

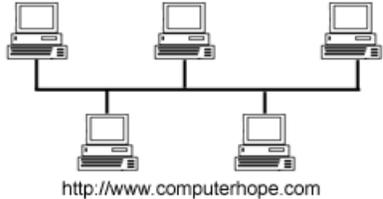
CHAPTER 2- Cabling and Topology

Network Topologies and Characteristics Study Guide

“the way in which constituent parts are interrelated or arranged”

Topology - The Lay of the Land

A **bus topology** is a topology for a Local Area Network (LAN) in which all the nodes are connected to a single cable. The cable to which the nodes connect is called a "backbone". If the backbone is broken, the entire segment fails. **Security Issue?**

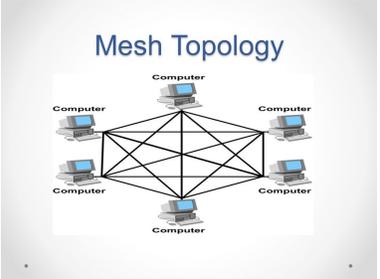
Pros	Cons	Notes
<ul style="list-style-type: none"> -Used single cable to connect all computers in a line (simple & easy) -Best for small Networks -No hubs or switches required; data flows freely throughout the network -Cheap set-up 	<ul style="list-style-type: none"> -Cable broken = stopped network -Additional devices slow the network down -Difficult to troubleshoot -Expensive maintenance 	<p>-Part of the first generation of topologies, along with ring topology</p> <p>--Needed termination at ends of cables to prevent a signal sent from one computer from reflecting at ends of cable, taking down the network.</p> <p style="text-align: center;">Bus Topology</p>  <p style="text-align: center;">http://www.computerhope.com</p>

A **hybrid topology** is a type of network topology that uses two or more differing network topologies. These topologies include a mix of bus topology, mesh topology, ring topology, star topology, and tree topology.

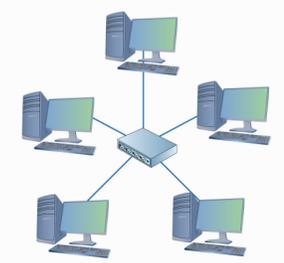
Pros	Cons	Notes
<ul style="list-style-type: none"> • Easy to connect and remove devices without disrupting the rest of the 	<p>A lot of cabling which may lead to complexity</p> <p>It is more complicated- it may require computer</p>	<p>It is very powerful because of how easy it is to maintain which includes easy ways to troubleshoot</p>

<p>network.</p> <ul style="list-style-type: none"> • Quick and easy to connect devices. • Easy to troubleshoot (once the problem is localized) • Scalability- which means that it is easy to add new hardware (connecting new hubs, storage, power) 	<p>science, financial analysis, and engineering which also cost more money.(Most expensive)</p>	<p>software. Mostly large enterprises use this.</p> 
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Mesh topology is a type of networking where all nodes cooperate to distribute data amongst each other. This **topology** was originally developed 30+ years ago for military applications, but today, they are typically used for things like home automation, smart HVAC control, and smart buildings. 192.168.1.1 ←-(2-250)

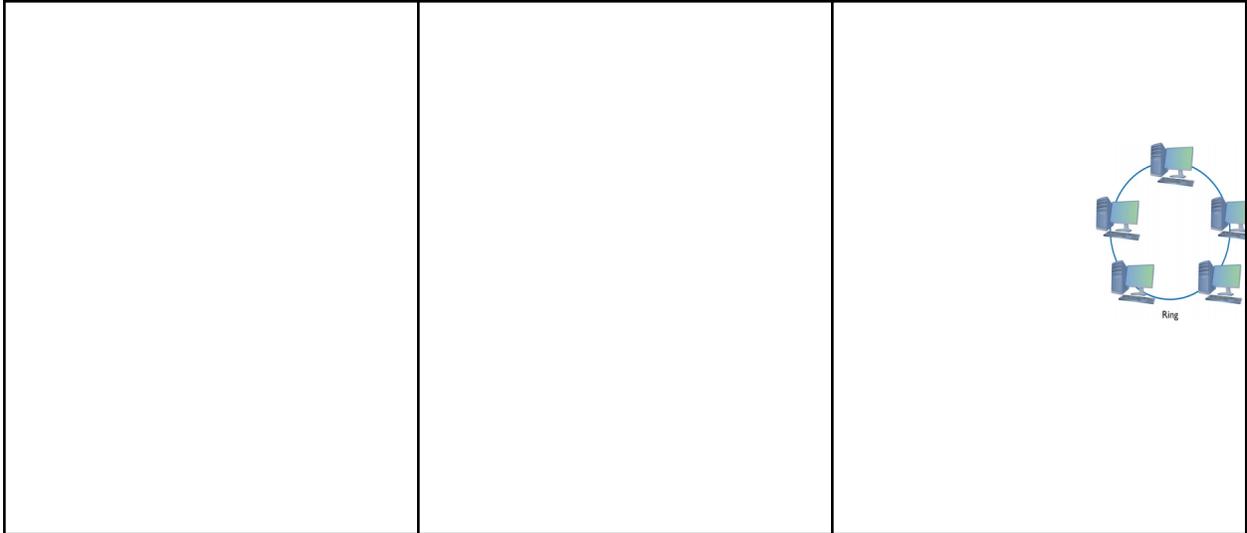
Pros	Cons	Notes
<ol style="list-style-type: none"> 1. Only one router is enough to connect all the computers. 2. Easy to add a range 3. resistant to problems, keep the network running even if a problem occurs 	<ol style="list-style-type: none"> 1. Every computer connects to every other computer via routes, increased workload for each node 2. Network setup can be complicated 	<p>Two types: partially mesh and fully meshed</p> 

A **star topology** is a **topology** for a Local Area Network (LAN) in which all nodes are individually connected to a central connection point, like a hub or a switch. A **star** takes more cable than e.g. a bus, but the benefit is that if a cable fails, only one node will be brought down. Today we often use a Star-Bus topology.

Pros	Cons	Notes
<ul style="list-style-type: none"> - Fault tolerance - if one of the cables break, all the other computers can still communicate with each other. - Faster than the bus and ring topologies, since the connection is going straight from connection box to each computer. 	<ul style="list-style-type: none"> - More expensive and complicated than bus and ring topology. - Can't easily re-design your existing network to star topology. 	<ul style="list-style-type: none"> - The Star topology uses a central connection box for all the computers on the network. 

A **ring topology** is a network configuration in which device connections create a circular data path. Each networked device is connected to two others, like points on a circle. Together, devices in a **ring topology** are referred to as a **ring** network.

Pros	Cons	Notes
<ul style="list-style-type: none"> ● It requires no termination ● Inexpensive to implement 	<ul style="list-style-type: none"> ● Stop working if the cable breaks (Stops data flow) ● Cannot redesign existing networks 	<ul style="list-style-type: none"> ● Ring topology connects all computers with a ring of cable



Coaxial Cable



Shield is to handle electromagnetic interference (EMI)

BNC Connector



Connects computers together (Bus topology)

Type of Coax
RG-6 - 75 ohms



RG - Radio Grade <- Ohms

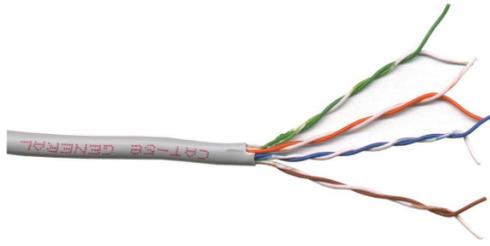
RG59 - 75 ohms



Splitter



Shielded / Non Shielded Twisted Pair



Most are 4 pairs (8 wires)

- Green/white, orange/white, blue/white, brown/white

Ratings are CAT

Bandwidth? Traffic -> How much data can travel

3 to 4 CATs

CAT5

CAT5e

CAT6

CAT6a

Different Ethernet Categories

	Category 3	Category 5	Category 5e	Category 6	Category 6a	Category 7
Cable Type	UTP	UTP	UTP	UTP or STP	STP	S/FTP
Max. Data Transmission Speed	10 Mbps	10/100/1000 Mbps	10/100/1000 Mbps	10/100/1000 Mbps	10,000 Mbps	10,000 Mbps
Max. Bandwidth	16 MHz	100 MHz	100 MHz	250 MHz	500 MHz	600 MHz

Two things to consider

- Frequency - Speed
- Bandwidth - How much (example is water in a pipe ½ versus 4")

Who sent the standards for the twisted pair?

IEEE - Institute of Electrical and Electronics Engineers

Work group 802 ----> 1980 / February

IEE 802 Standards 802.3 - Ethernet

IEEE 802.1	Higher Layer LAN Protocols (with many subcommittees, like 802.1X for port-based network access control)
IEEE 802.3	Ethernet (with a ton of subcommittees, such as 802.3ae for 10-Gigabit Ethernet)
IEEE 802.11	Wireless LAN (WLAN); specifications, such as Wi-Fi, and many subcommittees
IEEE 802.15	Wireless Personal Area Network (WPAN)
IEEE 802.18	Radio Regulatory Technical Advisory Group
IEEE 802.19	Wireless Coexistence Working Group
IEEE 802.20	Mobile Broadband Wireless Access (MBWA); (in hibernation)
IEEE 802.21	Media Independent Handover Services
IEEE 802.22	Wireless Regional Area Networks

Fire Ratings

Plenum cable rating is a fire rating. Non plenum is just PVC.

FIBER OPTICS

Types of Light

- LED - Light emitting diode aka - MMF multimode-fiber
 - Transmit data using on/off
- LASER - aka SMF - single-mode fiber

Four types connector types

- ST
- SC
- LC
- FC