SUBJECT: COMPUTER NETWORKS

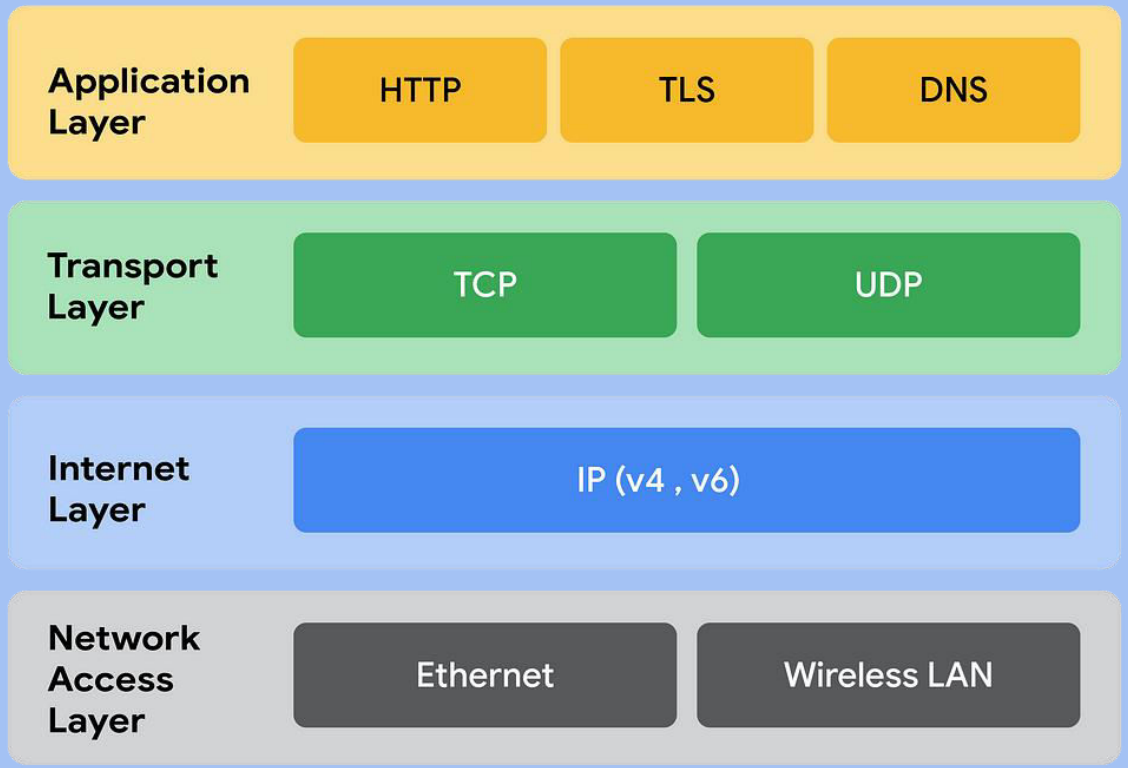
TCP/IP Model

Elementrix Classes

TCP/IP Model

- The **TCP/IP model (Transmission Control Protocol/Internet Protocol model)** is a four-layered framework that describes how data travels across networks like the internet. It offers a practical understanding of network communication.

- The TCP/IP protocol suite was invented in the **1970s by Vint Cerf and Bob Kahn** as a foundational technology for the internetworking that led to the creation of the modern internet.


Application Layer
HTTP
TLS
DNS
Transport Layer
TCP
UDP
Internet Layer
IP (v4 , v6)
Network Access Layer
Ethernet
Wireless LAN

1. Application Layer

Application Layer: Drafting and Sending the Email

- You use an email client (e.g., Gmail) to compose an email.
- When you hit "send," the email client formats the message according to email protocols like SMTP (Simple Mail Transfer Protocol) for transfer across the network.

2. Transport Layer

Transport Layer: Ensuring Reliable Delivery (via TCP)

- TCP breaks your email into smaller packets for efficient network transmission.
- TCP attaches headers to each packet, including port numbers to distinguish between different applications (like your email client) and ensure data arrives in the right order.
- TCP adds error-checking mechanisms to guarantee that every packet reaches its destination intact.

3. Internet Layer

Internet Layer: Finding the Destination (via IP)

- The IP layer assigns "addresses" to your device (the sender) and the recipient's mail server (the destination). These are IP addresses.

- IP, along with routing protocols, determines the best path across multiple networks for your email packets to reach the recipient's mail server.

4. Network Access Layer

Network Access Layer: Transmitting the Data

- This layer converts the data frames into physical signals suitable for the connection type (wired or wireless).
- If it's a wired connection, Ethernet protocols and your network adapter manage the physical transmission of electrical signals on cables.
- If it's Wi-Fi, Wi-Fi standards dictate signal transmission over the airwaves.

Receiving the Email:

- The recipient's mail server receives the packets.
- TCP on the mail server reassembles them in the correct order.
- Using SMTP, the mail server forwards the email to the recipient's device.
- Their email client retrieves the email and presents it in a readable format.

Key Points:

- **TCP/IP is modular:** Each layer performs specific tasks, independent of the others.
- **Encapsulation:** Data is wrapped with additional headers at each layer as it travels down the protocol stack.
- **Error Correction and Retransmission:** TCP provides mechanisms to resend any lost or corrupted packets.

पढ़िए और पढ़ाइये

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