1.8 Network Protocols and Layers: Test Pack

Total Marks

OCR J277 · Calculators not allowed · about 20 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A protocol is a set of rules that allows devices on a network to communicate with each other. Define what is meant by a network protocol.

(Total for Question 1 is 2 marks)

2 Networks are often described using a layered model, such as the four-layer TCP/IP model, rather than as one single set of rules.

(a) Name the four layers of the TCP/IP model, in order, starting with the layer closest to the user's application. **(4)**

(b) Explain one benefit of organising network communication into separate layers like this, rather than as one single set of rules. **(2)**

(Total for Question 2 is 6 marks)

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3 When a large file is sent across the internet using packet switching, it is broken into many separate packets before being sent. Explain how packet switching sends and reassembles the file.

(Total for Question 3 is 5 marks)

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4 A TCP segment's header is 20 bytes; a UDP header is only 8 bytes. A live voice call app sends 1000 packets, each carrying 160 bytes of audio payload data.

(a) Calculate the total header overhead, in bytes, saved across these 1000 packets if UDP is used instead of TCP. **(3)**

(b) Explain why this saving in overhead is particularly useful for a live voice call. **(1)**

(Total for Question 4 is 4 marks)

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Mark scheme · 1.8 Network Protocols and Layers: Test Pack

Question 1

a protocol is an agreed set of rules/standards, oe **B1**

that governs how data is formatted, sent and received between devices, so that devices made by different manufacturers can understand each other, oe **B1**

Answer: A protocol is an agreed set of rules that governs how data is formatted, sent and received, so devices from different manufacturers can communicate.

Question 2

(a) Application layer **B1**

(a) Transport layer **B1**

(a) Internet (network) layer **B1**

(a) Link (network interface) layer **B1**

(a) Answer: Application, Transport, Internet, Link (in that order).

(b) a benefit, e.g. each layer can be developed, updated or replaced independently; hardware and software from different manufacturers can work together; designing or troubleshooting is simpler, oe **B1**

(b) explanation of that benefit, e.g. because each layer uses standard interfaces to the layers above and below it, a change in one layer does not affect the others, oe **B1**

(b) Answer: Layers can be developed and updated independently, using standard interfaces between them, which makes it easier for different manufacturers' hardware/software to work together.

Question 3

each packet is given a header containing information such as the sender's and receiver's IP addresses and a sequence number, oe **B1**

packets from the same file may travel across the network by different routes, depending on which path is fastest/least congested at that moment, oe **B1**

because of this, packets can arrive at the destination out of order, or later than packets sent after them, oe **B1**

the sequence number in each packet's header allows the receiving device to reassemble the packets into the correct original order, oe **B1**

if a packet does not arrive/is lost, the receiving device can request that it be resent (using a reliable protocol such as TCP), oe **B1**

Answer: Packets carry header data including sequence numbers and IP addresses, may travel by different routes and arrive out of order, and are reassembled correctly at the destination using their sequence numbers; missing packets can be requested again.

Question 4

(a) 20 - 8 = 12 bytes saved per packet, oe **M1**

(a) 12 x 1000 shown as the method, oe **M1**

(a) 12000, cao **A1**

(a) Answer: 12000 bytes

(b) less header data to send/process per packet means less delay, helping keep the call smooth/close to real time, oe **B1**

(b) Answer: Less header overhead means less data to send and process per packet, reducing delay and helping keep the live call smooth.

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