**OSI Model with protocol examples**

1. Understanding about the OSI Model

7 OSI Layers:

Physical Layer

Data Link Layer

Network Layer

Transport Layer

Session Layer

Presentation Layer

Application Layer

Examples: HTTP, HTTPS, FTP, NFS, SMTP, DHCP, SNMP, TELNET, POP3, IRC, NNTP

**Why OSI is Important?**

* OSI → Open System Interconnection
* It is a conceptual model created by the International Organization for Standardization (ISO) for communication using standard protocols.

**Key Points:**

* The internet does not follow the OSI model strictly.
* It is useful for troubleshooting network problems.
* The OSI model breaks down the problem and helps to locate trouble and solve issues.

**Application Layer (Layer 7)**

Request → Web Server → Response

It is the only layer that directly interacts with users.

Protocols used:

HTTP, SMTP, FTP, NFS, DHCP, SNMP, TELNET, POP3, IRC, NNTP

Functions:

* File transfer
* Web browsing
* Email
* Virtual terminals

**Presentation Layer (Layer 6)**

**Handles**:

* Character/Number encoding
* Encryption → Compression (bits reduction) → Translation

**Responsibilities**

* Prepares data received from the application layer for transmission.
* Handles data translation, encryption, and compression.

**Session Layer (Layer 5)**

* Manages session of communication between two devices.

Responsibilities:

* Opens and closes communication sessions.
* Maintains the time duration between opening and closing of a session.

**Transport Layer (Layer 4)**

**Handles:**

* Segmentation → Transport → Reassembly
* Ensures complete data transfer and reliability.
* Responsible for end-to-end communication between devices.

**Protocols used:**

* TCP (Transmission Control Protocol)
* UDP (User Datagram Protocol)

**Network Layer (layer 3)**

**Handles:**

* Packet Creation → Transport → Packet Assembly
* Responsible for data transfer between two networks.

**Protocols used:**

* ICMP (Internet Control Message Protocol)
* IGMP (Internet Group Management Protocol)

**Data Link Layer (layer 2)**

**Handles**:

* Frame Creation → Transport → Transfer Frames between networks

Similar to the network layer, but:

* It takes packets from the network layer and breaks them into smaller frames for transmission.

**Physical Layer (layer 1)**

* Transfers raw bitstreams over the physical medium.

**Example:**

Sending cable ——— 0010100010 ———> Receiving Cable

(Sending Cable → Receiving Cable)

Physical Layer Includes physical equipment such as:

* Cables
* Switches
* The data transmitted at this layer is in the form of 0s and 1s.
* Responsible for transmitting bits over wires/hardware.

**OSI Layers and Their Functions**

**1.** **Application Layer (Layer 7)**

User-facing layer

protocols 🡪 HTTP, FTP, DNS

**2**. **Presentation Layer (Layer 6)**

Responsible for

Formatting, encryption, compression

Examples:

JPEG, TLS, ASCII

**3.** **Session Layer (Layer 5)**

Manages session control

Examples:

NetBIOS, SMB

**4. Transport Layer (Layer 4)**

Ensures end-to-end connection

Protocols 🡪 TCP, UDP

**5. Network Layer (Layer 3)**

Handles routing and IP addressing

Protocols 🡪 IP, ICMP

**6. Data Link Layer (Layer 2)**

Ensures frame delivery

Protocols 🡪 Ethernet, ARP, PPP

**7. Physical Layer (Layer 1)**

Transmits bits via hardware

Media:

Cables, radio, Wi-Fi, signals