



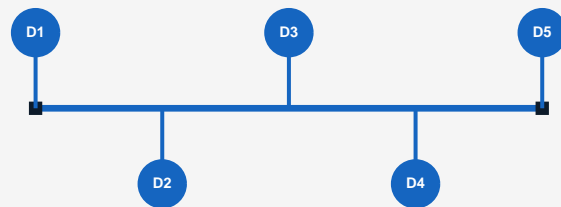
Network Topologies

IGCSE Computer Science Revision Sheet

■ **Big Idea:** A network topology is the physical or logical layout of devices in a network. The three main topologies for IGCSE are **Bus**, **Star**, and **Mesh**.

■ Bus Topology

All devices connect to a single main cable called the **backbone**. Data travels in both directions. Terminators at each end prevent signal bounce.



Advantages

- ✓ Cheap and easy to install.
- ✓ Uses less cable than other topologies.
- ✓ Simple to set up for small networks.

Disadvantages

- ✗ If the main cable fails, the whole network stops.
- ✗ Performance slows as more devices are added.
- ✗ Data collisions occur under heavy traffic.
- ✗ Difficult to troubleshoot faults.

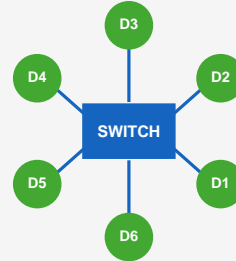
EXAM TIP: Bus topology: single cable, cheap, but one failure brings down the whole network.





■ Star Topology

All devices connect individually to a central **switch** (or hub). Data passes through the switch to reach its destination. Star is the most widely used topology in modern networks.



Advantages

- ✓ Fast and reliable — dedicated connection per device.
- ✓ Easy to manage and troubleshoot.
- ✓ One device failing does not affect others.
- ✓ Easy to add new devices.

Disadvantages

- ✗ If the central switch fails, the whole network goes down.
- ✗ Requires more cable than bus topology.
- ✗ Switch adds to overall cost.

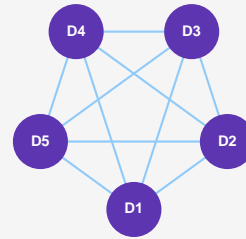
EXAM TIP: Star topology: most common modern network. Reliable but switch is a single point of failure.





■ Mesh Topology

Each device connects directly to **multiple other devices**. In a full mesh, every device connects to every other device. Data can take multiple paths to reach its destination.



Advantages	Disadvantages
<ul style="list-style-type: none">✓ Very reliable — data reroutes if one connection fails.✓ No single point of failure.✓ Fast data transmission with multiple paths.✓ Ideal where reliability is critical (e.g. internet backbone).	<ul style="list-style-type: none">✗ Very expensive to install — requires lots of cable.✗ Complex to set up and maintain.✗ High maintenance cost.✗ Not practical for large numbers of devices.

EXAM TIP: Mesh topology: most reliable, most expensive. Used where network failure is not acceptable.

Quick Comparison Table

Feature	Bus	Star	Mesh
Cost	Low	Medium	High
Reliability	Low	High	Very High
Cable used	Least	Medium	Most
Single point of failure	Main cable	Switch	None
Ease of setup	Easy	Moderate	Complex





Best used for	Small cheap networks	Modern offices/schools	Critical infrastructure
----------------------	----------------------	------------------------	-------------------------

KEY FACT: Star = most common modern topology. Bus = cheapest. Mesh = most reliable but most expensive.

Teacher note: Compare questions between two topologies are very common. Train students to use "whereas" — e.g. "Bus is cheaper whereas Star is more reliable."





Quick Check Questions

1.	What is a network topology?
2.	Describe how devices are connected in a star topology.
3.	State one advantage of a mesh topology over a bus topology.
4.	Explain why star topology is the most commonly used in schools and offices.
5.	State the main disadvantage of a bus topology.
6.	Compare bus and star topology. Give one similarity and one difference.

Answers on the next page →





Answer Guide

1.	A network topology is the physical or logical layout of devices and connections in a network.
2.	In a star topology, all devices connect individually to a central switch. Data passes through the switch to reach its destination device.
3.	Any one of: mesh is more reliable because data can take alternative routes if one connection fails; mesh has no single point of failure whereas bus fails if the main cable breaks.
4.	Star topology is the most common because it is fast and reliable — each device has its own dedicated connection to the switch. If one device fails, it does not affect the rest of the network, therefore it is easy to manage and troubleshoot.
5.	If the main cable fails, the entire network stops working.
6.	Similarity: both connect multiple devices together in a network. Difference: bus uses a single shared cable whereas star uses a central switch with individual connections to each device.

■ **FutureLogic Summary:** Bus = single cable, cheap, unreliable. Star = central switch, fast, reliable, most common. Mesh = every device connected, very reliable, very expensive. Star is the modern standard for schools and offices.

