



R&D Document

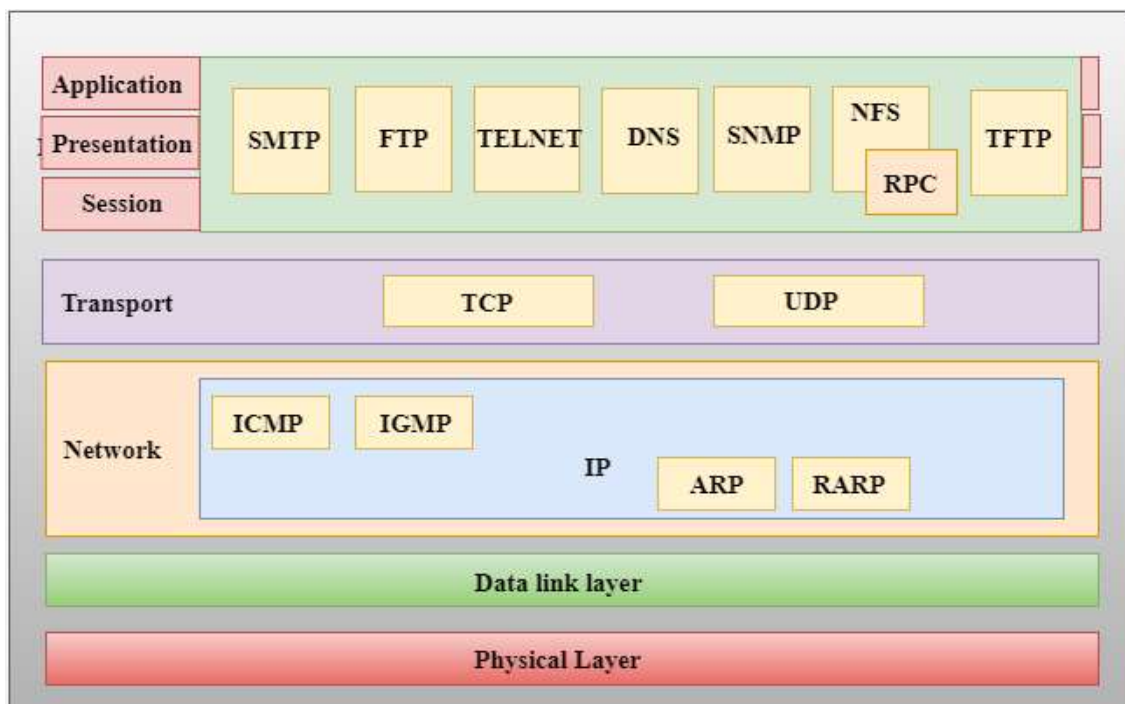
Working & functionality of TCP/IP Model

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TCP/IP Model

The TCP/IP (Transmission Control Protocol/Internet Protocol) model is a foundational networking model that defines the protocols and standards used for communication over the Internet. Comprising four layers, the TCP/IP model serves as the basis for modern networking and plays a crucial role in facilitating data transmission between devices. Understanding the working and functionality of the TCP/IP model is essential for network engineers and IT professionals to effectively manage and troubleshoot network systems.



Layers of TCP/IP Model

1. Network Access Layer
2. Internet Layer
3. Transport Layer
4. Application Layer

TCP/IP Model Layers

Layer 1: Network Interface Layer

- The Network Interface Layer corresponds to the Physical and Data Link layers of the OSI model.
- It deals with the physical connection between devices and the protocols for data transmission over the network medium.
- Functions include addressing, framing, error detection, and access control.
- Common technologies at this layer include Ethernet, Wi-Fi, and Point-to-Point Protocol (PPP).

Layer 2: Internet Layer

- The Internet Layer corresponds to the Network layer of the OSI model.
- It is responsible for routing packets between different networks and ensuring end-to-end delivery.
- Key protocols at this layer include Internet Protocol (IP), Internet Control Message Protocol (ICMP), and Internet Group Management Protocol (IGMP).

Layer 3: Transport Layer

- The Transport Layer corresponds to the Transport layer of the OSI model.
- It provides end-to-end communication services for applications and ensures reliable data delivery.
- Transmission Control Protocol (TCP) offers connection-oriented, reliable data transmission, while User Datagram Protocol (UDP) provides connectionless, best-effort delivery.

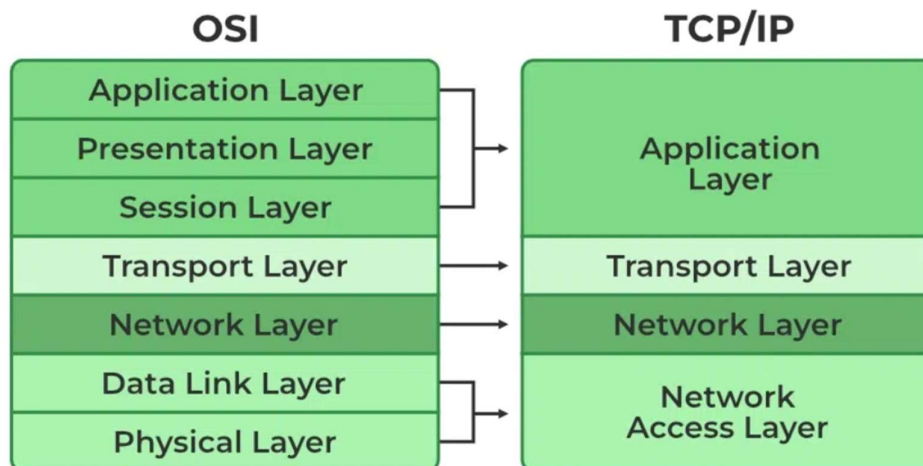
Layer 4: Application Layer

- The Application Layer corresponds to the Session, Presentation, and Application layers of the OSI model.
- It interacts directly with end-users and provides network services for applications.
- Protocols at this layer include Hypertext Transfer Protocol (HTTP), File Transfer Protocol (FTP), Simple Mail Transfer Protocol (SMTP), and Domain Name System (DNS).

Functionality of the TCP/IP Model

- The TCP/IP model facilitates communication between devices by defining a set of protocols and standards for data transmission.
- It enables devices to connect to the Internet and communicate with each other using a common framework.
- Each layer of the TCP/IP model performs specific functions to ensure reliable and efficient data transfer.
- The model allows for interoperability between different devices and networks, making it a widely adopted standard in networking.

Diagrammatic comparison of the TCP/IP and OSI model



Difference between TCP/IP and OSI Model

TCP/IP	OSI
TCP refers to Transmission Control Protocol.	OSI refers to Open Systems Interconnection.
TCP/IP uses both the session and presentation layer in the application layer itself.	OSI uses different session and presentation layers.
TCP/IP follows connectionless a horizontal approach.	OSI follows a vertical approach.
The Transport layer in TCP/IP does not provide assurance delivery of packets.	In the OSI model, the transport layer provides assurance delivery of packets.
Protocols cannot be replaced easily in TCP/IP model.	While in the OSI model, Protocols are better covered and are easy to replace with the technology change.
TCP/IP model network layer only provides connectionless (IP) services. The transport layer (TCP) provides connections.	Connectionless and connection-oriented services are provided by the network layer in the OSI model.