



Rewarding Learning

**ADVANCED
General Certificate of Education
2014**

**Applied Information and
Communication Technology**

Assessment Unit A2 13

assessing

Unit 13: Networking and Communications

[A6J71]

TUESDAY 17 JUNE, MORNING

**MARK
SCHEME**

General Marking Instructions

Introduction

Mark schemes are published to assist teachers and students in their preparation for examinations. Through the mark schemes teachers and students will be able to see what examiners are looking for in response to questions and exactly where the marks have been awarded. The publishing of the mark schemes may help to show that examiners are not concerned about finding out what a student does not know but rather with rewarding students for what they do know.

The Purpose of Mark Schemes

Examination papers are set and revised by teams of examiners and revisers appointed by the Council. The teams of examiners and revisers include experienced teachers who are familiar with the level and standards expected of students in schools and colleges.

The job of the examiners is to set the questions and the mark schemes; and the job of the revisers is to review the questions and mark schemes commenting on a large range of issues about which they must be satisfied before the question papers and mark schemes are finalised.

The questions and the mark schemes are developed in association with each other so that the issues of differentiation and positive achievement can be addressed right from the start. Mark schemes, therefore, are regarded as part of an integral process which begins with the setting of questions and ends with the marking of the examination.

The main purpose of the mark scheme is to provide a uniform basis for the marking process so that all the markers are following exactly the same instructions and making the same judgements in so far as this is possible. Before marking begins a standardising meeting is held where all the markers are briefed using the mark scheme and samples of the students' work in the form of scripts. Consideration is also given at this stage to any comments on the operational papers received from teachers and their organisations. During this meeting, and up to and including the end of the marking, there is provision for amendments to be made to the mark scheme. What is published represents this final form of the mark scheme.

It is important to recognise that in some cases there may well be other correct responses which are equally acceptable to those published: the mark scheme can only cover those responses which emerged in the examination. There may also be instances where certain judgements may have to be left to the experience of the examiner, for example, where there is no absolute correct response – all teachers will be familiar with making such judgements.

1 Serial Data transmission

- (a) Simplex
- (b) Half duplex
- (c) Full duplex

Each correct answer = $3 \times [1]$ [3]

- (d) In synchronous serial data transmission the signals on the data lines are valid when a **clock** signal, used by both the sender and receiver, assumes a predefined state. When this state is reached, both the sender and receiver have agreed that transmission of data may take place. The signal may be delivered on a **line** separate from the data transmission line. Various codes are sent to enable the transmission to take place properly and accurately. One such code is **SYN** which starts the process by synchronising the sender and receiver. The receiver will acknowledge it is ready to receive data by sending the code **ACK** (or if it is not ready by using the code **NAK**). The data **packet** is sent and framed by various other codes which include **SOH** (start of **header**), **STX** (start of text), **ETX** (end of text) and **BCC** (block cyclic check).

Each word correctly chosen = $6 \times [1]$ [6]

9

2 Functions of a network card

- Receives data from other network cards in the LAN
- Converts data into electrical signals
- Receives electrical signals and converts them into data
- Determines which computer is to receive which data
- Controls the flow of data through the connecting cable
- Identifies the nodes with its MAC address

Any 3 functions $\times [2]$ [6]

6

3 (a) Coaxial Cable [1]

(b) Bus network [1]

(c) There would be a collision. Both computers will back off and attempt to resend at two new random times [2]

4

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4	Star based networks use routers to manage user accounts.	false
	Peer to peer network computers allow users to share resources with other users.	true
	In star networks if one computer fails then all computers are affected.	false
	Hybrid networks are a mixture of bus and star based systems.	true
	Bus based networks are best used when many computers require to be networked.	false
	Baseband signalling is used on bus based topologies.	true

Each correct answer = $6 \times [1]$

[6]

6

5 (a) **Client server features**

- Very fast processor + description (e.g. to service many users)
- Large disk drive capacity + description (e.g. to handle multiple requests)
- Network Operating System + description (e.g. to allow multiprogramming)
- Redundancy (in power and file storage) built in
- Applications can be accessed by an individual client
- Any other valid feature + description

Any 3 features plus description of each = $[1] \times 3 + [1] \times 3$

[6]

(b) **Client server benefits**

- The fast, high specification machine provides.....<benefit>
- It oversees network management tasks
- It can hold software for use within the network
- It allows easy network management
- Shares resources
- Any other suitable benefit

Any 3 benefits $\times [2]$

[6]

12

6 Digital communication methods use a variety of naming conventions.

The **domain name** is a component of a Uniform Resource Locator (URL) used to access web sites.

An example of a URL is **http://www.sample.net/index.html**

An example of a **top-level** domain name is .net.

A second-level domain name is **sample.net** while an example of a **host name** is www.example.net.

Each correct phrase = $5 \times [1]$

[5]

5

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- 7 (a) www.bbc.com
- (b) the network manager’s computer
- (c) a router
- (d) Either the router does not respond to commands such as tracert or as a security measure protecting against Denial of Service (DoS) attacks.
- (e) The IP address of the URL is displayed at hop 12.

Each correct answer = 5 × [1] [5]

5

Voice over IP	E
Private IP addresses	B
A switch.....	F
When playing network games over the Internet.....	C
A proxy server.....	A
DNS.....	D
Bandwidth.....	G

Each correct answer = 5 × [1] [5]

5

- 9 (a) **MAC**
- Media Access Control – hardwired physical address identifying (typically) the network card [2]

- (b) **IP addressing**
- Logical address allocated to a node (statically or dynamically) that is used a security measure to prevent the address of the node being disclosed onto the Internet [2]

(c) ARP address

Address Resolution Protocol – set of rules used to determine the address of a node inside a network.

ARP is used within a LAN to identify the MAC address belonging to the IP address. One computer A may want to send a message to computer B and this needs the MAC address of B. (It may already have this address stored in its ARP table). If it is not stored (and thus not known) then A will broadcast to all computers on the LAN requesting the owner of the MAC address (belonging to the IP address). B will respond giving its MAC address.

Level of response	Marking criteria	Mark band
Excellent	The candidate describes correctly, and in detail, all the issues surrounding ARP. Their use of spelling, punctuation and grammar are excellent and clearly legible. Their discussion shows a very wide knowledge of the issues. Their discussion uses an excellent form and style. Their discussion is highly coherent and is very well organized and they use the specialist terms IP and MAC correctly.	[5]–[6]
Good	The candidate describes correctly the issues surrounding ARP. Their use of spelling, punctuation and grammar are good and legible. Their discussion shows a good knowledge of the issues. Their discussion uses a good form and style. Their discussion is coherent and is well organized and they use the specialist terms IP and MAC correctly.	[3]–[4]
Poor	The candidate describes few issues surrounding ARP. Their use of spelling, punctuation and grammar is weak and may not be very legible. Their discussion shows little knowledge of the issues. Their discussion uses a poor form and style. Their discussion is not coherent and is unorganized and they use few (if any) correct specialist terms.	[1]–[2]

[6]

10

10 (a) Wireless Access Points

These are locations at which the wireless signal is sent to all receiving stations.

[2]

(b) Wireless standards

These are the set of approved rules which govern the transmission and reception of wireless signals, e.g. 802.11b/g

[2]

(c) Security

Wired Equivalent Privacy is a standard network protocol that adds security to 802.11 Wi-Fi networks at the data link layer (OSI model Layer 2). It was designed to give wireless networks the equivalent level of privacy protection as a comparable wired network. However, the underlying technology behind WEP has been demonstrated to be relatively insecure compared to newer protocols like WPA. WEP utilises a data encryption.

WPA is a security technology for Wi-Fi wireless computer networks. WPA improves on the authentication and encryption features of WEP (Wired Equivalent Privacy). In fact, WPA was developed by the networking industry in response to the weaknesses of WEP. WPA provides stronger encryption. [4]

(d) Wireless Range

Wireless access points use radio waves to transmit.

The antenna is usually visible but can be blocked.

(Avoid obstacles, interference, metal, large amounts of water)

The antenna focus is omni-directional (i.e. radiates horizontally all round). [4]

12

11

Firewalls hide IP addresses using NAT.	true
Firewalls can be both hardware and software.	true
Firewalls prevent unauthorised access to or from a private network.	true
All messages entering or leaving an intranet should pass through the firewall.	true
A firewall recognises if the network is bus, star or ring.	false
A firewall records users' passwords	false

Each correct response = 6 × [1]

[6]

6

12 Cabling

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Terms mentioned should include:

- Cable names i.e. coaxial, twisted pair, fibre optic, wireless
- Properties of each
 - Coaxial – used in baseband systems
 - Twisted wire pair – used in star based systems
 - Fibre optic – used in broadband systems
 - Wireless
 - Features of wireless networks
 - Security
 - Speeds of transmission
 - Bandwidth
- Bandwidths
- Reliability – interference
- Installation difficulties

Level of response	Marking criteria	Mark band
Excellent	<p>The candidate describes correctly, and in detail, all the issues surrounding data transmission in LAN.</p> <p>Their use of spelling, punctuation and grammar are excellent and clearly legible.</p> <p>Their discussion shows a very wide knowledge of the issues including data transmission rates, cost and suitability.</p> <p>Their discussion uses an excellent form and style.</p> <p>Their discussion is highly coherent and is very well organized and they use a wide range of correct specialist terms.</p>	[7]–[10]
Good	<p>The candidate describes correctly the issues surrounding data transmission in LAN.</p> <p>Their use of spelling, punctuation and grammar are good and legible.</p> <p>Their discussion shows a good knowledge of the issues including data transmission rates, cost and suitability.</p> <p>Their discussion uses a good form and style.</p> <p>Their discussion is coherent and is well organized and they use a range of correct specialist terms.</p>	[4]–[6]

<p>Poor</p>	<p>The candidate describes few issues surrounding data transmission in LAN. Their use of spelling, punctuation and grammar are weak and may not be very legible.</p> <p>Their discussion shows little knowledge of the issues including data transmission rates, cost and suitability.</p> <p>Their discussion uses a poor form and style.</p> <p>Their discussion is not coherent and is unorganized and they use few correct specialist terms.</p>	<p>[1]–[3]</p>
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[10]

<p>AVAILABLE MARKS</p>
<p>10</p>

13 Ethernet

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The answer should be structured using the following sections:

- Initial developments in bus based systems
 - Baseband
 - Modulation
 - Speed
 - Coaxial cable
 - Segments
 - Nodes
 - Frames
- Standards and technical terms used in these systems
 - CSMA/CD
 - Limitations
 - half duplex
 - use of repeaters, bridges
- Evolution to current systems
 - Switched Ethernet
 - Twisted pair and fibre optic cables
 - Speeds
 - Full duplex – no collisions

Level of response	Marking criteria	Mark band
Excellent	The candidate describes correctly, and in detail, all the issues surrounding Ethernet. Their use of spelling, punctuation and grammar is excellent and clearly legible. Their discussion shows a very wide knowledge of the issues. Their discussion uses an excellent form and style. Their discussion is highly coherent and is very well organized and they use a wide range of correct specialist terms.	[7]–[10]
Good	The candidate describes correctly the issues surrounding Ethernet. Their use of spelling, punctuation and grammar is good and legible. Their discussion shows a good knowledge of the issues. Their discussion uses a good form and style. Their discussion is coherent and is well organized and they use a range of correct specialist terms.	[4]–[6]

Poor	<p>The candidate describes few issues surrounding Ethernet. Their use of spelling, punctuation and grammar is weak and not be very legible. Their discussion shows little knowledge of the issues. Their discussion uses a poor form and style. Their discussion is not coherent and is unorganized and they use few correct specialist terms.</p>	[1]–[3]
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[10]

Total

AVAILABLE MARKS

10

100