

OSI & TCP/IP MODEL

OSI Model:

A conceptual framework known as the OSI (Open Systems Interconnection) model is used to understand and explain how various networking protocols and technologies interact and work within a networked communication system. There are seven layers of the OSI model. Here is an overview of those models from the lower (Layer 1) to highest (layer 7).

- **Physical Layer:** It specifies the physical requirements (such cables, switches, and connections) as well as the technical, procedural, and electrical requirements for sending raw binary data across a network. It is focused on signaling and bit-level transmission.
- **Data Link Layer:** Framing, addressing, and error detection on the physical layer are the responsibility of the Data Link Layer. It makes sure point to point communication of two devices that are connected to the same network segment. It has two sub layers. Those are Media Access Control (MAC) and Logical Link Control (LLC) .
- **Network Layer:** The Network Layer is in responsible for distributing data packets across devices on different networks. It provides logical addressing, like IP addresses, and chooses the most efficient route for data to travel from the source to the destination.
- **Transport Layer:** The Transport Layer guarantees reliable data transfer and end-to-end communication between devices. Data segmentation, error checking, and reassembling are its responsibilities. TCP (Transmission Control Protocol) and UDP (User Datagram Protocol) are two popular transport layer protocols.
- **Session Layer:** The Session Layer manages and establishes communication sessions between devices, allowing them to establish, maintain, and terminate connections. It also handles synchronization and checkpointing to ensure that data is delivered reliably.
- **Presentation Layer:** The main responsibility of presentation layer are Data formatting, compression, encryption, and translation. It ensure that the data is provided in a way that the application layer can understand.
- **Application Layer:** The Application layer decides how to structure and interpret that is being transmitted and what other application will be compatible. It provides the process to process communication and It includes various application protocols and services for tasks such as file transfer, email, remote access, and more. Examples of application layer protocols include HTTP, FTP, SSH, SFTP.

TCP/IP Model

- **Physical Layer:** It Manages physical network connections and transmits raw data bits over the medium.
- **Data Link Layer:** It ensures reliable data transmission within a local network, framing data into frames, and using MAC addresses.

- Network Layer: It handles logical addressing (IP addresses) and routes data between different networks.
- Transport Layer: It is responsible for end-to-end communication, segments and reassembles data, and offers reliability through protocols like TCP and UDP.
- Application Layer: It provides user-level applications and services, including web browsing (HTTP), file transfer (FTP), email (SMTP/POP3), and domain name resolution (DNS).