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Mark Scheme (Results)

January 2008

GCE

GCE Applied Information & Communication Technology (6959/01)

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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.

Mark Scheme Unit 9 Jan 2008

Activity 1

Required evidence

Max three A4 pages:

Document to Bronco Brian discussing benefits of networks

The document could include any 5 benefits, there must be some discussion of each benefit. It is not sufficient to merely list benefits without any discussion.
Note. Candidates' bullet points may not correspond to single marks.
Candidates may score more than one mark for one of their points.
Brief points may be combined for a mark.
Examples of benefits. (terms from the specification), accept similar meanings.

1. (efficient use of hardware and software resources) Sharing hardware & software resources
   There is no need to purchase laser printers, fax machines, modems, scanners, and CD-ROM players for each computer. These or similar peripherals can be added to a network so that they can be shared by many users. All of the software can be loaded on one computer (the file server). This eliminates that need to spend time and energy installing updates and tracking files on independent computers throughout the building.
2. (information sharing) Sharing common data
   Rapid method for sharing and transferring files
3. (Effective communications)
   The presence of a network provides the hardware necessary to install an e-mail system.
4. (support for group, collaborative and flexible working) Supports group or collaborative working
   Allows many users to work on a document or project concurrently.
5. (Productivity gains)
   A network increases your employees' productivity by providing quick and more convenient access to the information they need. No more running around trading floppy disks, waiting to print on someone else's printer or having to use another computer to access a database.
6. (centrally managed backup) Centralised back-up services
   Networks enable you to easily backup and protect the important information you rely on every day. By centrally storing information Central data storage and security means that you can sleep better at night knowing your data is safe and secure.
7. (centrally managed security)
   Logon times and other restrictions can be set centrally. User password policies can be set for e.g. strength, length, lifetime.
8. (Control and monitoring of access and activity)

Passwords can be established for specific directories to restrict access to authorized users. Logs can be kept to show events such as: logon / logoff, software use, printing.

9. (Cost savings)
   Network versions of many popular software programs are available at considerable savings when compared to buying individually licensed copies. Besides monetary savings, sharing a program on a network allows for easier upgrading of the program. The changes have to be done only once, on the file server, instead of on all the individual workstations.
10. (centrally managed administration)
    System administration tasks are carried out on a server / domain controller, instead of on individual workstations. Many routine tasks such as defragmentation / antivirus updates can be performed automatically / remotely. Domain rules / policies are set up and enforced centrally.
11. (centrally managed user support)
    The network users should all be running the same OS and software packages. The machines will probably be the same. A central helpdesk should be able to deal with common problems. It should also be able to use e.g. remote desktop, to take over workstations.

Maximum 5 marks

Notes describing characteristics, properties and uses of different types of networks.

Characteristics of LANs WANs and MANs. Reference could be made to the geographical areas they cover, methods of connection, and possible uses.
Look for a statement about each type of network in each case.
Examples.

Geographical area.

LAN Limited area, e.g. in a single building
MAN metropolitan area. e.g. a town, city, suburb, university campus.
WAN geographically separated. e.g. sites in different countries.

all 3 = 1 mark

Method of connection

LAN cable, wifi
MAN cable, wifi bridge, mesh radio
WAN telecoms system. e.g. modem + telephone line, DSL, ISDN, satellite link

all 3 = 1 mark

Uses

LAN enable users to share files, peripherals. Internal communication.
MAN as LAN but with more emphasis on communication.
WAN emphasis on communication, e-mail, Internet, e-commerce.

all 3 = 1 mark

A suitable example of how the networks are used = 1 mark

Any other notes e.g. relative speeds / capacities (needs a figure), relation of network type to the scenario, reliability, scalability, performance, hardware / technical requirements.
Any 2 = 1 mark

Max 5 marks

Recommendations on which type of network to install

Recommendation should take into account plans for future growth. Several LANs linked to form a MAN or WAN would be the recommended solution. Candidates should justify the connection method in terms of cost and availability

2 LANS linked to form a MAN or WAN or extended LAN WiFi	1 mark
Reason in terms of cost	1 mark
Reason in terms of availability (of link)	1 mark
Already have a LAN	1 mark
Reason in terms of future growth	1 mark
Other sensible and relevant reason	1 mark
considered rest of the business	1 mark

Max 4 marks

Maximum total marks for Activity 1: 12

Activity 2 Components of a network

Required evidence

A list of all the components, transmission media, connections and software to be used.

Notes explaining the purpose of each item

Up to 4 marks to be awarded for a comprehensive parts list including speed or category of the components, and their use within the system. Any sensible, compatible selection of parts providing accompanied by a correct explanation of purpose

A possible parts list:

27 PCs +- 4

4 or 7 laptops

14 B&W printers +- 2

1 colour laser printer

Match PC numbers. Fast Ethernet (100baseT) NICs to connect the wired PCs to the network.

Match Laptops Wireless PC cards (802.11g) to allow the laptops to connect to the network.

Docking stations for laptops.

Wireless access points (802.11g or later), min one for each building, which will allow the laptops access to the network.

Cat 6 UTP cable to connect all wired computers, switches and hardware access points.

Sufficient RJ45 connectors to connect the cable to the devices.

Sufficient sets of fast Ethernet switches/hubs (48 ports per building, or other number if justified) for connecting the individual rooms/PCs in each building to the main switch.

Sufficient fibre optic cable for linking 2 sites if using
Sufficient Fibre optic connectors for connecting cable to network

2 routers, 1 for each building
2 Firewalls, 1 for each building

Patch panels, to match switches.
Cabinets, to house switches / patch panels

Server. minimum of 1 or 1 per building.
Network O.S.
Anti Virus.
Firewall if not given as hardware

1 mark per two sensible, compatible components, with sensible numbers. to a maximum of 4 marks
1 mark per two correct explanations of purpose, even if numbers are incorrect.
to a maximum of 4 marks

Maximum 8 marks

A list of possible alternatives that may be used if reducing the expenditure is necessary.

1 mark per sensible alternative e.g:

- could use Cat5e cable instead of Cat6 or fibre optic.
- could use hub instead of a switch.
- sharing of laser printers, e.g. in marketing

Giving cheaper alternatives to individual items is acceptable
Using less items, with sensible explanation.

Maximum 3 marks

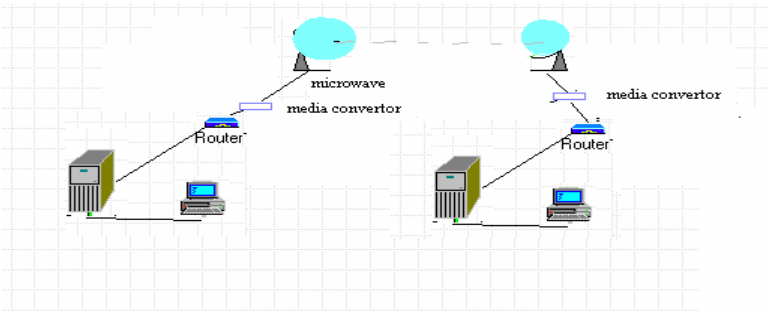
Notes describing the different methods of connecting the Chuck Time House to the network of the Ranch House

1 mark for identifying a correct method of connection with brief explanation.

1 mark for each method with detailed explanation which may include a diagram.

Examples

Microwave

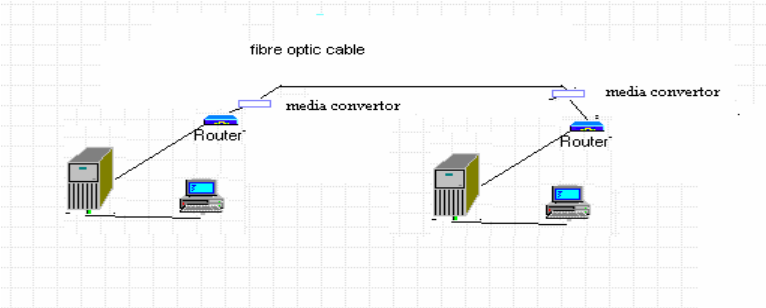


- Microwave dishes used to transmit data over long distances. 4 miles an easy distance
- Uses high frequency microwave to carry data

- Relatively easy to set up for a contractor
- Speed typically 1-10 mbps
- A problem, interference, absorption in rain etc, security.

2 marks

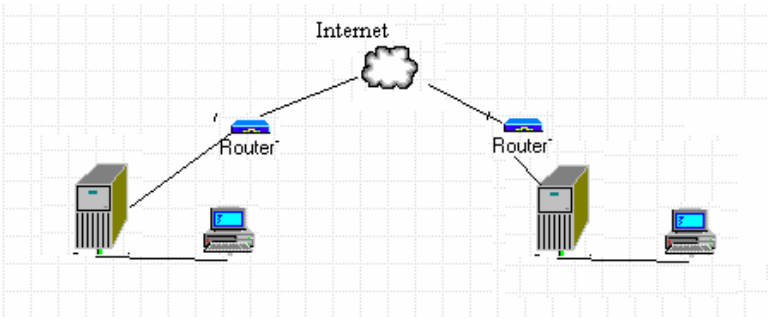
Single mode Fibre optic cable



- Small core
- Less dispersion then multimode therefore less loss of signal
- Can be used over long distances, up to 3km
- Uses lasers as light source for distances of several thousand of meters
- A problem, digging the trench.

2 marks

Connection via the Internet



- Connect at both ends to Internet using normal Internet routing
- No special contracting required.
- A problem, security.

2 marks

Leased Line.

- Connect at both ends to Telecoms using normal lines
- No special contracting required. Only needs telecom engineer to check line

Maximum 6 marks

Your recommendation as to which method of connection is most suitable

The recommendation must be justified. The quality of the justification is the most important element of this rather than the particular

recommendation as any of the three solutions is viable. The justifications should be related to the scenario at BBGs. They could involve:

- security
- cost
- performance

Max 3 marks

Total marks for activity 2: 17

Activity 3 Network Design

Required evidence

- ❑ A **one** page design for The Chuck Time House network
- ❑ A **one** page design for The Ranch House network
- ❑ **One** page of notes justifying each major decision made about the network design.

Network layout diagrams in an appropriate format showing the logical layout of the networks.

The diagrams should:

- be comprehensive, as a minimum, showing how each room or set of computers is connected. (showing lots of individual PCs would probably not be the most effective method of presentation).
- show how switches/hubs and access points and routers are used together to create the network. There are many possible configurations for the network and thus any sensible layout is acceptable.
- show separate rooms/areas for one site.
- show presence of cables.
- show an external connection (to the other site).
- each be on a single A4 page.

For each site. A basic layout showing direct connections between a number of areas and a central server without the detail of switches/hubs/routers etc. or means of connecting the two sites

1. Appropriate format for diagram 1
2. Logical server position 1
3. Cabling 1
4. Switch/hub/router 1

Up to 2 x 4 marks

For each site. A detailed layout showing accurately how areas are connected to switches/hubs/access points and then on to main servers. Cable types should be identified. Number of PCs and printers in each room identified

5. Cable type identified 1
6. Number of PCs/Printers in each room/area identified 1
7. Positioning of switch/hub in rooms, or other sensible. 1
8. Server/router connection 1
9. Connection between buildings 1

Up to 2 x 5 marks

A very comprehensive layout showing accurately how all areas are connected and revealing a detailed knowledge of network issues, including e.g. detailed allocation of printers or print servers; routers etc. Position of access points, switches and main server to be taken into consideration.

10.	Printers networked	1
11.	Position of wireless access points in rooms	1

Up to 2 x 2 marks

Notes justifying each (major) decision made with regard to the network design

Up to 6 marks

Notes should be on one A4 page

Maximum total marks for activity 3: 23

Activity 4 IP Addressing

Required evidence

A scheme for IP addressing with an indication of the actual IP addresses to be used

Any logical grouping of IP addresses within the network range specified is acceptable assuming a Class C private network:
e.g.
Main server 192.168. 1. 2
Main router 192.168.1. 1
Routers, servers etc 192.168.1.3 - 192.168.1.8
Print servers, access points etc. 192.168.1.9 - 192.168.1.32
ICT computers 192.168.1.32 - 192.168.1.254
etc..

The more fully specified the ranges of addresses are the more marks that should be allocated up to a maximum of 6. e.g

Address range, explain a class C address, demonstrate in IPs	**1 mark**
Reservations	**1 mark**
Address for server	**1 mark**
Addresses for router / gateway	**1 mark**
Addresses for networked printers	**1 mark**
Addresses for WAPs	**1 mark**
Indicating which addresses are dynamic and which are static DHCP	**1 mark**
Subnet mask 255.255.255.0	**1 mark**
Subnet mask division e.g. 255.255.255.128	**1 mark**

Maximum 6 marks

Notes justifying each (major) decision made with regard to the IP addressing scheme

The notes are an opportunity for the student to reveal more about the decision making processes involved in designing the network. Each sensible decision made should be awarded 1 mark up to a maximum of 6.

Maximum 6 marks

Maximum total marks for activity 4: 9

Activity 5 Network performance

Required evidence

Notes discussing possible causes of performance degradation

Possible causes may include:

- Processing ability of router
- Number of devices on network
- Firewall rules
- Access control techniques
- Bandwidth
- Volume of traffic
- Media and connectors used
- Malware
- User profiles too big

1 mark given for any possible cause
1 mark for explanation as to why performance could be affected

Maximum 6 marks

Up to 3 marks for detailing possible remedial action
Example
Cat5 cabling to be replaced with Cat 6 or fibre optic to increase bandwidth
Change hubs to switch/routers to reduce broadcast traffic

Maximum 6 marks

Total marks for activity 5: 9

Activity 6 – Network Management

Required evidence

Detailed job description listing the duties that would need to be performed to keep the network running efficiently

Example
Possible duties could include:

1. system configuration
2. user support
3. user management
4. usage monitoring
5. misuse monitoring
6. fault detection
7. backup procedures
8. passwords and access levels
9. other security procedures eg. anti virus, firewall
10. contingency planning
11. strategic long-term planning
12. software licensing
13. server management
14. loading server software
15. manage update rollout
16. centralised software rollout
17. formulating a network code of practice
18. user training
19. dealing with legislation
20. supervision / management of network staff
21. Purchasing advice
22. write reports to management / policy documents, etc.

For each duty there should be a clear explanation as to what needs to be undertaken
1 mark for each duty.
1 mark for an explanation.

maximum 18 marks

Total marks for activity 6: 18

Standard ways of working.

All printouts must contain the activity number, your name, candidate number, and centre number.
Pages must be securely fastened to the cover sheet and in the correct order.
Minimum font size of 10 should be used for all word processed documents.

Total 2 marks

Total for paper: 90 marks.