Answers

Task 1

A new secondary school for 11–18-year-old students is being built. It will house 150 desktop computers in IT rooms. It will also need to cope with over 1200 student devices (tablets or laptops) connecting to its network. Other peripheral equipment such as printers will also be available.

(a) Name the types of devices which will be connected with a wired connection.

150 desktop computers, possibly laptops

(b) Name the types of devices which will be connected with wireless connections.

Printers, laptops

(c) What are all the different hardware products that will be needed by the school to connect a desktop computer to the Internet?

Network Interface Card (NIC) (will be inside the desktop with a socket for an ethernet cable)

Switch (An ethernet cable will connect the NIC to the router)

Router (Will connect the LAN of the school to the Internet).

Task 2

For each of the scenarios below, suggest an appropriate connection media.

Options for connection media include Ethernet, fibre-optic, Bluetooth, Wi-Fi, mobile network.

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| **Scenario** | **Connection media** |
| A laptop for working in and around the office | Wi-Fi |
| Transferring files from one mobile device to another quickly and securely whilst in a hotel room | Bluetooth |
| Accessing company files via the cloud when in a park | Mobile network |
| To connect a business computer to the company’s LAN with a fast and reliable connection | Ethernet |
| To connect a company’s LAN to the Internet | Fibre-optic |
| Connecting a smart TV to a home network | Wi-Fi or Ethernet |

Alternatives to these options are possible but may need to be explained. For example, a small business with only a few users may be able to use a broadband FTTC (Fibre to the Cabinet) connection. These typically have speeds of up to 70Mb/s download and 20Mb/s upload which would be fine for a few users. This would not be fast enough to support a business with one hundred users though – especially where they needed quick access to video files.

Task 3

(a) Go to: <https://checker.ofcom.org.uk/mobile-coverage>

(b) Enter your school / college postcode

(c) Select ‘View map of available services’

(d) Which mobile network would give the best reception?

Students should compare both Indoor/Outdoor and 4G/No 4G before deciding on the best network. Students may wish to compare where they live instead of their school/college.

Task 4

A start-up video production business has grown to five employees, each who have their own personal computer. They have recently purchased a better Internet package which the marketing leaflet says has the following features:

* Up to 80 Mbps
* Unlimited usage
* Fibre broadband

(a) The company doesn’t have a fibre line put in but is able to use its old copper telephone line. How is it possible to be a ‘fibre broadband’ connection?

The majority of ‘fibre’ connections in the UK use FTTC (Fibre to the cabinet). This allows them to work on copper telephone lines. The fibre connection only runs as far as the cabinet.

(b) When the company checks the connection speed it seems to only reach around 60 Mbps. Why might they not be able to get 80 Mbps.

Distance from the business to the cabinet – the further it is the lower the speed will be (true fibre optic connections don’t have this problem)

Error correction can cause around a 10% loss in transmission speeds

The connection between the router and computer may be slower (especially if wireless)

Other users may be using some of the bandwidth of the Internet connection

(c) The company often needs to upload their videos to share with customers. They find that this takes at least three times as long as when they download videos.

Why is this the case?

Most connections using ‘fibre’ (FTTC) will have a download speed which is much higher than the upload speed. The maximum upload speed is normally 20Mbps on FTTC connections.

The server they are connecting to may also be slower.

Task 5

An employee works from home. They need a fast, reliable connection to access the Internet from a desktop computer. They also need to be able to work in any room of their house on a laptop and to be able to transfer files wirelessly between their mobile devices.

(a) What connection types could you suggest they use?

Ethernet for the desktop computer (as it is fast and reliable) – if they cannot lay the cables then Wi-Fi

Wi-Fi for the laptop

File transfer from mobile devices – Wi-Fi or Bluetooth

(b) What are the advantages and disadvantages of using Wi-Fi to connect the desktop computer?

**Advantages**

Wi-Fi is easy to connect

It doesn’t require any cables to be laid – there are no tripping hazards created

It is a secure transmission method if WPA2 encryption is used

**Disadvantages**

Wi-Fi is normally slower than a wired connection

There may be blackspots (areas with no signal) in the house

A password is needed to connect devices to the access point (AP)

The signal will get slower as more devices use it