

# revise brec national Information Technology units 1 and 2



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# REVISE BTEC NATIONAL Information Technology UNITS 1 AND 2



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# Introduction

# Which units should you revise?

This Revision Guide has been designed to support you in preparing for the externally assessed units of your course. Remember that you won't necessarily be studying all the units included here - it will depend on the qualification you are taking.

BTEC National Qualification	Externally assessed units
Certificate	2 Creating Systems to Manage Information
For both:	1 Information Technology Systems
Extended Certificate Foundation Diploma	2 Creating Systems to Manage Information
For both:	1 Information Technology Systems
Diploma	2 Creating Systems to Manage Information
Extended Diploma	*11 Cyber Security and Incident Management
	*14 IT Service Delivery

\* Units 11 and 14 are not covered in this book.

### Your Revision Guide

Each unit in this Revision Guide contains two types of pages, shown below.

pages help you revise the Content essential content you need to know for each unit.

Unit l

Content

pages help you prepare for Skills your assessment. Skills pages have a coloured edge and are shaded in the table of contents.

> Unit 1 Skills

systems. Each

ns and

e informat send and ce he is

#### **Application** software

Had a look Nearly there Nailed it!

Uses of application software There are many different types of application software that ha Productivity software – these are applications like word proce- sereadsheets that are used in office environments to support	N	Had a look N	early there	Nailed it!
Graphics software – these applications are used to edit phot. Communications software – these applications make communic instant mesoaring, email and VOIP software		Usiı	n <mark>g c</mark> ase s	studies
		Exam questions may be based on ca case study will give you all the back Always read a case study carefully a	ise studies about a busin iground information you n as your answers must rela	ess's or individual's use of IT eed to answer the questions ate to it.
Proprietary and open source software		Why case studies are imp	portant	
These terms refer to who owns the source code behind the s	•	Case studies allow you to apply you	ir knowledge of the unit's	s content to real-world situat
Proprietary software Open	100	contexts. This will help you when you	of knowledge you will be	world.
The source code is privately owned by the The so		Areas	or knowledge you will her	ca to apply
software company.			<b>*</b>	V
Users pay to buy or subscribe to the software. although	*	The devices in IT systems	Transmitting data	Online IT systems
Support (e.g. for setup and troubleshooting) service	1	<ul> <li>how devices are used</li> </ul>	<ul> <li>connection types</li> </ul>	<ul> <li>online systems ar</li> </ul>
is provided by the software	P I	<ul> <li>the relationships</li> </ul>	<ul> <li>networks</li> </ul>	<ul> <li>implications for in</li> </ul>
creators. commu	-	between them	<ul> <li>the implications</li> </ul>	<ul> <li>implications for o</li> </ul>
C It may have more features than open source	×			V V
software. compa		Protecting data	Impact of IT systems	Issues involved in usin
Q The software company may be slow to provide Q Sup	4 - L -	<ul> <li>implications of storing</li> </ul>	<ul> <li>on individuals</li> </ul>	<ul> <li>moral and ethical is</li> </ul>
updates and bug fixes. availab	9	<ul> <li>implications of transmitting</li> </ul>	<ul> <li>on organisations</li> </ul>	<ul> <li>legislation and code</li> </ul>
Software is usually very generic, with little	re			
scope for customisation due to copyright or for sup complexity issues	<b>4</b> -0-		Case studies	may be shown in a box above th
Comprising instances.			this. The cont	tent of case studies will be diffe
V il can de costij.		Worked example	and the form	at may be different. Details of as
	-m-		change so an	ways make sure you are up to as
		Thomas is a printer repair technician w	vho travels to offices	Wighlight volomon
Choosing software Perio		spread all over London to repair prints	215.	Aightight televal
When choosing software, consider: When I	0	In order to perform his job he uses a tab	let to check his work	information
ease of use - familiarity and ease of use is     the	-	email for new jobs and to report any up	dates to his managers.	It is a good idea to highligh
paramount of s	2	Describe the role of protocols in allowi	ng Thomas to access	etudent has done here to
reliability – ensuring software works as     nas	9	his emails.	6 marks	a specific response to the
intended and can be depended upon     inte		in an an artract		Here you could underline t
<ul> <li>capability – that the software can do the job</li> <li>can add the job</li> <li>sum</li> </ul>	1	Sample response extract		that Thomas needs to both
task		There are three main protocols use	d in email systems.	retrieve emails and the de-
	1.00	SMTP is used to send Thomas's en	nails from his email	using while on the move.
	1 -	client to his outgoing mail server. It	also transfers the	
		email between email servers over t	ne internet.	Relate each part of your and
Now try this		POP3 is a protocol for retrieving	emails from	to the case study about Tho
Alon al	1.0	emails from the server to be devi	ce so be can read	for this question, applying yo
Seth is looking at different software options for managing	1.0	them offline.		of protocols is quite straight
orders and deliveries in his freight shipping business.		IMAP is an alternative to POP3 w	here the emails	you were being asked to eval
Analyze the relevant benefits and drawbacks to Seth of using	p i i i i	are synced between the server a	nd device rather	might need to look at which p
an open source software application for meeting his needs.		than downloaded, so Thomas wou	ld also be able to 🌖	of IMAP and POP3 meets Inc
		access the emails on a different of	levice.	better, so you would need to
	1.0	Lange and the second		yes tary procratant no store
		stow try this		You can agin a lot of inte
		How is y	· · · ·	case studies to hele vo
		Olivia is a marketing consultant who h		exam questions. Which k
	1.1	organisations as her clients. She has re	cently started to store	you underline in this que
		all of her clients' information online us	ing cloud storage.	
		Explain the moral and ethical issues in	olved in Olivia soring her	Dinte Look at pages
		clients' information on the cloud.	and a state of the	moral and ethi
	1	-	manufun	pages allea to revise clow
tivities on every				
			1	

Use the Now try this activ page to help you test your knowledge and practise the relevant skills.

Look out for the sample response extracts to questions or tasks on the skills pages. Post-its will explain their strengths and weaknesses.





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#### A small bit of small print

Pearson publishes Sample Assessment Material and the Specification on its website. This is the official content and this book should be used in conjunction with it. The questions in 'Now try this' have been written to help you test your knowledge and skills. Remember: the real assessment may not look like this.

# **Copyrighted Material** Nearly there

Had a look

Nailed it!

# Unit 1 Content

# **Digital devices 1**

A digital device is an electronic device that uses digital data (such as Is and Os) as opposed to analogue data (such as a sound wave). Here are five commonly used types of device that you need to know about.

## **Multifunctional devices**

These devices can perform multiple functions, such as inputting and outputting data.

An example is a touch screen, which outputs an image while allowing the user to input data by pressing the screen or a multifunctional printer.

### **Personal computers**

These are small and inexpensive computers for use by individual users.

Examples are desktops and laptops, which are more portable and have a built-in battery, screen and keyboard.



Force feedback game controllers are multifunctional devices - they can input data and output vibration.



Web servers store web pages and online content, and serve data to users over the internet.

Entertainment systems These are devices for watching

TV/films (such as satellite or cable

digiboxes), listening to music and

playing video games.

#### **Mobile devices**

Smartphones and tablets are made with portability in mind to give people computer and internet access while on the go.

#### Servers

These powerful computers provide services to other computers connected to a network.

An example is a mail server that provides access to email services for all the users on a network.



For more on networks.

#### Games consoles

are entertainment systems with powerful graphics processors that allow users to play video games.

# Now try this

Nadeem wants to access the internet while he is travelling to college by train.

- (a) Give a type of digital device that would be appropriate for Nadeem to use.
- (b) Explain two reasons why the device you chose is appropriate for Nadeem's requirements.

Concentrate on Nadeem's requirements, and the features he most needs when using a device while out of the house, on a train.





Nearly there

Nailed it!	
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# **Digital devices 2**

Digital devices are often developed to make everyday tasks easier, quicker or more cost-effective and to provide efficient, improved access to data. There are four types of digital device that you need to know about.



#### Digital cameras

These capture images and videos digitally using an image sensor and store them as digital data on media such as a memory card or hard drive.

Had a look

Examples are still and video cameras.

# Links There is more about data storage on page 6.

# Navigation systems

These devices use a GPS (Global Positioning Satellite) receiver to locate the user's position on a digital map and provide directions to a given destination.

An example is an in-car satnav which uses GPS location data with software to provide directions to a given destination when driving.



# **Communication devices and systems**

These devices can send and receive analogue or digital data to and from another device.

Traditional analogue examples include phones and faxes. A modern digital example is a router which directs data across a network.



**WiFi dongles** are communication devices that allow your PC to communicate with a router wirelessly.

# Data capture and collection systems



These devices collect and input data through automated systems rather than direct data entry.

Examples include:

- a barcode scanner, which inputs (or reads) a barcode and converts the information into data
- an optical mark reader, which reads pencil or pen marks on specially designed printed forms, such as lottery tickets
- an EPOS (electronic point of sale) system, which records sales and updates stock levels.

An **RFID reader** reads data stored on a smartcard by being in close proximity to the card. These are often used by payment cards or for stock control.

# Now try this

J P Lucy is a chain of small department stores, with five branches.

State two different data capture and collection systems that might be used in the department stores.

Questions with the command word 'state' don't require long answers. You can give your answer using single words or short sentences.

2

# **Uses of digital devices**

Digital devices play an increasingly important role in many different areas of our lives. They enhance our social lives and make our work role more efficient. However, sometimes they also have the opposite effect.

### Uses of digital devices

Here are some examples of how digital devices are used in six key areas of our lives.



# Now try this

J P Lucy is a chain of small department stores, with five branches.

Explain how your choice of data capture and collection systems you have identified might be used in the stores and why they would be beneficial to the business.

This is the second part of the question you answered on the previous page. When explaining how J P Lucy might use the data capture and collection systems you identified, focus on the advantages of these systems. How do they help the business?



Content

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Nearly there



# Input and output devices

Peripheral devices are hardware devices that are not essential to the running of a computer system, but that connect to the system and provide additional functions. The most common types are input and output devices.



Had a look

**Clinks** For more on accessibility devices, see page 5.

rubar gean	ces		
Device	Features	Example uses	
Keyboard	Made up of keys used to input alphanumeric characters and symbols.	<ul><li>Writing a report</li><li>Inputting into a database</li></ul>	
Mouse	A pointing device used to select items on screen.	• Navigating a user interface, e.g. by clicking on icons	
Scanner	Converts hard copy text or images into a digital format.	<ul> <li>Inputting a photo for editing in graphics software</li> </ul>	
Graphics tablet	Controls the computer by using a stylus on a tablet.	Creating digital illustrations	
Microphone	Converts analogue signals (sound waves) into electrical signals to be sent to the sound card which converts analogue to digital.	<ul><li>Talking on VOIP software</li><li>Voice recording</li></ul>	
Webcam	Inputs video and still images directly into a computer.	Video conferencing	
Sensor	Takes and inputs readings from the physical environment, such as changes in temperature.	<ul><li>Automated central heating systems</li><li>Security systems</li></ul>	

# **Output devices**

Device	Features	Example uses	
Monitor	Outputs an image to the user, e.g. of the user interface, a photo or a document.	<ul> <li>Viewing the user interface</li> <li>Watching movies</li> </ul>	
Projector	Outputs an image onto a wall or screen.		
Printer	Produces hard copies of digital documents and images on paper.	<ul><li>A hard copy of a report</li><li>Printing digital photos</li></ul>	
Plotter	This specialist type of printer draws to a very high quality on very large paper.	<ul> <li>Drawing vector graphics</li> </ul>	
Speakers	Amplify analogue signals (sound waves) sent from the sound card for the user to hear.	<ul> <li>Listening to music</li> <li>Listening to someone during a VOIP</li> </ul>	
Headphones	A portable alternative to speakers.	call	

# Now try this

Marit is a graphic designer who produces posters and leaflets. She creates a lot of the digital illustrations for these herself.



State two input devices and two output devices, explaining how they would be useful to Marit in her graphic design work.

The question asks you to 'explain' your choice of input and output devices, so as well as naming the devices, you need to give reasons why they are useful to Marit.

4

# Had a look

Nailed it!

# Unit 1 Content

# Devices for accessibility and data processing

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Nearly there

Peripheral devices have been designed to perform many specialist functions. Two important types are devices that aid accessibility to computer systems, and those that automate data processing for organisations.

# **Accessibility devices**

Some peripheral devices are specifically created to allow accessibility for people with disabilities. For example:

 trackball – an easier-to-use alternative to a mouse, consisting of a moveable ball on a base

- touch screen or large key keyboard - useful for people unable to use a keyboard easily
- eye motion sensors and head motion trackers - used by people with significantly limited mobility
- Braille embosser a type of printer that outputs text as Braille cells (characters).

# **Adaptive technologies**

These are technologies that have been designed specifically to aid people with disabilities. They include both hardware and software.





Peripheral devices such as a trackerball or eye motion sensors are hardware they are physical items that you can touch.

There are also many types of software available to aid accessibility, such as voice recognition software for input and screen reading software for output.

# Manual and automatic data processing

There are peripheral devices which can automate the input and processing of data and avoid human errors such as typos during data entry. Some types of data collection, input and processing are more commonly done manually. Here are some examples of both.

#### **Automatic processes/devices**

- Biometric readers read fingerprints, hand prints or irises for use in personnel identification systems.
- Barcode readers read lines of different thickness and convert them into a string of values. 2D readers read more complex QR-style codes.
- Optical mark recognition (OMR) readers automatically read a form and input the data.
- Radio-frequency identification (RFID) devices are used in stocktaking and race timing systems.
- Smart meters accurately record electricity and gas usage and send readings to the energy supplier.

#### Manual processes

- Keying client or product details into a database.
- Entering customers' meal choices into a restaurant's system.
- Marking exam scripts.
- Entering survey responses from a form.



Marcus has recently become visually impaired following an accident.

Give two peripheral devices that will allow Marcus to continue using his IT systems.



The question is specifically asking you to identify peripheral devices rather than software. But the peripheral devices you suggest may allow Marcus to use adaptive software.

# Unit l Content

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Storage devices

Storage devices are a type of peripheral device used for storing, backing up and sharing data, usually

Nearly there

# Hard disk drives ...

are magnetic storage devices, commonly used as the primary internal storage device but can be external.

for individual use where a network is not available.

Had a look

#### **Characteristics and limitations**

Large storage capacity (I terabyte or more).

(Low cost on a per byte basis.

Very reliable.

P Slower than SSDs at loading data.

P External HDDs are not as portable as some other options.

# SD cards ...

are small flash memory cards that are commonly used for storage in digital cameras and some smartphones.

**Characteristics and limitations** 

S Very small and portable.

Easy to transfer between devices with SD card readers.

Dery small storage capacity, generally around 64gb – greater capacity is costly.

 $\notin$  Various 'enhancements' to the standards, resulting in potential compatibility problems, for example SDHC and SDXC.

# **Optical disks** ...

such as CDs, DVDs and Blu-ray disks are used for
software, music and movies.
Characteristics and limitations
Small and portable.
A lot of devices have built in capability to read optical
discs, with external devices being inexpensive if needed.
Archival stability of writable media can be questionable
8) Fragile and easy to damage

# Now try this

Explain two limitations of using a USB memory stick for transferring video footage and graphics between home and office.



Nailed it!

are flash memory devices commonly used as the primary storage in portable computing devices
like tablets and laptops.
Characteristics and limitations
Very fast data read/write speeds.
Low power consumption.
Extremely reliable as they have no moving
parts which can be damaged.
P Higher cost than HDDs on a per byte basis.
Usually have a lower storage capacity.
Only have a finite number of writes.

# USB memory sticks ...

are small flash memory devices that connect through a USB port. **Characteristics and limitations** Extremely portable device. Compatible with most computer systems via USB ports. Storage capacity is low when compared to ŠSDs and HDDs. Only have a finite number of writes before they break. O Because they are small, they can be lost easily.

#### Magnetic tape ...

is used for large data backups. Characteristics and limitations Dery large storage capacity. Wery cheap on a per byte basis. P Data is accessed serially which is very slow. 🖗 Requires specialist equipment for recording and reading data.



Try to explain each limitation you identify in as much detail as possible.



# Copyrighted Material Had a look Nearly there Nailed it! Content

# Types of operating system

The operating system is what coordinates all the operations of your computer. It manages all the resources on the computer, such as the CPU and RAM, and controls the software and hardware. Without it, your PC would be useless.

ABS

(P))

# Real-time operating systems (RTOS)

Inputs are processed and responded to instantaneously.

- Why choose real-time?
- It provides fast response.
- It is best used where inputs must be processed and responded to immediately, such as traffic light and air traffic control systems.

Automatic braking systems (ABS) are an example of a RTOS. The system continuously processes input data to detect obstacles and apply the brakes to avoid collision as required.

# Single-user multitasking operating systems

One user can use the system at a time, but many applications can run simultaneously.

Why choose single-user multitasking?

- It allows the user to use several applications at once.
- It is best used on systems where a user needs to be able to switch quickly between applications, for example an office worker using a laptop or desktop PC.

# Single-user single task operating systems

One user can use the system at a time, and one application can run at a time.

Why choose single-user single task?

- It requires fewer resources.
- It is best used on devices that have limited processing and memory, which could not handle running multiple applications, for example basic mobile phones or a simple handheld game (such as a Virtual Pet).

# Multi-user operating systems

Many users can use the system at the same time and can run many applications simultaneously.

Why choose multi-user?

- Processing and resources can be shared by multiple-users.
- It is best used where many users need access to the same processing or resources at the same time, for example web servers.

Operating system performance factors

Operating systems require careful maintenance to keep them performing efficiently.



# Now try this

Analyse the factors that affect the performance of an operating system.

You need to demonstrate your ability to use technical vocabulary. You should also cover a range of issues and not just one or two.

# Unit l

Content

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Nearly there



# The role of the operating system

The operating system on a digital device is the link between the hardware and the software. It passes messages back and forth and carries out instructions from the software to the hardware.

# Networking

Operating systems simplify networking in a computer. The operating system implements a number of networking technologies such as:

Had a look

- the TCP/IP stack
- network utility programs such as traceroute
- device drivers for the network interface card.

The TCP/IP stack is the set of protocols used for transmitting data over the internet. The data transmission takes place in layers (or steps). The diagram shows how the TCP/IP stack links to the OSI model, which is the standard model used to explain how computers network.

Links Fo

For more on traceroute, see page 10.



For more on protocols, see page 19.

#### Security Memory management A number of features are commonly built into The operating system manages the computer's operating systems to help improve security. resources, such as its memory. These include: To do this, the operating system decides and user authentication tracks: antivirus and firewall software which processes to allocate memory to how much memory to allocate to each process backup facilities. when to un-allocate memory • transferring data to the pagefile (or swapfile) on the HDD temporarily to free RAM (paging

# Multitasking

Most operating systems allow you to run more than one application simultaneously. To do this, the operating system must be able to allocate resources (CPU, memory, disk space) to each application in order to allow it to complete two or more tasks simultaneously.

# Now try this

Describe the ways in which operating systems help to manage memory on an IT system.

# **Device** drivers

or swapping).

An operating system comes with generic device drivers that work with a wide variety of different peripheral devices, allowing them to communicate with your computer. However, most hardware comes supplied with specific drivers to take full advantage of the hardware's capabilities.



Try to answer the question without looking at the information on this page. Then read the page again to check your answer.

# Copyrighted Material Unit 1 Had a look Nearly there Nailed it! Content

# User interfaces

The user interface is a core part of any operating system. It allows the user to interact with the computer system and is the part of the software that has a huge impact on a user in terms of useability.

#### Command line interface (CLI)

The user interacts with the computer by typing in commands in response to prompts displayed on the screen.

Experienced users find it quicker to complete tasks.

Requires far less memory and processing power than GUIs to run.

P Requires knowledge of the specific commands for performing functions.

 $\bigcirc$  Learning so many commands can be intimidating for inexperienced users.

16/12/2010 24/02/2012 31/10/2011 21/05/2012 23/12/2010 15/02/2012 22/05/2012 13/04/2012 15/02/2012 15/02/2012 15/02/2012 15/02/2012 15/02/2012 15/02/2012 15/02/2012 15/02/2012 15/02/2012 15/02/2012 15/02/2012	12:57 21:31 <dir 02:08 <dir 10:16 <dir 00:13 <dir 20:46 <dir 10:06 <dir 20:46 <dir< th=""><th>41 .gitconfig .idlerc .jdiskreport .VirtualBox Adobe Flash Builder 4.5 Calibre Library Contacts Desktop Documents Downloads Favorites 60,304 g2mdlh1px.exe Links Music Pictures Saved Games Searches 0 Sti_Trace.log Videos VirtualBox 60,34 Command line interfaces use 1,324,812,26 a cimple toxt based concern</th></dir<></dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir </dir 	41 .gitconfig .idlerc .jdiskreport .VirtualBox Adobe Flash Builder 4.5 Calibre Library Contacts Desktop Documents Downloads Favorites 60,304 g2mdlh1px.exe Links Music Pictures Saved Games Searches 0 Sti_Trace.log Videos VirtualBox 60,34 Command line interfaces use 1,324,812,26 a cimple toxt based concern
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# Graphical user interface (GUI)

Users interact with the device by controlling a pointer or touch screen to select icons and menus displayed on screen. GUIs are widely used on devices from PCs to smartphones.

() This simple, intuitive method of interacting is easy for beginners to use.

() It doesn't require users to learn any commands to perform tasks.

There are usually options to adapt the interface according to an individual user's needs, for example by using screen magnifiers or changing the colours or font sizes.

P It is often resource intensive, requiring a lot of processor power and memory.

DExperienced users can find it frustrating to complete tasks they could perform in a CLI with one command.

# Menu-based interface



# Now try this

Rahul is an expert user of computer systems and has spent many years using different types of operating system user interface.

Explain why Rahul is more suited to using a command line interface.



Make sure that you explain what it is about Rahul that makes a CLI advantageous for him.



Nearly there

Nailed it!

# **Utility software**

Utility software is used to manage system resources. Utilities are like a tool box to help us optimise and maintain our computer system. Many utilities are pre-installed as part of the operating system, such as traceroute, while others may be selected by the user and installed, such as antivirus scanners.

#### **Disk utilities**

Disk utilities are designed to maintain the performance of a computer's disk drive.

Had a look

File compressors – backing up very large files and sharing them online can be difficult. This utility compresses files to reduce their size and decompresses them for later access.

Backup – you regularly want to back up your files, but this can be slow as a manual process. Backup utilities allow you to automate the backup process.

Disk defragmenter – over time a computer's disk drive becomes fragmented, which slows down file access. This utility reorganises the data for quicker access, but is only required on a HDD when using Windows (fat32/NTFS) file systems.

#### **Network utilities**

Command Prompt
Stracert mediacollege.com csing route to mediacollege.com ts anaximum of 30 hops: t (10 ms (10 ms (10 ms 192.168.1.1 2 40 ms 421 ms 70 ms 219.58.265.123 4 ms 421 ms 70 ms 219.58.265.123 4 ms 40 ms 421 ms 70 ms 219.58.265.123 4 ms 70 ms 219.58.265.123 5 ms 70 ms 20 ms 40 ms 202.59.123 5 ms 70 ms 20 ms 40 ms 202.59.123 5 ms 70 ms 70 ms 219.58.164.11 5 ms 70 ms

Network utilities are designed to maintain good network traffic and keep networks secure.

Firewalls – open networks are at risk from threats like hackers and worms. Firewalls prevent unauthorised access by monitoring and blocking suspicious traffic.

Antivirus – this utility prevents computers from receiving viruses and detects and removes viruses that have already infected a system.

**Traceroute** allows you to display the path that data packets travel over an IP network to help diagnose problems.

# Other utilities

There is a huge range of utilities which do not fall under a particular category.

Registry cleaners are designed for Windows systems to remove old, redundant registry entries. This can help improve system performance.

System profilers display a detailed breakdown of the system, including hardware and software. This can help with deciding where a system needs upgrading and diagnosing problems with the system.



**System monitors** monitor resources and performance of PC systems. They help identify the causes of poor system performance.

# Now try this

Jessica wants to improve the performance of her computer system as it has been running slowly recently.

Analyse the features of two utility tools that would help Jessica improve her system performance.



The question asks you to 'analyse' rather than simply 'explain'. Make sure you clearly explain why each feature you identify would be useful for Jessica and how they would therefore improve the system's performance. You should also comment on how effective they might be.



# Implications of file types

The choice of file type or storage method of data has ongoing implications for individuals and organisations, including:

Issue	Description	Why might this be an issue?
Compatibility	Some file types only work with certain software.	May need to purchase new software. Sharing files with others who do not have the required software.
Quality	Different image, video and audio file types provide varying levels of quality.	Choice will depend on intended use of the files – e.g. is high quality the priority or small file size?
File size	The file type affects file size – some types are very efficient in the way they store data	File size may have implications for storing, transmitting or displaying files.
	whereas others use lots of storage space.	

# Now try this

Kasim is making a website to advertise his wedding photography business and wants to know what file type he should be using to display his photographs.

Explain the benefits of using two different file types for displaying his images.



Nearly there

Nailed

	e	d	it	



Application software allows end users to complete tasks, such as creating a report or a presentation.

#### Uses of application software

There are many different types of application software that have their own uses. These include: Productivity software – these are applications like word processors, desktop publishers and spreadsheets that are used in office environments to support business tasks and improve efficiency. Graphics software – these applications are used to edit photos or create original artwork. Communications software – these applications make communicating quicker and easier. They include instant messaging, email and VOIP software.

#### Proprietary and open source software

Had a look

These terms refer to who owns the source code behind the software.

Proprietary software	Open source software		
The source code is privately owned by the	The source code is available to read and modify.		
software company.	S Most open source software is free to use,		
Users pay to buy or subscribe to the software.	although many companies provide paid-for		
Support (e.g. for setup and troubleshooting)	services to enhance and/or support open source.		
is provided by the software	Support and fixes are provided by the		
creators.	community, often via forums.		
${}_{\mathrm{A}}$ It may have more features than open source	Dpen source utility software is usually		
software.	compatible with other proprietary utility software.		
The software company may be slow to provide	P Support with fast response may not be		
updates and bug fixes.	available when needed, as it relies on goodwill.		
Deftware is usually very generic, with little	P There may be indirect costs involved in paying		
scope for customisation due to copyright or	for support and training.		
complexity issues.			
() It can be costly			

#### **Choosing** software

When choosing software, consider:

- ease of use familiarity and ease of use is paramount
- reliability ensuring software works as intended and can be depended upon
- capability that the software can do the job required of it and do it effectively.

#### Performance

When looking at performance, consider:

- the maturity of the software, as stable versions of software can be more efficient given there has been time for bugs to be resolved
- interoperability interface with other devices or systems
- support of dedicated hardware for complex tasks.

# Now try this

Seth is looking at different software options for managing orders and deliveries in his freight shipping business.

Analyse the relevant benefits and drawbacks to Seth of using an open source software application for meeting his needs.

This task requires greater depth as it asks for you to 'analyse'. Identify advantages and clearly explain why they would be useful for Seth, as well as how some drawbacks would affect him.



# **Emerging technologies**

Emerging technologies are those that are currently in development and are just starting to make an impact on business and general society.

#### What are emerging technologies?

Some of the emerging technologies we see today include:

- artificial intelligence
- biometrics
- robotics
- virtual reality.

Virtual reality is an emerging technology set to make a big impact on how we entertain ourselves at home.



#### Emerging technologies at home and work

Emerging technologies are changing the way we live our personal lives and the way we do business. Here are some examples.

At h	ome
------	-----

	- Biometrics let	Virtual reality is opening up new and
Artificial intelligence in	us log securely	exciting video gaming opportunities.
automated vacuum cleaners	into our tablets	
gives us more leisure time.	and smartphones	Domestic robots can carry out
Self-driving cars could soon	through our thumb	household chores or home security.
make the roads safer.	print.	Social robots provide companionship.

#### At work

Artificial intelligence used in	Biometrics are increasing security at airports through facial recognition at passport checks.	Virtual reality is allowing businesses to test products
business forecasts	Robots are performing dangerous jobs without risk	under development
is helping in	to life. They can then carry out routine production	in a virtual
decision making.	line tasks, as well as delicate surgical procedures.	environment.

# Implications of emerging technologies

- The Internet of Things (IoT) allows your car to know where you are going and how to get there, and your fridge to pre-order your supplies, but all this needs data. Increasingly, advanced data-hungry technologies are placing a strain on the existing infrastructure.
- Society demands data wherever and whenever it likes we are no longer confined to the home WiFi
  network or the office LAN. Location-aware technologies and the availability of 3D imagery means that data
  access is essential to maintain and develop the emerging world of virtual reality and autonomous systems.
- There are new ways of gathering data resulting in the emergence of 'big data' which means we need new ways of analysing it.
- New ways of identifying ourselves through biometric data also brings the need for greater and more powerful security.

# Now try this

Liam has a small chain of petrol stations and wants to capture the buying habits of his customers so he has introduced a loyalty card scheme.



Think about how Liam is going to collect data and what he will do with it. Explain the potential impact on his existing systems.

Explain what other measures Liam needs to consider so he can get useful marketing information.



Nailed it!

# Wired connection methods

Wired methods of connecting devices are any method that uses physical cables to connect between devices, systems or components. Different types of connection rely on widely differing connectors, depending on what the signal or data is transmitting.

# Wired system connection methods

	Uses	Advantages	Limitations
Cat5	Telephone communications and ethernet networks.	<ul> <li>Versatile and widely available.</li> <li>Cheap compared to other networking options.</li> </ul>	<ul> <li>Only useful over shorter distances.</li> <li>More susceptible to interference than other wired techniques such as fibre.</li> </ul>
Coaxial	All types of data communication, commonly used in television cabling.	<ul> <li>Less susceptible to interference than UTP/STP so works over longer distances.</li> <li>Cheap, though not as cheap as UTP/STP.</li> </ul>	<ul> <li>Thickness of cable makes</li> <li>it difficult to work with.</li> <li>Limited bandwidth.</li> </ul>
Fibre optic	Telephone and internet cables, cable television and computer networking.	<ul> <li>Improved security as the cable cannot be tapped.</li> <li>Can be used over long distances.</li> <li>High data transfer rate.</li> </ul>	<ul> <li>Very expensive.</li> <li>Specialist skills needed to install.</li> </ul>

#### Wired device connections Uses Advantages Limitations VGA Analogue connection of Cumbersome cabling. Dniversally used on highvideo display equipment, Signal affected over resolution display equipment. such as projectors, CRTs or distance (noise). Low-cost cabling. LCDs. DRM (digital rights management). HDMI Digital connection of Dimited length. Capable of 8k (and both video and sound $\vec{e}$ Cabling and technology beyond) resolution. from devices to display is more expensive than Used in computing and equipment. analogue equivalents such entertainment. as VGA. USB/ Connecting equipment and Dimited distance. High speed capability. FireWire peripherals, such as printers, P Limited power supply. Backwards compatibility. scanners, input devices, Can connect multiple cameras. devices.

# Now try this

Meera wants to connect her new laptop to the large 4k LCD Touchscreen TV in the conference room to allow her to collaborate with colleagues on product development.



Make sure you consider ALL aspects of connecting the screen to Meera's computing equipment and how she might make use of the display as both an input and an output device.

Describe what wired connection methods Meera should consider to get the best out of the system.

# Unit l

Content

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Nearly there

Nailed it!

# Wireless connection methods

Wireless connection methods connect using the electromagnetic spectrum. This may be traditional radio waves or even light waves.

# Wireless system connection methods

Had a look

	Uses	Advantages	Limitations
WiFi	To connect devices wirelessly to local and wide area networks such as the	) High data transfer speeds.	<ul> <li>Can be complex.</li> <li>Security concerns.</li> </ul>
-	internet.	الله Good range. A Relatively cheap to install.	
3G/4G/ WiMAX	To connect to data networks such as the internet whilst on the move.	Allows true mobility. 4G provides for very fast connection speeds.	<ul> <li>Heavy data usage can</li> <li>be costly.</li> <li>Uses public networks.</li> </ul>
Satellite broadband	Provides connectivity to remote areas, often rural.	ि Wide coverage. ि High speed.	<ul> <li>High latency.</li> <li>Subject to weather conditions.</li> </ul>
Microwav <i>e</i> / Laser	Allows point-to-point LAN connections between locations.	) High speed.	<ul> <li>Affected by poor</li> <li>weather.</li> <li>High initial cost.</li> </ul>

# Wireless connections methods for devices

	Uses	Advantages	Limitations
Bluetooth	For pairing devices over short distances, such as wireless headphones, watches, keyboards and mice.	Easy to set up.	<ul> <li>Low data transfer</li> <li>speeds.</li> <li>Very short range.</li> </ul>
WiFi Direct	For connecting devices to remote displays.	Can transmit both audio and video. Usually built in to devices.	<ul> <li>Limited range.</li> <li>Can affect data connectivity (interference).</li> </ul>
WiFi	Allows 'ad-hoc' networks to permit wireless printing/ scanning, for example.	Simple setup. Uses existing WiFi Infrastructure.	Dising ad-hoc networks can impact connectivity.

# Now try this

Shaheera wants to set up a local area network in her home to allow her to share an internet connection and files between her different devices.

Explain two benefits of using WiFi for her home network.



Make sure you compare WiFi to other methods of connecting Shaheera's devices, both cabled and other wireless methods.



Now try this

James is considering whether he should use his home's wireless network or use Bluetooth to allow him to connect his PC, smartphone, printer and smartwatch.

Make sure you cover three different factors and link them to the features of PANs and LANs.

Explain what the differences are in terms of the type of network (PAN, LAN and WAN) and what he should consider when making his decision.

# **Copyrighted Material** Unit 1 Had a look Content

Nearly there



# Network choice and performance

Networks are all around us and are as unique as the users who use them. There are many factors and reasons for selecting the various components that make up a network.

# Factors affecting choice of network



# Choosing components

Consider:

- manufacturer is there an affinity to a particular manufacturer? What is the corporate policy?
- specification what kit meets the needs and supports required features?
- warranty/ongoing support corporate level of support? SLA? Response times?
- adherence to standards will it work well with existing components?
- familiarity are there specific skills that in-house staff possess?
- infrastructure what does it have to fit into, for example incorporate existing Cat6 cabling?

# **Performance** factors

Consider:

- available bandwidth and connection methods
- load is the demand likely to be 100% loading the components (how much 'wiggle room' is there)?
- professional level equipment or SOHO equipment?
- infrastructure is it being used on ageing infrastructure?

Now try this

Jane's graphic design business is expanding and she is recruiting two new graphic artists and moving into a small unit.



Don't forget to think about the future. How might Jane's business continue to grow and what impact might this have?

Explain two factors Jane should consider when choosing a network infrastructure.

# Had a look

Nearly there Nailed it!





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Protocols are the rules that define methods of communicating data between two or more digital devices. They ensure that the transmission of data always follows a set procedure. There are different protocols for different applications.

### TCP/IP

Transmission Control Protocol and Internet Protocol are used together as the basic communication language of the internet.

Data sent over the internet is broken up into 'packets' to enable it to be sent more efficiently. Each packet is sent individually and then reassembled at the destination.

- TCP is used to create the packets and reassemble them at the end.
- IP is used to route packets to the intended computer, using the computer's IP address.

#### Email

SMTP – the Simple Mail Transfer Protocol is used to transfer emails between mail servers. It is also used to transfer email from the client software to the outgoing mail server.

POP3 – the Post Office Protocol 3 is used to retrieve emails from the mail server. It allows us to download messages to our client software for offline reading.

IMAP – the Internet Message Access Protocol is used to retrieve emails from the mail server. Rather than downloading the messages, IMAP syncs them with the mail server.

### Voice and video calls

Many companies use their own proprietary protocols for voice and video calls over the internet. Some well-known protocols are:

H.323 – this was one of the first successful VOIP protocols and is recommended by the ITU (International Telecommunication Union). It defines the rules for communicating audio and video over packet switched networks.

**Clinks** Have a look at the diagram of the TCP/IP stack on page 8.

SIP – the Session Initiation Protocol is used to create, control and end VOIP connections.

RTP – the Real-time Transport Protocol is designed to transfer audio and video over IP-based networks.

#### Web pages

HTTP – the HyperText Transfer Protocol is used to allow web servers and browsers to transfer files over the internet. It is how we access the World Wide Web.

HTTPS – the secure version of the standard HTTP. It uses public key cryptography to encrypt communications between a web browser and server.

FTP – the File Transfer Protocol is used to transfer files over a network. It is the technology used to upload files to a server as well as to download large files.

#### Security protocols

SSL (Secure Sockets Layer) and TLS (Transport Layer Security) are used to ensure that transactions over networks are kept safe. SSL is gradually being phased out and replaced with TLS.

# Now try this

Alex is a business executive who uses email as her main means of communication. As she has to travel a lot she needs to use her email on several different devices.

Evaluate the protocols used for receiving emails and which would be most beneficial to Alex.



There are two protocols to talk about for this question. Look at the case study – one protocol is certainly more useful to Alex than the other. Remember, when you are asked to 'evaluate', you need to review the information so you can give a supported judgement about the topic or problem. Often, a conclusion will be required.

# Unit 1 Content

# Data transmission issues

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Nearly there

Data transmission is an important part of computer use. It involves sending digital messages between devices in a network, such as in a LAN or over the internet. Here are the main issues associated with data transmission that you need to know about.

#### Security considerations

Had a look

User authentication – usernames and passwords authenticate users who have permission to use a network and prevent unauthorised access by hackers.

Firewalls – these monitor traffic to prevent unauthorised access and dangerous data packets being passed into the system and causing harm.

Encryption – information can be intercepted while being transmitted. Using encryption ensures intercepted data cannot be read. HTTPS is a commonly used method for secure data transmission.



**VPNs** create a secure connection between remote sites and users over the internet to prevent data being intercepted and read.

Nailed it!

### **Bandwidth and latency**

Bandwidth is the rate of data transfer over a network – usually measured in bits per second.

Latency is the time delay for a data packet to transfer to its destination – usually measured in milliseconds.

### **Bandwidth and latency implications**

Browsing the internet doesn't need an instant response so latency isn't a big factor. Bandwidth is an important factor as it affects how long files take to download.

Online gaming needs very low latency as players need a fast response for real-time updates of character movements, etc.

Video calls need low latency and high bandwidth as you need to transfer a lot of data (video and audio), but you also want a fast response to avoid stutter.

#### Compression

Compression reduces file size so files can be transferred faster. Compression is used for images to be displayed on the Web, video and audio in streaming and VOIP, and documents attached to emails. There are two main types of compression.

- Lossy data removed during compression is permanently deleted. Commonly used in images, audio and video.
- Lossless all original data can be recovered when uncompressed. Commonly used for documents.

#### Codecs

A codec is a program used to compress and decompress video and audio files. This reduces the space they take up on disk and allows fast transfer over a network, such as the internet, for VOIP calls and online streaming.

This leads to a loss of quality in the video or audio – in the resolution, frames per second or both.

# Now try this

Joanna is a big fan of online video games. She is currently experiencing a lot of skipping. She has a high bandwidth connection and thinks the problem is the latency.

Make sure you relate your answer to the context of video gaming.

Describe how bandwidth and latency would affect Joanna when playing video games.