Date :

# B1 U1 Introduction to Internet

Internet → WW comp. net. → millions of computing devices are connected.

ISP & Internet Backbone

↳ traffic, no of end systems, no. of intermediate devices manage

3 tier → tier-1 ISPs, tier-2 ISPs, tier-3 ISPs

named for core network, can handle traffic at very high speed, interconnecting various networks to allow transmission of data over WW network.

connects all tier-1 ISPs

Interconnection of ISPs

Tier 1 . Tier 2, Tier 3

Taxonomy of Network

↳ PAN, LAN, MAN, WAN

- ↳ Enterprise → one org
- ↳ Global → several org.
- ↳ Internet → largest net. www

Topology

how comp. are connected

Architecture

· peer to peer · client-server

Transmission Technology

· Broadcast · point-to-point

Standard Internet Protocols

↳ set of rules, allows comp. to talk, defines the data type may be exchanged

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IEEE 802.11 protocol for wireless communication.

(i) Appl. layer → HTTP, SMTP

(ii) Transport layer → TCP, UDP

(iii) Network layer → IPv4, IPv6

(iv) Data link layer → Ethernet, IEEE 802.11 (wifi)

Public Network & Private Network (Intranet)

↳ open network ↳ managed & controlled by authority.

↳ least restricted ↳ School, univ etc.

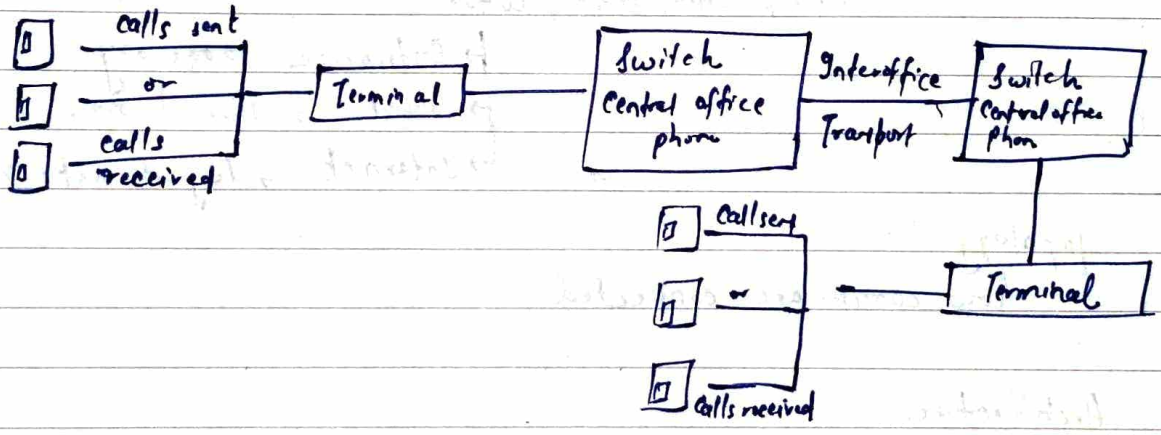
↳ administrator can apply rules.

Accessing the Internet

↳ Telephone Network

PSTN (public switched telephone network)

↳ for voice comm$^n$.




(i) Dial up lines

↳ data comm. over existing telephone lines

↳ Install modem on both sides.

↳ To establish conn., modem on sender side dials the telephone number of receiver side's modem

Advantages → low cost, availability

Disadvantages → low speed, Req. phone line.

(ii) Dedicated lines

↳ No req. to dial the tel. numb. of other end.

↳ sep. conn. for the data from voice conn.

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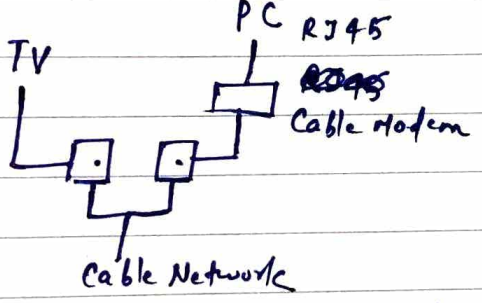
Some of the dedicated lines are:-

ISDN (Intg. Services Digital Network)
- ↳ uses std. telephone lines
- ↳ ISDN modem at both sides
- ↳ 3-5 miles, urban areas

DSL (Digital Subscriber line)
- ↳ transmit info at fast speed using existing tel. lines
- ↳ DSL modem at both side.
- ↳ No need to dial the tel. number.

ADSL (Assymetric DSL)
- ↳ higher downloading rate.

↳ Cable Network




- Network cables are used as transmission medium in the network.
- uses TV cable infrastructure.
- Broadband Internet Access

Adv. :- High speed data transfer, easy install

Disadv :- · costlier than dialup & DSL connection
· less secure.

↳ Wireless Network
- ↳ much cheaper to install & maintain
- ↳ modem/router.
- ↳ Bluetooth, Infrared, Wi fi (Wireless fidelity)

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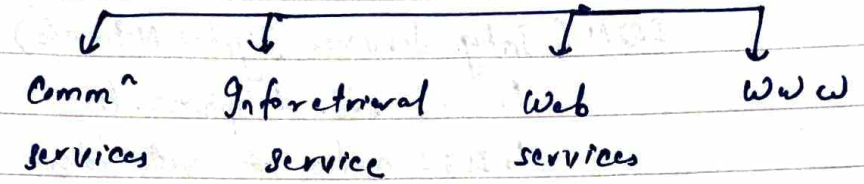
Internet Services



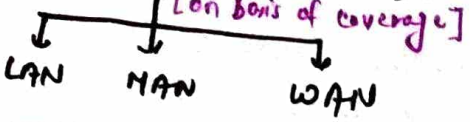

(E-mail, VoIP, Instant Messaging)

(FTP)

Network Topology
- Bus
- Star
- Ring
- Mesh

OSI & TCP/IP models

## Network classification [on basis of coverage]




### LAN

- LAN stands for Local Area Network.
- It operates in small areas such as a building or a campus with a maximum span of 10 km.
- Its ownership is private.

### MAN

- MAN stands for Metropolitan Area Network.
- It operates in relatively large areas such as a city within the range of 50 km.
- It may be a single network or many LAN combined to make a large network.
- Its ownership can be private or public.

### WAN

- WAN stands for Wide Area Network.
- It operates in very large areas such as a country or continent.
- Its ownership can be public or private.

More diff.

Transmission speed

High, Avg., Low

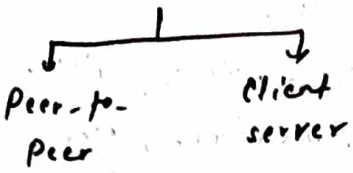
Congestion

Low, Avg, Max

Maintenance

less difficult, more difficult, most difficult

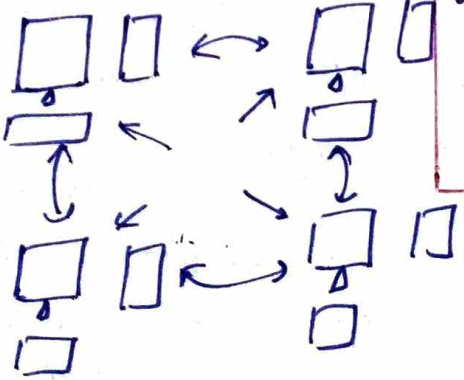
## Network classification [on basis of function]




### Peer-to-Peer

It is a decentralized network in which each node can request for services and provide services.

It is designed primarily for small to medium local area networks.

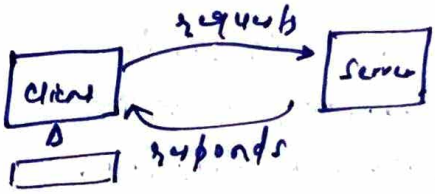


### Advantages

- No need for network administrator.
- Network is fast / inexpensive to setup / maintain

### Client-server

It is a centralized network in which the client can request for service and a server responds with a service.



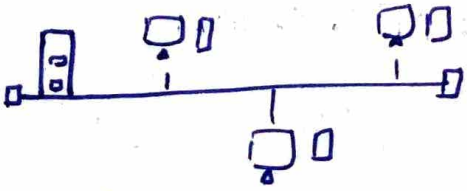

## LAN TOPOLOGIES

Network Topology:- A network topology is the physical & logical arrangement of node in a network.

### Bus Topology

Bus Topology is a topology in which every device is connected to a single cable.

Data is transmitted in a single route from one point to the other. The terminators are used at both ends to prevent signal from reflecting back.



### Advantages

1) Simple and easy to extend.

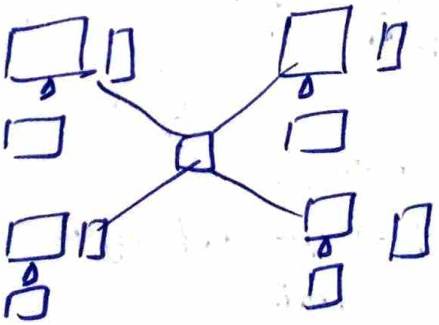
2) It requires the least cable length.
3) Failure of one station does not affect others.
4) There is no central point of failure.

Disadvantages

1) If the main cable breaks down, the entire network gets shut down
2) Addition of nodes -> may impact the performance
3) Terminators are req. at both ends.
4) Difficult to identify the problem if entire network shuts down.

## Star Topology

Star Topology is a type of network topology in which all the nodes are connected to a centralized node called the switch / hub.
Data passes through the switch/ hub before ~~passing~~ continuing to its destination.



Advantages

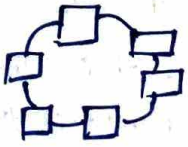
1) Failure of one node does not effect the others.
2) Easy to extend as each station has its own direct cable connection to the switch
3) Easy to troubleshoot as all information goes through a central point.

Disadvantages

1) Single point of failure as if switch / hub fails, nodes are disabled.
2) Depending on where the switches are located, star networks can require more cable length than a bus topology.
3) Expensive because of cost of the switches.

## Ring Topology

Each device is connected with two devices forming a ring.
In general the data can move in one direction, but by installing another cable, reverse direction is possible.



Advantages

- Min. chances of data collision
- Cheap to install

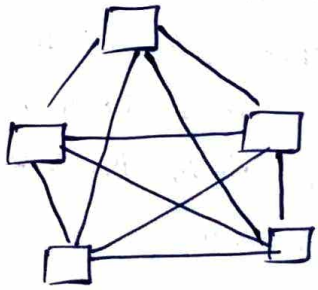
Disadvantages

- Fault diagnosis -> difficult
- Extension not easy.

## Mesh Topology

Each device/node is directly connected to every other device/node.

$\frac{n(n-1)}{2}$ no. of cables



Advantages

- Highly Robust
- Easy to diagnose the fault
- Secure

Disadvantages

- Costlier
- Maintenance -> Not easy
- diff. to merge mesh network.