

1.5 OSI MODEL

OSI model is developed by the International Standards Organization (ISO).

This model is called ISO OSI (Open Systems Interconnection) Reference model because it deals with connecting open systems (systems that are open for communication with other systems).

Seven layers of the OSI model

Physical Layer

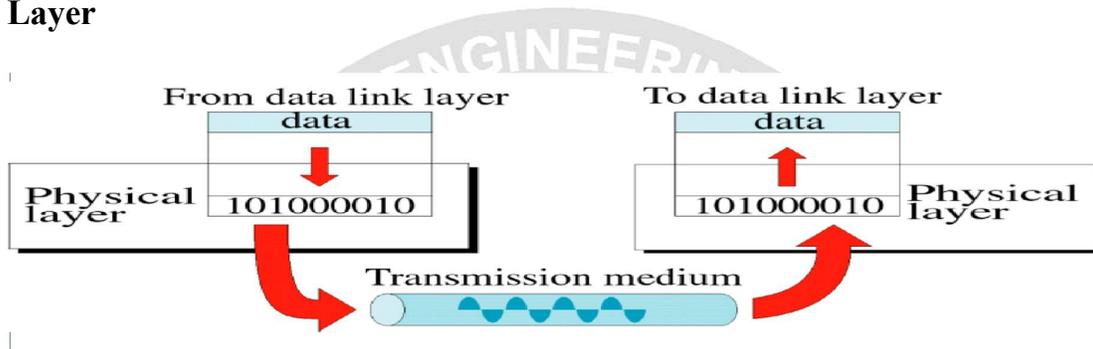


Fig1.5.1: Physical layer.

[“Source : Data Communications and Networking” by Behrouz A. Forouzan,Page- 33]

It is the bottom layer of OSI Model. It is responsible for the actual physical connection between the devices. Such physical connection may be made by using twisted pair cable. It is concerned with transmitting bits over a communication channel as shown in figure 1.5.1.

Physical Layer Functions

Provides synchronization of bits by a clock.

- Physical layer manages the way a device connects to network media.
- It defines the transmission rate.
- It defines the way in which the devices are connected to the medium.
- It provides physical topologies
- It can use different techniques of multiplexing.

Data Link Layer

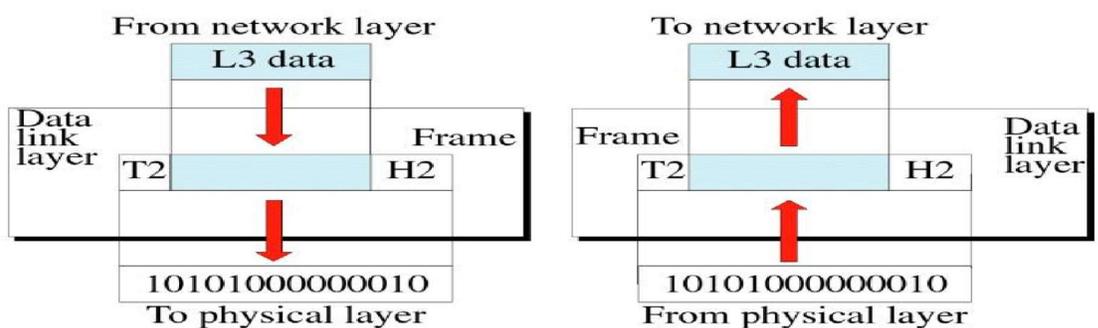


Fig1.5.2: Datalink layer.

[Source : “Data Communications and Networking” by Behrouz A. Forouzan,Page-34]

It is responsible for node-to-node delivery of data as shown in figure 1.5.2.

It receives the data from network layer and creates frames, add physical address to these frames & pass them to physical layer

It consist of 2 layers:

Logical Link Layer (LLC) :Defines the methods and provides addressing information for communication between network devices.

Medium Access Control (MAC): Establishes and maintains links between communicating devices.

Functions of Data Link Layer

Framing :DLL divides the bits received from N/W layer into frames. (Frame contains all the addressing information necessary to travel from S to D).

Physical addressing: After creating frames, DLL adds physical address of sender/receiver (MAC address) in the header of each frame.

Flow Control: DLL prevents the fast sender from drowning the slow receiver.

Error Control: It provides the mechanism of error control in which it detects & retransmits damaged or lost frames.

Access Control: A single communication channel is shared by multiple devices, MAC layer of DLL provides help to determine which device has control over the channel.

Network Layer

It is responsible for the source to destination delivery of a packet across multiple networks as shown in figure 1.5.3. If two systems are attached to different networks with devices like routers, then N/W layer is used.

Thus DLL oversees the delivery of the packet between the two systems on same network and the network layer ensures that the packet gets its point of origin to its final destination.

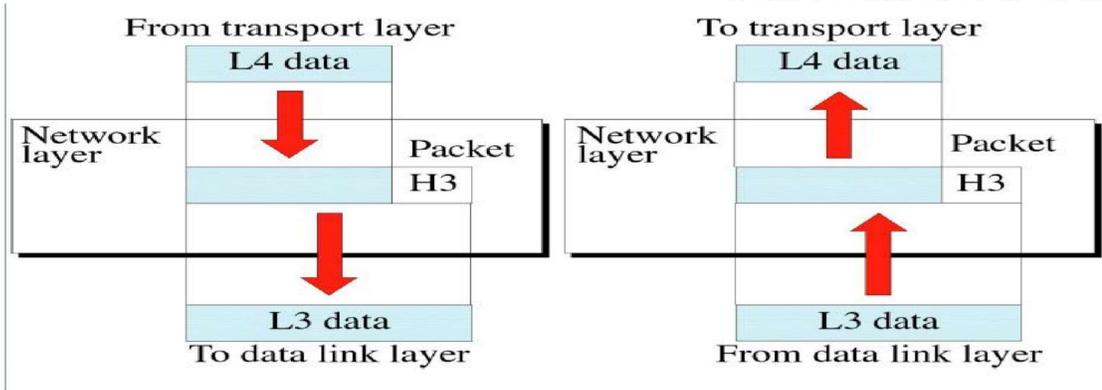


Fig1.5.3: Network layer.

[Source: "Data Communications and Networking" by Behrouz A. Forouzan, Page- 36]

Functions of Network Layer

It provides Internetworking.

Logical Addressing: When packet is sent outside the network, N/W layer adds Logical (network) address of the sender & receiver to each packet.

Network addresses are assigned to local devices by network administrator and assigned dynamically by special server called DHCP (Dynamic Host Configuration Protocol).

Routing: When independent network are connected to create internetwork several routes are available to send the data from Source to Destination.

These n/w are interconnected by routers & gateways that route the packet to final destination.

Transport Layer

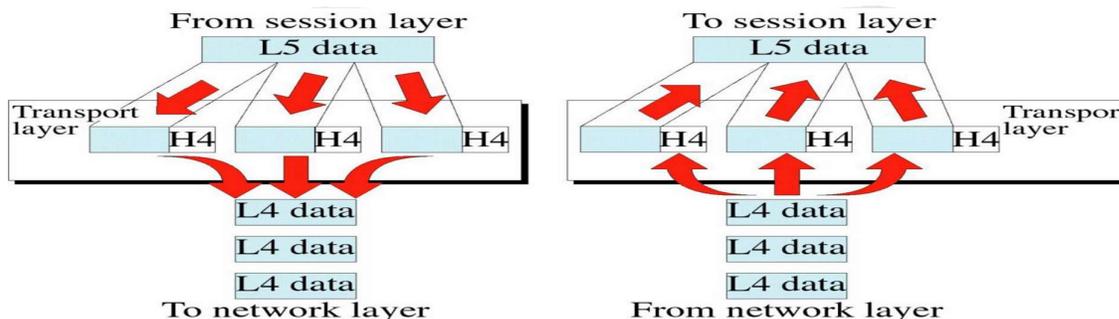


Fig1.5.4: Transport layer.

[Source : "Data Communications and Networking" by Behrouz A. Forouzan, Page- 38]

It is responsible for process-to-process delivery of the entire message as shown in figure 1.5.4.

Transport Layer looks after the delivery of entire message considering all its packets & make sure that all packets are in order. On the other hand n/w layer treated each packet independently.

At the receiver side, TL provides services to application layer & takes services form n/w layer.

At the source side, TL receives message from upper layer into packets and reassembles these packets again into message at the destination.

Transport Layer provides **two types of services**:

Connection Oriented Transmission: In this type of transmission the receiving devices sends an acknowledge back to the source after a packet or group of packet is received. It is slower transmission method.

Connectionless Transmission: In this type of transmission the receiving devices does not sends an acknowledge back to the source. It is faster transmission method.

Segmentation of message into packet & reassembly of packets into message.

Port addressing: Computers run several processes. TL header include a port address with each process.

Flow Control: Flow control facility prevents the source form sending data packets faster than the destination can handle.

Error control: TL ensures that the entire message arrives at the receiving TL without error.

Session Layer

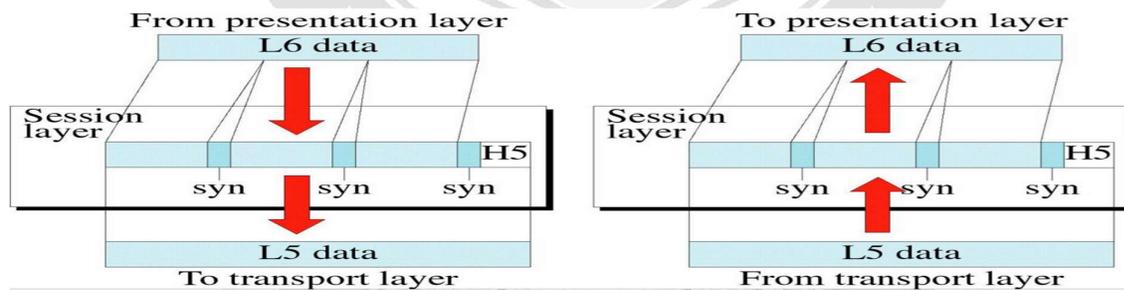


Fig1.5.5: Session layer.

[Source : "Data Communications and Networking" by Behrouz A. Forouzan, Page- 40]

It has the responsibility of beginning, maintaining and ending the communication between two devices as illustrated in figure 1.5.5 called session. It also provides for orderly communication between devices by regulating the flow of data.

Functions of Session Layer

Establishing, Maintaining and ending a session: When sending device first contact with receiving device, it sends syn(synchronization) packet to establish a connection & determines the order in which information will be sent.

Receiver sends ack (acknowledgement). So the session can be set & end.

Dialog Control: This function determines that which device will communicate first and the amount of data that will be sent.

Dialog separation: Process of adding checkpoints & markers to the stream of data is called dialog separation.

Presentation Layer

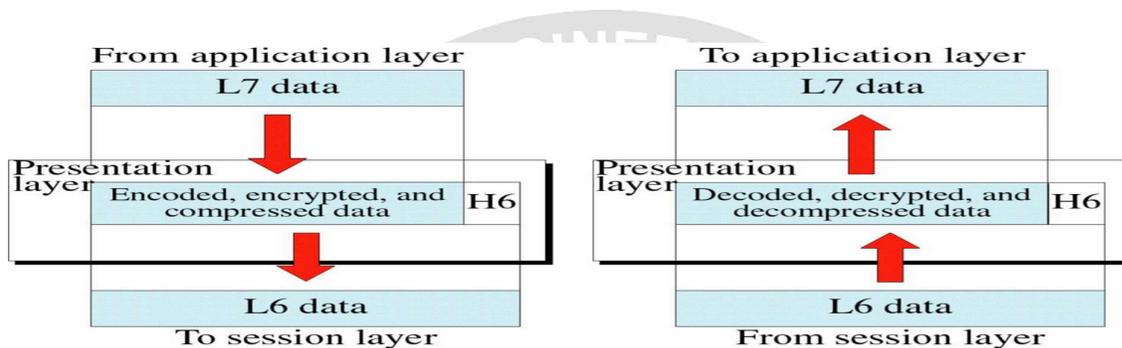


Fig1.5.6: Presentation layer.

[Source : "Data Communications and Networking" by Behrouz A. Forouzan, Page- 40]

It is concerned with the syntax & semantics of the information exchanged between the two devices. It was designed for data encryption, decryption and compression as shown in figure 1.5.6.

Functions of Presentation Layer

Data Presentation or Translation: Because different computers use different encoding systems. It ensures that the data being sent is in the format that the recipient can process.

Data Encryption: PL provides this facility by which hides the information from everyone except the person who originally sent the information & the intended recipient. When encrypted data arrives at destination, PL decrypts the message.

Data Compression: PL shrinks large amount of data into smaller pieces i.e. it reduces the size of data.

Application Layer

It enables the user to access the network.

It provides user interface & supports for services such as e-mail, file transfer, access to the world wide web as shown in figure 1.5.7. So it provides services to different user applications.

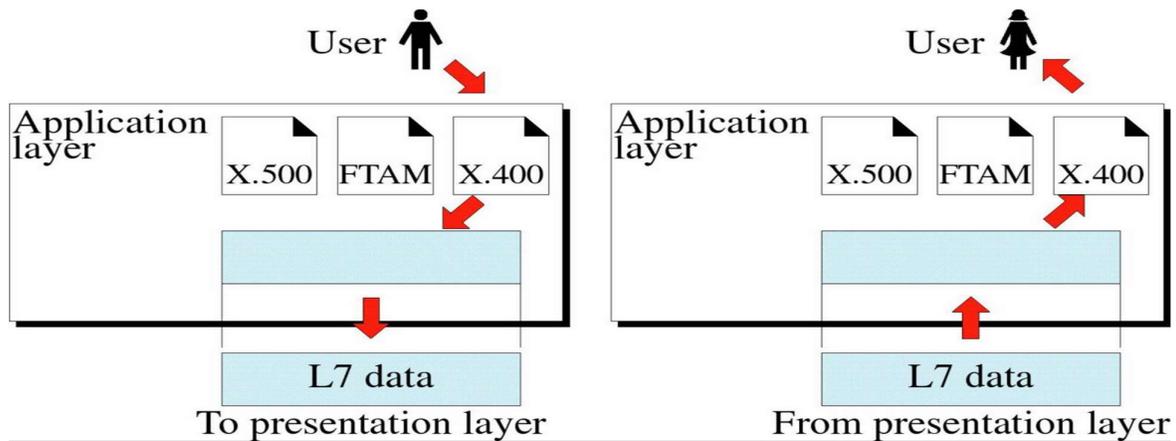


Fig1.5.7: Application layer.

[Source : "Data Communications and Networking" by Behrouz A. Forouzan, Page-41]

Functions of Application Layer

Mail Services: This application provides various e-mail services.

File transfer & Access: It allows users to access files in a remote host, to retrieve files from remote computer for use etc.

Remote log-in: A user can log into a remote computer and access the resources of that computer.

Accessing the World Wide Web: Most common application today is the access of the World Wide Web.

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