

Aim: Study of basic elements of computer networking with details of networking devices

Theory:-

### \* Networking Devices

#### 1] Router

- Connects different networks together, like a home network to the internet.
- Ex:- Wifi
- Assign local IP addresses, routes data to correct destination.

#### 2] Switch

- Connects multiple devices within the same network (LAN) and forwards data only to the devices that needs it.
- more efficient than hubs

#### 3] Hub

- Broadcasts data to all connected devices, not just the intended one.
- Causes unnecessary traffic and less secure than switches.



#### 4] Bridge

- Connects and filter traffic between two different LANs.
- Works at data link layer (Layer 2)

#### 5] Gateway

- Acts as a translator between different network protocols.
- Works at all layers depending on configuration

#### \* Cabling

Cabling is the physical medium through which data travels in a computer network.

#### Types of Network Cables:-

1] Twisted Pair Cable :- Most commonly used in LANs (Local Area Networks).

##### (a) Unshielded Twisted Pair

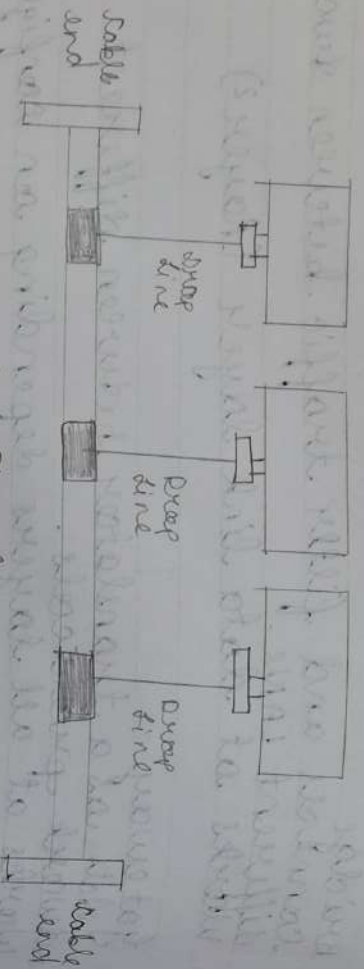
- Common Uses:- Ethernet Cables
- Pros:- Cheap, easy to install, flexible

##### (b) Shielded Twisted Pair

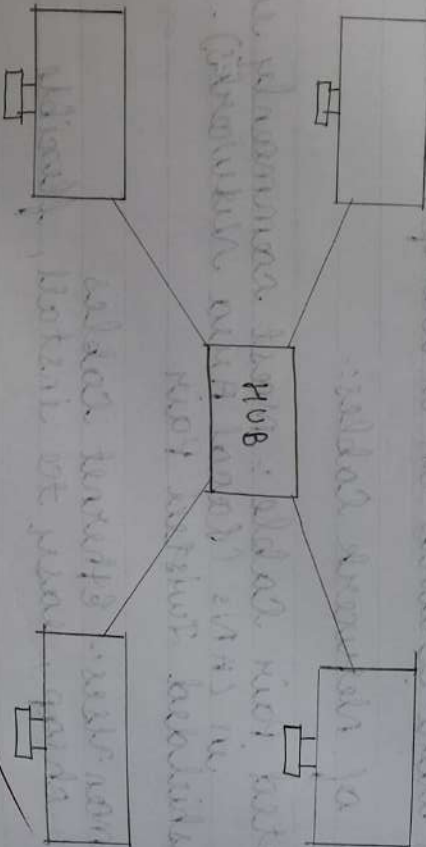
- Shielding:- Foil shielding to reduce interference
- Use:- Industrial or high interference environment



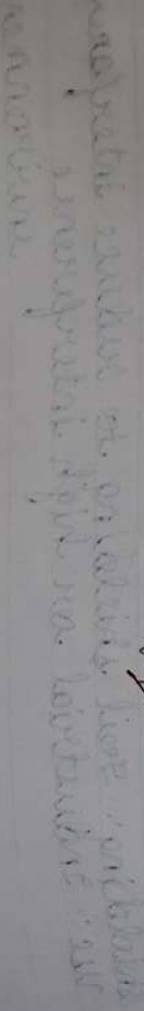
# Topology:



Star Topology



Bus Topology



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## 2] Fibre Optic Sable

- Uses light to transmit data - extremely fast and secure.
- Core types:
  - single mode fibre
  - multi-mode fibre
- very high speed
- expensive

## \* Topologies

Topologies refers to how computer and other devices are arranged and connected in a network.

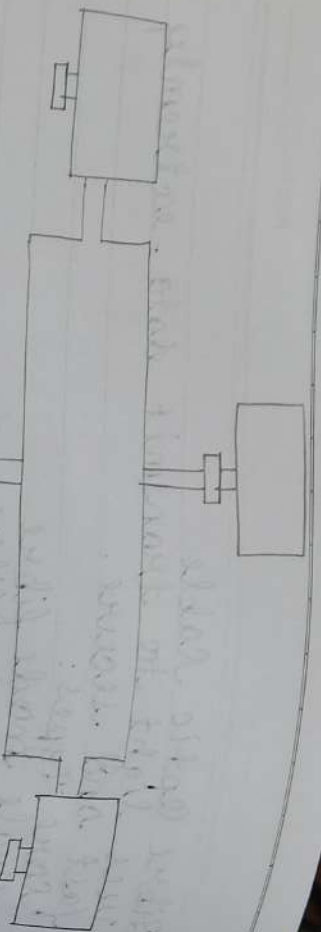
## 1] Bus Topology

- All devices share single communication line
- One main cable connects all devices
- Terminators are placed at both ends of the cable.

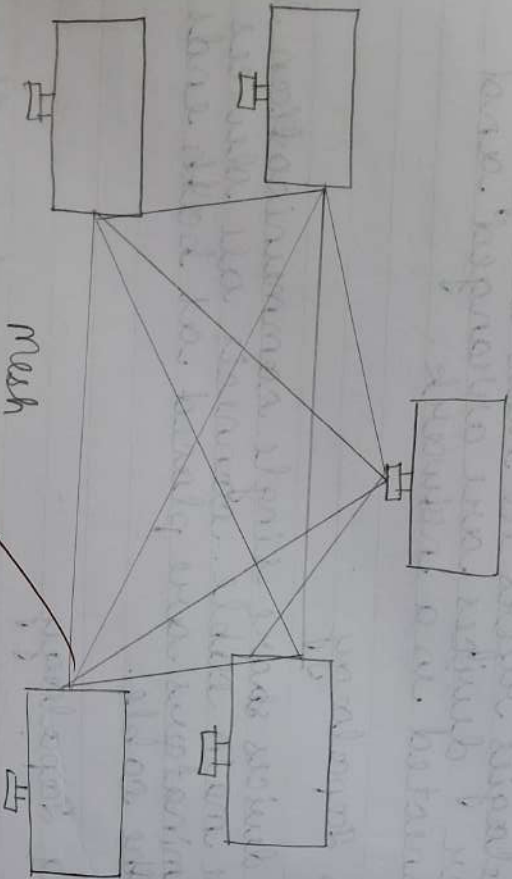
## 2] Ring Topology

- Each device is connected to two others, forming a circular path for data.
- Data travels in one direction.
- Each device has exactly two neighbours

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Star Topology



Ring Topology

Conclusion: Hence, we studied basic elements of computer networking.

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### 3] Star Topology

- All devices are connected to a central device
- Central node controls and manages all communication.
- Most common in modern LANs

### 4] Mesh Topology

- Each device is connected to every other device
- Can be full mesh or partial mesh
- High fault tolerance
- + Troubleshooting commands

1] ping - checks if host is reachable.  
ping - google.com

2] ipconfig - shows your system's network configuration  
shows IP address, default gateway, DNS, etc.

3] tracert - shows path packets take to reach the host  
tracert google.com

4] nslookup - checks DNS resolution (name to IP)  
nslookup google.com  
helps find DNS problems

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