



**Unit:
Computer Networks**

Assignment title:

Delight – Private Hire

Sample Marking Scheme

Markers are advised that, unless a task specifies that an answer be provided in a particular form, then an answer that is correct (factually or in practical terms) **must** be given the available marks. If there is doubt as to the correctness of an answer, the relevant NCC Education materials should be the first authority.

This marking scheme has been prepared as a **guide only** to markers and frequently there will be many alternative responses which will provide a valid answer.

Each candidate's script must be fully annotated with the marker's comments (where applicable) and the marks allocated for each part of the tasks.

Throughout the marking, please credit any valid alternative point.

Where markers award half marks in any part of a task, they should ensure that the total mark recorded for the task is rounded up to a whole mark.

Task	Guide	Maximum Marks
1	<p>a) Award 1 mark for a valid point up to a maximum of 8 marks. Points to consider include:</p> <ul style="list-style-type: none"> • Ethernet (logical bus, contention based, usually UTP) • 10base T is 10 Megabit per second over UTP • Recommend newer Gigabit Ethernet to the desktop for future proof, given server usage. • Cable – discuss difference Cat5/5e/6. Cat 6 twice price of Cat5e, but safe for Gigabit • WiFi could have problems with concrete floors/ brick walls and large bandwidth (+ interference from public Wi-Fi and others in the building, though mitigated by channel selection. Would not be suitable as sole office network given traffic requirements since it only provides a single channel (like Hub rather than switch). Wi-Fi could be used in branch office, but not head office. <p>b) Award up to 8 marks on the basis of the following:</p> <ul style="list-style-type: none"> • Hub: Physical: Does not understand addresses – forwards traffic to all ports(1 mark for layer, 1 for justification) • Switch Data Link Uses MAC addresses to forward frames to correct destination. (1 mark for layer, 1 for justification) • WAP: Data Link Uses MAC addresses to forward frames to correct destination. It bridges 802.11 to 802.3. (1 mark for layer, 1 for justification) • Router: Network Layer: Uses IP addresses to route packets to next hop in the path to destination. (1 mark for layer, 1 for justification) <p>c) OSI layers</p> <p>1 mark for each of the 7 layers with explanation: key points</p> <ul style="list-style-type: none"> • Physical –electrical/ connectors • Data Link – Transmission between adjacent nodes using MAC address. • Network – end to end comms, Ratable protocols/ Network/ Host distinction • Transport - Responsible for delivering messages between networked hosts. Also responsible for fragmentation and reassembly of messages. • Session- Responsible for establishing process-to-process communications between networked hosts. • Presentation -Responsible for defining the syntax which two network hosts use to communicate. • Application - Responsible for providing end-user services, such as file transfers, electronic messaging, email, virtual terminal access, and network management. This is the layer with which the user interacts. • Ethernet/TR/Wifi cover layer 1 & 2 	<p>8</p> <p>8</p> <p>7</p>

is used to distinguish the network ID from the host ID in an arbitrary IP address. (1 Mark)

- All bits that correspond to the network ID are set to 1.
- All bits that correspond to the host ID are set to 0. (1 Mark)
- Both SNM / DG are required as they perform different functions (1 Mark)
- Each host on a TCP/IP network requires a subnet mask even on a single segment network. Either a default subnet mask, which is used when using class-based network IDs, or a custom subnet mask, which is used when subnetting or supernetting, is configured on each TCP/IP node.

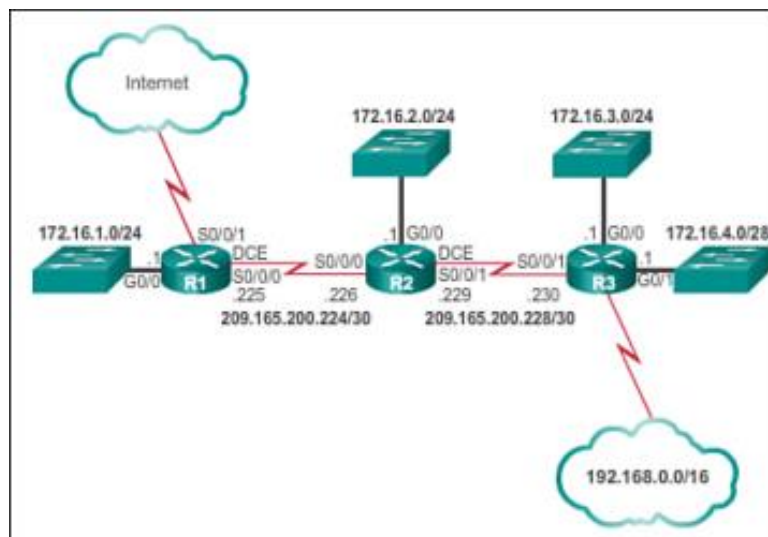
f) Routing table Award 1 mark for each bullet point up to a maximum of 3 marks:

- The routing table stores information about IP networks and how they can be reached (either directly or indirectly) (1 Mark)
- When an IP packet is to be forwarded, the routing table is used to determine the forwarding or next-hop IP address. (1 Mark)
- For a direct delivery, the forwarding IP address is the destination IP address in the IP packet. For an indirect delivery, the forwarding IP address is the IP address of the next hop router. (1 Mark)

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Award up to 5 marks for a relevant example and a suitable description. A good answer will include an extract from the routing table to explain how it works.

Below is an example of a diagram:



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Task	Guide	Maximum Marks
3	<p>a) Award 1 mark for a valid point and 1 mark for an description of how it keeps the network safe up to a maximum of 6 marks. The solution should include the following points concerning security controls:</p> <ul style="list-style-type: none"> a. Minimum: Access control, Border (firewall), consistent Anti-Malware, Secure configuration (no default pw etc.), Patch/updates. Also backup/ UPS – on to HIDS, Remote access needs encryption. Server-based storage with security groups. b. Security Policies (technical and managerial, e.g. Password, acceptable use, backup) Security Training, Physical security. This is not mentioned in the scenario, so assumptions that none exist (they would be accurate!). c. Audit/ Vulnerability scan. <p>b) Award up to 4 marks. Credit suitable answers that provide a justification. Arguments can be made for insider threat, or Malware (on volume). Personal information covered by the Data protection act, particularly for vulnerable clients.</p>	<p>6</p> <p>4</p> <hr/> <p>10</p>

Task	Guide	Maximum Marks
4	<p>a) Award up to 10 marks for a Diagram – should include minimum Router/ Firewall/ Switch(es) / Server/some client PCs/ DMZ (with Email & possibly application server for bookings – but needs explanation of how security maintained.) / VPN link from firewall/router/ Internal Server based network with DC. Branch office with Router/VPN/Client PCs / Wi-Fi or Wired.</p> <p>b) IP addresses expected to be private in the network. Good answers will identify which are static (Router/server) and which are DHCP provided.</p> <p>c) Valid justifications attract marks, location of server should be secure, Mention of EAP rather than secret keys for authentication should attract additional mark.</p> <p>d) Look for evidence of research.</p> <p>NB Discussion of relative merits of self-hosting services rather than using cloud should attract marks if justified.</p>	<p>10</p> <p>3</p> <p>4</p> <p>3</p> <hr/> <p>20</p>
5	<p>a) Remote Access</p> <p>A VPN to the router/firewall/VPN server in the UK would be one appropriate solution.</p> <p>a. Authentication - validates that the data was sent from the sender</p> <p>b. Access Control - preventing unauthorised users from accessing the network</p> <p>c. Confidentiality - preventing the data from being read or copied as the data is being transported</p> <p>d. Data Integrity - ensuring that the data has not been altered</p> <p>b) Security</p> <p>a. It increases the attack surface as access is required from outside the network perimeter.</p> <p>b. Mobile devices may be lost/stolen/ additional issues for wiping remotely, encrypting contents (e.g. bitlocker)/ ensuring good security hygiene by users.</p>	<p>6</p> <p>4</p> <hr/> <p>10</p>
Total: 100 Marks		

Learning Outcomes matrix

Task	Learning Outcomes assessed	Marker can differentiate between varying levels of achievement
1	1,2,4,	Yes
2	1,2	Yes
3	3	Yes
4	1,2,3,4,5	Yes
5	6	Yes

Grade descriptors

Learning Outcome	Pass	Merit	Distinction
1. Understand network and communication protocols	Demonstrate adequate level of understanding	Demonstrate robust level of understanding	Demonstrate highly comprehensive level of understanding
2. Understand the principles of common network topologies and architectures	Demonstrate adequate level of understanding	Demonstrate robust level of understanding	Demonstrate highly comprehensive level of understanding
3. Understand the application of network security measures	Demonstrate adequate level of understanding	Demonstrate robust level of understanding	Demonstrate highly comprehensive level of understanding
4. Be able to select and configure the hardware components of a computer network to meet the requirements of a precise specification	Demonstrate ability to perform the task	Demonstrate ability to perform the task consistently well	Demonstrate ability to perform the task to the highest standard
5. Be able to design and install network and server operating systems to meet the requirements of a precise specification	Demonstrate ability to perform the task	Demonstrate ability to perform the task consistently well	Demonstrate ability to perform the task to the highest standard
6. Be able to install and configure internet telephony and communication systems	Demonstrate ability to perform the task	Demonstrate ability to perform the task consistently well	Demonstrate ability to perform the task to the highest standard