Day 5	LAN and WAN + The Telephone Network + The Internet + Intranets and Extranets + Electronic Mail	25-10-2015 26-10-2015

LAN and WAN

- *Network*: has the following features:
    * Two or more PCs (may be several hundred) connected together.
    * Allows PCs to share information and resources via that connection.
    * Shared files may be: e-mail messages – files containing text.
   * Shared resources may be: printers – scanners.

    (This would provide financial advantages - a smaller number of peripheral devices shared between a larger numbers of users require less investment in hardware, together with performance benefits - the network is able to operate more efficiently)

- **Local Area Network (LAN)**: consists of computers that are linked together by lengths of cabling within a building or other close proximity.

- **<mark>Wide Area Network (WAN)</mark>**: involves computers linked up over longer distances. An example of a WAN is a computer that is linked to another by means of a telecommunications network.

  (A rule of thumb used by telecommunications engineers is that any network covering an area of less than one square kilometre is a LAN, while any network covering more than one square kilometre is a WAN)
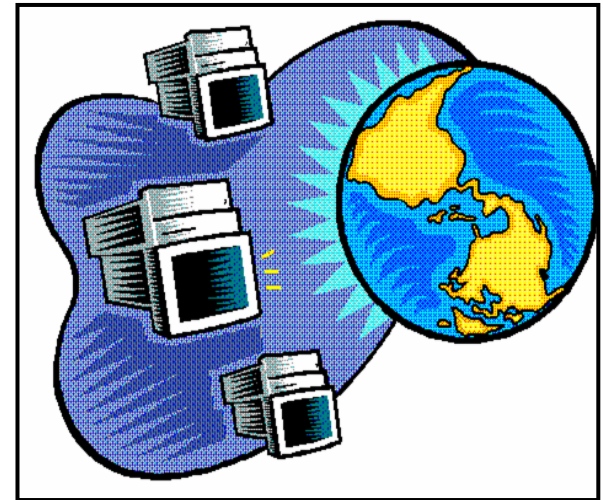
- *<mark>Client/Server Networks</mark>*: is this network; all data is stored on a central server computer. The data may then be accessed by the peripheral PCs or clients, which allow users to interface with the server.

Telephone Network

- Advances in telecommunications mean that computers can be linked to telephone systems in order to produce a world-wide WAN.

- *Analogue* transmissions transfer data as electromagnetic waves, which is not only slower, but also more susceptible to corruption.

- *Digital* data is transmitted as a series of digits made up of 1 and 0. This is the format of the data that computers use. Data in digital form can be transmitted significantly more quickly than it can in analogue form.

- The growing use of digital rather than analogue devices is responsible for on-going improvements in the capabilities of communications systems.

- *A modem* is a device that converts a *digital* signal from within a computer into an *analogue* (audio) signal that can be passed along a standard telephone line. The modem in the computer that receives the signal then converts it back to digital form.
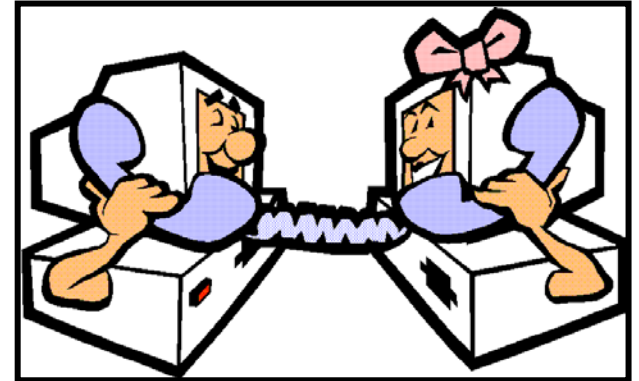
Telephone Network (continued)

- Modems have been able to operate at a variety of speeds (known as *transfer rate*) over the telephone line. Faster modems may be more expensive to buy, but can result in cheaper phone bills because of their quicker transmission rate.

2015:
Maximum transfer rate when you are downloading is about 78906.25 kbps
Maximum transfer rate when you are uploading is about 15625 kbps

- **The Integrated Services Digital Network (ISDN)** is a system that allows transmission of digital data between telephone exchanges. No modem is required at the PC, since banks of modems at the exchange do all analogue-digital-analogue conversion. This type of telephone link allows faster data transfer rates, i.e. e-mail transmission, web page downloads, etc., than the standard **Public Switched Telephone Network (PSTN)** telephone line, as accessed by the average home user.

Telephone Network (continued)

- **An Asymmetric Digital Subscriber Line** (**ADSL**) allows transfer rates up to 40 times faster than a PSTN line. This technology allows two different frequencies of signal to be sent down the normal line, one for telephone message transmission (including fax) and the other for high-speed broadband Internet communications. It is an "always on" link, which does not need a dial up connection. This type of technology requires extra expenditure on a more expensive type of modem and converting the telephone line to ADSL.

Type of Network		Properties
PSTN	Public Switched Telephone Network	Standard system, analogue, dial-up connection, slow transfer rate.
ISDN	Integrated Services Digital Network	Faster than PSTN, no modem needed, no dial-up.
ADSL	Asymmetric Digital Subscriber Line	Faster than PSTN and ISDN, special modem required, no dial-up.

The Internet

- The Internet is a Wide Area Network of computers all linked together. The **W**orld-**W**ide-**W**eb (**www**) refers to the vast collection of information, stored in web pages within web sites, which is available for access by anyone connected to the Internet. Internet users can download information (pictures, sounds, videos or games) and save it to their own PC, or place data from their own PCs into web pages. The Internet also allows people to leave messages for, or even talk to, like-minded groups around the world. E-mails can be sent via the Internet.

- To gain access to the Internet a modem is usually required. It is also necessary to subscribe to an **I**nternet **S**ervice **P**rovider (**ISP**), who will provide the connection service, an e-mail address and the Browser software, e.g. Microsoft Internet Explorer or Netscape Navigator to enable the PC to connect to and use the Internet. The **ISP** acts as an Internet equivalent of a mobile telephone service provider.

- In order to find specific subject matter on the world-wide-web, a user can access a web page linked to a database - called a Search Engine - from suppliers such as Yahoo, Microsoft, Alta Vista and Excite.

- These sites enable a word or phrase to be typed and the facility will then search the web for any references to the terms entered and produce a list of web sites containing relevant references.

Intranets and Extranets

Intranets

- Many medium to large organisations now operate their own internal networks that provide similar funtions to the Internet, i.e. web pages containing company information and procedures, standard forms that can be downloaded, pricing structures, newsletters, etc. Such a network is known as an intranet since it is effectively an internal Internet! Intranets may or may not be connected to the Internet. An intranet would only be accessible from within the organisation.

Extranets

- An extranet is an intranet, or part of an intranet, which can be accessed by certain external users via the Internet. A company or organisation that operates an intranet may wish to make specific information such as product ranges, prices, on line order forms, etc. available to suppliers, clients or potential customers. Access to this area of the intranet would often be controlled by usernames and passwords to establish the credentials of the external user, and the specific areas of the extranet that the user is entitled to view.

Electronic Mail

- **E-mail** (**E**lectronic **Mail**) allows messages to be sent from one computer to another, via an electronic mailbox, using an e-mail address, equivalent to the address on an envelope.

- E-mail can transmit documents over the Internet very quickly to worldwide destinations at the cost of a local rate telephone call. This compares very favourably with using postal services. E-mail messages may also be used as "carriers" for files of any type or format, e.g. a word-processed document, a spreadsheet file, a scanned photograph or an audio file could be attached to an e-mail message and transmitted along with the e-mail. Such files are known as e-mail attachments. Great care must be taken when opening a received attachment since they are now the most common method of spreading computer viruses.

- Used properly, e-mails are completely confidential.
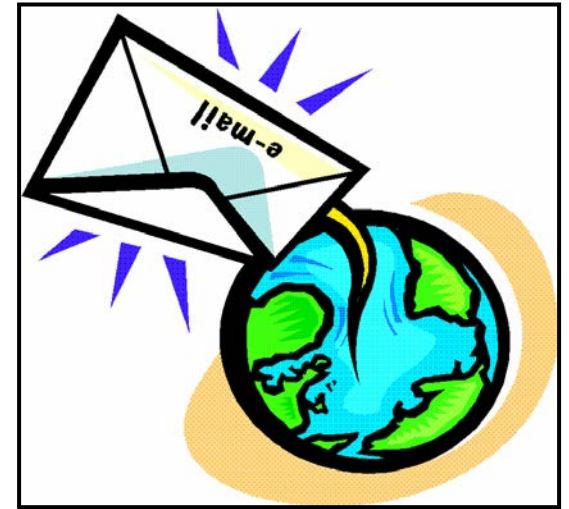
Electronic Mail (continued)

- In order to be able to send and receive e-mails externally, a PC must have an appropriate software application installed and must be connected to a telephone network, usually via a modem. It is also necessary to subscribe to an Internet Service Provider (**ISP**), who provides the connection to the Internet and holds e-mails for delivery to you and sends your e-mails.

- E-mail is also used within organisations to handle internal communications, such as memos, announcements and messages between employees. These messages are carried over the local area network.

Day 6	Computers at Work + The Electronic World	

Computers at Work

Computers in business

Computers now play vital roles in commerce and industry.

National and multi-national organisations use computerised systems to sell their products, track their customer base and process and store their sales records.

Airline booking systems allow travellers to access flight times and ticket prices choose their flights and pay for their tickets on-line.

It is common for **banks** to offer current accounts that can be run totally via the Internet. Balances, deposits and payments can be checked.

Insurance companies also utilise large-scale computer systems to provide personalised insurance and increased efficiency of claims processing.

Computers in healthcare

Hospitals and Health Care Trusts make use of computerised Patient Record databases. Ambulance Control Systems, like those of other Emergency Services are computerised. Computers can even be used to assist with diagnosis and also maintaining precise control over specialist surgical equipment and instruments.

Computers in government

Government agencies use national computer database systems to store vast amounts of public records data. Social security records, vehicle registration details, census information, revenue collection records, criminal records, housing information, etc., are all stored on computers.

Computers in education

Educational establishments use software applications in order to introduce them as teaching aids for pupils. Computer systems are now widely used to store student records and registration details and to assist with working out complicated timetable plans. Access to the Internet and computer based reference software is particularly useful to students who have homework/project work to complete.

Computer **B**ased **T**raining (**CBT)** refers to situations where a student uses learning materials that are either provided as software that is run from CD/DVD or loaded into the students PC, or accessed via the Internet. Such learning material would consist of exercises to work through in order to test personal competence. Distance Learning refers to situations where students could "attend" training courses over the Internet. Course material and assignments would be viewed or downloaded from the training provider's web site, teachers would be contacted via e-mail and completed assignments submitted over the Internet.

Computers in education (continued)

CBT/Distance Learning	
Advantages	Disadvantages
Learn at own pace	Distractions around the home
Learn at times appropriate to individual	Need for extra self discipline
No travelling	Lack of human interaction
Much more control over learning process	

Teleworking العمل عن بعد

This is a concept that allows employees who would otherwise be office based to work at home. Since more and more office work involves the use of computer systems and electronic communication, the necessity for such work to be done in a central office, rather than on an individual workstation in the employee's own home is being reduced. There are a number of theoretical benefits to teleworking, which are not dissimilar to those identified in the paragraph above, relating to CBT/distance learning. An employee could operate a much more flexible schedule, adjusting their working day to suit their own needs.

There could be a reduction in company space since fewer employees would need to be accommodated in central offices. In theory, individuals would be able to focus on a specific task, without being side-tracked onto other matters by colleagues. Disadvantages to teleworking are also very similar to those listed above: distractions in the office could be replaced by distractions in the home; there could be a lack of human contact and a resultant lack of teamwork.

Teleworking (cont'd)

| Teleworking	
Advantages	Disadvantages
Enables flexible schedules	Distractions around the home
Reduces commuting التنقُل	Need for extra self discipline
Reduces company space requirements	Lack of human interaction/teamwork
Enables greater focus on specific task	

Computers or People?

- Computers in business and industry can fulfil useful functions where highly accurate machining is required. For instance, repetitive tasks can be automated, fast and accurate calculations can be performed.

- There are, however, situations where a human being is still a more useful worker than a computer. A computer has no initiative or common sense; it will only perform the exact function for which it is programmed. A person is more adaptable, more capable of applying judgement to a situation and finding a more cost-effective way of carrying out a task.

Computer Systems	
Benefits	Drawbacks
Fast, accurate calculations	
Fast data correlation	Cannot apply judgement
Good doing of Automation of repetitive tasks	Cannot adapt to the unexpected
Highly accurate control	Lacks the human customer interface

The Electronic World

- The term **Information Superhighway** is used to describe a situation where information of any kind, anywhere in the world, would be available to anyone who had access to a PC linked to the Internet.

- This would create an **Information Society** in which access to unlimited amounts of information would be available without having to leave home or work or without having to look it up in huge reference books or visit libraries.
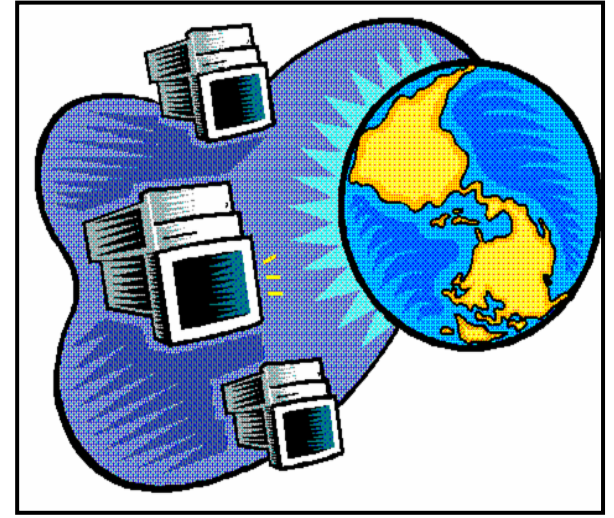
- In an **e-commerce** environment, a company will advertise and display its products on the Internet via its own web site. Customers are able to view this type of on-line catalogue, make their choice of goods or services, complete an on-line order form, in which they provide their personal details including name; address, contact telephone number, e-mail address, etc. The next stage is to specify the payment method electronically via secure debit card or credit card transfer. The goods will then be delivered.

- In the electronic world, almost anything can be bought over the Internet: the smallest component part of a computer, a book, music CD, an airline ticket, a family holiday, a new car.

On-line Purchasing	
Advantages	Disadvantages
Services available 24hrs a day, 7 days a week	A virtual store, only pictures available, can't examine the goods
Services available world-wide	No human interface, can't ask for advice
Huge range of products/services on view	Some risk of insecure payment methods