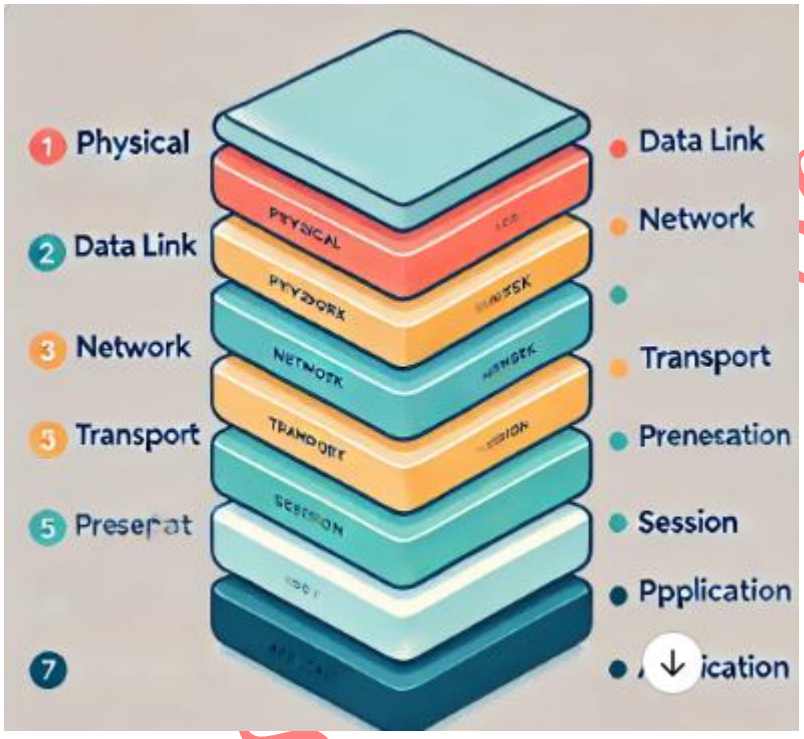
OSI Model

The **OSI Model** (Open Systems Interconnection Model) is a framework that explains how data moves from one device to another over a network. It breaks down the communication process into **7 layers**, each with a specific function. These layers work together to ensure that data is transmitted successfully between devices.



7 Layers of the OSI Model:

1. **Physical Layer (Layer 1)**:
   - Deals with the **physical connection** between devices.
   - It controls things like cables, switches, and electrical signals.
   - Example: Ethernet cables or Wi-Fi signals.
2. **Data Link Layer (Layer 2)**:
   - Ensures **error-free data transfer** between two devices.
   - Uses MAC (Media Access Control) addresses to identify devices on the same network.
   - Example: Ethernet, Wi-Fi protocols.
3. **Network Layer (Layer 3)**:
   - Handles **routing** and **sending data** across different networks.
   - Uses IP (Internet Protocol) addresses to move data between networks.
   - Example: IP addresses, routers.

4. **Transport Layer (Layer 4)**:
   - Ensures **reliable data transfer** and error correction.
   - Divides large data into smaller packets and reassembles them on the other side.
   - Example: TCP (Transmission Control Protocol), UDP (User Datagram Protocol).
5. **Session Layer (Layer 5)**:
   - Manages and controls **sessions** between two devices.
   - Establishes, manages, and terminates communication between applications.
   - Example: Keeping a video call session active.
6. **Presentation Layer (Layer 6)**:
   - Ensures that the data is in a **format that can be understood** by the application.
   - Handles encryption, decryption, and data compression.
   - Example: JPEG for images, SSL for secure communication.

7. **Application Layer (Layer 7)**:
   - The **interface** where users interact with the network.
   - Provides network services directly to applications like web browsers and email.
   - Example: HTTP (used by web browsers), FTP (for file transfer).

Why is the OSI Model Important?

- **Standardizes Communication**: It makes sure that different systems and devices can communicate with each other, even if they are made by different companies.
- **Troubleshooting**: It helps identify where a problem is happening in a network by looking at which layer is not working correctly.

Simple Analogy:

Think of the OSI model like a **postal service**:

- **Physical Layer**: The delivery truck (physical transport of the letter).
- **Data Link Layer**: Sorting office that makes sure the address is correct.
- **Network Layer**: The road map the truck follows (finding the right path).
- **Transport Layer**: Breaking the letter into pieces, if it's too big, and reassembling it.
- **Session Layer**: Making sure the right mailbox is open for delivery.
- **Presentation Layer**: Ensuring the letter is in the right language.
- **Application Layer**: You receiving and reading the letter.