Computer Network

- Types of network

1. Personal Area Network (PAN) – communication between two- three mobile devices or PC for personal purpose.
2. Local Area Network (LAN) – limited area (within building)
3. Metropolitan Area Network (MAN) – within city
4. Wide Area Network(WAN) – within multiple city/state/ countries

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1. Personal Area Network(PAN) –

Spread in the proximity of an individual. Cover an area of a few meters radius. Set up using guided media(USB cable) or unguided media (Bluetooth, Infrared). Owned, controlled, and managed by a single person.

Examples: A network of devices such as computer, Phone, MP3/MP4 Player, Camera etc. Transferring songs from one cell phone to another is a PAN of two phones. Transferring files from a PC to an MP3 playeris a PAN between the two.

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2. Local Area Network (LAN) – LANs are the most frequently used/discussed networks.It is one of the most common one of the simplest types of network.It is designed for small physical areas such as an office, group of buildings.Any of different types of topologies can be used to design LAN like Star, Ring, Bus, Tree etc.

Characteristics of LAN

- private networks means no need of regulatory control.
- Operate at relatively high speed.
- Ethernet, Token ring etc type media access controls are used
- Connects computers in a single building, block or campus.

Advantages of LAN

- Resource Sharing
- Software Applications Sharing
- Easy and Cheap Communication
- Centralized Data
- Data Security
- Internet Sharing

Disadvantages of LAN

- High Setup Cost
- Privacy Violations
- Data Security Threat
- LAN Maintenance Job
- Covers Limited Area

Examples: A networked office building, school or home. Sometimes one building can contain a few small LANs (Like some schools have independent LANs in each computer lab.).

3. Metropolitan Area Network(MAN):– Spread within a city . Cover an area of a few kilometres to a few hundred kilometres radius. Set up using all types of all guided and unguided media. Owned and operated by a government body or a large corporation.

Examples: A network of schools, or banks, or Government offices etc. within a city. A MAN is usually formed by interconnecting a number of LANs and individual computers.

4. Wide Area Network (WAN) –Slightly more complex than a LAN, a WAN connects computers across longer physical distances. The Internet is the most basic example of a WAN, connecting all computers together around the world. Because of a WAN's vast reach, it is typically owned and maintained by any single person or owner.

Characteristics of WAN

- Covers large distances(states, countries, continents).
- Communication medium like satellite, public telephone networks etc and routers are used establish connection.

Examples: A network of ATMs, BANKs, National Government Offices, International Organizations' Offices etc., spread over a country, continent, or covering many continents.

Advantages of WAN

- Long distance business can connect on the one network.
- Shares software and resources
- Messages can be sent very quickly to wide range of nodes
- Hardware devices can be shared.

Disadvantages of WAN

- Need a good firewall to restrict unauthorized access
- Setting up a network can be an expensive, slow and complicated.
- Maintaining a network is a full-time job
- Security is a mazor issue when many different people have the ability to use information

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Network Layout –
The plan or design or arrangement of network wings and nodes to be laid out is known as network layout.

A good network layout provides the following features

- Communication speed
- File sharing
- Back up and Roll back is easy
- Software and Hardware sharing
- Security
- Scalability
- Reliability

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How to decide Network Layout –

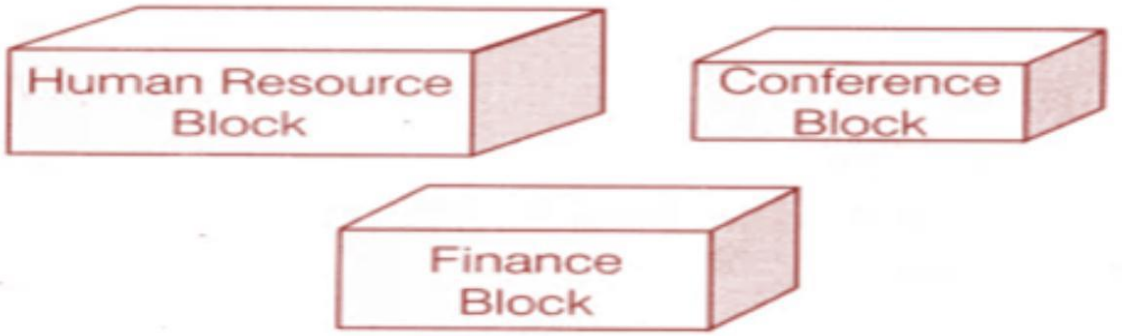
The network layout can be best which provide less installation and maintenance cost as well as easy installation and maintenance.

It is only possible when it is properly designed with shortest cable length and fulfill our network requirements.

How to decide Network Layout – Example

Freya Tech Corporation (FTC) is a professional consultancy company. The company is planning to set up their new offices in India with its hub at Udaipur. As a network adviser, you have to understand their requirement and suggest them the best network layout.

Physical Location of the blocks of FTC



Block to block distance (in m)

Block (From)	Block (To)	Distance
Human Resource	Conference	110
Human Resource	Finance	40
Conference	Finance	80

How to decide Network Layout – Example

Block to block distance (in m)

Block (From)	Block (To)	Distance
Human Resource	Conference	110
Human Resource	Finance	40
Conference	Finance	80

-> Possible bus topologies

a) Human Resource > Conference > Finance = 110+80 =190m

b) Conference -> Finance > Human Resource = 80+40 =120m

c) Finance -> Human Resource > Conference = 40+110=150m

All can be arranged in round robin manner

Ring topology will be discarded as it will increase the cable length

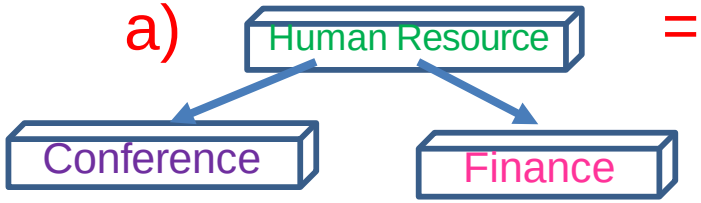
How to decide Network Layout – Example

Block to block distance (in m)

Block (From)	Block (To)	Distance
Human Resource	Conference	110
Human Resource	Finance	40
Conference	Finance	80

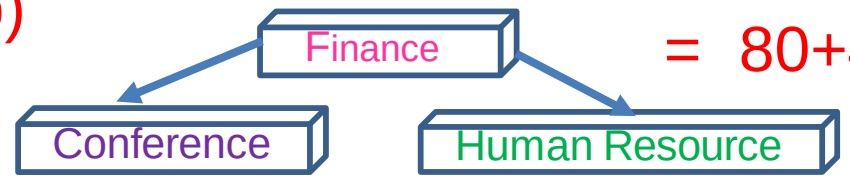
-> Possible Star topologies

a)



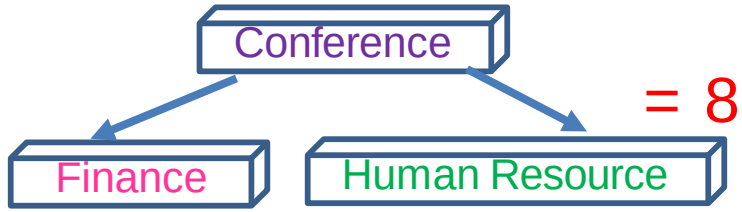
= 110+40 =150m

b)



= 80+40 =120m

c)



= 80+110=190 m

- **Here best layout is b) finance to conferece and finance to Human resourse as it require minimum cable length**
- **Tree topology will be also same due to only three blocks are here**

How to decide Server location– Example

Expected number of computers to be in each block

Block	Computers
Human Resource	25
Finance	120
Conference	90

Server location can be decided by seeing the number of computers/nodes required in each block of network.

Server must be installed at the wing/block with Maximum number of Computers due to maximum load/requirement of services in that block in whole network .So in above example Server can be installed at Finance block.

How to decide Repeater location

- We need a repeater when the total length of a single span of network cable(Twisted pair) exceeds 100 meters (328 feet).
- We need a repeater when the total length of a single span of network cable(Coaxial cable) exceeds 500 meters.
- maximum distance of a fiber optic link can be 80-100 km but it depends on varying factors like the bit rate and the quality of the splices and the total attenuation of distance. It also depends on the power of the transmitter and receiver quality.

Satellite link is required when network blocks/wings are too much far from each other or where installation of cable is hard.

For data security firewall can be installed in network.

For economic internet connection – dialup internet connection would be preferred but for faster internet broadband internet connection would be preferred.

How to decide hub/switch location

The answer is always switch when we can afford it. A Hub is always half-duplex, and simply acts as a repeater. The resulting packet collisions, even with only 2 devices, will make it slower than simply using a cable, whereas a switch intelligently directs traffic based on the Ethernet address(MAC address), and is full duplex, resulting in full speed between any devices on the network at the same time.

In general sense Hub or switch any device can be installed when there are more than one computer in a wing/block.