OCR
Oxford Cambridge and RSA

GCE

Applied ICT

Unit **G055:** Networking Solutions

Advanced GCE

Mark Scheme for June 2016

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

Annotations

Annotation	Meaning
^	Something vital to the mark point has been omitted.
BOD	Benefit of the doubt given.
NBOD	Benefit of the doubt **not** given.
CON	Candidate contradicts him/herself.
NAQ	Candidate has not answered the question as set.
MTP	Candidate has missed the point of the question.
W	Candidate is working towards a mark but has not given enough to receive credit at this point.
NE	Not enough for the candidate to receive credit.
TV	Answer is too vague to receive credit.
FTC	Follow-through credit. When an earlier wrong answer has been penalised, this may be used to show that credit can now be given to a part of the script which depends on that earlier wrong answer. This avoids penalising a candidate twice for the same error, but **should only be used where specified by the PE**.
MAX	Shows that the maximum number of marks for a part-question or question has been awarded (even though the answer may contain further correct points).
R	The point repeats one already awarded credit.
JE	Candidate has *just* given enough to be awarded a mark.

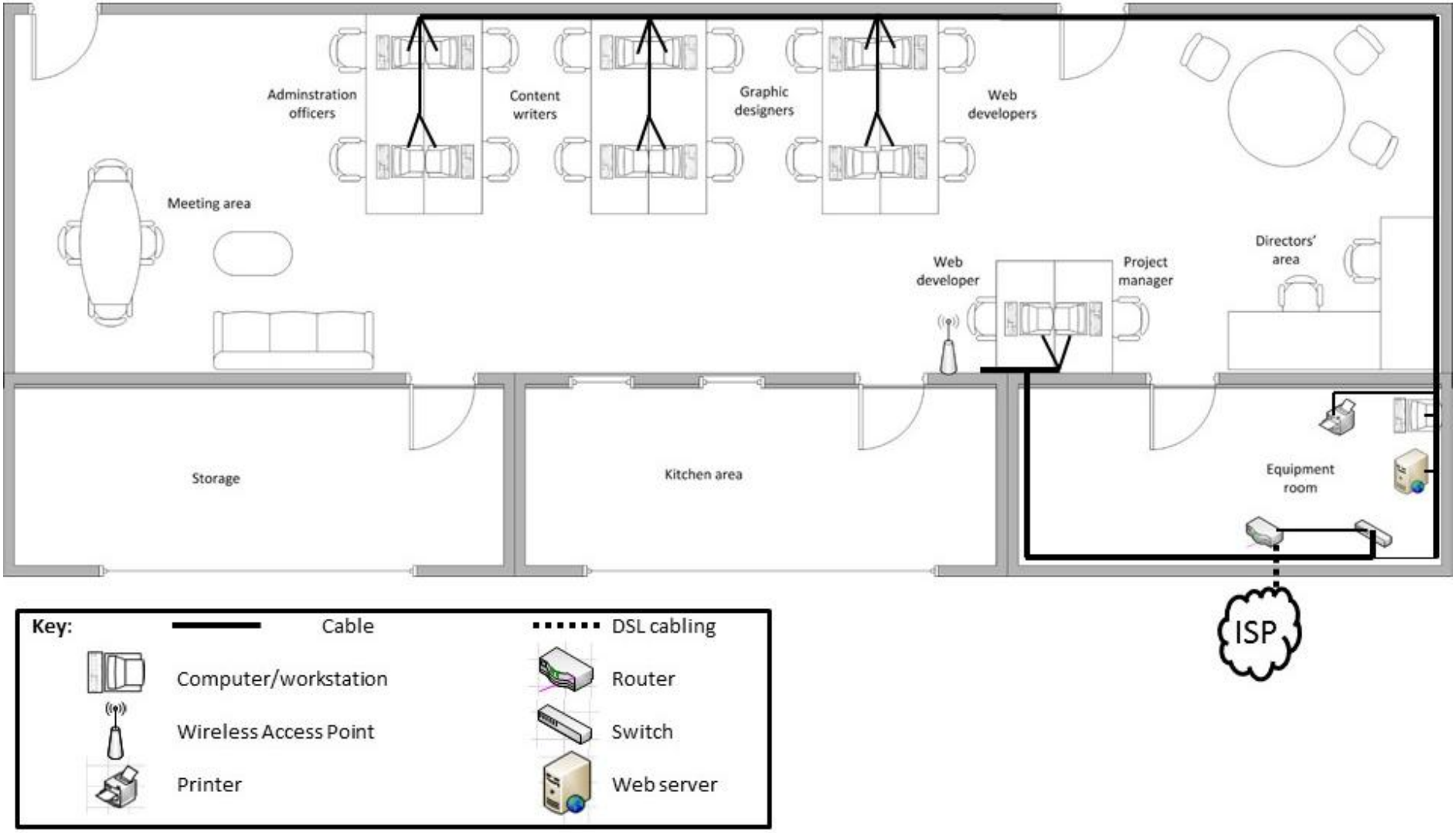
Subject-specific Marking Instructions

There are 100 marks available for this test. They are allocated as follows:

- Tasks 2 and 3 30
- Section A of the test paper 50
- Section B of the test paper 20

Task		Answer	Marks	Guidance
2	**TABLE**	Up to two marks for each description of the function of the device in the GreenFish network, e.g.: **14 workstations:** (high specification) computer equipment for specialist software (1) for example professional graphics software/sound editing software/web authoring software (1) **NAS device**: file sharing for all other computers on the network (1) and for back up of finished work (1) **Broadband (DSL) router**: to manage traffic between GreenFish network and ISP (1) for sharing of one broadband connection for all devices (1) **Wireless access point**: to provide a point of connection for wireless devices on the network (1) with a private, secured network and a public network (1) **24 port switch:** to provide a connection point for the wired devices (1) for sharing of the broadband connection/connections to the shared computer and printer (1) **Web server:** to host GreenFish web pages while in the testing stage (1) and deal with internal and external HTTP requests (1)	12	
	DIAGRAM	See **Task 2 Diagram Example** for example answers 1 mark for each device/set of devices from table if device is correctly placed AND device is correctly connected	6	
	EVALUATION	Some comment is made on method(s) used (1) A strength <u>or</u> a weakness of the method(s) used is identified (1) A strength <u>and</u> a weakness of the method(s) used is identified (1)	3	

Task 2 Diagram Example



<table>
<tr><th>Task</th><th>Answer</th><th>Marks</th><th>Levels of response</th></tr>
<tr><td rowspan="4">3</td><td rowspan="4">Answer may include (field, use of information by GreenFish router, use of information on path through internet):

Total length:
• Allows the GreenFish router to check that the whole packet has been received and to inform the sender if not
• Allows all routers to check that the whole packet has been received and to inform the sender if not
Time to live:
• N/A
• Allows any router on the network to remove the packet and inform the sender if a packet is obviously lost
Header checksum:
• Allows the GreenFish router to check that the packet has arrived intact by calculating a checksum on the header data and checking that it matches the stored checksum
• The sender can be informed if the packet became corrupted on its journey so that it can be sent again if there was a problem
Source address:
• The GreenFish router knows where the data came from and can inform the sender of problems detected from packet length and checksum checks
• The sender can be informed of any problems by any router on the journey that finds the error. This might come from Time To Live or from the packet length or the checksum
Destination address:
• The packet should reach its destination as it has the address of the GreenFish router, which can deal with the data in the packet to send it to the correct device in the GreenFish network
• All routers on the packet's journey can ensure that it reaches its destination by inspecting the destination address</td><td>H
7-9</td><td>The candidate will show a clear understanding of the information contained in the header and its significance in the successful delivery of a packet on an IP network with the GreenFish router as its destination. The candidate will have discussed the use of the information by both the GreenFish router and the routers on the packet's path through the internet. The discussion will be wholly relevant to the router at GreenFish.

The information will be presented in a structured and coherent form. There will be few, if any, errors in spelling, grammar and punctuation. Technical terms will be used appropriately and correctly.</td></tr>
<tr><td>M
4-6</td><td>The candidate will show an understanding of the information contained in the header and what a range of fields means for the successful delivery of a packet on an IP network with the GreenFish router as its destination. The discussion will have some relevance to the GreenFish network.

The information will be presented in a structured format. There may be occasional errors in spelling, grammar and punctuation. Technical terms will be mainly correct.</td></tr>
<tr><td>L
1-3</td><td>The candidate will demonstrate a limited understanding of the information contained in the header by describing the role of a limited number of the given fields. Little or no reference will be made to the GreenFish router.

Information will be poorly expressed and there will be a limited, if any, use of technical terms. Errors of grammar, punctuation and spelling may be intrusive.</td></tr>
<tr><td>0</td><td>Answer not worthy of credit</td></tr>
</table>

For all questions in Section A, *italicised text* is the part of the answer which is relevant to GreenFish. For full marks at least one per description/explanation, or something similar, must be included in the answer.

Question			Answer	Marks	Guidance
	1	a	Any **two** of e.g.: • Lower setup and running costs (1) *only one subscription for over 18 connection*s (1) • *Only one point of entry to the GreenFish network from outside* (1) this is easier to manage for security (1) • Easy to set up and manage without extra staff (1) *GreenFish do not have room in their office for extra staff* (1)	4	
		b	Any **one** of e.g.: • *The connection could potentially be used by over 18 devices at the same time* (1) this would affect the speed of access (1) *especially with the transfer of large files such as the images sent to graphic designers* (1) • Everyone in the office is dependent on one connection with total loss of service if this breaks (1) *GreenFish employees depend on the connection for email/directors depend on the connection for showing developed pages to clients* (1) breakage could cause loss of productivity or embarrassment (1)	3	

Question			Answer	Marks	Guidance
	2		Any **two** of e.g. • Email (1) used by employees to communicate with clients (1) accessed through *web based email* (1) • WWW (1) to *find content, images* (1), use of search engines for research (1) • Public domain software (1) eg, *movie players, software development kits, plug-ins*(1) download and update software (1) • Discussion forums (1) *developers might look for help with coding problems* (1) discuss new ideas in web development with others (1) • Web-based marketing (1) buy software online, *buy images with copyright* (1) *research current trends in web-based advertising* (1)	6	

Question			Answer	Marks	Guidance
	3		Any **two** of e.g.: • Network operating system (1) needed in all devices connected to the network (1) *allow the devices to connect to the peer-to-peer network* as both client and server (1) • Network adapter software (1) needed to drive the network adapters in each device (1) *both wired and wireless network adapters will need software* (1) • Protocol software (1) examples: TCP/IP, NetBIOS, AppleTalk (1) needed to allow communication on the network of *different types of devices* (1) • Web browser software (1) *needed for all employees to access email/web developers to test their pages* (1) *needs to be installed on all devices except sharing computer and printer* (1) • HTML&web page editors (1) *needed for the web developers and content developers* (1) *for the development of finished pages for clients* (1)	6	

Question			Answer	Marks	Guidance
	4	a	Any **one** of e.g.: • Only use i*mages provided by client* as permitted by them (1) and not for any other purpose (1) • Websites containing copyrighted images can be filtered (1) *to prevent employees downloading images from them* (1) • Employees can be required to sign an acceptable use policy (1) agreeing to respect copyright when *downloading images from the web* (1)	2	
		b	e.g.: Network connection should be secure from external access (1) by configuring a firewall (1) which can block unauthorised access *especially to the web server* (1)	3	

Question	Answer	Marks	Guidance
5	Answer may include: Advantages of peer-to-peer over client-server: • lower equipment costs due to no server machines, this is more suitable for a small company • most GreenFish staff will be using specialist software so many files can't be shared • software updates will be specific to different computers with different operating systems and software • large files are quicker to load locally than from a file server, this is especially important for the graphic designers • printing is high cost and is rarely done, cost of a print server may not be justified and network printers have printer queue capabilities anyway Disadvantages of peer-to-peer compared with client-server: • lack of central control may have implications for back up and security, data loss would be expensive for GreenFish • each GreenFish computer has internet access, security must be good on each computer and must be continually updated by each computer separately, this is difficult to manage • it will be the responsibility of the graphic designers to make sure that all image files are shared as necessary, this is difficult to track from a management point of view • it could be more difficult to manage a print queue from the printer, specialist knowledge would be needed but may not be available within GreenFish Conclusions: • GreenFish is a small company and a client-server network would not be financially reasonable • there is not enough homogeneity in the network to justify managing all devices in the same way • Peer-to-peer is the most cost efficient option for an IT-literate workforce with responsibility for managing their own work in terms of security, back up and sharing.	**H** 7-9	The candidate will show a clear understanding of the issues relating to peer-to-peer and client-server networks. The candidate will have made a coherent and balanced evaluation which includes both the advantages and disadvantages of peer-to-peer networks in comparison to client-server networks and will include a justified recommendation for the network at the GreenFish office. The information will be presented in a structured and coherent form. There will be few, if any, errors in spelling, grammar and punctuation. Technical terms will be used appropriately and correctly.
		M 4-6	The candidate will show an understanding of the issues relating to peer-to-peer and client-server networks. The evaluation will include some advantages and disadvantages of peer-to-peer networks in comparison to client-server networks and the candidate will have attempted to justify the choice of network at the GreenFish office. The evaluation may be one-sided. The information will be presented in a structured format. There may be occasional errors in spelling, grammar and punctuation. Technical terms will be mainly correct.
		L 1-3	The candidate will demonstrate a limited understanding of the issues relating to peer-to-peer and client-server networks. The candidate may have listed some advantages and/or disadvantages of peer-to-peer networks and some advantages and/or disadvantages of client-server networks but may have made little or no reference to the GreenFish office network. Information will be poorly expressed and there will be a limited, if any, use of technical terms. Errors of grammar, punctuation and spelling may be intrusive
		0	Answer not worthy of credit

Question			Answer	Marks	Guidance
	6	a	4 seconds	1	
		bi	Any **one** of e.g.: • Fibre optic uses light rather than electromagnetic frequencies to transmit data (1) light is less susceptible to loss and so more data gets through first time (1) • Fibre optic cables are thin and many can fit into a cable channel (1) this allows more connections for each subscriber so more bandwidth (1)	2	
		bii	Any one of e.g.: • *speeds are increased for the shared connection* (1) • *more bandwidth means faster transmission for a shared connection* (1)	1	

Question			Answer	Marks	Guidance
	7	(i)	Recommendation e.g: UTP cable (1) with RJ45 connectors (1)	2	Follow through credit may be given for (ii) so long as the answer is correct for the transmission media given in (i)
		(ii)	Any **two** explained reasons e.g.: • this media is suitably fast, up to 1000Mbps (1) *fast enough for transferring even large images* (1) • flexible (1) so *easy to fix around the office* (1) • *many devices will have RJ45 and onboard LAN* (1) so no extra equipment would be required (1) • Ethernet switches are readily available (1) the *24 port switch* will be easy to get hold of and inexpensive (1)	4	

Question			Answer	Marks	Guidance
	8	a	253	1	
		b	11111111 11111111 11111111 00000000	1	
		c	e,g, For each bit in the address, the bit in the corresponding place in the subnet mask is compared (1) and a new address is filled in (1). If both are 1 then the answer is 1(1). If either is 0 then the answer is 0 (1). The result should be the network address for GreenFish 192.168.2.0 (1)	5	

Section B

Question			Answer	Marks	Guidance
	9	a	Tree or hierarchical	1	
		bi	Any **one** of e.g.: All requests for internet access from all parts of the network will be made through the proxy server (1) which will filter requests (1) and only allow access to permitted sites (1) The proxy server will cache web pages (1) and will take from the cache in preference to downloading again (1) to reduce incoming traffic (1)	3	
		bii	e.g.: Extranet is a web site hosted on the web server (1) that can be accessed from outside the network (1)	2	
		ci	Any **one** of e.g.: • a VLAN is a part of a network separated out (1) which then appears as a separate network (1) • uses managed switches (1) to control the flow of data on and between VLANs (1)	2	
		cii	e.g. It is used for security so that one part of the network is unable to see another part (1) this allows all devices to share resources (1) but not to be able to share with each other (1)	3	

Question	Answer	Marks	Levels of Response
10	Answer may include: Protocols e.g.: • TCP/UDP • IPX/SPX • NetBIOS/NetBEUI What is defined e.g.: • How data is placed on the transmission media. This might be in frames (Ethernet) or packets (TCP) • How data is packaged ready for transmission, with addresses and error checking information. TCP uses IP addresses for source and destination and included sequence numbers and port numbers. • How data is received, unpacked and checked. TCP acknowledges each packet so that those with errors can be retransmitted, so it guarantees error free transmission. • How the operating system is able to talk to the network adapter software. NetBIOS and NetBEUI provided a set of instructions for operating systems to address network software. • How data packets are sequenced to ensure that they are received and dealt with in the correct order. TCP reassembles packets into the correct order when all received. • How data packets are acknowledged. TCP acknowledges all packets. UDP does not acknowledge packets but tries to correct errors as far as possible.	**H** 7-9	The candidate will show a clear understanding of protocols and what is defined by these protocols. The candidate will have discussed a range of protocols and will have included a range of examples of how the protocols deal with data transfer. The discussion will be limited to protocols at transport layer and below. The information will be presented in a structured and coherent form. There will be few, if any, errors in spelling, grammar and punctuation. Technical terms will be used appropriately and correctly.
		M 4-6	The candidate will show an understanding of protocols and what is defined by these protocols. The candidate will have identified a range of protocols and will have included some examples of how the protocols deal with data transfer. There will be a full discussion of at least one protocol. Others might only be lightly referenced. The discussion will be limited to protocols at transport layer and below. The information will be presented in a structured format. There may be occasional errors in spelling, grammar and punctuation. Technical terms will be mainly correct.
		L 1-3	The candidate will demonstrate a limited understanding of protocols and what is defined by these protocols. The candidate will have described a limited number of protocols in terms of data transfer. The discussion may include application layer protocols, demonstrating a lack of knowledge of the protocol layers. Information will be poorly expressed and there will be a limited, if any, use of technical terms. Errors of grammar, punctuation and spelling may be intrusive.
		0	Answer not worthy of credit

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