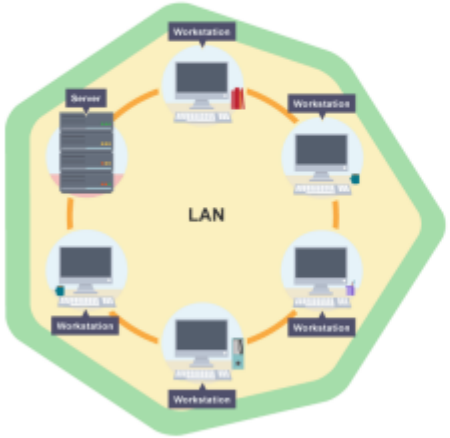
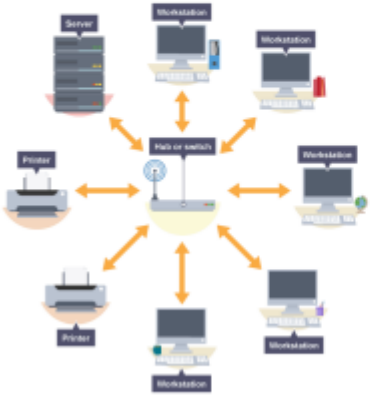
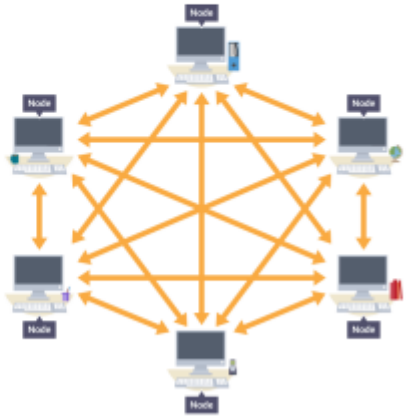
## Types of network

| LAN | WAN |
|---|---|
|  |  |



## Topologies

| Star | Mesh |
|---|---|
|  |  |



## Key vocabulary

| | |
|---|---|
| Network | A group of interconnected computers/devices. |
| LAN | Local area network. A network of computers that covers a small area, eg a school or college. |
| WAN | Wide area network. A network that spans across a building, buildings or even countries, eg the internet. |
| Client-server | A relationship in which data or web application is hosted on a server and accessed by client computers. |
| Peer to peer | A relationship where all computers on the network share responsibility and there is no one central server. |
| WAP | A device that connects computers to a network using Wi-Fi. |
| Switch | A device for connecting computers and other network capable devices together to form a network. |
| NIC | **Network Interface Controller** -A circuit board that is installed in a computer so it can be connected to a network. |
| Transmission media | How data is carried from point A to point B physically, either by cable or wirelessly. |
| Ethernet | A set of protocols used in a wired local area network that describes how data is transmitted within it. |
| Wi-Fi | A method of connecting to the internet wirelessly using radio waves. |
| Bluetooth | Wireless technology used for transmitting data over short distances. |
| DNS | **Domain name server** - an internet service that translates IP addresses into website domain names. All websites have equivalent IP addresses. |
| Host | A server that stores files for other computers to access. |
| Cloud | A term often used to describe a location on the internet from which software applications are run and where data is stored. |

## Key vocabulary

| | |
|---|---|
| Encryption | Files that are encrypted have been altered using a secret code and are unreadable to unauthorised parties. |
| IP address | A unique address for each computer device on a network. |
| MAC address | Media access control - each unique piece of hardware on a network has a MAC address. |
| Standard | An agreed way of doing things. |
| Protocol | A set of rules for how messages are turned into data packets and sent across networks. |

## Layers

**Layering** means to break up the sending of messages into separate components and activities. Each component handles a different part of the communication. This can be referred to as the Transmission Control Protocol/Internet Protocol (TCP/IP) model.

Layering allows **standards** to be developed, but also to be adapted to new hardware and software over time. For example, different software packages (applications) may use the same transport, network and link layers but have their own application layer. The way the program encodes the message changes - the rest of communication method remains the same.

## Common protocols

| | |
|---|---|
| TCP/IP | **Transmission Control Protocol/Internet Protocol** - enables communication over the internet. |
| HTTP | **Hypertext Transfer Protocol** - governs communication between a webserver and a client. |
| HTTPS | HTTPS **(secure)** includes secure encryption to allow transactions to be made over the internet. |
| FTP | **File Transfer Protocol** - governs the transmission of files across a network and the internet. |
| POP | **Post Office Protocol** – governs the transmission of emails to devices. Once downloaded to the device is deleted from the server. |
| IMAP | **Internet Message Access Protocol** – governs the transmission of emails. Stored on server and accessed by devices. |
| SMTP | **Simple Mail Transfer Protocol** - governs the sending of email over a network to a mail server. |
| Layering | In networking, the concept of breaking up communication into separate components or activities. |

## Encryption

A simple method of encryption requires the use of a technique known as the Caesar cipher. The cipher works by giving a number value to a key. Each plaintext letter is replaced by a new letter, the one found at the original letter's position in the alphabet plus the value of the key. The example uses a key value of 3.

| | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Plaintext | a | b | c | d | e | f | g | h | i | j | k | l | m | n | o | p | q | r | s | t | u | v | w | x | y | z |
| Ciphertext | d | e | f | g | h | i | j | k | l | m | n | o | p | q | r | s | t | u | v | w | x | y | z | a | b | c |

## Protecting networks

| Form of attack | Prevention |
|---|---|
| Malware | Anti-Malware software. |
| Phishing | Training of user to detect scams as well as the filtering of emails. |
| Brute-force attacks | Use of different strong passwords. A limit on the number of incorrect attempts. |
| Denial of service attacks | Block IP addresses which send too many requests. Increase capacity. |
| Data interception and theft | Encryption of data. |
| SQL injection | Ensuring that all data input is sanitized. (Forcing data to be in the format you want it such as a date, text or integer.) |

## Key vocabulary

| | |
|---|---|
| Malware | Software that is designed to cause harm or damage to a computer. This includes viruses that might damage files, adware that causes pop-ups, and spyware that collects and shares login details. |
| Social Engineering | Tricking people into giving sensitive data such as PINs or passwords. |
| Phishing | An attempt to gain personal information about someone by way of deception, eg sending an email pretending to be from their bank asking them for their bank details. |
| Brute-force attack | Attempting every combination of a password or encryption key until it is correct. |
| Denial of service attack | An attack designed to render online services inaccessible. One type of this attack involves many computers simultaneously flooding a target with network traffic. |
| Data interception | Where data is intercepted during transmission. This is done using software called a packet sniffer, which examines data packets as they are sent around a network. |
| SQL Injection | Where SQL code is entered as a data input. Many databases use SQL code to interrogate the data and maintain the structure. SQL code can be inputted as data, which can cause errors or unintended operations. |
| Penetration testing | Systems are tested for vulnerabilities to reveal any weaknesses in the system which can be fixed. |
| Anti-malware | A type of computer program which detects, prevents and removes malware on a system. |
| Firewall | An application that prevents unauthorised connections to and from the Internet. |
| User-access level | These are the permissions given to a user to access facilities on a computer. |
| Encryption | Files that are encrypted have been altered using a secret code and are unreadable to unauthorised parties. |