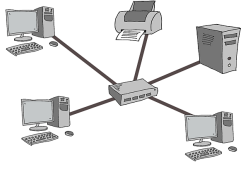


Network Topologies, Protocols and Layers



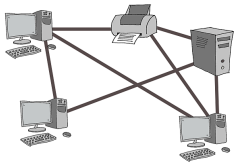
WiFi is a brand name for a popular type of wireless network.

Star Topology



All the devices connect to a central hub or switch.

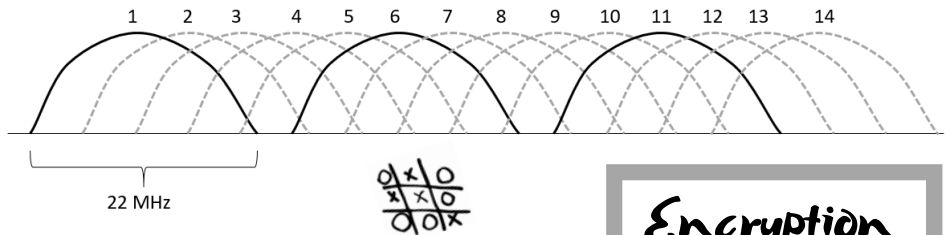
Mesh Topology



The devices connect to many other devices on the network.

WiFi frequency

Radio waves are sent out in waves and the number of times these are sent is known as the frequency. The higher the frequency, the more waves are sent in the same period of time.



WiFi CHANNELS

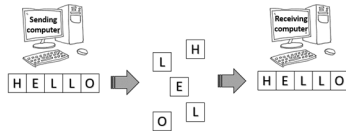
Frequencies are divided into channels which overlap and share the bandwidth. If wireless networks are close together and use channels that overlap they will have reduced bandwidth and will run slowly.

Ethernet

Ethernet is a set of standards (protocols) for how data is transmitted over a wired network and defines how devices on a network can easily communicate with the other devices and as long as new devices use the same standards they can be easily added to the network.

IP ADDRESS

Every device on the internet has a unique IP (Internet Protocol) address which is assigned to the device by the server.



Mac Address

This is a hardware address associated with the Network Interface Card (NIC). Every NIC has a unique address made up of the manufacturer's ID and the individual card ID. This is known as a MAC (Media Access Control) address.

Encryption

Wireless networks are very susceptible to cyber-attacks as unprotected signals can be used by anyone near-by.



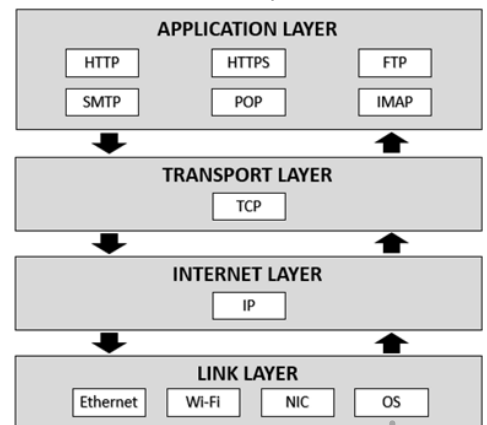
It is important to make sure the signals are encrypted so that only devices that are authorised to use the network can read and send messages over the network.

Packet Switching

When data is sent through a network, it is split into small sections called "packets". Each packet contains the address of the destination it needs and a message to tell the receiving computer how to put the pieces of the message back together in their original order.

Network Layers

The TCP/IP model has 4 layers :



OS = Operating System

Protocol	Purpose and Use
TCP/IP	TCP (Transmission Control Protocol) defines how to establish and maintain a network conversation through which applications can communicate and data can be sent (usually over the internet). IP (Internet Protocol) defines how data is sent from one computer to another on the internet and includes a standard way for how devices are addressed
HTTP	HTTP (Hypertext Transfer Protocol) defines how web pages are formatted and transmitted and how web servers should cope with commands on web pages
HTTPS	HTTPS (Hypertext Transfer Protocol Secure) is a secure version of HTTP which encrypts all data sent between the browser and the webpage. These are often used for payment pages on websites
FTP	FTP (File Transfer Protocol) this is a standard network protocol that is used to transfer files. It can be used on LANs and WANs such as the internet
POP	POP (Post Office Protocol) defines how messages are extracted and retrieved from a remote mail server for access by the host machine
IMAP	IMAP (Internet Message Access Protocol) defines how email messages are stored on a mail server but allows the end user to view and manipulate the messages as though they were stored locally on the end user's computer
SMTP	SMTP (Simple Mail Transfer Protocol) defines how e-mail messages are sent between servers