

Reference Models

OSI & TCP/IP Models

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OSI Model

TCP/IP Model

OSI Model

- ❖ **OSI** means **O**pen **S**ystem **I**nterconnect model.
- ❖ Developed by ISO in 1974.
- ❖ It consists of seven layers.
- ❖ Each layer has a specific functionality to be performed.

OSI Model

Layer - 7

Application

Layer - 6

Presentation

Layer - 5

Session

Layer - 4

Transport

Layer - 3

Network

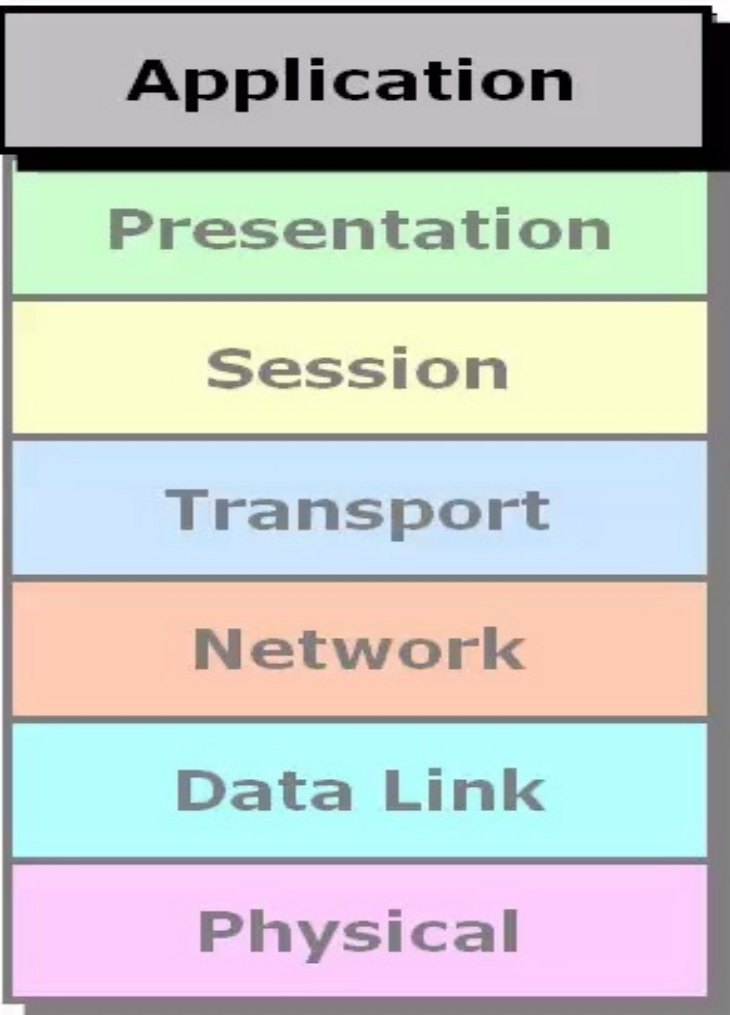
Layer - 2

Data Link

Layer - 1

Physical

OSI Model



- ❖ **Application Layer** is responsible for providing Networking Services [**email**] to the user.
- ❖ **Applications** : Browser, Yahoo Messenger, e.t.c
- ❖ Identification of Services is done using Port Numbers.
- ❖ Every Networking Application must have Port Number. [HTTP : 80, FTP: 21]

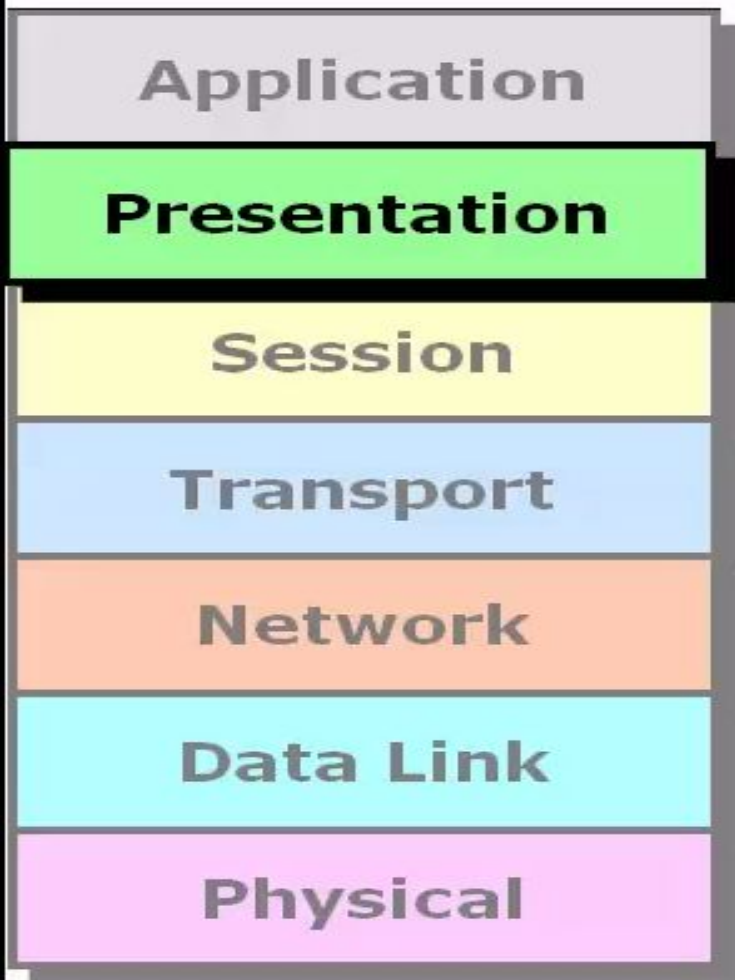
Ports are Entry and Exit Points to the Layer

Total No. Ports **0 – 65535**

Reserved Ports **0 – 1023**

Open Client Ports **1024 – 65535**

OSI Model



Presentation Layer is responsible for converting data into standard format.

Examples: ASCII, JPEG, MPEG, BMP, MP3, e.t.c

Presentation Layer will do the following :-

Translation [ASCII (vs) UNICODE]
Encryption – Decryption
Compression – Decompression [Winzip]

OSI Model

Application

Presentation

Session

Transport

Network

Data Link

Physical

Session Layer is responsible for establishing, maintaining and terminating sessions.

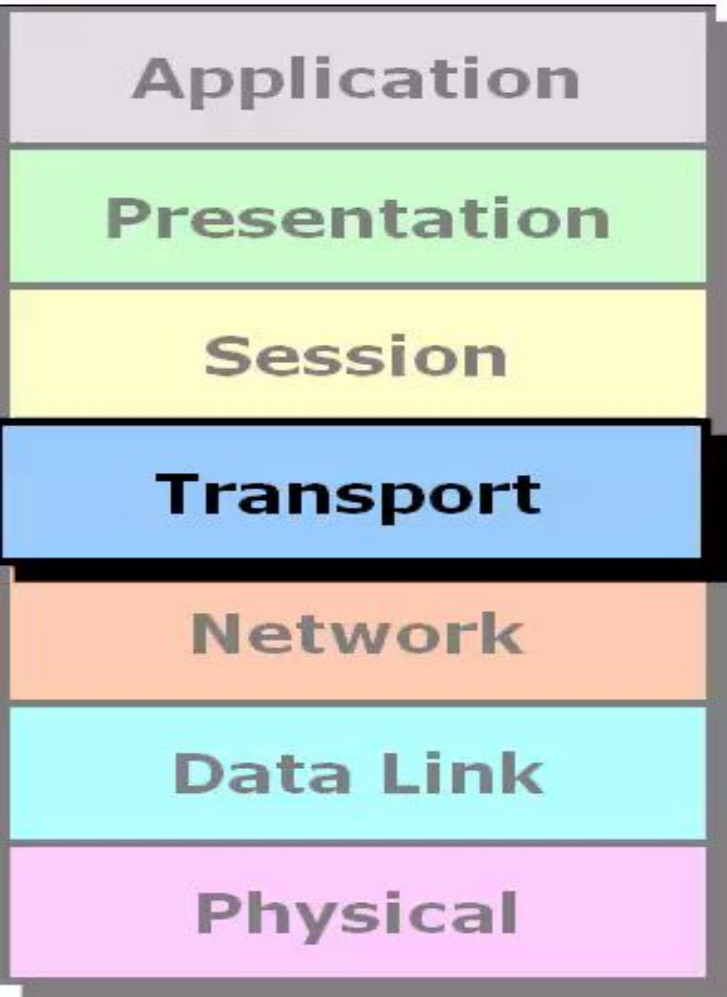
Session ID works at **Session Layer**.

Examples :

SQL → Structured Query Language

OSI Model

Identifying Service:- Includes Source Port No & Destination Port No of Communicating Applications]



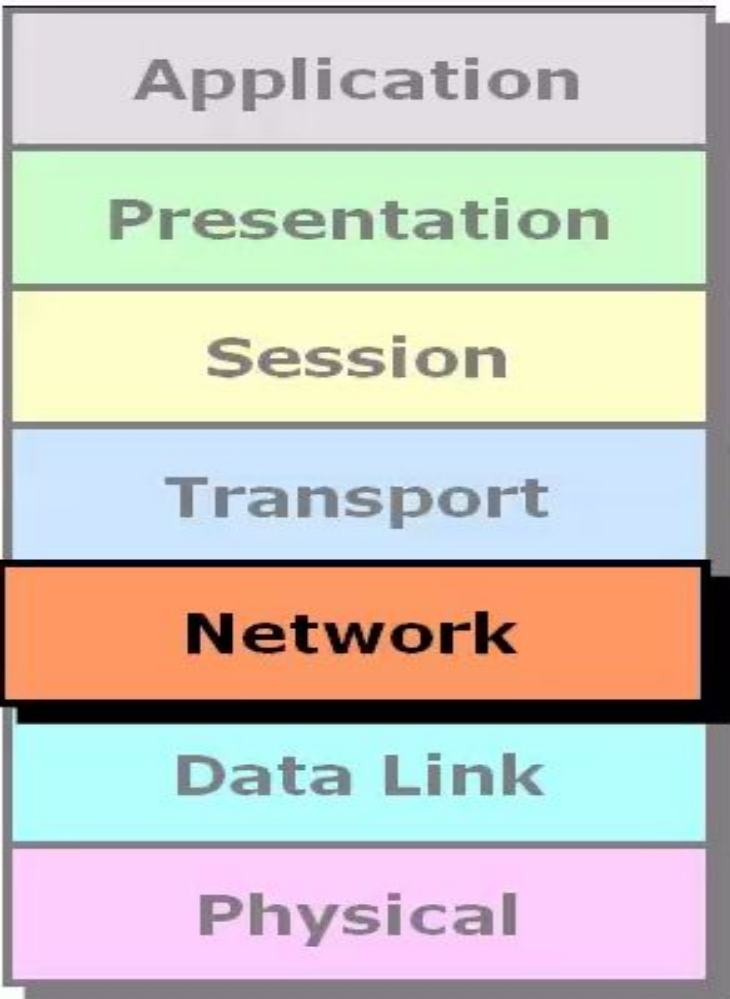
Transport Layer is responsible for delivering the message from Source Process to Destination Process.

Transport Layer will do the following Tasks : -

- ❖ **Identifying Service**
- ❖ **Segmentation, Sequencing & Reassembling**
- ❖ **Flow Control [Fast Sender (vs) Slow Receiver]**
- ❖ **Error Control [Lost Messages & Damaged Messages]**

It supports 2 Protocols : TCP & UDP

OSI Model



Network Layer is responsible for delivering the message from Source Host to Destination Host located in Different Networks.

Logical Addressing [IP-Address] works on this layer.

Router is a Network Layer device.

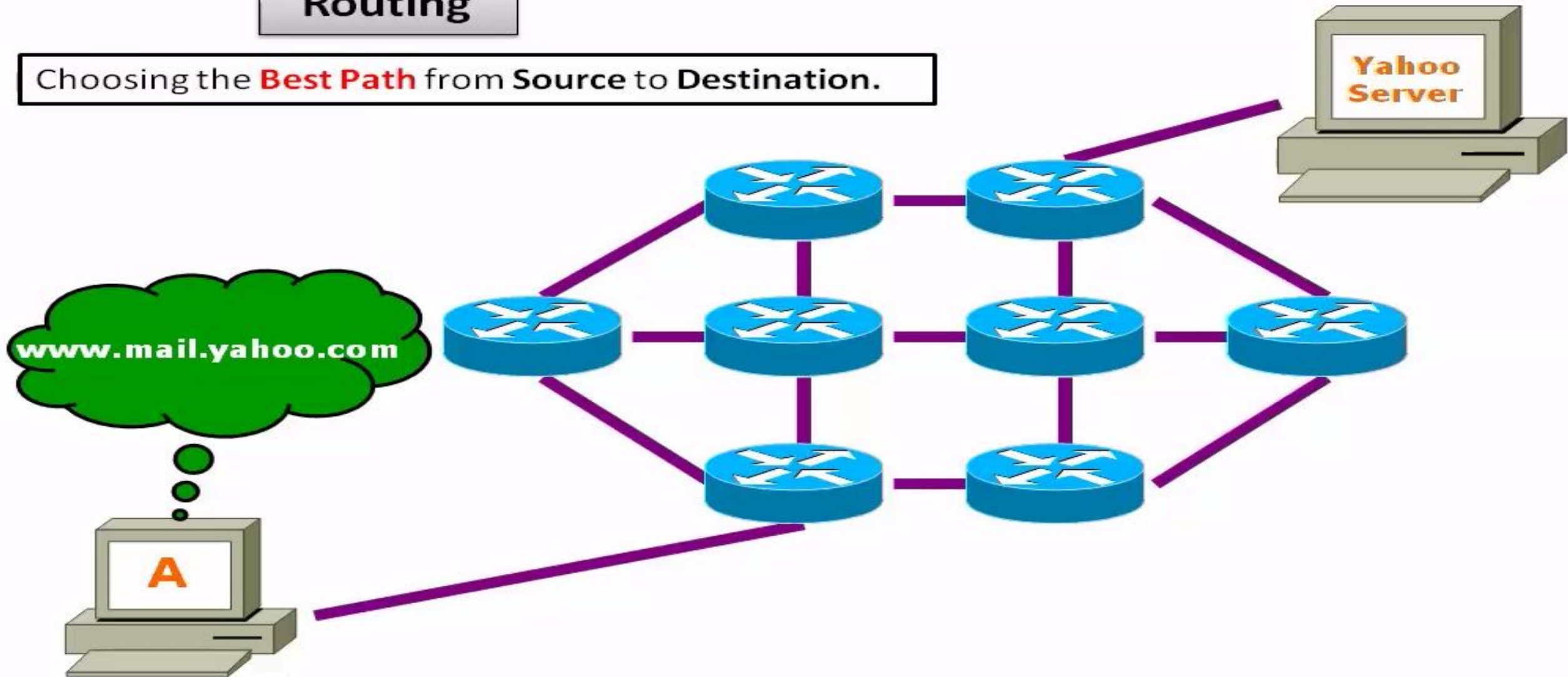
Network Layer will do the following Tasks : -

- ❖ **Logical Addressing** [Adding Source IP & Dest IP addresses]
- ❖ **Routing** [Choosing Best Path from Source to Destination]

OSI Model

Routing

Choosing the **Best Path** from **Source** to **Destination**.



OSI Model



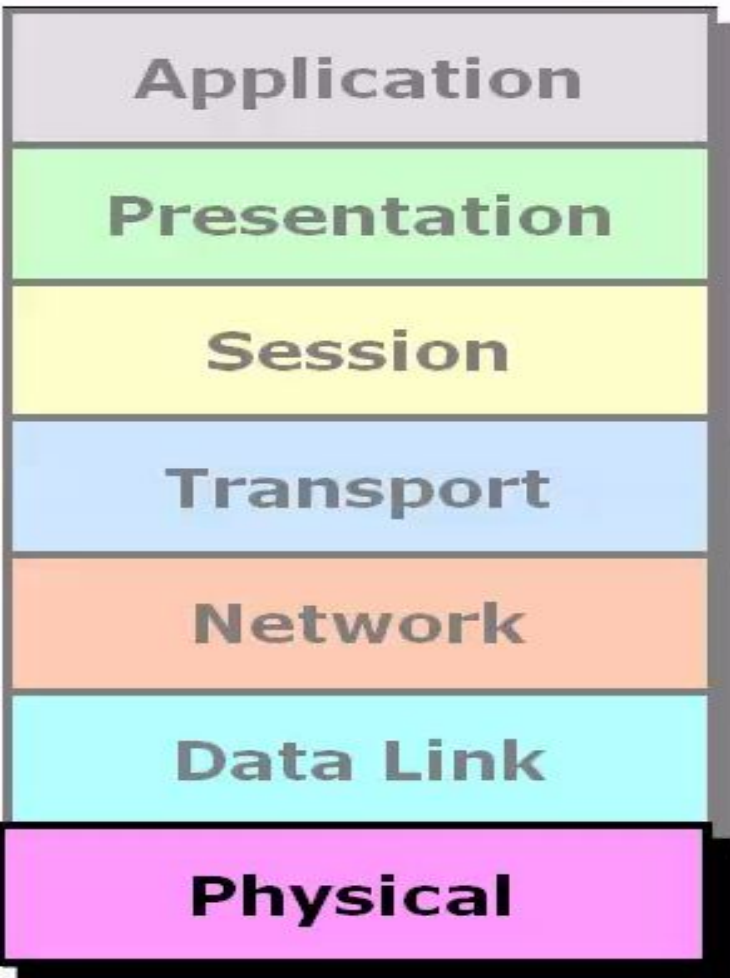
Data Link Layer is responsible for transferring message from one host to other host within the network [**Same Network**].

Switch & Bridge are Data Link Layer devices.

Data Link Layer will do the following Tasks : -

- ❖ **Framing**
- ❖ **Physical Addressing** [Ethernet Address (or) MAC Address]
- ❖ **Flow Control** [Fast Sender (vs) Slow Receiver]
- ❖ **Error Control** [Lost Messages & Damaged Messages]
- ❖ **Access Control**
[Controlling the Access to Medium in a Multi-Point Network]

OSI Model



Physical Layer is responsible for transmission of **bits** from one node to the next node using Medium.

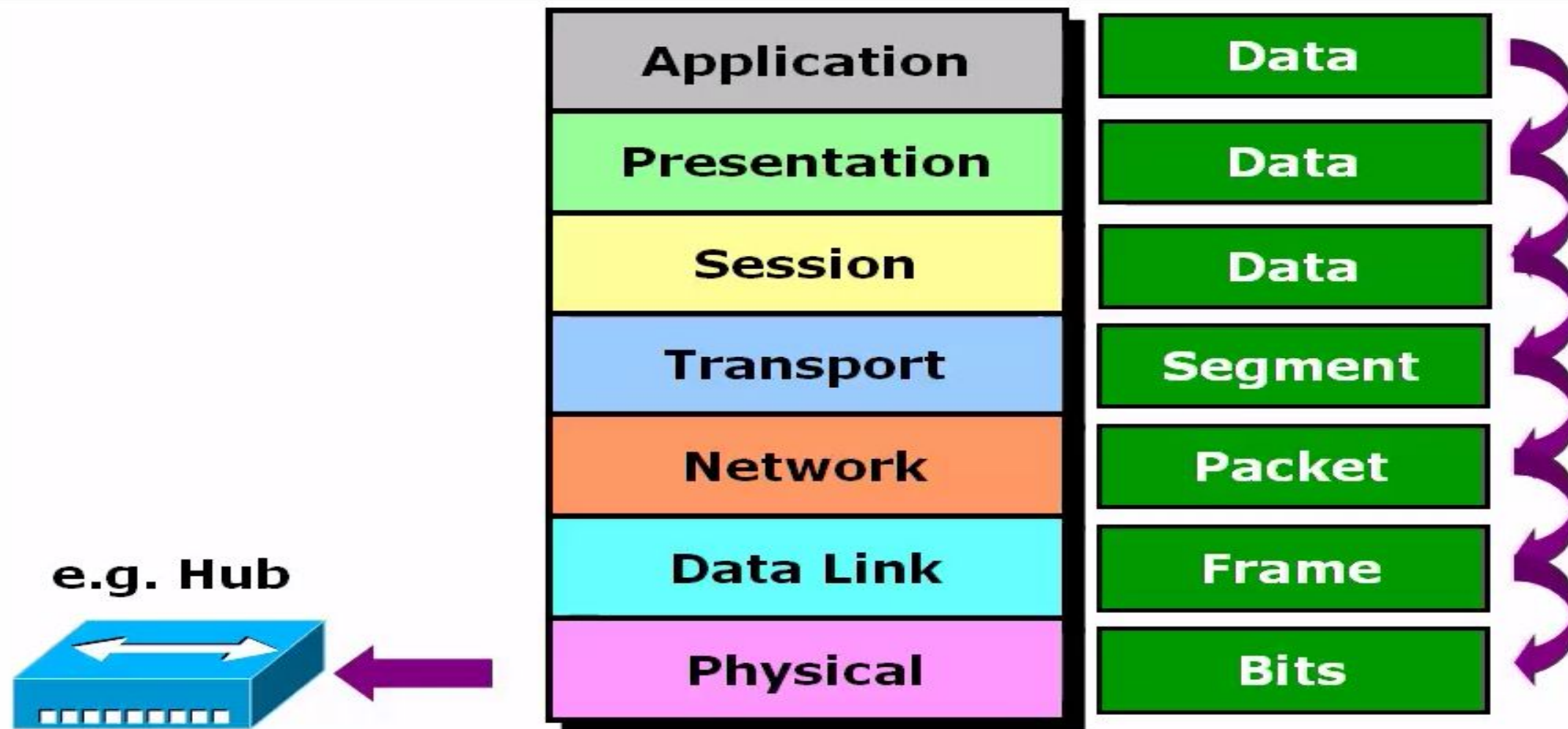
Hub, Repeater, Modem, Cables are Physical Layer devices.

Physical Layer will do the following Tasks : -

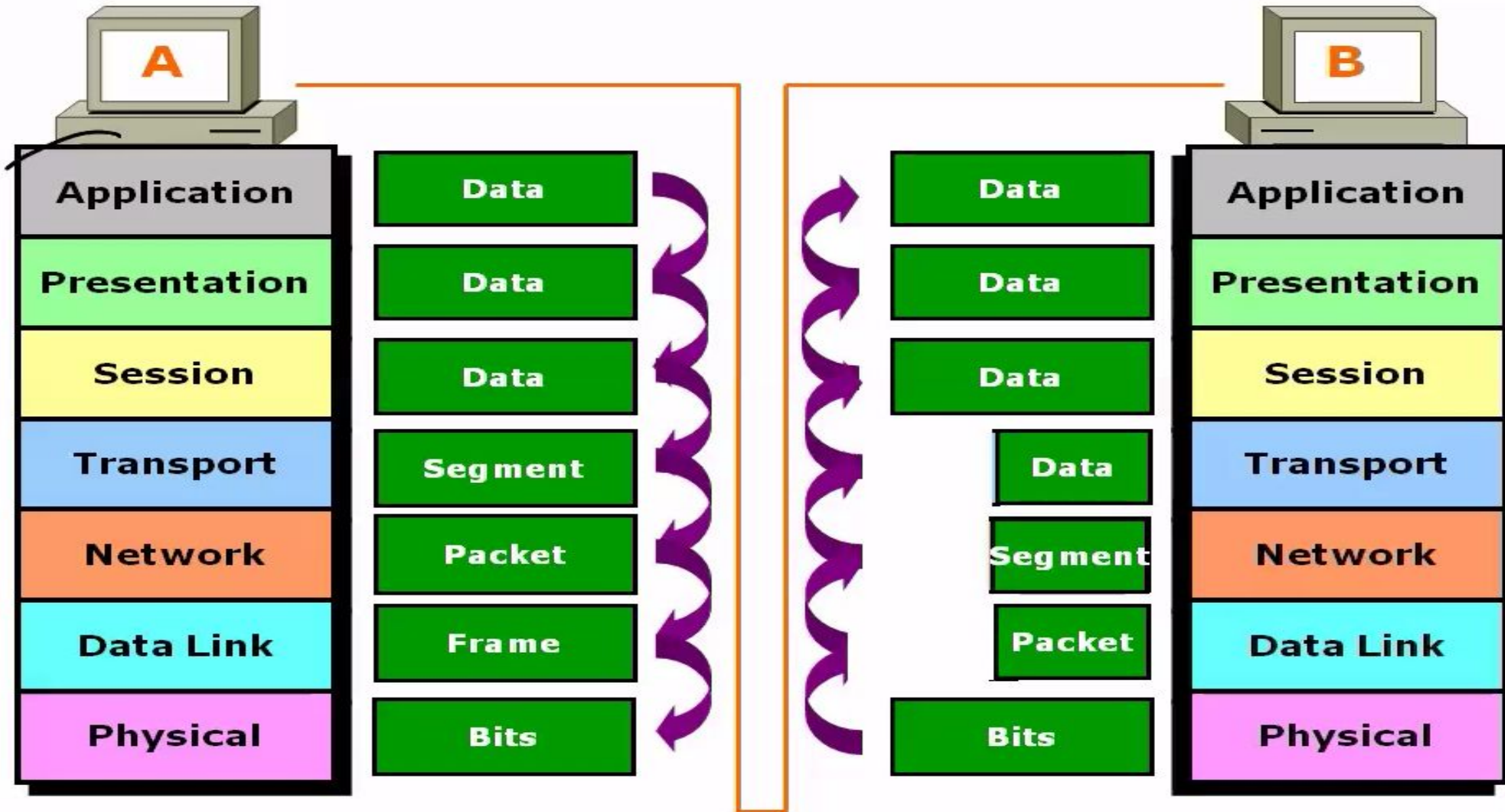
- ❖ **Representation of Bits** [0 → 0 volts, 1 → 5 volts]
- ❖ **Data Rate** [Bandwidth of medium/channel = 1Mbps]
- ❖ **Line Configuration** [Point-to-Point (or) Multipoint]
- ❖ **Physical Topology** [Mesh, Star, Ring, Bus]

Finally, Data from Application Layer converts into the following 4 formats:-

- 1) Data → Segment in **Transport Layer**
- 2) Segment → Packet in **Network Layer**
- 3) Packet → Frame in **Data Link Layer**
- 4) Frame → Bits in **Physical Layer**

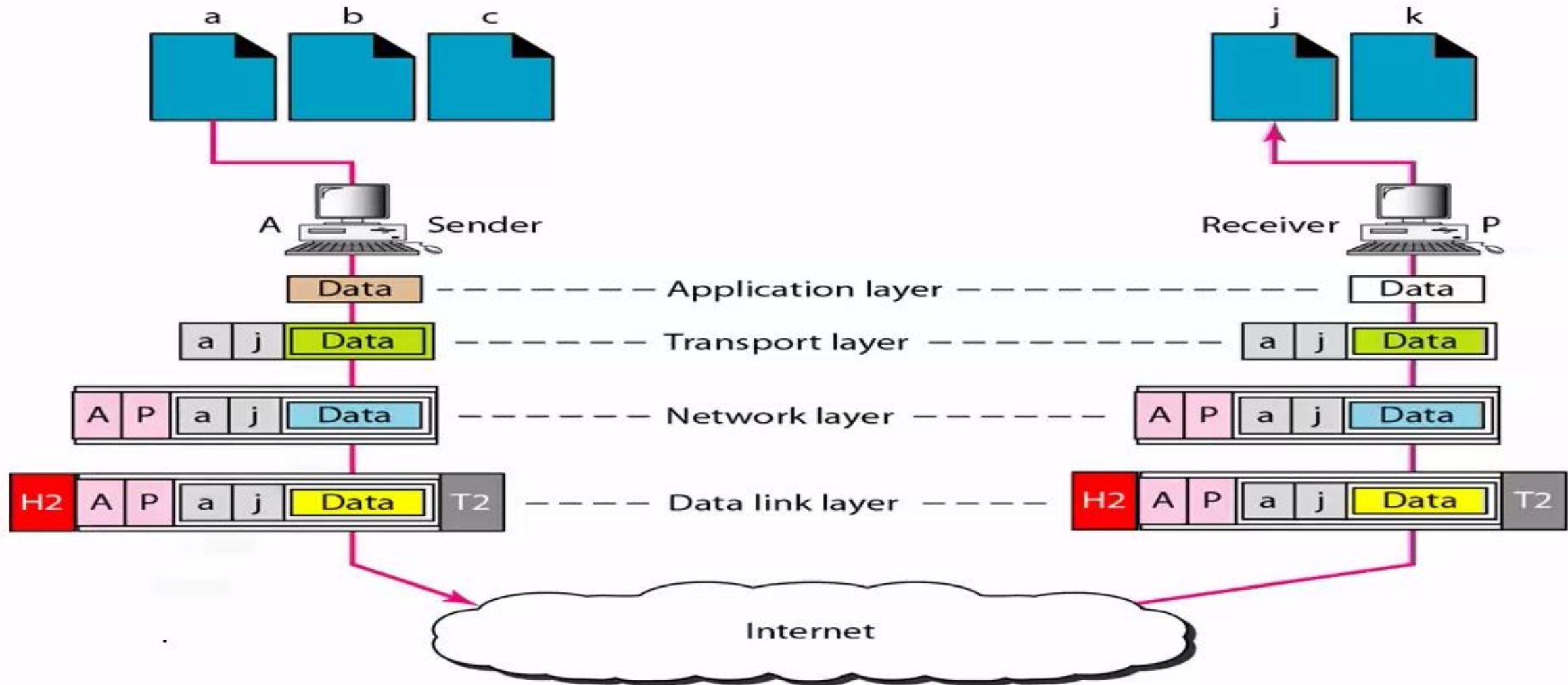


OSI Model

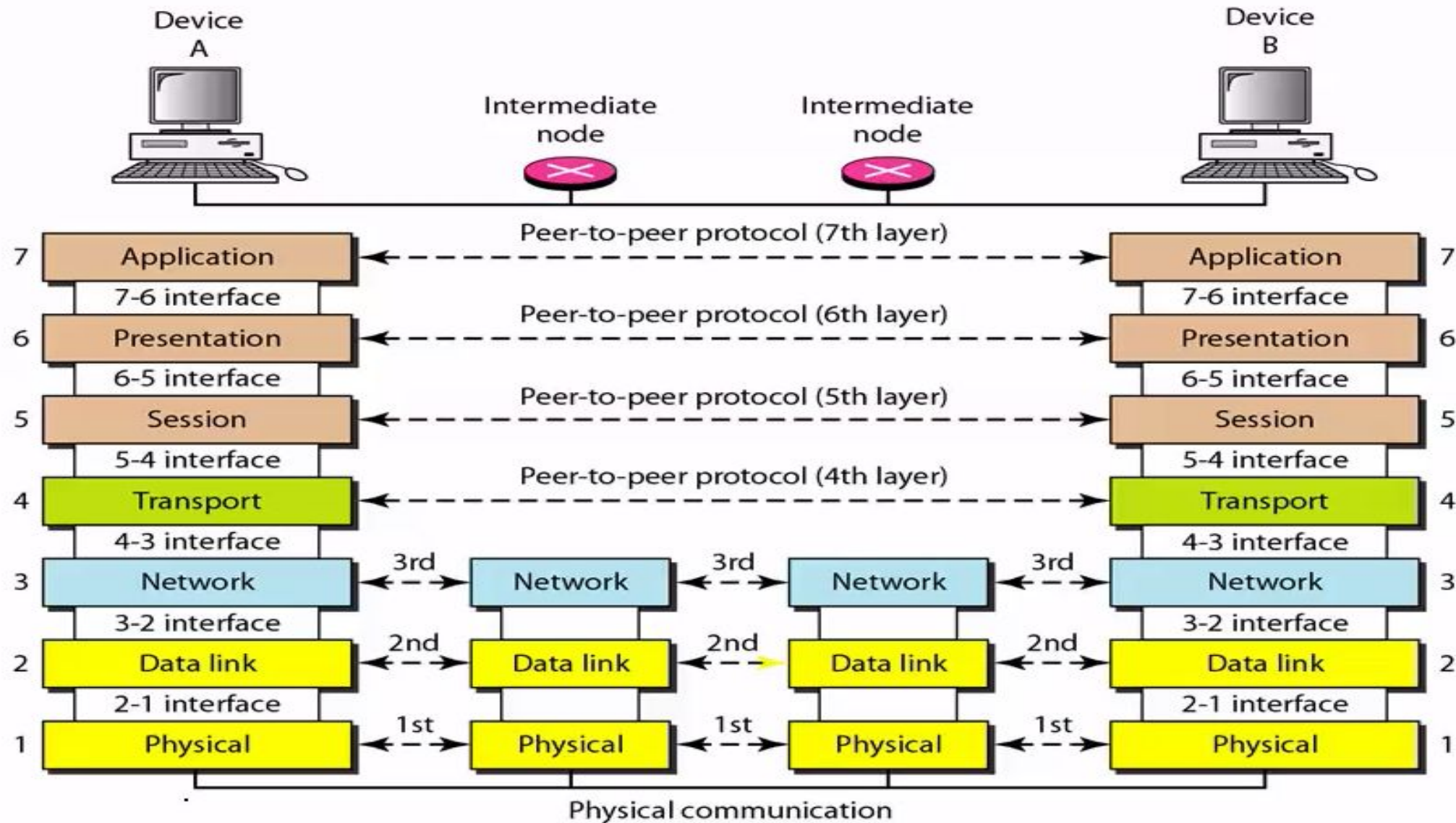


OSI Model

Note that although physical addresses change from hop to hop, logical and port addresses remain the same from the source to destination.



OSI Model



OSI Model

Is **OSI** Model implemented in Internet ?

NO

Why **OSI** has not been implemented ?

Bcoz of Late Invention

On which Network Model Internet is working today ?

TCP/IP Model

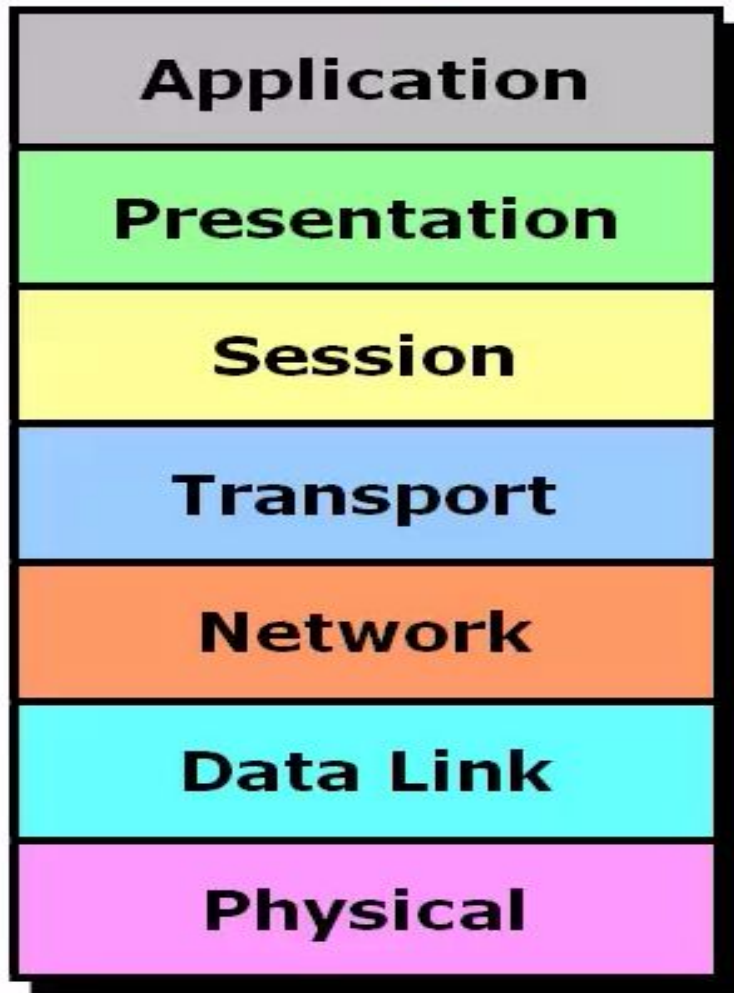
What is the use of learning **OSI** model ?

Reference Model

TCP/IP Model

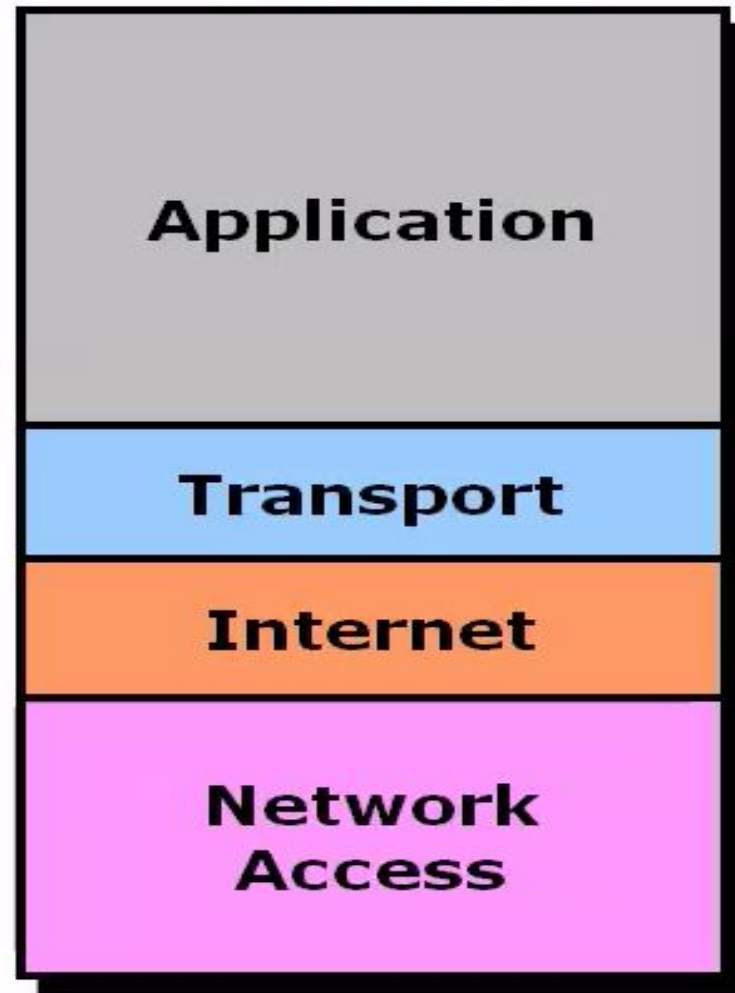
Total Layers = 7

OSI Layers



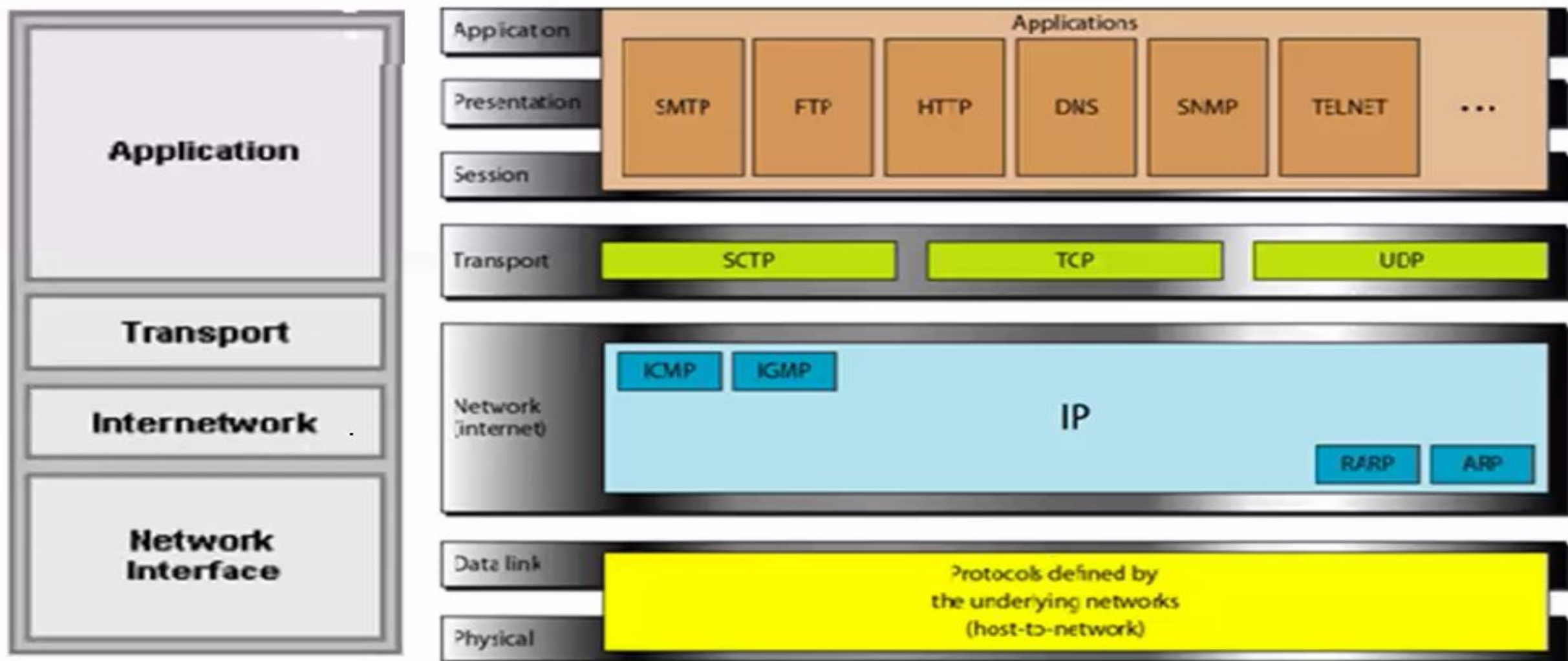
Total Layers = 4

TCP/IP Layers



TCP/IP Model

Protocols used by TCP/IP Model



Network Layer

- **IP (Internetwork Protocol):**

- Transmission mechanism
- Connectionless and Unreliable protocol
- Message in network layer also called as Datagram(Packet)

Network Layer

- **ICMP (Internet Control Message Protocol):**

- It is used to handle Control and Error Messages in Network layer

Network Layer

- **IGMP (Internet Group Message Protocol):**

- For multicasting purpose IGMP protocol is used

Network Layer

- **ARP (Address Resolution Protocol):**

- It is used to find physical address of other node when Internet address (IP address) is known

Network Layer

- **RARP (Reverse Address Resolution Protocol):**

- It is used to find IP address of node when Physical address (MAC address / Ethernet address) is known

Transport Layer

- **TCP (Transmission Control Protocol):**

- Connection Oriented and Reliable
- Message in Transport layer is called Segment
- It is slower than UDP

Transport Layer

- **UDP (User Datagram Protocol):**

- Connectionless and Unreliable
- Packet produced by UDP is called User Datagram
- It is faster than TCP

Both TCP and UDP protocol are port to port communication Protocol.

Application Layer

- **SMTP (Simple Mail Transfer Protocol):**

- TCP/IP protocol that supports Electronic Mail (E-Mail) on the internet is called SMTP

Application Layer

- **FTP (File Transfer Protocol):**

- Standard mechanism Provided by the TCP/IP for copying file from one computer to another computer
- To copy the file some problems must occurs like two systems may use different file structure, two system may have different way to represent text and data, two systems may have different directory structure
- All this problems have been solved by FTP

Application Layer

- **TFTP (Trivial File Transfer Protocol):**

- It simply copies the file from one computer to another computer
- They do not need to solve the problems provided by FTP

Application Layer

- **SNMP (Simple Network Management Protocol):**

- It provides set of fundamental operations for monitoring and maintaining devices in the internet

Application Layer

- **TELNET (Terminal Network):**

- It is a general purpose client server applications program used for remote login