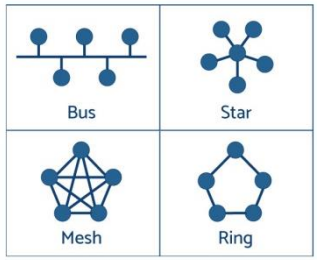
1.5 NETWORK TOPOLOGIES, PROTOCOLS AND LAYERS

NETWORK TOPOLOGIES



A topology is the layout of a network.
Bus: Slow network due to data collisions on the single backbone cable.
Star: If the central switch fails, the whole network fails. If one device fails, the network is fine.
Ring: Data moves in one direction which prevents collisions. Only one device can send data at once.
Mesh: Each device is connected to every other device so they can send data the fastest route. There is no single point where network can fail. Require lots of wire.

PROTOCOLS

Protocols are the rules for how devices communicate and transmit data across a network.
Every device has a **MAC address** so that it can be identified on a network. Eg: 98-1C-B3-09-85-15
IP addresses are used when sending data between networks. They can be static (permanent) or dynamic (different each time the device connects).
TCP/IP: Used to send data between networks in packets.
Transmission Control Protocol (TCP): Splits the data into packets and re-assembles. Checks data is sent correctly.
Internet Protocol (IP): does the packet switching
Hyper Text Transfer Protocol (HTTP): for accessing websites
HTTPS: The secure version of HTTP
File Transfer Protocol (FTP): Moves files between devices
Post Office Protocol (POP3): Retrieves emails from server. Once you download the email the server copy is deleted.
Internet Message Access Protocol (IMAP): Retrieves email from server. Email is kept on server, you see a copy.
Simple Mail Transfer Protocol (SMTP): sends emails.

LAYERS

Network protocols are divided into layers so that protocols with similar functions are grouped together.

Layer 4: Application	•Turn data into applications or websites •HTTP, FTP, SMTP
Layer 3: Transport	•Control the flow of data •TCP
Layer 2: Network	•Direct data packets between networks •IP
Layer 1: Data Link	•Sending data over a physical network •Ethernet

PACKET SWITCHING

- Data is split into packets and numbered in order.
- Each packet is send the fastest route across the internet by the routers. This means packets can take different routes and arrive out of order.
- The packet numbers are used to put them in order.
- If packets are missing a timeout message is sent
- Once all have arrived a receipt confirmation is sent to the device that sent them.

EXAM QUESTIONS

1. Explain why protocols are used
2. Describe how packet switching works
3. Evaluate the benefits and drawbacks of a mesh network.
4. Draw topologies for bus, ring and star networks.
5. Explain the difference between HTTP and HTTPS
6. Explain the difference between POP3 and IMAP