

* Computer Networks: A group of computers which are connected to each other for the purpose of sharing their resources is called Computer Network.

→ ^{Imp.} The Goals of Computer Network are Resource sharing, Saving money, Improve performance, Communication medium.

→ The main objective of Computer Network is to be able to follow transfer data from sender to Receiver.

→ Application of Computer Network:-

- (i) Sharing of resources such as printers.
- (ii) Sharing of Expensive software and database.
- (iii) Communication from one computer to another.
- (iv) Sharing of information over wide areas.

^{Imp for end user}

* Switching:- Switching is a technique by which data/info. sent from source towards destination which are not directly connected.

→ There are 3 techniques of switching :-

- (i) circuit switching
 - (ii) Message switching
 - (iii) Packet switching
- └─→ Datagram Approach
- └─→ virtual circuit Approach

(i) circuit switching :- In circuit switching there is always a dedicated path established between the sender and Receiver.

e.g. Telephone Network

In circuit switching before data transfer, connection will be established first.

(ii) Message switching :- Message switching was a technique developed as an alternative to circuit switching before packet switching was introduced. In message switching, end-users communicate by sending and receiving messages.

message switching not suited for streaming media and real time application.

(iii) packet switching :- The internet is a packet switching network.

In packet switching the message is broken into individual chunks called as packets.

Each packet is send individually.

Each packet will have source and destination IP address with sequence number which helps the receiver to reorder the packets and detects the missing packets.

④ Datagram Approach :- Datagram packet switching is also known as connectionless switching.

→ Each **packet** called as datagram.

→ In datagram packet switching the path is not fixed. Each datagram/packet contains destination information.

⑤ virtual circuit switching :- virtual circuit switching is also known as connection-oriented switching. A preplanned route is established before the message are sent.

→ path is fixed for the duration of logical connection.

Note :- A switch is a small hardware device which is used to join multiple computer together.

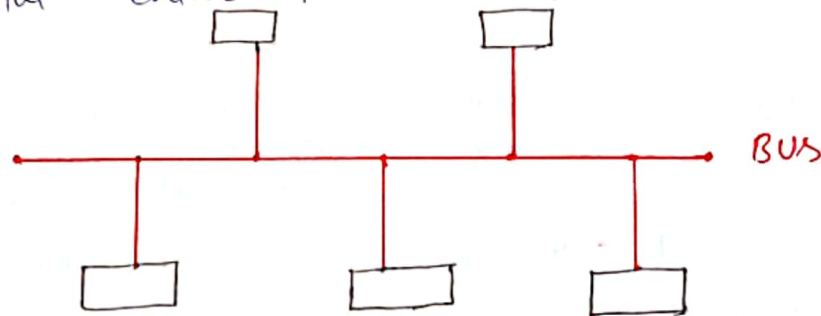
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* Network Topology:- Topology means Arrangement of nodes of a Computer Network.

(i) Bus Topology:- A Bus topology consist of a single central cable called the Backbone to which all computers connected.

→ Advantage of Bus topology is that computers and other devices can be attach or detach at any point without disrupting the network.

→ Disadvantage is if there is a problem with cable the entire network fails.



(ii) Ring Topology:- A Ring topology is a kind of bus topology in a closed

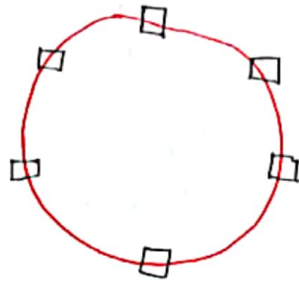
loop. A Ring topology is also known as ring network. In the each node is directly connected with two neighbouring nodes.

→ Advantage of Ring topology are:- minimal cable requirement, no data collision between nodes, easy to manage.

→ Disadvantage of Ring topology are:- if any node

goes down It will affect whole Network. ⑤

It is totally depend on one cable.



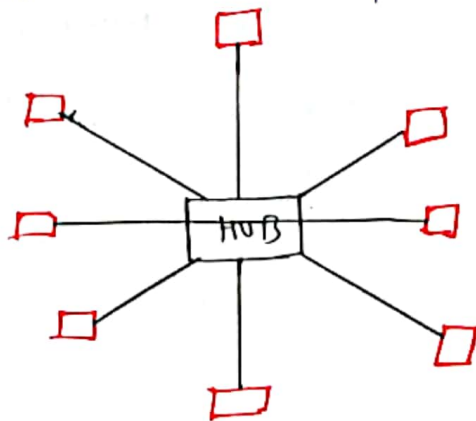
Ring Topology

(iii) Star Topology:- In Star topology every Node is Connected to a central ~~node~~ device called HUB or Switch.

In this topology all traffic must pass through the HUB or Switch.

→ Advantage of this topology are:- It is easy to install, Easy to detect or remove faulty devices.

→ Disadvantage of this topology is if central HUB fails the whole Network fails.
It cost more compared to Bus, Ring Topology.



Star Topology.

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* OSI Model:- The open system interconnection (OSI) model was developed by International organisation of Standardization (ISO). It was developed to allow system to communicate with each other.

→ OSI model divides the whole task into seven smaller and manageable tasks. Each layer assigned a particular task.

→ It has 7 Layers as follows:-

(i) Application Layer:- Application Layer is used by Network application like, chrom, firefox, skype, outlook e.t.c. Application layer consist Network protocols like **HTTP, HTTPS, FTP, SMTP** e.t.c.

(ii) presentation Layer:- presentation layer receives data from Application Layer in the form of characters and numbers. presentation layer converts these data into Binary format. presentation Layer Encrypt / Decrypt the data.

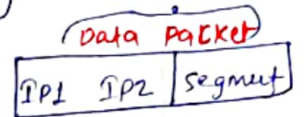
(iii) Session Layer:- Session Layer establish, manage and terminate the sessions.

(iv) Transport Layer:- Transport Layer controls the Reliability of Communication through

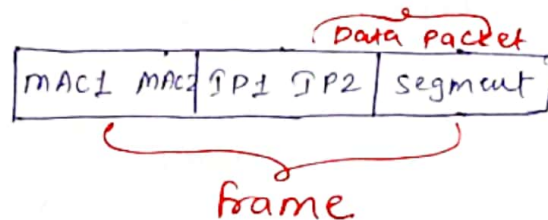
Segmentation, Flow control and Error Control. ③

Transport Layer keep track on missing or corrupted data.

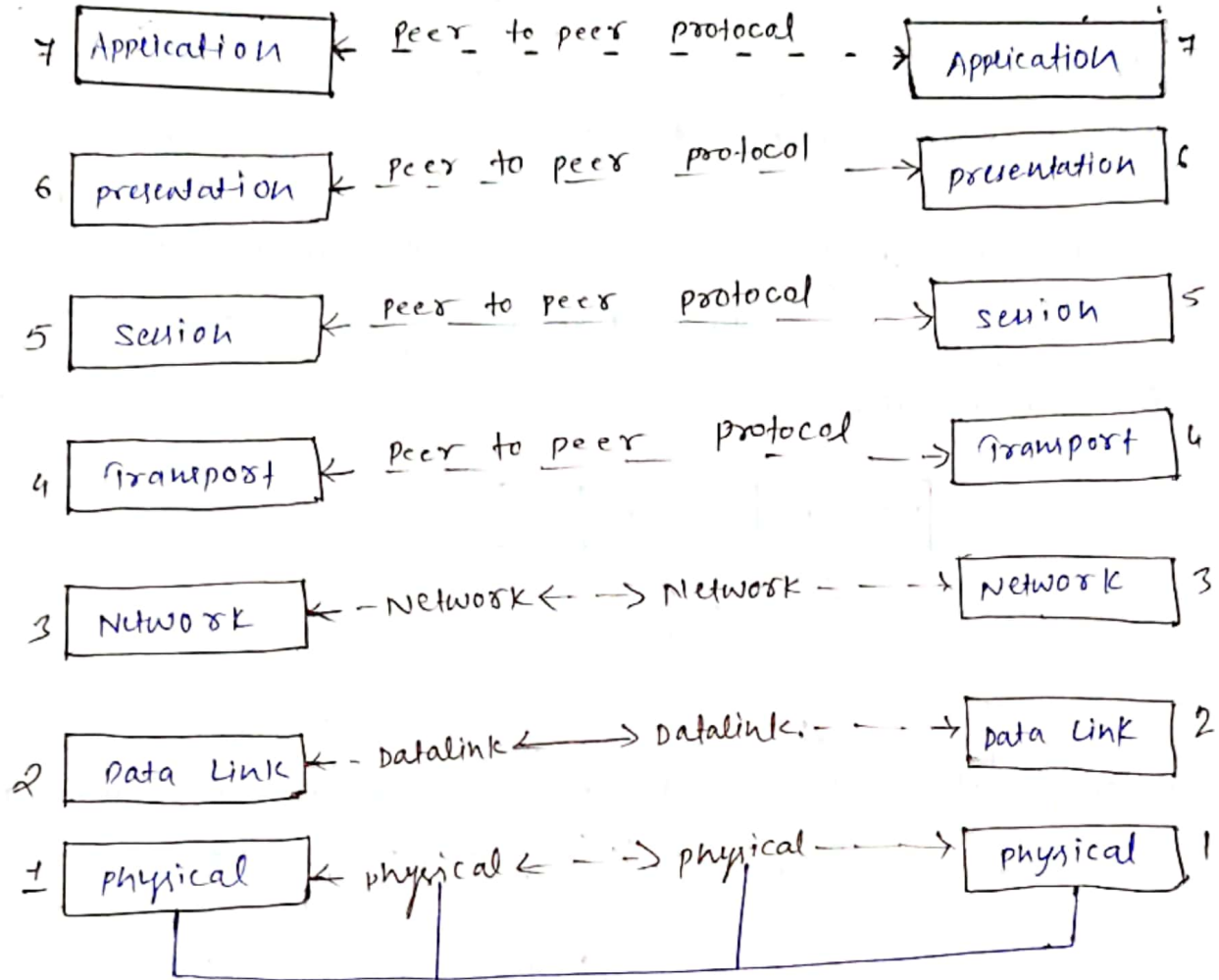
(v) Network Layer:- This Layer is responsible for moving the packets from ~~one~~ source to destination. Logical Addressing (Assigning IP of sender and receiver) done at this Layer.



(vi) Data Link Layer:- physical addressing done at this Layer physical addressing means Assigning MAC Address to each data packets.



(vii) physical Layer:- It provides a physical medium through which bits are transmitted.



* Advantage of OSI model:-

- (i) Reduce Complexity: OSI model breaks Network Comm. into smaller, simpler parts.
- (ii) It simplifies Teaching and Learning.
- (iv) It is layered model, changes in one layer do not affect other.
- (v) It is easy to add multiple network models in a proper way.

* Disadvantage of OSI model:-

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- (i) It is very complex to understand and manage.
- (ii) Less privacy and easy to access.
- (iii) Due to complexity of OSI model, the first implementations were pretty heavy and slow.

* OSI protocols:-

(i) HTTP (Hyper text ~~markup~~ ^{transfer} protocol ~~language~~):- HTTP is an application layer protocol that allows web-based application to communicate and exchange data. HTTP is the messenger of the web.

It is used to deliver contents such as images, videos, audios, document etc.

HTTP is a connectionless protocol.

HTTP runs on port 80.

(ii) HTTPS (Hyper text transfer protocol secure):- It is

designed to prevent hackers from accessing critical information. Data is encrypted in this protocol.

HTTPS runs on port 443

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(iii) FTP (File transfer protocol):- FTP protocol is used to transfer files

between Computers and Servers over a Network. It is not a secure protocol. for ~~enh~~ enhancing security SFTP protocol is used. ~~which~~ its data is encrypted in this protocol.

FTP and SFTP is Connection oriented protocols. FTP runs on port 21 and SFTP on port 22.

(iv) SMTP (Simple mail transfer protocol):- SMTP is the standard

protocol for email transmission. It is used to send, ~~receive~~ and receive emails. SMTP runs on port 25.

(v) ~~Telnet (Telecommunication Network)~~:-

(v) Telnet (Terminal Network):- This protocol enables one computer to connect to local computer. It is used to access a device through its remote login features.

Telnet runs on port 23

* Interfaces and Services in OSI model:-

It is a process that generally provides and gives common technique for each layer to communicate with each other.

Services is defined as set of primitive operations. Services are provided by layer to each of layers ~~of~~ above it.