



*Rewarding Learning*

**ADVANCED  
General Certificate of Education  
2016**

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**Applied Information and  
Communication Technology**

**Assessment Unit A2 13**

*assessing*

**Unit 13: Networking and Communications**

**[A6J71]**

**WEDNESDAY 22 JUNE, MORNING**

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**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 the 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 the 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.

			AVAILABLE MARKS
<p><b>1</b> A network card converts data into <b>electrical</b> signals. It determines which <b>computer</b> is to receive data. It controls the <b>flow</b> of data through the connecting <b>cable</b>.</p> <p>Each correct word = 4 × [1] [4]</p>			4
<p><b>2 (a)</b> Wireless network advantages</p> <p>No need for cabling            Increased mobility            Increased productivity            Facilitates BYOD            Use of public hotspots            Use of VOIP            Health and Safety . . . no wires            Expandability/Scaleability            Any other acceptable advantage</p> <p>Any 2 × [2] plus brief description [4]</p> <p><b>(b)</b> Wireless network disadvantages</p> <p>Speed/Bandwidth            Security issues re WPA            Interference from other objects may be an issue            Distance from wireless router . . . range            Any other acceptable disadvantage</p> <p>Any 2 × [2] plus brief description [4]</p>			8
<p><b>3 (a)</b> IPv4 Connectivity</p> <p>IPv4 (Internet Protocol Version 4) is the fourth revision of the Internet Protocol (IP) used to identify devices on a network. The Internet Protocol is designed for use in interconnected systems of packet-switched computer communication networks.</p> <p>IPv4 is the most widely deployed Internet protocol used to connect devices to the Internet. IPv4 uses a 32-bit address scheme allowing for a total of <math>2^{32}</math> addresses (just over 4 billion addresses).</p> <p>With the growth of the Internet it is expected that the number of unused IPv4 addresses will eventually run out because every device – including computers, smartphones and game consoles – that connects to the Internet requires an address.</p>			

**(b) IPv6 Connectivity**

A new Internet addressing system Internet Protocol version 6 (IPv6) is being deployed to increase the number of Internet addresses.

IPv6 is the successor to Internet Protocol Version 4 (IPv4). It was designed as an upgrade to the Internet Protocol and will, in fact, coexist with the older IPv4 for some time. IPv6 is designed to allow the Internet to grow steadily, both in terms of the number of hosts connected and the total amount of data traffic transmitted.

IPv6 uses  $2^{128}$  addresses.

**(c) SSID**

This is the Service Set Identifier. A wireless network's SSID is simply its name. Most wireless networks come with a default name (typically the name of the company which supplies the hardware, i.e. 'BTHub5').

**(d) Physical Address B8-03-05-2A-29-5C**

This is the address of the wireless network card on computer being examined on the wireless network. It is a unique identifier used by the Media Access Control (MAC) address.

Each of 4 answers (a–d) × 2 [8]

**(e) DHCP Enabled**

When switched on:

It is a protocol for assigning or supplying IP addresses
It makes network administration easy to manage
It allows a device to have a different IP address every time it connects to the network.

**(f) IPv4 Subnet Mask**

An IP address has two components, the network address and the host address. Consider the IP address a.b.c.d.

A subnet mask is used to determine what subnet an IP address belongs to. The first two numbers (a.b.) represent the network address, and the second two numbers (c.d.) identify a particular host on this network.

Each of 2 answers (e–f) × 4 [8]

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Level of response	Marking Criteria	Mark band
Excellent	<p>The candidate compares and contrasts many of the correct features of a switch and router.</p> <p>Their use of spelling, punctuation and grammar are excellent and clearly legible.</p> <p>Their discussion of the switch and router shows a very good knowledge of the filtering and forwarding of packets between LAN segments and the Internet.</p> <p>Their description of the differences of a switch and router will show a very good knowledge of the different properties of each.</p> <p>Their discussion of the switch and router uses an excellent form and style.</p> <p>Their discussion is highly coherent and is very well organised and they use a wide range of correct specialist terms.</p>	[7]–[10]
Good	<p>Candidate compares and contrasts some features of a switch and a router.</p> <p>Their use of spelling, punctuation and grammar are satisfactory and legible.</p> <p>Their discussion of the switch and router shows a satisfactory knowledge of the filtering and forwarding of packets between LAN segments and the Internet.</p> <p>Their description of the differences of a switch and router will show a satisfactory knowledge of the different properties of each.</p> <p>Their discussion of the switch and router uses a satisfactory form and style.</p> <p>The discussion is coherent and is organised and they use a range of correct specialist terms.</p>	[4]–[6]
Poor	<p>Candidate describes few of the features of a switch or a router.</p> <p>Their use of spelling punctuation and grammar are poor and their work is not that legible.</p> <p>Their discussion of a switch or router is not organised and uses a poor form and style.</p> <p>The discussion is not coherent and may use few (if any) correct specialist terms.</p>	[1]–[3]

When a response is not worthy of credit a [0] mark should be awarded.

[10]

10

## 5 BUS BASED NETWORKS

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MARKS

In a bus network the failure of one station affects the whole network.	FALSE
Within a bus network, each network interface card has its own unique identifier.	TRUE
Only one hub can be installed in a bus network.	FALSE
Bus networks can be used as peer to peer networks when there are only a few computers to be connected.	TRUE
The cabling for bus networks requires the use of terminators.	TRUE
A bus network uses a token to pass on data from one node to another.	FALSE

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

6

### 6 (a) DoS attacks

A Denial of Service attack is not a virus.

It is an attack characterized by an explicit attempt to prevent legitimate users of a network service from using that service.

The most common method is to flood a network with useless traffic, overloading the network's capacity.

Other DoS techniques include disruption of the connection between two machines and malicious alteration of server configuration. [3]

### (b) Computer virus

This attaches itself to a program or file so it can spread from one computer to another, leaving infections as it travels.

Almost all viruses are attached to an executable file, which means the virus may exist on your computer but it cannot infect your computer unless you run or open the malicious program.

It is important to note that a virus cannot be spread without a human action (such as running an infected program) to keep it going.

People continue the spread of a computer virus, mostly unknowingly, by sharing infecting files or sending e-mails with viruses as attachments in the e-mail. [3]

### (c) Trojan horses

This is a destructive program that masquerades as a benign application.

Unlike viruses, Trojan horses do not replicate themselves but they can be just as destructive.

One of the most insidious types of Trojan horse is a program that claims to rid your computer of viruses but instead introduces viruses onto your computer.

Also known to create a backdoor on your computer that gives malicious users access to your system, possibly allowing confidential or personal information to be compromised. [3]

### (d) Worms

Worms spread from computer to computer, but unlike a virus, it has the ability to travel without requiring a host (i.e. it does not need to attach itself to an existing program). A worm takes advantage of file or information transport features on your system, which allows it to travel unaided.

The biggest danger with a worm is its ability to replicate itself on your system, so rather than your computer sending out a single worm, it could send out hundreds or thousands of copies of itself, creating a huge devastating effect.

One example would be for a worm to send a copy of itself to everyone listed in an e-mail address book.

Then, the worm replicates and sends itself out to everyone listed in each of the receiver's address book, and this continues on down the line.

Due to the copying nature of a worm and its ability to travel across networks the end result in most cases is that the worm consumes too much system memory (or network bandwidth), causing Web servers, network servers, and individual computers to stop responding.

You should have anti-virus software installed on your system and ensure you download updates frequently to ensure your software has the latest fixes for new viruses, worms, and Trojan Horses.

Additionally you want to make sure your anti-virus program has the ability to scan e-mail and files as they are downloaded from the Internet. This will help prevent malicious programs from even reaching your computer. If this isn't enough protection, then you may want to consider installing a firewall as well. [3]

Each of answers (a – d) =  $3 \times 1 = [3]$

12

## 7 (a) ACCEPTABLE USE POLICY

- The role and responsibilities of the Board of Directors, senior managers, staff and others in relation to use of the Internet
- Information about how the Internet will be made accessible to all, regardless of age, race, gender, religion, background or disability
- A statement about whether or not the Internet, email and social media can be used for personal reasons (some institutions may allow limited use for these purposes, particularly for staff) and prohibiting use for commercial reasons
- A statement requiring all users not to access unsuitable material (such as defamatory, obscene, offensive, or indecent material)
- A request that unsuitable material is not created, transmitted or stored anywhere at the institution
- Information about the Computer Misuse Act 1990
- Information about the security provided by the ISP
- A reminder about copyright and the disciplinary procedure for any breach or act of plagiarism
- Notification that all material obtained via the Internet will automatically be checked for viruses
- A statement that computer equipment at the institution should not be used for accessing other computers or networks illegally or without permission
- A statement to inform users that they should not reveal any passwords or other security measures to others
- A statement about the penalties that will be incurred if this policy is infringed, such as withdrawal of access rights.

Any 3 correct named items =  $[1] \times 3 = [3]$  + 3 correct explanations  $\times [1] = [3]$  [6]

- (b) There may be issues with:  
 Lack of staff training with regard to what is acceptable or not:  
 Personal use of say Facebook, Twitter e-mail  
 Access to unsuitable material  
 Copyright issues  
 Virus protection  
 Security  
 Any  $2 \times 2$  risks –  $2 \times 2 = [4]$

10

8	A unique identifier associated with an item of networking equipment is a . . .	4.
	A discovery protocol used to match a MAC address with an IP address is . . .	6.
	To determine the host section of a network use a . . .	2.
	The management of the network traffic becomes easier and more practical with . . .	1.
	A transmission protocol used on the Internet is . . .	3.
	A protocol for assigning or supplying IP addresses is . . .	5.

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

6

9 PROXY SERVER

It is a computer that holds all the software that users may need on the network.	
It is a computer that eases the load on Web and FTP servers by requesting updated or new files that are not already held in store.	✓
It is a computer that tries to prevent 'hacking'.	
It is a computer that sits between your computer and the Web server whose pages you are accessing.	✓
It is a computer that holds a 'cache' of the most popular recently accessed web pages.	✓
It is a very powerful computer.	
It allocates permissions to users on the network.	

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

3

10 FIREWALL

It is software or hardware used to prevent viruses.	TRUE
It holds the addresses of all the computers in the World Wide Web.	FALSE
It can filter data packets based on the MAC address.	TRUE
It contains the website addresses that are not permitted to be viewed by users of a network.	TRUE
It is contained in a black box.	FALSE
It can be used as a word processor.	FALSE
It resembles a router.	FALSE

Each correct answer =  $7 \times [1]$  [7]

7



## 11 E-MAIL

The reasons for not sending by e-mail are:

- Security
- Sending to the wrong person is possible
- Files being infected or corrupted
- Large data files may not be supported by e-mail
- Mistakes cannot be easily corrected

Any 3 valid reasons  $\times$  [2] = [6]

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12 The candidate should give a suitable example and mention:

Domain name resolution

- The (unique) text name of the web page requested corresponding to the numeric IP address
- Mention of static or dynamic IP addressing

MAC addressing

- The (permanent) address of the network card. ARP will map this layer 2 address to layer 3 IP

ARP

- Address resolution protocol

Proxy server

- Used to store recently accessed web pages

Router

- Use of routing tables to access websites

Firewall

- Software or hardware feature used to prevent unauthorised access

Level of response	Marking Criteria	Mark band
Excellent	The candidate explains many of terms mentioned. Their use of spelling, punctuation and grammar are excellent and clearly legible. Their discussion shows a very good knowledge of converting a domain name and its retrieval from a distant website. Their discussion of the terms listed uses an excellent form and style. Their discussion is highly coherent and is very well organised and they use a wide range of correct specialist terms.	[9]–[12]
Good	The candidate explains a number of terms mentioned. Their use of spelling, punctuation and grammar are good and legible. Their discussion shows a good knowledge of converting a domain name and its retrieval from a distant website. Their discussion of the terms listed uses good form and style. Their discussion is coherent and is well organised and they use a number of correct specialist terms.	[5]–[8]
Poor	The candidate explains few of terms mentioned. Their use of spelling, punctuation and grammar are poor and may not be clearly legible. Their discussion shows a little knowledge of converting a domain name and its retrieval from a distant website. Their discussion of the terms listed uses a poor form and style. Their discussion is not coherent and is poorly organised and may use few (if any) correct specialist terms.	[1]–[4]

**Total**

12

**100**

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