

# Mark Scheme (Results)

## January 2009



GCE

### GCE Applied ICT (6959/01)

## 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
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<b>Activity 1</b>	<b>Network Topologies</b> On no more than one A4 page each:	
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A document for Steven which describes the characteristics of the different network topologies. The document should be in non-technical language and include a diagram of each topology.

The information **must be written in non-technical language**.  
 Each topology must have a diagram or a good description of the layout.  
 Each topology must have at least **one** other piece of information.  
 1 mark per topology

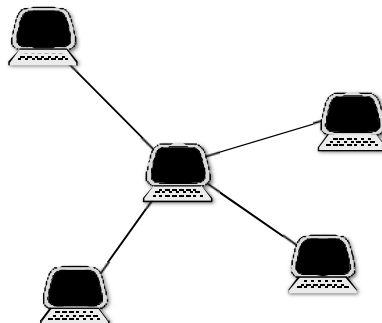
Answers may include:

- bus



requires a terminator at each end  
 therefore a break anywhere in the main cable stops all of the network from working / communicating  
 data sent by one PC goes to all the PCs on the network  
 PCs can be attached via spurs,  
 Spurs make it more robust as a broken spur does not affect the rest

- star



cable break only isolates a single PC  
 requires a hub or switch at the centre except for the simplest cases.  
 a hub centre means all data sent from one PC goes to all PCs  
 a switch centre means data is directed to the correct PC only

Question Number	Answer	Mark
Activity 1 cont		

- tree

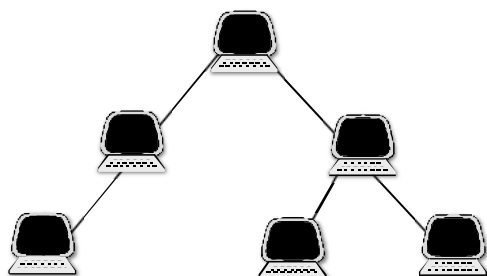


Diagram must be at least 3 levels, else it is a star.

Can be thought of as a star of star networks

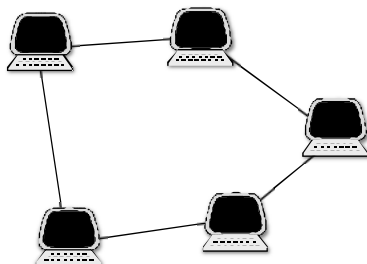
If one cable breaks only the section beyond is affected.

If one cable breaks the isolated section can still operate as a smaller network

5-4-3 rule not applicable in this case, with reason

Cable break only isolates a single PC.

- ring



data usually moves in one direction around the ring

data sent from one PC will go to all PCs between sender and receiver

cable break may not stop the network but speed will drop significantly

PCs can be attached via spurs

Spurs make it more robust as a broken spur does not affect the rest

- mesh

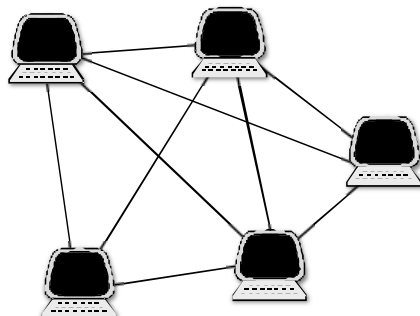


Diagram shows fully connected mesh, a partly connected mesh is acceptable.

Min of 4 nodes, 3 with >2 connections

Lots of redundancy, (if one cable breaks, data can be sent on an alternative path.)

Data from one PC goes to all PCs

Full connection is usually too expensive / impractical except for very small networks often used in WiFi

Question Number	Answer	Mark
<b>Activity 1 cont</b>		
<p>A one page document for Steven and Laura which identifies the <b>two</b> best options for their situation and compares them in terms of:</p> <ul style="list-style-type: none"> <li>• cost</li> <li>• security</li> <li>• reliability</li> <li>• other relevant factors.</li> </ul> <p>There are <b>no</b> marks for the two choices.</p> <p>1 mark for simple <b>comparison</b> of:</p> <p style="margin-left: 150px;">cost security reliability other factor</p> <p>Up to 4 marks for extensions or other factors e.g. ease of installing / maintaining the network, ease of adding or removing nodes, implications for network control, robustness. Must involve a <b>comparison</b>.</p> <p>Cost, reliability, and security depend on how the system is set up, including software measures.</p> <p style="text-align: right;">(8) Total 13 marks</p>		

Question Number	Answer	Mark
<b>Activity 2</b>	<b>Components of a network</b>	

On no more than one A4 page a table showing:

- the quantity, cost, and function of all hardware devices to be used in your design.

Device	Quantity	Function	Cost
Router / WiFi router	1	Are sophisticated switched hubs. They hold information about the addresses of computers attached to the network and can forward data efficiently via an appropriate route.  In this scenario it would be used as a Gateway to the Internet.	Any reasonable cost
Switch	More than 8 ports	Also called a switched hub. It allows any two computers connected to it to send data to each other. It has switching circuitry which allows it to deal with many connections simultaneously.	Any reasonable cost
WiFi Access Point	1 or 2	To allow access to system from laptops / PCs depending on network type.	Any reasonable cost
Printer	5	5 required by Laura and Steven, in scenario	Any reasonable cost
Laptop Access Point / Docking station	2	To allow access to system from laptops if not using WiFi	Any reasonable cost
Other appropriate HW, with a reason	as required	Correct function, with justification.	Any reasonable cost

1 mark per device to a maximum of 4 marks

(4)

- the quantity and cost of any cables or network infrastructure components to be used in your design

Component	Quantity	Cost
Cable, Cat 5 / 6	1 box / 300m	Any reasonable cost
Faceplates, RJ45 centres, and boxes. Accept data sockets	Minimum of 5	Any reasonable cost
Patch leads	Minimum of 5 leads accept larger packs	Any reasonable cost
RJ45 connectors	Minimum of 10 connectors, accept larger packs	Any reasonable cost
Other appropriate, with a reason	as required	Any reasonable cost

mark for each pair of items to a maximum of 2 marks

(2)

Question Number	Answer	Mark
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**Activity 2 continued**

- the function and cost of each item of **network** software required. Include the **total** cost of your design.

Software	Function	Cost
Firewall	Software which inspects network traffic passing through it, and denies or permits passage based on a set of rules.	Any reasonable cost but free versions available
Virtual Network software	Software to handle the connection, encryption of data / security	Any reasonable cost but free versions available
Anti Virus	Software to prevent / detect virus attacks	Any reasonable cost but free versions available
Anti Spyware / Anti Malware	Software to prevent / detect malware other than viruses, e.g. browser hijackers, ad-loaders	Any reasonable cost but free versions available
Other appropriate SW, with a reason	Correct function, with justification.	Any reasonable cost

Look for multi purpose security software. Allow multiple marks if functions are given.  
1 mark per item to a maximum of 3 marks

1 mark for keeping the budget under £1000. To get this mark they **must** have a minimum network consisting of: Router, switch, means of connecting laptops, 5 printers, cable and data sockets (or a WiFi solution).(4)

Question Number	Answer	Mark
<b>Activity 2 continued</b>		
On no more than <b>one</b> A4 page,		
<ul style="list-style-type: none"> <li>• Notes describing <b>two</b> ways of connecting Laura's laptop to a Virtual Network while she is on sales trips</li> </ul>		
1 mark for a method and any <b>two</b> relevant facts Answers may include:		
<ul style="list-style-type: none"> <li>• Telephone modem. Connecting to the Internet via the mobile telephone system <ul style="list-style-type: none"> <li>○ Modem speeds are relatively slow and connections can be patchy away from urban areas.</li> <li>○ Can be used while moving, e.g. on a train or in a taxi.</li> <li>○ Simple USB connection / auto-configuration</li> <li>○ Charged on contract like a mobile phone but may be high cost per megabyte if using a foreign network</li> </ul> </li> <li>• WiFi connection, via public WiFi hotspots <ul style="list-style-type: none"> <li>○ Speeds similar to home or office WiFi</li> <li>○ Only at fixed points, cannot move away and keep the connection.</li> <li>○ Built in to the laptop, simple auto detection / configuration</li> <li>○ Some sites are free, others are on contract or pay as you go.</li> </ul> </li> <li>• Your recommendation as to which is most suitable.</li> </ul>		
(2)		
Either answer is allowable, the marks are for the justification.		
The two methods may be compared in terms of e.g.		
<ul style="list-style-type: none"> <li>○ Cost</li> <li>○ Security</li> <li>○ Reliability</li> <li>○ coverage</li> <li>○ foreign travel</li> <li>○ ease of use</li> <li>○ other sensible factor</li> </ul>		
(4)		
<b>Total 16 marks</b>		

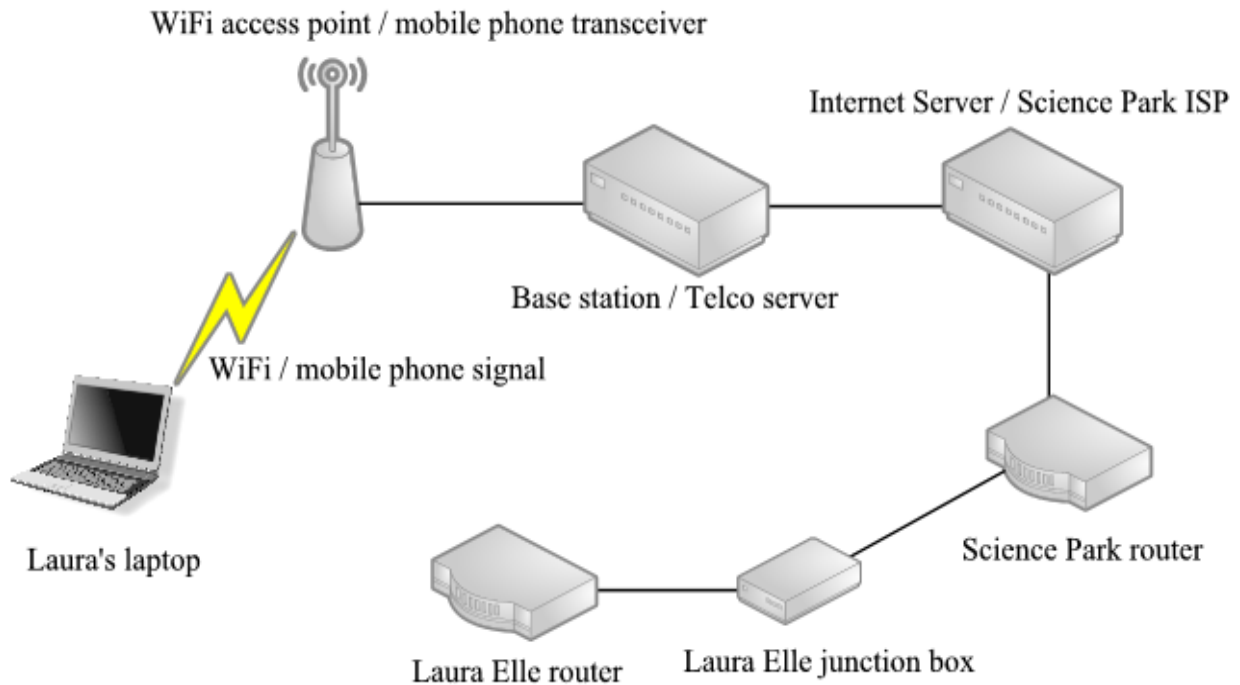


Question Number	Answer	Mark
<b>Activity 3</b>	<b>Network Design</b>	
<p>On no more than <b>one</b> A4 page each:</p> <ul style="list-style-type: none"> <li>• A design for the complete project which meets all of the requirements (12) <ul style="list-style-type: none"> <li>a) diagram shows; despatch and warehousing areas, 3 balcony rooms. Ignore production area.</li> <li>b) cabling to all rooms</li> <li>c) cable from building to Internet</li> <li>d) cable types identified</li> <li>e) junction box, internal network / external cable in the despatch area.</li> <li>f) server in sensible position with max 2 connections</li> <li>g) 5 PCs, 1 per room.</li> <li>h) 5 printers, correctly connected.</li> <li>i) router</li> <li>j) switch</li> <li>k) WiFi Access Point</li> <li>l) Steven's house, modem or router</li> <li>m) Steven's house, connection to Internet</li> <li>n) Laura's laptop, connection to WAP / mobile phone system</li> <li>o) Laura's laptop, connection from WAP / phone system to Internet</li> </ul> </li> <li>• Word processed notes explaining and justifying each major decision made about the network devices and equipment. (4) There are no marks for descriptions of what is on the diagram.</li> </ul> <p>Answers may include:</p> <ul style="list-style-type: none"> <li>• server position</li> <li>• server protection</li> <li>• router position</li> <li>• number of switches</li> <li>• switch position</li> <li>• number of WAPs</li> <li>• WAP position</li> </ul> <p style="padding-left: 40px;">1 mark per explanation which justifies a decision, to a maximum of 4</p>		

Question Number	Answer	Mark
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**Activity 3 continued**

- A diagram explaining the route Laura's data will take between her laptop and the network in the building. (5)



1 mark for each stage of the route to a maximum of 5

(Total 21 marks)

Question Number	Answer	Mark
<b>Activity 4</b>	<b>Network addressing</b>	
On no more than <b>one</b> A4 page each:		
<ul style="list-style-type: none"> <li>• A document to Steven which explains, using examples, what the leaflet means by: <ul style="list-style-type: none"> <li>• has been allocated a public Class C address of <b>164.58.28.250</b></li> <li>• may use any private Class C address on his own network</li> </ul> </li> </ul> <p style="text-align: right;">4 marks</p>		
1 mark each to a maximum of 4 for:		
<ul style="list-style-type: none"> <li>a) description of a class C address</li> <li>b) explanation of public addresses</li> <li>c) explanation of private addresses</li> <li>d) private address example 192.168.x.x.</li> <li>e) description of a subnet mask for C address</li> </ul>		
<ul style="list-style-type: none"> <li>• A document which answers Steven's concerns about changes to his home PC or Laura's laptop.</li> </ul>		
<p>explanation that the home PC will not be affected by IP settings at the unit or Science Park</p> <p>1 mark</p>		
<p>explanation that the laptop must be set to automatically get an IP via DHCP, otherwise it could not use WAPs.</p> <p>1 mark</p>		
<ul style="list-style-type: none"> <li>• A scheme for implementing IP addresses across the private network, with notes justifying each major decision</li> </ul> <p style="text-align: right;">6 marks</p>		
<ul style="list-style-type: none"> <li>a) explanation of static and dynamic addressing / DHCP</li> <li>b) justification for using DHCP, essential for laptop connection / less admin for Steve</li> <li>c) explanation of reservations or scopes</li> <li>d) Static address for server, with justification. Runs DHCP so cannot be in DHCP scope</li> <li>e) Static address for router, with justification. IP used by other machines to make Internet connection so must be fixed.</li> <li>f) Static address for WAP / printers with justification. e.g. remote admin</li> <li>g) Static or Dynamic addresses for PCs, with justification</li> <li>h) gateway address, with justification</li> </ul> <ul style="list-style-type: none"> <li>• A draft reply to Laura's e-mail.</li> </ul>		
<p>which IP address she should put into the Set Up screen?</p> <p style="text-align: center;"><b>164.58.28.250 / 192.58.28.250</b></p> <p style="text-align: right;">1 mark</p>		
<p>why does it want a Port Number, what is a Port Number, and what should she enter?</p> <p>1 mark per point to a maximum of 3</p>		
<p>used by the receiving computer to decide which service / software the data is for</p> <p>used by firewall to allow packets through for correct port</p> <p>A number added on to the IP address</p> <p>sent with each packet of data</p>		
<p style="text-align: center;">1 mark for</p> <p>she should use the default port given with the Virtual Network documentation e.g. VNC 5800, Open VPN 1194, MS PPTP VPN 1723, any specific example.</p> <p>but could use any number as long as the same number is on the computer at the other end</p>		

Question Number	Answer	Mark
<b>Activity 4 continued</b>		
	<p>there is something about enabling Network Address Translation on the router, what does that mean and does she need it?</p> <p>Look for the following ideas</p> <p>1 mark per point to a maximum of 3</p> <p>NAT allows the router to forward the connection request to the correct computer in the private network</p> <p>By changing the port she could connect to different computers / networks / devices.</p> <p>She must have NAT enabled because she is connecting to the public address of the router and needs to access a private address from there.</p>	<p>3 marks</p> <p>ECC</p> <p>Total 20 marks</p>

Question Number	Answer	Mark
<b>Activity 5</b>	<b>Network Management</b>	
<p>On no more than <b>one</b> A4 page, a set of word processed notes which:</p> <ul style="list-style-type: none"> <li>State the key tasks which Steven will need to carry out when managing the network Marks may only be awarded for stating a key task if there is an explanation or description with it. 1 mark per task to a maximum of 6 marks.</li> <li>Explain why each task is necessary for the Laura Elle network and / or company Marks may only be awarded if the reason is appropriate to the scenario 1 mark per explanation to a maximum of 6 marks.</li> <li>Briefly describe a way for Steven to carry out each task.</li> </ul> <p>Marks may only be awarded if the method described is workable for a competent but non-technical user 1 mark per description to a maximum of 6 marks. Answers may include:</p>		

Key task	Explanation of why it is needed	Description of how to do it
System configuration	Should be limited to replacing, e.g. printer, altering, e.g. changing a WAP encryption, or adding a device. e.g. bar code reader.	These are routine events and DIY would be cheaper than calling someone in. Use PnP where possible. Use devices with web page admin screens for easier set up and changes.
User support and management	Support warehouse, despatch and office staff. e.g. They need to have accounts set up. Not much management needed in a business of this size, but allow sensible example.	Steve could be given a simple check list to follow.
Usage monitoring	Not really applicable on such a small system, allow sensible example and explanation.	Not really applicable on such a small system, allow sensible example and explanation.
Fault detection	System failures are often due to simple things, e.g. stuck keyboard, loose data cable, something switched off. Detection and fixing is often simple and should be tried before calling someone in.	Steve could be given a simple check list to follow. This could give actions to take for failure of individual devices, loss of network connectivity, loss of Internet, etc.
Backup procedures	Important data, e.g. client details, sales data, need to be safeguarded against loss due to things like hard drive failure or a fire. Such data should be copied regularly and kept somewhere safe.	This could be set up as an automatic task. e.g. Data could be copied to a set location such as a flash drive, Steve's laptop, or Steve's home PC. Using OS or third party backup utility.
Security procedures	The system needs to be protected against e.g. viruses, spyware, people trying to access the system from outside. Any of these could wreck the system or lead to loss of confidential data.	This can be dealt with by installing anti-virus, anti-spyware, and a firewall. These can be set to run regular scans, auto-update, and give alerts if there are problems.
Contingency planning	Plans should be made for events. These may be rare but likely, e.g. devices will fail and need replacing, or simply possible, e.g. burglary, lightning strike. Plans may help the company to recover faster from the event.	Steve should prepare plans for continuing the business if one of the events happens. It is probably not worth having spare equipment on standby but he could ensure that he can handle essential business from a laptop.

Strategic planning	Plans should be made for the next phase of the business. e.g. expansion on site, move to larger site. This will help the business respond to opportunities.	Steve and Laura should be producing these plans together, taking their business model into account.
Software licensing	Unlicensed software leaves Steven and the company open to prosecution.	Steve needs to keep a record of all the software installed on the system and check that he has a licence for everything. Paper licences should be kept somewhere safe
Formulate a network code of practice	Not really applicable on such a small system, allow sensible example and explanation.	Not really applicable on such a small system, allow sensible example and explanation.
User training	Training of warehouse, despatch and office staff. they need to know basic procedures before they can use the system e.g. logon procedure, any reasonable example.	At this level, possibly a small handbook with one procedure per page.
Legislation	The most applicable is probably the Data Protection Act. Steven must keep personal data secure. He and the company could be prosecuted if he does not conform to the act. Allow other relevant legislation.	Steve needs to password protect / encrypt any files containing personal data. He should also download a guide to the legislation (from information commissioner's site) and check that he is complying with it.
Anything else sensible and relevant	Allow anything sensible and relevant to the scenario.	Allow anything sensible and relevant to the scenario.
		<b>Total 18</b>

## SWW

Header with activity number

Footer with name, candidate number and centre number.

1 mark

All pages have minimum font size of 10 point

Pages inserted into cover sheet correctly

1 mark