



Introduction to Networking

Networking II

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NETWORK

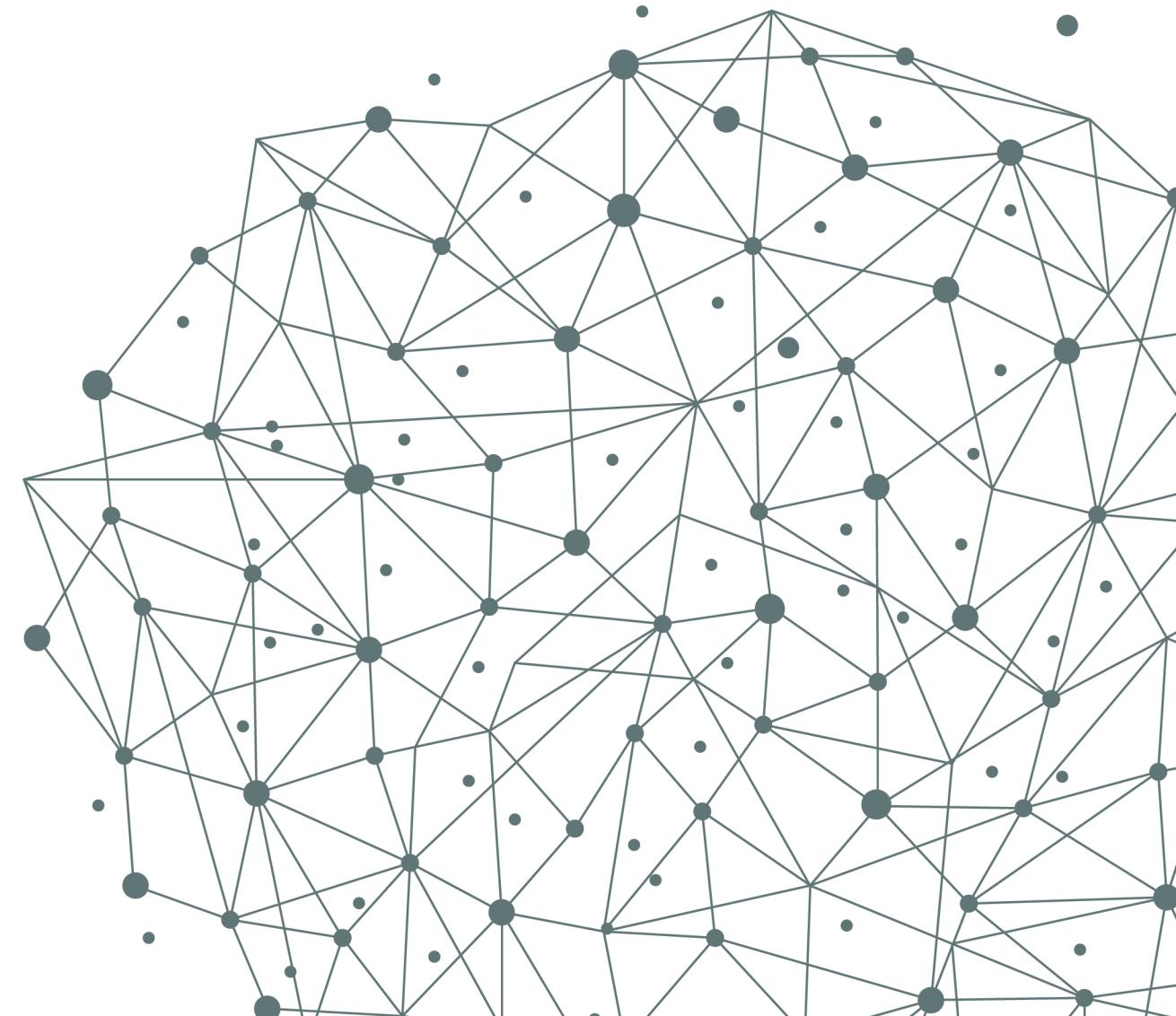
Network

- Network is the group of computers connected with each other through some type of media that they can share data and resources
- A Computer network links two or more computers so that they can exchange data and share resources such as printer etc. Data (files) Resources (Printer, Scanner etc.)



Computer Networking

- the process of connecting two or more computing devices, such as desktop computers, mobile devices, routers or applications, to enable the transmission and exchange of information and resources.



Network

Scope and Application

This term is broad and can apply to various systems of interconnected components beyond just computers. For instance, it can refer to transportation networks, social networks, or electrical grids. The concept of a network is not limited to digital or electronic systems.

Components and Technologies

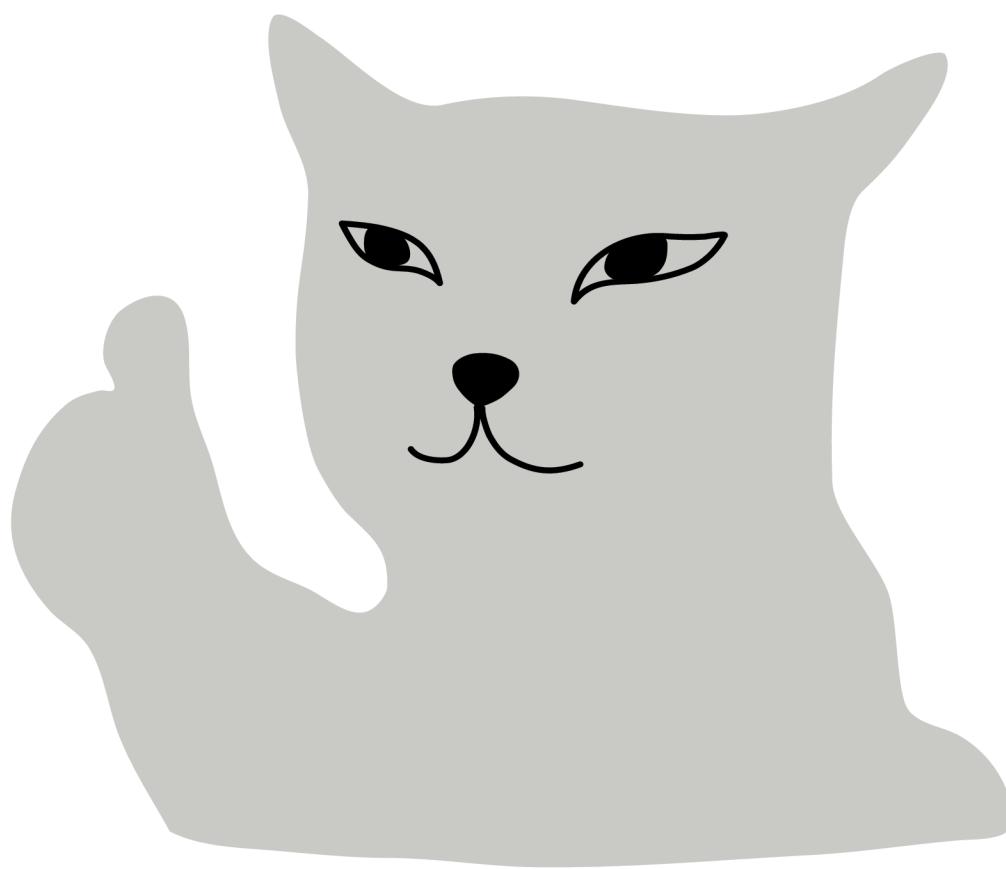
In general, a network can consist of diverse elements depending on its type. For example, a transportation network includes roads and vehicles, while a social network includes people and their interactions. The components of a network vary widely based on its purpose and domain.

Computer Networking

This term specifically refers to the field of connecting computers and digital devices. It involves the design, implementation, and management of networks for digital communication, including protocols, hardware, and software used to facilitate data exchange between computers and other devices.

This involves specific components and technologies tailored for digital communication, such as routers, switches, cables, and network protocols (like TCP/IP). The focus is on technologies and methodologies to ensure data transmission, network security, and efficient communication between computing devices.

9 TYPES OF COMPUTER NETWORKING



1. PAN

- A **personal area network**, or **PAN**, is a small-scale network that revolves around one person or device. A PAN connects just a few devices in a small localized area. Rather than including many devices, PANs usually operate from one or two main devices.

For example, if you use the Bluetooth functionality on your smartphone to share a photo with a nearby device, you're using a PAN.

2. LAN

- A local area network, or LAN, is the most common network type. It allows users to connect within a short distance in a common area. Once they connect, users have access to the same resources.

For example, you might use a LAN when you connect your laptop to the internet at your home and print a document from a printer on the same network.

3. WLAN

- A **wireless local area network, or WLAN**, operates similarly to a LAN because it transmits data within a small area. It's rarely necessary to have a wired connection for devices that use a WLAN. While typically less secure and slightly weaker than other networks, a WLAN provides users with the flexibility to use their devices in various locations.

For example, a user might connect a baby monitor to a WLAN to ensure the device remains operational wherever their child sleeps.

4. CAN

- A **campus area network**, or CAN, is a network used in educational environments such as universities or school districts. While each department in a school might use its own LAN, all the school's LANs could connect through a CAN. Campus area networks combine several independent networks into one cohesive unit.

For example, the English and engineering departments at a university might connect through a CAN to communicate with each other directly.

5. MAN

- A **metropolitan area network**, or a **MAN**, is a medium-sized network that's larger than a CAN. While a MAN is a costly network, it provides efficient connectivity between devices across a wide geographical range.

For example, a city government might operate with a MAN if it has offices across the entire metropolitan area.

6. WAN

- A **wide area network, or a WAN**, is an extensive network that's not confined to geographical space. Corporations and international companies may use WANs to provide a common network with far-reaching connectivity.

For example, remote workers who use the internet to access information from their company make use of a WAN.

7. SAN

- A **storage area network**, or a **SAN**, is a network that teams use to store mass amounts of sensitive data. It provides a way to centralize data on a non-localized network that differs from the main operating one.

One example of a SAN is if your team stores customer information on a separate network to maintain the high speeds of your main network. **companies uses SAN - Accenture, HP etc.

8. EPN

- An **enterprise private network**, or an **EPN**, is an exclusive network that businesses build and operate to share company resources at high speeds. EPNs are typically unique to a specific company, which ensures the connection is secure.

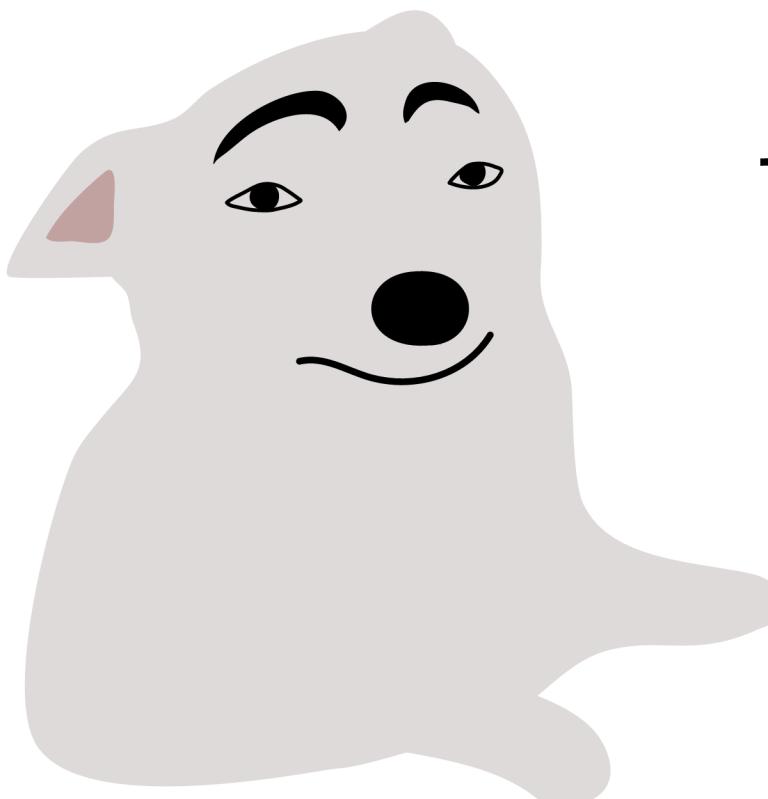
For example, a high-security technology company might use an EPN to reduce the risk of data breaches. **companies uses EPN, **Walmart**.

9. VPN

A **virtual private network, or VPN**, is a private network that's available through the internet. This type of network functions similarly to an EPN because it provides a secure, private connection. VPNs typically don't require the same infrastructure as EPNs. Both the general public and companies can use VPNs to ensure privacy and security.

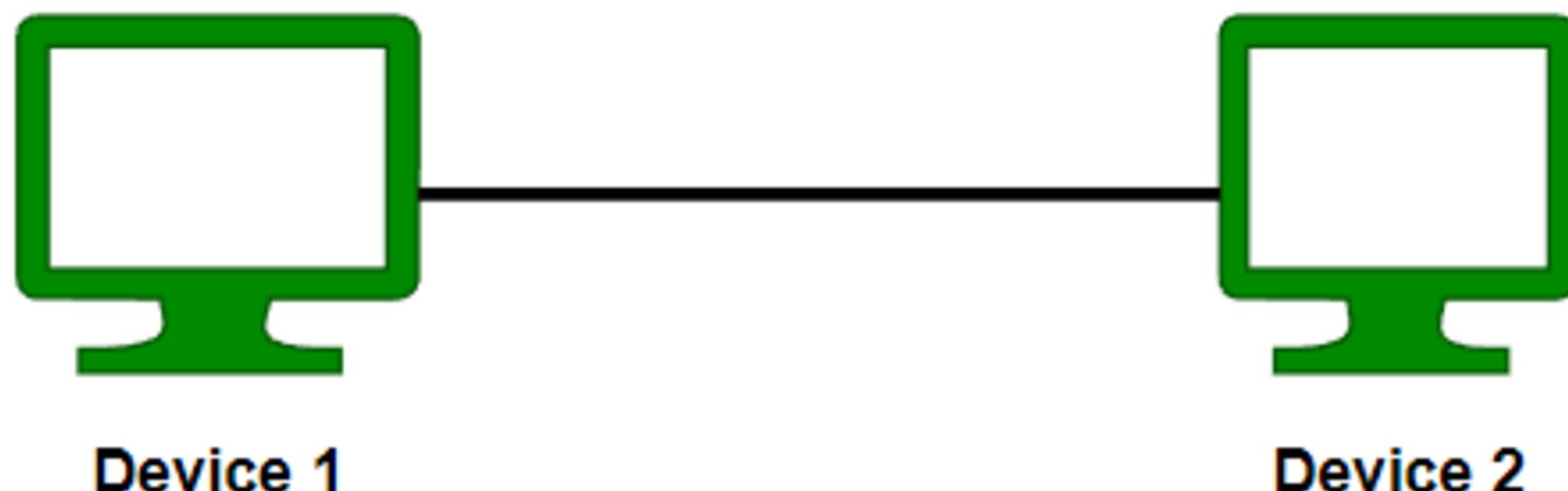
Example: NordVPN, CiscoAnyConnect etc.

8 NETWORK TOPOLOGIES



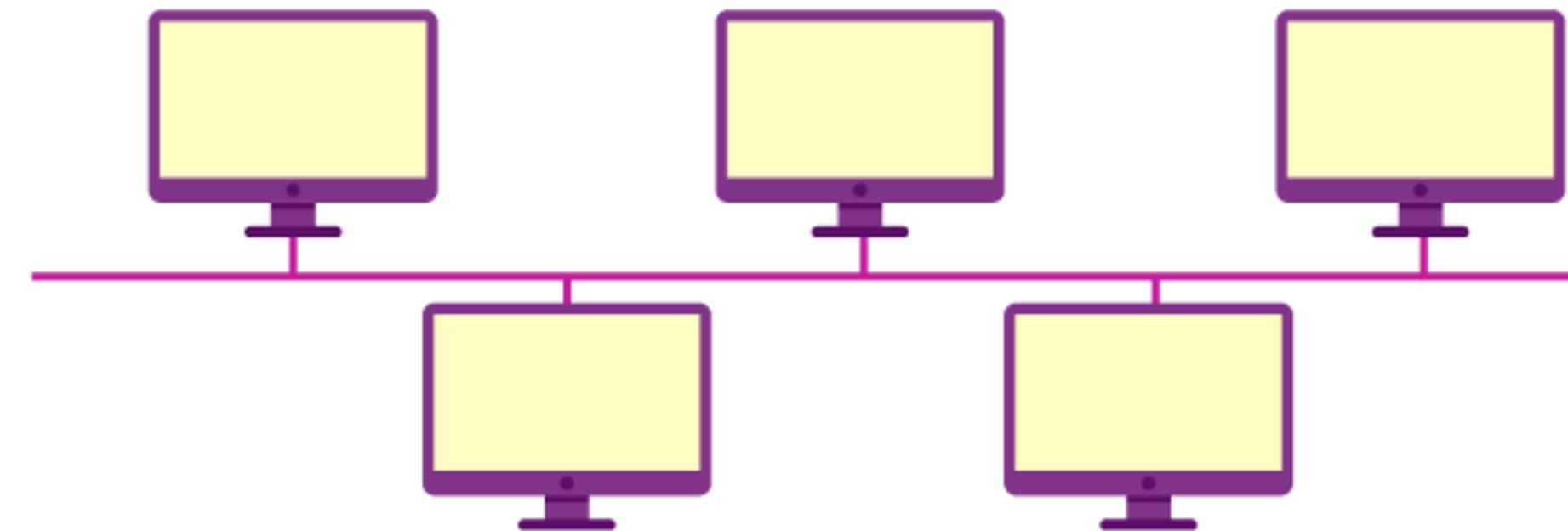
1. Point-to-Point topology

- Two devices are connected directly with a dedicated communication link. This can be a physical cable or a wireless link, depending on the implementation.
- The simplest communication between two nodes, in which one is the sender and the other one is the receiver. Point-to-Point provides high bandwidth.



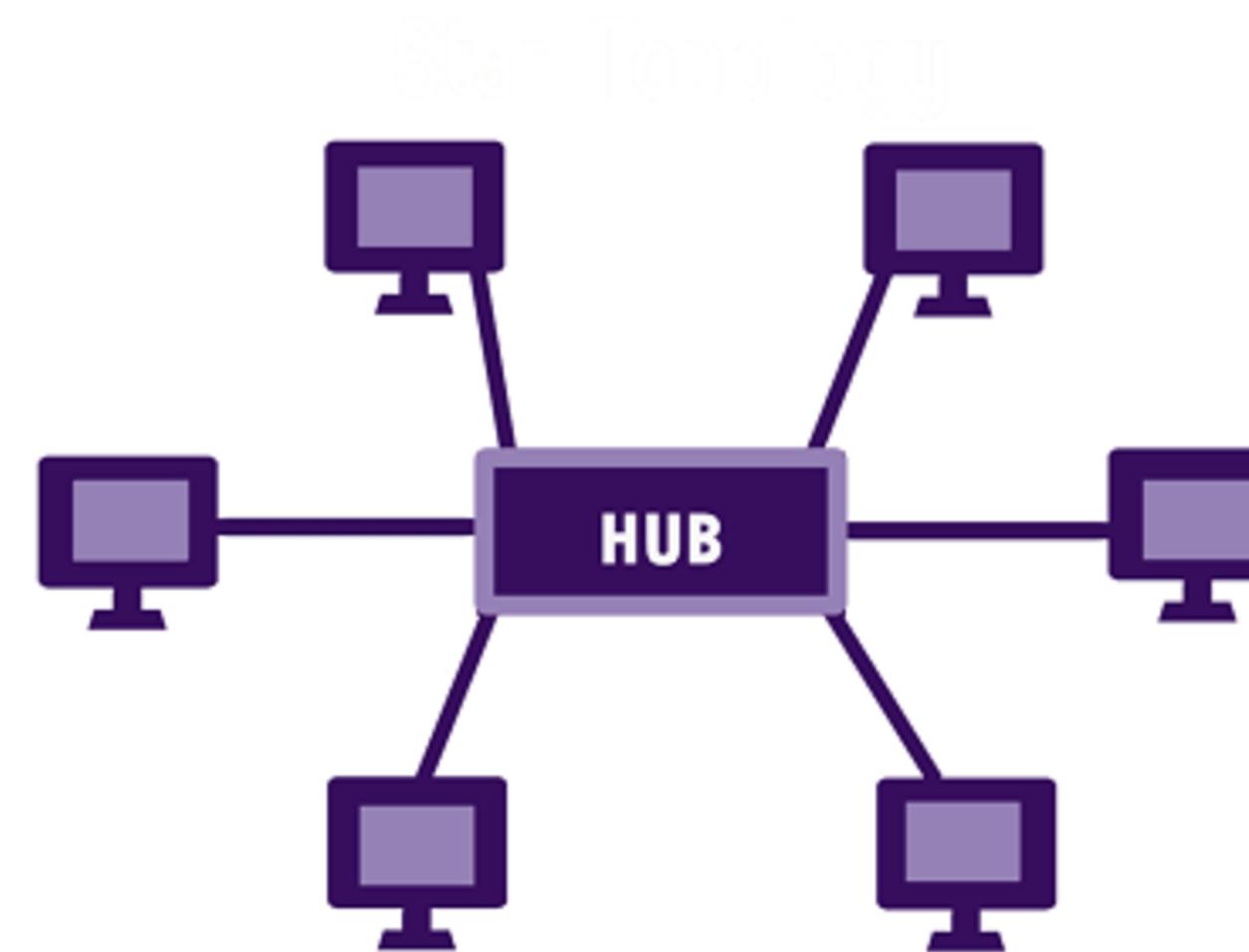
2. Bus topology

- All devices are connected to a single central cable (the bus). Data sent by one device is available to all other devices on the network.



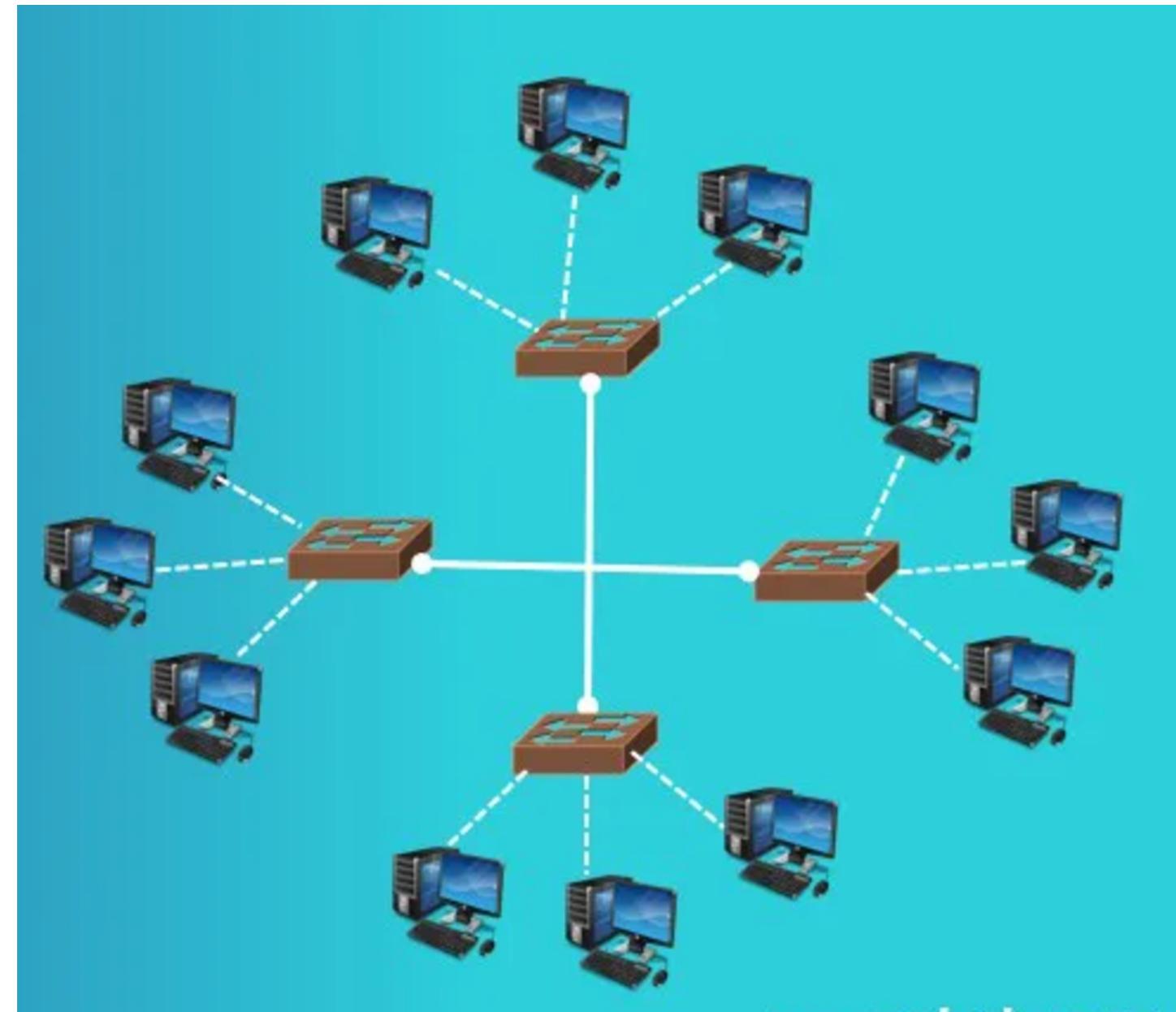
3. Star Topology

- All devices are connected to a central(primary) hub or switch.
 - Each device has a dedicated point-to-point connection to the central hub.



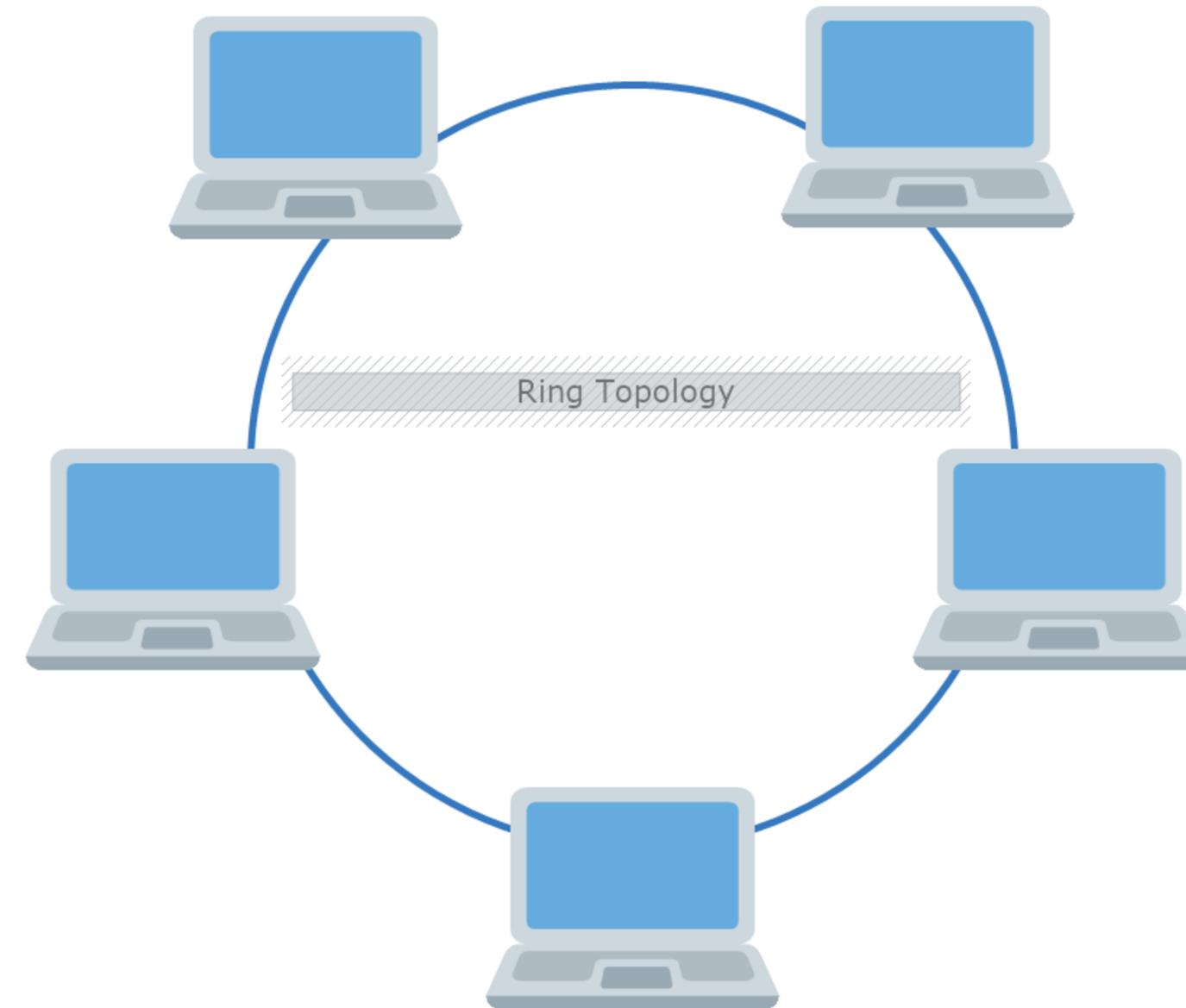
3.1 Extended Star Topology

- a type of star topology in which one or more additional networking devices are directly connected to the central networking device. It looks like a mesh of switches that are interconnected to network and one central networking device controls the network.



4. Ring topology

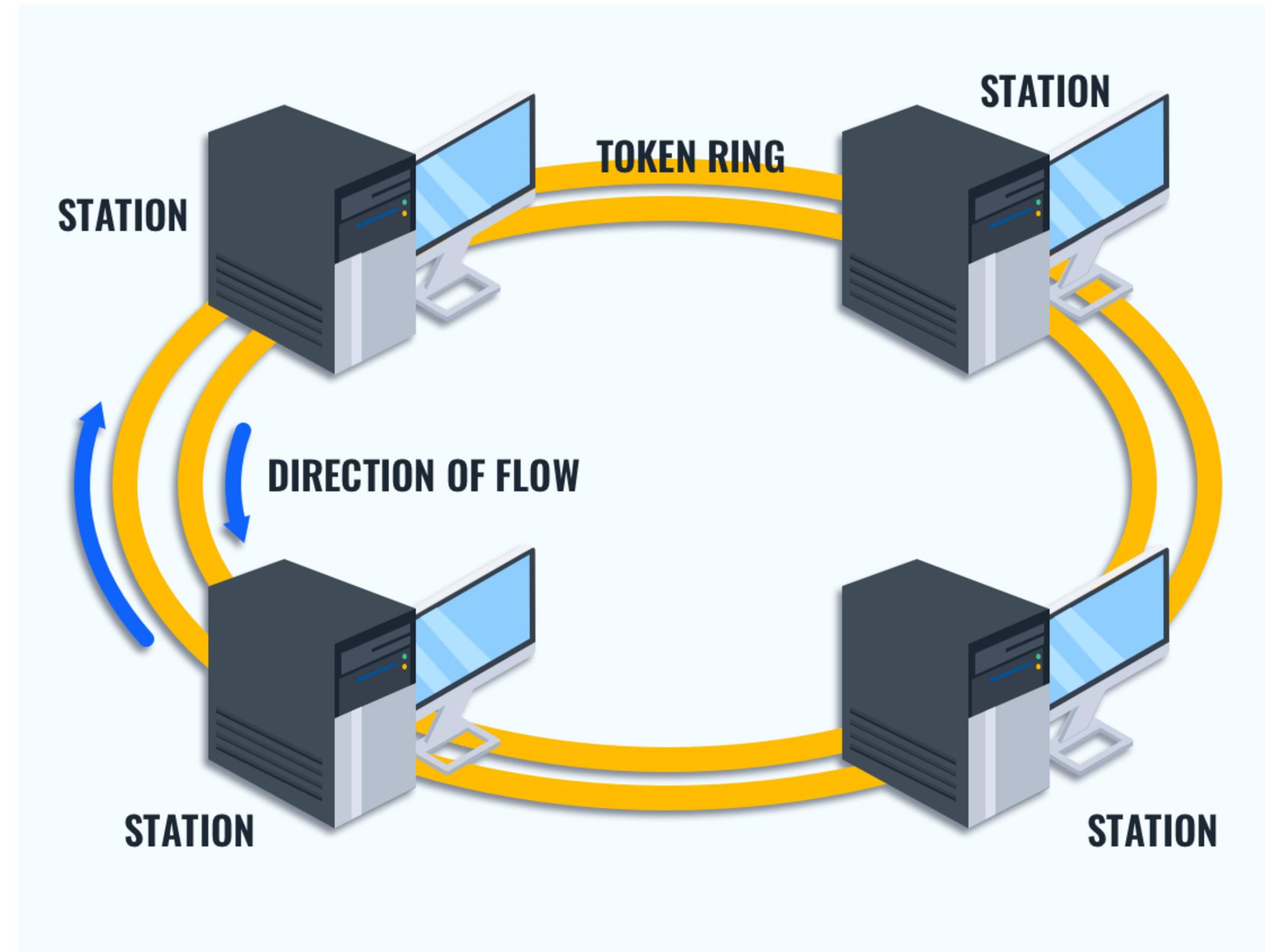
- Devices are connected in a circular fashion, with data traveling in one direction (or both in a dual ring) around the ring until it reaches its destination.



4.5 Dual Ring Topology

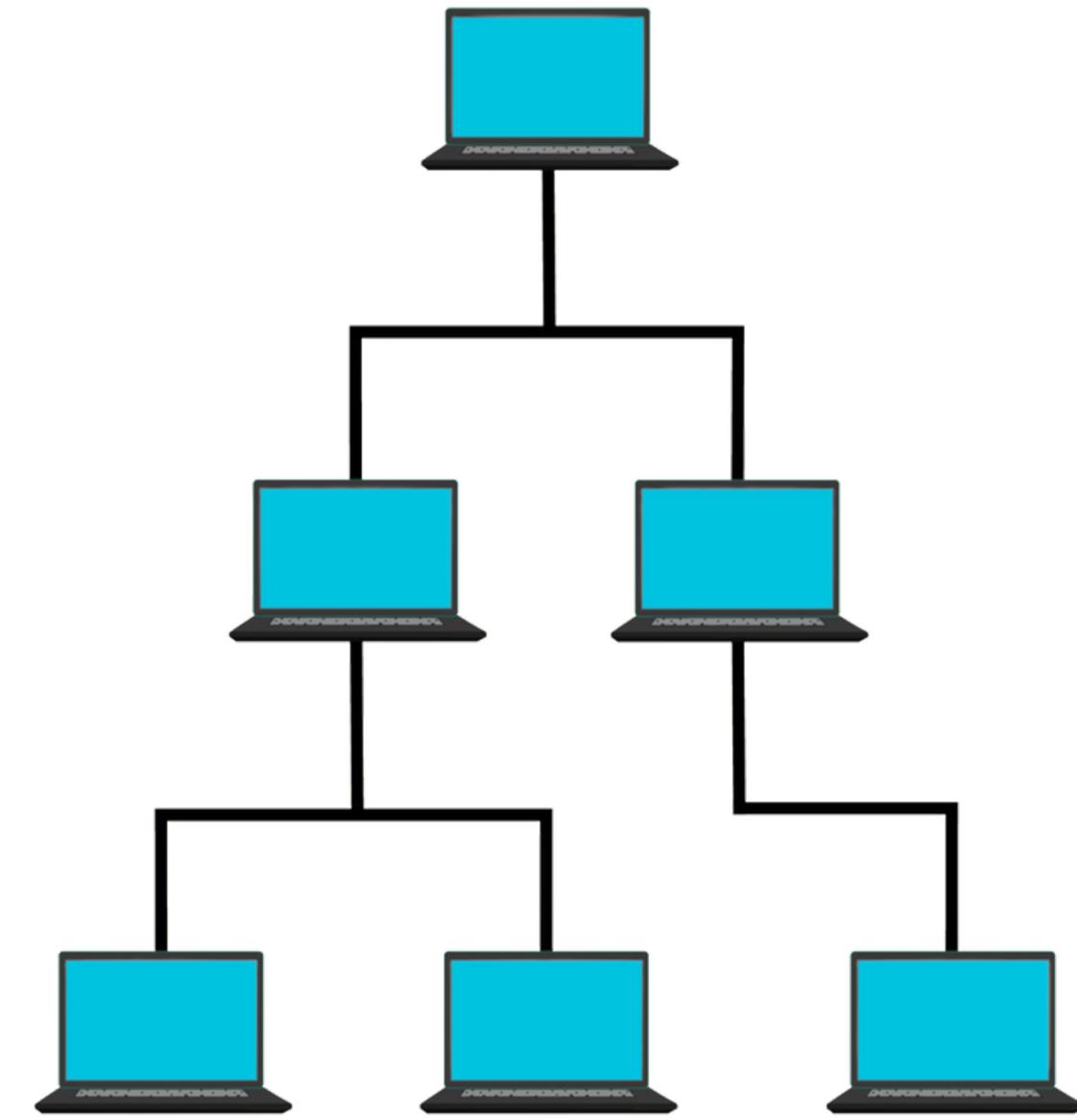
- The primary ring is a uni-directional data flow path that enables communication between network devices.
- The secondary ring is a failover circuit in case the first one breaks.
- Next comes tokens. The tokens ensure stable communication through the network. Think of it as a “talking stick” in a group therapy session. A talking stick ensures that no one is interrupted so that proper communication can take place.

4.5 Dual Ring Topology



5. Tree topology

- Tree topology is a type of network topology that resembles a tree. In a tree topology, there is one central node (the “trunk”), and each node is connected to the central node through a single path.

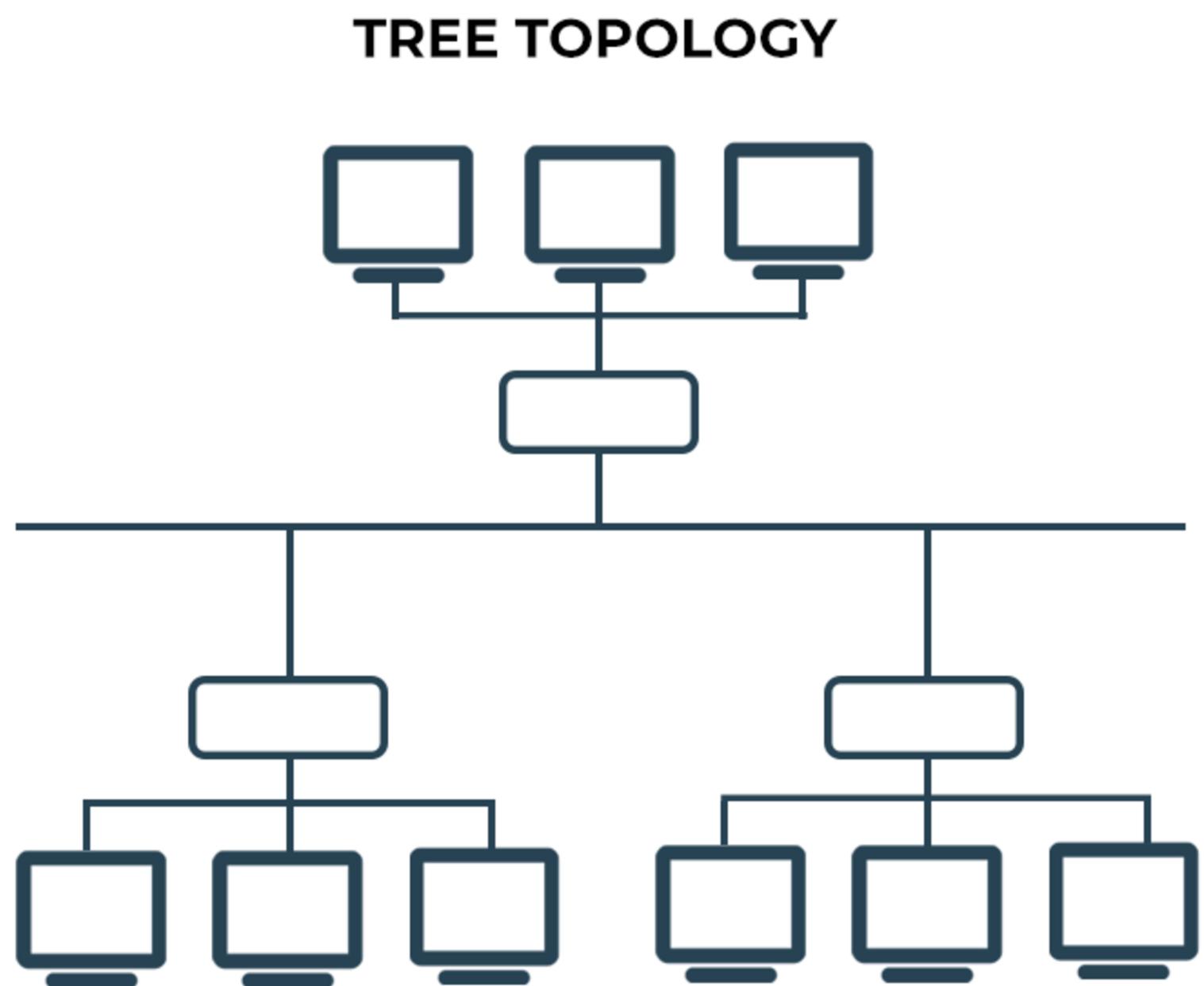


TREE TOPOLOGY

5. Tree topology

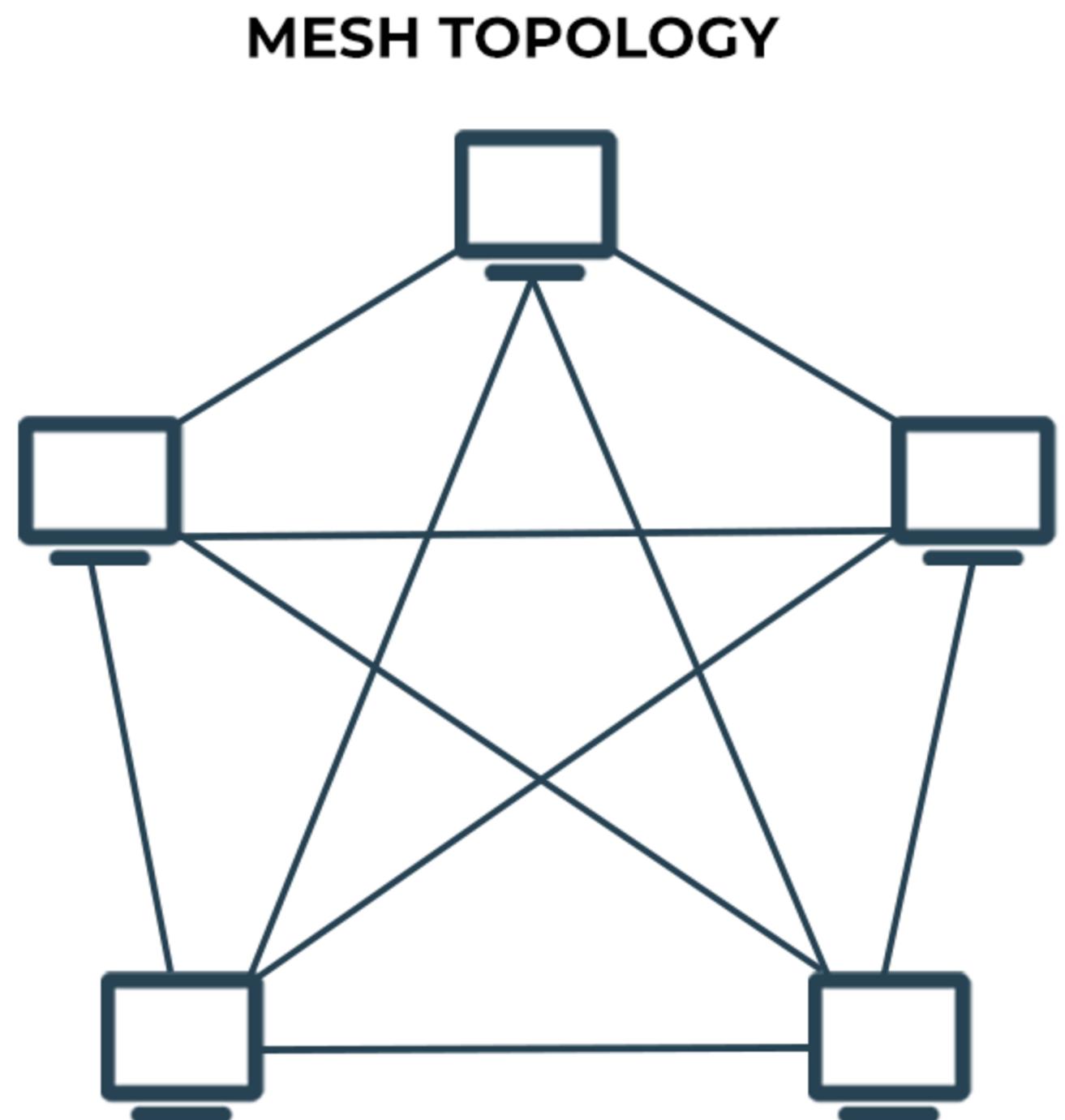
- A hybrid topology combining star and bus topologies. It has a central bus with star-configured networks branching out.

**** Tree topologies are suitable for large networks such as offices, university campuses, and hospitals.**



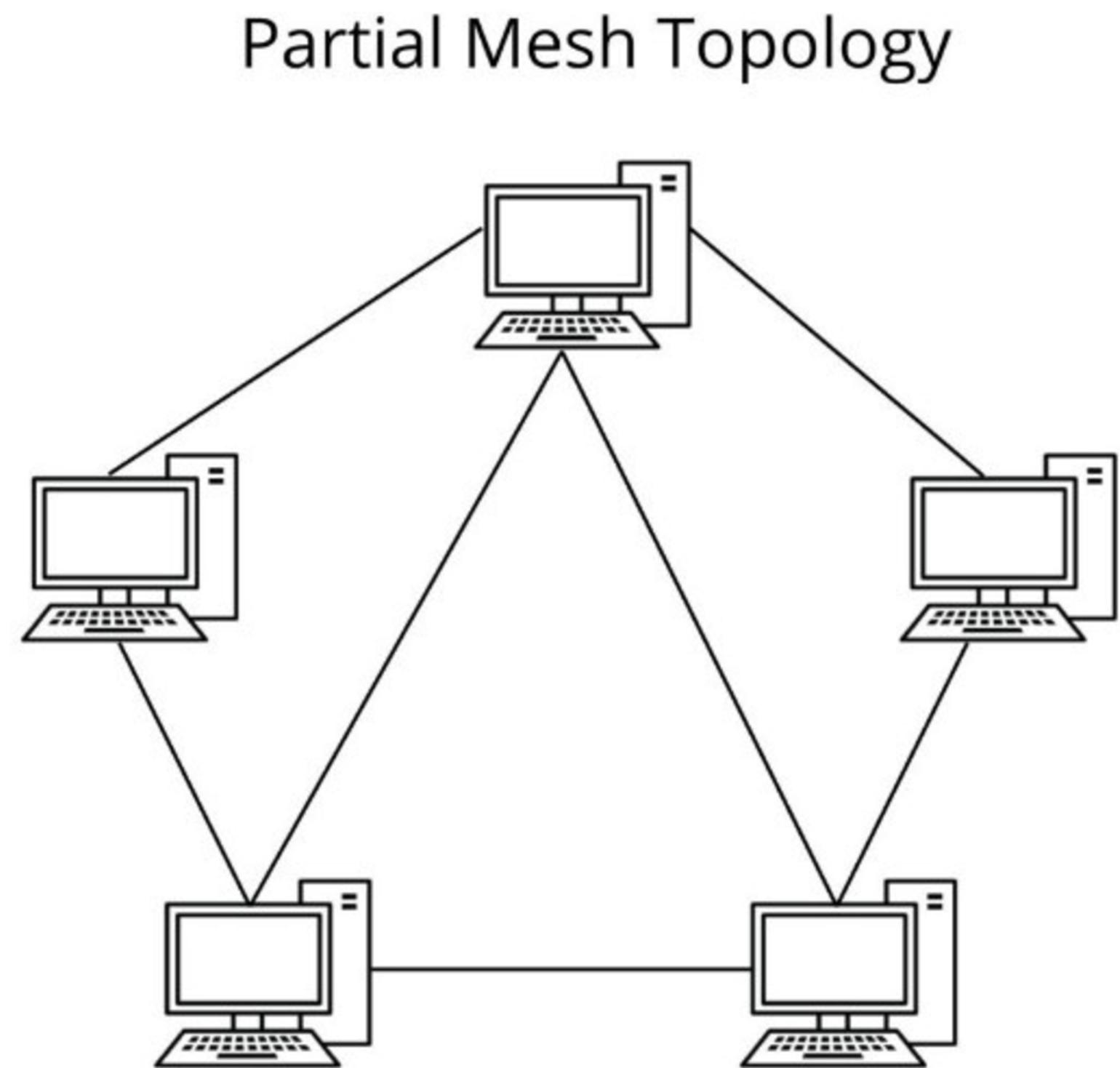
6. Mesh Topology

- All the nodes are interconnected and can send and receive their data and relay data from other nodes.
- Every device is connected to every other device in the network. This can be a full mesh (where all devices are interconnected).



6.1 Partial Mesh Topology

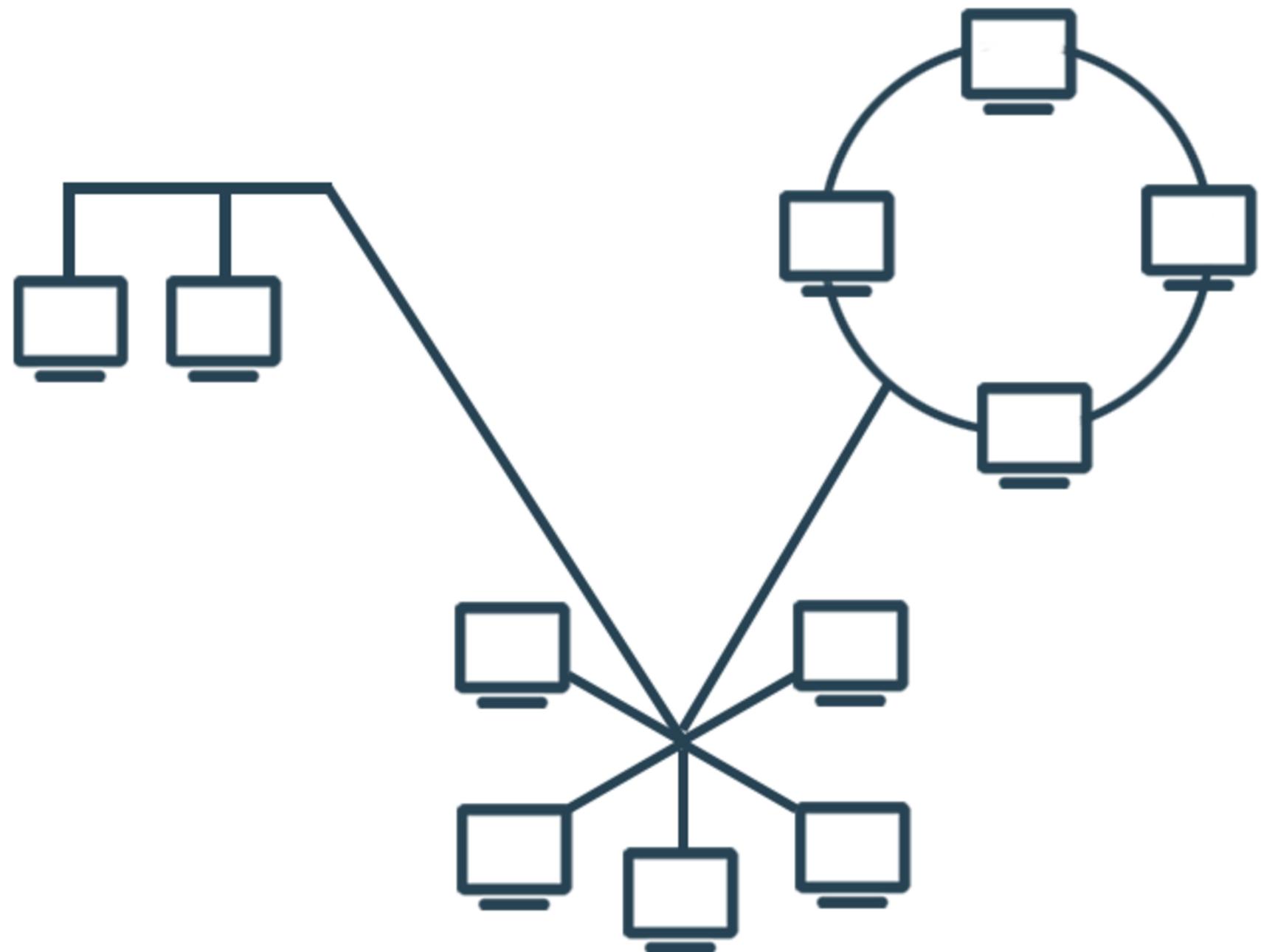
A variation of mesh topology where only some of the nodes (devices) in the network are interconnected, while others are connected to just one or two other nodes. Unlike a full mesh topology, where every node is connected to every other node, partial mesh provides a balance between redundancy and cost-effectiveness.



7. Hybrid Topology

A hybrid network topology, as the name suggests, features characteristics of multiple other topologies. The creation of such a configuration depends on the requirement of the network.

HYBRID TOPOLOGY



8. Daisy chain topology

a network configuration where each device is connected in series to the next. This means that data travels from one device to the next in a linear sequence, like links in a chain.

