AQA Computer Science A-Level

4.9.3 The Internet

Past Paper Mark Schemes

January 2009 Comp 2

6	(a)	(i)	the protocol used // this is the hypertext transfer protocol;	**1**
		(ii)	address of Aqa's World Wide Web server; **R** domain name	**1**
		(iii)	the path/location of the file/resource; **OR** *description of folder structure*;	**1**

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1	(a)		<table><tr><th></th><th>URL</th><th>Domain Name</th><th>IP Address</th><th>Protocol</th></tr><tr><td>(i) http://www.guineas.co.uk</td><td>✓</td><td></td><td></td><td></td></tr><tr><td>(ii) 212.58.251.195</td><td></td><td></td><td>✓</td><td></td></tr><tr><td>(iii) guineas.co.uk</td><td></td><td>✓</td><td></td><td></td></tr></table> **1 mark for each correctly placed tick** **R** Answers with more than one tick on a row.	3

1	(b)		To translate/convert/resolve domain names into IP addresses; **A** FQDN for domain name Answer must have the CONCEPT of an action **NE** To store the domain names and IP Addresses **NE** To access the web page without knowing the IP address **NE** To link the domain name to the IP address	1

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10	a		(aqa.org.uk) domain name; **R** FQDN (courses/computing.html) path name // location of file/resource/object/document // path of file/resource/object/document; **NE** file name	2

10	b		A set of (agreed) rules / codes / signals (for data exchange between systems); Agreed standard for communication between computer systems;	MAX 1

10	d		Easier to remember a FQDN or converse for IP address i.e. IP addresses are less memorable; FQDN can identify (to a human) what a site is whereas an IP address cannot // easier to understand;	MAX 1	

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5	**a**		To examine the destination of each packet; To forward packets from one network to another; To manage congestion; Choose an appropriate forwarding route; Route packets according to destination IP address; Store incoming packets temporarily; Change link address in packet; To store/make use of a routing table; **A** – data instead of packets **R** – information / signals	**MAX 2**

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6	**a**		WWW (**max 3 marks**) A system of interlinked / hypertext documents; Accessed via the Internet; Using HTTP protocol; **NE** web a collection of web pages Internet (**max 3 marks**) A network of interconnected computer networks; **A.** a network of computers; Using a globally unique address space; Using end-to-end communication protocol // Internet Protocol // "TCP / IP"; Supports a range of application protocols; **A.** two examples of different protocols; **R.** "TCP" **R.** "IP"	**MAX** **4**

6	**b**		Messages split into packets; **A.** chunks Each packet given destination/source address; Each packet dispatched to the Internet through a router/gateway; Packets sent independently; Packets given a sequence number; Routers forward packets (until they reach destination); Path of packet transfer determined by router(s); Packets reassembled at the destination;	**MAX** **2**

6	**c**		**12.23.45.89** An IP (v4) address (that uniquely identifies a machine on the Internet) // Internet protocol address; **80** A port number // a number that specifies which process on the receiving machine/host to send the data to; **A.** port; Denotes that HTTP (server) is recipient of packet // packet is an HTTP packet	**2**

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2	**(c)**		Communication initiated by clients; Clients must know which port number to connect to // (Server) port number must be known by client (before communication with server starts) // So client can select service; Particular port numbers are used to provide a particular service // **A** Example of specific well known port number with its use; **MAX 2**	2

3		A	The protocol // This resource uses file transfer protocol;	1

3		B	Address of (ftp) server // Fully Qualified Domain Name; **A** FQDN **R** Domain name	1

3		C	Pathname/location of file/page/resource // Description of file structure; **R** Filename	1

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2			(http means) Hypertext transfer protocol (will be used) // this is the protocol / set of rules (that will be used) **A** "The protocol" as a BOD mark on this occasion but just the word "protocol" as **NE**. **R** format (www means) Resource/web page/web site/URL is part of the world wide web // on a web/virtual server; **NE** world wide web on its own (uk means) Country the site is registered in; **A** organisation / company based in UK **NE** site in the UK, country on its own	3

June 2011 Comp 3

8	(e)		Below are some example security threats and measures, but they are only examples. Award marks for all reasonable security threats and appropriate measures. *Threats:*	

Virus	Malicious self-replicating programs which attach to other programs
Spam	Unsolicited junk email
Worm	Malicious self-replicating programs which replicate across networks using security vulnerabilities
Remote Login	Ability to login to a computer via Internet **A** "hacking" if explained
Trojan	A malicious program hidden inside another program // masquerading as another program
Phishing	Attempts to get users to divulge personal information
Pharming	Misdirecting users to a fake website by changing DNS entries
Spyware	Program that collects information from a user's computer without user knowing
Denial of Service Attack	Repeated requests/pings from the Internet could overwhelm (parts of) the network.

Measures:

Use a secure operating system
Regularly install security patches/upgrades for software
Use virus checking software + some explanation of what this will do
Keep virus definitions up to date
Use anti-spyware software + some explanation of what this will do
Use of firewall to control traffic between private network and Internet // explanation of how firewall might work
Use of spam filter in email package
Enable web browser features to detect Pharming
Restrictions on which websites users can visit
White lists/black lists
Enforce strong passwords
Encryption of data during transmission
Authentication of user/computer attempting remote login using digital certificate//smart card//security code generating device
Log files
Network manager keeps informed about latest threats // network manager trains users about threats

Measures must be appropriate to security issues described.

More than one measure can be used for the same threat.

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8	(c)		To connect networks using different protocols // to convert transmitted data from one protocol to another;	1

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5	**(f)**		**SUBJECT MARKING POINTS:** **Internal:** • Student's computer uses subnet mask (and destination/web server's IP address) to determine if destination computer/web server is on same subnet // identify not on same subnet • Up to two marks from description (in separate section below) of how subnet mask is used • Packet is sent (from student's computer) to Router (1) • Router 1 identifies that destination is outside the LAN so forwards packet to Gateway **External:** • Hierarchical organisation of routers • Example of hierarchical organisation of routers e.g. passed up to a national router, transferred internationally and then passed back down a hierarchy • Path to take selected by each router (not determined at start) **NE** passed from router to router • Route may change as a result of e.g. congestion, technical problems	**8**

			Either: • (Possible) repackaging of packet to use different protocol (e.g. Gateway may change protocol) • Route determined using the (Network ID part of the destination) IP address (Note: can infer "IP address" if just "address" is stated, if previously candidate has written about an IP address) • Use of router tables / criteria to determine next hop / (step of) path • Router decrementing "time to live" of packet • Source and destination MAC addresses changed at each router // MAC addresses used for each "hop" **How subnet mask used (MAX 2 points):** • AND operation of subnet mask with student's computer's IP address • AND operation of subnet mask with web server's IP address • Result (of AND operation) is the network ID; • Network IDs compared • If they are the same, then the computers are on the same subnet	

Specimen AS Paper 2

04	**3**		**Marks are for AO1 (understanding)** In coffee shop speed could be limited for each device that is connected // throttling; In coffee shop more clients connecting to one access point; In coffee shop connection to Internet might have less bandwidth; In coffee shop there may be more collisions; **NOTE** accept answers made in terms of home **Max 2 marks**	MAX 2