

COMMUNICATIONS

Reasons for growth of networks

- Falling cost of hardware and software so became more widespread.
- Growth of the paperless office managers used wordprocessors , filing systems etc on their desk
- Managers needed more rapid access to accurate and up to date information.
- Development of good and reliable telephone and satellite communications
- It is becoming more and more important to use new methods of exchanging information rapidly and reliably

Definitions

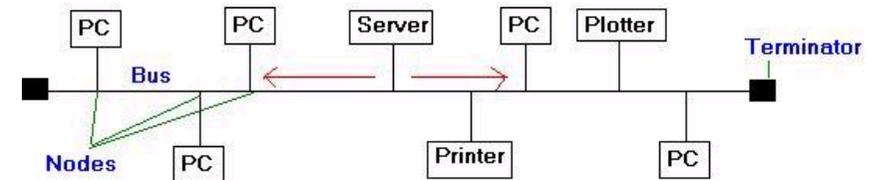
What is a Network?

- A computer network is a collection of computers **linked** by network cabling, together so that they can communicate with each other sometimes a mainframe and sometimes a powerful microcomputer. Each workstation has a network decoder card into which the cabling is connected to the computer. The card is operated by a card driver software.
- A computer that is not connected to a network is called a stand-alone computer
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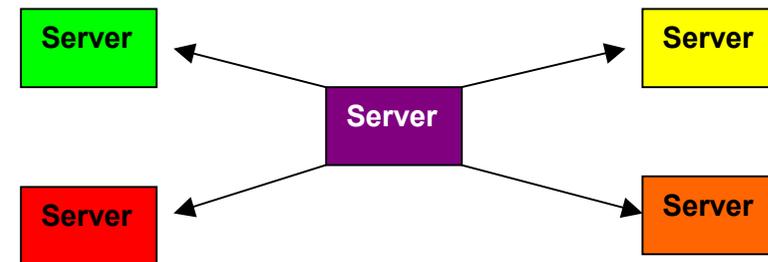
Computer Networks

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.



Advantages and Disadvantages of networks

Advantages

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

- Users can email
- You don't have to use the same computer.

Disadvantages

- Networks are expensive to purchase and maintain.
- If a network breaks down everybody is affected.
- Special security measures are needed to stop users from using programs and data that they shouldn't have access to.

Disadvantages of Local Area Networks

But it's not all good. The organisation has to pay technical staff to maintain the network. User accounts need to be added and deleted as people join and leave an organisation. Because users' data is stored on the hard drives in the servers these need to be backed up regularly or there would be a public outcry if it were lost. Networks fail occasionally and then no one in the organisation can use the computers. As more users log onto the network, the servers have to share their time among them and the system may slow down. Users forget their passwords and can't log on, which causes additional work for the Network Manager. Or, because each user is allocated a specific amount of space on the hard drive, they exceed it and moan for more. And, users tend to get up to all kinds of naughty tricks like hacking into other users' areas, downloading or installing software that they shouldn't, stealing peripherals, clogging the system up with silly emails, forgetting to log off and so on. Security can become a major headache.

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

Protection from Crime

- Hacking - Hierarchy of passwords:-
- ID authentication authorisation
- 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
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Access Security limits a persons 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 users different access rights. 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.

The Bits That Make up a Network

Networking is not simply connecting up a few computers with cables. Here are some parts that can be found in a typical network.

Software

Network software may be part of the operating system (e.g. Windows98, Windows XP) or it can be special software for managing a network.

Cables

Connecting cables are usually used to connect devices on a network, although some networks make use of radio or microwaves to provide the link.

Connectors

Connectors are used to connect network cables to terminals or other devices.

Network Interface Cards (NICs)

To use a PC as a terminal on a network it is necessary to include a device called a Network Interface Card inside the computer. A NIC looks like a small circuit board and slots into one of the connectors on the main circuit board (called the Mother Board) inside the computer. NICs have connectors on them for network cables.

Data Transmission

Communication Links

- For computers to communicate there needs to be a communication link.
- These links are not necessarily cables so you can not always see or touch them.
- Links can involve radio waves, microwaves or infra-red.

Cable Media

Metal cable

Metal cable consists of metal wires (usually copper) down which data is transmitted in the form of a varying current.

Fibre Optic cable

Fibre optic cable works by transmitting data as a series of pulses of light along a thin glass fibre. One bundle of fibres is used to send messages and a second bundle carries messages in the opposite direction.

Fibre optics are very good for transferring data because they are fast and do not suffer from interference like metal cables.

Wireless Media

Radiowaves

Here the data is transmitted as a series of radio waves.

Microwaves

Mobile phones use microwaves. Ideal for linking computers in two separate buildings fairly near to each other.

Satellite systems also make use of microwaves.

Infra-red

This works a bit like your television remote control. Infra-red signals can only travel short distances and this limits their use.

Often used to provide a link from a laptop computer to a printer so that data can be sent between the two without the need for a cable.

The Internet

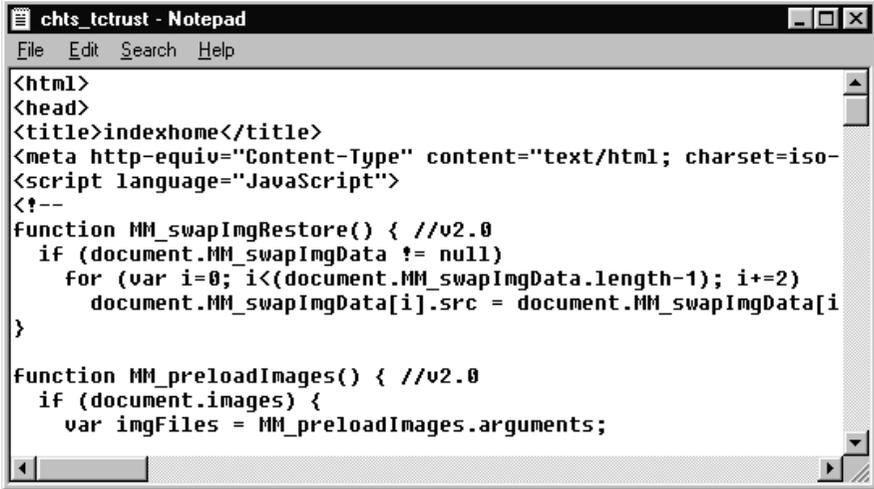
- The Internet links private PCs, public networks and business networks together using telephone lines to form one vast world-wide network. It allows computer users to share and exchange information with each other wherever they are in the world.
- information on the Internet comes in many different formats. E.g. simple e-mail text files, music, video clips, computer software

Connecting to the Internet

- A computer with a modem and access to a telephone line is needed.
- Faster connection is possible with a special type of digital telephone line called an ISDN line which doesn't need a modem.
- A separate Internet line can be leased.
- A leased line is a private telephone line which is permanently open 24 hours a day.
- Broadband; very high speed digital lines are available but these are expensive
- A router is a special piece of hardware which co-ordinates the switching of messages between the computers and the rest of the Internet.
- Find an Internet Service Provider (ISP)

The World Wide Web (WWW)

- World Wide Web is largest part of the Internet
- Pages of information begin at 'home page'
- Pages are linked together using hypertext
- Hypertext generated using Hypertext Mark-up language or HTML



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chts_tctrust - Notepad
File Edit Search Help
<html>
<head>
<title>indexhome</title>
<meta http-equiv="Content-Type" content="text/html; charset=iso-
<script language="JavaScript">
<!--
function MM_swapImgRestore() { //v2.0
  if (document.MM_swapImgData != null)
    for (var i=0; i<(document.MM_swapImgData.length-1); i+=2)
      document.MM_swapImgData[i].src = document.MM_swapImgData[i]
}

function MM_preloadImages() { //v2.0
  if (document.images) {
    var imgFiles = MM_preloadImages.arguments;
```

Browsers

- To browse or 'surf' the Internet a browser program is required
- Microsoft Internet Explorer and Netscape Navigator use search engines to search for information by entering keywords



URLs

- Uniform Resource Locator
- These give the location of individual sites on the World Wide Web
- Most start with http://www.
- They often reveal the country of origin such as .uk for the United Kingdom. They also indicate whether the site is commercial with either .co or .com, a government organisation with .gov, or an academic organisation with .ac

http:// www. demon. Com /index.htm

Uses hypertext mark up language	World Wide web	Name (owner or type of site)	Top level domain, org or country	Specific page
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Email

Sending messages from one computer to another across a network

Videoconferencing

Communicate visually with other Internet users.

E-commerce

Buy goods online

Tele-banking

Manage banking transactions, pay bills, transfer money between accounts etc

Web publishing

Create and administer your own websites for specialist interests, etc...

Chat lines

Send messages 'Talk' on-line

Broadcasting

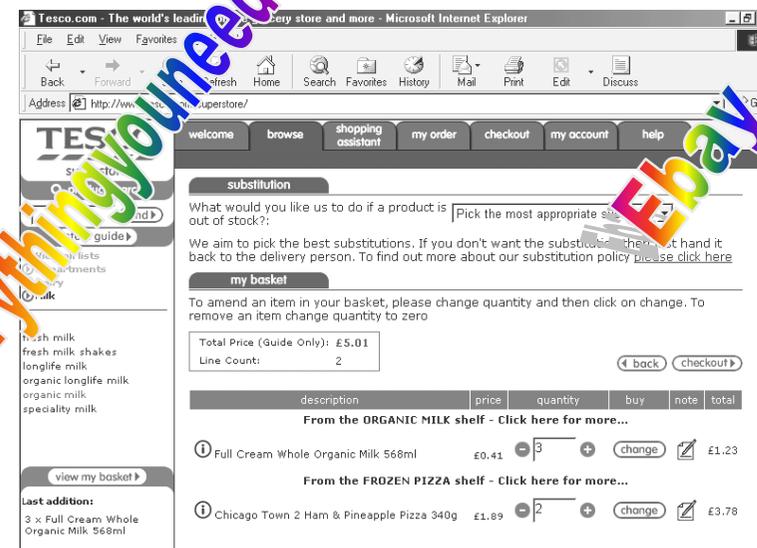
Music (MP3) and video

Downloading

Software, drivers and other files

Online shopping

- Allow Internet users to buy goods or services online any time day or night without needing to travel anywhere or get pushed around in crowded shops
- Some companies do all of their business over the Internet and reach a world wide market.



Advantages of online shopping

- Money doesn't have to be spent on normal business overheads like renting shops and paying employees.
- Customers can be offered a much wider choice of goods because they can be ordered from suppliers as required rather than having to be kept available on the shelves all the time.
- Money is not tied up in unsold stock or wasted on products that aren't popular.
- Data about customers and their buying habits can be collected directly and used to offer a much more personalised service tailored to suit the needs of an individual customer.

Disadvantages of online shopping

- Online transactions require users to enter a debit or credit card number before a purchase can be completed. There is a danger of these numbers being intercepted by hackers during transmission and used to make unauthorised purchases. The use of agreed words, secure payment sites, encryption and smart cards can help to protect against this.
- Criminals can set up fake web sites offering goods or services often using the name of a genuine company. This can lead to people spending money on goods and services that they will never receive as well as damaging the reputation of a genuine business.
- It is much easier for a business to gather information about its rivals by simply accessing their web sites — this can make it much harder to remain competitive.

Online booking systems

- Allow Internet users to check the availability of and book things like:
 - Theatre, cinema and concert tickets
 - Seats on coaches, trains and aeroplanes
 - Hotel rooms
- An online booking system is essentially a web site that can be used to access a remote database

Advantages

- Overbooking should not occur
- Alternatives can be offered if 1st choice not available
- Access to wider database of information

Dangers of the Internet

- Hackers
 - Firewall software
 - Hierarchy of passwords
- Viruses
 - Often spread via e-mail
 - Virus detection and eradication programs
- Undesirable material and paedophiles in chat rooms
 - Software to block sites
 - Adult supervision
 - Filtered service from ISP

Advantages of the Internet

- Easy communication with other people

- Valuable learning resource because Internet skills will be needed for jobs in the future
- Enables more people to work from home using computer networks (teleworking)
- A vast amount of information can be accessed
- Up-to-date information can be accessed on-line without the need to await publication
- Publishing documents on the Internet saves paper
- A valuable resource for companies to advertise and conduct business

Disadvantages of the Internet

- Much of the information isn't checked and may be incorrect or irrelevant
- A large amount of undesirable material, such as pornography, is readily available
- Messages sent across the Internet can be easily intercepted and are open to abuse by others
- Large telephone bills can easily be run up
- Too much time spent on the Internet could result in a lack of face-to-face interaction with others and a loss of social skills
- Going on-line runs the risk of hackers or viruses being able to damage your computer