Ministry of Higher Education and Scientific Research

Al-Mustaqbal University

College Of Engineering & Technology

Computer Techniques Engineering Department

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Computer Networks Fundamentals
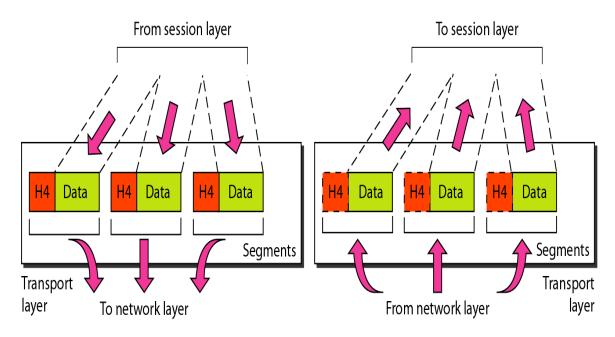
Lecture 7:

Transport Layer

7.1- *Transport Layer*

The transport layer is **responsible for** source -to-destination (end-to-end) delivery of the *entire message*. Whereas the network layer oversees end-to-end delivery of *individual packet*s, 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.

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 application on one computer to a specific application on the other. The transport layer header must therefore include a type of address called a service point address (also called a *port address* or socket address). The network layer gets each packet to the correct computer; the transport layer gets the entire message to the correct application on that computer.

As the transport layer receives the message from session layer it divides the message into a transmittable segments, indicating in the header the sequence of the segments so that it can be reassembled upon receipt at the destination.
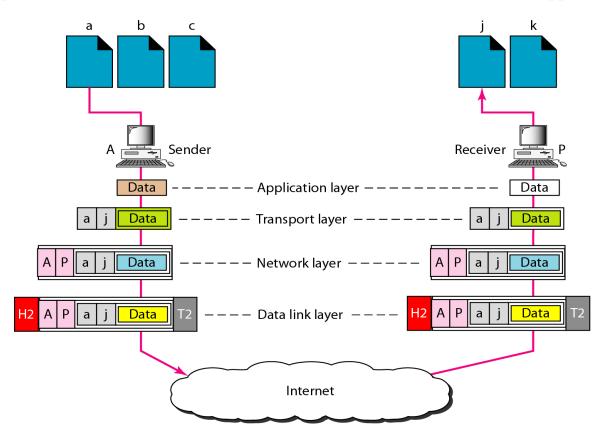
Specific responsibilities of the transport layer include the following:

❖ **End-to-end message delivery:** Overseeing the transmission and arrival of all packets of a message at the destination point.

❖ **Service-point (port) addressing:** Guaranteeing delivery of a message to the appropriate application on **a** computer running multiple applications.

❖ **Segmentation and reassembly:** Dividing a message into transmittable segments and marking each segment with a sequence number. These numbers enable the transport layer to reassemble the message correctly at the destination and to identify and replace packets lost in transmission.

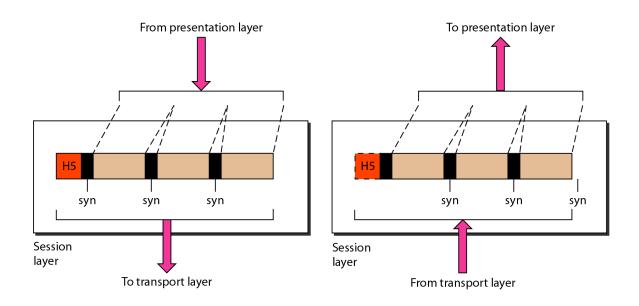❖ **Connection control:** Deciding whether or not to send all packets by a single path.

Example:

Figure below shows an example of a transport layer. Data coming from the upper layers have Service-point (port) addresses (a) and (j) (a is the address of the sending application, and j is the address of the receiving application). Then in the network layer, network addresses (A and P) are added to each packet. The packets may travel on different paths and arrive at the destination either in order or out of order. The packets are delivered to the destination transport layer, which is responsible for removing the network layer headers and the delivery to the upper layers.

7.2- *Session Layer*

The session layer is the network *dialog controller*. It establishes, maintains, and synchronizes the interaction between' communicating devices. It also **ensures** that each session closes appropriately rather than shutting down abruptly and leaving the user hanging.

From presentation layer

To presentation layer

H5   syn   syn   syn

Session layer

To transport layer

H5   syn   syn   syn

Session layer

From transport layer

Specific responsibilities of the session layer include the following:
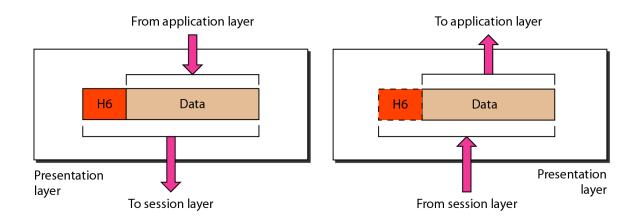
- ❖ **Session management:** Dividing a session into sub sessions by the introduction of checkpoints and separating long messages into shorter units called dialog units appropriate for transmission.
- ❖ **Synchronization:** Deciding in what order to pass the dialog units to the transport layer and where in the transmission to require confirmation from the receiver.
- ❖ **Dialog control:** Deciding who sends, and when.
- ❖ **Graceful close:** Ensuring that the exchange has been completed appropriately before the session closes.

Example

A computer needs to update a huge file (e.g. a database). The session layer subdivides the task into different dialog units.

7.3 *Presentation Layer*

The presentation layer **ensures** interoperability among communicating devices. Functions at this layer make it possible for two computers to communicate even if their internal representations of data differ (e.g., when one device uses one type of code and the other uses another). It *provide* necessary translation of different control codes and character sets, graphics characters, and so on to allow both devices to understand the same transmission the same way.

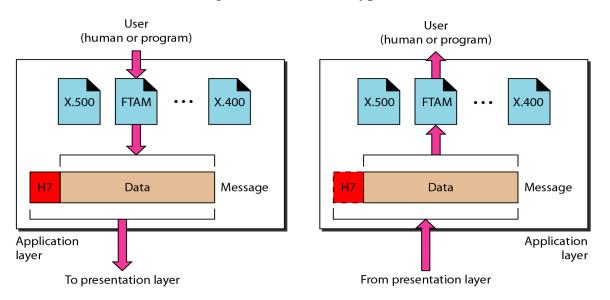### *Specific responsibilities of the presentation layer include following:*

- ❖ **Translation:** Changing the format of a message from that used by the sender into one mutually acceptable for transmission. Then, at the destination, changing that format into the one understood by the receiver.
- ❖ **Encryption:** Encryption and decryption of data for security purposes.
- ❖ **Compression:** Compressing and decompressing data to make transmission more efficient.
- ❖ **Security:** Validating passwords and log-in codes.

Example

The sending station uses an encryption algorithm to protect the data from eavesdropping. The encrypted data are decrypted at the destination presentation layer before being delivered to the application layer.

7.4- *Application Layer*

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 the application layer include the following:

- ❖ **Web Services :** Allows accessing web content in the form of text, images and multimedia using the HTTP protocol (Hyper Text Transfer Protocol).

- ❖ **File access, transfer, and management:** Allows a user at a remote computer to access files in another host (to make changes or read data); to retrieve files from remote computer for use in the local computer; and to manage or control files in remote computer at that computer.

- ❖ **Mail services:** Provides the basis for electronic mail forwarding and storage.

- ❖ **Directory services:** Provides distributed database sources and access for global information about various objects.

Example

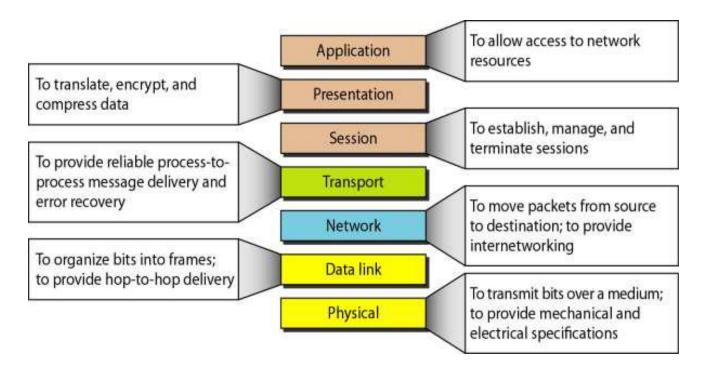A user in Beijing, China, wants to send a large proprietary data file to a station in Los Gatos, California. An application service such as FTAM (File Transfer and Access Management) can do the job.

Figure (7.1) Summary of layers