OSI Model —

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The Open System Interconnection (OSI) model is a conceptual framework that standardizes the functions of a telecommunication or computing system into seven abstract layers. This model helps vendors and developers create interoperable network devices and software.

- Physical layer (layer 1) —
- The Physical layer is the first and lowest layer of the OSI model. It is responsible for transmitting raw bitstreams over a physical medium.
- This layer deals with the physical connection b/w devices

including the hardware components like Ethernet cables, hub and repeaters.

- Data Link Layer (Layer 2) —
- The Data Link Layer provides node-to-node data transfer - a direct link b/w two physically connected nodes. It ensures that data frames are transmitted with proper synchronization, error detection and correction.
- Devices such as switches and bridges operate at this layer, using MAC (Media Access Control) addresses to identify network devices.

- Network Layer (Layer 3) —
- The Network layer handles packet forwarding, including the routing of packets through different routers to reach the destination network.
- It is responsible for logical addressing and path determination ensuring that data reaches the correct destination across multiple networks.
- Routers operate at this layer, using IP (Internet Protocol) addresses to identify devices and determine the most efficient path for data transmission.

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- Transport Layer (Layer 4) —
- The transport layer provides end-to-end communication services for applications. It is responsible for the reliable (or unreliable) delivery of data, segmentation,

reassembly of messages, flow control and error checking.
- Protocols like TCP and UDP function at this layer. TCP offers reliable, connection-oriented transmission with error recovery, while UDP provides faster, connectionless communication without guaranteed delivery.

- Session layer (layer 5) —
- The session layer manages sessions b/w applications. It establishes, maintains and terminates connections, allowing devices to hold ongoing communications known as sessions.
- This layer is essential for session checkpointing and recovery, ensuring that data transfer can resume seamlessly after interruptions.
- Protocols and APIs (Application Programming Interfaces) operating at this layer coordinate communication b/w systems and applications.

- Presentation layer (layer 6) —
- The presentation layer acts as a translator b/w the application layer and network format. It handles data representation, ensuring that information sent by application layer of one system is readable by the application layer of another.
- This include data encryption and decryption, data compression and converting data formats. Encryption protocols and data compression techniques operate at this layer to secure and optimize data transmission.

08.00 • Application Layer (Layer 7) —

• The application layer is the topmost layer of the OSI model and provides network services directly to end-user applications. It enables resource sharing, remote file access and other network services.

• Common protocols operating at this layer include HTTP for web browsing, FTP for file transfers, SMTP for email transmission and DNS for resolving domain names to IP addresses.

• This layer serves as the interface b/w the network and the application software.

HTTP, FTP, SMTP, DNS → Application Layer

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Encryption protocols, data compression → Presentation Layer

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Session Protocols, APIs → Session Layer

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TCP, UDP → Transport Layer

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Routers, IP addresses → Network Layer

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Switches, bridges, MAC address → Data Link Layer

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Ethernet cables, hubs, repeaters → Physical Layer

Notes

→ Example of sending a file across Network layers —
When sending a file over network, several steps occur across
different layers of the network model. The process begins at
the Application Layer which initiates the file transfer request.
Following this, the Presentation Layer encrypts the file to
ensure its security during transmission. The Session layer
then establishes a communication session with the receiving
device. At the Transport Layer, the file is broken down
into segments to ensure error-free transmission. The
Network layer takes over to determine the best route
for transferring the data across the network. Next
the Data Link Layer encapsulates the data into frames,
preparing it for node-to-node delivery. Finally, the
Physical layer handles the actual transmission of bits
over the physical medium, completing the process.