Chhetri Academy

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GCSE COMPUTER SCIENCE

4.1

Edexcel 1CP2 | Specification point 4.1.7

How the 4-layer (application, transport, internet, link) TCP/IP model handles data transmission over a...

Untiered

Answers and examiner comments

2	2021-2023	Untiered
question groups	available papers	tier

Using this booklet

1. Answer numbers match the companion question booklet.
2. Follow the original question number on marking tables.
3. Examiner comments are included where available.

Name _____ **Date** _____

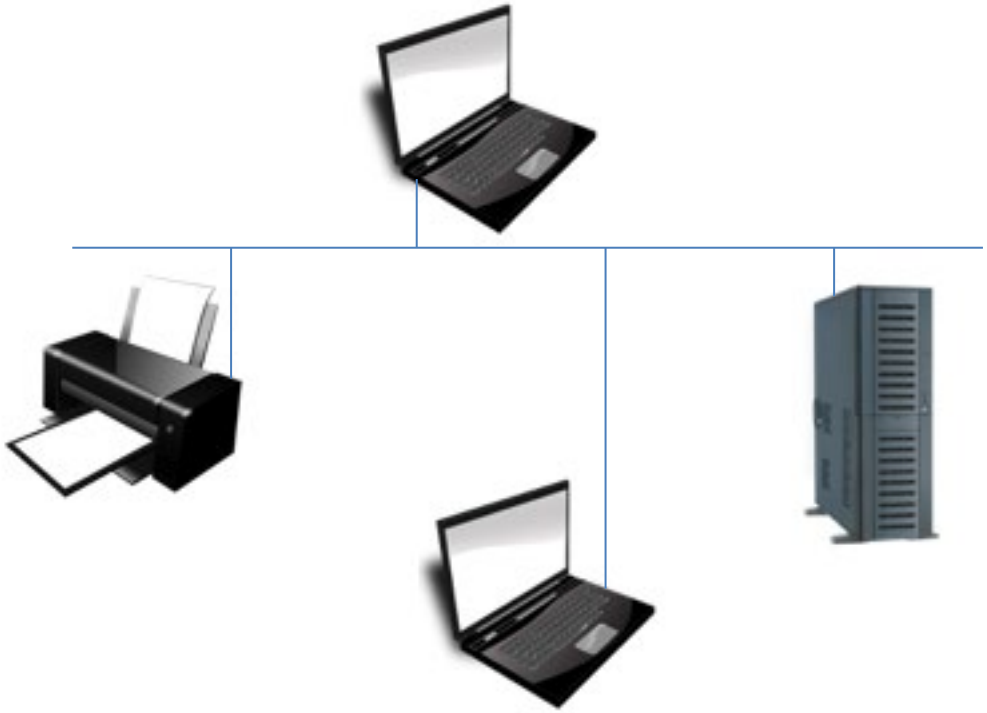
Some entries use full source marking material in an appendix. Any unavailable mark schemes are identified beside the relevant answer.

Question Number	Answer	Additional Guidance	Mark
7(a)	C		**1**

Question Number	Answer	Additional Guidance	Mark
7(b)	An explanation to include **two** from: • IMAP retains the data on a server (1) which can be read by any computer (1) • POP3 downloads the data to the client (1) so it would not be available from a different computer (1)		**2**

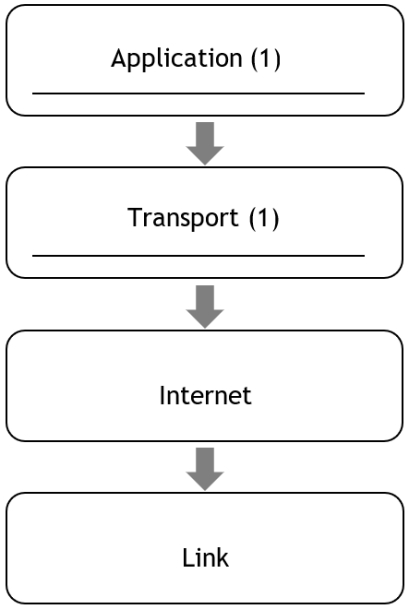
Question Number	Answer	Additional Guidance	Mark
7(c)	A linked description to include **four** from: Splits the data into packets (1) and numbers them (1) using a checksum (1) to see if packets have been delivered correctly (1) to avoid error/data corruption detection (1) before reordering them at their destination (1) Award other linked points such as: resends packets if found to be corrupt/missing on arrival (1) handles handshaking and transmission details (1) establishes a dedicated channel between source and destination devices (1) communicates with the application layer above and the network layer below (1)		**4**

Question Number	Answer	Additional Guidance	Mark
7(d)	Responds to incoming client requests (1) by supplying a service/resource (1) Examples: File/web/mail/database server (1) stores resources (data/files) and delivers (data/files) / manages requests (for data/files) (1) Print server (1) manages requests for print jobs (1)		**2**

Question Number	Answer	Additional Guidance	Mark
7(e)	Single line not directly connected to any device (bus) (1) single lines connecting each device to bus (1) 		**2**

Question Number	Indicative content
8	• Validation and authentication techniques (access control, physical security and firewalls) • Security issues associated with the 'cloud' and other contemporary storage • Different forms of cyberattack (based on technical weaknesses and behaviour) including social engineering (phishing, shoulder surfing), unpatched software, USB devices, digital devices and eavesdropping • Methods of identifying vulnerabilities including penetration testing, ethical hacking, commercial analysis tools and review of network and user policies • How to protect software systems from cyber-attacks, including considerations at the design stage, audit trails, securing operating systems, code reviews to remove code vulnerabilities in programming languages and bad programming practices, modular testing and effective network security provision

Level	Mark	Descriptor
	0	No rewardable content
Level 1	1-2	Basic, independent points are made showing elements of knowledge and understanding of key concepts/principles of computer science. The discussion will contain basic information with little linkage between points made.
Level 2	3-4	Demonstrates adequate knowledge and understanding of key concepts/principles of computer science. The discussion shows some linkages and lines of reasoning with some structure.
Level 3	5-6	Demonstrates comprehensive knowledge and understanding by selecting relevant knowledge and understanding of key concepts/principles of computer science to support the discussion being presented. The discussion shows a well-developed, sustained line of reasoning which is clear, coherent and logically structured.

Question Number	Answer	Additional Guidance	Mark
2(a)	Award one mark for each of:  	Award one mark if both layers are named correctly, but in the wrong order Allow alternatives, such as Process and Host-to-host	(2)

Question Number	Answer	Additional Guidance	Mark
2(b)	Award one mark for: • Bus (topology) (1)		(1)

Question Number	Answer	Additional Guidance	Mark
2(c)	The only correct answer is D *A is not correct because files can be encrypted without the computers holding them being connected in a network* *B is not correct because unconnected computers are at less risk than connected computers* *C is not correct because latency is a network metric, not a reason to connect devices*		(1)

Question Number	Answer	Additional Guidance	Mark
2(d)	Award one mark for any of the following: • HTTP (1) • HTTPS (1) • Hypertext Transfer Protocol (1) • Hypertext Transfer Protocol Secure (1)		(1)

Question Number	Answer	Additional Guidance	Mark
2(e)	Award up to two marks for a linked explanation such as: • Emails can be accessed from multiple devices (1) because IMAP does not remove/delete emails (from the server) (1) • Emails can be accessed through a browser (1) because IMAP doesn't need a client application to download messages (1)	For both marks, the expansion must associate with the statement.	(2)

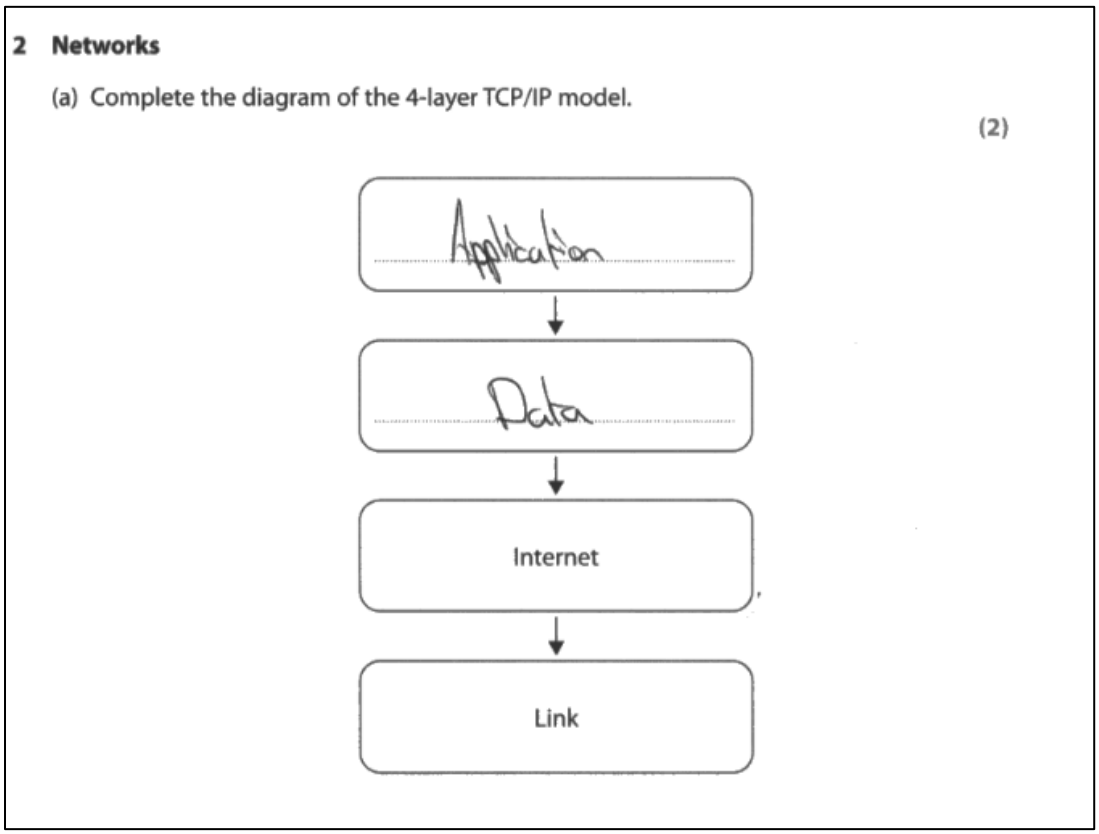
Question Number	Answer	Additional Guidance	Mark
2(f)	Award up to two marks for a linked explanation such as: • (Digital/biometric) locks / magnetic card scanners / security personnel could be put on the office door (1) to prevent unauthorised access (1) • Movement sensors (1), to activate an alarm/ a light (1) • Security lights / alarms (1), so that intruders would be scared off / identified (1) • Alarms / alerts could trigger (1) because there is unauthorised access (1) • The servers/assets could have security tags (1), so that the owner can be tracked if stolen (1) • ID cards could be issued to all staff (1) to prevent impersonation/to allow unknown people to be challenged (1) • Warning posters could be positioned at entrances (1) to make people aware of shouldering/tailgating/two people entering together (1)	CCTV given in the question For both marks, the expansion must associate with the statement.	(2)

Question Number	Answer	Additional Guidance	Mark
2(g)	Award one mark for any of the following: • The **maximum** volume/amount of data that can be transmitted (in one second/unit of time) (1) • The **full capacity** of data that can be transmitted (in one second) (1)	Response must be about capacity of transmission, i.e. the maximum that can be transmitted, not how much/how fast data is currently being transmitted.	(1)

Question Number	Answer	Additional Guidance	Mark
2(h)	Award one mark for any of the following up to a maximum of two marks: • Read the destination/recipient's IP address (in each packet) (1) • Uses a routing table (1) • Sends the data packet **to the next router** (1) • Uses the fastest/least congested route/pathway (1) • Keeps track / informs other routers of traffic conditions (1)		(2)

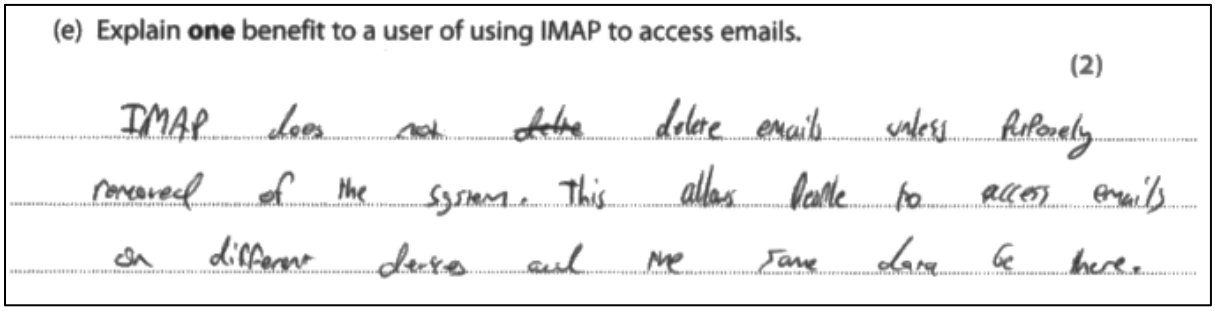
Question 2a

Students could either complete the first two layers correctly or not identify either of the layers. There were a wide range of unrelated responses that showed a lack of understanding of the layers.



This response scored 1 mark for 'Application'.

Many responses stated that IMAP allows emails to be accessed from multiple locations instead of multiple devices, thereby confusing IMAP with networking. A number of responses made reference to speed of access and security, which were not relevant to the question.


(e) Explain **one** benefit to a user of using IMAP to access emails.

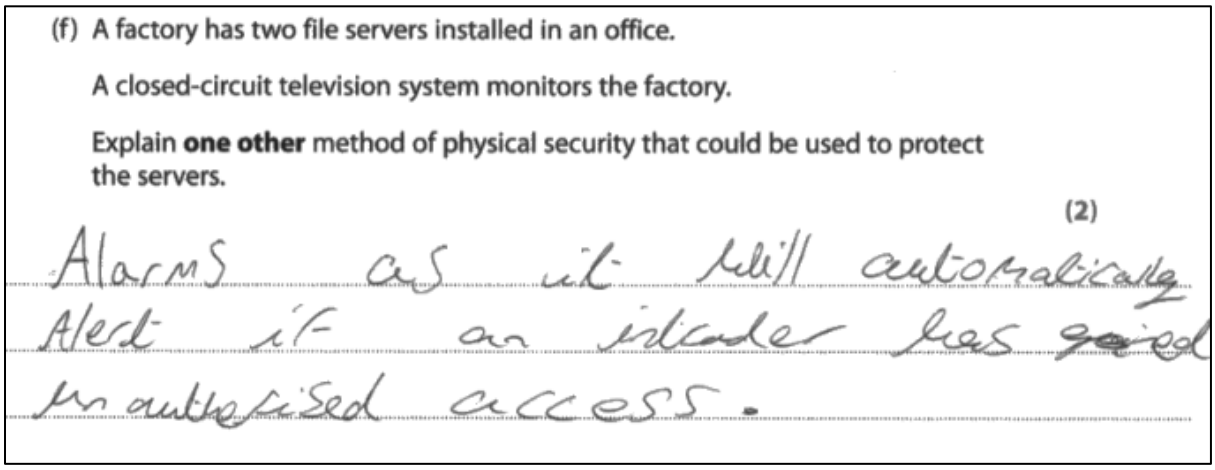
(2)

IMAP does not delete emails unless purposely removed of the system. This allows people to access emails on different devices and the same data be there.

This response scored 2 marks. 1 mark for 'unless purposely removed' and another mark for 'allows people to access emails on different devices'.

Question 2f

Many students highlighted the use of locked doors as a suitable method of physical security. Some referenced CCTV, despite it being in the question. Those who only gained one mark did not make it clear that unauthorised users would be prevented. A few responses mistakenly identified protection such as firewalls, which did not directly address the question's focus on physical security. While their responses demonstrated some knowledge, they needed to be aligned with the specific requirements of the question.


(f) A factory has two file servers installed in an office.

A closed-circuit television system monitors the factory.

Explain **one other** method of physical security that could be used to protect the servers.

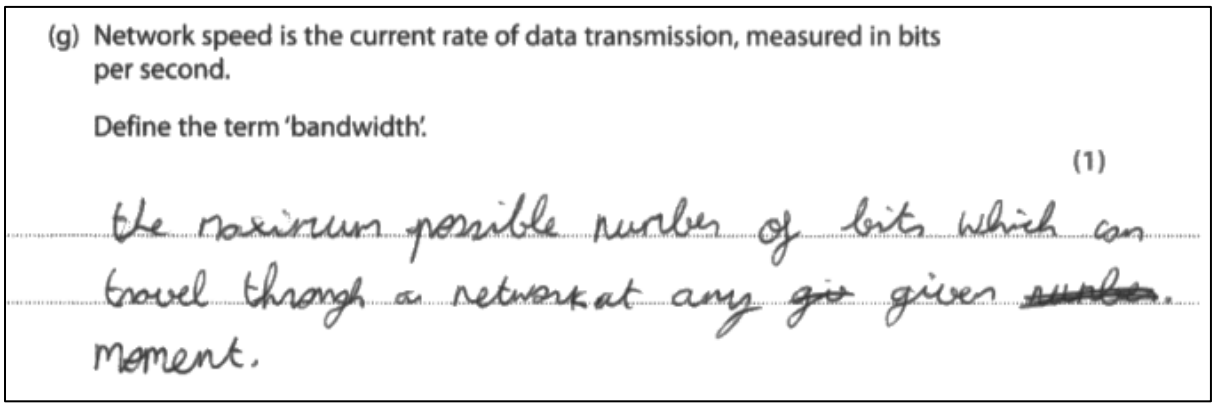
(2)

Alarms as it will automatically Alert if an intruder has gained unauthorised access.

This response scored 2 marks.

Question 2g

Most responses suggested some knowledge of bandwidth, but students did not identify that it is the maximum amount of data that could be transmitted at a given point in time. Most students who did not gain full marks did not refer to maximum data capacity. Some responses referred to 'bandwidth' in terms of distance/range.

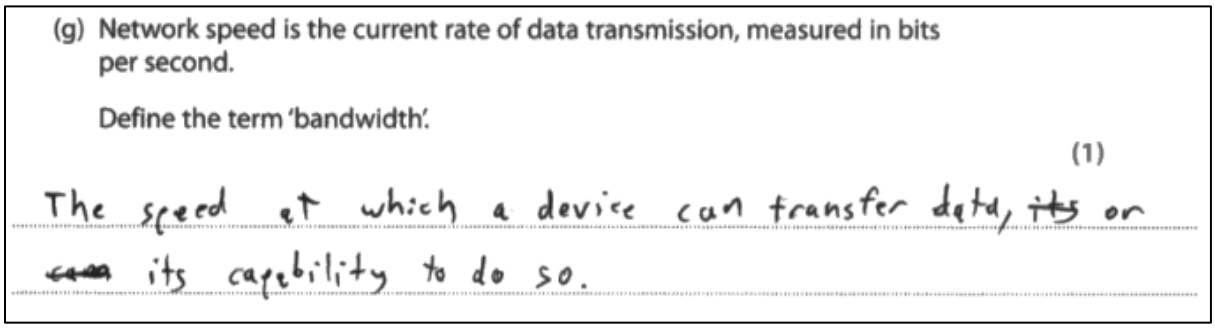

(g) Network speed is the current rate of data transmission, measured in bits per second.

Define the term 'bandwidth'.

(1)

the maximum possible number of bits which can travel through a network at any ~~gi~~ given ~~number~~. moment.

This response scored 1 mark for 'The maximum possible number of bits'.


(g) Network speed is the current rate of data transmission, measured in bits per second.

Define the term 'bandwidth'.

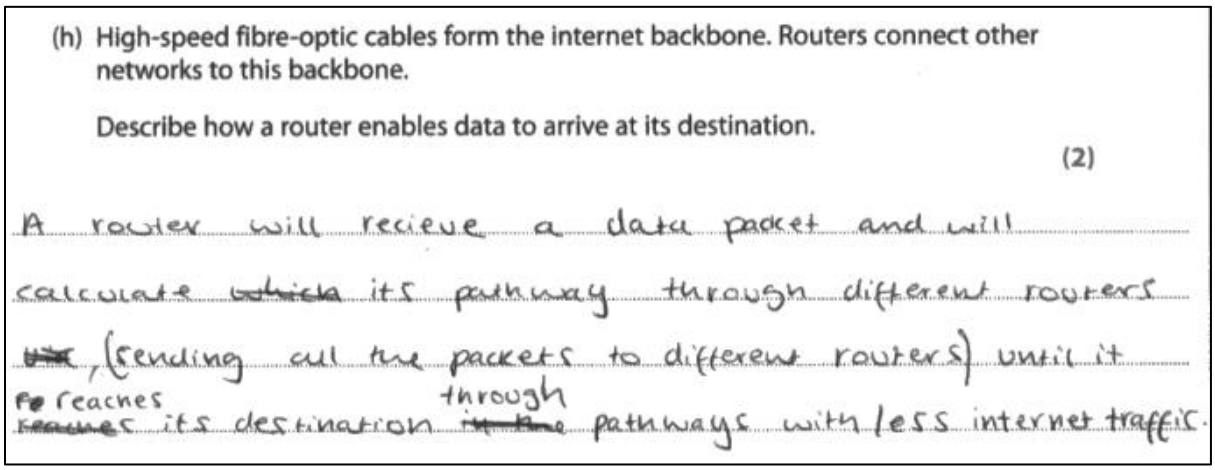
(1)

The speed at which a device can transfer data, ~~its~~ or ~~can~~ its capability to do so.

This response scored 0 marks.

Question 2h

Students often described the process of what happens when data travels through the network but not how (i.e. packet switching). Many were able to identify that the data travelled through the router and concentrated on what it does rather than how it gets there. Many key words were used, including IP address, but MAC was also used in descriptions of the process. At other levels, students had described the packet switching process in detail including checksum processes, clearly showing their level of knowledge and understanding.
There was some evidence that students were recalling a model answer from a similar question on a previous paper.


(h) High-speed fibre-optic cables form the internet backbone. Routers connect other networks to this backbone.

Describe how a router enables data to arrive at its destination.

(2)

A router will recieve a data packet and will calculate ~~which~~ its pathway through different routers ~~the~~ (sending all the packets to different routers) until it reaches its destination ~~the~~ through pathways with less internet traffic.

This response scored 2 marks. 1 mark for 'calculate its (the data packet's) pathway' and the other mark for 'will receive a data packet ... sending all the packets to different routers'. This was enough to imply packets received and then sent **to the next router** (mark point 3). The implication that data is sent to another router was required for this mark point.