

## Scenario

Dorsetshire High school needs a network to accommodate all the computers together. It must be appropriate for the purpose specified. There are two buildings, and a connection is needed between them. It is illegal to have a connection under the road. How do they solve this problem?

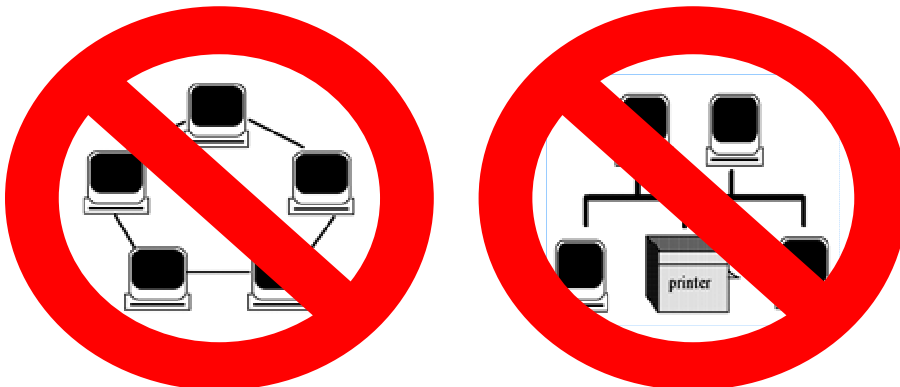
I will use a star WLAN. Its speed is 11Mb/s and per computer. It comes equipped with 1x wireless network card and PCI, ISA or PCMCIA depending on type used. 1 wireless hub is available for the whole network. What is a star wireless network?

This is basically a star topology without wires! Currently only up to 11Mb/sec and expensive, but ideal for offices with lots of laptop users who move about a lot and for buildings where it is difficult to lay down cabling. It can be connected to different types of networks, e.g. a WLAN to a 100 base-T network.

I would use a WLAN Wireless Area Star Network in the school, as it is easiest to implement across the board, despite the high cost of running it, it is the cheapest to run in terms of equipment used.

It is a more viable option than a bus or ring network in terms of speed, although, like the other two, there are disadvantages: also, due to the illegality of wires under a road, which is impossible unless the school is a permit holder, a WLAN is viable.

As we can see above there is a strong argument for having a Wireless Area Network in Dorsetshire High School. Bus and ring network topologies are sluggish to run, and are prone to going down frequently, compared to star Wireless Local Area Networks, WLANs which, although more costly to run, are definitely faster, and use less equipment.



*The bus and ring network - both infeasible on this system. The “PROHIBITED” roundel shows this.*

However, I would use a network with fibre-optic cables in other parts of the building because certain classes will require a faster bandwidth in usage of the Internet/computers, e.g. those who do graphic design or computing, these

activities require high bandwidth, **but** in a science laboratory or research room, a faster bandwidth is unnecessary because these activities do not require fast speed to load, **unless** it involves video or sound files (which students are rarely going to access, anyway, unless they do subjects like science or geography !). It depends on the purpose the workstation is being used for.

The idea of using broadband Internet for the school is very feasible.

GroupWise e-mail software WILL be used as instant -messenger software!

### **Internet access**

There are many ways to connect the computer or network to the internet, the reasons could range from using email, browsing the web, connecting a remote office, video conferencing, accessing the intranet and beyond. To be able to achieve any of these tasks, your PC needs to be connected to the Internet, the method list is as follows (from slowest to fastest):

An analogue modem is suitable for single use, e.g. home/office but unsuitable for school use as it is too slow to run on a network connection. That is why I have ruled this choice out. 56k is too slow for a network in a school, but it's suitable for home use.

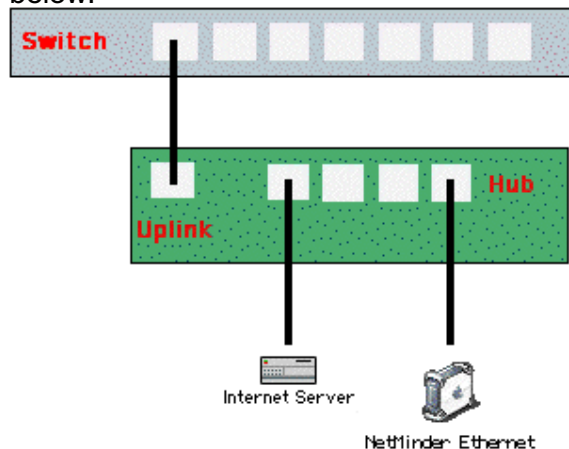
An ISDN Terminal Adaptor (64k/128k) uses a digital modem. These are called ISDN adaptors or terminal adaptors. It can give every user on the network a connection, making it suitable for use in a high school environment but the cost is unfeasible and expensive to run. You have to pay for all the online time you are using it, which rules this one out. (Unless you're a millionaire, and can afford the high cost of running it!)

Broadband Internet is the ideal solution for a school. Faster than 56k dial -up and charged at a fixed monthly rate, it is an affordable solution.

ADSL (asymmetrical digital subscriber line) is the type of DSL(digital subscriber line connection) provide. The asymmetric d igital subscriber line means that all the products upload at 256k which is slower than the download speed. The fixed monthly rate makes this an affordable, cost -effective option. Leased lines have been ruled out on grounds of cost. Despite allowing any user to connect anywhere to the Internet, and having a fast up/download speed, the high cost of using it rules it out for many, even education.

### ***The features of a network***

Every network will have a hub that connects to a central file -server, as shown below:



This hub is connected to a switch via an uplink. An internet server and workstations are connected to it.



***Fibre-optic cable***

But a Wireless Area Network may be used in the science laboratories and presentation halls. Fibre-optic cables will be used in the rest of the building, as they have a higher bandwidth and can carry large data amounts in the cable. The significant advantages of using fibre-optic cable are:

- Security of transmission
- Complete electrical isolation
- Freedom from crosstalk, which is unwanted talk on the network.
- Low weight compared to electrical copper cable
- Elimination of sparking and fire hazards
- Freedom from electro-magnetic interference
- Absence of ground loops
- Increased bandwidth and lower transmission losses than in coaxial cables at high frequency

### **What makes up a LAN**

A local area network is made up of several key components:

File server

Web server

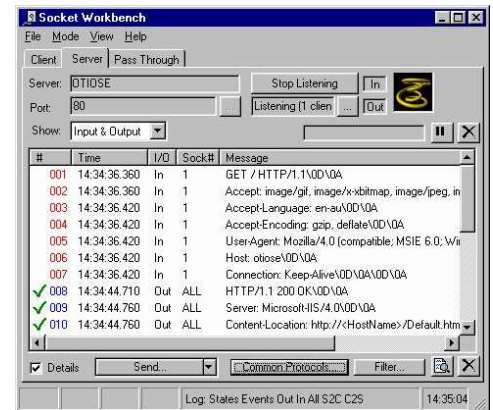
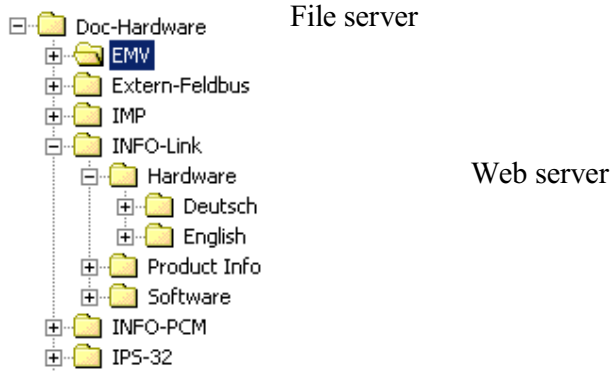
Hub/switch

Network card

I will explain what these do.

## File server

This is a server which stores the entire network's file collection - that is, every file that is stored by each and every user. This is probably the most important bit of the network to a user. If it crashes, then all files **may** be lost, but you should **always** keep a back-up file for support.



## Webserver

This is a computer that delivers ( **serves up** ) Web pages. Every Web server has a unique IP address and possibly a domain name. For example, if you enter the URL <http://www.rockfm.co.uk> in your browser, this sends a request to the server whose domain name is *rockfm.co.uk*. The server then fetches the page named *index.html* and sends it to your browser. To find out the IP address of a website you need a **whois** program which traces the IP address of a website. A **whois** program traces the IP address of a computer

Any computer can be turned into a Web server by installing server software and connecting the machine to the Internet. There are many Web server software applications, including public domain software from NCSA and Apache, and commercial packages from Microsoft, Netscape and others.

## Hub/switch

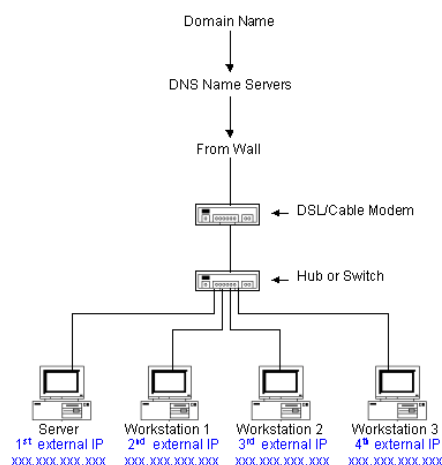
A hub is a common connection point for devices in a network. Hubs are commonly used to connect segments of a LAN. A hub contains multiple ports. When a packet arrives at one port, it is copied to the other ports so that all segments of the LAN can see all packets.

A *passive hub* serves simply as a conduit for the data, enabling it to go from one device (or segment) to another. So-called *intelligent hubs* include additional features that enable an administrator or a moderator to monitor the flow of traffic passing through the hub and to configure each port in the hub. Intelligent hubs are also called *manageable hubs*.

A third type of hub, called a *switching hub*, actually reads the destination address of each packet and then forwards the packet to the correct port.

### A switch

In networks, a switch is a device that filters and forwards packets between LAN segments. Switches operate at the data link layer (layer 2) and sometimes the network layer (layer 3) of the OSI Reference Model and therefore support any packet protocol. LANs that use switches to join segments are called *switched LANs* or, in the case of Ethernet networks, *switched Ethernet LANs*. Switches are essential in the network for its operation. Switch pictured below



Hub/switch and the processes of IP transferrance.

### The options considered

I will use a radio link for the network. This is wireless, and sends a signal across an area, ie. from one building to another. This is a fairly practical way of working in the sphere of networks, as it does not require much equipment aside from a transmitter. The usual distance it extends over a LAN is 200m. Fibre-optic cable will be used in the areas where the computers are static, ie. The science laboratories/computer labs where IT lessons may take place. The wireless signal will be used where a portable computer is to be moved around the room, e.g. in a presentation area, like a school hall. The fixed fibre-optic cables will not be used; despite the fact the school has permission to use them with a licence from BT.

