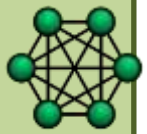
GCSE Computer Science
Topic 1.3 Topologies & Protocols 2

A topology describes how the devices in a network are arranged / laid-out.

In a star topology, all devices are connected to a central switch or server.

- ✓ If one device fails the rest of networks is unaffected.
- ✓ It's easy to add more devices.
- ✓ All devices can send data at the same time (faster than RING).
- ✓ There are few collisions than the BUS).

- ✘ In wired networks, each device needs a cable which can be expensive.
- ✘ If there is a problem with the switch or the server, the whole network fails.



In a mesh topology, every device is directly or indirectly connected to every other device without a central switch or server.

- ✓ Data can be sent from different devices simultaneously.
- ✓ Decentralised (not reliant on one switch or sever in the centre).
- ✓ Each device connected to every other one – lots of routes to send data.
- ✓ Mesh networks send data along the fastest route.
- ✓ Can handle high volumes of data.

- ✘ Wired mesh = expensive.
- ✘ Difficult to manage - requires a network technician.
- ✘ Each device connected directly to every other one – **adding new devices is complicated.**

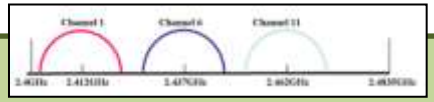
A network protocol is a set of rules for how devices communicate and transmit data.

The **Wi-Fi protocol** is responsible for sending and receiving data wirelessly using radio waves.

2.4GHz
- Universally used.
- Passes through objects well.
- Range 100 metres.
- Interference prone.

5GHz
- Less common.
- Not as good at passing through objects.
- Range 30 metres.
- Faster due to less interference.

- Each frequency band is divided up into channels.
- The 2.4 GHz band has 14 channels.
- In the UK, only channels 1 – 13 are available.
- Most of the channels overlap and if many devices are using the same channel it can cause overloading and a poor Wi-Fi signal.



- As there is no PHYSICAL way of protecting the data travelling in a wireless network, encryption algorithms are used.
- Coding data so it can't be READ by unauthorised users.
- Can only be decoded with a decryption key.
- A common encryption used for Wi-Fi is WPA2.

DNS:
- Every device connected to the internet has an IP address so that other computers know where to send the requested data to e.g. websites .
- The IP address is used on the internet in the same way the MAC address is used on a LAN.
- A Domain Name Server/System looks up the domain name typed into a browser and returns the IP address.

e.g. www.google.com = http://74.125.224.72/

- The IP address is then used to access the webpage you were searching for and is returned to your computer using your IP address.

Ethernet is a family of protocols responsible for sending and receiving data along a network cable.

The **internet** is a world wide connection of networks.

The **www** is a collection of websites that are hosted on web servers and accessed through the internet.

- Web **hosting** companies rent space on their servers for websites.
- The hosting companies handle all of the back-ups and security issues.
- Host computers must always be on.

THE CLOUD: this is where users can store their personal files on line on a **host** computer.
There is also online software available now through 'the cloud' which is also stored on a remote computer and accessed through the internet.

A software based network.
Virtual networks use the hardware and bandwidth of the physical network it is created on.
The virtual network can only be accessed by using certain software and log-in information.

- ✓ Users can access resources from anywhere around the world as though they were physically connected to the local network.
- ✓ Virtual networking makes it possible to communicate with a computer from any other computer/device on the *internet*.

GCSE Computer Science - Topic 1.3 Topologies & Protocols (2)

What I need to know:

What is a topology?			
Describe the star topology.			
What are the advantages and disadvantages of a star topology?			
Describe the mesh topology.			
What are the advantages and disadvantages of a mesh topology?			
What is a network protocol?			
What is the function of the Wi-Fi protocol?			
Describe the two frequencies of Wi-Fi.			
How many channels are on the 2.4GHz frequency?			
Why should Wi-Fi be encrypted?			
Describe the Ethernet protocol.			
Define the ‘internet’.			
Define the ‘www’.			
Describe the function of DNS.			
Define ‘hosting’.			
What is ‘the cloud’?			
What is a virtual network?			
What are the advantages of using virtual networks?			