# TCP/IP

TCP is the protocol for sending the data over the Internet. The main condition of this process is to make data reliable and accurate so that the receiver will receive the same information which is sent by the sender. Whenever we want to send something over the internet using the TCP/IP model, it breaks down the data into packets at the sender's end and reassembles the packet into the data into the receiver's end, thus maintaining the accuracy of the data. TCP/IP model breaks the data into 4-layer procedure where the data first go into this layer in one order and again in reverse order to get organized in the same way at the receiver's end.

Layers of TCP/IP Model
- Application Layer
- Transport Layer(TCP/UDP)
- Network/Internet Layer(IP)
- Network Access Layer

The diagrammatic comparison of the **TCP/IP and OSI** model is as follows:
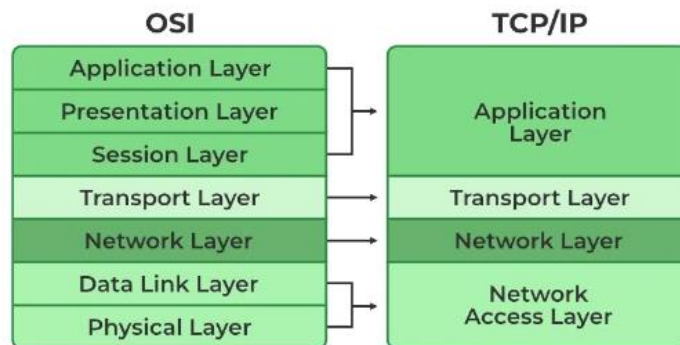
1. Application Layer
- **What it does:**
  - This layer allows users and applications to interact with the network.
  - It provides services like email, file transfer, web browsing, and remote login.
- **Examples of Protocols:** HTTP (web), FTP (file transfer), SMTP (email), DNS (domain name resolution).
- **Real-Life Example:**
  - Think of this layer as the **front desk of a hotel**, where customers (users) request specific services (like booking a room or ordering food).

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2. Transport Layer
- **What it does:**
  - This layer ensures reliable data delivery between devices.
  - It splits large data into smaller chunks (segments) and ensures all segments are delivered correctly.
  - Handles error-checking and retransmissions.
- **Examples of Protocols:** TCP (reliable, connection-oriented) and UDP (faster but connectionless).
- **Real-Life Example:**
  - Imagine sending a parcel via courier service. The courier ensures each box (segment) reaches the destination safely and in order (TCP) or sends without guarantees for quick delivery (UDP).

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3. Internet Layer
- **What it does:**
  - Handles the movement of data across different networks.

- o   Determines the best route for data to reach its destination.
- o   Works with IP addresses to identify source and destination devices.
- **Examples of Protocols:** IP (Internet Protocol), ICMP (for error reporting), ARP (to resolve MAC addresses).
- **Real-Life Example:**
    - o   This layer is like the **postal system**, deciding the best path to deliver a package from your home to someone in another city.

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4. Network Access Layer (Link Layer)
- **What it does:**
    - o   Manages how data is physically sent over the network hardware, such as Ethernet or Wi-Fi.
    - o   Includes framing, addressing (MAC address), and error detection at the physical level.
- **Examples of Protocols:** Ethernet, Wi-Fi (IEEE 802.11), PPP.
- **Real-Life Example:**
    - o   This is like the **road or delivery truck** that physically moves the parcel from one place to another.

Putting It All Together:

Let's use the example of visiting a website:

1. **Application Layer:** You type a URL in your browser (HTTP request).
2. **Transport Layer:** The data is split into packets and ensures reliability using TCP.
3. **Internet Layer:** IP finds the best route to the web server.
4. **Network Access Layer:** The data is physically sent via your network's hardware (e.g., Ethernet or Wi-Fi).

The **TCP/IP Model** ensures that data moves seamlessly from your device to the intended destination and back, enabling reliable communication across networks.