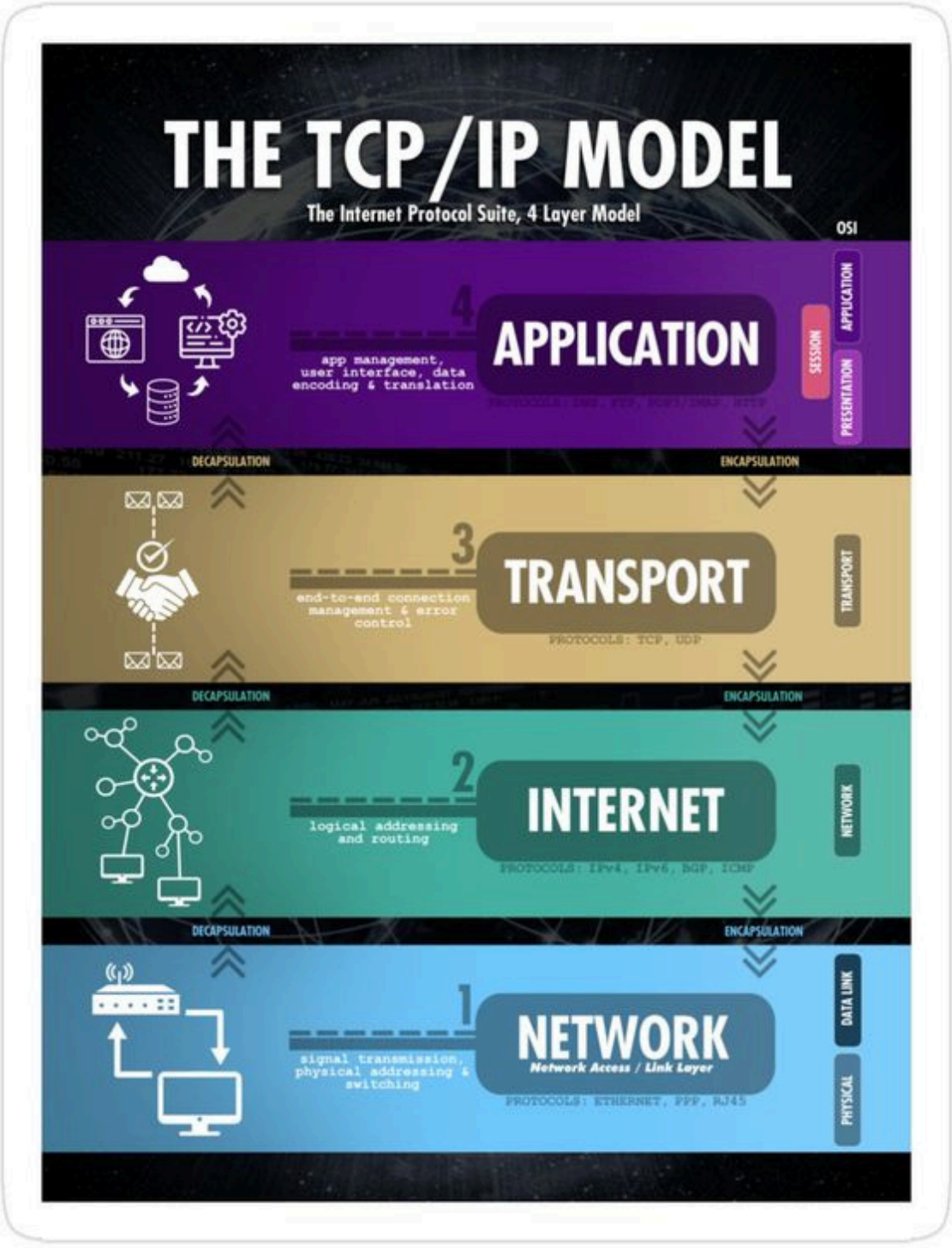
TCP/IP Model: R&D Document

TCP/IP Model :

The TCP/IP model is the foundation of the internet and modern network communication. It is simpler than the OSI model, consisting of only 4 layers. Still, they each serve a specific function and work together to enable complete, reliable communication.

This document explains each layer in more detail, with examples and key protocols used in real-world networking.



1. APPLICATION LAYER

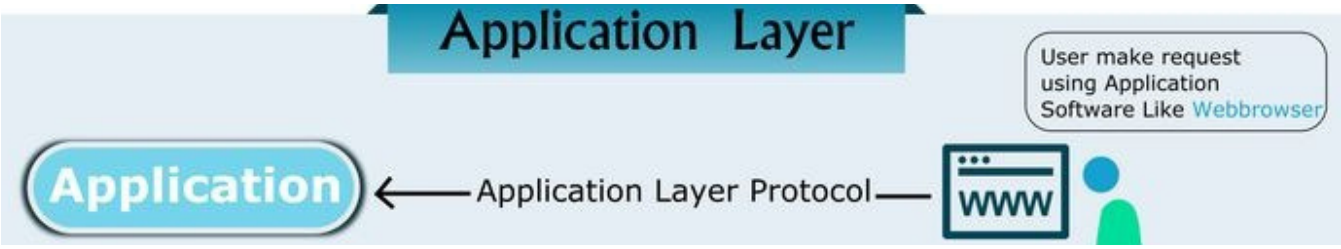
(Application, Presentation, Session)

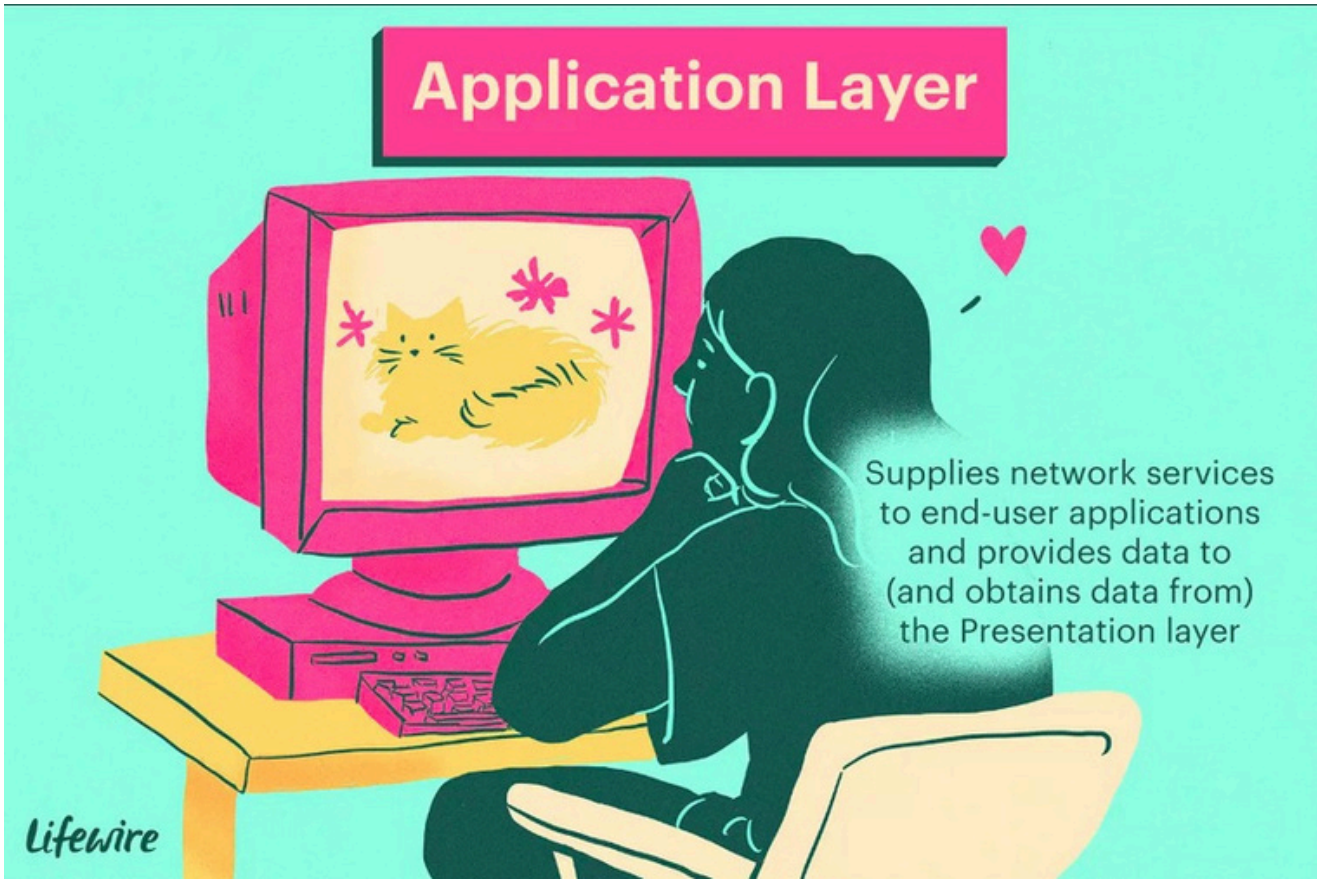
This top layer provides services for applications to communicate over a network. It provides services like web browsing, email, and file transfers. It's where applications access the network.

Protocols: HTTP, FTP, SMTP, DNS, POP3

Example: Web browsing, sending emails, remote login

Key Role: Acts as the interface between the user's applications and the underlying network





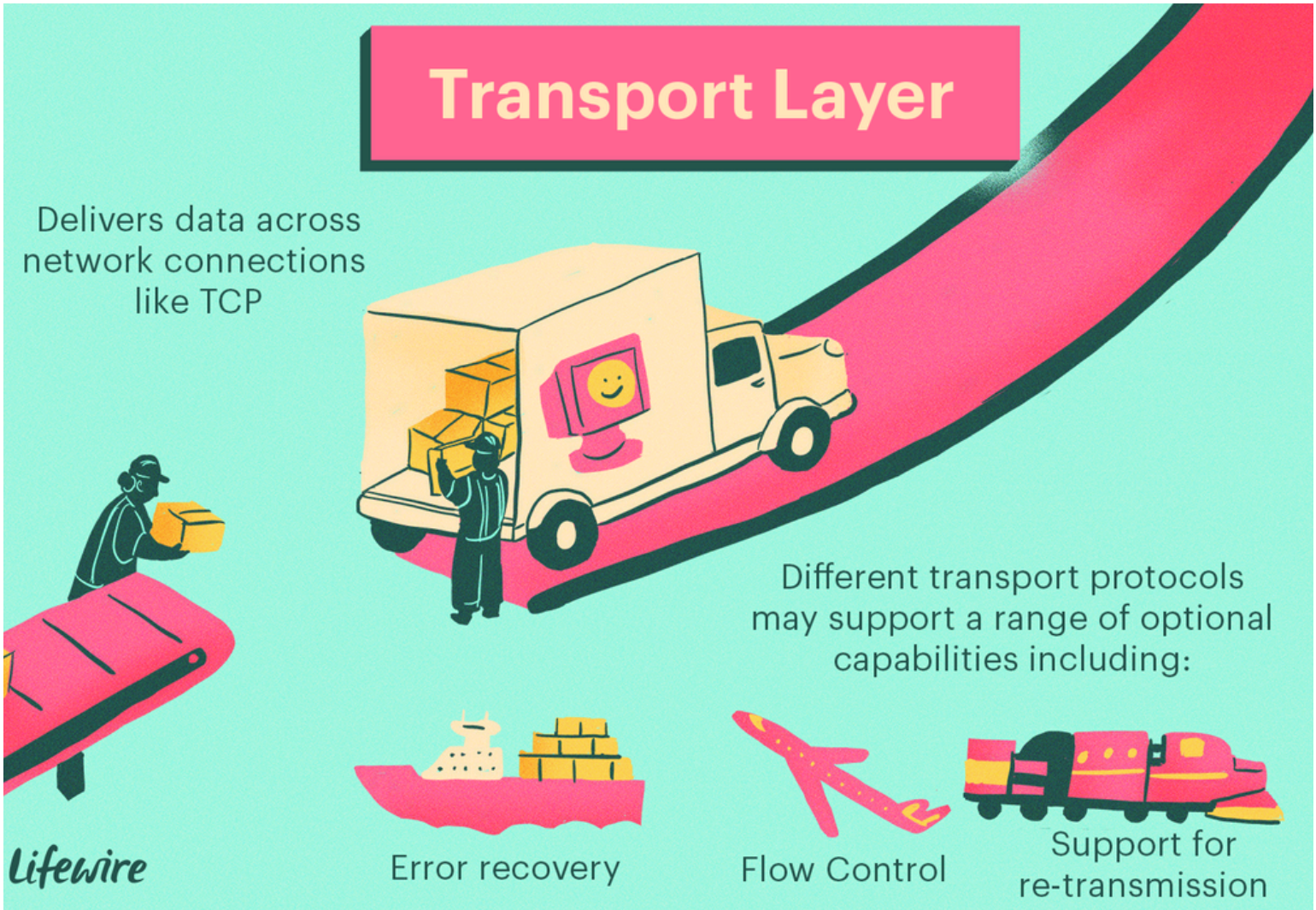
2. Transport Layer

The transport layer manages end-to-end communication. It ensures that data is reliably delivered and in order when needed. This layer makes sure data gets to the right application on the right device. It also ensures that large messages are broken down into chunks and reassembled correctly on the other side.

Key Tasks: Port addressing, segmentation, error detection, flow control

Example: TCP is used for web pages to ensure all data arrives. UDP is used in video streaming where speed is more important than perfect delivery.

Protocols: TCP (Transmission Control Protocol), UDP (User Datagram Protocol)



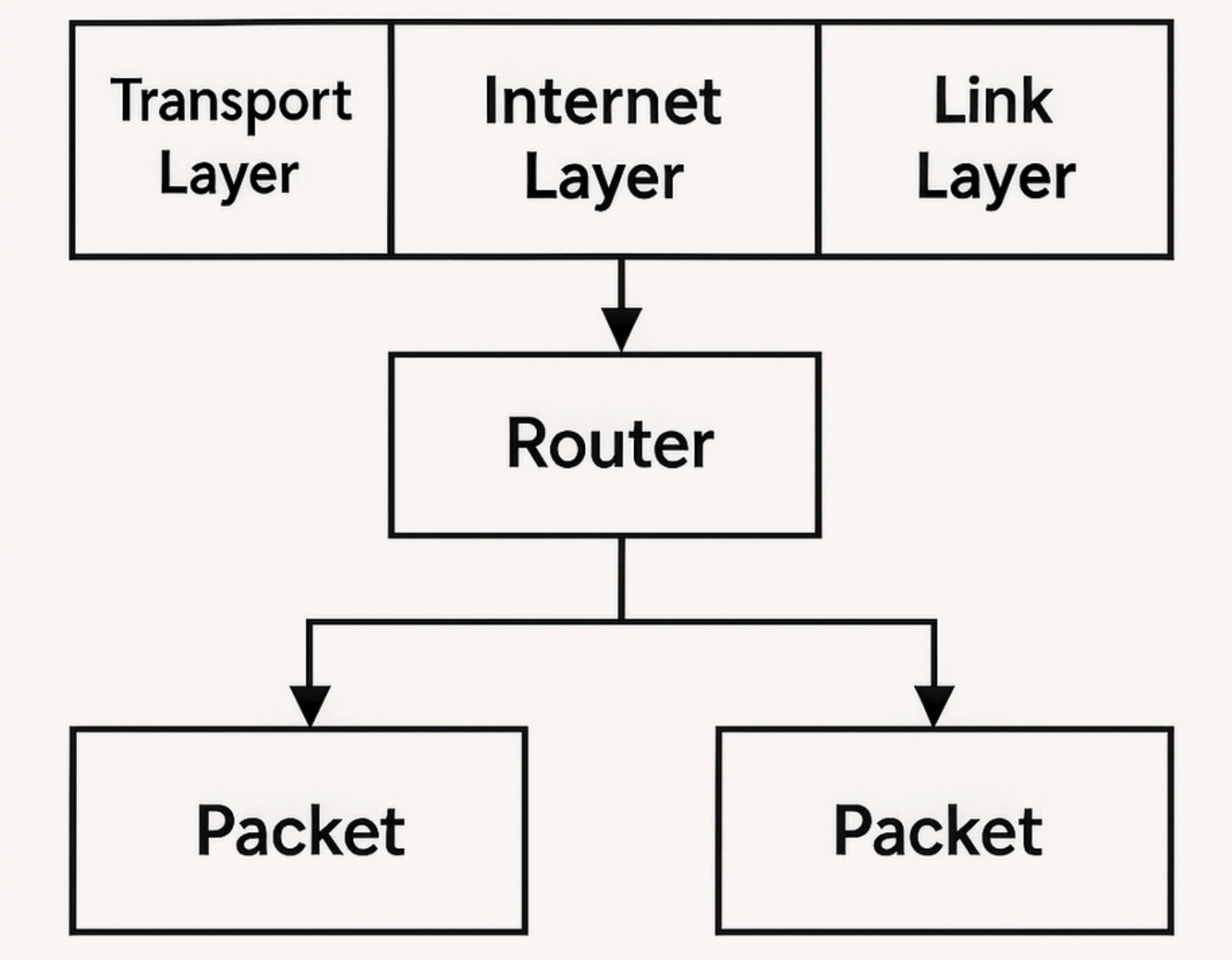
3. Internet Layer

This layer is responsible for sending packets from the source to the destination across networks. It uses logical addressing to route data.

Key Tasks: Determines the best path for data to travel through different networks

Devices: Routers

Protocols: IP (Internet Protocol), ICMP, ARP



4. NETWORK ACCESS LAYER

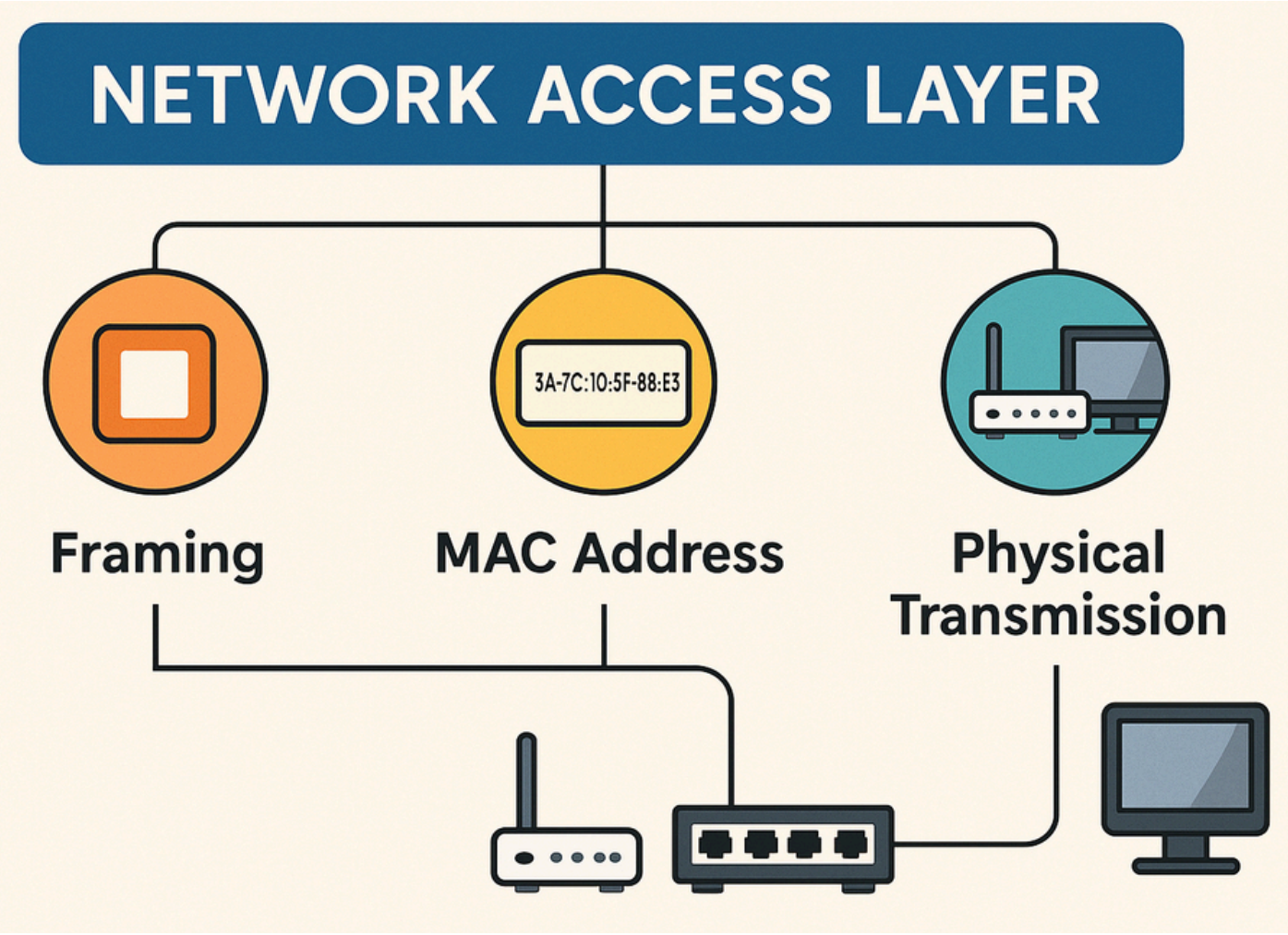
(Data Link, Physical)

The lowest layer, it handles the physical transmission of data over network hardware. This includes both hardware addressing and the actual sending of bits over a medium.

Protocols: Ethernet, Wi-Fi

Devices: Switches, Network Interface Cards (NICs), Modems

Key Role: Prepares data for physical transmission and controls access to the medium



TCP/IP vs OSI MODEL

Sr. No.	TCP/IP Reference Model	OSI Reference Model
1	Defined after the advent of Internet.	Defined before advent of internet.
2	Service interface and protocols were not clearly distinguished before	Service interface and protocols are clearly distinguished
3	TCP/IP supports Internet working	Internet working not supported
4	Loosely layered	Strict layering
5	Protocol Dependant standard	Protocol independent standard
6	More Credible	Less Credible
7	TCP reliably delivers packets, IP does not reliably deliver packets	All packets are reliably delivered

CONCLUSION

The TCP/IP model simplifies the way we understand real-world networking. Each layer plays a role in helping devices talk to each other-from loading websites to streaming videos. By studying this model, we gain insight into how modern communication works behind the scenes.

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