

Describe the OSI Reference Model.

Open System Interconnections (OSI) is a network architecture model based on the ISO standards. It is called the OSI model as it deals with connecting the systems that are open for communication with other systems. It consists of seven layers. Each layer has specifying network functions and protocols. Each layer communicates with the same layer's software or hardware on other device.

OSI model has seven layers are followings:-

- 1) Application layer
- 2) Presentation layer
- 3) Session layer
- 4) Transport layer
- 5) Network layer
- 6) Data link layer
- 7) Physical layer

Application Layer:

- Application layer enables the user to access the network.
- It is the topmost layer of the OSI reference model.
- Application layer protocols are FTP, HTTP, SMTP etc.
- The most widely used application protocol is HTTP(Hypertext transfer protocol).
- Web browsers, email clients, and other user-facing software operate at this layer.

Presentation Layer:

The presentation layer is also known as a Translation layer as it translates the data from one format to another format.

- **Translation:** At the sender side, this layer translates the data format used by the application layer to the common format and at the receiver side, this layer translates the common format into a format used by the application layer
- **Compression:** Data compression is to reduce the number of bits to be transmitted.
- **Encryption/Decryption:** At sender side, presentation layer encrypts the data and When encrypted data arrives at receiver side, Presentation Layer decrypts the message to its original form.

Session Layer:

- The session layer establishes, manages, and terminates communication sessions between devices.
- It is also responsible for dialog control and synchronization, retransmission of data if it is not received by a device.

Transport Layer:

- Transport Layer is responsible for delivering messages between hosts.
- Transport Layer provides error checking and flow control so that no error occurs during the transfer of data.

It provides two types of services:

1)Connectionless transmission: In Connectionless, sender can send a message without establishing a connection with the receiver. There is no need to check if the receiver is ready or even exists. A message is broken into packets, and each packet is transferred separately. Connectionless service is typically provided by the UDP. In this transmission, the receiver does not send the acknowledgement to the sender

2)Connection Oriented Transmission: - In connection-oriented transmission, session is established between sender and receiver before exchanging data. This connection ensures reliable and orderly data transfer, including error detection, correction, and flow control. In this transmission, the receiver sends the acknowledgement to the sender after the packet has been received.

Network Layer:

- Network layer converts the logical address into the physical address.
- **Routing:** This layer responsible for routing of data packets means it determines the best route for the packet to travel from source to the destination. Routing is done by router.
- **Logical Addressing:** - In this layer, Segments are divided into small packets and Network layer assigns logical addresses/IP address on each packet so that a packet of data can be routed across the network. Packets use logical address to uniquely identify computer at the destination.

- **Internetworking:** The network layer provides the logical connection between the different types of networks for forming a bigger network.
- **Routers operate at this layer.**

Data Link Layer:

- The Data Link Layer provides node-to-node data transfer
- This layer provides error detection, correction, and flow control within the physical transmission, ensuring reliable data transfer.
- It receives the data from the network layer and converts the data into data frames and then attaches the physical address (MAC address) to these frames which are sent to the physical layer.
- Switches and bridges operate at this layer.

Physical Layer:

- This is the lowest layer of OSI model.
- It deals with the actual physical transmission of data over the communication medium (such as cables, wireless signals, or optical fibers).