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1. Introduction to the OSI Model and the TCP/IP Stack

OSI Model

The OSI (Open Systems Interconnection) Model is a conceptual model which enables diverse communication systems to communicate using standard protocols. It is divided into seven layers, each of which performs a specific function. The layers are:

1. Physical layer: Sends unprocessed data bits across a physical media, like a copper cable or fiber optic cable.

2. Data link layer: information on error detection and correction.

3. Network layer: Uses a network to direct packets to their intended locations.

4. Transport layer: Offers dependable device-to-device connectivity between processes.

5. Session layer: Controls how devices communicate with one another.

6. Presentation layer: Conversion of Text to Binary, Encryption, and Compression

7. Application layer Human: Machine Interface and Message Formatting under the

TCP/IP Stack

The TCP/IP (Transmission Control Protocol/Internet Protocol) Stack is a suite of protocols that implement the OSI Model. It is the most widely used protocol suite in the world, and is the basis for the Internet. The TCP/IP Stack is divided into four layers:

1. Link layer or network interface: Combines the physical layer and data link layer of the OSI Model.
2. Internet layer or network layer: same as network layer of the OSI Model.
3. Transport layer: Corresponds to the transport layer of the OSI Model.

4. Application layer: Corresponds to the session, presentation, and application layers of the OSI Model.

Significance of the OSI Model and the TCP/IP Stack

The OSI Model and the TCP/IP Stack are both important for understanding computer networking. The OSI Model provides a comprehensive overview of the different functions involved in network communication, while the TCP/IP Stack is the protocol suite that is actually used by most networks.

2. Comparison and contrast of the OSI Model and the TCP/IP Stack

compares and contrasts the corresponding layers in the OSI Model and the TCP/IP Stack:

OSI Layer	TCP/IP Layer	Functionality	Protocols
Physical	Network interface	Transmits data bits over a physical medium	Ethernet, Wi-Fi, Bluetooth
Data link	Network interface	error detection and correction information	Ethernet, Wi-Fi, Bluetooth
Network	Internet or network	Routes packets to their destination over a network	IP
Transport	Transport	Provides reliable end-to-end communication between devices	TCP, UDP
Session	Application	Manages the communication session between devices	FTP, Telnet
Presentation	Application	Formats data for applications	HTTP, SMTP, DNS
Application	Application	Provides network services to applications, such as email, file transfer, and web browsing	HTTP, SMTP, DNS, FTP, Telnet

Similarities

- Both the OSI Model and the TCP/IP Stack are layered models, meaning that they divide network communication into different layers, each of which performs a specific function.
- The corresponding layers in the OSI Model and the TCP/IP Stack have similar functionality. For example, the network layer in both models is responsible for routing packets to their destination.

Differences

- The OSI Model has seven layers, while the TCP/IP Stack has four layers.
- The TCP/IP Stack combines the physical layer and data link layer of the OSI Model into a single link layer.
- The TCP/IP Stack does not have a dedicated session layer or presentation layer. Instead, these functions are performed by the application layer.

3. Addresses used in network according to TCP/IP layers

The following table shows the different types of addresses used in network according to the TCP/IP layers:

TCP/IP Layer	Address Type	Purpose
Link	MAC address	Identifies a device on the local network.
Internet	IP address	Identifies a device on the Internet.
Transport	Port number	Identifies a specific application or service on a device.

MAC addresses are unique 48-bit addresses that are assigned to network interface cards (NICs). MAC addresses are used to identify devices on the local network, and are used by network switches and routers to forward packets.

IP addresses are unique 32-bit addresses that are assigned to devices on the Internet. IP addresses are used to route packets between devices on different networks.

Port numbers are 16-bit numbers that are used to identify specific applications or services on a device.