

**NETWORK TOPOLOGIES – How Computers are connected in a network**

**LAN = LOCAL AREA NETWORK**

A collection of computers and devices connected together within a SINGLE SITE

**WAN = WIDE AREA NETWORK**

A collection of computers and devices that are NOT PHYSICALLY CONNECTED by computers but use other INFRASTRUCTURE such as the internet

Benefits of networking	
Sharing FILES and FOLDERS	SHARING
Sharing PRINTERS and other devices	SHARING
Sharing INTERNET connection	SHARING
Use email to communicate	COMMUNICATION
Instant messaging	COMUNICATION
Security managed centrally	MANAGEMENT
Software distributed via network	MANAGEMENT

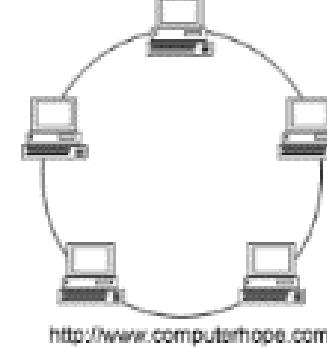
**Star Topology**



All PC's have cable connected them to central PC (Server)

Advantages	Disadvantages
One cable breaks only 1 station breaks	Costly to install – Need powerful server
Consistent performace	Dependance on central computer
Easy to add new PCs	

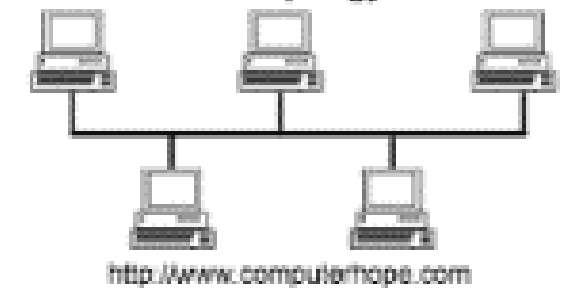
**Ring Topology**



Computers connected to adjacent computers in a RING. Computers take it in turns to transmit passing a TOKEN around

Advantages	Disadvantages
Not dependant on central computer	Single PC or cable breaks whole network breaks
Simple and Reliable	
Consistent performance even when network is busy	

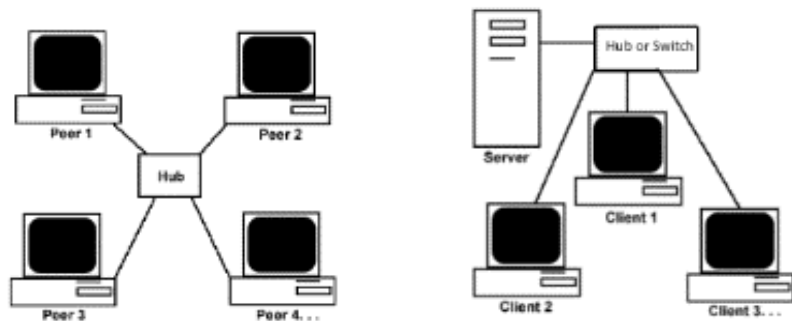
**Bus Topology**



Computers connected to single backbone cable. This is ahred. Only one computer can transmit at a time

Advantages	Disadvantages
Easy to install	Main cable breaks whole network breaks
Less Cabling	Low performance if network busy
East to add new PCs	

**CLIENT SERVER vs PEER TO PEER**



PEER TO PEER	CLIENT SERVER
All PCs have equal status	Needs network manager
Easy to set up & maintain	Backup done centrally
No centralised management	Centralised security
Backup each computer seperatly	Shared resources
Not dependant on a server	

**IP / MAC / PACKETS / PROTOCOLS**

When we go aborad its hard to communicate as we are using different languages - > i.e we are using different protocols. If we speak French in France then we are using the SAME PROTOCOLS.

**PROTOCOLS = RULES OF COMMUNICATION**

**INTERNET PROTOCOL (IP address)**

Each device on the INTERNET has its own IP ADDRESS which is a series of 4 numbers separated by dots i.e. 193 . 127 . 030 . 023

**MAC ADDRESS**

Each network card has its own MAC ADDRESS which is like its postyal address. Its used to transmit signals between devices on a LAN.

**PACKETS**

In a communication one device will send a message to another. The message will be broken down into PACKETS. Each packet will then be broadcast with the MAC address of the destination. At the other end the device will listen for signals and will recognize the MAC

**NETWORK SECURITY**

**NETWORK SECURITY MEASURES**

**1) PREVENTATIVE**

- AIM – Stop hazards occurring
- Access rights – Only allow to see what they need to see
- Firewalls – Prevent nasties from coming onto PC
- Passwords – Stop unauthorized people accessing network

**2) DETECTIVE**

- Detecting when data has been corrupted / hacked
- Virus Checking software
- Fire Alarms / Access alarms
- Audit trails – Recording when data is changed and by whom

**3) CORRECTIVE**

- Backup and Restore
- Redundant hardware / Failover
- Disaster recovery procedures

Security Precautions	Network Policies
ACCESS RIGHTS	Backup & Restore
ENCRYPTION	Archiving
PASSWORD PROTECTION	Disaster Recovery
	Failover
	AUP

### INTERNET = WAN (Wide area network)

The INTERNET is a world wide collection of computers that uses the INTERNET PROTOCOL to communicate. NETWORK is made up of network devices called ROUTERS.

### IP ADDRESS

Each device has a unique IP ADDRESS. Websites are stored on WEB SERVERS which are connected to the INTERNET.

### Accessing Websites

1. User types in a web address e.g. [www.bbc.co.uk](http://www.bbc.co.uk)
2. Web address translated to IP address by a DNS (Domain name System) server which has a database of Web addresses and their IP Addresses. If DNS doesn't have IP address links with other DNS servers
3. PC sends request for webpage
4. Web Server then sends web page back using PACKETS

### FILE TYPES and FILE COMPRESSION

#### HTML – Programming language used to create WEB PAGES for the WWW

When data is transmitted across the internet it will go through many different links between routers. The connection from your PC to the internet will be the slowest. If we make the files being transmitted smaller then they will move across the internet quicker

#### LOSSY COMPRESSION

Files are compressed by REMOVING some of the DETAIL e.g Store photographs using 4 bits for the colour rather than 8 BITS -> This will use less colours so the image will not be as sharp. Audio files can be compressed by removing the sounds that humans cannot hear.

#### LOSSLESS COMPRESSION

Files are compressed but NO DATA IS LOST.

### HTML and CSS

#### HTML – Programming language used to create WEB PAGES for the WWW

HTML is the STANDARD web programming languages – All web pages have their main content set up in this way. All web pages will have the following structure:

```
<html>
  <head>
    <Title> Web page example </title>
  </head>
  <body>
    MAIN BODY OF WEB PAGE GOES HERE
  </body>
```

#### ADVANTAGES

Web pages on different servers and different types of network are ALL set up in the same way  
People can create webpages knowing what they will look like  
Browsers can receive the web page and display it correctly.

#### COMPRESSING IMAGES

Use fewer bits per pixel – JPEG uses 24bits per pixel giving a high quality image, GIF uses 8 bits per pixel so is lower quality – You will see solid blocks rather than gradual tones

#### COMPRESSING VIDEOS

Video files are mostly stored as MPEG format:

**MPEG 1** – Low resolution videos on a website (10 frames per second)

**MPEG 2** – Higher Resolution

**MPEG 4** – High quality broadcast video (24 frames per second)

Lower quality uses a lower FRAME RATE

#### COMPRESSING SOUND

Video files are mostly stored as MPEG format:

MP3 – Music downloads – Deletes part of sound that we cannot hear

WAV files – Higher quality used to manipulate sound files and to construct music

#### DOCUMENT FILE TYPES

Documents created in wide variety of packages with each having their own format – WORD (DOC) PUBLISHER (PUB) POWERPOINT (PPT)

When SHARING documents this means recipient needs the software that was used to create it.

PDF (Portable document format) eliminates this as documents can be saved in PDF format, these can be sent to other people and FREE

READERS are available that lets them view the document. When saving in PDF files you can REDUCE the file size by compressing

### HARDWARE needed to connect

#### MODEM

Cheapest but SLOWEST type of connection  
– Uses telephone system

#### LOCAL ROUTER

Usually WIRELESS so multiple devices can connect to the internet.