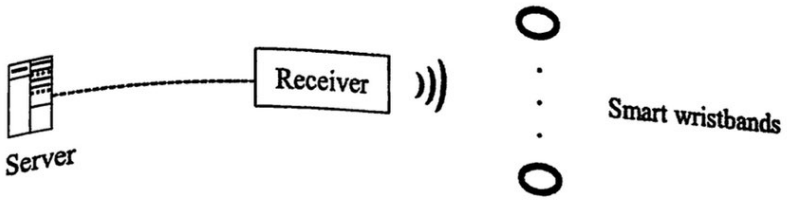
Answer all questions.

1. *Mr Wong designs a smart wristband system for a nursing home. Each elderly person in the nursing home will wear a smart wristband.*



(a) Mr Wong considers using Bluetooth, Infrared and radio-frequency identification (RFID) for the data transmission between the receiver and smart wristbands. For each of the following applications in the nursing home, suggest one of the three wireless technologies and justify your suggestion.

(i) Synchronising biological readings from the elderly people to the server while they are sleeping

(2 marks)

(ii) Counting and identifying the elderly people in the nursing home

(2 marks)

(iii) Opening the door of a bedroom

(2 marks)

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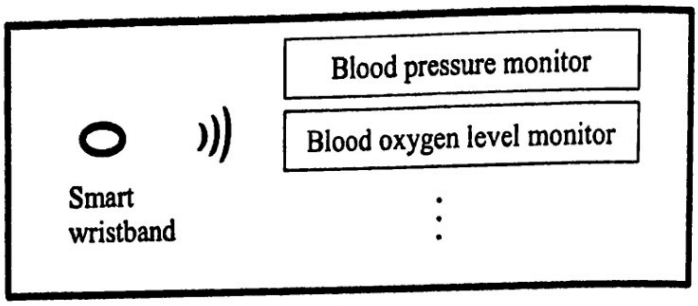
In each bedroom, there are some devices such as a blood pressure monitor and a blood oxygen lev monitor. Mr Wong considers using a smart wristband to connect those devices to form a wireless person area network (WPAN).



(b) Give **two** technical reasons to support the use of WPAN, instead of other kinds of network, in th bedrooms.

(2 marks

(c) Give another daily life example of a WPAN application and state the devices and wireless technolog involved.

(2 marks

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(d) Explain briefly why RAID and UPS should be installed in the server in the smart wristband system.

RAID: _____

_____

_____

_____

UPS: _____

_____

_____

_____

(4 marks)

Answers written in the margins will not be marked.

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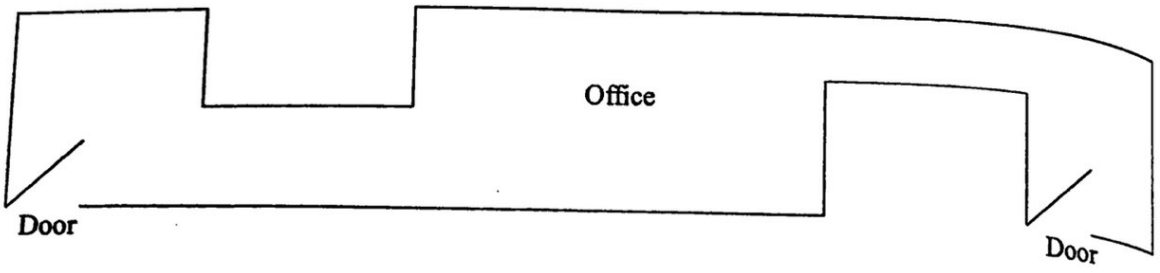
2. Amy sets up a WiFi network in the office below.



(a) (i) What should Amy consider when deciding on the number of Access Points (APs) to be installed in the office? Give **three** technical considerations.

(3 marks)

(ii) CSMA/CA is adopted in this WiFi network. Briefly describe how collisions are avoided.

(2 marks)

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Amy plans to install four APs on the WiFi network in the office.

(b) Give a benefit of each of the following SSID settings.

(i) Same SSID for all APs

(1 mark)

(ii) Four different SSIDs

(1 mark)

(iii) Hidden SSIDs

(1 mark)

(c) WPA and WPA2 are available in the security settings of the network. How can WPA and WPA2 enhance the security?

(1 mark)

(d) Amy wants to enhance network security. Describe a method of controlling network access, other than username and password.

(2 marks)

Answers written in the margins will not be marked.

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(e) The APs support communication protocols including 802.11g, 802.11n and 802.11ac.

(i) What is the use of a communication protocol in data transmission?

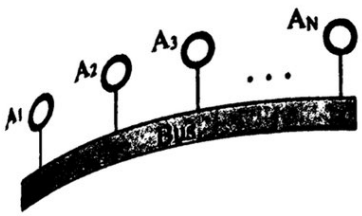
(2 mark

(ii) Give **two** major technical differences between these communication protocols.

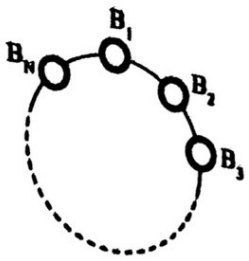
(2 marks)

Provided by dse.life

Mr Li considers using Topology A or Topology B to build a computer network of N devices for a company, as shown below:



Topology A



Topology B

Node

Connection

(a) The communication mode in a network using Topology A is half duplex. Briefly describe how a message is transmitted in the network.

(2 marks)

(b) In each of the following cases, can A_1 and A_3 communicate with each other?

Case	Communication between A_1 and A_3 (Yes/No)
A_2 is shut down.	
The connection between A_2 and the bus is broken.	
The bus is out of order.	

(3 marks)

(c) In Topology B, when a node is under maintenance, the remaining nodes cannot communicate with each other. Why?

(2 marks)

...in the margins will not be marked.

Provided by dse.life

(d) Mr Li plans to create two subnets, D1 and D2, in the network. Each subnet consists of 200 devices. The details are:

IP address: 192.168.x.y ($0 < x < 255, 0 < y < 255$)

(i) Suggest full IP address ranges and subnet masks for D1 and D2.

D1

Full IP address range: _____ – _____

Subnet mask: _____

D2

Full IP address range: _____ – _____

Subnet mask: _____

(4 marks)

(ii) Mr Li wants to further divide D1 into two subnets, D1a and D1b, where each subnet consists of 100 devices. Suggest full IP address ranges and subnet masks for these two new subnets.

D1a

Full IP address range: _____ – _____

Subnet mask: _____

D1b

Full IP address range: _____ – _____

Subnet mask: _____

(2 marks)

(e) Mr Li plans to divide D2 into four subnets. Give **two** advantages of this plan.

_____

_____

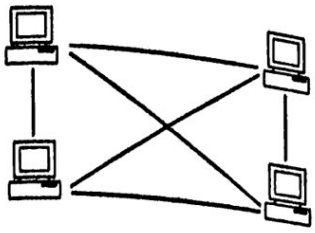
_____

_____

(2 marks)

Provided by dse.life

4. Ms Ng works in a school. There is a peer-to-peer (P2P) network of four workstations in an office.



(a) Give two technical reasons to support the use of a P2P network in the office.

(2 marks)

Ms Ng plans to use a client-server network for the campus.

(b) Give two roles of a server on the network.

(2 marks)

Ms Ng builds a network of over 100 workstations in the campus.

(c) Give two technical reasons why Ms Ng should not build a P2P network to provide a file sharing service.

(2 marks)

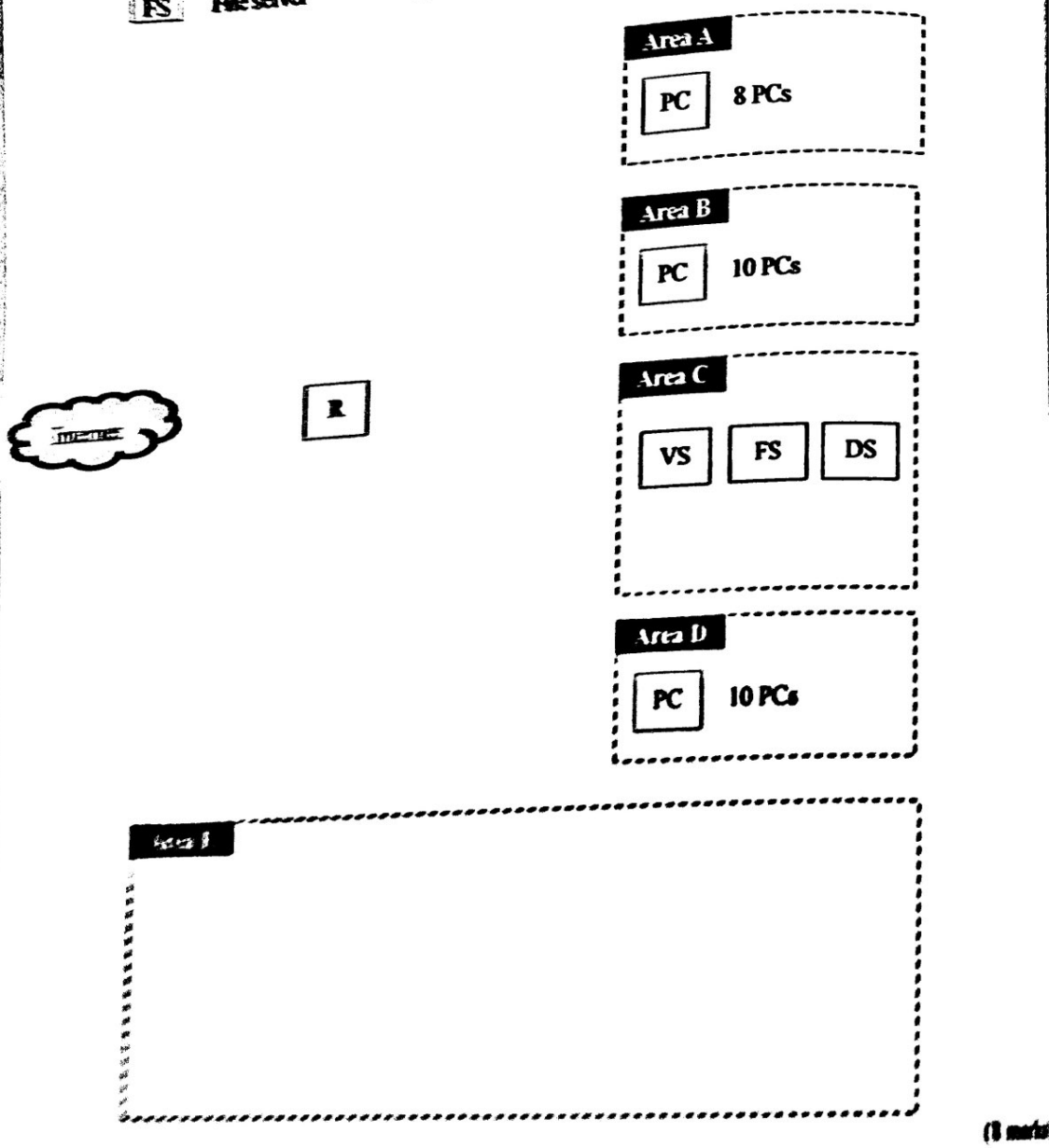
Provided by dse.life

The network covers five areas:

Area	Description	Device
A	Campus TV – live broadcasting production	8 computers
B	Multimedia production room for students	10 computers
C	Server room	3 servers
D	Staff room – teachers only	10 computers
E	Students' general use	90 computers

(d) There will be 90 computers for students' general use, a domain controller, a firewall, a 5-port router and five 32-port switches in the campus network. Complete the draft of the network design below by drawing the necessary network connecting devices. Use the following symbols to represent the relevant network components:

F	Firewall	R	Router	S	Switch
DC	Domain controller	PC	Computer	VS	Video server
FS	File server	DS	Database server		



(3 marks)

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(e) Suggest two additional types of server to be used in the network.

(2 marks)

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