=> 7 layers of OSI

The OSI (open system Interconnection) model is like a guide that explains how data moves through a network, such as the internet. It divides the process into seven steps or "layers", each with a specific job.

=> 7 layers include:

① Application layer :- This is the layer that directly interacts with user data. When you use an app like a web browser or email client, this layer is what helps initiate communication with other devices.

-> Protocols :- The application layer uses protocols like HTTP (for web browsing) and SMTP (for sending emails).

Note :- The application themselves (like Chrome) aren't part of this layer. Instead, this layer handles the protocols and data manipulations these apps rely on.

② Presentation layer :- This layer makes sure that the data sent by application layer in a format that the next computer can understand.

It handles tasks like

- Data encryption/decryption : If the data is encrypted (turned into a code for security), this layer adds the encryption before sending the data and decrypts it when receiving it, making sure only authorized users can access it.
- Translation :- It translate data between different encoding method used by different devices so that they can understand each other.
- Compression :- The presentation layer also compresses data

to reduce its size, which makes communication faster and more efficient. After the data is compressed, it's sent to the session layer.

(3) Session layer :- The session layer manages the opening, maintaining, and closing of communication sessions between two devices.

It includes :-

- Session Management :- It opens a session (communication channel) between 2 devices and keeps it open for the duration of the communication.
- Synchronization :- This layer also manages synchronization by using checkpoints. If a large file is being transfered and the connection is interrupted, the session layer allows the transfer to resume from the last checkpoint instead of starting over.
- Resource Management :- It closes the session once the data transfer is complete to free up resources.

(4) Transport layer :- The transport layer is responsible for the reliable delivery of data across the network. It manages end-to-end communication between the source and destination.

- Segmentation :- This layer breaks down large data from the session layer into smaller segments, which are easier to send across the network. It reassembles these segments at the receiving end.
- Flow control :- It ensures that data is sent at a pace that the reciver can handle, preventing overload.
- Error Control :- The transport layer checks for errors in the data it receives. If any segment is missing or incorrect, it requests a retransmission.

- Protocols :- common protocols used here include TCP (Transmission control protocol) for reliable communication and UDP (user datagram protocol) for faster, but less reliable communication.

(5) Network layer :- The network layer handles the routing of data between different networks ensuring it reaches the correct destination.

- Packetization :- It takes segments from the transport layer and breaks them down into smaller units called packets.
- Routing :- The layer determines the best path for the data to travel across different networks to reach its destination.
- Addressing :- It assign IP addresses to the data packets, making sure they are delivered to the correct address.
- Protocols :- This layer includes protocols like IP (Internet protocol), ICMP (Internet control message protocol), and IGMP (Internet Group management protocol)

(6) Data link layer :- The data link layer is responsible for the transfer of data between devices on the same network. It ensures that data is delivered without errors.

- Framing :- It packages data from the network layer into frames, which are units of data for transfer within the same network.
- Flow control and error control :- Like the transport layer, the data link layer manages the flow of data and checks for errors, but it does this within the same network.

- **MAC Addressing** :- It uses MAC addresses to ensure that data is delivered to the correct device on the network.

(7) **Physical layer** :- This is the lowest layer, dealing with the physical connection between devices. It involves the hardware and the actual transmission of data as electrical signals, lights or radio waves.

- **Bit Transmission** :- The physical layer converts data into binary (a series of 1s and 0s) and transmit it over physical media like cables or wireless signals.
- **Physical Media** :- This includes the actual hardware like cables, switches, and network interface cards (NICs)
- **Signal Convention** :- Both devices must agree on how the signals will represent data so that 1s and 0s can be correctly interpreted.