

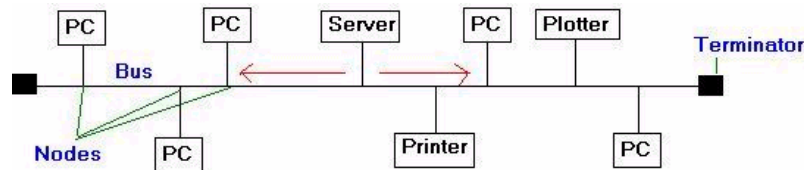
4.1.8 Networks

A computer network is a collection of computers linked together by network cabling so that they can communicate with each other. Each workstation has a network interface card (NIC) through which the cabling is connected to the computer. The card is operated by the card driver software.

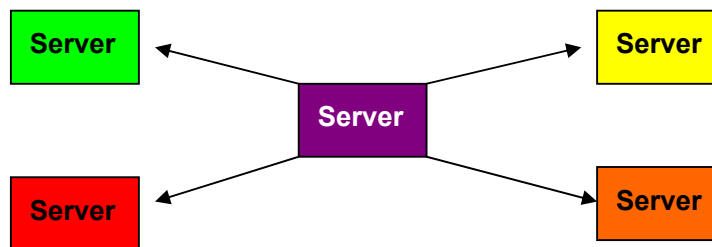
A computer that is not connected to a network is called a **stand-alone** computer.

There are two different sorts of computer network:

‘Local Area Network’ or ‘LAN’ - the computers are all in the same building or in different buildings on one site permanently connected to each other with special cables.



‘Wide Area Network’ or ‘WAN’ - the computers are spread over a large geographical area not permanently connected to each other communicate using telephone lines, radio transmitters or satellite links. E.g. The Internet



Advantages and Disadvantages of Networks

Advantages:

- Printers can be shared.
- Programs can be shared.
- Data can be shared.
- Users can communicate with each other

Disadvantages:

- Hacking
- Spreading of viruses
- Power failure

The Internet, Intranet and Extranet

The Internet is a network of networks – i.e. the World Wide Web

An **intranet** is a network that can only be accessed from within an organisation. It is used to share information with employees, staff or students.

An **extranet** is an intranet with an Internet external link from outside. Information on an extranet can be accessed externally (via the Internet) provided the passwords are known.

Networks and administration in schools

Uses of a school network for administration

- Bulletin board messages can be distributed to all classrooms at the same time.
- Software such as year tutor reports can be entered by all teachers from their classrooms and collated by the year tutor.
- Administration software can be installed on the server and accessed by all teachers on the network.
- Printers and scanners can be shared.
- Server can be backed up automatically and save essential school data.

Use of the Intranet for school administration

- Teachers can leave work for supply staff to use when on a trip
- Teachers can access the school calendar find out when meetings are on
- Teachers can access the booking of computer rooms.
- Teachers can send notes to other staff members

Use of the Internet/ extranet for pupils

- Pupils can email work home and vice versa.
- Access to online databases
- Virtual trips and tours

E-mail

Messages sent from one computer to another across a network

Features:

- Group sending
- File attachments
- Voice mailboxes
- Address books

Disadvantages/Dangers of e-mail

- Viruses often sent via e-mail attachments
- Junk e-mail can fill mailbox
- Not everyone has an e-mail address
- Could be intercepted by hackers.

Network Security

There are three types of network security – **physical** security, **access** security and **data** security.

Physical Security protects the Hardware. Some examples are:

- Serial numbers – Keep a record of all serial numbers.
- Alarms – Protect computer room with burglar alarms.
- Doors & windows – Locked when room not in use.
- Fire Protection – Use fire doors and smoke alarms

Access Security limits an individual's use of the network:

- All authorised users should be given user names and passwords. This will limit unauthorised access to the network.
- Passwords should be un-guessable and should never be told to anyone or written down.
- Users should change their passwords frequently.
- Unauthorised access can be reduced by assigning different access rights to different users. For example, network managers can be given complete access to the network whilst other users may be limited to certain types of applications software such as word processors.

Data Security prevents loss of data:

- Regular back-ups should be made of the data on the system using suitable backup storage. The main method used to back-up network data is the Grandfather-Father-Son method.
- Back-up files should be kept secure – ideally in locked, fireproof rooms or safes in a different location to the network.
- Archiving means copying or moving files somewhere for long-term storage.
- Some software and files can be password protected.

Protection from Crime

- Firewalls to prevent Hacking.
- Hierarchy of passwords.
- Encryption:
 - Code one end
 - Send in scrambled form
 - Decode at other end
 - Both ends must have codes.
- Smart cards - Programmable cards to control access to rooms.
- Virus detection and eradication software to stop the spreading of viruses.
- Don't open email (attachments) from unknown sources.

Other Features of the Internet

- File Transfer Protocol (FTP) – A common system used for transferring files over the Internet. It can be used to download software and information or upload pages to a Web site.
- Newsgroups – There are tens of thousands of groups on the Internet that exist to exchange material on just about any topic under the sun.
- Chatrooms – Web sites where users can meet and send on-line text messages.
- On-line shopping – The ability to buy and sell goods on the Internet.
- On-line databases – Web sites that contain information on a wide range of topics.
- Accessing information – The Internet can be used to look up information on any subject you can imagine. It is important to consider the reliability of any information you find on the Internet.
- Search engines. A program on the Internet that searches for items of interest. There are hundreds of search engines available on the Internet. Some are general purpose (e.g. Google, Yahoo, Alta Vista) but there are many that have been developed to search for specific topics (e.g. aviation, medicine).

Questions

1. A review of a primary school's IT needs suggests that its computers should be networked.
 - a. With reference to appropriate examples, give three specific benefits that networking would give the school in dealing with its administration needs. [3]
 - b. A member of staff has agreed to produce an Intranet site for the school. Define the term Intranet and give one advantage to the staff of having such a site. [2]
 - c. Describe two different ways pupils could use the Internet to enhance their school work. [2]
2. Describe two good features and two disadvantages/dangers of using e-mail to communicate. [4]
3. There are a number of methods that can be used to protect a computer network from accidental or malicious damage. Describe two types of:
 - a. Access security
 - b. Physical security
 - c. Data security [6]
4. Define the following terms:
 - a. FTP.
 - b. Newsgroups
 - c. Search Engine. [3]
5. An organisation has decided that its ICT system needs upgrading and a network installed.
 - a. With reference to appropriate examples, other than sharing peripherals and email, describe **three** benefits that networking would give the organisation in dealing with its administration needs. [3]
 - b. The organisation also realises that it needs an Intranet. Define the term *Intranet* and describe **one** advantage to the organisation of having an Intranet. [2]

6. A school has installed a new local area network (LAN) to help with its school administration.
 - a. Describe how the school staff could use the LAN to help with administration. [4]
 - b. Discuss **two** *health and safety* issues which the school should consider when designing the LAN. [2]
 - c. Explain how the school can prevent:
 - i. accidental loss of data; [3]
 - ii. deliberate destruction of data. [3]
7. At the central office of a large landscape gardening company there are 10 employees. Each employee has their own standalone computer system and printer. The Chief Executive realises that it would be beneficial to network these computers.
 - a. State **three** benefits that the company would gain from networking the computers. [3]
 - b. The landscape gardening company has an *extranet* for its employees and a *website* for its customers. Describe, with examples, **three** benefits these facilities bring to the company or its customers. [3]