1.10 Networking and the Internet: 10-minute Pack

AQA 7517 · Calculators not allowed · about 10 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Owen also needs to choose the hardware for the ICT suite's network and its connection to the Internet.

(a) State the purpose of a MAC address. **(1)**

(b) A network interface card's MAC address is given in hexadecimal as 3C-A6-2F-01-9B-4E. Determine how many bits this represents, showing your working. **(2)**

(c) Explain the difference between how a switch and a hub forward an incoming data frame. **(3)**

(d) Explain why a router, not just a switch, is needed to connect the college's internal network to the Internet. **(2)**

(Total for Question 1 is 8 marks)

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Mark scheme · 1.10 Networking and the Internet: 10-minute Pack

Question 1

(a) to uniquely identify a network interface/device on a network, e.g. for forwarding frames at the link layer (oe) **B1**

(a) Answer: A MAC address uniquely identifies a network interface (device) on a network, so that data frames can be forwarded to the correct device.

(b) recognises the address is written as six hexadecimal pairs, and each hexadecimal pair represents one byte (8 bits) (oe) **M1**

(b) 48 bits cao **A1**

(b) Answer: 48 bits.

(c) a hub forwards (broadcasts) every incoming frame out of all of its other ports, regardless of which device it is actually intended for (oe) **B1**

(c) a switch reads the destination MAC address in the frame and looks it up in its MAC address table (oe) **B1**

(c) the switch then forwards the frame only out of the specific port connected to the intended destination device, rather than to every device (oe) **B1**

(c) Answer: A hub simply forwards (broadcasts) every incoming frame out of all of its other ports, regardless of which device the frame is actually intended for. A switch instead reads the destination MAC address in each frame, looks it up in its stored MAC address table, and forwards the frame only out of the one port connected to the intended destination device, rather than to every device.

(d) a switch only forwards data between devices on the same local network, using MAC addresses; it does not route data between different networks using IP addresses (oe) **B1**

(d) a router connects and routes traffic between two different networks (the college's internal network and the Internet) using IP addresses, and typically also performs other functions such as NAT, which a switch cannot do (oe) **B1**

(d) Answer: A switch only forwards data between devices on the same local network, based on MAC addresses; it has no way of routing data between different networks. A router is needed instead, because it connects two separate networks together (here, the college's internal network and the Internet) and routes traffic between them using IP addresses, typically also handling functions such as Network Address Translation, which a switch cannot do.

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