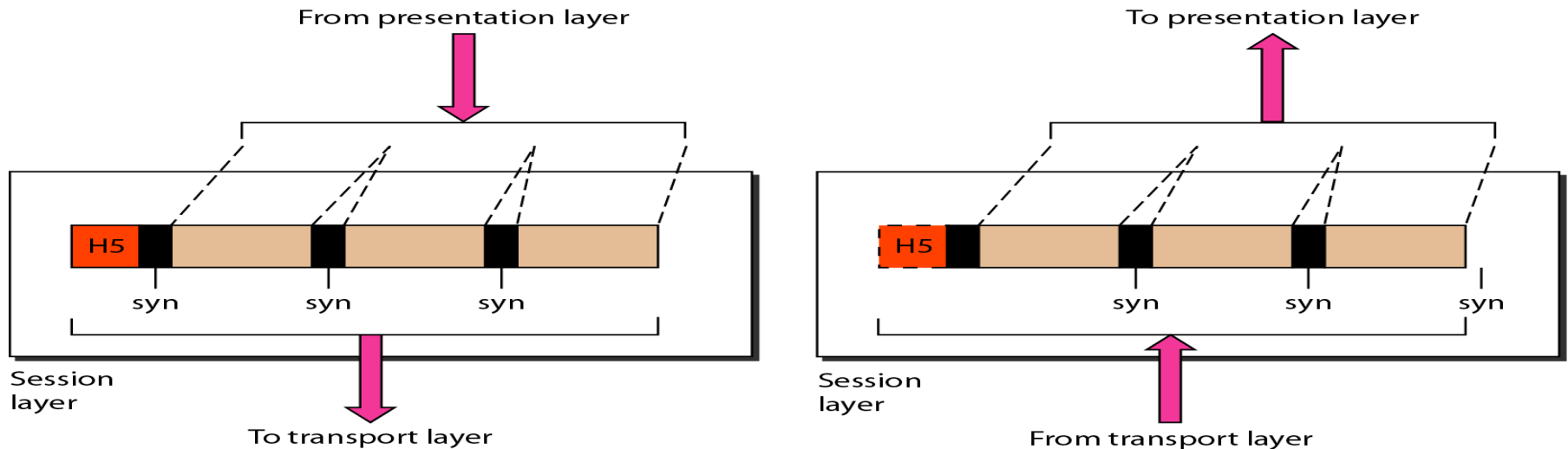
Dialog control: It allows the communication between two processes to take place in either half-duplex (one way at a time) or full-duplex (two ways at a time) mode.

Synchronization: The session layer allows a process to add **checkpoints**, or **synchronization points**, to a stream of data.

Presentation Layer

The presentation layer is concerned with the syntax and semantics of the information exchanged between two systems.

The presentation layer is responsible for translation, compression, and encryption.
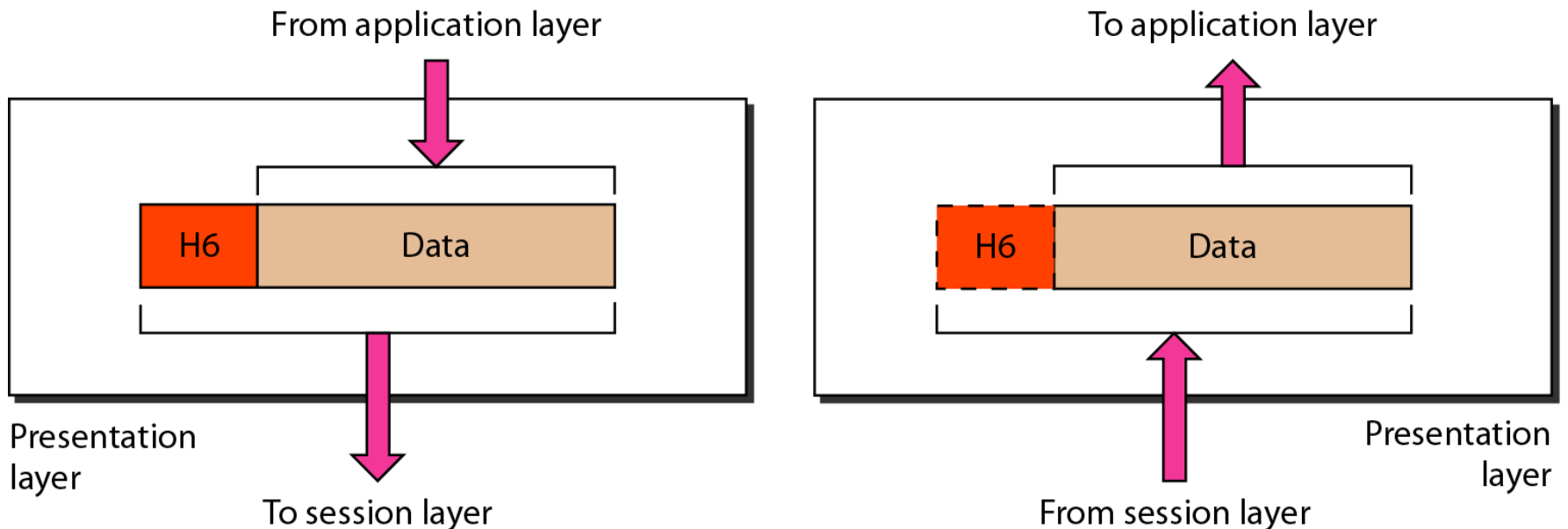
Translation: The information (in the form of character strings, numbers, and so on) must be changed to bit streams before being transmitted. But in the Physical Layer the Bits should be converted to signal.

Encryption: it means that the sender transforms the original information to another form and sends the resulting message out over the network. Decryption reverses the original process to transform the message back to its original form.

Compression: Data compression reduces the number of bits contained in the information. Data compression becomes particularly important in the transmission of multimedia such as audio, and video.

Application Layer

The application layer is responsible for providing services to the user.
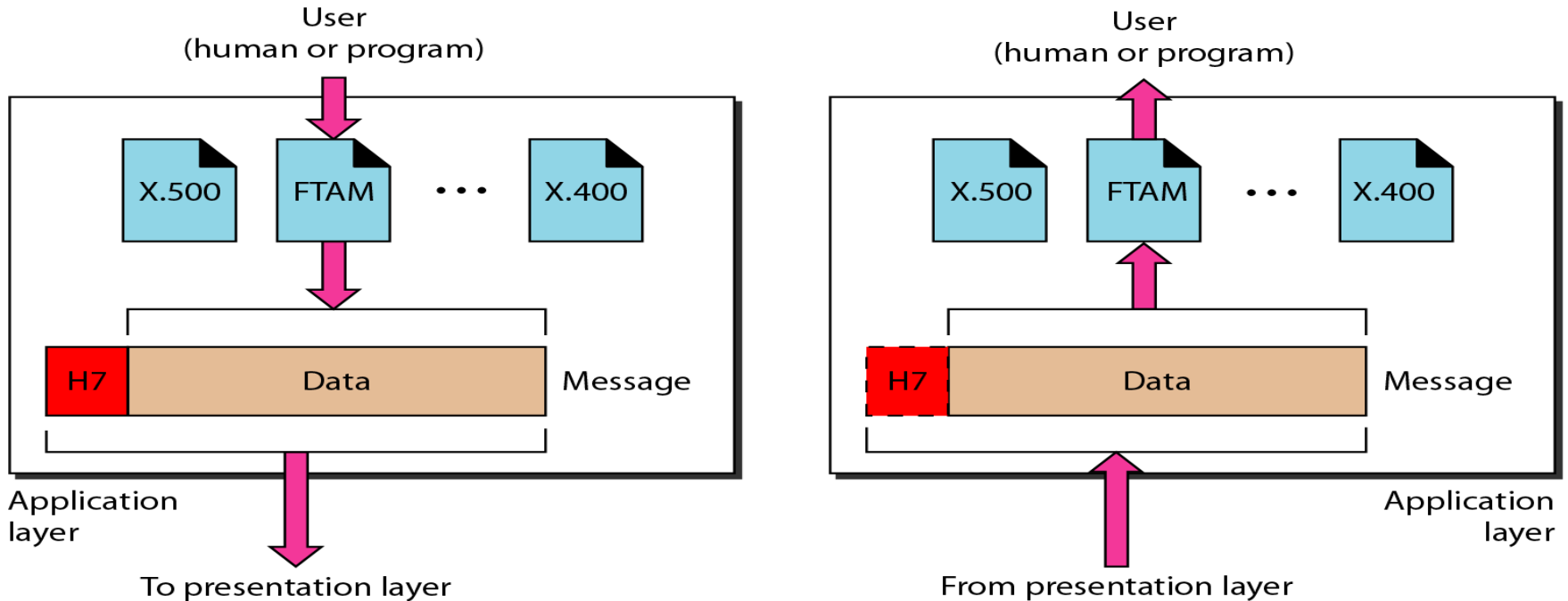
This Figure shows the relationship of the application layer to the user and the presentation layer

Summary of layers

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

Host A		Host B
Application	Data	**Application**
Presentation	Data	**Presentation**
Session	Data	**Session**
Transport	Segments	**Transport**
Network	Packets	**Network**
Data Link	Frames	**Data Link**
Physical	Bits	**Physical**