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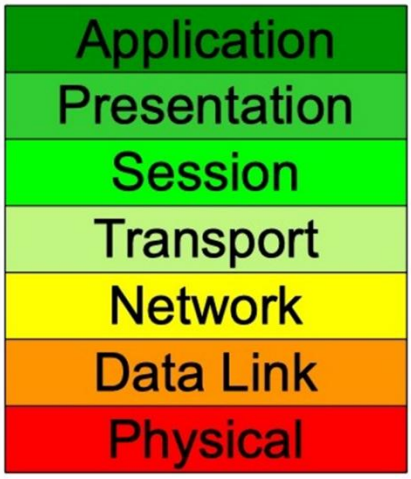
Working of all the layers in OSI Model

1. Title
In-depth Research on the Working of All Layers in the OSI Model

2. Introduction
The Open Systems Interconnection (OSI) Model is a theoretical framework established by ISO to standardize the operations of a telecommunication or computing system into seven theoretical layers. The layered architecture facilitates interoperability and organized communication in various systems and plays a critical role in network design and troubleshooting.

3. Objectives
3.1 To understand the roles of every OSI layer.
3.2 To examine data exchange and service provided by every layer.
3.3 To learn actual implementations and protocols related to every layer.

4. OSI Model Overview



The OSI Model divides the network architecture into seven different layers:

Layer Number	Layer Name	Function
7	Application	User interface and application services
6	Presentation	Data translation, encryption, compression
5	Session	Session control and synchronization
4	Transport	End-to-end communication and reliability
3	Network	Routing and logical addressing
2	Data Link	MAC addressing and error detection
1	Physical	Transmission of raw bits over media

5. How Each Layer Operates

5.1 Application Layer
Function: Provides direct communication with the user. Offers services like network management, email, file transfers, and more.
Examples include DNS, SMTP, FTP, and HTTP.
Operation: Receives user data and sends it in an organized manner to the lower layers.

5.2 Presentation Layer
Function: Converts data between network and application formats. Manages compression and encryption/decryption.
Examples include ASCII, JPEG, MPEG, and SSL/TLS.
Operation: Transforms incoming data into an application-readable format. Guarantees accurate data encoding and decoding.

5.3 Session Layer
Function: Manages device conversations and sessions. In charge of establishing, maintaining, and terminating connections.
Examples include RPC and NetBIOS.
Working: Uses checkpoints and recovery mechanisms to make sure sessions are started, managed, and ended correctly.

5.4 Transport Layer
Function: Uses flow control and error correction to guarantee dependable data transfer. Divides and reassembles data.
TCP and UDP are two examples.
Operation: UDP is quicker but less dependable than TCP, which offers dependable transmission through acknowledgments and retransmissions.

5.5 Network Layer
Function: Manages packet forwarding, addressing, and routing between networks.
For instance, IP, ICMP, and IGMP
Working: Uses routing algorithms to determine the optimal path for data. adds IP addresses for the source and destination.

5.6 Data Link Layer
Function: Provides error-free communication between two neighboring nodes. manages MAC addressing.
Examples are Ethernet, PPP, and ARP.
Functioning: Adds the MAC address and splits packets into frames. uses CRC to check for errors.

5.7 Physical Layer:
Function: Uses a physical medium such as cables or fiber optics to transmit raw data.
Examples include Network Interface Cards (NICs), Ethernet cables, hubs, and repeaters.
Operation: Transforms digital bits into radio, light, or electrical signals for delivery.

8. Importance of OSI Layers

8.1 Isolates layers to make troubleshooting easier.
8.2 Helps in the creation of software and hardware that are compatible.
8.3 Encourages the development of safe, fast network technologies.

9. Conclusion

A clear framework for comprehending network communication is offered by the OSI Model. Each layer carries out a distinct function, and when combined, they allow for smooth data transfer. Anyone working in network design, development, or research must have a solid understanding of the OSI layers.

10. References

[1] https://www.webopedia.com/definitions/7-layers-of-osi-model/
[2] https://www.geeksforgeeks.org/open-systems-interconnection-model-osi/