Mark Scheme (Results)

June 2014

Pearson Edexcel GCE in Applied ICT (6959)
Unit 9: Communications and Networks

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.

- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.

- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.

- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.

- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question Number	Answer	Mark

1 (a) i	Describe the advantages and disadvantages of open source software compared to proprietary software.
	1 mark per correct and relevant statement to a maximum of 4 marks.
	Maximum of 3 marks for advantages.
	Maximum of 3 marks for disadvantages.
	  Answers may include:
	  Advantages
	• cost, open source is free to download / free to use/ only costs the price of the media
	• has a faster update / bugfix cycle
	• developers / authors responds faster to user requests for changes
	• simpler licensing requirements / no pirating or copyright issues
	• code is visible / released so it can be checked for errors / adapted to needs
	• uses open standards so better compatibility.
	
	  Disadvantages
	• may be abandoned by the author / developer leaving users without support / with an obsolete product/ author has no responsibility to keep software updated
	• documentation / support may be poor / expensive
	• software which mimics commercial products will lag behind them
	faster update cycle can mean more work for administrators
	• Source code may branch, creating multiple versions
		(4)

1(a) ii	Discuss the compatibility between open source and proprietry file formats 1 mark per correct and relevant statement to a maximum of 4 marks. Answers may include: • open source **must** use open formats / open standards • proprietary software may use closed formats / patented formats to protect sales / reduce competition / cause vendor lock-in • some closed / patented formats are released / patents not enforced for compatibility reasons • Fair, Reasonable and Non Discriminatory (FRAND) terms may be agreed for (standards) essential formats • it is (generally) legal to develop / use readers / converters to read / convert closed formats into open ones • open source software can include routines to read / write closed formats (for compatibility)	**(4)**
1(a) iii	Recommend, with reasons, four named pieces of open source software appropriate for use in the college. 1 mark for an appropriate package with a sensible reason	**(4)**

Answers may include:
- Operating system, Linux or a version of Linux, Free BSD
Reason. well supported, runs wide range of (relevant) software
Other free OSs are available but must have a good reason for recommending them

- Office packages. Open Office / Apache Open Office, Libre Office, Calligra
  - Reason, complete packages (WP, spreadsheet, database, and presentation)

Art and Graphics package. GIMP, Inkscape,
Reason, good facilities, active support / forums / guides
There are many other free art packages, the reason must be relevant to their features / required features for school use
CAD packages. FreeCAD,
Reason. Most complete package with good compatibility and similar to e.g. Solidworks
There are many other free CAD packages, the reason must be relevant to their features / required features for school use

Accept Libre CAD (2D only) ? SketchUp Make (script based, not full CAD), Google SketchUP, OpenScad (3D modeller)

Question Number	Answer	Mark
1 (b) i	Discuss the benefits and drawbacks of changeover systems.	
	For each changeover method.	
	1 mark per correct and relevant statement to a maximum of 3 marks.	
	Maximum of 2 marks if only benefits OR drawbacks considered.	
	Answers may include.	
	Direct changeover benefits:	
	• cheapest method as there is no duplication of systems / work	
	• Fastest method	
	• clearer for users, no requirement for people to use two different systems	
	• simpler training, all users can be trained on the same schedule	
	Direct changeover drawbacks:	
	• problems with the system will not be identified until after the changeover	
	• if the new system breaks it may be expensive to fix / return to old system	
	• if the new system breaks it may badly disrupt the	**(3)**

		working of the college • delay between stopping old system, starting new system	
1 (b) ii	Parallel operation benefits: • possible problems can be identified / resolved without disrupting the working of the college/ safest method • users have more time / less pressure in learning the new system • training / development can be ongoing while the system is introduced Parallel operation drawbacks: • extra costs due to running two systems, e.g. staff hours • users may be confused / overworked by running two systems • users may be reluctant to fully adopt the new system if the old one is still available	**(3)**
1 (b) iii	Pilot changeover benefits: • users in the pilot can be given a greater level of support • only one part affected if the system does not work • lessons learned in the pilot will help subsequent changeover • no / less pressure on non-pilot users as problems should have been solved before they need to make the changeover Pilot changeover drawbacks: • different systems in use at the same time may cause problems. e.g. in sharing files • changeover period can become protracted • users have a wide variety of roles and a pilot may not address all of them	**(3)**
1 (b) iv	Phased changeover benefits: • cheap and low risk as only a small part of the system is changed at one time • users can be given a greater level of support / training until they are comfortable with the change • lessons learned in each phase will help subsequent phases Phased changeover drawbacks: • inappropriate for scenario as OS and software will be replaced, not modules within software • changeover period can become protracted	**(3)**

Total for Question 1 – 24 marks

Question Number	Indicative Content
* 2(a)	**An analysis of netbooks v tablets for Aileen, including:**
	• two price points, sub £200 and sub £300
	• ability to use the software discussed in activity 1
	• ease of use in typical school situations
	• total cost of ownership
QWC	**NOTE, there is no 'correct' answer and recommendations are not required.**
	The analysis may include:
	• operating systems
	o ease of use
	o familiarity of interface / controls
	o available / compatible applications
	o security
	• ability to use the application software
	o compatibility
	o power / CPU speed
	o RAM
	o drive space
	o graphics ability / GPU
	• use in school situations
	o screen size / resolution / brightness
	o keeping it clean
	o robustness
	o weight
	o battery life
	o available connections / ports / interfaces
	o keyboard / mouse / input methods
	o network connectivity
	• total cost of ownership
	o maintenance costs
	o warranties
	o training requirements for support staff
	o likely lifespan of device
	o likely lifespan of ancillaries, e.g. powerpacks, batteries

Level	Mark	Descriptor
	0	No rewardable material.
1	**0 -4**	Document presents factual statements but there is little analysis / explained consequences of them. (less than 50%) Material is not in the context of the scenario.
		Analysis covers at least two topics with at least four sensible statements overall. Analysis mentions price points but may not give any detail. May not identify any devices.
		The candidate uses everyday language and the response lacks clarity and organisation. Spelling punctuation and the rules of grammar are used with limited accuracy.

2	**5 to 8**	Document presents factual statements and analyses / explains consequences of most of them. (over 50%) Material is mainly (over 50%) in the context of the scenario. Analysis covers at least three topics with at least six sensible statements overall. Analysis deals with both price points but may not cover all topics at both prices. May only identify 1 – 3 devices. The candidate uses some specialist terms and the response shows some focus and organisation. Spelling, punctuation and the rules of grammar are used with some accuracy.
3	**9 to 12**	Document discusses relevant factual statements and analyses / explains consequences of most of them. (over 75%) Material is nearly all (over 75%) in the context of the scenario. Analysis covers all four topics with at least eight sensible statements overall. Analysis deals with both price points and covers all topics at both prices. Will identify at least 4 devices. The candidate uses specialist terms consistently and the response shows good focus and organisation. Spelling, punctuation and the rules of grammar are used with considerable accuracy.

Total for Question 2 – 12 marks

Activity 3 - Components of a network - (suggested time 2 hours)

3a A table which details, with reasons, the hardware and cabling components for the Bankside College network.

Must have detail of the items, not just e.g. printer, server, PC, WAP

1 mark per component with sensible quantity and reason in context to a maximum of 14 marks.

Accept higher numbers if answer includes old + new items.

Component	Qty	Reason	Notes
Suitable PCs	2	For ICT and D&T offices and admin office, in scenario.	Suitable to run school SW Assume monitors, keyboards, etc. are included. May state that these are taken from existing stock.
Server	1	Needed to run the LAN. In scenario.	Should use existing server. Only allow additional server if there is a specific purpose for it. Assume monitors, keyboards, etc. are included.
Backup server	1	For backup	Used for both domains.
NAS device	1	In scenario.	Should use existing NAS device
Suitable printer. Colour laser, networked.	6+	Two per floor, in scenario	Must be networkable / stated to be network printers
Suitable projector, wifi enabled	12	One per classroom, in scenario.	Must be WiFi networkable / stated to be WiFi networked.
WAP / Wifi router	16+	Network and Internet access in all parts of the school	Number depends on location of devices. Needs at least sixteen, two per floor in each building.
Main Switch	2	One for each sub-domain	Min of 48 ports
Subsidiary switches / switch-routers	8+	Used to reduce cable runs from main switch, give more flexibility in each area.	8 would give one switch per floor in each building.
Fibre optic cable	160 m +	To make link between sub-domains, other plausible use(s)	160m would be enough to go from the Technology block to the Administrative wing. Quantity should be higher if a longer / extra link is made.
Twisted pair cable	2 x 305 m box	Cable connections for most areas.	Could be given as individual lengths, amount depends on use of switches.
RJ 45 ends	150 +	to connect cables to PCs / waps and other devices.	Accept any plausible number over 150. Accept included as made patch leads.

Mobile computing devices	825 +	800 students, assume at least 25 staff.	Needs to be in line with devices considered in activity 2.
System for moving D&T PCs	20	D&T PCs need to be moved between classrooms	Any sensible system, e.g. trollies
Other sensible device		With reason	May include: UPS, patch panels, cabinets. Accept up to 3 devices for 1 mark each.

Total for Question 1 – 14 marks

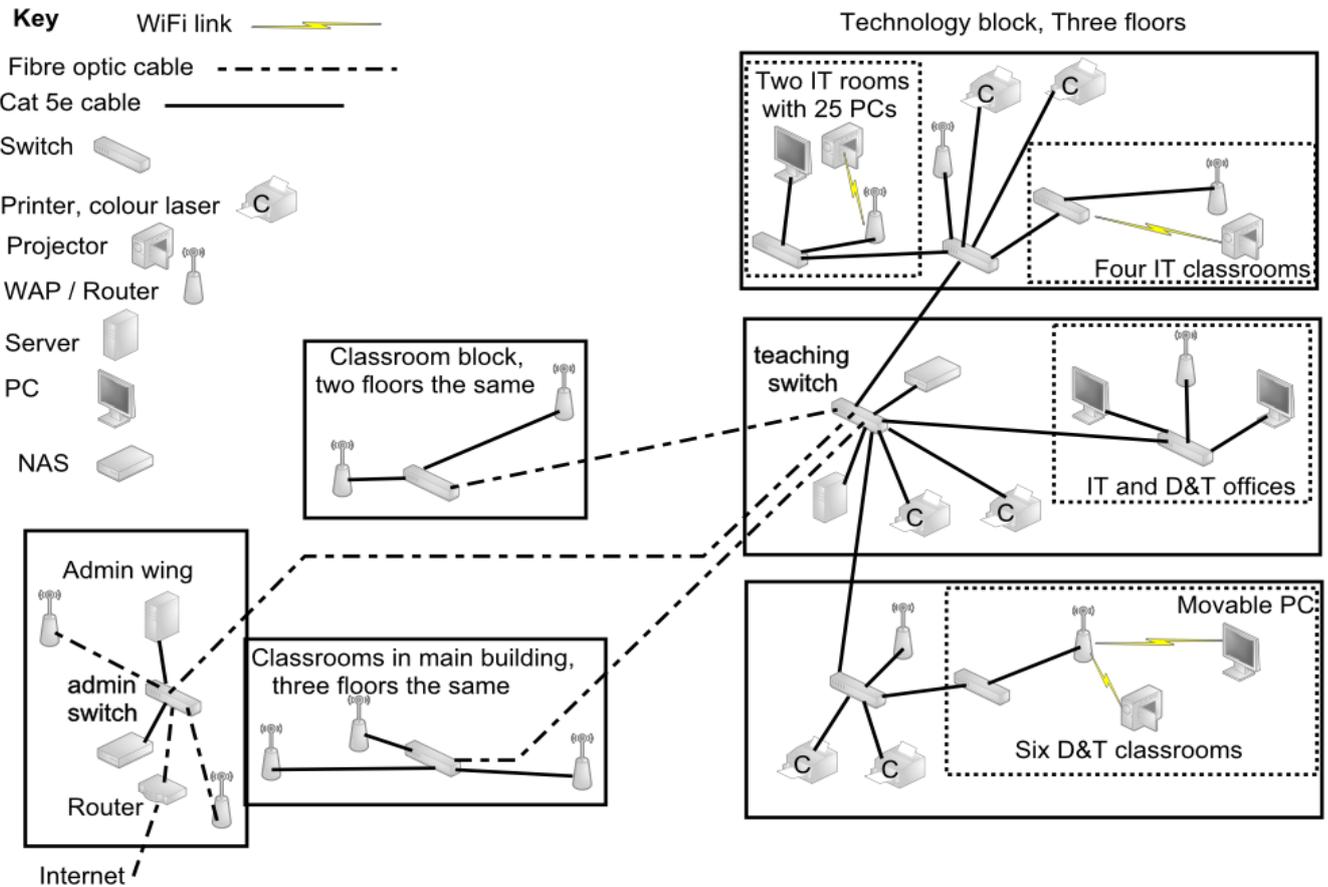| Question Number	Answer	Mark

4 (a)	**A network design for the complete project.**
	1 mark per item to a maximum of 18 marks.
	
	  a) diagram shows at least: Administration wing (AW), Technology Block (TB), Classroom block, Main building (areas other than the Administration wing)
	  b) cable types shown
	  c) AW, admin sub-domain server
	  d) AW, network attached storage device
	  e) AW, Internet connection with (ISP supplied) router
	  f) AW, main switch for admin sub-domain
	  g) AW, direct link from admin server to main switch
	  h) direct link from admin sub-domain to teaching sub-domain
	  i) TB, teaching sub-domain server
	  j) TB, network attached storage
	  k) TB, main switch for teaching sub-domain
	  l) TB, two IT classrooms with large switch, for PCs
	  m) TB, two IT classrooms for PCs with WAP and networked data projector
	  n) TB, ten other classrooms with small switch
	  o) TB, ten other classrooms with WAP
	  p) TB, ten other classrooms with data projector
	  q) TB, six colour laser printers, two per floor. May be shown as six rooms with one printer each.
	  r) TB, IT and D&T offices with PC each
	  s) TB, WiFi access for mobile devices, e.g. one WAP per classroom plus coverage for offices
	  t) TB, indication of movable PC(s) for D&T
	  u) TB, cable links to classroom block and areas of main building other than the AW
	  v) WiFi coverage for entire school
		(18)

Question Number	Answer	Mark
4 (b)	Notes explaining each major decision made with regard to the network devices and equipment There are no marks for descriptions of what is on the diagram. 1 mark per explanation which justifies a decision, to a maximum of 6. eg. I have used a fibre optic cable to link the two sub-domains = 0 I have used a fibre optic cable to link the two sub-domains because the link must carry all the Internet traffic for the teaching sub-domain = 1 Answers may include explanations of: - type of cable - network protection, e.g. cabinets, position WAPs out of reach of students - number of switches - switch positions - wifi provision and / or coverage - provision for expansion	**(6)**

Total for Question 4 – 24 marks

Network Diagram.

NOTE.   This diagram:
- is **not** the only answer
- is probably not the best answer
- is drawn to illustrate all of the marking points

Key

WiFi link

Fibre optic cable

Cat 5e cable

Switch

Printer, colour laser   C

Projector

WAP / Router

Server

PC

NAS

Technology block, Three floors

Two IT rooms with 25 PCs

Four IT classrooms

Classroom block, two floors the same

teaching switch

IT and D&T offices

Admin wing

admin switch

Classrooms in main building, three floors the same

Movable PC

Six D&T classrooms

Router

Internet

Question Number	Answer	Mark
5 (a)	A description of the role of a DHCP server. 1 mark for each relevant factual statement to a maximum of 2 marks. Answers may include: • allocates IP addresses • keeps a database of IP addresses / information • gives address when connecting device requests one • address has time limit	**(2)**

Question Number	Answer	Mark
5 (b)	A statement, with a reason, of which type of address should be used 1 mark for a statement with a sensible reason. • colour laser printers. Static for remote admin • wireless access points. Static for remote admin • PCs in the IT classrooms. Static for remote admin / know where they are OR dynamic as PCs will be swapped out for maintenance etc. • movable PCs in the D&T department. Static for remote admin / know where they are OR dynamic as PCs will be swapped out for maintenance etc. • data projectors. Static for remote admin • mobile computing devices. Dynamic as devices present will change frequently	**(6)**

Question Number	Answer	Mark
5 (c)	A description of how the DHCP server should be configured in terms of address ranges, reservations, and leases 1 mark for each relevant factual statement to a maximum of 6 marks. Must include at least one mark for each of address ranges, reservations, and leases. Look for the ideas: addresses • address range 192.168. 1 - 5, 1 - 255 • need over 900 addresses for all devices • have to use e.g. 192.168. 2 - 5 . 1 - 255 for mobile	**(6)**

	devices	
	• keeping 192.168. 1. range for other devices / printers / waps / PCs	
	• server IP must be outside of DHCP range	
	reservations	
	• reservations needed for static addresses identified in 5b	
	• reservations are fixed IP addresses allocated to specific devices	
	leases	
	• leases, give time limit to IP allocation	
	• leases can be long as there are a known / fixed number of devices and plenty of addresses available	
	• leases could be short to prevent unused / replaced devices from tying up addresses	

Total for Question 5 – 14 marks