

GCSE Computer Science

Topic 1.4 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 hardware in a LAN is owned by the company using it.



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.

- 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.

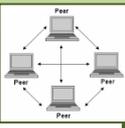


- ✓ Files are all stored in one place.
- ✓ Servers are reliable (and always on).
- ✓ Central back up.
- ✓ Central installation / updates.
- ✓ Security (user access levels / antivirus).

- ✗ 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.



- ✓ 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.

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**.



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

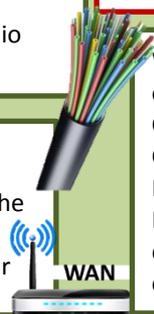


The bandwidth is the amount of data that can be transmitted per second. **MORE BANDWIDTH = FASTER NETWORK.**



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.



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.





GCSE Computer Science - Topic 1.4 Networks

What I need to know:

- Define the term network
- State what LAN stands for.
- Define the term Local Area Network.
- State what WAN stands for.
- Define the term Wide Area Network.
- State 3 benefits of creating a network
- Describe the term network performance.
- State 3 factors that affect network performance.
- Define the term bandwidth.
- Describe how bandwidth affects network performance.
- Describe how the number of users affect network performance.
- State the difference between a wired and wireless network connection.
- Describe a client server network.
- Explain the advantages and disadvantages of a client-server network.
- Describe a peer-to-peer network.
- Explain the advantages and disadvantages of a peer to peer network.
- Describe the function of a Wireless Access Point.
- Describe the function of a switch.
- Describe the function of a router.
- State what NIC stands for.
- State the function of a NIC.
- Describe the differences between fibre optic and copper cable.

Paula is the manager of Penfold & Penfold, a talent agency which uses a wireless LAN in their office.

- (a) The computer systems at Penfold & Penfold feature various network-related hardware. One of these pieces of hardware is a Network Interface Controller (NIC). State why this piece of hardware is required.

.....

 [1 mark]

State the piece of hardware that would be required to connect Penfold & Penfold to an external network.

.....
 [1 mark]

Identify **two** benefits and **two** drawbacks of changing from a Peer-to-Peer (P2P) network to a Client-Server network.

Benefits 1

2

Drawbacks 1

2

[4]

Identify **two** benefits and **two** drawbacks of using a Peer-to-Peer (P2P) network.

Benefits 1

2

Drawbacks 1

2

[4]

** Identify means the same as state.*
No explanation needed.