Your notes

GCSE Computer Science: revision notes

Networks, topologies and protocols

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Types of network

- A network is two or more devices connected so they can share data and resources.
- A LAN (local area network) covers a small area, such as a school, and its hardware is usually owned by the organisation. A WAN (wide area network) covers a large area, often using links hired from telecoms companies. The internet is the biggest WAN.
- (AQA) A PAN (personal area network) connects devices around one person, such as Bluetooth earphones.
- Wired connections (copper or fibre-optic cables) are faster, more reliable and more secure. Wireless connections (Wi-Fi) let devices move around, but are slower and can suffer interference.

Network hardware and models

- A network interface controller (NIC) connects a device to a network. A **switch** connects the devices in a LAN and sends data to the right one. A **router** connects different networks, such as a LAN and the internet, and directs **packets** between them. A wireless access point lets devices join by Wi-Fi.
- Client–server: servers provide services, such as files or web pages, to clients. It is easier to manage and back up, but the server is expensive, and if it fails the clients lose access.
- Peer-to-peer: every computer is equal and shares with the others. It is cheap and simple, but harder to manage and back up.

Topologies

- Star: every device connects to a central **switch**. If one cable fails, only that device is affected, but if the **switch** fails, the whole network stops. It needs a lot of cable.
- (AQA and Edexcel) Bus: all devices share one main cable. It is cheap, but data collisions slow it down as more devices join, and a break in the main cable stops the network.
- (OCR and Edexcel) Mesh: each device connects to several others, so data can take many routes. It is very reliable, but expensive.

Protocols and layers

- A **protocol** is a set of rules for communication. Data is split into **packets**, which may take different routes and are put back together at the end.
- TCP splits data into **packets** and checks they all arrive. **IP addresses** and routes the **packets**. UDP sends packets without checking, which is faster (good for live streaming). HTTP and HTTPS fetch web pages (HTTPS is encrypted). FTP transfers files. SMTP sends email. IMAP and POP receive email: IMAP keeps it on the server, while POP downloads it.
- Ethernet and Wi-Fi are standards for wired and wireless LANs.
- **Protocols** are organised into layers, each doing one job.
- (AQA and Edexcel) The TCP/IP model has four layers: application, transport, internet and link.

Addresses and performance

- An **IP address** identifies a device on the internet. A **MAC address** identifies a piece of network hardware. DNS (the domain name system) translates domain names, such as example.com, into **IP addresses**.
- Performance depends on bandwidth, the number of users, the type of connection, interference and distance.

Key terms

LAN	A local area network, covering a small area such as a school.
WAN	A wide area network, covering a large geographical area.
Router	A device that connects different networks and directs packets between them.
Switch	A device that connects the devices in a LAN and sends data to the right one.
Protocol	A set of rules for how devices communicate.
Packet	A small piece of data sent across a network.

Your notes

Star topology	A network layout where every device connects to a central switch.
IP address	A number that identifies a device on the internet.
MAC address	A unique address given to a piece of network hardware.
DNS	The domain name system, which translates domain names into IP addresses.

Quick questions

Cover the answers and test yourself: remembering is what makes it stick.

1. What is a LAN?
2. Which device connects a LAN to the internet?
3. What does a switch do?
4. In a star topology, what happens if the central switch fails?
5. What is a protocol?
6. Which protocol is used to send email?
7. What does HTTPS add to HTTP?
8. What does DNS do?

Answers

1. A network covering a small area, such as a school
2. A router
3. Connects the devices in a LAN and sends data to the right one
4. The whole network stops working
5. A set of rules for communication
6. SMTP
7. Encryption
8. Translates domain names into IP addresses

What to do next

Practise 13 questions on this topic

Try 5 exam questions, with mark schemes

Read the lesson, one step at a time

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