COMPNET REVIEWER

Open Systems Interconnection (OSI) MODEL describes seven layers that computer systems use to communicate over a network. It was the first standard model for network communications, adopted by all major computer and telecommunication companies in the early 1980s.

The OSI 7 Layers

7. Application Layer

The application layer is used by end-user software such as web browsers and email clients. A few examples of application layer protocols are the Hypertext Transfer Protocol(HTTP), File Transfer Protocol (FTP), Post Office Protocol (POP), Simple Mail Transfer Protocol (SMTP), and Domain Name System (DNS).

Network virtual terminal: A network virtual terminal is a software version of a physical terminal and allows a user to log on to a remote host.

File transfer, access, and management (FTAM): This application allows a user to access files in a remote host (to make changes or read data), to retrieve files from a remote computer for use in the local computer, and to manage or control files in a remote computer locally.

E-mail services: This application provides the basis for e-mail forwarding and storage.
Directory services: This application provides distributed database sources and access for global information about various objects and services.

6. Presentation Layer

The presentation layer prepares data for the application layer. It defines how two devices should encode, encrypt, and compress data so it is received correctly on the other end. The presentation layer takes any data transmitted by the application layer and prepares it for transmission over the session layer.

Translation: The processes (running programs) in two systems are usually exchanging information in the form of character strings, numbers, and so on

Encryption\Decryption:
Encryption 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 text, audio, and video.

5. **Session Layer**

The session layer creates communication channels, called sessions, between devices. It is responsible for opening sessions, ensuring they remain open and functional while data is being transferred, and closing them when communication ends.

Dialog control: The session layer allows two systems to enter into a dialog. 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 (synchronization points) into a stream of data.

4. **Transport Layer**

The transport layer takes data transferred in the session layer and breaks it into "segments" on the transmitting end. It is responsible for reassembling the segments on the receiving end, turning it back into data that can be used by the session layer.

Segmentation and reassembly: A message is divided into transmittable segments, with each segment containing a sequence number.

Connection control: The transport layer can be either connectionless or connection oriented. For a connectionless transport layer use UDP protocol and for connection oriented TCP protocol.

Flow control: Like the data link layer, the transport layer is responsible for flow control. However, flow control at this layer is performed end to end rather than across a single link.

Error control: Like the data link layer, the transport layer is responsible for error control. The sending transport layer makes sure that the entire message arrives at the receiving transport layer without error (damage, loss, or duplication)

3. **Network Layer**

The network layer has two main functions. One is breaking up segments into network packets, and reassembling the packets on the receiving end.

Logical addressing: The network layer adds a header to the packet coming from the upper layer that, among other things, includes the logical addresses of the sender and receiver.

Routing: When independent networks or links are connected together to create Internet works (network of networks) or a large network, the connecting devices (called routers or switches) route or switch the packets to their final destination.

2. Data Link Layer

The data link layer establishes and terminates a connection between two physically connected nodes on a network. It breaks up packets into frames and sends them from source to destination.

Framing: The data link layer divides the stream of bits received from the network layer into manageable data units called frames.

Physical addressing: If frames are to be distributed to different systems on the network, the data link layer adds a header to the frame to define the sender and/or receiver of the frame.
Flow control: If the rate at which the data is absorbed by the receiver is less than the rate produced at the sender, the data link layer imposes a flow control mechanism to prevent overwhelming the receiver.

Error control: The data link layer adds reliability to the physical layer by adding mechanisms to detect and retransmit damaged or lost frames. It also uses a mechanism to recognize duplicate frames.

Access control: When two or more devices are connected to the same link, data link layer protocols are necessary to determine which device has control over the link at any given time.

1. Physical Layer

The physical layer is responsible for the physical cable or wireless connection between network nodes. It defines the connector, the electrical cable or wireless technology connecting the devices, and is responsible for transmission of the Raw data, which is simply a series of 0s and 1s, while taking care of bit rate control.

Representation of bits: The physical layer data consists of a stream of bits (sequence of 0s or 1s) with no interpretation Data rate:

Synchronization of bits:The sender and receiver must not only use the same bit rate but must also be synchronized at the bit level.
Line configuration: The physical layer is concerned with the connection of devices to the media.

Physical topology: The physical topology defines how devices are connected to make a network.
Transmission mode: The physical layer also defines the direction of transmission between two devices: simplex, half-duplex, or full-duplex.(A, n.d.

Advantages of OSI Model

The OSI model helps users and operators of computer networks:

· Determine the required hardware and software to build their network.
· Understand and communicate the process followed by components communicating across a network.
· Perform troubleshooting, by identifying which network layer is causing an issue and focusing efforts on that layer.)