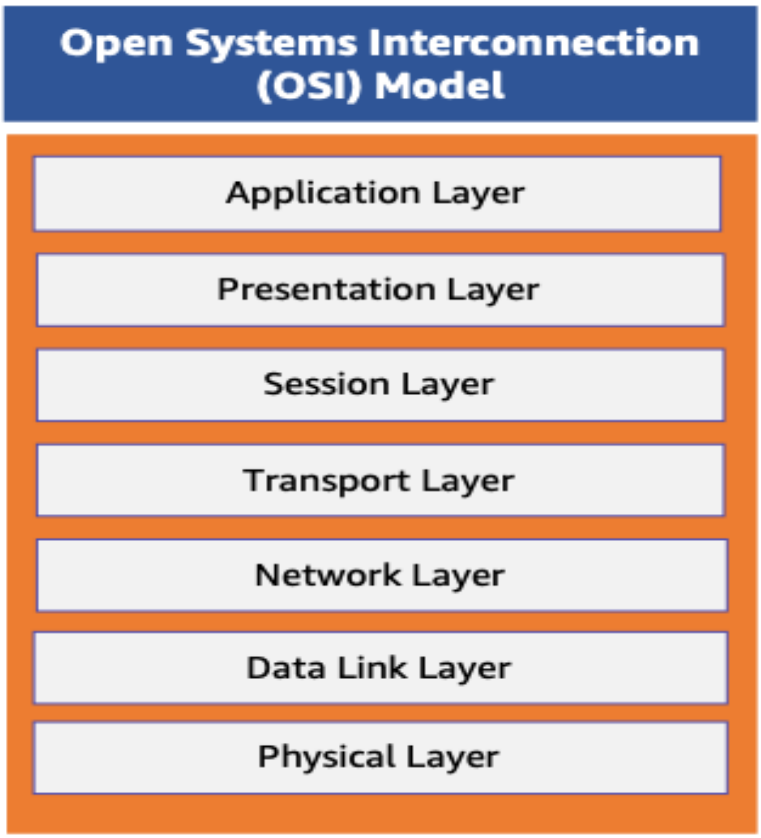
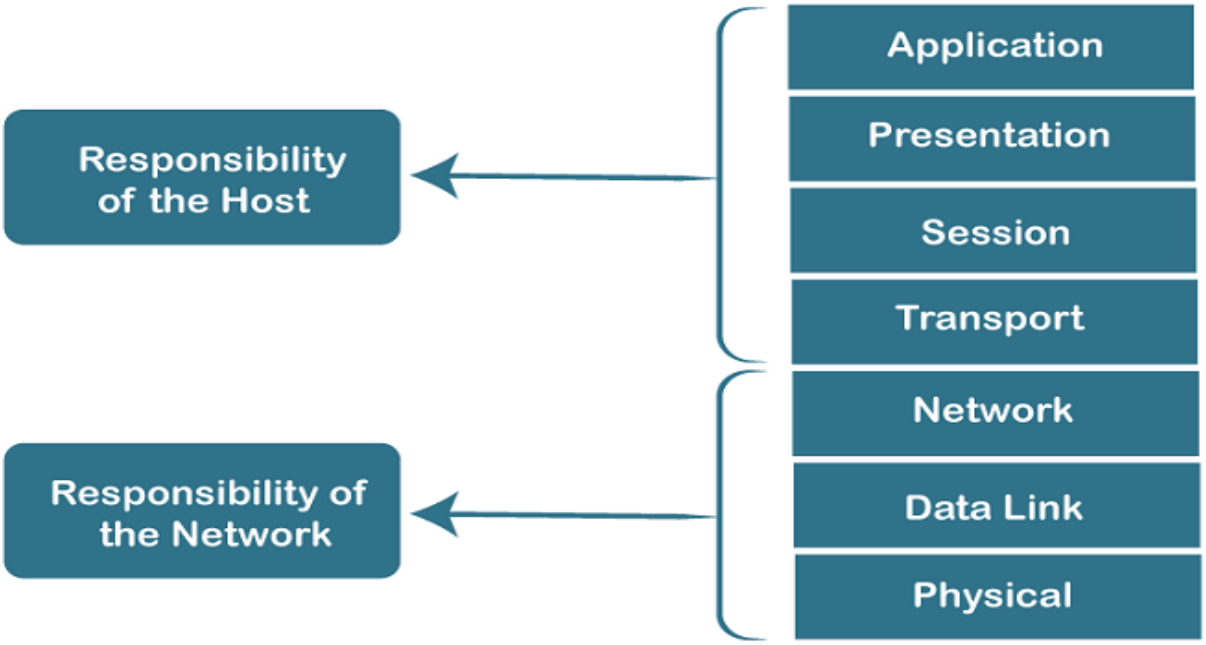
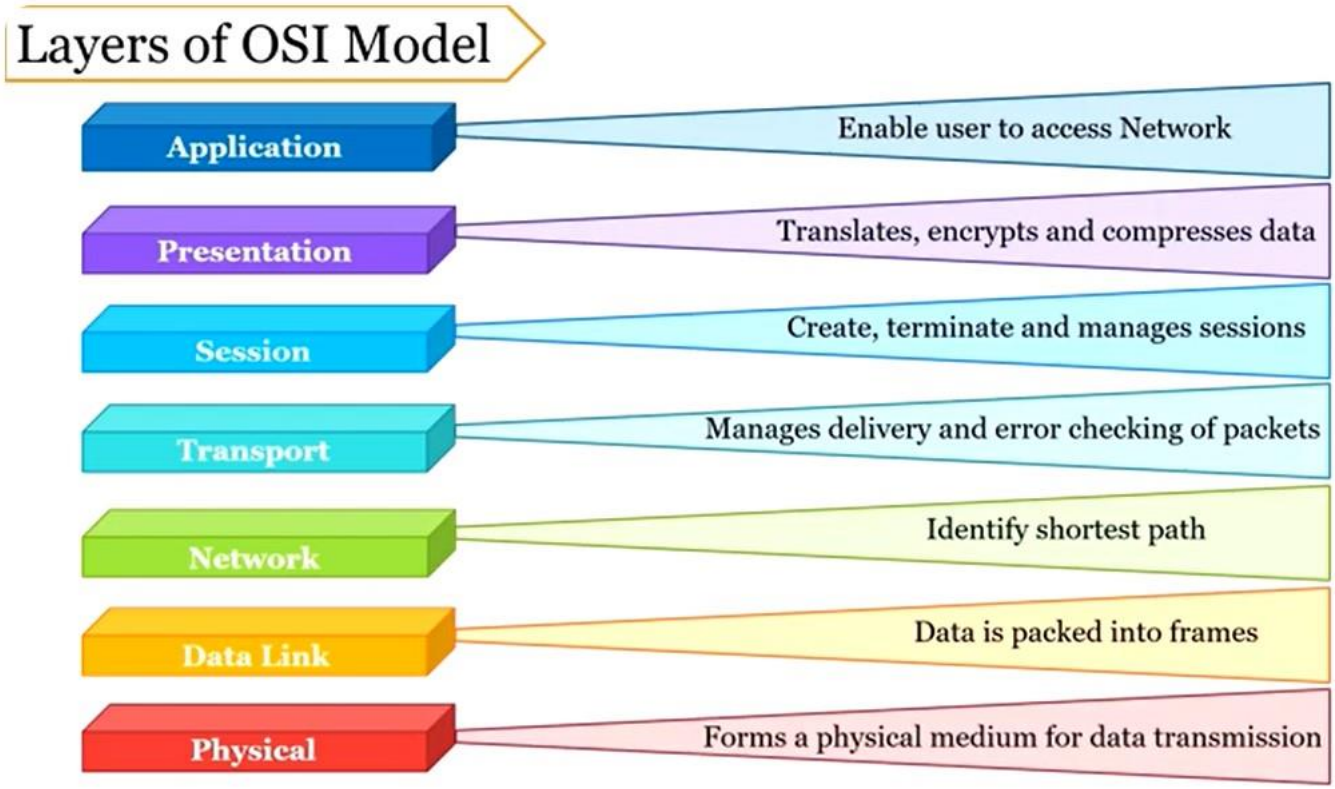
OSI layered protocol system(architecture): -

OSI stands for **Open System Interconnection** and is a reference model that describes how data from one host moves through a physical medium to another host. OSI comprises seven layers, each performing a particular network function or operation. OSI model was developed by the International Organization for Standardization (ISO) in 1984, and it is now considered an architectural model for inter-computer communications. OSI model divides the whole network activity into seven smaller and manageable tasks. Each layer is assigned a particular task. Each layer is self-contained, so tasks assigned to each layer can be performed independently.




Responsibility of the Host
Application
Presentation
Session
Transport
Responsibility of the Network
Network
Data Link
Physical


Layers of OSI Model
Application
Enable user to access Network
Presentation
Translates, encrypts and compresses data
Session
Create, terminate and manages sessions
Transport
Manages delivery and error checking of packets
Network
Identify shortest path
Data Link
Data is packed into frames
Physical
Forms a physical medium for data transmission

Application layer:

This layer enables the user/human/software to interact with the application or network whenever the user wants to read or send messages, transfer files, or perform other network-related tasks. Web browsers and other internet-connected apps like Outlook and Skype use Layer 7 application protocols. The browsers can communicate using Hypertext Transfer Protocol Secure (HTTPS) or HTTP, and email clients can communicate using POP3 (Post Office Protocol version 3) and SMTP (Simple Mail Transfer Protocol).

Presentation layer:

It translates or formats data for the application layer based on the semantics or syntax the application accepts. This layer also handles the encryption and decryption.

Session Layer:

The session layer controls the conversations between different computers. A session or connection between machines is set up, managed, and terminated at this layer. Session layer services also include authentication and reconnections.

Transport Layer:

The transport layer manages the delivery and error checking of data packets. It regulates the size, sequencing, and data transfer between hosts. One of the most common examples of the transport layer protocol is TCP (the Transmission Control Protocol).

Network Layer:

The network layer receives and delivers data packets to their intended destinations based on the addresses inside the data frame (packets). The network layer finds the goal using logical addresses like IP (internet protocol). At this layer, routers are crucial components used to route information where it needs to go between networks.

Data Link Layer:

Data is packaged into frames. It also corrects errors that may have occurred at the physical layer.

The data link layer encompasses two sub-layers of its own. The first, media access control (MAC), provides flow control and multiplexing for device transmissions over a network. The

second, logical link control (LLC), provides flow and error control over the physical medium and identifies line protocols.

The physical layer:

The physical layer transports data using various interfaces. This layer sends data from one device to another through the network. It determines how physical connections to the network are set up and how bits are represented into predictable signals as they are transmitted electrically, optically, or via radio waves.

Advantages of the OSI Model:

- It gives the idea about the hardware and software to build their network.
- Understand and communicate the process followed by components corresponding across a network.
- Perform troubleshooting by identifying which network layer is causing an issue and focusing efforts on that layer only.
- Clearly defines services, protocols, and interfaces.

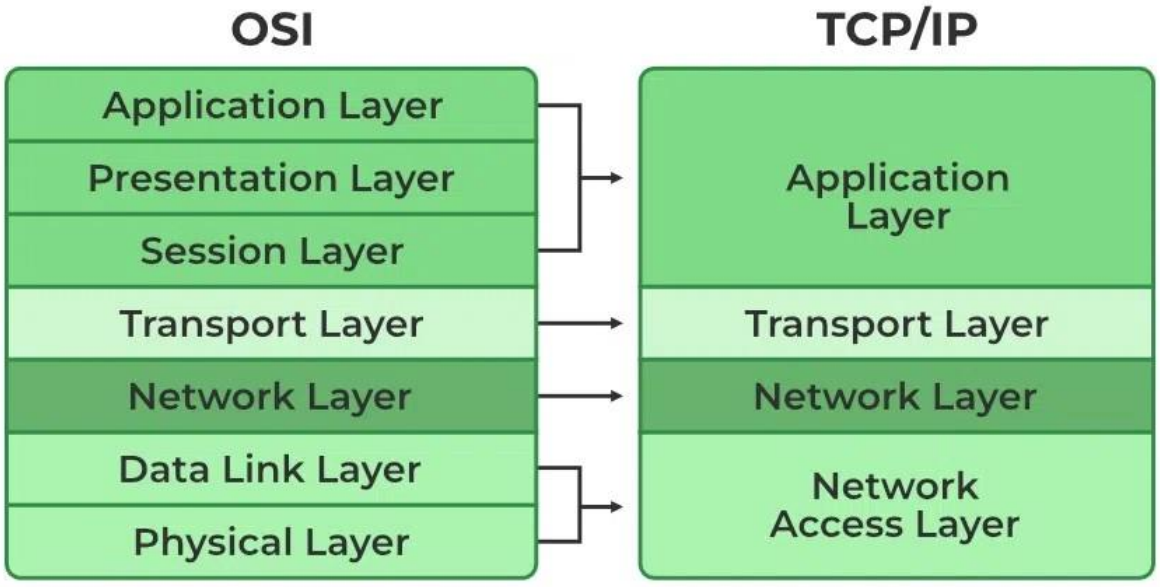
TCP/IP layered protocol system (architecture): -

The transmission control /internet protocol (TCP/IP) model originates from the ARPANET reference model. The TCP/IP model

describes how packets exchange information through the web. This set of communication protocols determines how data is to be broken, addressed, transferred, routed, and received for sharing. The server-client model is the communication model for this set.

The TCP/IP model has four or five layers; the four-layered model is below.

- Application Layer
- Transport Layer
- Network or Internet Layer
- Physical Layer or Link Layer or Network interface layer



Application Layer:

The application layer combines OSI's application, presentation, and session layers. This layer is responsible for the interaction between the user and the network application. Data is formatted,

converted, encrypted, decrypted, and set to the user. The protocols used in this layer are HTTP, SMTP, FTP, DNS, RTP, etc.

Transport Layer:

The transport layer is responsible for end-to-end communication and provides error-free data delivery. This layer can transport the data through a connection-oriented or connectionless. The two protocols used in the transport layer are user datagram protocol (UDP) and TCP.

Network Layer:

The network layer addresses hosts and chooses the best path to the destination network. This layer maintains the quality of service and offers connectionless end-to-end networking. The protocols in the network layer are IPV4, IPV6, and ICMPV4.

Network Interface Layer:

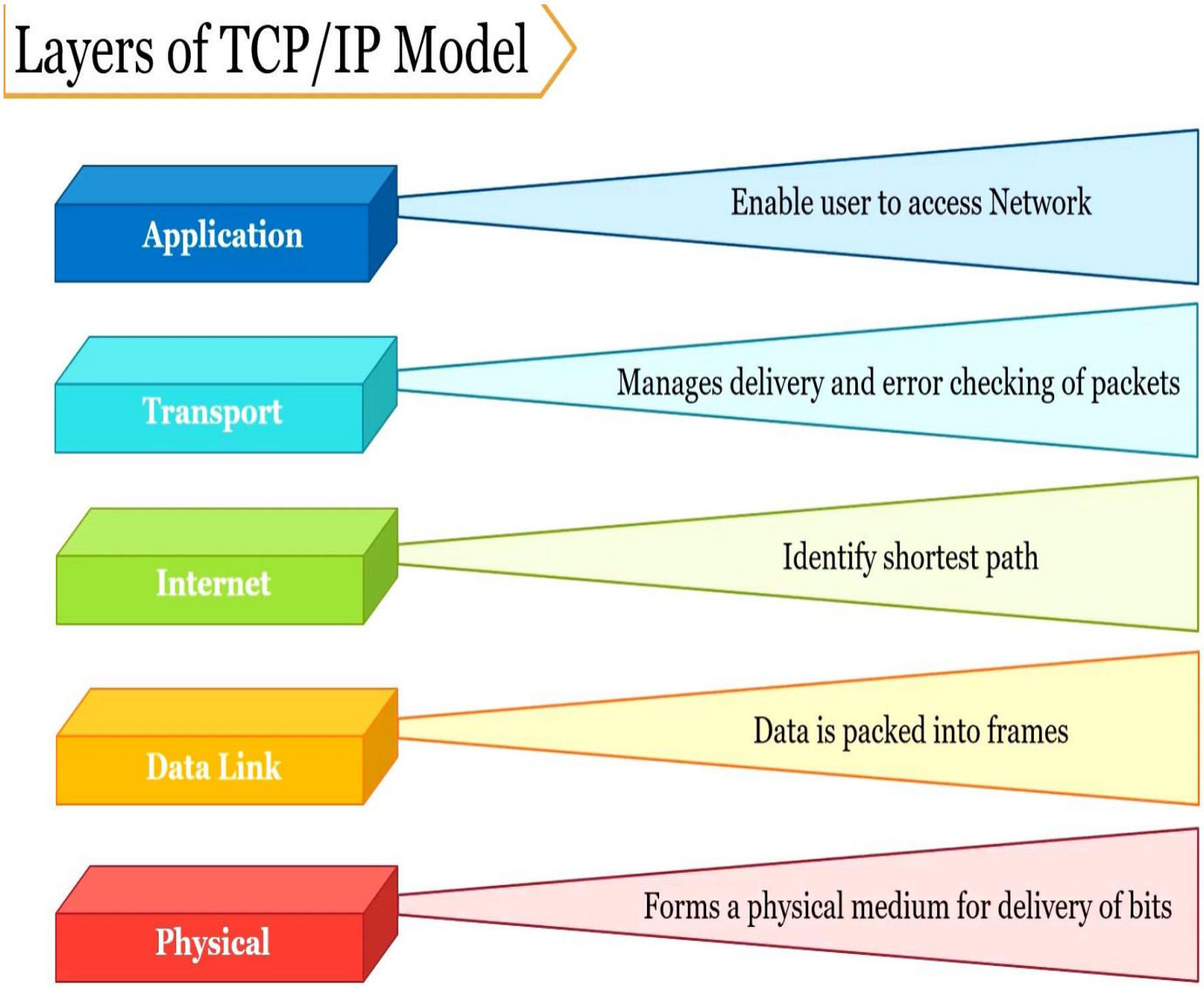
This layer is also called a network access layer. It helps you define how data should be sent using the network. It also includes how hardware devices that directly interface with a network medium, like coaxial, optical, coaxial, fiber, or twisted-pair cables, should optically signal bits.

A network layer is a combination of the data line defined in the OSI reference model article. This layer defines how the data should be sent physically through the network. This layer is

responsible for transmitting the data between two devices on the same network.

Note: -

Many scientists use the five-layered TCP/IP model, and many authors also use it in their books. (This is used in our textbook.)



OSI vs. TCP/IP:

Parameters	OSI Model	TCP/IP Model
No. of Layers	There are 7 layers.	There are 4 layers.
Acronyms	OSI stands for open system interconnection.	TCP/IP stands for transmission control protocol/internet protocol
Developed by	ISO	Department of Defense (DoD)
Layer Separation	OSI model has a separate Presentation layer and Session layer.	TCP/IP does not have a separate Presentation layer or Session layer.
Protocol implementation	Model was defined before implementation takes place.	Model defines after protocol were implemented.
Model Concept	based on three concept i.e. Service, interface and protocol.	It did not distinguish between service, interface and protocol.
Reliable delivery	It gives guarantee of reliable delivery of packet.	It does not give guarantee of reliable delivery of packet.