

# GCSE Computer Science

## Topic 1.3 Networks



|              | Cable  | Wireless  |
|--------------|--|---|
| Bandwidth    | High – up to 10 Gbps                             | Low – up to 600 Mbps  |
| Installation | Difficult – must run cables throughout the site. | Easy – just need wireless access points.  |
| Cost         | Expensive – cost of cables and installation.     | Cheap – just cost of wireless access points.                                    |
| Security     | Good – need to plug computer into a socket.      | Poor – anyone within range can access the network. Must use security passwords. |
| Interference | Good – there is no interference with cables.     | Not so good – signals can be affected by walls and other electronic equipment.  |
| Mobility     | Poor – need to plug computer into a socket.      | Good – access can be from anywhere within range.                                |

All computers must have a Network Interface Card to connect to a network. Each NIC has a MAC address which is the unique address of the computer so data can be directed.



A network is 2 or more devices connected to share data.

A LAN is 2 or more devices connected to share data **in a SMALL geographical area.**



LANs are found in homes, schools and offices. LANs are managed by a individual person or small group of technicians.

- The 3 main benefits of creating networks are to:
- ✓ Share data
  - ✓ Share internet connection
  - ✓ Share hardware.

Switches connect devices together on a LAN to allow them to share data. Switches send and receive data in frames and use MAC addresses to direct data to the correct computer.



### Client Server

- 2 or more devices connected to a **central** server.
- The server manages the network, processing data requests from the client machines.
- Users log into the server to access files and programs stored on them.

- ✓ Files are all stored in one place.
- ✓ Servers are reliable (and always on).
- ✓ Central back up.
- ✓ Central installation / updates.
- ✓ Security (user access levels / antivirus).

- ✗ Servers are expensive.
- ✗ Technician needed to manage network.
- ✗ Dependent on server.
- ✗ Server can be overloaded.

### Peer to Peer

- 2 or more devices connected directly to each other **without** a central server.
- All devices are equal.
- Files are stored on individual computers and shared with other computers.



A WAN is 2 or more LANs connected over a **LARGE** geographical area to create a network of networks. A WAN allows computers in one geographical area to connect with computers in another. The internet is a WAN. The infrastructure required to create a WAN is hired.



- ✓ No technician needed.
- ✓ No expensive hardware needed.
- ✓ Not reliant on server.

- ✗ Peer machines are less reliable.
- ✗ Peer machines aren't always on.
- ✗ Sharing files causes duplicates.
- ✗ Software installed on each machine.
- ✗ Peer machines slow down when others access them.
- ✗ All files stored on individual machines.
- ✗ Back ups done individually.

Many factors affect the performance of a network. **Performance relates to speed and stability.**



The bandwidth is the amount of data that can be transmitted per second. **MORE BANDWIDTH = FASTER NETWORK.**

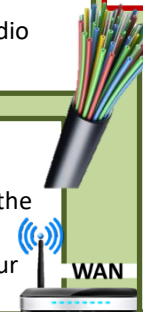


The bandwidth of a network is **SHARED** between it's users... **MORE USERS = LESS BANDWIDTH PER USER = SLOWER NETWORK.** Too many users can cause congestion; packets of data gets queued, the network becomes slow.



Wireless Access Points allow wireless devices to connect to other devices on a LAN to share data. WAPs send data through radio waves.

Routers connect different networks together. They use IP addresses to send data to the correct network. Routers in home networks connect your LAN to the internet.



Wired networks usually use copper or fibre optic cable. Copper cable sends data as electric signals. Copper cable is cheaper than fibre optic. Fibre optic sends data as pulses of light. Fibre optic transmits data over longer distances at faster speeds than copper cabling.



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## What I need to know:

|   |  |  |  |
|---|--|--|--|
| What is a network?  |  |  |  |
| What does LAN stand for?  |  |  |  |
| What is a LAN?  |  |  |  |
| What does WAN stand for?  |  |  |  |
| What is a WAN?  |  |  |  |
| What are the benefits of creating a network?                          |  |  |  |
| What is network performance?  |  |  |  |
| Name 3 factors that affect network performance.                       |  |  |  |
| What is bandwidth?  |  |  |  |
| How does bandwidth affect network performance?                        |  |  |  |
| How does the number of users affect network performance?              |  |  |  |
| What are the main differences between wired and wireless connections? |  |  |  |
| Describe a client server network.                                     |  |  |  |
| Discuss the advantages and disadvantages of a client-server network.  |  |  |  |
| Describe a peer-to-peer network.                                      |  |  |  |
| Discuss the advantages and disadvantages of a peer to peer network.   |  |  |  |
| <b>Local Area Network Hardware:</b>                                   |  |  |  |
| What is a Wireless Access Point required for?                         |  |  |  |
| What is a switch required for?  |  |  |  |
| What is a router required for?  |  |  |  |
| What does NIC stand for?  |  |  |  |
| What is a NIC required for?   |  |  |  |
| What are the main differences between fibre optic and copper cable?   |  |  |  |