

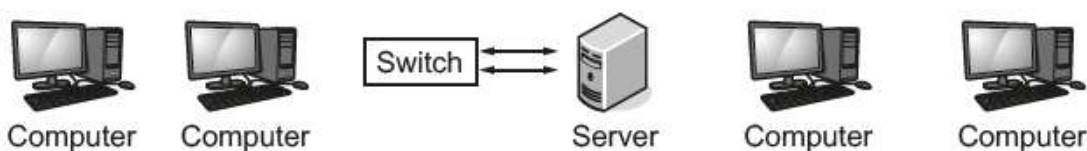
Past Papers May/June 2015 to May/June 2024, Oct/Nov 2015 to Oct/Nov 2024:

9618/12/O/N/22

1) A Local Area Network (LAN) consists of four computers, one server and a switch.

The LAN uses a star topology.

(a) Complete the following diagram to show how the hardware is connected.



[1]

(b) A router is attached to one of the devices on the LAN shown in **part (a)** to connect the LAN to the internet.

(i) Identify the device. Give a reason for your choice.

Device .....

Reason .....

.....

.....[2]

(ii) Describe the role **and** function of the router in the network.

.....

.....

.....

.....

.....

..... [3]



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2 (c) Seth accesses both software and data using cloud computing.

(i) Give **two** benefits of storing data using cloud computing.

1 .....

.....

2 .....

.....[2]

(ii) Give **two** drawbacks of Seth using cloud computing.

1 .....

.....

2 .....

.....[2]

(d) Draw **one** line from each term to its **most appropriate** description.

Term	Description
	It is only visible to devices within the Local Area Network (LAN)
Public IP address	It increments by 1 each time the device connects to the internet
Private IP address	A new one is reallocated each time a device connects to the internet
Dynamic IP address	It can only be allocated to a router
Static IP address	It is visible to any device on the internet
	It does not change each time a device connects to the internet

[4]



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3. Melinda and her friends set up a peer-to-peer network between their computers to share data.

(a) Describe the key features of a peer-to-peer network.

.....

.....

.....

.....[2]  
(b) Describe two drawbacks to Melinda and her friends of using a peer-to-peer network.  
1

.....

.....

.....

2

.....

.....

.....

..... [4]

(c) Melinda connects her laptop to the internet through her router.

✓ Tick one box in each row to identify whether the task is performed by the router or not.

Task	Performed by router	Not performed by router
Receives packets from devices		
Finds the IP address of a Uniform Resource Locator (URL)		
Directs each packet to all devices attached to it		
Stores the IP and/or MAC address of all devices attached to it		

[2]



- (ii) Melinda mainly uses the internet to watch films and play computer games.

Tick (✓) **one** box to identify whether Melinda should connect to the router using a wired or wireless network **and** justify your choice.

Wired	
Wireless	

Justification .....

.....  
.....  
.....  
.....[3]

- (d) Melinda sends emails from her webmail account (email account accessed through a website). Explain whether Melinda is using the internet, or the World Wide Web (WWW), or both.

.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....[3]

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4 (a) The following incomplete table contains four network devices and their descriptions. Complete the table by writing the missing devices and missing descriptions.

Device	Description
.....	Receives and sends data between two networks operating on the same protocol
Wireless Network Interface Card (WNIC)	..... ..... .....
.....	Restores the digital signal so it can be transmitted over greater distances
Wireless Access Point (WAP)	..... ..... .....

[4]

(b) Describe **three** differences between fibre-optic cables and copper cables.

- 1 .....
- 2 .....
- 3 .....

[3]

(c) Ethernet uses Carrier Sense Multiple Access/Collision Detection (CSMA/CD). Describe CSMA/CD.

- .....  
.....  
.....

.....  
.....  
.....  
.....  
..... [4]

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**5.** An assessment board scans exam papers and stores the digitised papers on a server. Exam markers download the digitised papers to mark. The exam markers then upload the mark for each paper.

**(b)** The exam markers use software that operates as a thin-client to mark the exam papers. Complete the table by identifying **two** characteristics of a thin-client. Describe how each characteristic will be used in this software.

	Thin-client characteristic	Description of use in this software
1	..... ..... ..... .....	..... ..... ..... .....
2	..... ..... ..... .....	..... ..... ..... .....

**(c)** Data transmitted on the internet passes through multiple different systems. [4]

**(i)** Describe the role of routers in the transmission of data through the internet.

.....  
.....  
..... [2]

**(ii)** Describe the role of the PSTN (Public Switched Telephone Network) in the transmission of data through the internet.

.....  
.....  
..... [2]



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6.(b) Andy plays some of the computer games over the internet. He has several devices that connect wirelessly to the router in his house.

(i) Identify the topology of Andy's home network. Justify your choice.

Topology .....

Justification .....

[2]

(ii) The router has a wireless access point (WAP) to allow the devices to connect wirelessly.

Identify **three** functions of the router in Andy's network.

1 .....

2 .....

3 .....

[3]

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7 (a) Four descriptions and three types of local area network (LAN) are shown below.

Draw a line to connect each description to the type of LAN it applies to.

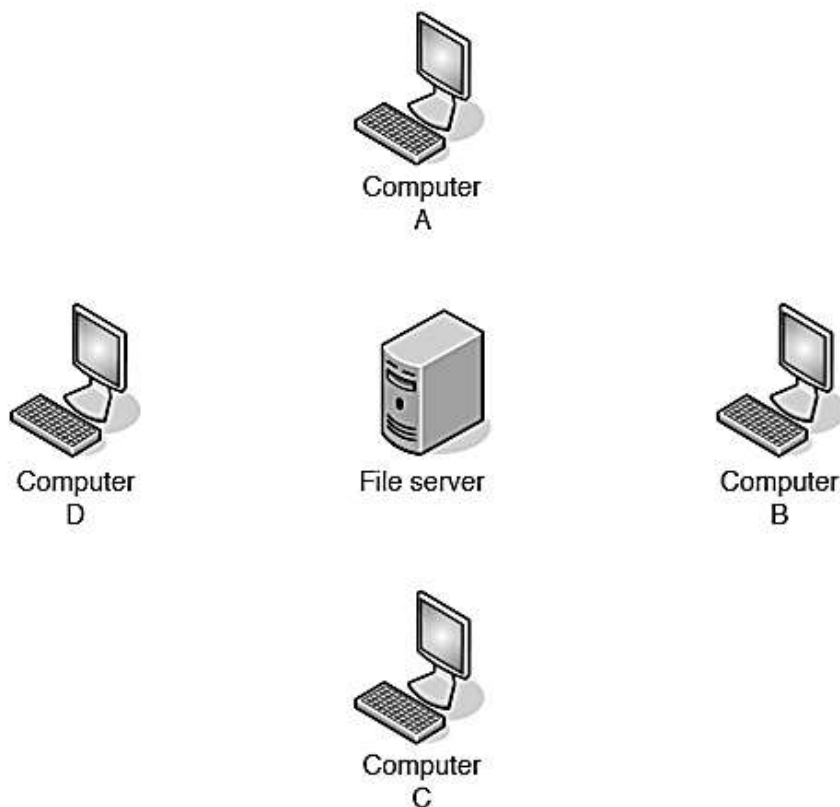
Description	Type of LAN
Any packet the listening computer receives may be part of a message for itself	Bus with terminators at each end
Connection provided through an access point	Star
A process for handling collisions has to be implemented	Wireless
Listening computer only receives packets that are addressed to itself	

[4]

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8 A Local Area Network (LAN) consists of four computers and one server. The LAN uses a bus topology.

(a) Complete the diagram below to show how the computers and the File server could be connected.



[2]

(b) Computer C sends a data packet to Computer A.

Three statements are given below.

Tick (✓) to show whether each statement is true or false.

Statement	True	False
Computer C uses the IP address of Computer A to indicate that the packet is for Computer A.		
Computer B can read the packet sent from Computer C to Computer A.		
The File server routes the packet to Computer A.		

[3]



(c) Computer A starts transmitting a packet to Computer C. At exactly the same time, the File server starts transmitting a packet to Computer D. This causes a problem.

(i) State the name given to this problem.

.....  
.....[1]

(ii) Give three steps taken by both Computer A and the File server to allow them to transmit their packets successfully.

Step 1

.....  
.....

Step 2

.....  
.....

Step 3

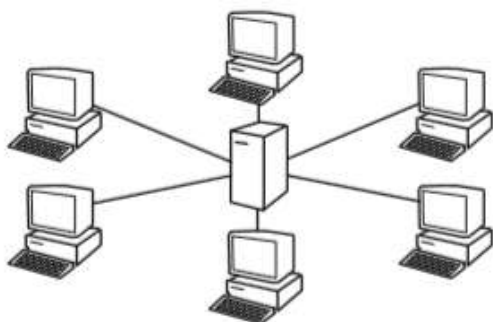
.....  
.....[3]

(d) Adding a switch to the LAN changes its topology. Explain how the use of a switch removes the problem identified in part (c)(i).

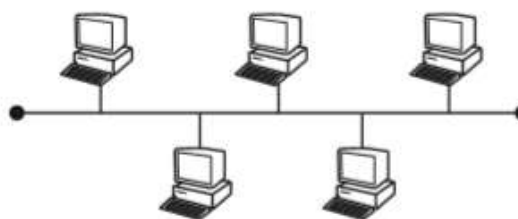
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....[4]

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9. Star and bus are two types of topology that can be used in a Local Area Network (LAN).



Star topology



Bus topology

(a) (i) State one benefit and one drawback of the star topology. Benefit

.....  
.....

Drawback .....  
.....[2]

(ii) State one benefit and one drawback of the bus topology. Benefit

.....  
.....

Drawback .....  
.....[2]

(b) The sequence of steps 1 to 7 describes what happens when the LAN transmits data from Computer X to Computer Y using circuit switching. Four statements (4 to 7) are missing from the sequence.

<b>A</b>	Computer X sends the data.
<b>B</b>	The sender signals node to deallocate resources.
<b>C</b>	Computer Y sends a receipt signal.
<b>D</b>	If available, Computer X sets up path between nodes.



Write one letter (A to D) in the appropriate space to complete the sequence.

- 1 Computer X sends a connection request to Computer Y.
- 2 Computer Y sends ready or busy signal.
- 3 If busy, Computer X waits and then resends the connection request to Computer Y.
- 4 .....
- 5 .....
- 6 .....
- 7 ..... [3]

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## Answers

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1

a)	all four computers directly connected to the <b>switch</b> and no other connections.	1
b)(i)	<p><b>1 mark</b> for the device. <b>1 mark</b> for corresponding reason.</p> <ul style="list-style-type: none"> <li>• Device: Server</li> <li>• Reason: Server processes the requests and authorises traffic // firewall software on the server authorises traffic // server acts as the proxy</li> <li>• Device: Switch</li> <li>• Reason: Switch is connected to all the computers // to share access to the router on the network</li> </ul>	2
b)(ii)	<p><b>1 mark</b> for each bullet point (<b>max 3</b>):</p> <ul style="list-style-type: none"> <li>• receive packets from devices / internet</li> <li>• find destination of packets using the IP address</li> <li>• forward packets to <b>the destination</b></li> <li>• assign <b>private</b> IP addresses to devices on LAN</li> <li>• store/update/maintain a routing table</li> <li>• find most efficient <b>path</b> to destination</li> <li>• maintain table of MAC and IP addresses</li> <li>• provides the LAN with a public IP address</li> <li>• acts as a gateway</li> <li>• performs protocol conversion</li> </ul>	3

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2)-

☐ The **faster** the clock speed the more instructions can be run per second

5(c)(i)	<p><b>1 mark</b> per bullet point to <b>max 2</b></p> <ul style="list-style-type: none"> <li>• Cloud storage can be free (for small quantities )</li> <li>• No need for separate (high capacity) storage devices // saves storage on existing devices</li> <li>• Can access data from any computer <b>with internet access</b></li> <li>• Most cloud data services will have in-built backup/disaster recovery</li> <li>• Security could be better</li> <li>• Can easily increase capacity</li> <li>• Data can be easily shared</li> </ul>	2
---------	--	---

5(c)(ii)

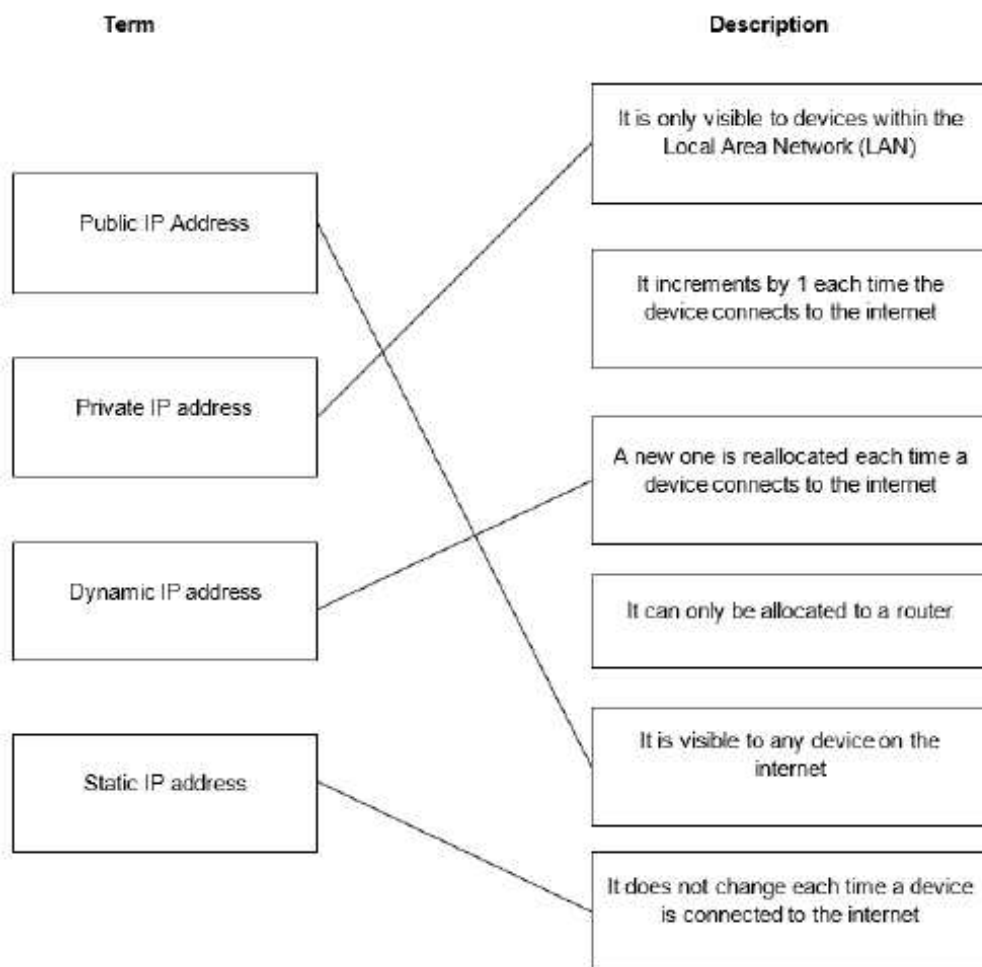
1 mark per bullet point to max 2:

2

- Can only access (the cloud) with internet access
- Security may not be strong // no control over security
- There may not be any backups // no control over backups
- It can take a long time to **upload/download** the data
- It can be more expensive in the long term
- There could be a limit to the amount of storage unless paid for
- There could be compatibility/access issues
- There could be issues with the company offering cloud services

1 mark for each correct line

4



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3

4(a)	<b>1 mark</b> per bullet point to <b>max 2</b> <ul style="list-style-type: none"> <li>All computers are of equal status</li> <li>Each computer provides access to resources and data // data is distributed</li> <li>Computers can communicate and share resources</li> <li>Each computer is responsible for its own security</li> </ul>	<b>2</b>
4(b)	<b>1 mark</b> per bullet point to <b>max 2</b> per drawback <ul style="list-style-type: none"> <li>Reduced security // no central management of security</li> <li>... only as secure as the weakest computer on the network</li> <li>... each computer is at risk from viruses from other computers</li> <li>No central management of backup</li> <li>... if the data from one computer is not backed up it is lost to all of them</li> <li>No central management of files/software</li> <li>... consistency may be difficult to maintain</li> <li>... each computer may have different software from the others</li> <li>Individual computers may respond slower</li> <li>... because they are being accessed by other computers</li> <li>In order to share files etc. all the computers involved need to be switched on</li> <li>... so the files etc. may not be always available</li> </ul>	<b>4</b>

Question	Answer	Marks															
4(c)(i)	<b>1 mark</b> for first 2 ticks, <b>1 mark</b> for last 2 (shaded) <table border="1"> <thead> <tr> <th>Task</th><th>Performed by router</th><th>Not performed by router</th></tr> </thead> <tbody> <tr> <td>Receives packets from devices</td><td>✓</td><td></td></tr> <tr> <td>Finds the IP address of a Uniform Resource Locator (URL)</td><td></td><td>✓</td></tr> <tr> <td>Directs each packet to all devices attached to it</td><td></td><td>✓</td></tr> <tr> <td>Stores the IP and/or MAC address of all</td><td>✓</td><td></td></tr> </tbody> </table>	Task	Performed by router	Not performed by router	Receives packets from devices	✓		Finds the IP address of a Uniform Resource Locator (URL)		✓	Directs each packet to all devices attached to it		✓	Stores the IP and/or MAC address of all	✓		<b>2</b>
Task	Performed by router	Not performed by router															
Receives packets from devices	✓																
Finds the IP address of a Uniform Resource Locator (URL)		✓															
Directs each packet to all devices attached to it		✓															
Stores the IP and/or MAC address of all	✓																



4(c)(ii)	<p><b>1 mark</b> per bullet point for justification up to <b>max 3</b></p> <p>No mark for identification of wired/wireless</p> <p>Wired</p> <ul style="list-style-type: none"> <li>• Faster connection // higher bandwidth</li> <li>• .... needed as she is downloading/streaming large files</li> <li>• ... less time waiting / less latency / fewer delays</li> <li>• <b>More</b> reliable / stable connection</li> <li>• ... is less susceptible to issues with distance/walls/interference</li> <li>• <b>More</b> secure</li> </ul> <p>Wireless</p> <ul style="list-style-type: none"> <li>• Freedom of movement</li> <li>• ... can move between different rooms with a mobile device and still receive/transmit data</li> <li>• ... no need of a physical connection</li> <li>• Easily expanded if friends want to access the same network</li> <li>• Less cabling / expertise is needed</li> <li>• ... making the initial setup less expensive</li> </ul>	3
4(d)	<p><b>1 mark</b> for identifying that she is using both.</p> <p><b>1 mark</b> per bullet point for justification</p> <ul style="list-style-type: none"> <li>• using internet because sending data on <b>the infrastructure</b></li> <li>• using WWW because accessing a <b>website</b> (that is stored on a web server operated by the webmail) that is part of the WWW</li> </ul>	3

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4

<b>1 mark</b> for each completed name or description		4
Device	Description	
Router	Receives and sends data between two networks operating on the same protocol	
Wireless Network Interface Card (WNIC)	Hardware component that allows a device to connect to a <u>wireless</u> network // Provides a MAC address to the device to identify it on the <u>wireless</u> network	
Repeater	Restores the digital signal so it can be transmitted over greater distances	
Wireless Access Point (WAP)	Hardware component that provides radio communication from the central device to nodes on the network (and vice versa)	



**4(b) 1 mark** for each difference

e.g.

- Fibre optic data is transmitted using light, copper cable through electrical signals
- Fibre optic has higher bandwidth than copper cable // Fibre optic has higher transmission rates than copper cable
- Fibre optic has smaller risk of (noise) interference than copper cable
- Fibre optic can be used over longer distances than copper cable before repeaters are needed
- Fibre optic is much more difficult to hack into than copper cable
- Fibre optic is more prone to damage than copper cable

[3]

**4(c) 1 mark** per point to **max 4**

- A **workstation** / node (wishing to transmit) listens to the communication channel
- ...data is only sent when the channel is free // ... if channel is free data is sent
- Because there is more than one computer connected to the same transmission medium
- ... two workstations can start to transmit at the same time, causing a collision
- If a collision happens, the **workstations** send a (jamming) signal / abort transmission
- ...and each waits a **random** amount of time before attempting to resend

[4]

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**5**

(b)

1 mark for characteristic  
1 mark for description of application to examination software:

4

Thin-client characteristic	Description of use in this software
Data is not stored on the client computer	Exam papers are stored on the server and not on the examiner's computer // exam papers are not permanently stored on the examiners' computers
Client computer is reliant on access to server	Examiners cannot mark if their device cannot access the server / the server 'goes down'
Client computer heavily reliant on network/internet connection	The marking software will not operate without network/internet access
Client computer requires few local resources/memory	Examiners can use devices with low resources and the marking software will still function
Client computer performs minimal functions/processes	The marking software transmits requests, the server responds and sends the response to the user



5(c)(i) **1 mark** each to **max 2**:

- Receives **packets** from internet
- Analyses the destination IP address of each packet
- Forwards the **packet** towards its destination
- ... using the routing table
- Maintains/updates the routing table
- Finds the most efficient route to the destination **[2]**

5(c)(ii) **1 mark** each to **max 2**:

- The PSTN consists of many different types of communication lines
- ... therefore the digital data may need to be converted into a different form/analogue signal
- Data is transmitted in both directions at the same time // duplex data transmission
- Using a PSTN the communication passes through different switching centres/ISPs **[2]**

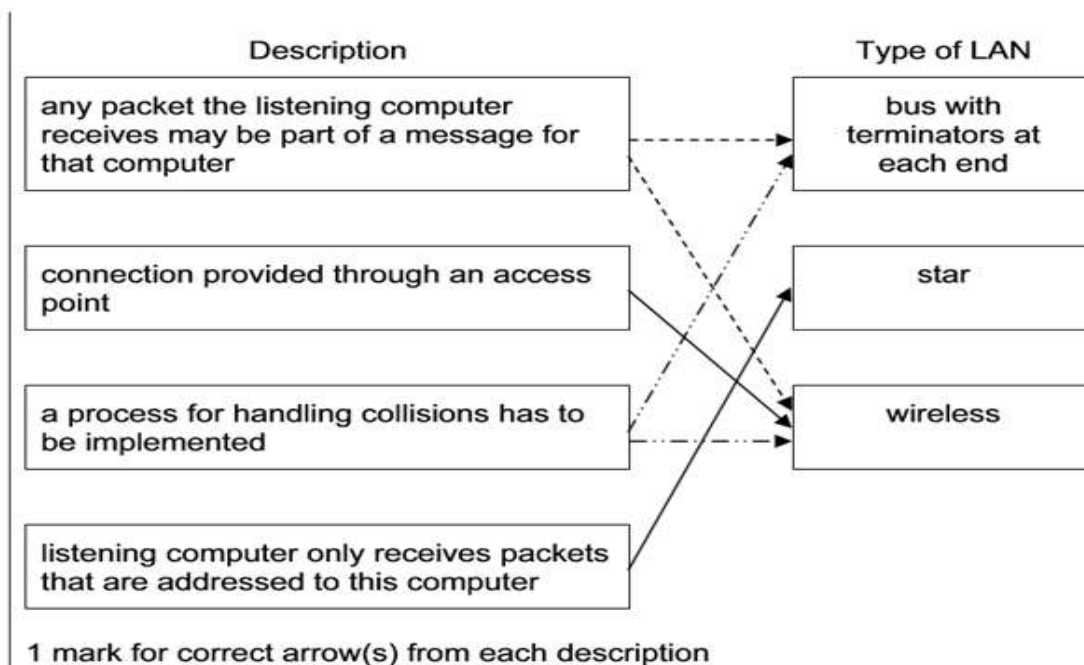
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Q6

(b)(i)	<b>1 mark</b> for identification of star topology  <b>1 mark</b> for justification Devices are connected directly to the <u>router</u> independently // all devices are <b>only</b> connected to the <u>router</u>	2
(b)(ii)	<b>1 mark</b> for each correct function to <b>max 3</b> <ul style="list-style-type: none"> <li>• To receive packets from devices or the Internet</li> <li>• To forward / route packets to the destination</li> <li>• To find the destination of the packet</li> <li>• To assign / allocate private IP addresses to devices on LAN</li> <li>• To store / update / maintain a routing table</li> <li>• To find the most efficient path to the destination</li> <li>• To maintain a table of MAC and IP addresses</li> </ul>	3

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7



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8

(a)	Single line joining all four computers and file server One "terminator" at each end	1 1												
(b)	<table border="1"> <thead> <tr> <th>Statement</th><th>True</th><th>False</th></tr> </thead> <tbody> <tr> <td>Computer C uses the IP address of Computer A to indicate that the packet is for Computer A.</td><td>✓</td><td></td></tr> <tr> <td>Computer B can read the packet sent from Computer C to Computer A.</td><td>✓</td><td></td></tr> <tr> <td>The File server routes the packet to Computer A.</td><td></td><td>✓</td></tr> </tbody> </table>	Statement	True	False	Computer C uses the IP address of Computer A to indicate that the packet is for Computer A.	✓		Computer B can read the packet sent from Computer C to Computer A.	✓		The File server routes the packet to Computer A.		✓	1 1 1
Statement	True	False												
Computer C uses the IP address of Computer A to indicate that the packet is for Computer A.	✓													
Computer B can read the packet sent from Computer C to Computer A.	✓													
The File server routes the packet to Computer A.		✓												
(c) (i)	Collision	1												
(ii)	Both stop transmitting Each uses a random time Wait for time period Check for bus status Attempt to re-transmit	1 1 1 1 1 Max 3												
(d)	Star topology created A switch has a number of <u>ports</u> Each connects to a single device (using a dedicated cable) Switch provides direct transmission/path from device to device Collisions are no longer possible There are dedicated links from Computer A to Computer C AND from the Server to Computer D	1 1 1 1 1 1 Max 4												

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9.

(a)(i)	1 mark per bullet, max 1 benefit, max 1 drawback  Benefits <input type="checkbox"/> Signals only go to destination//secure <input type="checkbox"/> Easy to connect/remove nodes or devices/trouble shoot. <input type="checkbox"/> Centralised management helps in monitoring the network. <input type="checkbox"/> Failure of one node or link doesn't affect the rest of network. <input type="checkbox"/> Performance does not degenerate under load <input type="checkbox"/> Connections may use different protocols <input type="checkbox"/> Fewer collisions Drawbacks <input type="checkbox"/> If central device fails then whole network goes down. <input type="checkbox"/> Performance is dependent on capacity of central device.	2
(a)(ii)	1 mark per bullet, max 1 benefit, max 1 drawback  Benefits <input type="checkbox"/> Easier to set-up/extend. <input type="checkbox"/> Less cable required Drawbacks <input type="checkbox"/> If the main cable breaks, network performance badly degraded. <input type="checkbox"/> Difficult to detect and troubleshoot fault at an individual station. <input type="checkbox"/> Efficiency reduces as the number of devices connected to it increases. <input type="checkbox"/> Collisions // not suitable for networks with heavy traffic. <input type="checkbox"/> Security is lower (because several computers receive the sent signal from the source.)	2

9 (b)

(b)	1 mark for each correct pair of letters in the right order max 3	3
1	Computer X sends a connection request to Computer Y.	
2	Computer Y sends ready or busy signal.	
3	If busy, Computer X waits and then resends the connection request to Computer Y.	
4	D	
5	A	
6	C	
7	B	