Network Topology

Def

- Network topology defines the way in which computers, printers and other devices are connected.
- A network topology defines the layout of the wire and devices as well as the paths used by data transmission.

LAN topologies

Networks may be classified by shape. Three most popular :

- Star
- Ring
- Bus
- Mesh
- Hybrid

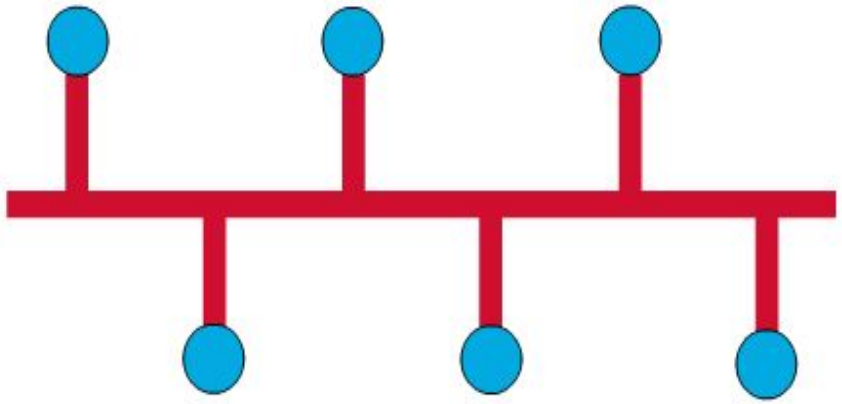
Bus topology

- Shared broadcast links
- Direct point to point communication

Shared broadcast links

- Point to point communication
- Each pair of communicating nodes use the link for a short time. Other nodes ignore the communication.
- There has to be a distributed protocol to decide who gets to use the link

- Single cable connects all computers
- Each computer has connector to share cable
- Computers must synchronize and allow only one computer to transmit at a time.



- Network is maintained by a single cable
- Cable segment must end with a terminator
- Uses thin coaxial cable (background will be thick coaxial)
- Extra stations will be added in a daisy chain manner

- Standard is IEEE 802.3
- Thin Ethernet(10 Base 2) has a maximum segment length of 200m
- Max no of connections is 30 devices
- Four repeaters may be used to a total cable length of 1000 m
- Thick Ethernet (10 Base 5) used for backbones
- Limited to 500m
- Max of 100 nodes per segment

Advantages :

- In expensive to install
- Easy to add stations
- Use less cable than other topologies
- Works well for small networks

Disadvantages:

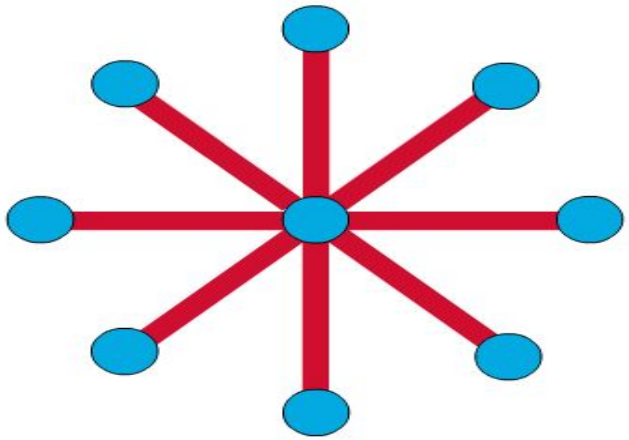
- No longer recommended(out of fashion as it is unreliable)
- Backbone breaks, whole network downs
- Limited no of devices can be attached
- Difficult to isolate problems
- Sharing same cable slows response rate

Star topology

- All computers attach to a central point
- Center of star is sometimes called a hub
- Easy to detect defects and to remove parts
- No disruption to the network when connecting or removing devices.

Disadvantage:

- High dependence of the system on the functioning of central hub.



Ring topology

- Computers connected in a closed loop
- First passes data to second, second passes data to third and so on.
- In practice, there is a short connector cable from the computer to the ring
- Ring connections may run past offices with connector cable to socket in the office

- No beginning or end
- All devices have equal access to media
- Single ring- data travels in one direction only
- Double ring – fault tolerance
- Each device has to wait its turn to transmit
- Most common type is Token Ring (IEEE 802.5)

Advantages

- Data packets travel at great speed.
- No collisions
- Easier to find faults
- No terminators required

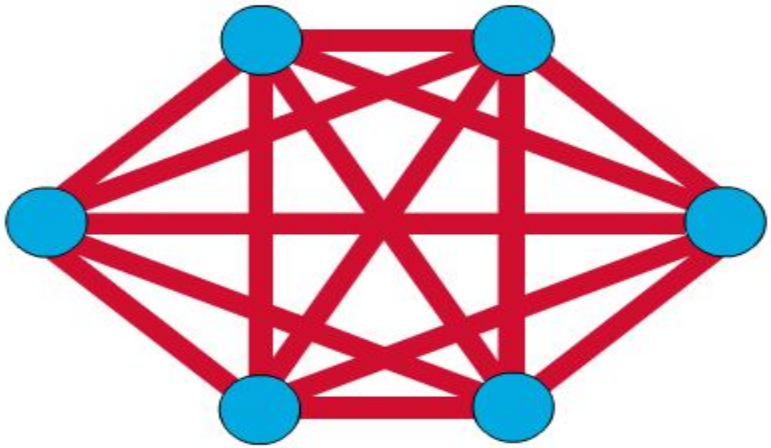
Disadvantages

- Requires more cable than a bus
- A break in a ring bring it down
- Not as common as the bus- less devices available

MESH TOPOLOGY

- Not common on LANs
- Most often used in WANs to interconnect LANs
- Each node is connected to every other node
- Fault tolerant- Allows communication to continue in the event of a break in any one connection

Mesh topology



Advantages

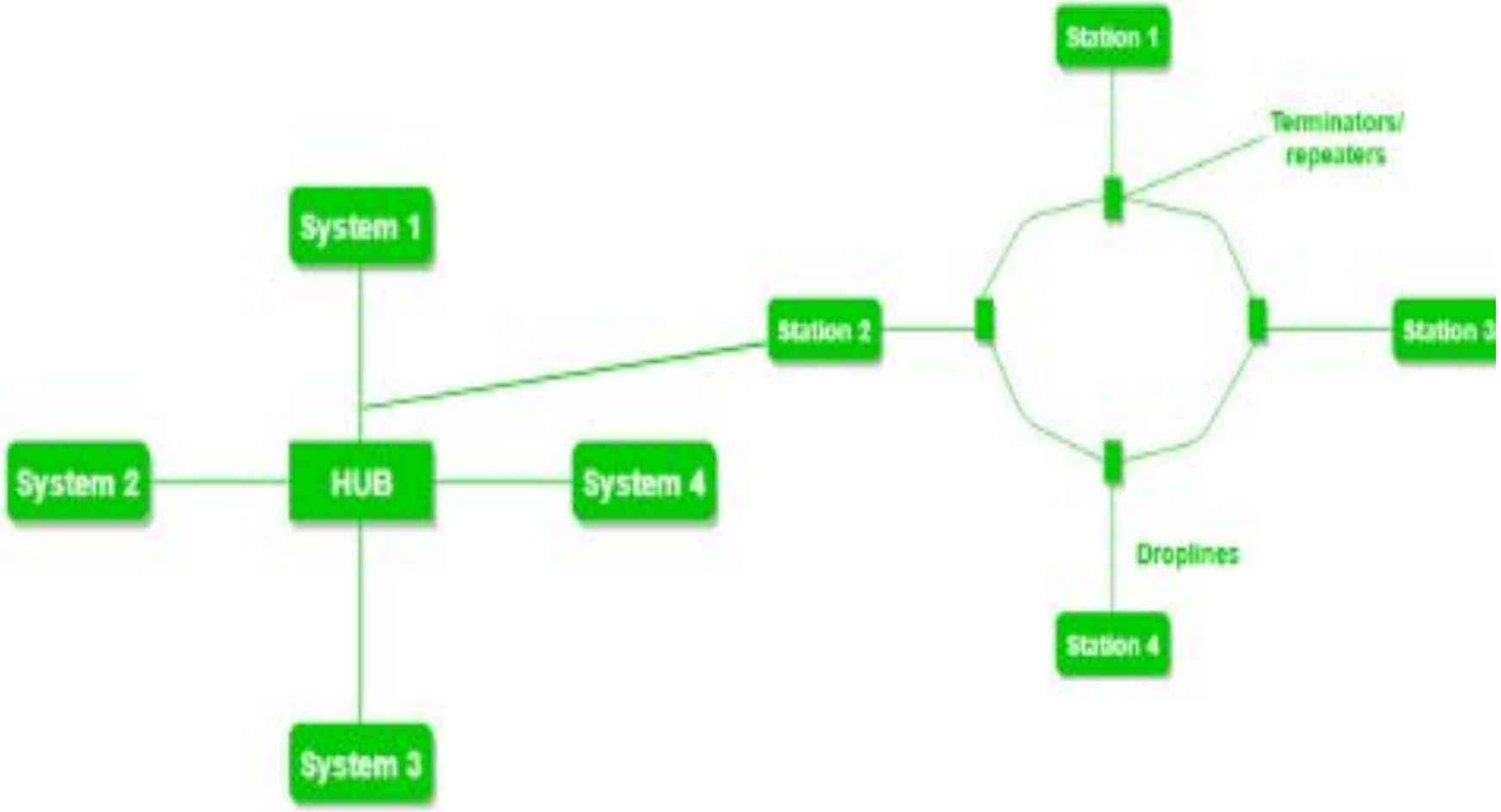
- Improves fault tolerance
- Can carry more data

Disadvantages

- Expensive
- Difficult to manage
- Difficult to install
- Difficult to troubleshoot

Hybrid topology

- This topological technology is the combination of all the various types of topologies we have studied above.
- Hybrid Topology is used when the nodes are free to take any form.
- It means these can be individuals such as Ring or Star topology or can be a combination of various types of topologies seen above.


Station 1
Terminators/
repeaters
System 1
Station 2
Station 3
System 2
HUB
System 4
Droplines
Station 4
System 3