

# NETWORKS

The purpose of networking is purely to share data, the Internet, resources and printing. Servers require networking in order to log on, share resources and save work.

There are two types of networking and these are WIRED and WIRELESS.

We will look at the differences between the two types and also help you decide upon which is best for your school.

## Wired Networks

This type of network entails the routing of cables around your school from a central point called a network switch. The switch is housed in a data cabinet and enables computers, laptops and printers to communicate with the internet and server.

Network cabling starts its path from the faceplate located in the room that requires a connection. The cable then back runs along corridors, rooms and ceilings until it reaches the data cabinet where it is wired into a termination block called a patch panel. Then a patch cable is connected from the patch panel to a switch. The switch is where the internet line and server is connected.

The internet signal currently enters schools at a set speed. If only one user is using the internet in the school then that person will get the full bandwidth signal. If two people are on the internet at the same time then the bandwidth signal will be halved. Therefore the speed of the information being downloaded would be only half that of a single user. This pattern continues pro rata. With 16 users on the internet at the same time they would, in theory, only be able to receive a 16<sup>th</sup> of the speed available to a single user. However with recent advances in networking speeds – this is less of an issue and if your school is using the latest technology switches (managed or unmanaged) as they broadcast the data simultaneously to all ports no matter how many machines are connected at the same speed.

It is worth noting that there are different cables offering different speeds of network traffic. If your school has older CAT5 cabling then it could benefit from being upgraded to CAT5E. The connection from the server to the data cabinet should be CAT6 at least. This can be likened to speed of a car. imagine a car going 1mph - 10mph or 100mph. in heavy use you need the speed to avoid gridlocking.

This type of network is by far the most efficient as the cable connection is 'always on' much like your electrical wiring around the school. It is also the fastest way to move information around your network.

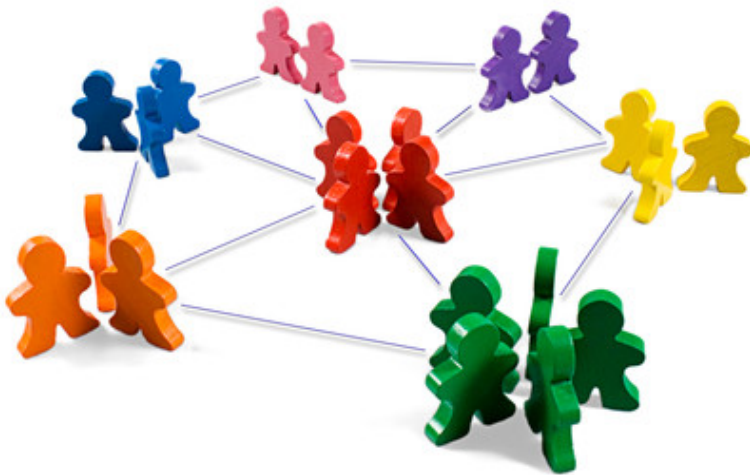
CAT6 is becoming the way forward as it is backwards compatible and yet also future proof. This is worth considering if you are fully rewiring the building - however not worth ripping out a fully functional CAT5 network. The speed improvement will be negligible at the moment.





# Wireless Networks

A wireless network is one that generally can be set up without cables but in essence there is always some amount of cabling required. It works by talking to laptops/computers/printers that have a wireless capability built-in. These wireless networks comprise of a set of Access Points which are usually wired back to the switch. This is known as an unmanaged wireless network. There is a relatively new technology which is termed as a managed wireless network. The main difference is that the managed solution offers very efficient routing of the network traffic however, it can cost considerably more and can also have on costs in the form of an annual fee for remote support.



Both these types of wireless networks are less reliable than a wired network and they also tend to be slower. Wireless lends itself well to a teacher laptop, to laptops being used in a staff room or PPA room. Where a school has no provision for a computer suite then a bank of laptops on a trolley would definitely require a wireless solution.

It is worth noting that wireless connections can be temperamental and that they can suffer from other devices that use wireless signals such as microwaves and cordless telephones. The wireless access points can also 'crash' just like a laptop or PC. A wireless system will, in theory, run only at about half the speed of a wired solution at best and generally much slower in reality - more like a tenth.

We would recommend the wired solution in every school then add a wireless network to the wired system as and where required.

Another issue that is also connected to wireless technology is the claim that there may be harmful side effects to this type of networking. Studies have tried for the last 60 years to prove radio waves are harmful - and as yet have not provided any clear evidence. However this is an emotive subject and with many schools having issues with mobile phone masts - which are essentially massive versions of a wireless access point - it does have to be considered.



# Managed Wireless Networks

Next generation learning and working is about enabling anytime, anywhere access and pushing ICT from beyond the four walls of the office or classroom - then reliability and performance of wireless networks is only going to become more critical.

Historically access points have had to be managed individually. Whilst not an issue in the past when usage was light, the issue of poor wireless performance is blighting an increasing number of infrastructures as demands become greater.



- Latest "n" switches - get connection speeds up to 5 times faster than those of previous access points
- Dual-band offers simultaneous connection for new "n" standard devices and older "g" devices, without slowing down the quicker machines
- Dramatically reduce connection pains and drop outs
- Additional points can be added as your wireless demands increase, or you can start with minimal coverage for key areas and grow from there
- Improved staff confidence and reduced frustration - makes the most of laptop trolley solutions and teacher devices
- Intelligent hardware manages and balances your entire wireless infrastructure

# Network Furniture

All networks require a location from which to branch out to the required network locations. As there can be quite an amount of technological equipment in order to run a network there is a requirement for some form of furniture or housing in which to securely mount this equipment.

The central location is usually best kept in a cool dust free cupboard if at all possible; it would also be preferable to locate a server in the same cupboard. The piece of furniture used to house the equipment is called a data cabinet and for the size of networks required in primary school-sized buildings it would normally be wall mounted. The cabinet would hold a router for your internet access and a network switch for your cabling. There may well be other equipment stored in this cabinet depending on the setup in your school.



## Things To Watch out for

The Following is a list of things to be watching out for when you are making yours choices. The are ranked in order of speed - ability and longevity.

**Red** being things to avoid.

**Orange** is a good short term place to be - but its time to start thinking of changing.

**Green** will last the longest and you are future proofing yourself as much as possible.

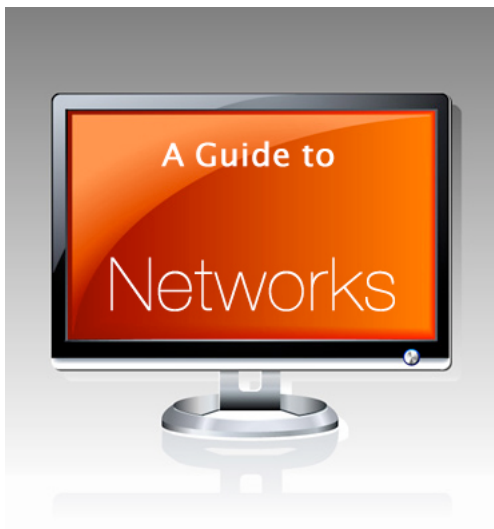
**Blue** is up and coming breaking technology - it may catch on - it may not !

**Lots of little switches  
All around the school**

**100 base switches  
a b and g wireless**

**CAT 5e or 6  
N wireless**

**Managed Wireless**



Here is a glossary of the most commonly used jargon when describing computers.

### JARGON BUSTER

CAT 5	CAT5 cable contains four pairs of copper wire. It supports speeds up to 100 Mbps
CAT 5e	CAT5 cable contains four pairs of copper wire. It supports speeds up to 1000 Mbps
CAT 6	CAT5 cable contains four pairs of copper wire. It supports speeds safely at 1000 Mbps
Access Point	A way of transmitting the internet wirelessly to computers, Laptops, Mobile phones.
Router	A device that shares one internet connection to many computers allowing multiple connections to the internet
WiFi	An acronym for Wireless Fidelity - but its actual meaning is basically any device that uses wireless technology
Patch Panel	A panel in a data cabinet where all the network points from around the building terminate. Mostly found in a comms cabinet somewhere in the school.
Fibre Optic	A non conductive cable - using light to transmit the signal - used for very long runs of networking or when the connection has to span between buildings - between different parts of the network.
Hub	A device that connects up multiple machines together via CAT 5 cabling. It slows down the more computers are attached.
Switch	A device that connects up multiple machines together via CAT 5 cabling. It runs at a set speed no matter how many devices are connected.
Managed Switch	Same as a switch but is configurable to separate traffic on the network. Also is capable of giving information about the network so you can allow certain machines to access only certain parts of the network. e.g Admin area can be split completely from the curriculum.
Intranet	A website hosted locally that only machines on the same network can view. e.g the grid - most of this is only viewable in school. You could also have your own school intranet that only your school could view.
TCP/IP	This is the language computers speak to communicate over a network. This is soon to be upgraded to TCP/IP v6
POE	Power Over Ethernet - a technology used with wireless access point to provide power over the network cables enabling access point to be sited anywhere and not be tied down to being near a power socket.
Comms Cabinet	A cabinet with all of the schools wiring terminating and connecting. A large school will have a few cabinets - all connected to each other via Fibre Optic cable. These will also be home to the internet connections into the school.
Managed wireless	A centrally managed wireless system that has greatly improved performance and reliability