



R&D Document

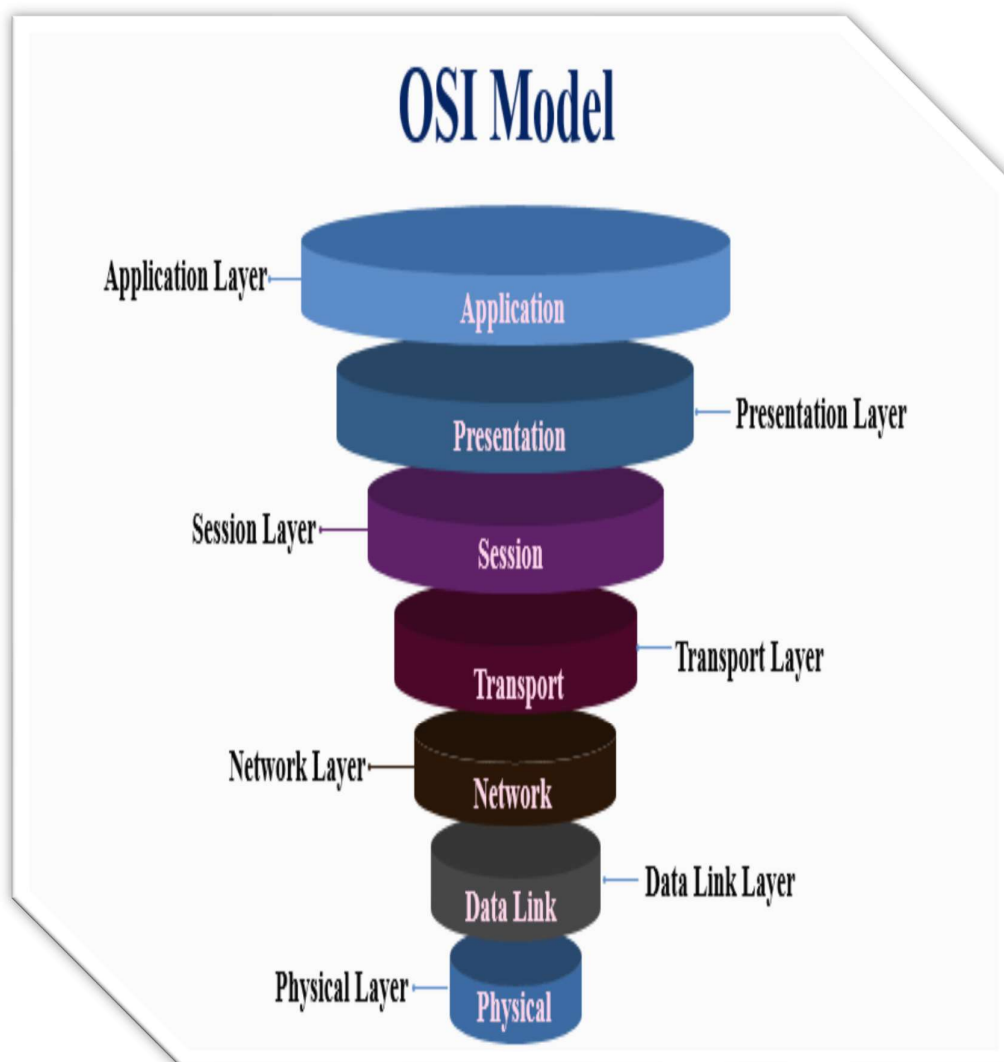
Working of all the layers in OSI Model

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The OSI Model

The OSI (Open Systems Interconnection) model is a conceptual framework that standardizes the functions of a telecommunication or computing system into seven distinct layers. Each layer has specific functions and interacts with adjacent layers to facilitate communication between devices on a network. Understanding the working of each layer is essential for network engineers and IT professionals to troubleshoot network issues effectively



History

The history of the OSI (Open Systems Interconnection) model traces back to the late 1970s and early 1980s when there was a growing need for a standardized framework to facilitate communication between different computer systems and networks. Prior to the OSI model, each vendor developed its own proprietary networking protocols and architectures, which often led to interoperability issues and hindered the growth of networking technologies.

In response to this challenge, the International Organization for Standardization (ISO) initiated the development of the OSI model. The goal was to create a universal standard that could define the functions and interactions of various networking components in a systematic and comprehensive manner.

The OSI model development process involved collaboration among international experts from different fields of computer science, telecommunications, and networking. The work was organized under the auspices of ISO's Technical Committee 97, Subcommittee 16 (TC97/SC16).

Key milestones in the history of the OSI model include:

1. **Conceptualization Phase:** The conceptual groundwork for the OSI model was laid out through discussions and proposals from various stakeholders in the late 1970s. The primary objectives were to create a layered architecture that could support interoperability, scalability, and modularity.
2. **Development and Standardization:** The development of the OSI model involved the creation of seven abstraction layers, each addressing specific aspects of network communication. These layers were defined based on functionalities rather than specific technologies, allowing for flexibility and adaptability.
3. **Publication of OSI Reference Model:** In 1984, the OSI model was formally published as the ISO/IEC 7498 standard, titled "Information processing systems – Open Systems Interconnection – Basic Reference Model." This document provided a detailed description of the seven layers of the OSI model and their respective functions.
4. **Adoption and Influence:** Although the OSI model did not gain widespread adoption as a practical networking architecture, it had a significant impact on the development of networking standards and technologies. The model served as a conceptual framework for understanding and designing network protocols, influencing subsequent networking standards such as TCP/IP.

OSI Model Layers

Layer 1: Physical Layer

- The physical layer is responsible for transmitting raw data bits over a physical medium.
- Functions include encoding, signaling, and physical connection establishment.
- Examples of physical layer devices include cables, hubs, and network interface cards (NICs).

Layer 2: Data Link Layer

- The data link layer provides error detection and correction in the transmission of data frames.
- It also manages access to the physical medium and addresses devices on the same network.
- Common protocols at this layer include Ethernet and Wi-Fi.

Layer 3: Network Layer

- The network layer is responsible for routing packets between different networks.
- It determines the best path for data transmission based on logical addressing (IP addresses).
- IP, ICMP, and routing protocols like OSPF and BGP operate at this layer.

Layer 4: Transport Layer

- The transport layer ensures reliable data transfer between end systems.
- It segments and reassembles data, provides flow control, and error recovery.
- TCP (Transmission Control Protocol) and UDP (User Datagram Protocol) are key protocols at this layer.

Layer 5: Session Layer

- The session layer establishes, maintains, and terminates connections between applications.
- It manages sessions, synchronization, and dialog control.
- Examples of session layer protocols include NetBIOS and PPTP.

Layer 6: Presentation Layer

- The presentation layer is responsible for data translation, encryption, and compression.
- It ensures that data is in a readable format for the application layer.
- Protocols like SSL/TLS and MIME operate at this layer.

Layer 7: Application Layer

- The application layer interacts directly with end-users and provides network services.
- It includes protocols for email (SMTP), web browsing (HTTP), file transfer (FTP), and more.
- Applications like web browsers and email clients operate at this layer.

OSI Model Chart

