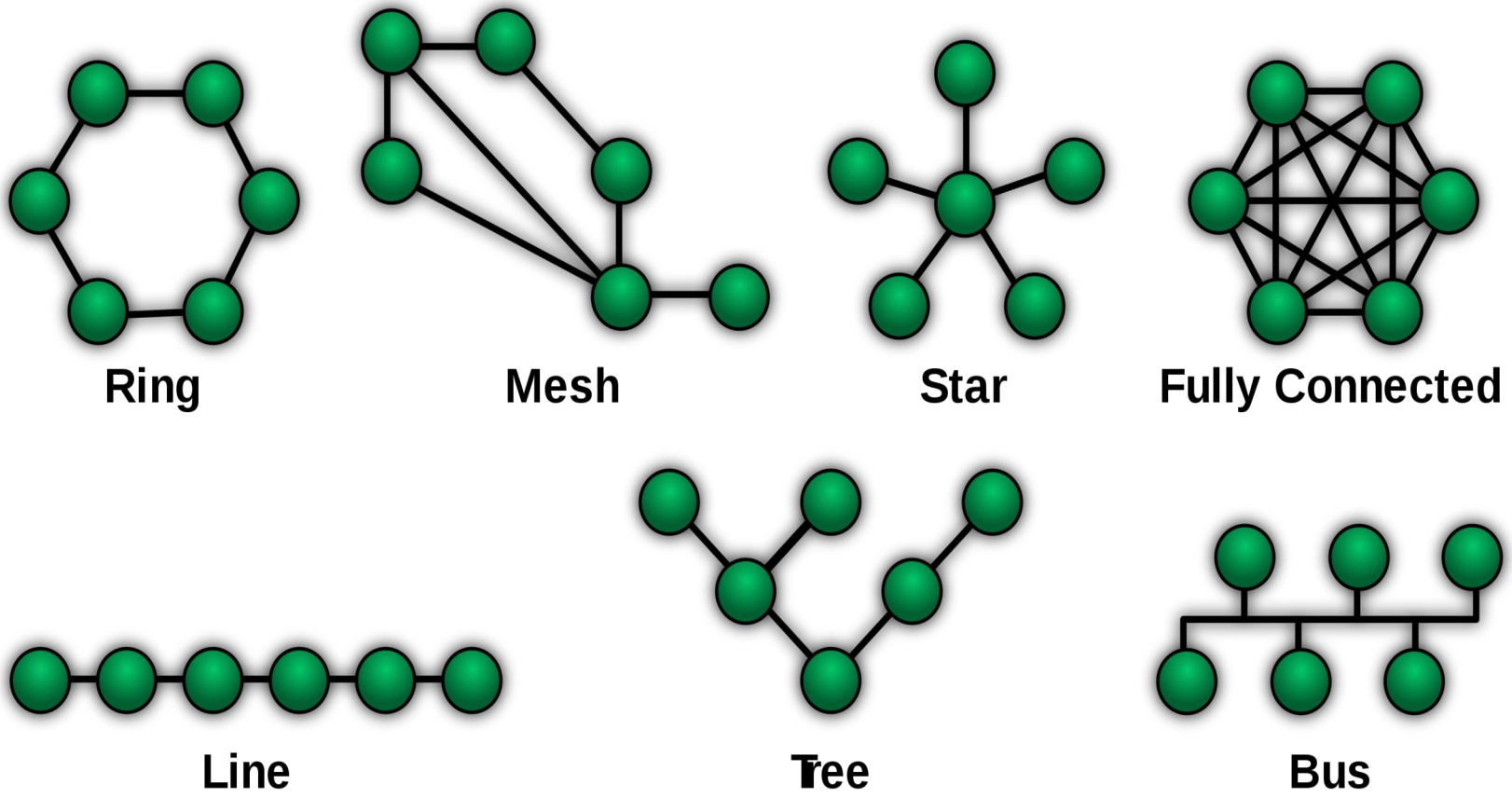
IT 609
Network and System Administration

Network Topologies

Thursday November 18, 2021

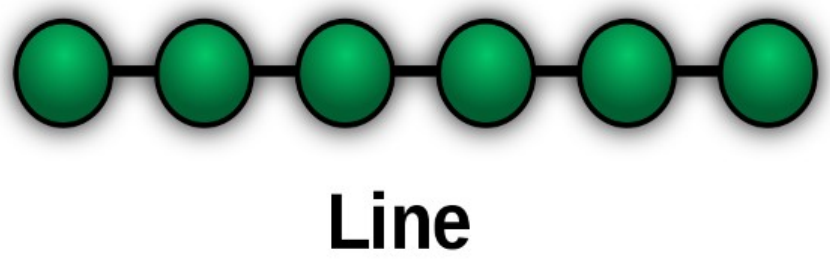
Network Topologies



Network Topologies

- Point-to-Point
- Daisy Chain
- Bus
- Star
- Ring (Circular)
- Mesh
- Tree
- Hybrid
- Other Networks
  - Sneakernet
  - Fishnet
  - RRnet

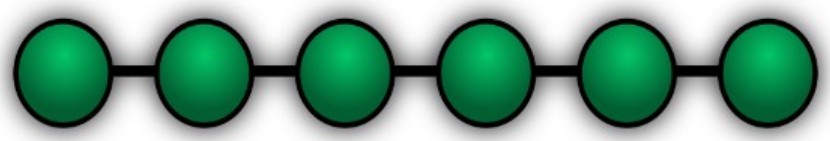
Point-to-Point



Point-to-Point

- The simplest topology with a dedicated link between two endpoints.
- A child's tin can telephone is one example of a physical dedicated channel.
- Using circuit-switching or packet-switching technologies, a point-to-point circuit can be set up dynamically and dropped when no longer needed. Switched point-to-point topologies are the basic model of conventional telephony.

Daisy Chain

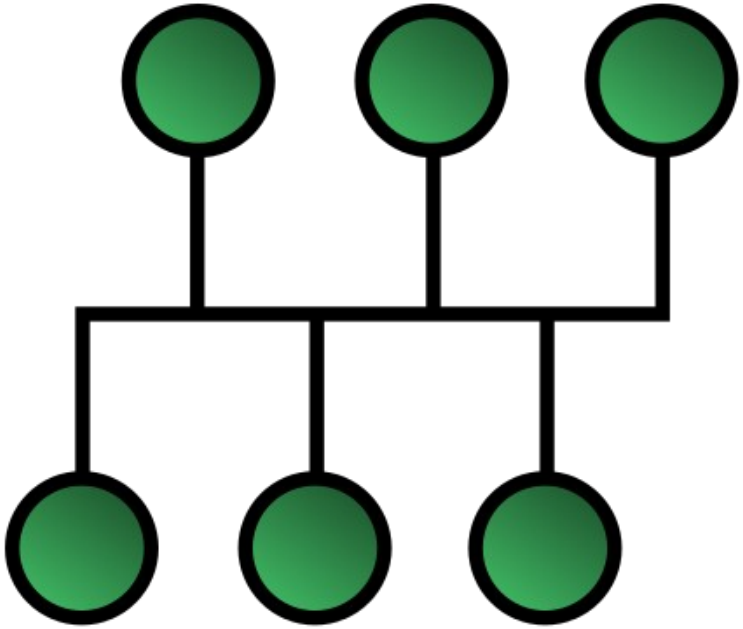


Line

Daisy Chain

- Daisy chaining is accomplished by connecting each computer in series to the next.
- If a message is intended for a computer partway down the line, each system passes it along in sequence until it reaches the destination.
- A daisy-chained network can take two basic forms: linear and ring.

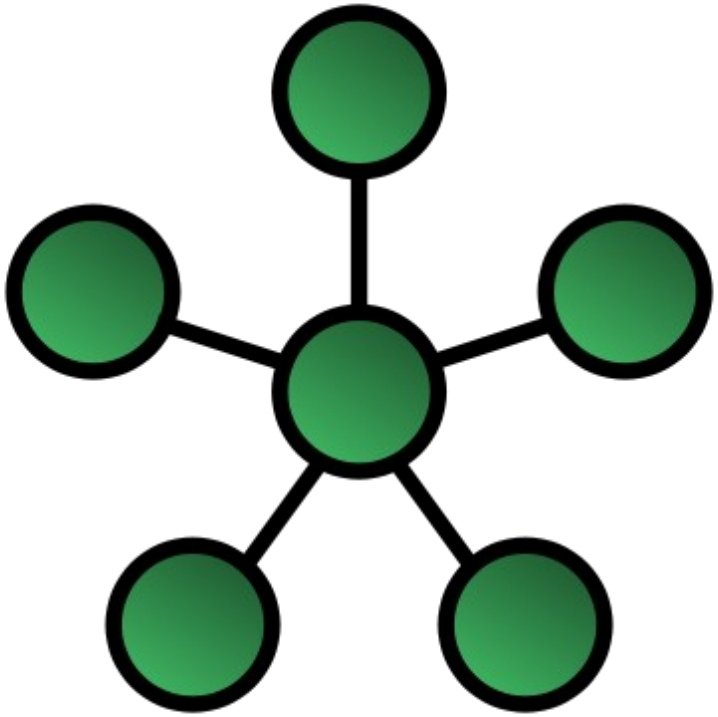
Bus



Bus

- In local area networks using bus topology, each node is connected by interface connectors to a single central cable.
- The 'bus', also referred to as the backbone, or trunk carries all data transmission between nodes in the network

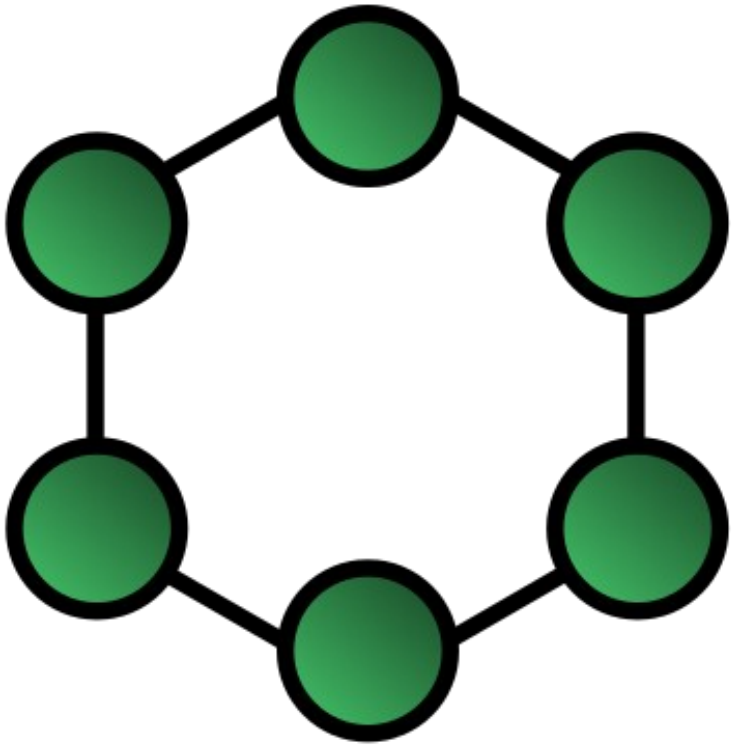
Star



Star

- In star topology, every peripheral node is connected to a central node called a hub.
- All traffic that traverses the network passes through the central hub, which acts as a signal repeater.
- The primary disadvantage of the star topology is that the hub represents a single point of failure. Also, since all peripheral communication must flow through the central hub, the aggregate central bandwidth forms a network bottleneck for large clusters.

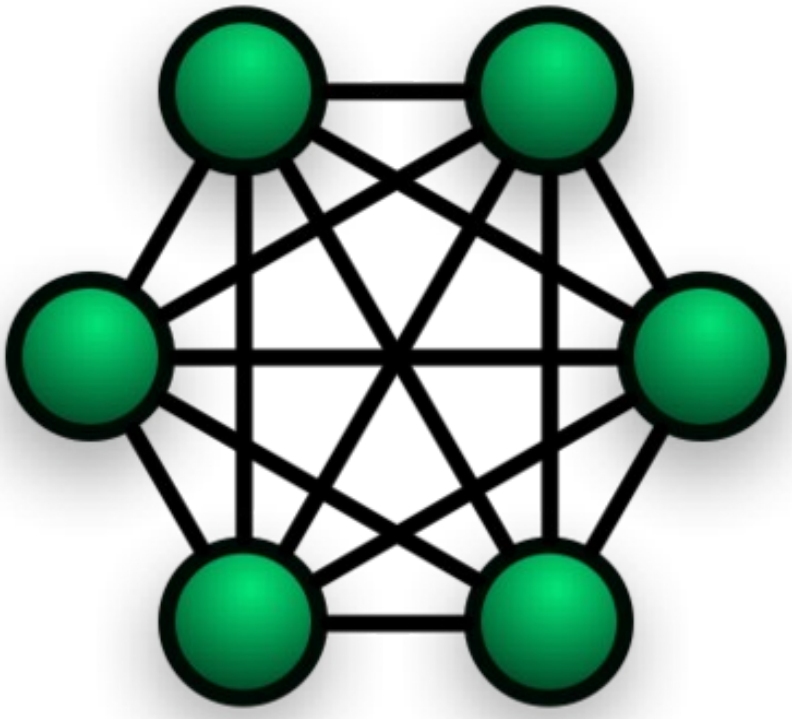
Ring (Circular)



Ring (Circular)

- A ring topology is a daisy chain in a closed loop.
- When the load on the network increases, its performance is better than bus topology.
- There is no need of network server to control the connectivity between workstations.
- Aggregate network bandwidth is bottlenecked by the weakest link between two nodes.

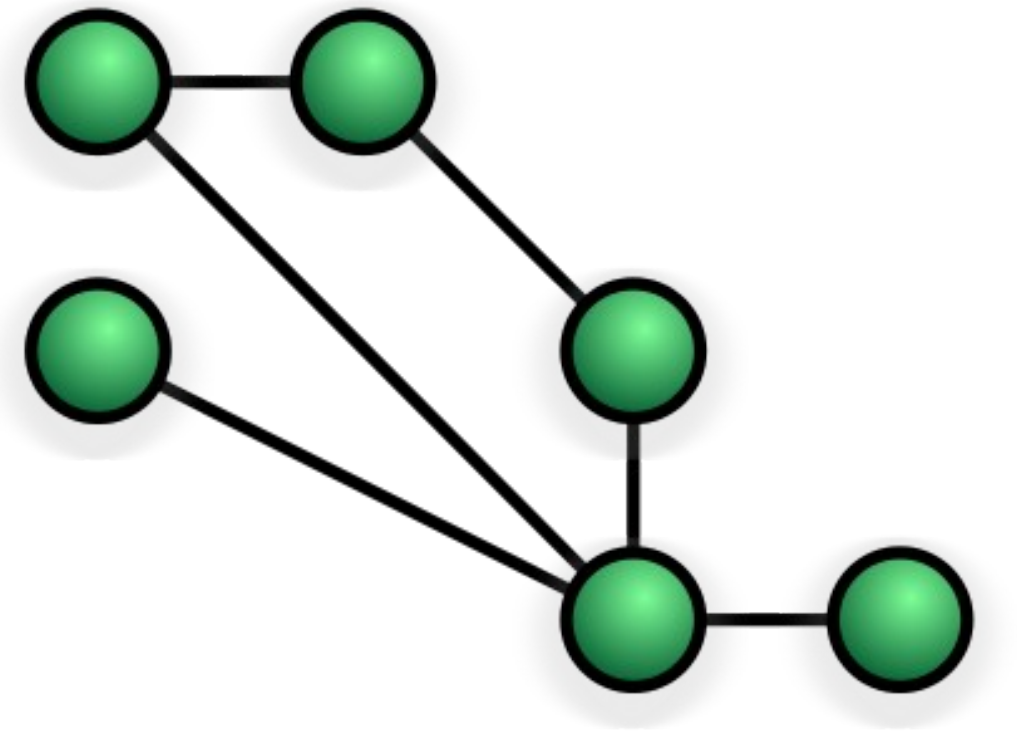
Mesh



Mesh

- In a fully connected network, all nodes are interconnected. (In graph theory this is called a complete graph.)
- A fully connected network doesn't need to use packet switching or broadcasting.
- However, since the number of connections grows quadratically with the number of nodes, This makes it impractical for large networks.

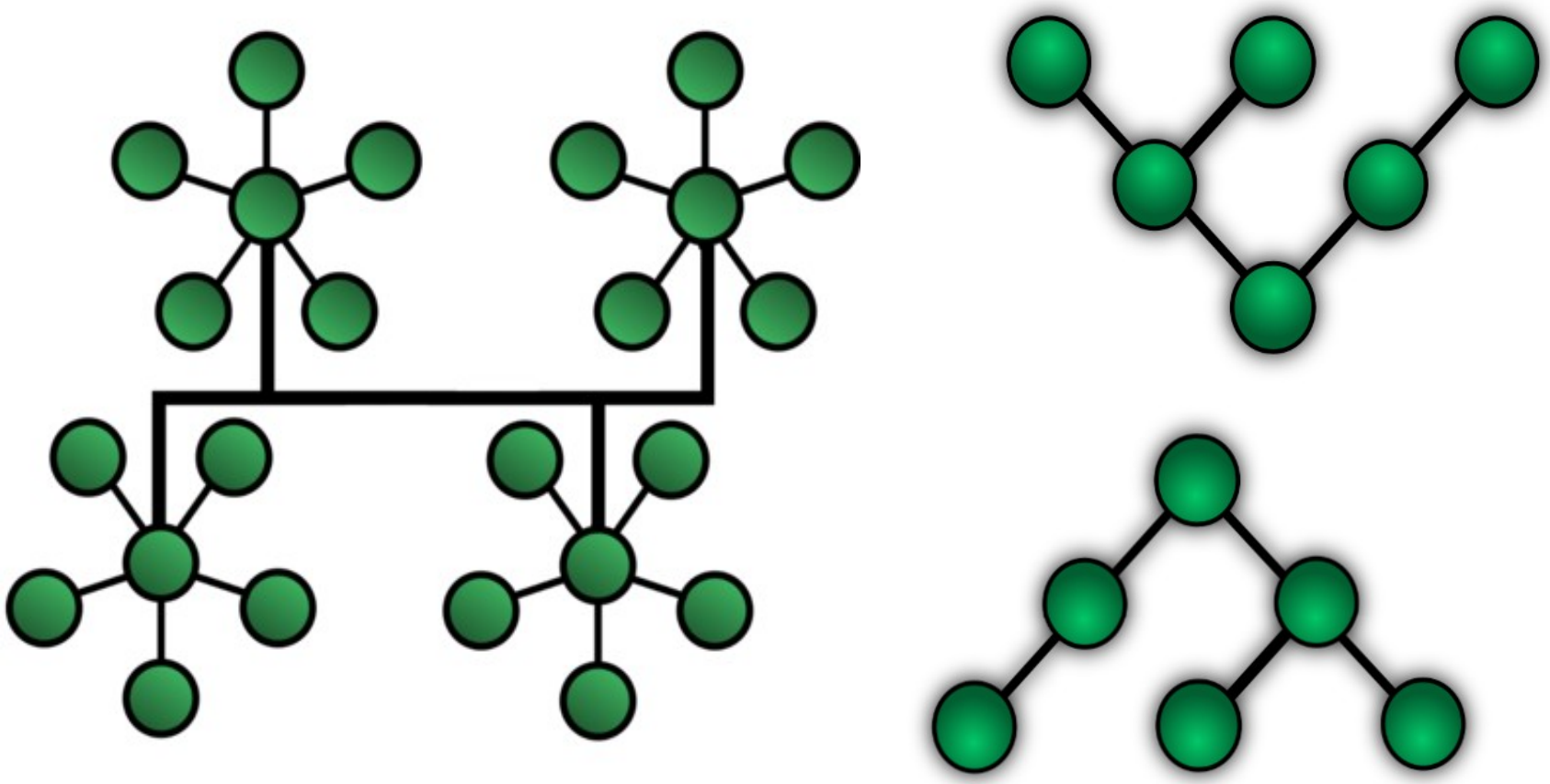
Hybrid



Hybrid

- Hybrid networks combine two or more topologies in such a way that the resulting network does not exhibit one of the standard topologies (e.g., bus, star, ring, etc.).
- For example, a tree network (or star-bus network) is a hybrid topology in which star networks are interconnected via bus networks.
- A hybrid topology is always produced when two different basic network topologies are connected.

Tree



Tree

- A tree topology (a.k.a. hierarchical topology) can be viewed as a collection of star networks arranged in a hierarchy.
- This tree has individual peripheral nodes (e.g. leaves) which are required to transmit to and receive from one other node only and are not required to act as repeaters or regenerators.
- Unlike the star network, the functionality of the central node may be distributed.

Other Networks

- Sneakernet
  - https://en.wikipedia.org/wiki/Sneakernet
  - https://www.pcmag.com/encyclopedia/term/sneakernet
- Fishnet
  - https://www.youtube.com/watch?v=bgsQR1qECso
- RRnet
  - https://www.youtube.com/watch?v=dQw4w9WgXcQ