

Applied ICT

Advanced GCE

Unit **G055**: Networking Solutions

Mark Scheme for June 2013

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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.

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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

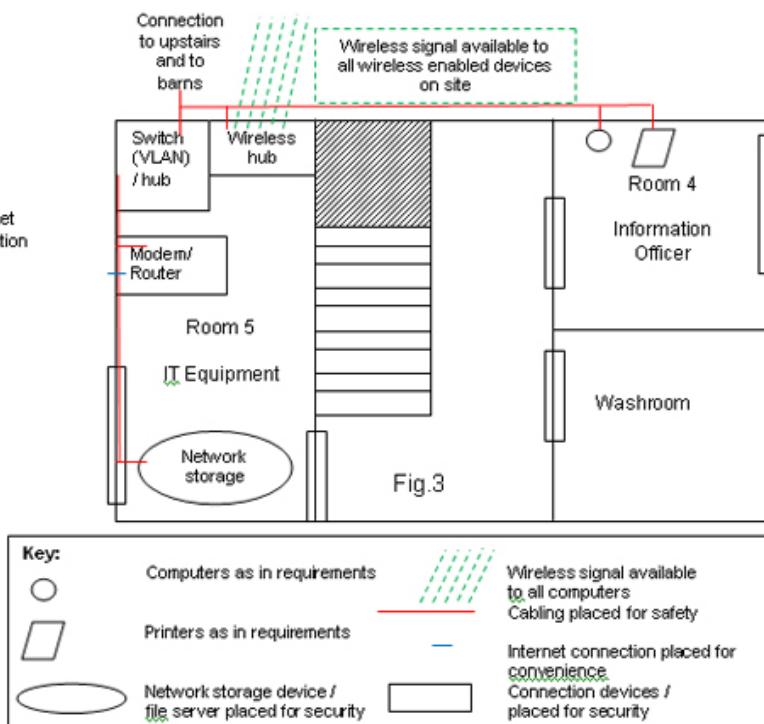
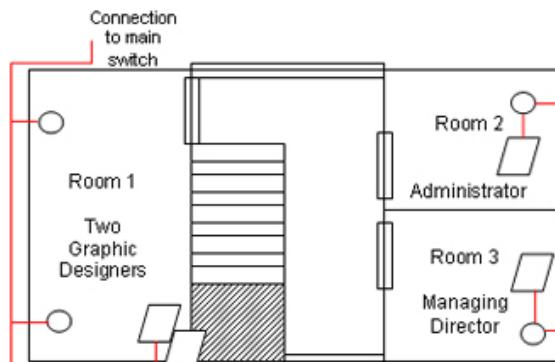
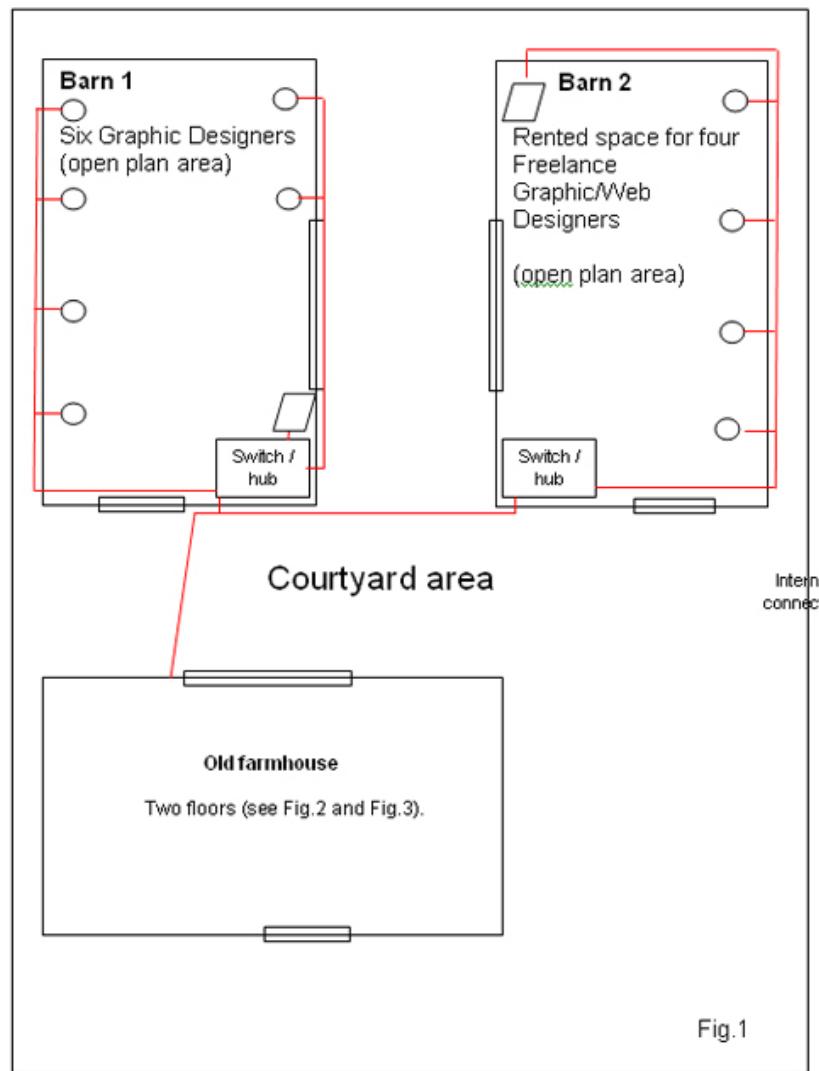
There are 100 marks available for this test. They are allocated as follows:

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

Task		Answer	Marks	Guidance
2		<p>Refer to Diagram example</p> <p><i>All computers:</i> Diagram contains six computers in Barn 1, four computers in Barn 2 and at least five computers in the Old Farmhouse (1). Each must be connected to a central connection device (eg switch or wireless hub) (1).</p> <p><i>Network storage device:</i> Diagram will contain a file server or NAS device in the IT equipment room (1). This must be connected to the central connection device for the main network (1).</p> <p><i>Printers:</i> Diagram must show five printers: one in each barn, one in the Graphic Designers' room, one in the Administrator's room and one in the Managing Director's room (1). Each must be connected to a central connection device (eg switch or wireless hub) (1).</p> <p><i>Internet connection:</i> Diagram contains an internet connection in the IT equipment room in the Old farmhouse (1). This must be connected to a modem and/or router which is, in turn, connected to the central connection device for the main network (1).</p> <p><i>Connection media:</i> Diagram shows cabling/wireless connections for all devices in the network (1). Must be placed in sensible positions around and between buildings (1).</p> <p><i>Connection devices:</i> Diagram contains at least one main switch (which may be a VLAN switch) in IT equipment room, a modem/router and a separate switch/wireless hub in each barn (1). Each must be connected to the internet connection (may be indirectly) and to a number of computers and other devices (1).</p>	18	Condone extra printer in Information Officer's room

Task		Answer	Marks	Guidance
		<p>Key</p> <p>Statement given why: computers are where they are (as in original requirements) (1) either a file server or NAS is placed in the IT equipment room (eg security) (1) the printers are placed where they are (as in original requirements) (1) the internet connection is placed in the IT equipment room (eg security, convenience) (1) the identified connection media has been placed where it has (eg reduce tripping hazard, keep it tidy) (1) the identified connection devices have been placed where they have (eg proximity to connected computers/security) (1)</p>		
		<p>Evaluation</p> <p>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)</p>	3	

Task 2 Diagram example



Task		Answer	Marks	Guidance
3		<p>Answers may include:</p> <p>How a VLAN may be used:</p> <ul style="list-style-type: none"> • VLAN switch installed in network • All computers/devices connected to the VLAN switch • Freelance Designers' computers connected to different parts of the switch from the company computers • Both sides can connect to internet connection (router). <p>How the Freelance Designers' computers will be separated from the network:</p> <ul style="list-style-type: none"> • Freelance Designers' computer connections barred from connection to all parts of the network except the router • Switch programmed to ensure both sides are kept separate • As far as OGD computers are concerned they can't see the Freelance Designers' computers • Freelance Designers' computers can't see OGD computers. 	9	<p>H (7–9) The candidate will show a clear understanding of the task by giving a detailed explanation, with full reference to VLAN technology. The explanation will cover the link between the technology and the security of the main network and will be wholly relevant to OGD.</p> <p>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.</p> <p>M (4–6) The candidate will show an understanding of the task by giving a general explanation of VLAN technology and making reference to how it can be used in the OGD network. The explanation will make some reference to the security of the main network and will be mostly relevant to OGD.</p> <p>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.</p> <p>L (0–3) The candidate will demonstrate a limited understanding of the task by providing a description of VLAN technology with passing reference to the security of the main network. Little or no reference will be made to OGD.</p> <p>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.</p>

Question		Answer	Marks	Guidance
1	(a)	<p>One from e.g.:</p> <ul style="list-style-type: none"> • reduced costs/time (1) can send artwork by email to customers (1) • employees can communicate with customers by email (1) which may be more convenient than telephone or face to face meetings (1) • all users could use the internet for online meetings (1) saving on cost of travel or hosting (1). 	2	
	(b)	<p>One from e.g.:</p> <ul style="list-style-type: none"> • potential security problems (1) email attachments can carry viruses (1) • needs effective policies for use by employees and designers (1) may need to pay for advice on this (1) • employees may spend too much time communicating (1) lowering productivity (1). 	2	
2		<p><u>File server</u> Three from eg: stores all files for all users of the network (1) users log into server to access the files they have permissions to access (1) controls access to all files (1) can manage other aspects of security centrally (1) artwork would be stored here with access only to Graphic Designers (1) Freelance Designers could be given their own areas for back up (1).</p> <p><u>Proxy server</u> Three from eg: controls internet access for all users of the network (1) users log into server to access internet (1) can be configured to block access to particular websites (1) can hide IP addresses for security (1) can be used to monitor activity of Freelance Designers (1) designers may often access the same websites and the proxy server can cache pages for quicker access (1).</p>	6	For full marks answer must relate to case study.

Question		Answer	Marks	Guidance	
3	(a)	<p>See below for diagram One mark per point max 6</p> <ul style="list-style-type: none"> • a correct logical topology diagram for a tree network • correct number of computers shown (15 or 16 if file server included) and connected to local connection devices • correct number of printers shown (6 in total) and connected to local connection device. • file server or network area storage device shown and connected to main connection device • router/modem shown and connected to main connection device • diagram shows separation of Freelance Designers' computers from the rest of the network through own switch connected to a main switch. 	6	A general tree topology diagram may be awarded up to 3 marks if it includes a file server and router connected to the main connection device.	
		<p>Example logical topology diagram for a tree network</p> <p>Printer</p> <p>Computer</p>			

Question		Answer	Marks	Guidance
	(b)	One from: <ul style="list-style-type: none"> • faster access to local printers (1) for OGD and freelance designers (1) • network will not fail if an individual switch fails (1) only the user connected to that switch will lose access to network storage/internet connection (1) • all nodes have a connection to internet (1) through a maximum of two switches (1). 	2	At least one mark is awarded for relevance to OGD.
4	(i)	Fibre optic/STP cable/UTP cable.	1	
	(ii)	Fibre optic – eg uses light pulses (1) rather than electrical signals (1). STP/UTP – eg transmits data up to 100 metres (1) without loss of signal (1).	2	Answer must relate to the answer given in 4 (i).
	(iii)	<u>Fibre optic eg</u> <ul style="list-style-type: none"> • durable for outside conditions (1) should be less need for maintenance (1) less downtime for OGD network (1). <u>STP/UTP eg</u> <ul style="list-style-type: none"> • the distance between the old farmhouse and the barns is less than 10m (1) which is within the limitations of the cable (1) making it cost effective (1) • individual switches are likely to have STP/UTP connections already (1) in all buildings (1) this means no extra expense for connection (1). 	3	Answer must relate to OGD. Answers may take points from more than one bullet to provide an explanation.

Question		Answer	Marks	Guidance
5		<p>FTP (software) (1st) plus two from: manages the FTP connection (1) initiates transfer of files (1) provides file management functions for Mr Cachalot (1) interface is often graphical (1).</p> <p>OR</p> <p>HTML editor (1st) plus two from: allows Mr Cachalot to make changes to existing web pages (1) can be used with a browser to view changes (1) allows him to make new pages (1) highlights errors in the page or code (1).</p> <p>OR</p> <p>Web page editor/authoring (software) (1st) plus two from: allows Mr Cachalot to make changes to existing web pages (1) displays his changes on the screen (1) can be used with a browser to view changes (1) allows him to make new pages (1) highlights errors in the page or code (1).</p>	3	If candidate gives HTML rather than HTML editor do not allow first mark but allow description marks.

Question		Answer	Marks	Guidance
6		<p>Three from eg:</p> <ul style="list-style-type: none"> • <u>ergonomic design</u> (1st) everything in easy reach/sockets easy to access/printer within reasonable distance (1) plenty of space around working area (1) • <u>to reduce risk of back problems</u> (1st) provide adjustable chair height and back (1) to allow user to sit at correct height/so that elbows at right angles/and neck is held straight (1) • <u>to reduce risk of tripping</u> (1st) cables kept tidy/fixed to walls/no trailing cables (1) sockets positioned so that designers do not need to trail cables/holes in desktops to allow cables to go through (1). 	9	3 marks for each up to max 9
7		Regular backup of the file server (1) onto separate storage media (1) ensures that Graphic Designers' work can be recovered (1) if lost due to hardware failure/or data corruption (1) backup kept somewhere else in case of natural disaster eg fire or flood (1).	5	

Question	Answer	Marks	Guidance
8	<p>Answers may include, eg:</p> <p>Copyright Minimum level of protection on home computers Strong password enforcement Server security</p> <p>Benefits:</p> <ul style="list-style-type: none"> • Protects images against unlawful copying • Protection of home computers against malware • Ensures that problems are not passed to the main network • Can be enforced by contract/conditions of use • Strong passwords minimise risk of unauthorised access • Fulfils obligation to keep Freelance Designers' data secure • Keeps Freelance Designers' data separate from VPN access. <p>Drawbacks:</p> <ul style="list-style-type: none"> • Incurs costs • Conditions of use are hard to enforce and monitor • Special software required to enforce strong passwords • Failure to secure server could mean loss of data or confidentiality • Must be regularly maintained. 	9	<p>H (7–9) The candidate will show a clear understanding of the question by giving a detailed balanced discussion of the security measures required, with full reference to the way that the VPN would be used at OGD. The candidate will have identified a range of security measures with benefits and limitations.</p> <p>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.</p> <p>M (4–6) The candidate will show an understanding of the question by giving a mainly one-sided discussion of the security measures required. Some measures will be related to OGD. The candidate will have identified a limited range of security measures with benefit(s) and limitation(s).</p> <p>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.</p> <p>L (0–3) The candidate will demonstrate a limited understanding of the question by identifying security measures with some basic descriptions of each. Little reference will be made to OGD.</p> <p>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.</p>

Section B

Question		Answer	Marks	Guidance
9		<p>Any one from:</p> <ul style="list-style-type: none"> • source <u>IP</u> address (1) IP address of sending host(1) • destination <u>IP</u> address (1) IP address of receiving host (1) • protocol (1) which is being used by the carrier eg TCP (1) • type of service (1) eg VOIP, FTP, SMTP (1) • time to live (1) how many hops before considered lost (1) • version (1) this will be 4 or 6 (1) • checksum (1) used for ensuring the receiver can verify the correctness of the data (1) • total length(1) number of bytes in header and data(1) • header length (1) number of bytes in header only (1) • flags-fragment offset-options-identification (1) configuration settings (1). 	2	
10	(a)	255.255.255.0	1	Only answer.
	(b)	<p>One from:</p> <ul style="list-style-type: none"> • Makes routing easier (1) less routes to choose from (1) • Can increase security (1) individual IP addresses are hidden (1). 	2	
11		<p>Three from:</p> <p>Defines how a web page is requested (1) defines how a web page is transferred to a client's browser (1) uses URLs to locate web pages (1) generates error codes for when a problem occurs (1) operates on TCP networks (1).</p>	3	

Question		Answer	Marks	Guidance
12		<p>Two from:</p> <p>Source/destination port address (1) to identify the sending/receiving device (1).</p> <p>Checksum (1) calculated at both ends to ensure no transmission errors (1).</p> <p>Sequence number (1) used to ensure that the packet is put into the correct place in the original message (1).</p> <p>Acknowledgement (1) used to inform sending device that packet was received with no errors (1).</p>	4	

Question		Answer	Marks	Guidance
13		<p>Answers may include:</p> <p><u>Purpose(s)</u> eg:</p> <ul style="list-style-type: none"> • Record of problems and associated solutions • Referring to previous problems and solutions • Identification of trends and recurring problems • Making problems and solutions easy to find. <p><u>Way(s) of storing</u> eg:</p> <ul style="list-style-type: none"> • Using meaningful file names • Controlling access • Logical directory structure. <p><u>Way(s) of using</u> eg:</p> <ul style="list-style-type: none"> • Look up problems and their solutions • Group similar problems together. <p>Answers may also include:</p> <p><u>Explanations</u> eg:</p> <ul style="list-style-type: none"> • Future problems can be solved by reference to previous problems and their solutions • Allows identification of trends and recurring problems • Will always be available to those who need them • Other users have limited access. 	8	<p>H (6–8) The candidate will show a clear understanding of the question by giving a detailed explanation of a range of purposes and ways of using and storing problem logs. 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.</p> <p>M (3–5) The candidate will show an understanding of the question by explaining a range of purpose(s) and way(s) of using and storing problem logs. Some explanations may be limited. 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.</p> <p>L (0–2) The candidate will demonstrate a limited understanding of the question by describing a limited range of purpose(s) and way(s) of using and storing problem logs. 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.</p>

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