**7(a)**

**1 mark** for each correct description, **max 2** marks

| Type of IP address | Description |
|---|---|
| Static | IP address that does not change each time a device **connects to the network** |
| Public | IP address assigned to a device on a network to allow the device to be visible on the internet |

**7(b)**

**1 mark** per bullet point for justification, **max 2** marks

Choice: Invalid (no mark for the choice)

Justification:

- It is not IPv4 because the maximum denary value should be 255, this uses 256
- It is not IPv6 because it uses a full stop to separate sections and not colon // It is not IPv6 because there are not enough groups

**7(c)**

**1 mark** per bullet point, **max 4** marks

- The browser checks its cache for the URL
- The browser parses the URL and splits it into its component parts
- The browser finds the IP address for the domain name by querying a DNS server
- The browser receives the matching IP address from the DNS server
- The browser creates connection with the web server with the matching IP address
- A request for the resource is sent to the web server with that IP address
- The browser renders and displays the result
- The IP address is stored in the browser cache for future use

**7(d)(i)**

**1 mark** for the working
**1 mark** for the correct answer

Working:
(512 * 2048 * 8) / (8 * 1024 ) // (512 * 2048) / 1024
// $(2^9 * 2^{11} * 2^3) / (2^3 * 2^{10})$ // $(2^9 * 2^{11}) / 2^{10}$

Answer: 1024 kibibytes // $2^{10}$ kibibytes

**7(d)(ii)**

**1 mark** per bullet point, **max 2** marks

- The file will contain metadata
- The file will have a header

**7(d)(iii)**

**1 mark** per bullet point, **max 2** marks

- Sequences of consecutive identical colours / pixels
- ... are stored as the colour value and the number of times it occurs consecutively





**5(a)**

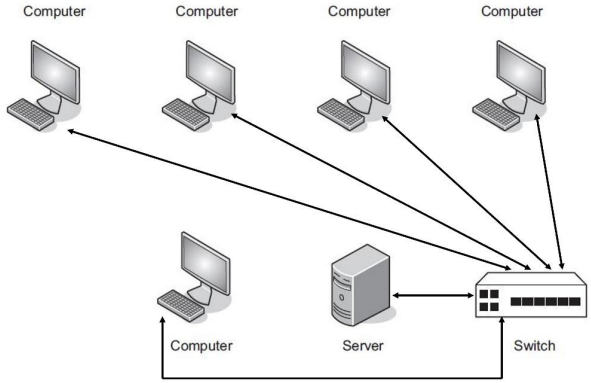
**1 mark** per bullet point, **max 2** marks

- Covers a small geographical area
- Normally privately owned / dedicated infrastructure
- Can use wired or wireless communication

**5(b)**

**1 mark** per bullet point, **max 2** marks

- All computers directly connected to switch and no other connections
- Switch connected directly to server




**5(c)**

**1 mark** per bullet point, **max 3** marks

- The sending device sends the packets to the switch
- The switch checks the destination address on each packet
- … and sends them **only** to the intended receiver

**5(d)**

**1 mark** per bullet point, **max 3** marks

- The use of CSMA/CD // Carrier Sense Multiple Access with Collision Detection
- The workstations listen to the communication channel
- ... and send data only when there is no data being transmitted / the line is idle
- If a collision is detected, transmission is aborted
- …and a jamming signal is sent
- The workstation calculates a random wait time before trying to re-transmit
- The random time is increased if there are multiple collisions

5(e)

**1 mark** for correct threat
**1 mark** corresponding description
**1 mark** for correct method of prevention

| Threat | Description | Prevention |
|---|---|---|
| Malware / Virus | Malicious code that can alter/delete files | Anti-virus // Anti-malware // Firewall |
| Spyware | Records keystrokes which are sent to third party | Anti-spyware // Firewall // Anti-malware |
| Hacking | Gaining unauthorised access to a computer network / device | Authentication // Firewall |
| Phishing | Emails supposedly from reputable companies are sent to trick people into revealing personal information | Use a spam filter // Do not open emails from unknown sources |
| Pharming | Users are directed to a bogus website that looks legitimate to obtain personal information | Use a VPN // Anti-malware// Do not open links or download attachments |





8(a)(i)

**1 mark** per bullet point, **max 2** marks

- Cloud storage can be free of charge for a limited amount
- There is no need for personal storage devices
- The data can be accessed from any computer **with an internet connection**
- Cloud data services usually include data backup and recovery services
- It is easier to share data / collaborate with colleagues
- Cloud storage capacity can be quickly and easily increased if needed

8(a)(ii)

**1 mark** per bullet point, **max 2** marks

- The storage/cloud can only be accessed with an internet connection
- There may be no backups // possibly no control over backups // reliance on third party for backups
- Uploading / downloading data could take a long time
- Potential issues with the cloud storage company impacting access e.g. downtime or technical problems
- Potential compatibility issues if wanting to move the data
- Limited storage availability without paying extra
- … meaning (possibly) more expensive in the long term
- Possibly security issues

8(b)(i)

**1 mark** per bullet point, **max 4** marks

Methods to determine point of touch (**Max 2)**

- Resistive // two layers of material make contact and complete a circuit
- Capacitive // contact with the screen creates a change in charge
- Infrared // the beams are broken by the pointing device
- Optical imaging // a shadow is created when the surface is touched
- Acoustic pulse // the acoustic wave is absorbed by the pointing device
- Selection from the menu (**Max 2**)
- The point of touch is used to determine the x and y coordinates
- The menu item corresponding to the coordinate position is recognised and the menu item is added to the order

8(b)(ii)

**1 mark** per bullet point, **max 2** marks

- Disk repair / disk contents analysis
- Back-up software



4(a)

**1 mark** for each benefit, **max 3**

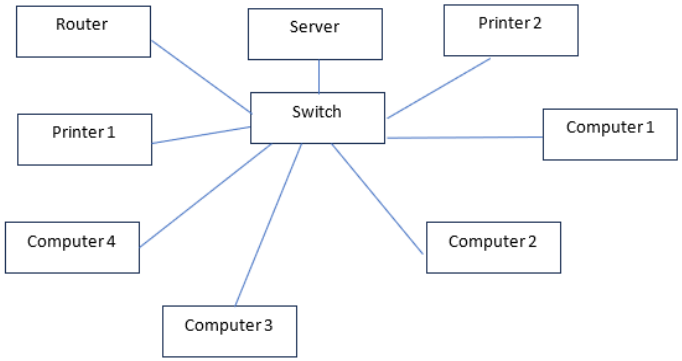
- Devices can be more mobile as no physical connection is required
- No cabling is needed so easier to set up
- Easier to add additional devices
- Multiple different device types can be connected

<table>
<tr><td>4(b)</td><td>1 mark for a drawback<br><br>• Can be less secure<br>• Transmission speed can be slow<br>• Interference is possible<br>• The signal degrades quickly without repeaters/boosters</td></tr>
<tr><td>4(c)</td><td>One mark for each correct row<br><br>
<table>
<tr><th>Description</th><th>Memory Technology</th></tr>
<tr><td>A read only memory where the contents can be erased using a voltage pulse. The contents can be changed multiple times without physically removing the memory.</td><td>EEPROM</td></tr>
<tr><td>A read only memory where the contents are erased using ultraviolet (UV) light. The memory must be physically removed to be reprogrammed.</td><td>EPROM</td></tr>
<tr><td>A read only memory where the contents can be written only once after manufacture.</td><td>PROM</td></tr>
</table>
</td></tr>
</table>





<table>
<tr><td>6(a)</td><td>1 mark each to max 2<br><br>• In a WAN devices can connect over a larger geographical area in a LAN devices connect over a smaller geographical area<br>• A WAN may use non-dedicated hardware the hardware in a LAN is usually dedicated<br>• A WAN uses external / not company owned transmission media // the transmission media for a LAN is usually company owned</td></tr>
<tr><td>6(b)</td><td>1 mark each to max 4<br><br>e.g.<br>• Land is split into cells designed for maximum line of sight<br>• Each cell has a tower with an antenna which receives and transmits data<br>• Data is transmitted between the tower and the phone<br>• Data transmission is wireless using low power radio signals/frequencies<br>• Multiple devices can communicate simultaneously with the same tower</td></tr>
<tr><td>6(c)</td><td>1 mark for each correct word<br><br>• full stops<br>• hexadecimal<br>• zeros<br>• 128<br>• dynamic<br>• private<br><br>IPv4 is made of four groups of 8-bit numbers separated by full stops. Each IPv4 address is 32 bits.<br><br>IPv6 is made of eight groups of 4 hexadecimal numbers separated by colons.<br><br>Multiple consecutive groups of zeros can be replaced with a double colon. Each IPv6 address is 128 bits.<br><br>A dynamic IP address can change each time the computer connects to a network.<br><br>A private IP address can only be accessed by other devices in the same LAN and is assigned by the router within the LAN.</td></tr>
</table>

| | |
|---|---|
| 6(d) | **1 mark** each<br><br>• Server directly connected to the switch<br>• Four labelled computers all connected directly to the switch<br>• Two printers each directly connected to the switch / server / a computer<br>• Router / modem directly connected to the switch / server for internet access<br><br>e.g. Example only<br><br>  |
| 6(e) | **1 mark** each to **max 3**<br><br>e.g.<br>• To store the MAC addresses of devices connected to it<br>• To receive packets from devices<br>• To forward packets directly to the intended recipient<br>• To provide a central point of connection for the network<br>• to enable connected devices to communicate |





| | |
|---|---|
| 9(a) | **1 mark** for each bullet point (**max 2**)<br><br>• A WAN covers a large geographical area<br>• External/public infrastructure is used<br>• Non-dedicated hardware |
| 9(b) | **1 mark** for correct media **1 mark** for matching description e.g.<br><br>• Fibre optic<br>• Transmits data as pulses of light<br><br>• Radio waves / microwaves<br>• Transmits electromagnetic waves on different frequencies |
| 9(c) | **1 mark** for each bullet point (**max 4**)<br><br>• Data is compressed before transmitting<br>• The video and audio are transmitted continuously as a series of bits<br>• The video is uploaded to a media server<br>• On download, the media server sends the data to a buffer<br>• The buffer stores data from server until the receiving device can process it<br>• The receiving device receives the bit stream from the buffer |
| 9(d)(i) | **1 mark** for public IP address and **1 mark** for private IP address:<br><br>Public IP address:<br>• So that the router is visible to the Internet/external network/WAN<br><br>Private IP address:<br>• So that the router is identified to computers within the LAN |
| 9(d)(ii) | **1 mark** for each bullet point (**max 2**)<br>• It allows the network to be divided into smaller networks<br>• … which reduces traffic in some parts of the network // reduces congestion<br>• … because traffic only travels through the parts necessary<br>• … which hides the complexity of network<br>• … and allows for easier maintenance of the network |

8(a)

**1 mark** for each correct row:

| Statement | Bus | Star | Mesh |
|---|---|---|---|
| all devices connect to one central device | | ✓ | |
| all devices connect to a central cable | ✓ | | |
| multiple paths for the packets to travel | | | ✓ |
| robust against damage because if any line fails, the rest of the network retains full functionality | | ✓ | ✓ |
| most likely to lose data through collisions | ✓ | | |

8(b)(i)

**1 mark** for:

to **be visible** to and accessible by other devices on the internet

8(b)(ii)

**1 mark** each:

- IPv4 has 4 groups of digits whilst IPv6 has 8 groups
- IPv4 is usually represented in **denary** whilst IPv6 is usually represented in **hexadecimal**
- IPv4 groups are between 0 and 255 whilst IPv6 is between 0 and FFFF
- IPv4 is **32** bits whilst IPv6 is **128 bits**