

Network Topologies

1. Match the following network topologies with their descriptions:

Bus	All devices are connected to a central hub or switch.
Star	Devices communicate directly with each other, forming a web-like structure
Mesh	Devices are connected to a single main cable, like beads on a string.

2. True or False (1 mark each):

- (a) A bus network is generally considered the fastest network topology. (True/False)
- (b) A star network is easier to troubleshoot compared to a bus network. (True/False)
- (c) Mesh networks are ideal for large-scale deployments like city-wide Wi-Fi. (True/False)

3. (3 marks):

A small school computer room has 10 student PCs and requires a reliable network for internet access and file sharing.

- (a) Which network topology (bus, star, or mesh) would be most suitable for this scenario and why?
- (b) What are some potential drawbacks of using the chosen topology in this situation?

4. Compare and contrast bus, star, and mesh topologies in terms of scalability and fault tolerance. (*Fault tolerance is how well the network can cope with breaks in the network and scalability is how easy it is to add more devices to the network*) (6)

ANSWERS

1.

Bus	All devices are connected to a central hub or switch.
Star	Devices communicate directly with each other, forming a web-like structure
Mesh	Devices are connected to a single main cable, like beads on a string.

2. A bus network is generally considered the fastest network topology. (True/False)

A star network is easier to troubleshoot compared to a bus network. (True/False)

Mesh networks are ideal for large-scale deployments like city-wide Wi-Fi. (True/False)

3. A star would be the most suitable. It allows central management – setting up users and permissions, installing and updating software, giving access to hardware such as printers. It would also be easier to add new computers than to a bus topology because the limitation is the room size and not the cabling. If the switch runs out of sockets a new switch can be added easily. If a computer, or cable connecting a computer to the switch, breaks, the rest of the room won't be affected, unlike a bus topology where all the data goes through all the devices. Security is better on a star topology as the data doesn't go through all the devices. A mesh topology is the fastest and most fault-tolerant but this would be unnecessary with only 10 computers.

The potential drawbacks of a star topology are that it would require more specialist knowledge to set up than a bus topology, which only needs a cable and some terminators. It is also more expensive to set up requiring additional hardware (the switch). If the switch fails then the whole room will be taken offline.

4. Here is a table of facts that you could include in a longer answer about scalability and fault tolerance.

Feature	Bus Topology	Star Topology	Mesh Topology
Scalability	Limited - Adding devices can slow down performance	Good - Easy to add new devices by connecting to switch	Excellent - Highly scalable, adding devices minimal impact
Explanation	All devices share a single cable, adding devices increases traffic and potential collisions.	Each device has dedicated connection to switch, adding devices doesn't affect existing connections.	Devices communicate directly, adding devices creates more paths for data flow.
Fault Tolerance	Poor - Single fault (cable break, device failure) disrupts entire network.	Moderate - Fault in one device typically only affects that device.	High - Fault in one device often doesn't affect others due to redundant connections.
Explanation	Disruption travels through entire cable affecting all devices.	Fault isolated to the cable or device itself.	Data can reroute around the faulty device using alternative paths.