School Network

Junior Computer Science

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Important Information (Read before lesson)

Understanding a School Network (Page 1)

Server

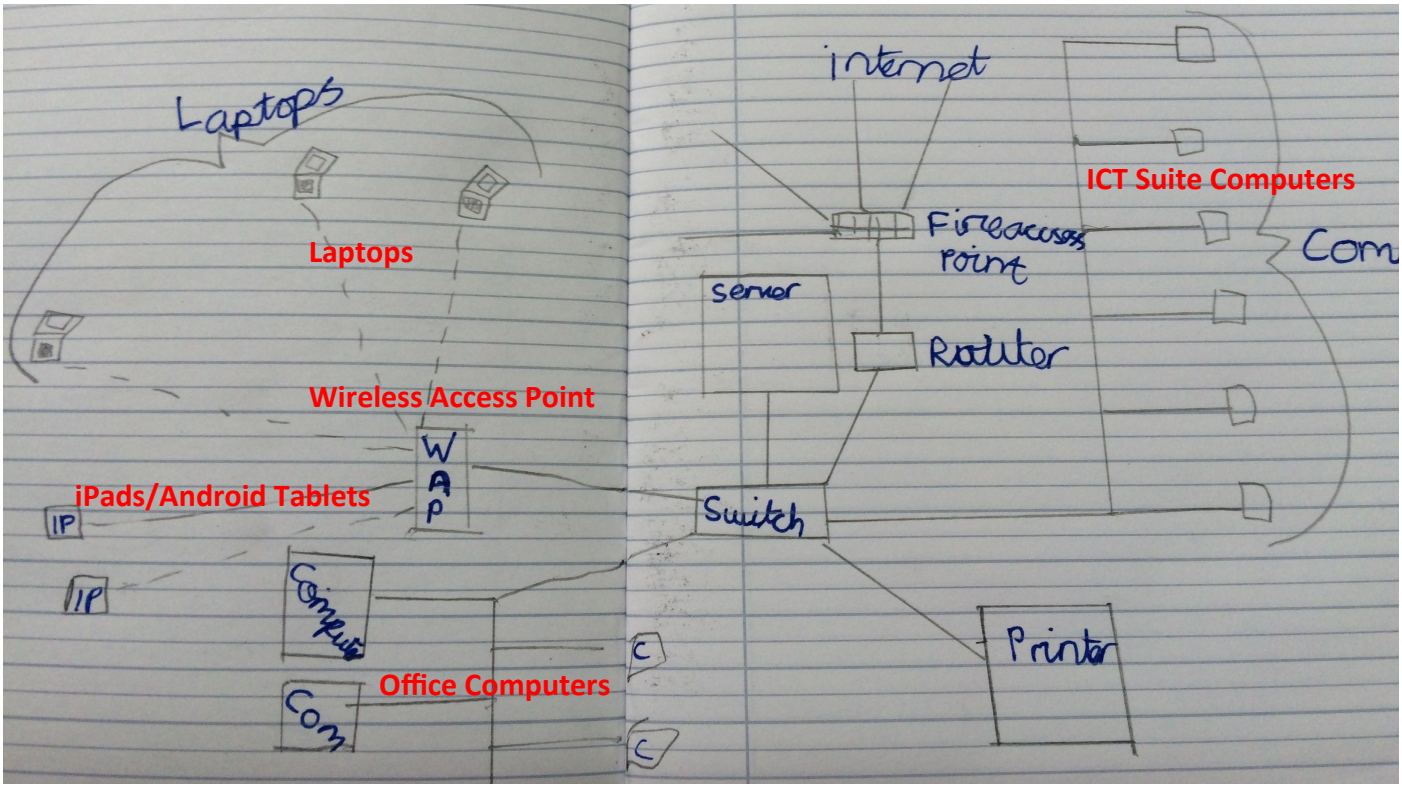
The heart of any school network is the server or servers. These are computers made from the best components. Typically schools spend 10 times as much money on a server than any other computer. Find out where your servers are stored. Servers are rarely turned off.

National Curriculum KS2 Computing Program of Study

Pupils should be taught to understand computer networks including the internet; how they can provide multiple services, such as the world wide web; and the opportunities they offer for communication and collaboration

Server Jobs

Manage a list of people who are allowed on the network (logon)
Hold all school saved work Manage printers



Switch

A box that switches data from one computer to another. Schools can have lots of switches but this model is best served by one. All wired computers connect back to the switch.

Wireless Access Point

A box that takes data from a wired network and converts it into wireless signals. Schools can have lots of WAPS but our model is best served by one.

Router

A box that connects the schools network to the internet. There are millions of routers across the world.

Firewall

Software that tries to reduce the amount of viruses that can come into the school network from the Internet

Wired Network

These are wires that go from the switch to every wired computer. These are typically much faster than wireless connections. On our diagram these are solid lines.

Wireless Network

Signals that pass through the air from the wireless access point to laptops or tablets.

Laptops

Most laptops are wireless computers managed by the server

Computers or PCs

Personal computers that are managed by the server, typically these are wired into the network. Every school is different but if you have a suite or banks of fixed computers they are most likely to be wired.

iPads or Android Tablets

Typically most of these devices are not managed by the server but do use the network to access the internet and sometimes share media such as photos and videos

Every network is different but this basic model is similar to most primary school networks

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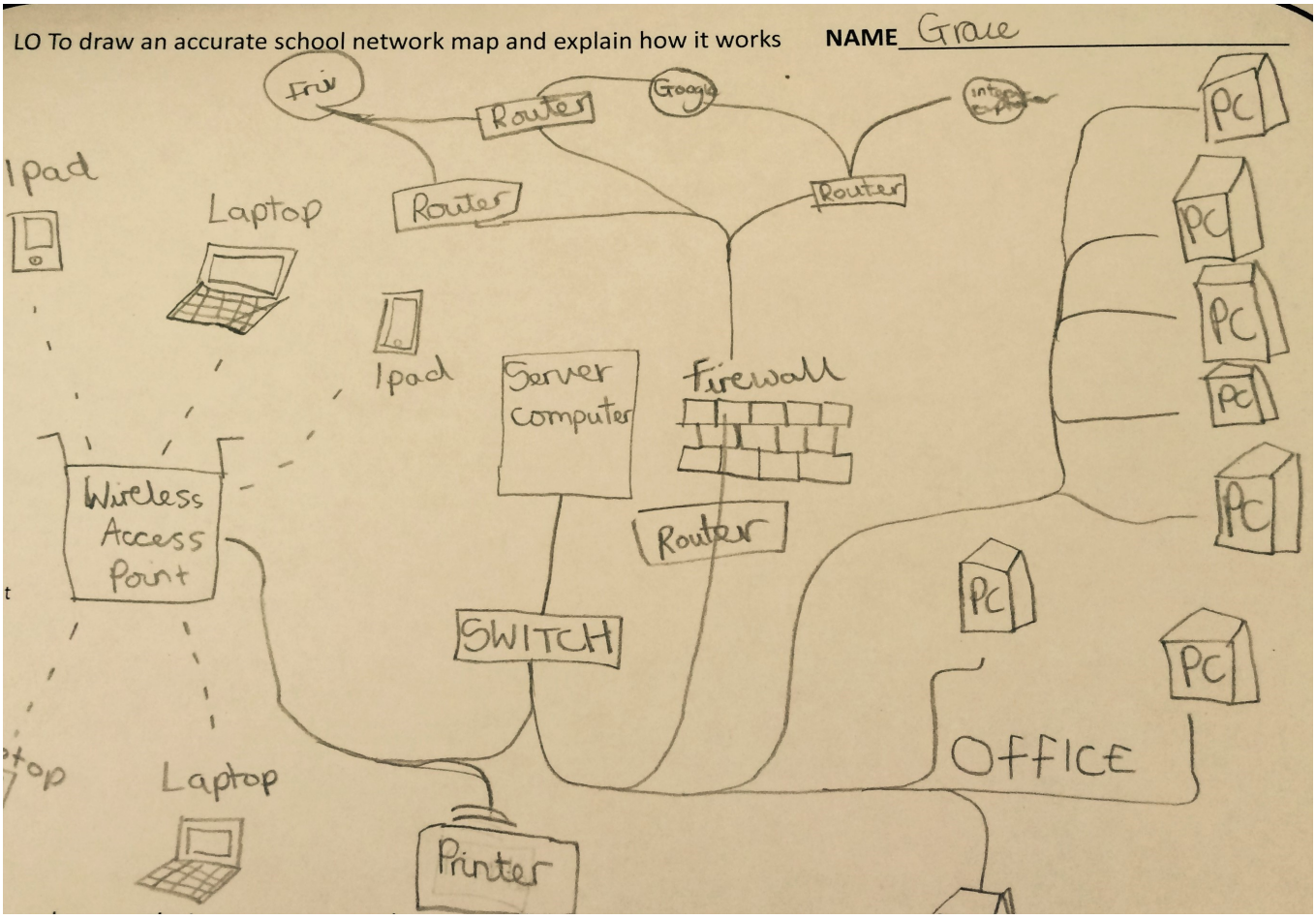
Playground Preparation

Before the lesson go out onto the playground and mark in the main server, computers (PCs), laptops, switch, wireless access point, router, firewall and web sites**. Don't mark in the wires or wireless connections as you will do this in the lesson.**



Grace shows you one possible layout in her diagram above.

Roleplaying the Network

Take your pupils outside and position them near to the model but not on it. Explain that those who concentrate and listen will get to take part in the model. In reality there are positions for everyone but it is good to have an incentive.

Server

Start with the server mention that it is the most important computer in the school and that it is typically 10 times more expensive than other school computers. Explain that it has a list of everyone's names who are allowed on the school network and that it holds everyone's saved files. It helps to mention specific projects that they have saved recently. Choose a sensible child to model the server and sit them behind your drawing of a server. Give them a class list to check when pupils try to logon.

Switch Now draw a line from the server to switch box. Explain that the switch carries signals from the server to every other computer on your network and back again. You may wish to show your pupils an old switch if you have one in a cupboard.

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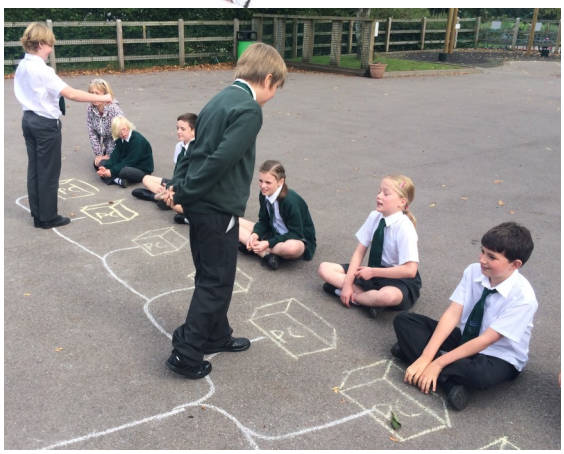

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Logon

Continue your line from your switch box to link up one wired computers (PCs). Sit a children behind the PC and choose another child to carry the data requests from the PC. Ask the child to logon, what message should they send to the server? Answer Username and Password. If your school network uses passwords let your children say password instead of their real password for obvious reasons. The data child will now carry the username and password to the server along the wires. When they get to the server they will tell the server the information, the server will check this on the list and if it is the same will send them back to tell the computer to logon. Draw wires to connect the other wired computers and place children behind them and a child for each computer as the data.

Opening Files

When you get to the last wired PC get them to logon like the first one did. Now ask them to think of a piece of work they saved recently. Ask them to send the data child to open the file and bring it back to work on. The data should go along the wires, through the switch and ask the server for the file before bringing it back for the computer. If it is saved and closed the data should take it back to the server.

Connecting Wireless Computers

Now wire up the switch to the wireless access point. Explain that this converts the signal from data in a wire to data that can be carried through the air. Draw a dashed line to one of the wireless laptops. You may wish to logon and open a file to demonstrate that this uses the same procedure as the wired computers for logon and file opening.

Connecting to the Internet

Explain that not every computer on the network is controlled by the server, iPads and android tablets don't logon to the server and many don't save work on the server either. However they do connect to the Internet through the school network. Connect up any tablets you have drawn on your network. And connect the switch to the router by a solid line. Explain that this carries signals beyond the school all over the world to fetch web pages, emails, videos and other internet services. Now join the router to the firewall. Appoint a child to be the firewall and explain that their job is to check data to see if it has viruses before letting it in or out of the school.

The firewall check a piece of data for viruses before the data completes its job

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If it does find a virus it locks the data down so it can be cleaned or deleted. New connect up the firewall to the routers and websites. Model a child looking up a webpage on a tablet, laptop or PC, They send the data of to find the webpage, through the switch, through the router, through the firewall, through other routers until they find the web server. They collect the page and return it back to their original device. This takes less than half a second typically.

Network Printing

You may wish to add a printer to your model and model an open document being sent to the server and then to the printer. On your school network your servers manage the printing queues. If you were at home the page would go straight to the printer.

The server checks the list to see if users can logon. Note the bottleneck that has built up because everyone is logging on at the same time

Network Roleplay

Make sure every computer has a data child. Before you start tell pupils that you will get them to swap roles half way through the roleplay.

At the end of the roleplay lead a brief class discussion about what they found out

Did they spot any bottlenecks where lots of data was trying to do the same thing? The queue for the server is the obvious one. On larger networks there are often more than one servers to speed the process up.

Creating their own Map

Get all pupils to leave the map. Explain that they are going to draw the network and explain how some of it works. Get them to look at the playground map and memorise the key features. Lead them back to class before handing out the network map sheets.