A2 NETWORKS · A2.2

Network architecture

How a network is laid out: **topologies**, the role of **servers**, the **client-server** and **peer-to-peer** models, and how networks are split with **segmentation**.

01 Topologies

Star	Central node; a failed device isolates itself.
Bus	One backbone; a break downs all.
Ring	A loop; data passes node to node.
Mesh	Many paths; reliable but costly.
Hybrid	Combines the above (most real networks).

02 Servers (a role, not a box)

Web	Serves pages over HTTP/HTTPS.
File	Stores and shares files.
Mail	Sends and receives email.
DNS	Translates a domain name to an IP.
Print	Manages shared printers.
Database	Stores and serves structured data.

03 Client-server vs peer-to-peer

- **Client-server**

  A central server hosts resources; clients request them. **Centralised**: easy to secure and back up, but the server is a single point of failure.

- **Peer-to-peer (P2P)**

  No central server; every peer is both client and server. **Decentralised**: resilient and cheap, but harder to secure and manage.

04 Network segmentation

What	Split a network into subnets or VLANs.
Security	A breach is contained, not spread.
Performance	Less broadcast traffic per segment.
Control	Cross-segment traffic crosses a firewall.
Example	Staff, guest, and servers kept separate.

05 DNS resolution

Step 1	Ask the local DNS resolver for the IP.
Step 2	If not cached, query a root server.
Step 3	Query the authoritative server; get the IP.
Step 4	Cache it and return it to the browser.
Recursion	The resolver chases the answer down.

06 Where each architecture is used

Star	Most home and office LANs, with devices wired to a central switch or wireless access point.	COMMON
Mesh	Wi-Fi mesh systems and critical or backbone links where many redundant paths are worth the cost.	RELIABLE
Client-server	Business networks with shared resources, central security, and managed backups.	CENTRALISED
Peer-to-peer	File-sharing networks, blockchain, and some messaging, where no central server is wanted.	DECENTRALISED

FINAL PASS BEFORE THE EXAM

Rapid exam tips

Eight things that lose marks in Paper 1 if you slip on them. Skim before you walk in.

01

In a **star** the central node is the single point of failure; in a **bus** it is the backbone.

02

Mesh is the most reliable (many paths) but the most cabling and cost.

03

A **server** is a role providing a service, not always a big, powerful machine.

04

Client-server is centralised; **peer-to-peer** has no central server.

05

Segmentation improves both security (containment) and performance (less broadcast).

06

A **VLAN** logically separates devices even when they share physical switches.

07

DNS resolves a domain to an IP via the resolver, root, and authoritative servers (**recursion**).

08

Real networks are usually **hybrid**: star LANs joined by a mesh or bus backbone.