# Osi Modell

A comprehensive cheat sheet detailing the OSI (Open Systems Interconnection) model, its layers, functions, and protocols. Perfect for networking students and professionals.

## OSI Model Layers Overview

### Mnemonic Devices

Remember the order:

- All People Seem To Need Data Processing
- Please Do Not Throw Sausage Pizza Away

### Layer Breakdown

The OSI (Open Systems Interconnection) model is a conceptual framework used to describe the functions of a networking system. It's divided into seven layers, each with specific responsibilities.

Layers from top to bottom:
7. Application
8. Presentation
9. Session
10. Transport
11. Network
12. Data Link
13. Physical

### Encapsulation

Data travels down the OSI model during transmission, each layer adding its own header (encapsulation). On the receiving end, the headers are removed (decapsulation) as data moves up the layers.

## Layers 7-4: Application to Transport

### Layer 6: Presentation

**Function:** Data representation, encryption, and decryption.
**Protocols:** TLS/SSL, MIME, XDR

**Example:** Encoding data for proper display (e.g., ASCII, UTF-8), encrypting data for secure transmission (SSL/TLS).

### Layer 5: Session

**Function:** Manages connections between applications.
**Protocols:** NetBIOS, SAP, PPTP, L2TP

**Example:** Starting, maintaining, and terminating sessions between a client and a server.

### Layer 7: Application

**Function:** Provides network services to applications.
**Protocols:** HTTP, SMTP, FTP, DNS, DHCP, Telnet, SNMP, POP3, IMAP, SSH, NTP

**Example:** A web browser (HTTP), email client (SMTP, POP3, IMAP)

### Layer 4: Transport

**Function:** Reliable data transfer, segmentation, and flow control.
**Protocols:** TCP, UDP

**Example:** TCP ensures reliable, ordered delivery of data. UDP offers faster, connectionless service.

## Layers 3-1: Network to Physical

### Layer 3: Network

**Function:** Logical addressing and routing of data packets.
**Protocols:** IP, ICMP, IGMP

**Example:** Routers use IP addresses to forward packets across networks.

### Layer 2: Data Link

**Function:** Physical addressing and error detection for direct connections.
**Protocols:** Ethernet, Wi-Fi, PPP, Frame Relay, ARP

**Example:** Ethernet uses MAC addresses for device identification on a local network. Switches operate at this layer.

### Layer 1: Physical

**Function:** Physical transmission of data bits over a communication channel.
**Protocols:** Ethernet cables, Fiber optics, Wireless signals

**Example:** Cables, connectors, voltage levels, and radio frequencies.

## Key Concepts and Protocols

### TCP/IP vs. OSI

**TCP/IP Model:**
A practical implementation of the OSI concepts, but with fewer layers (4 layers). Layers: Application, Transport, Internet, Network Access.

**OSI Model:**
A theoretical model with seven layers, providing a detailed framework for network communication. It serves as a reference for understanding network protocols and functions.

### Common Protocols by Layer

- **Application Layer:** HTTP, FTP, SMTP, DNS
- **Transport Layer:** TCP, UDP
- **Network Layer:** IP, ICMP
- **Data Link Layer:** Ethernet, Wi-Fi, ARP

### Troubleshooting with OSI

The OSI model aids in network troubleshooting by allowing you to isolate problems to a specific layer. For instance, if you can't access a website (Application Layer), check lower layers like Network (IP configuration) and Data Link (physical connection).