CAMBRIDGE IGCSE (0478)

# Module E: Networks

Workbooklet mark scheme · 3 parts · 60 marks

E1-E3, E5, E6, E10 and E11 are GCSE (OCR) only and not on 0478.

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| | **Total** | **60** |

MODULE E NETWORKS · E4

# Network hardware: mark scheme

20 marks · Cambridge 0478 syllabus 3.4.1 (a computer needs a NIC to access a network; a NIC is given a MAC address at the point of manufacture) and 3.4.4 (the role of a router)

**How to use.** One mark per creditworthy point up to the maximum shown. **/** separates alternative words; **//** separates alternative answers. Words in (brackets) are not needed for the mark. Credit any other valid answer that shows the same understanding.

| QUESTION | ANSWER | MARKS | GUIDANCE |
|---|---|---|---|
| **1(a)** 0478 3.4.1 | Network interface card // NIC | **1** | Accept network interface controller. Do not accept router / modem / switch. |
| **1(b)** 0478 3.4.1 (notes) | MAC address // media access control address | **1** | Do not accept IP address. |
| **1(c)** 0478 3.4.1, 3.4.4 | Connect a local network to the internet: True<br>Router gives the MAC address: False<br>Router can assign IP addresses: True<br>No NIC but plugged into a router: False | **4** | One mark per correct row. A row with both boxes ticked scores 0. |
| **2(a)** 0478 3.4.4 | Any three from:<br>Sends / forwards data to a specific destination on a network<br>Uses the (destination) IP address to decide where to send the data<br>Connects a local network to the internet // connects networks together<br>Can assign IP addresses to devices on the network<br>Receives data from the internet and passes it to the correct device on the local network | **3** | max 3. Do not accept "gives the internet / Wi-Fi" alone. Do not credit "assigns MAC addresses". |
| **3(a)** 0478 3.4.4 | Any two from:<br>The router reads the destination // IP address of the data<br>Each computer on the network has its own IP address (assigned by the router)<br>The router sends the data to the specific destination // computer with that IP address | **2** | max 2. Do not accept "the router sends it to every computer". |
| **3(b)** 0478 3.4.4 | Any two from:<br>So the laptop can be identified on the network<br>So data can be sent to the laptop // the router knows where to send data meant for it<br>An IP address is allocated by the network (not set at manufacture) // the laptop has no IP address for this network yet<br>So no two devices on the network have the same IP address | **2** | max 2. Accept "the IP address may be dynamic / change each time it joins". Do not credit answers saying the router assigns the MAC address. |

| QUESTION | ANSWER | MARKS | GUIDANCE |
|---|---|---|---|
| **4(a)**<br>0478 3.4.1 | Any two from:<br>The printer needs (its own) network interface card // NIC to access a network<br>A router alone is not enough // the router sends data / connects networks, it does not give a device access to the network<br>Without a NIC the printer cannot send or receive data on the network // has no MAC address | **2** | max 2. Accept "the printer must have a NIC (built in)" for the first point. |
| **5(a)**<br>0478 3.4.1, 3.4.4 | Any five from:<br>**NIC:** the computer needs a NIC to access the network<br>the NIC has a MAC address, given at manufacture, that identifies it<br>the NIC sends / receives the data (the request) to / from the network<br>**Router:** assigns an IP address to the computer (when it joins the network)<br>connects the local network to the internet<br>sends / forwards the request to a specific destination // the server using the (destination) IP address<br>sends the reply / file back to the computer that asked for it (using its IP address) | **5** | max 5. Max 3 if only the NIC or only the router is described. Do not credit "the router gives the computer its MAC address" or "the NIC connects networks together". |

**Total: 20 marks**

MODULE E NETWORKS · E7

# IP addressing and MAC addresses: mark scheme

20 marks · Cambridge 0478 syllabus 3.4.2, 3.4.3(a), 3.4.3(b)

**How to use.** One mark per creditworthy point up to the maximum shown. **/** separates alternative words; **//** separates alternative answers. Words in (brackets) are not needed for the mark. Credit any other valid answer that shows the same understanding.

| QUESTION | ANSWER | MARKS | GUIDANCE |
|---|---|---|---|
| **1(a)**<br>0478 3.4.2 | Media access control | **1** | Spelling must be recognisable. |
| **1(b)**<br>0478 3.4.2 | Any three from:<br>First half // 6E-14-AB is the manufacturer code / ID / number<br>Second half // 90-2C-F7 is the serial code / number<br>Written in hexadecimal<br>12 hex digits // 6 pairs (of hex digits)<br>48 bits // 6 bytes | **3** | max 3. Halves reversed: no credit for either half. |
| **1(c)**<br>0478 3.4.2 | Given at the point of manufacture // when the NIC is made // by the manufacturer<br>Does not normally change // is fixed / permanent | **2** | Do not accept "given by the network / router" or "changes each time it connects". |
| **2(a)**<br>0478 3.4.3(a) | Any two from:<br>Identifies a device on a network // the internet<br>(Allocated by the network) so data can be sent to // reach the correct device / destination<br>Used (by routers) to send data across networks<br>Allows devices to communicate (on a network) | **2** | max 2. Do not accept "to connect to the internet" alone. |
| **3(a)**<br>0478 3.4.3(b) | 128 bits: IPv6<br>Four denary numbers, full stops: IPv4<br>Allocated by the network: Both<br>Eight groups of hexadecimal, colons: IPv6 | **4** | One mark per correct row. More than one tick in a row: 0 for that row. |
| **4(a)**<br>0478 3.4.3(b) | B<br>261 is greater than 255 // each number must be 0 to 255 // 261 cannot be stored in 8 bits | **2** | Second mark only if B is identified. |
| **4(b)**<br>0478 3.4.3(b) | Any two from:<br>IPv4 (is 32 bits so) has a limited number of addresses // about 4.3 billion<br>IPv4 addresses are running out // more devices need addresses<br>IPv6 (is 128 bits so) gives many more addresses | **2** | max 2. Do not accept "faster" or "more secure" alone. |
| **5(a)**<br>0478 3.4.3(b) | Static: stays the same // does not change (each time the device connects)<br>Dynamic: allocated (by the network / router) when the device connects // can change | **2** | Do not accept "dynamic changes all the time / every second". |

| QUESTION | ANSWER | MARKS | GUIDANCE |
|---|---|---|---|
| **5(b)**<br>0478 3.4.3(b) | Static (no mark for choice alone)<br>Any two from:<br>The server's address never changes // is always the same<br>... so the laptops can always find / connect to the server (at the same address)<br>Requests for artwork always reach the server | **2** | max 2. If "dynamic" is chosen, award 0 for the whole part. |

**Total: 20 marks**

MODULE E NETWORKS · E9

# Protocols: HTTP and HTTPS: mark scheme

20 marks · Cambridge 0478 syllabus 5.1.3 (purpose and operation of HTTP and HTTPS)

**How to use.** One mark per creditworthy point up to the maximum shown. **/** separates alternative words; **//** separates alternative answers. Words in (brackets) are not needed for the mark. Credit any other valid answer that shows the same understanding.

| QUESTION | ANSWER | MARKS | GUIDANCE |
|---|---|---|---|
| **1(a)** 0478 5.1.3 | Hypertext transfer protocol secure | **1** | All four words needed. Ignore capitals and spacing ("hyper text"). |
| **1(b)** 0478 5.1.3 | Any one from:<br>(Rules) to transfer / request and send web pages // HTML / web page files (between a web server and a browser)<br>To allow web pages to be accessed / viewed (over the internet) | **1** | Do not accept "it is a protocol" alone. |
| **2(a)** 0478 5.1.3 | Any three from:<br>The web browser / client sends a request (for the page) to the web server<br>... the request follows the rules of HTTP<br>The web server finds the page / files<br>The web server responds // sends the page / HTML / files back to the browser<br>The data is not encrypted<br>The browser renders / displays the page | **3** | max 3. |
| **3(a)** 0478 5.1.3 | Both protocols: True<br>HTTP data is encrypted: False<br>HTTPS data cannot be intercepted: False<br>Same purpose: True | **4** | One mark per correct row. A row with both boxes ticked scores 0. |
| **4(a)** 0478 5.1.3 | Any four from:<br>HTTP does not encrypt data<br>Card details could be intercepted (in transit)<br>... and read / understood / used (fraudulently)<br>HTTPS encrypts the data (between the browser and the web server)<br>Intercepted data would be meaningless / could not be understood (without the key)<br>HTTPS uses SSL / TLS // the server is authenticated (with a digital certificate)<br>Customers can see the site is secure (padlock) // customers are more likely to trust the site | **4** | max 4. Do not accept "more secure" / "safer" alone. Do not accept "HTTPS stops data being intercepted" or "stops hacking". |
| **5(a)** 0478 5.1.3 | Any two from:<br>The URL / address starts with https<br>A padlock (symbol) in the address bar<br>The browser shows the connection is secure // the site's digital certificate can be viewed | **2** | max 2. |

| QUESTION | ANSWER | MARKS | GUIDANCE |
|---|---|---|---|
| **5(b)**<br>0478 5.1.3 | Logging in to a bank account<br>Paying for a hotel room<br>Sending medical details | **3** | One mark per correct tick. If more than three boxes are ticked, deduct one mark for each extra tick (minimum 0). |
| **6(a)**<br>0478 5.1.3 | Similarity, any one: both are protocols // both transfer / request web pages // same purpose // both used between a browser and a web server<br>Difference, any one: HTTPS encrypts data, HTTP does not // HTTPS is secure, HTTP is not // HTTPS uses SSL / TLS // the URL starts https, not http | **2** | One mark each. Do not accept "HTTPS is better" or "HTTPS is faster". |

**Total: 20 marks**